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

Sufco Mine
597 South SR24
Salina, Utah 84654
(435) 286-4880
Fax (435) 286-4499

RECEIVED
MAR 27 2019
DIV OF OIL, GAS & MINING

March 25, 2019

Utah Coal Regulatory Program
1594 West North Temple, Suite 1210
P. O. Box 145801
Salt Lake City, UT 84114-5801

Re: 2018 Annual Report for Canyon Fuel Company LLC, Sufco Mine
C/041/0002, Sevier County, Utah

Dear Permit Supervisor:

Enclosed is a memory stick containing the 2018 annual report and two maps for Canyon Fuel Company, Sufco Mine. The information included is thought to be complete as requested.

Questions should be referred to Amanda Richard at (435) 286-4489 or arichard@wolverinefuels.com.

Sincerely,
CANYON FUEL COMPANY, LLC
SUFCO Mine

John D Byars
General Manager

Enclosures

cc: Division of Oil, Gas and Mining Correspondence File

SUFPUB\GOVT2019\DOGMCORR\2018 Annual Report Cover ltr.doc

2018 ANNUAL REPORT

Submit the completed document and any additional information identified to the Division by March 31, 2019.

GENERAL INFORMATION

Company Name	Canyon Fuel Company, LLC	Mine Name	Sufco Mine
Permit Number	C/041/0002	Permit Expiration Date	May 21, 2022
Operator Name	Sufco Mine	Phone Number	+1 (435) 286-4489
Mailing Address	597 South SR 24	Email	arichard@wolverinefuels.com
City	Salina		
State	Utah	Zip Code	84654

		DOGM File Location or Annual Report Location
Excess Spoil Piles	☐ Required ☒ Not Required	
Refuse Piles	☒ Required ☐ Not Required	Required reports previously submitted.
Impoundments	☒ Required ☐ Not Required	Required reports previously submitted.
Other:		

OPERATOR COMMENTS

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

COMMITMENTS AND CONDITIONS

The Permittee is responsible for ensuring annual technical commitments in the Mining and Reclamation Plan and conditions accepted with the permit are completed throughout the year. The Division has identified these commitments below and has provided space for you to report what you have done during the past year for each commitment. If additional written response is required, it should be filed as an attachment to this report.

Title: RAPTOR SURVEYS
Objective: Determine existence and status of raptor nests that may be impacted by mining. Any raptor nest that has the potential to be disturbed will be evaluated with DWR and FWS and an appropriate plan of action will be developed on a case by case basis.
Frequency: Any area with suitable habitat where raptor nests could be adversely affected will be monitored during the year that it will be subsided for both known and potential new nests on a yearly basis using aerial or ground surveys near the end of May.
Status: Ongoing
Reports: Upon receipt from consultant and evaluation of permittee.
Citation: Chapter 3, page 3-10 & 3-42

OPERATOR COMMENTS

The 2018 Raptor survey for Sufco was submitted to the Division in August 2018.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

Title: SUBSIDENCE MONITORING
Objective: To document the amount of subsidence that has occurred.
Frequency: Annually
Status: Ongoing
Reports: Annual
Citation: Chapter 5, page 5-29

OPERATOR COMMENTS

The Subsidence Monitoring report is located on the thumb drive under Subsidence Report.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

Title: CLIMATOLOGICAL DATA
Objective: Collect climatological data to aid in determining the impact to runoff, stream flow and local springs from mining.
Frequency: Annually
Status: Ongoing
Reports: Annual
Citation: Chapter 7, page 7-59

OPERATOR COMMENTS

The Climatological Data report is located under Climatological Data on the thumb drive.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

Title: REFUSE SAMPLING/REPORT OF VOLUME PLACED
Objective: To determine chemical characteristics of the waste and ensure burial beneath four feet of non-toxic, non-acidic material and protect surface and groundwater.
Frequency: Quarterly, during periods of deposition at the waste rock site.
Status: Ongoing
Reports: Annual, indicate frequency of sampling (#samples/volume).
Citation: Chapter 5 Sec. 528 and 536.100

OPERATOR COMMENTS

The Inter Mountain Labs (IML) lab results for the samples from the Waste Rock Site are located in the Waste Rock Samples tab on the thumb drive. Sufco only placed 12,013 tons during the 2018 calendar year.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

Title: TOPSOIL SAMPLING DURING WASTE ROCK CONSTRUCTION
Objective: To determine soil chemistry and nutrient status prior to disturbance. During each phase of construction, "a composite sample will be taken [of each soil map unit] during each phase and analyzed for the pH; % Saturation; EC; Soluble Na, K, Mg, Ca; Available N03-N; Available Phosphorus; Particle Size% very fine sand, sand, silt, clay; Organic Matter%; CaC03%; and Extractable Potassium."
Frequency: During each Phase of construction prior to soil salvage.
Status: During construction of each Phase of the Waste Rock site.
Reports: Appendix V
Citation: Chapter 2 Sec. 222.400

OPERATOR COMMENTS

The Topsoil Sampling results will be placed in Appendix V and will be submitted by Bryant Bunnell when the as-built drawings are submitted in 2019.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

Title: TOPSOIL SALVAGE

Objective: Topsoil and subsoil salvage will be under the direction of a qualified person and will utilize pits or trenches to determine depth of salvage. "The quantity of topsoil/subsoil salvaged during the construction of the expanded WRDS will be determined by surveying the phased area prior to salvage and post salvage. The M&RP will be updated with as-built drawings, cross sections and a table(s) listing volumes of subsoil and topsoil stockpiles."
Frequency: During each Phase of construction within six months of completion of salvage
Status: During construction of each Phase of the Waste Rock site.
Reports: As Built drawings and updated narrative listing volumes salvaged
Citation: Chapter 2, Sec. 231.100 and 242.100

OPERATOR COMMENTS

Bryant Bunnell is currently working on the as-built drawings for the Waste Rock Site and will have them turned into the Division in 2019.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

FUTURE COMMITMENTS AND CONDITIONS

The following commitments are not required for the current annual report year, but will be required by the permittee in the future as indicated by the "status" field. These commitments are included for information only, and do not currently require action. If you feel that the commitment is no longer relevant or needs to be revised, please contact the Division.

Title: COLOR INFRARED PHOTOGRAPHY

Objective: To assess changes in vegetation due to mining. Photos submitted after 2008 must include an analysis between 2008 and current photos to assess changes in vegetation due to subsidence.
Frequency: Once every 5 years beginning in 2008.
Status: Due in 2018.
Reports: Annual
Citation: Chapter 3, page 3-45, Chapter 5, page 5-29

Title: PROTECTION OF WILDLIFE DURING EXCLUSIONARY PERIODS

Objective: To avoid disturbance to wildlife during critical periods of their life cycle. Surface activities are curtailed from Nov. 1-April 1,& May 1 and July 1 in the calving area, except in the portal areas, for wintering elk. Any maintenance requiring heavy equipt will require monitoring from Dec.1 -April 15 for big game winter range and from Jan.1-Aug15 for raptors.
Frequency: During surface disturbing activity
Status: When construction or mitigation activities during wildlife exclusionary periods
Reports: Not Required, Contact DOGM if disturbance occurs during exclusion period
Citation: Chapter 3, page 3-42 through 3-44 and 3-9

Title: VEGETATION SURVEY OF SOUTH FORK QUITCHUPAH

Objective: To provide sufficient data to make a determination of the degree of impacts of subsidence on riparian vegetation.
Frequency: Surveys will be conducted the fifth year following undermining (2018)
Status: Ongoing, Reports were provided in 2013. Next report due 2018.
Reports: 2018, (Reports shall provide information and data collected before the area is mined, throughout the mining period, and after mining is past. Monitoring and data collection will continue until the mine, Division and Forest agree that mining impacts, if any, have occurred, have been mitigated, and no further impacts are anticipated. Two reports shall be provided and the Division will provide the second copy to the Fishlake National Forest.)
Citation: Appendix 3-14 page 5

Title: TOPSOIL SAMPLING AT RECLAMATION

Objective: "The topsoil will be tested for need of nutrients and soil amendments following application and grading at the rate of one sample/acre. The depth of sampling should be the surface six inches of distributed topsoil. Parameters for testing will include plant available nitrogen, phosphorus and potassium. Section 528 contains the sampling commitments for the placed waste rock. Application will be on an as needed basis as determined by the tests."
Frequency: Reclamation
Status: Reclamation
Reports: Confer with the Division and include in the Annual Report (where easily found at bond release)
Citation: Chapter 2, Sec. 231.300 and Section 243.

Title: NORTHWATER SPRING MITIGATION

Objective: Mitigation for water loss
Frequency: 3 years prior to mining cessation
Status: The system is completed but perpetual maintenance must be determined 3 years prior to cessation of mining.
Reports: A summary report of the systems performance and maintenance was included in the 2014 Annual Report. By 2017, a perpetual maintenance agreement needs to be constructed between the Division, USFS and Sufco. Three years prior to cessation of mining, the hydrologic condition of the Northwater area will be evaluated. A report will describe conditions of water systems and future mitigation will be evaluated.
Citation: Appendix 7-25, page 5

Title: SUBSIDENCE CRACKS

Objective: Protect livestock and wildlife from physical hazards of surface cracks
Frequency: Upon discovery of subsidence cracks
Status: Subsidence cracks observed Summer 2016
Reports: Annual Report
Citation: Chapter 3 page 3-42

REPORTING OF OTHER TECHNICAL DATA

Please list other technical data or information that was not included in the form above, but is required under the approved plan, which must be periodically submitted to the Division.

Please list attachments:

Stock Pond Monitoring
Sufco has to monitor one (1) set of stock ponds annually. Also One (1) set of stock ponds are monitored during high flow (Spring) and low flow (Fall). Photographs are added to each inspection. The reports are located under Stock Pond Monitoring on the thumb drive.

REVIEWER COMMENTS

MAPS

Copies of mine maps, current and up-to-date, are to be provided to the Division as an attachment to this report in accordance with the requirements of R645-301-525.240. The map copies shall be made in accordance with 30 CFR 75.1200 as required by MSHA. Mine maps are not considered confidential.

Map Name	Map Number	Included		Confidential	
		Yes	No	Yes	No
Annual Subsidence Map	Map 1	☒	☐	☐	☒
Mine Map	Plate 5-7	☒	☐	☐	☒
		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not Meet Requirements

Comparison of Weather Data and Stream Discharge At the Sufco Mine During 2018

Introduction

This report provides an analysis and discussion of the relationship between climatic variability and stream discharge rates in the Pines area at the Canyon Fuel Company, LLC, Sufco Mine during 2018. The information used in this analysis includes the information provided herein and information provided previously to the Utah Division of Oil, Gas and Mining.

Climate Data

A National Weather Service weather station (Salina 24E) is operated at the Sufco Mine surface facilities. This weather station is operated year-round and records precipitation amounts as direct rainfall and/or as snow-water equivalent. Information from this weather station is used in the flow comparisons presented in this report. A plot of yearly precipitation at the Salina 24E station for the period 1984 to 2018 as percentages of the station average is presented in Figure 1. It is evident from the Salina 24E weather data that the 2017-2018 water year was the driest year at the Sufco Mine area in the past 33 years of record. During the 2017-2018 water year, the total precipitation was 7.65 inches, which is only 55% of the long-term station average of 13.8 inches.

The Palmer Hydrologic Drought Index (PHDI) has also been used in the flow comparisons presented in this document. A plot of the PHDI for Utah Region 4 is included in this analysis as Figure 2. The PHDI is a monthly numerical value generated by the National Climatic Data Center that indicates the severity of wet and dry spells. The PHDI is calculated from various hydrologic parameters including precipitation, temperature, evapotranspiration, soil water recharge, soil water loss, and runoff. Consequently, it is useful for evaluating the relationship between climatic conditions and groundwater and surface water discharge.

As reflected in Figure 2, beginning in late 2009, the region began a transition from moderate drought conditions toward wetter than normal conditions that peaked in July 2011 with an extreme wet spell. Beginning in July 2011 and continuing into early 2012, the region experienced decreasing wetness, transitioning to drought conditions. The region experienced a prolonged continuous period of drought during the three and a half year period from March 2012 through September 2015. During this 42-month period, drought conditions ranged from mild to severe (Figure 2). Beginning in October 2015 and continuing through the first two months of 2016 the region experienced a period of mild wetness. The remainder of 2016 through November was characterized by slightly dryer than normal to near-normal conditions. Beginning in December 2016 the region transitioned from the dryer than normal conditions that prevailed for the previous nine months to a somewhat wetter period that peaked in January and February as a mild wet spell. After peaking in wetness during January and February of 2017, the region transitioned gradually to dryer conditions throughout the

remainder of 2017. Drought conditions continued to deepen during the remainder of 2017 and continued throughout 2018. Severe to extreme drought conditions continued throughout 2018.

It is noteworthy that as reflected by both the record low precipitation at the Salina 24E weather station and the PHDI data for 2018, the drought conditions the regions experienced during 2018 were exceptional. While the precipitation at the Salina 24E station was the lowest in the 33 period of record, the drought intensity as indicated by the PHDI index value for Utah Region 4 during September of 2018 was the second most intense drought period the region has experienced over the 124-year period of PHDI record (1895-2018). (The most intense drought condition ever reported for PHDI Region 4 occurred during July and August of 2002).

Pines 407

Pines 407 is a surface-water monitoring station on the Main Fork of Box Canyon Creek just above the confluence with the East Fork of Box Canyon (see Figure 3 for location). Historically, the discharge at Pines 407 has been measured using the 3-inch Parshall flume installed at the site or using a pipe and a calibrated container. The pipe and calibrated container method has been used during periods of low flow in the stream. During 2018, the discharge measurements at Pines 407 were performed using the pipe and calibrated container method.

Pines 407 is monitored quarterly for discharge rate and field water quality parameters. Discharge data for Pines 407 diromg 2018 are plotted together with precipitation data from the Salina 24E Weather Station and PHDI data for Utah Region 4 on Figure 4. Additionally, discharges from Pines 407 and Pines 408 are plotted together with a plot of the PHDI for Utah Region 4 for the period 2000-2018 in Figure 5.

Discharge measured at Pines 407 during 2018 ranged from 6 gpm during June to 10 gpm during November. As is typical with surface water drainages in the area, the minimum discharge rates measured in the stream typically occur during the warm summer months when potential evapotranspiration is greatest (Figure 5). The maximum flow measured during November 2018 (10 gpm) was less than that measured at Pines 407 during November 2017 (25.3 gpm). The lower flows measured at Pines 407 during 2018 (and in recent years) may be in response to the recent prolonged periods of drought that have prevailed in the region (Figure 5). The overall prolonged drought conditions that have prevailed generally in the region since early 2012 as indicated by the PHDI and the historically intense drought intensity the region experienced during 2018 have likely influenced surface-water discharge rates in Box Canyon. However, a quantification of the magnitude of the potential effects of the climatic variability on surface-water discharge rates in the drainage is problematic.

The general lack of pronounced early season discharge peaks historically at Pines 407 suggests that either 1) substantial springtime snowmelt runoff events did not occur, or 2) the peak discharges occurred in the drainage prior to the first monitoring events of the year (usually in June). Because of the flat plateau surface adjacent to the Box Canyon drainage,

the prevalence of sandy soils at the surface, and the typically scant winter snow accumulation in the Box Canyon area, it is not unanticipated that a substantial springtime snowmelt surface-water runoff event is not commonly observed. Periodic short-lived, high-intensity surface-water runoff events resulting from torrential monsoonal precipitation events are not uncommon, however.

It is noteworthy that immediate responses to previous significant wet spells in the region have generally not been observed at Pines 407 (Figure 5). This observation seems to support the conclusion that the groundwater systems that support baseflow in the creek are likely associated with long groundwater flow paths and/or slow groundwater migration rates and appreciable, multi-year groundwater storage in the groundwater system (i.e. a buffered system). Accordingly, large-scale seasonal variability is not generally noted in the discharge at Pines 407 while longer term climatic trends may be apparent. It is seems probable that when persistent wet climatic conditions prevail in the region in the future, baseflow discharge rates in the stream would increase in response to the cumulative effects of increased recharge to the bedrock groundwater systems that supply baseflow to the stream. Future discharge rate data collected at Pines 407 may be used to verify that discharge rates in the stream respond to periods of increased groundwater recharge associated with long-term wet climatic cycles in the future.

Pines 408

Pines 408 is a monitoring station on the East Fork of Box Canyon Creek just above the confluence with the main fork of Box Canyon Creek (see Figure 3 for location). Monitoring

site Pines 408 is monitored quarterly for discharge and field water-quality parameters. Discharge data at Pines 408 for 2018 are plotted together with precipitation data from the Salina 24E Weather Station and the PHDI for Utah Region 4 in Figure 6. Additionally, discharges from Pines 407 and Pines 408 are plotted together with a plot of the PHDI for Utah Region 4 for the period 2000-2018 in Figure 5.

Discharge data have historically been measured at Pines 408 using a 3-inch Parshall flume that is installed at the site. There was no discharge observed at Pines 408 during the three quarterly monitoring events of 2018.

It is noteworthy that immediate responses to previous significant wet spells in the region have generally not been observed at Pines 408 (Figure 5). This observation seems to support the conclusion that the groundwater systems that support baseflow in the creek are likely associated with long groundwater flow paths and/or slow groundwater migration rates and appreciable, multi-year groundwater storage in the groundwater system (i.e. a buffered system). Accordingly, appreciable seasonal variability is not generally noted in the discharge at Pines 408 while variability associated with longer term climatic trends may be apparent. The overall prolonged drought conditions that have prevailed generally in the region since early 2012 as indicated by the PHDI and the historically intense drought intensity the region experienced during 2018 have likely influenced surface-water discharge rates in Box Canyon. However, a quantification of the magnitude of the potential effects of the climatic variability on surface-water discharge rates in the drainage is problematic. Future discharge rate data collected at Pines 408 may be used to verify that discharge rates in

the stream respond to periods of increased groundwater recharge associated with long-term wet climatic cycles in the future.

FP-1

FP-1 is a monitoring site on a specified reach of the stream channel in the upper west fork of the Main Fork of Box Canyon located between monitoring sites SUFCO 089 and GW-20 (See Figure 3 for FP-1 location). Monitoring at FP-1 occurs on or near October 1 of each year. On 26 September 2018 and 13 November 2018 monitoring events there was no flow in the designated FP-1 stream section.

Historically, monitoring at FP-1 has also included the identification of the location of the first (uppermost) discharge in the stream on that date. A discharge measurement has also been performed at that location. The first occurrence of continuous flow in the main fork of Box Canyon Creek on 13 November 2018 occurred at the approximate location as shown on Figure 3. A discharge of <0.25 gpm was estimated at that time in the creek a short distance downstream. A more precise discharge measurement could not be performed in the channel at that time because of the ice/frozen conditions prevailing at the monitoring location. At locations higher in the stream drainage, zones of intermittent wetness were sometimes present during 2018. These conditions are similar to those measured during the previous year (2017). It was noted during the September 2018 monitoring event that the first occurrence of water in the channel was somewhat lower than it was during November of 2018. This condition may possibly be attributable to the effects of the extensive animal activity that was apparent in the canyon at the time and also to the extreme drought condition

the region was experiencing during September of 2018 (Figure 2). It is not uncommon for stream flows in the Sufco Mine area to increase during the cool fall months relative to summertime flow rates. This is because of the decreasing rates of evaporation in the stream and also the decreases in transpiration rates from riparian vegetation that occur as vegetation goes dormant during the cold weather conditions that commonly prevail during the fall season on the Wasatch Plateau.

FP-2

FP-2 is a monitoring site on a specified reach of stream in the North Water Canyon tributary of the East Fork of Box Canyon Creek between Pines 105 and the confluence with the East Fork of Box Canyon Creek (See Figure 3 for location). Monitoring at FP-2 occurs on or near October 1 of each year. Monitoring at FP-2 consists of the identification of the location of the perennial portion of the stream. There was no perennial stream flow at the confluence with the East Fork of Box Canyon Creek when the site was visited on 26 September 2018. Discharge at FP-2 was also not present when the site was visited on 13 November 2018.

Pines 106

Pines 106 is a monitoring station which is part of Sufco's regular quarterly water monitoring plan. The location of Pines 106 is approximately coincident with the historical uppermost occurrence of perennial flow in the East Fork of Box Canyon Creek. Above this location, in most reaches the stream has usually been dry historically.

Discharge measured at stations Pines 106 and Pines 408 are plotted together with the annual precipitation measured at the Salina 24E weather station on Figure 7. No discharge was measured at Pines 106/EFB-6 during 2018. However, discharge continued to be observed in the creek just below the nearby EFB-7 location during 2018. The first location of flow in the East Fork of Box Canyon during 2018 was slightly below the first flow location observed during 2017. This condition is possibly in response to the prolonged drought conditions the region has experienced in recent years, including the extreme drought conditions the region experienced during 2018.

The discharge at EFB-7 is perennial in nature and the modest discharge at that location does not exhibit appreciable seasonal variability. As indicated above, during previous years, it was common for sustained discharge in the East Fork to begin near the Pines 106 location with isolated zones of wetness higher in the drainage. The somewhat stratigraphically lower occurrence of the first sustained water in the drainage may be related to subsidence effects associated with mining in the underlying 4 Left Pines East longwall panel (i.e. a local depression of water levels in the shallow groundwater system). The extreme drought conditions that prevailed during 2018 may have exacerbated this condition. However, the fact that sustained perennial stream discharge still occurs a short distance below Pines 106 demonstrates that the water has not been entirely diverted away from the site or into deep rock strata underlying the creek.

Groundwater systems that support baseflow in the East Fork of Box Canyon creek are likely associated with long groundwater flow paths and/or slow groundwater migration rates and

appreciable, multi-year groundwater storage in the groundwater system (i.e. buffered groundwater systems). The perennial discharges from the bedrock groundwater systems in the East Fork of Box Canyon (below EFB-7), which do not exhibit large-scale seasonal variability in discharge rates, seem to support this conclusion. Based on this conceptual model, at a time when persistent wet climatic conditions again prevail in the region in the future, baseflow discharge rates in the stream may increase correspondingly in response to the cumulative effects of increased recharge to bedrock groundwater systems. The discharge response in the stream during future periods of prolonged wetness will be useful in validating this conclusion. We recommend that monitoring of stream discharge rates at Pines 407, Pines 408, and Pines 106 in the Box Canyon Creek drainage be continued during 2019.

USFS 109

USFS 109 is routinely monitored as part of Sufco's quarterly water monitoring program. The site is located in the upper middle fork of the Main Fork of Box Canyon. There was no discharge measured during 2018 at USFS 109.

USFS 110

USFS 110 is routinely monitored as part of Sufco's quarterly water monitoring program. The site is located in the upper main fork of Box Canyon Creek. There was no discharge measured during 2018 at USFS 110.

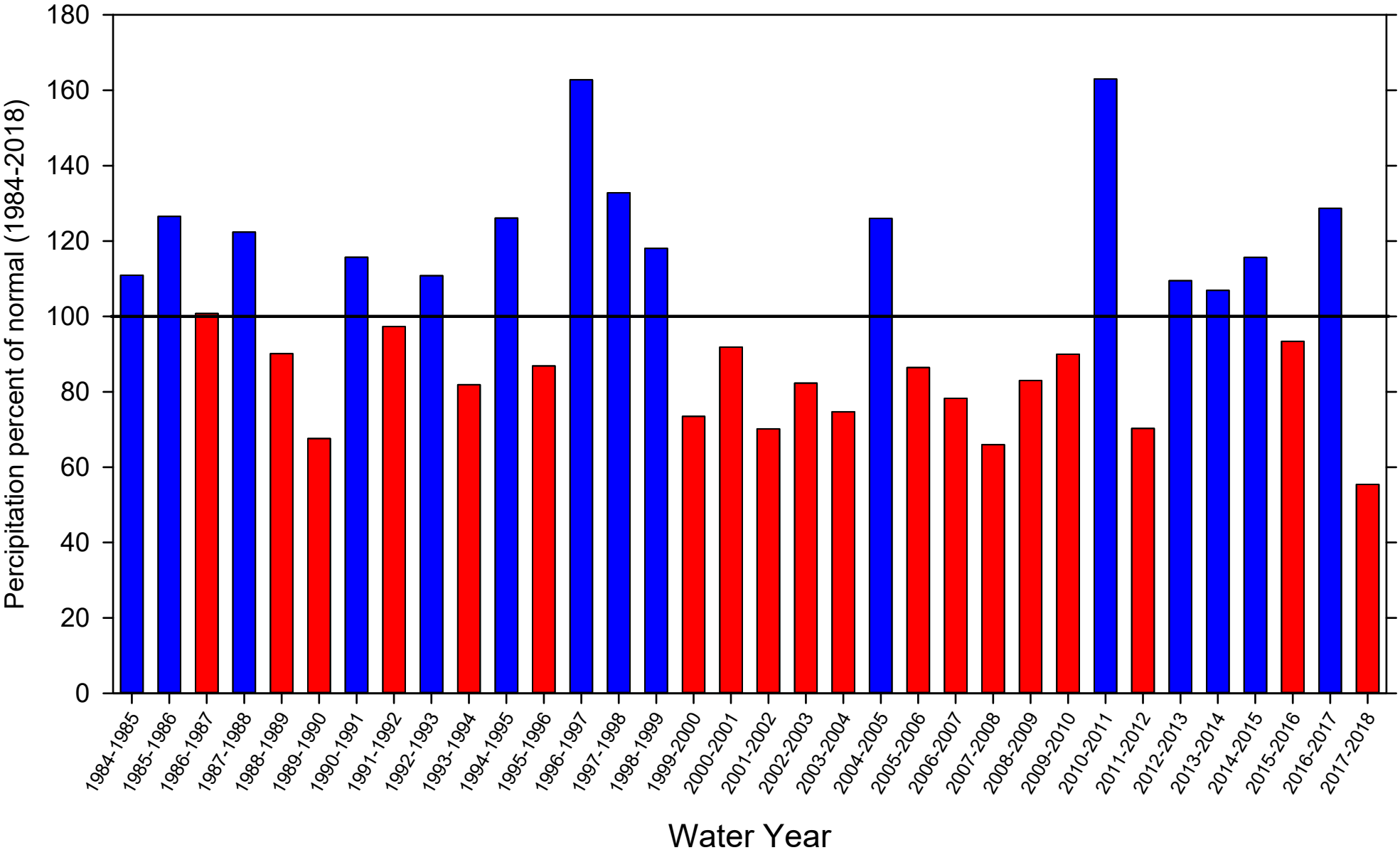
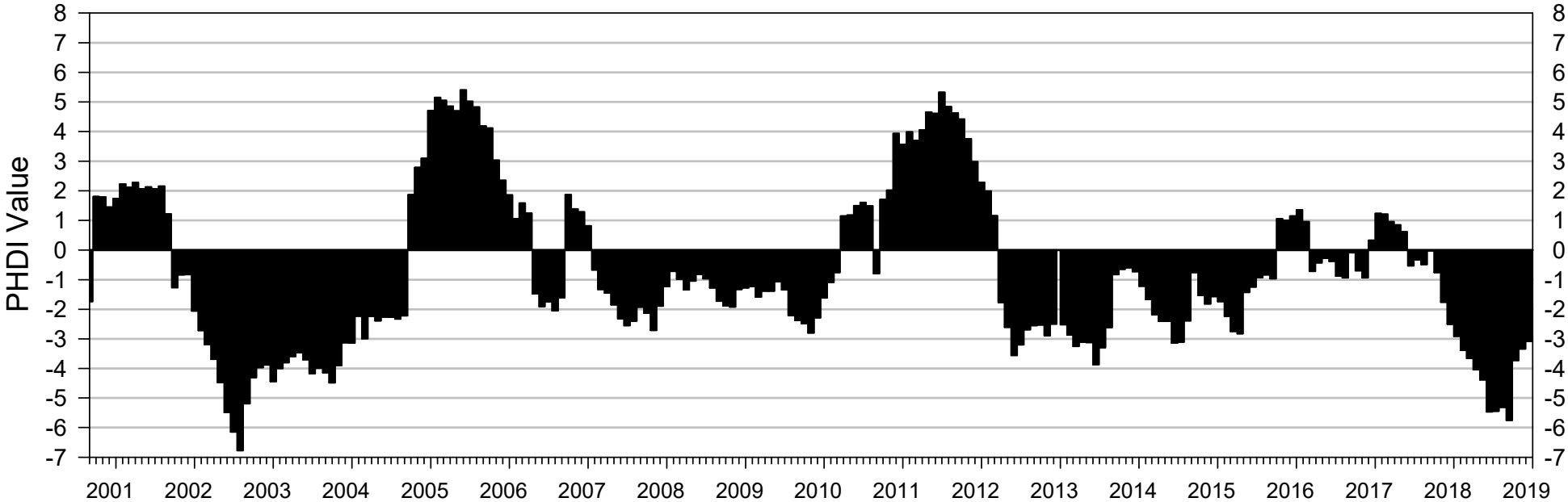


Figure 1 Sufco Mine Weather Station Precipitation.



-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

Figure 2 Plot of Palmer Hydrologic Drought Index for Utah Region 4.

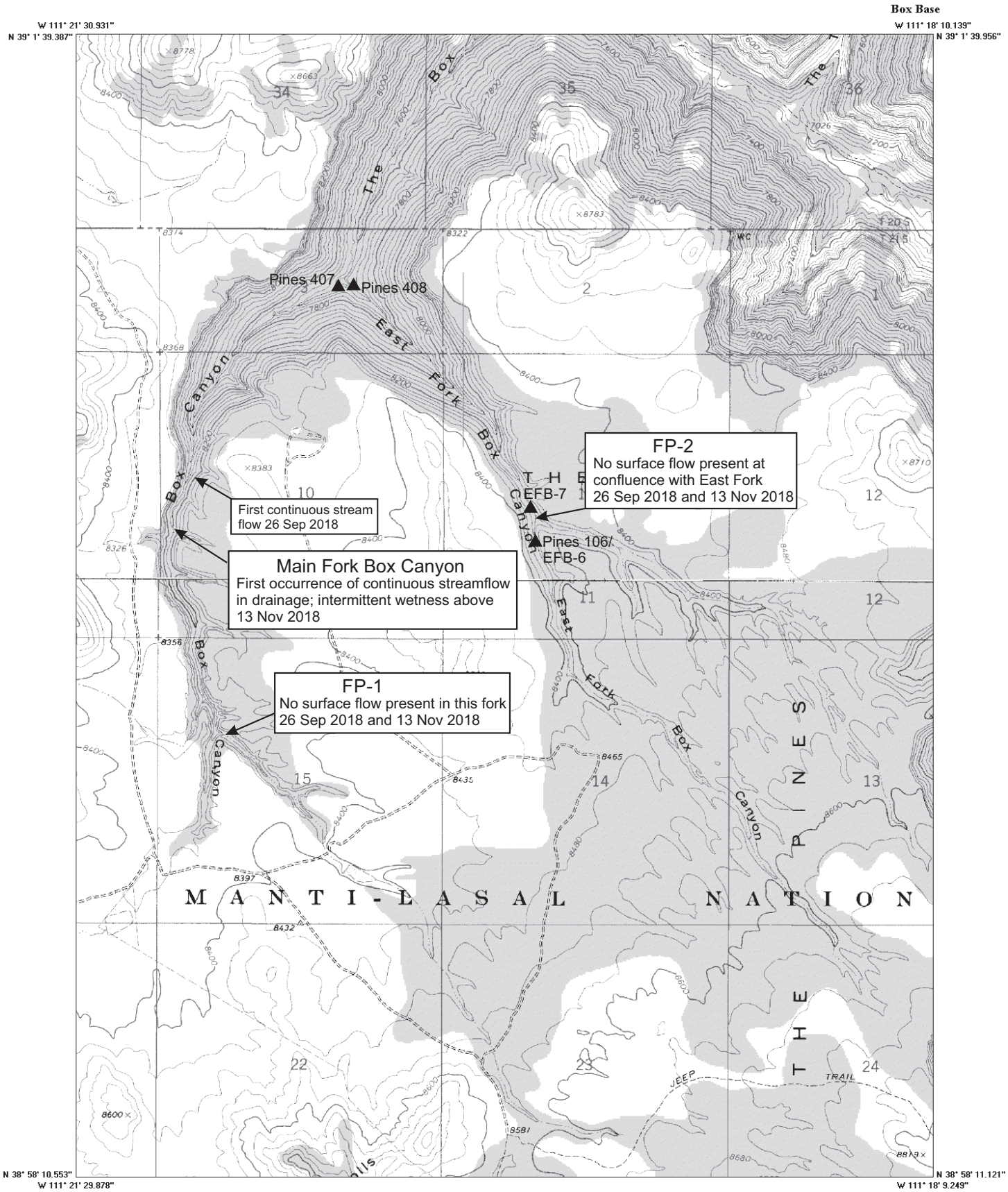


Figure 3 Stream locations.

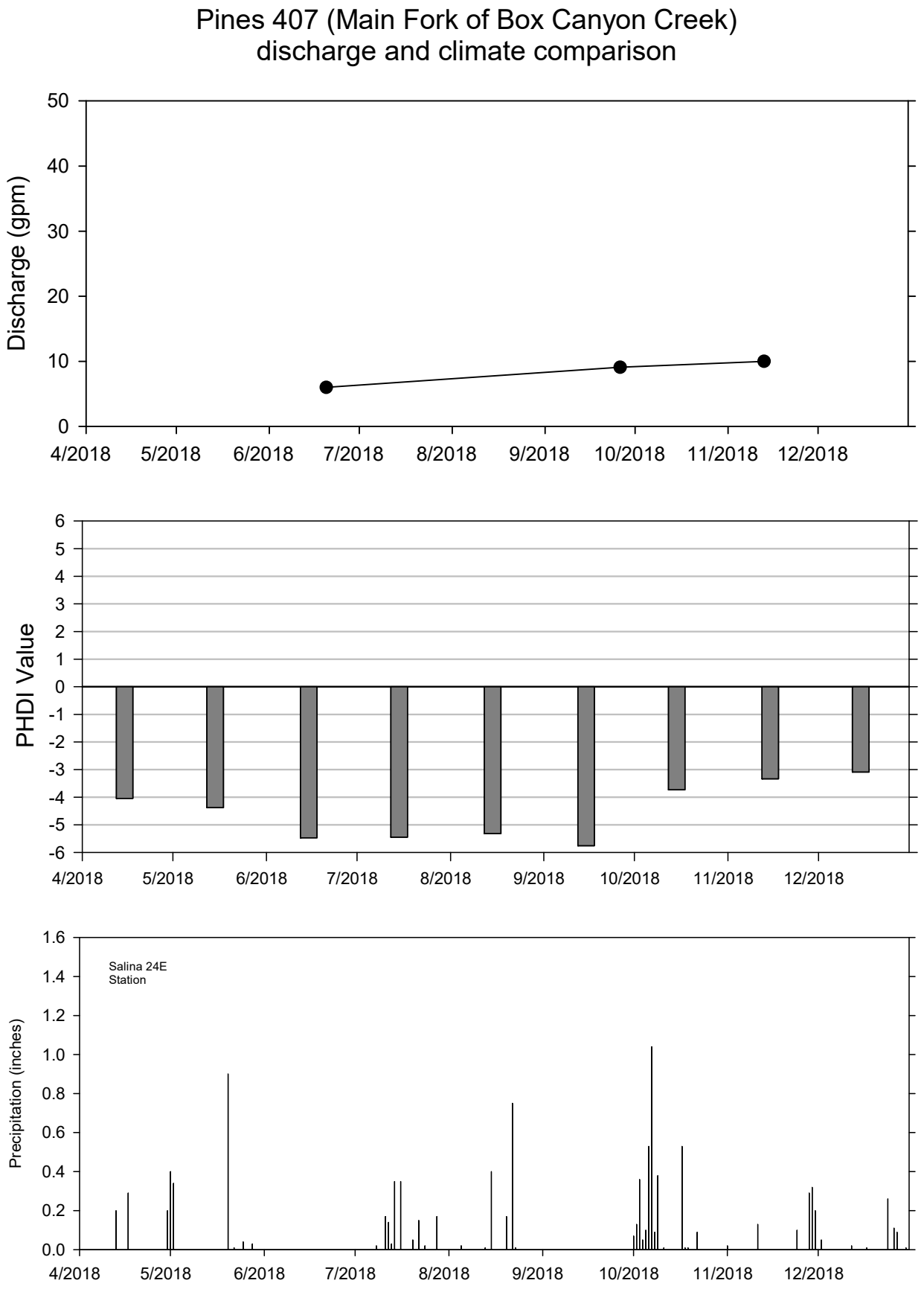


Figure 4 Pines 407 discharge and climate comparison.

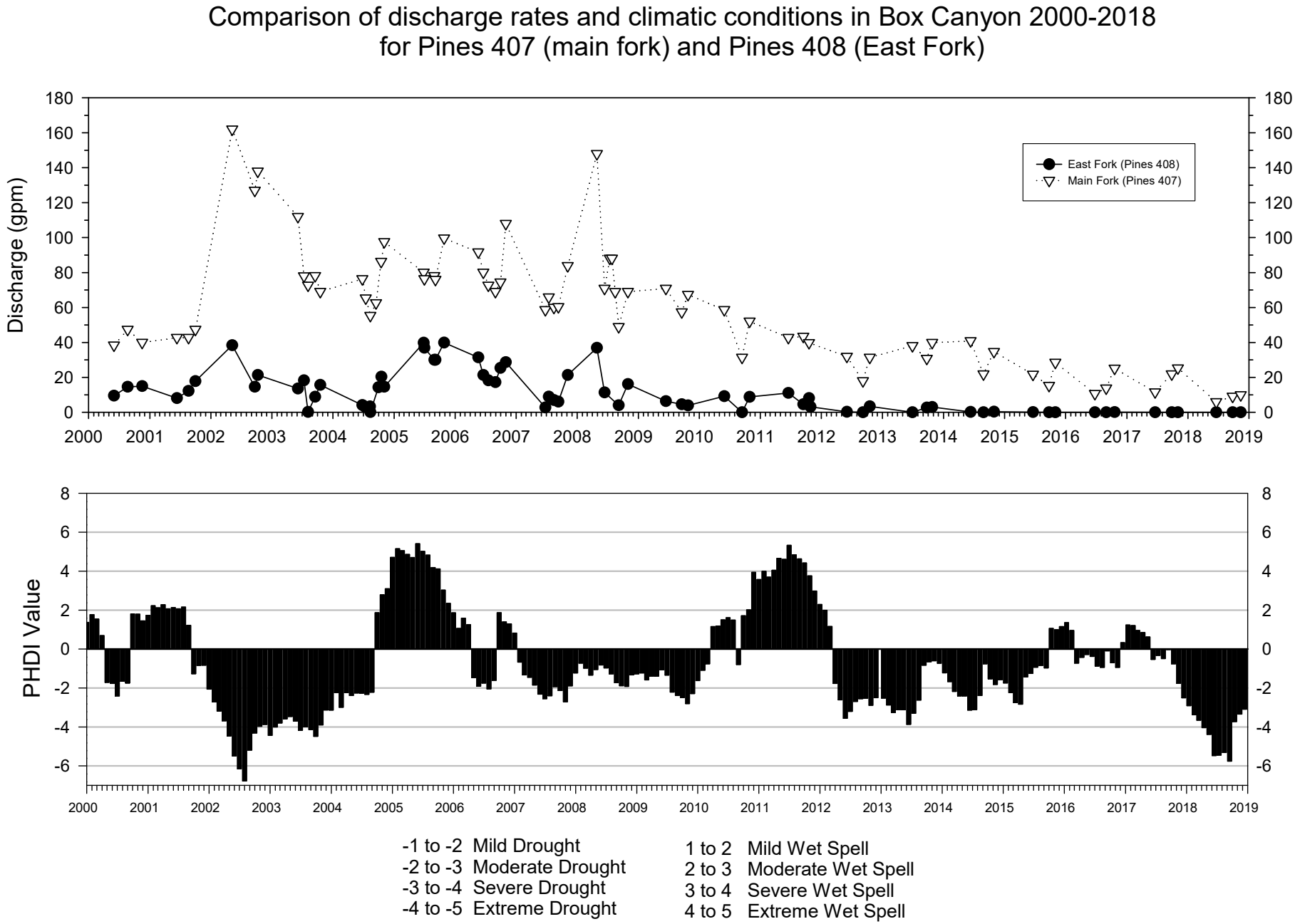


Figure 5 Discharge hydrographs for Pines 407 and Pines 408 and PHDI for Utah Region 4.

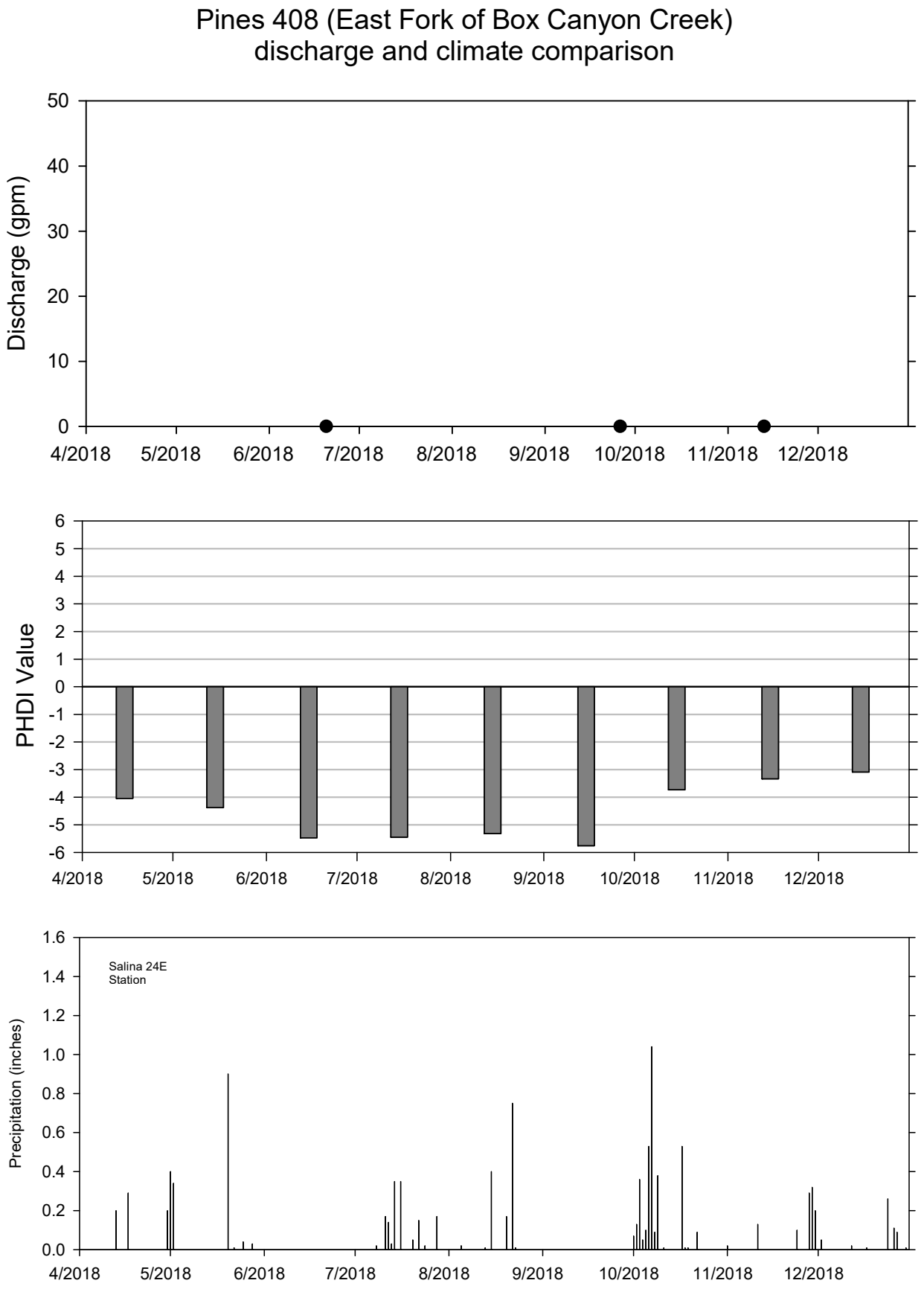


Figure 6 Pines 408 discharge and climate comparison.

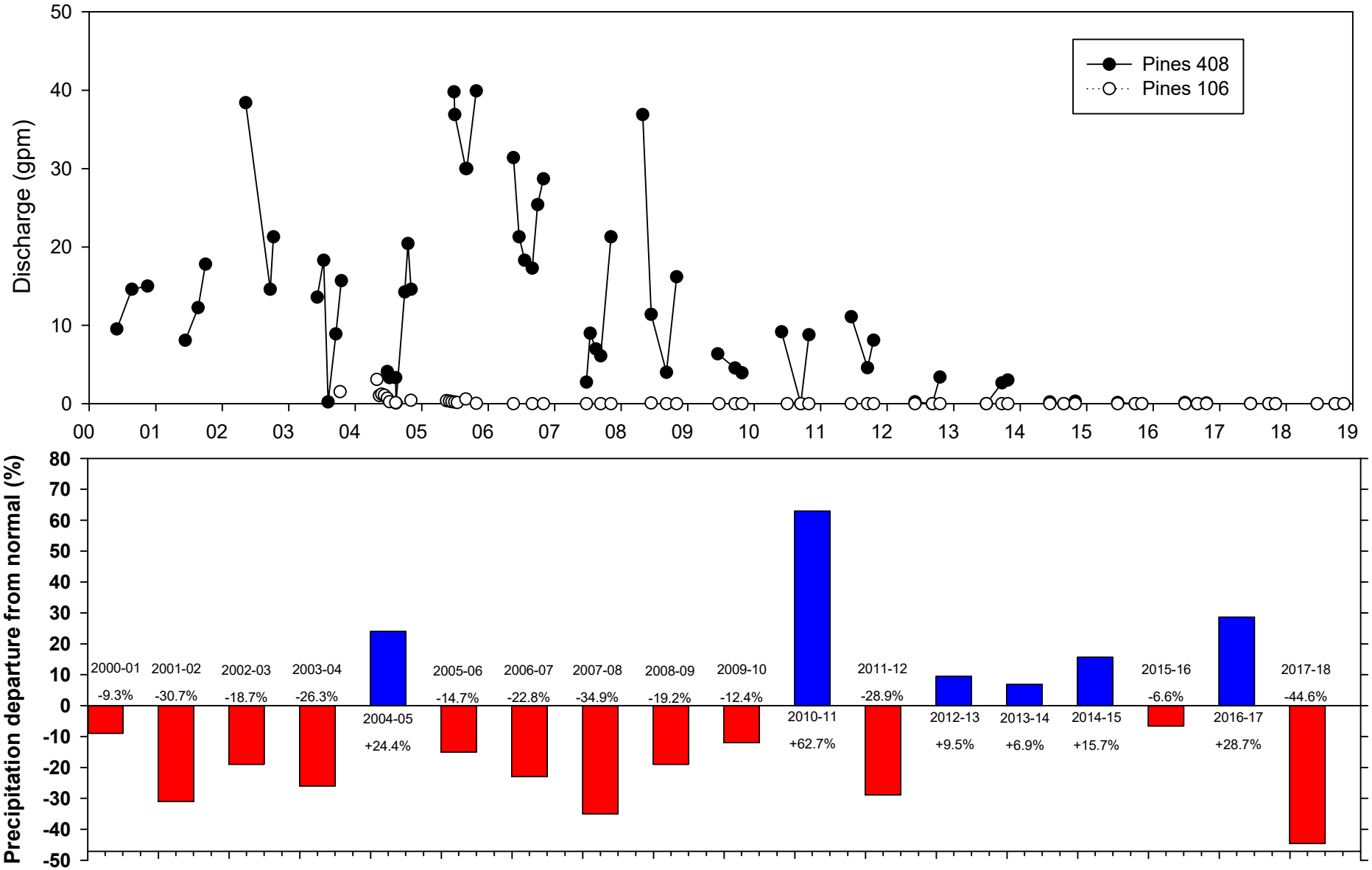


Figure 7 Pines 408 and Pines 106 discharge and Sufco Mine weather station data 2000-2018.

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: GH-P01 Hugh's

Pond: Depth of Water	(feet)	0.17		
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.5	(feet)	50 x 60
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In good condition. Bottom of pond is well vegetated with water only in the center of the pond.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: GH-P01 Hugh's

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.5	(feet)	50 x 60
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In good condition. Bottom of pond is well vegetated with no sign of recent water.
Limited evidence of cattle or wildlife using the pond. Vegetation in bottom of pond not grazed.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: GH-P02 Greens Hollow

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.6	(feet)	15 x 28
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In good condition. Bottom of pond is well vegetated.

5. Other Notes:

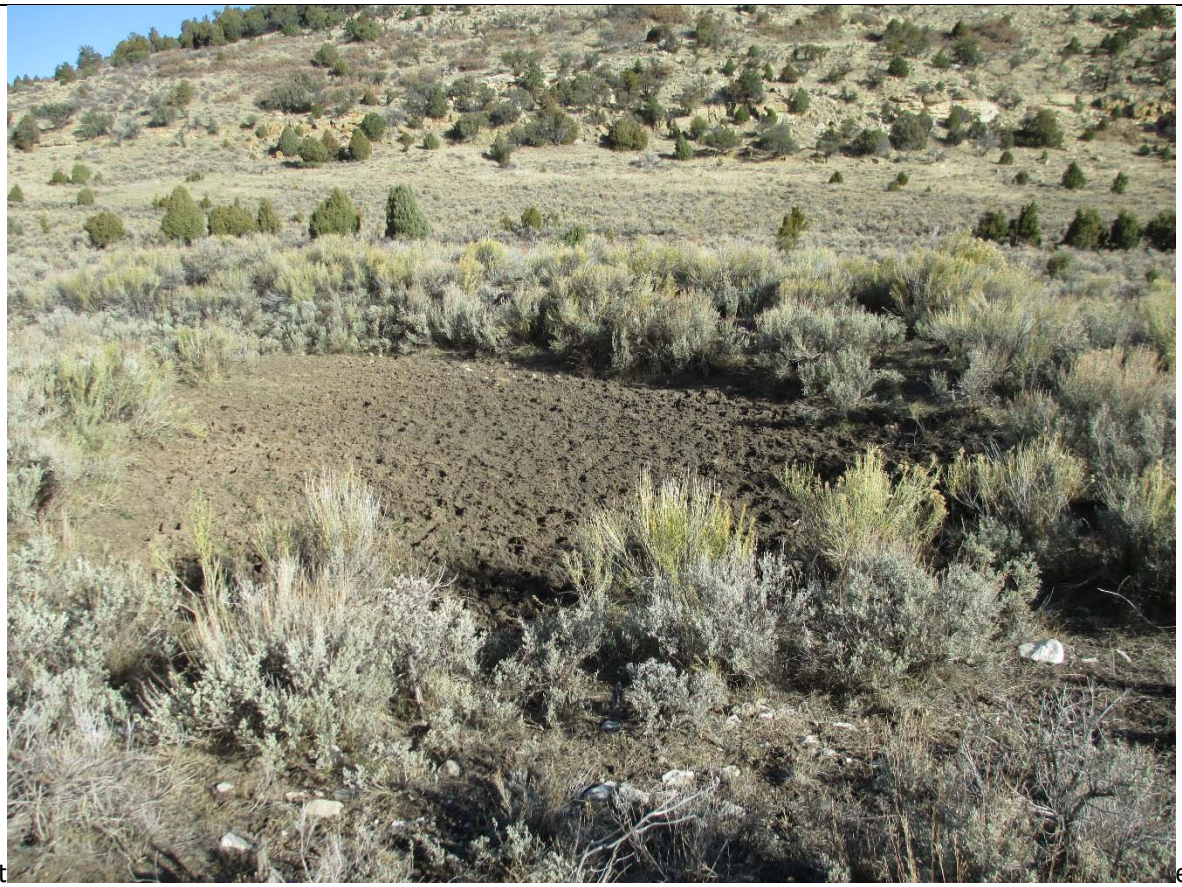
Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: GH-P02 Greens Hollow

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.6	(feet)	15 x 28
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In good condition. Cattle had used the pond, the bottom was covered with footprints.



5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Mike Grant_____ Date:__11/5/2018_____

Pond Name/ID: GH-P03 Ridge

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	0.6	(feet)	12 x 14
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x
4. General Pond Condition: Pond is empty with small amount of snow in bottom. Deadfall in pond area.				

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Bryant Bunnell &/or Lance Carter Date: 6-22-2018

Pond Name/ID: GH-P03 Ridge

Pond: Depth of Water	(feet)	0.125		
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)		(feet)	
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
Pond in good condition. Bottom of pond is well vegetated with puddle of water in the center of the pond.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter Date: 10/4/18

Pond Name/ID: GH-P04 Duke

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	1.25	(feet)	40 X 60
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In good condition. Bottom of pond is well vegetated with no sign of recent water.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-28-18

Pond Name/ID: GH-P04 Duke

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.75	(feet)	30 x 40
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	X

4. General Pond Co
Bottom of pond app sses were
growing around anc ndition.

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-28-18

Pond Name/ID: GH-P05 Daisy

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)		(feet)	
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In fair condition. Pond shows heavy use by livestock/wildlife with no sign of recently containing water.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter Date: 10-4-18

Pond Name/ID: GH-P05 Daisy

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.3	(feet)	20 X 30
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	X

4. General Pond Condition:
In good to fair condition. Pond shows no sign of recently containing water.

5. Other Notes:

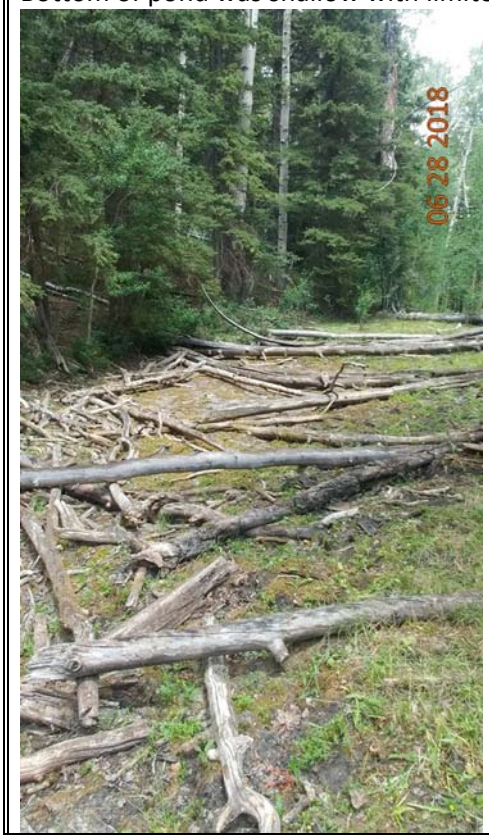
Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-28-18

Pond Name/ID: GH-P06 Dove

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)		(feet)	
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
Bottom of pond was shallow with limited vegetation and in fair condition.



Stock Pond Inspection Form

5. Other Notes:

Aerial Photo

Stock Pond Inspection Form

Inspectors Name: Lance Carter Date: 10/4/18

Pond Name/ID: GH-P06 Dove

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)		(feet)	
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition:
In good condition. Bottom of pond is well vegetated with no sign of recent water.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-22-18

Pond Name/ID: GH-P07 Sweetwater

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	0.75	(feet)	14 x 20
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x

4. General Pond Condition:
Pond was in good condition and dry with limited vegetation in pond. Would hold a small amount of water.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Mike Grant_____ Date:__11/6/2018_____

Pond Name/ID: GH-P07 Sweetwater

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	0.75	(feet)	14 x 20
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x
4. General Pond Condition: Pond was dry. Would hold a small amount of water.				

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-28-18

Pond Name/ID: GH-P08 Bugle 1

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	3	(feet)	35 x 25
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x

4. General Pond Condition:

Pond in good condition. Pond was dry but will hold water well. Pond is immediately adjacent to the stream channel. Vegetation indicates the pond contained snow/water earlier in the season.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Mike Grant_____ Date:__11/5/2018_____

Pond Name/ID: GH-P08 Bugle 1

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	3	(feet)	35 x 25
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x
4. General Pond Condition: Pond in good condition. Pond was dry but will hold water well. Pond is immediately adjacent to the stream channel.				

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-28-18

Pond Name/ID: GH-P09 Bugle 2

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	1.5	(feet)	22 x 30
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x

4. General Pond Condition:

Pond in relatively good condition. Heavy deadfall in pond. Bottom of pond is saturated, some ponding. Spring feeds directly into the pond.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Mike Grant_____ Date:__11/5/2018_____

Pond Name/ID: GH-P09 Bugle 2

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	1.5	(feet)	22 x 30
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	x

4. General Pond Condition:

Pond in relatively good condition. Heavy deadfall in pond. Two puddles approximately 6 inches deep. Spring feeds directly into the pond.

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: MP-02 Basin

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.66	(feet)	15 x 56.2
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Evidence of water in the pond, likely sometime during the winter. Pond bottom is covered in dehydrate cracked clay soils.
Area of pond recorded is reduced, the area has been larger in the past.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: MP-02 Basin

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.66	(feet)	15 x 56.2
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Evidence of water in the upper end of the pond. No water at the time of the inspection. Evidence of cattle usage.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: MP-03 Bunnell

Pond: Depth of Water	(feet)	3		
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)		(feet)	50 x 82
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	

4. General Pond Condition:
In good condition. Evidence of heavy use by wildlife.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: MP-03 Bunnell

Pond: Depth of Water	(feet)	3	DRY	
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)		(feet)	50 x 82
3. Soil moisture conditions within pond (if no water).	Dry:		Wet:	

4. General Pond Condition:
In good condition. Evidence of heavy use by wildlife and cattle. More water in pond than during the inspection in May. Likely due to snow storms in the past two weeks. Snow still on north facing slope adjacent to the pond.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: MP-04 Buck

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.66	(feet)	40 x 60
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Bottom of pond covered with vegetation.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: MP-04 Buck

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	0.66	(feet)	40 x 60
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: Bottom of the pond was damp, but no sign of it recently holding water. Area of the pond is well vegetated, with evidence of grazing.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: MP-05 Tropical

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	1.8	(feet)	70 x 80
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Ditch around north and east side of pond is eroded. Bottom of pond is well vegetated. Outcrops of bedrock below the pond.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: MP-05 Tropical

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	1.8	(feet)	70 x 80
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Ditch around north and east side of pond is eroded. Bottom of pond is well vegetated. Bottom of pond was dry, no sign of it having held water recently.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: MP-07 Cowboy

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	2	(feet)	60 x 120
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Shows sign of recent use by wildlife, may have contained water following thaw. Dehydrated cracked clay soils in bottom of pond.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: MP-07 Cowboy

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	2	(feet)	60 x 120
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Shows sign of recent use by wildlife and cattle. Contained water following rain and snow the last two weeks, damp at time of inspection. Fire pit and camp adjacent to the pond, area disturbed by vehicular traffic.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Lance Carter &/or Bryant Bunnell Date: 6-28-2018

Pond Name/ID: M-P08 Ute

Pond: Depth of water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	1	(feet)	12 x 18
3. Soil moisture conditions within pond (if no water).	Dry:	x	Wet:	

4. General Pond Condition:
Small depression in a large grassy area, likely hold snow/moisture longer than surrounding area.
Pond depression was dry.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Mike Grant_____ Date:__11/5/2018_____

Pond Name/ID: M-P08 Ute

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	1	(feet)	12 x 18
3. Soil moisture conditions within pond (if no water).	Dry:	x	Wet:	
4. General Pond Condition: Small depression in a large grassy area, likely hold snow/moisture longer than surrounding area. Pond depression was dry.				

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Lance Carter &/or Bryant Bunnell Date: 6-28-18

Pond Name/ID: M-P09 Cougar

Pond: Depth of Water			DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	0.5	(feet)	10 x 12
3. Soil moisture conditions within pond (if no water).	Dry:	x	Wet:	

4. General Pond Condition:
Pond was dry with healthy vegetation in bottom.

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: __Mike Grant_____ Date:__11/5/2018_____

Pond Name/ID: M-P09 Cougar

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	x
2. Estimated pond depth and surface area.	(feet)	0.5	(feet)	10 x 12
3. Soil moisture conditions within pond (if no water).	Dry:	x	Wet:	
4. General Pond Condition: Pond was dry with vegetation in bottom.				

Stock Pond Inspection Form

5. Other Notes:

Stock Pond Inspection Form

Inspectors Name: Vicky Miller & Lance Carter Date: 5-30-18

Pond Name/ID: MP-10 Doe

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	3.1	(feet)	35 x 62
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. No evidence of recent water in pond.
Bottom of pond is well vegetated.

5. Other Notes:

Stock Pond Inspection Form

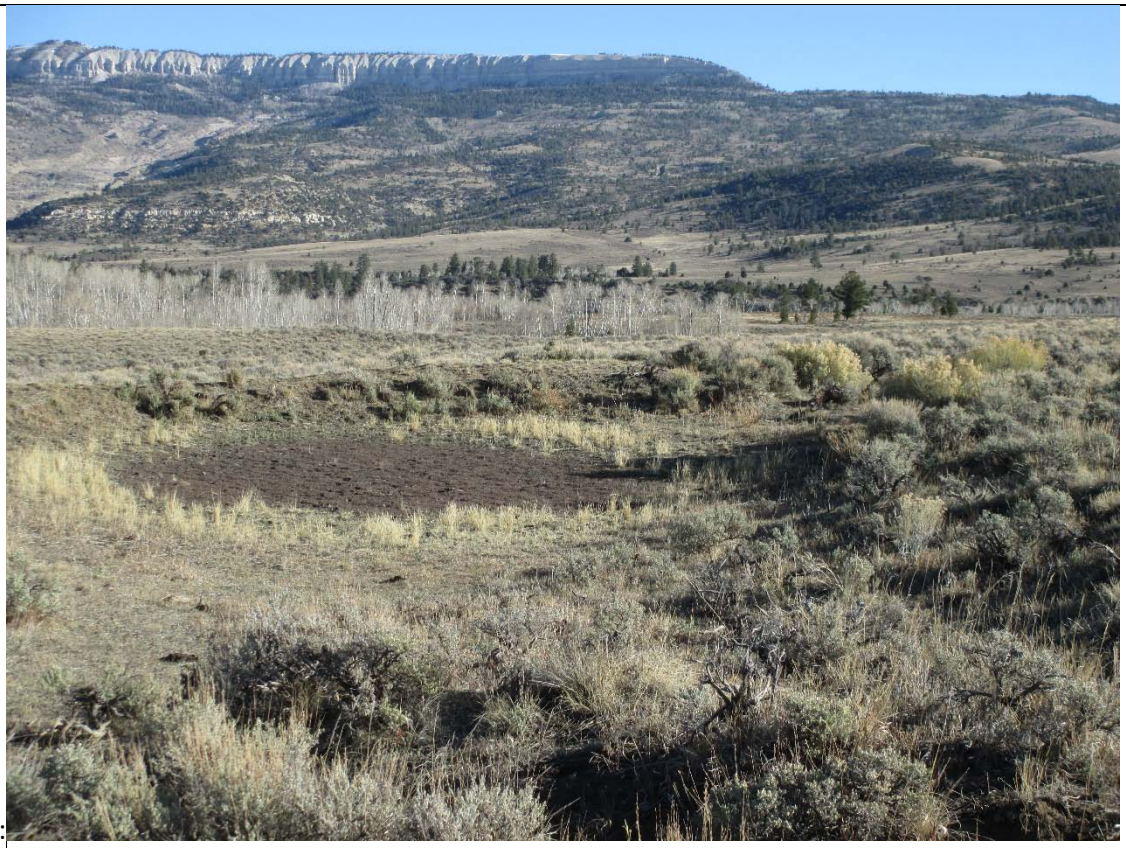
Inspectors Name: Vicky Miller Date: 10/29/18

Pond Name/ID: MP-10 Doe

Pond: Depth of Water	(feet)		DRY	X
1. Are there subsidence cracks within or near the pond?	Yes:		No:	X
2. Estimated pond depth and surface area.	(feet)	3.1	(feet)	35 x 62
3. Soil moisture conditions within pond (if no water).	Dry:	X	Wet:	

4. General Pond Condition: In good condition. Bottom of pond dry and dusty.

5. Other Notes:



Jensen Pond 5/5/18

POND NAMES	Photo (Yes/No)	Pond (Dry) Not Sampled (NS)	Pond Cracking (Yes/No)	Estimated Depth at Center (feet)	Estimated Size (feet)
Jensen	Yes	Dry	No	3	25 X50
Johnson	Yes	Dry	No	1	26 X 40
Rock	Yes	Dry	No	1.25	16 X 20
Dry Point	Yes	Dry	No	0.75	15 X 18
Big Ridge So. Draw	Yes		No	3	50 X100
Big Ridge East Draw	Yes		No	3	20 X 40
Box	Yes		No	6	100 X 100 X 60
Slab	Yes	Dry	No	3	80 X150
Verdus	Yes	Dry	No	1	40 X 50
Joes Mill	Yes	Dry	No	0.75	20 X35

Surface Cracking (Yes/No)	Moisture In Pond (Yes/No)	General Condtion Pond (G-Good), (F- Fair) (P-Poor)	Manmade (M) or Natural (N)	Fed by Precipitation (P) or Spring (S)	Date
N		G	M	P	5/5/2018
N		G	M	P	5/5/2018
N		G	N	P	5/5/2018
N		G	M	P	5/5/2018
N	4"	G	M	P	5/5/2018
N	18"	G	M	P	5/5/2018
N	18"	G	M	P	5/5/2018
N		G	M	P	5/5/2018
N		G	N	P	5/5/2018
N		G	N	P	5/22/2018

Canyon Fuel Company, LLC
SUFCO Mine
597 South SR 24
Salina, Utah 84654
(435) 286-4880 Fax: (435) 286-4499

March 18, 2019

Mr. Steve Falk
Bureau of Land Management
125 South 600 West
Price, UT 84501

Re: Annual Subsidence Report

Dear Mr. Falk:

Enclosed is a copy of the annual subsidence report for Canyon Fuel Company's SUFCO Mine. This report was prepared from aerial photogrammetric data collected in 2018. If you have questions, please give me a call.

Sincerely,
CANYON FUEL COMPANY, LLC
SUFCO Mine

Jason G. Christensen
Survey Supervisor

JGC:jds

Enclosure: 2018 Subsidence Report

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2018 SUBSIDENCE REPORT

CANYON FUEL COMPANY, LLC

SUFCO MINE

by

Jason G. Christensen

INTRODUCTION

Canyon Fuel Company LLC, SUFCO Mine's 2018 subsidence report is an update of annual subsidence data that has been accumulated since 1976 as the former Southern Utah Fuel Company. Prior to 1985, the data was derived from conventional survey methods. Since then, photogrammetric surveys have been employed to monitor the ground movement.

During 1985, the entire SUFCO Mine property was flown to establish a set of baseline photography and a grid of surface elevations. Where possible, an elevation was photogrammetrically determined on an approximate 200-foot grid. These original x, y and z locations serve as a comparative base for determining ground movement in the succeeding years. Other lease holdings that are acquired are flown for similar baseline information. Lease U-63214 was flown in 1991 and the 150-acre modification to lease U-63214 and lease UTU-76195 were flown in 1999. Lease ML 49443-OBA was flown in 2006. The westerly modifications of Lease U-63214, Lease U-47080, and Lease SL-062583 were flown in 2011. In 2018 SUFCO Mine acquired lease UTU-84102. Aerial targets were placed to establish a set baseline for this lease prior to the 2018 subsidence flight.

Once each year around the end of August, another set of aerial photography is obtained. A new elevation is then found at the same x and y coordinates as all the originals within all areas considered to be active. The new, or current, elevations are compared to the originals and the difference between the two is used to generate a contour map. The result is the subsidence contour map included with each annual subsidence report.

The mine subsidence map accompanying this report shows surface control monuments, overburden contours, subsidence contours, surface tension cracks, a current outline of the mine, a one year mining projection and other miscellaneous items as explained in the legend.

SUBSIDENCE HISTORY

SUFCO Mine began operations that cause surface subsidence in June 1976. Continuous miners were used to extract coal from pillars that were developed as part of a retreating panel. The panels were approximately 650 feet wide and varied in length up to 2,500 feet. The average mining height approached 11 feet and the extraction ratio averaged about 80%.

The resulting subsidence from these continuous miner panels averaged 4 feet in the plateau areas where overburden was 900 feet thick. In areas where panel boundaries were outside the escarpment and beyond the Castlegate Sandstone, subsidence increased with decreasing overburden thickness. The maximum subsidence measured in a continuous miner panel to date, 8.5 feet, occurred in one of these areas. The overburden was only 600 feet thick.

Retreat mining continued in this manner until October, 1985, when a retreating longwall system was added. Longwall panels have ranged from 550 feet to 1,110 feet wide and up to 18,500 feet in length. Mining heights have varied from 8.5 feet to 12.5 feet.

Subsidence above the longwall panels has averaged 5 to 6 feet in the center of the panels. The overburden thickness has been from 1,000 feet to 1,800 feet (except outside the escarpment where overburden rapidly decreases). The maximum measured subsidence caused by longwall mining until 2009 was seven feet. This occurred in two cases: 1. An area outside the escarpment very similar to the one mentioned above for the continuous miner panel and 2. Down the center of panels that are under plateaus with 1,000 feet of overburden, but this is not typical. In 2009 there was a small area on the north end of the last longwall panel in area 12 that maximum subsidence measured nine feet. This area has overburden of approximately 900 feet, and is relatively close to the escarpment. In 2015 there was a small area in Area 15 that had a maximum subsidence of twelve feet.

DORMANT AND ACTIVE AREAS

Dormant areas are those areas that have shown little or no movement for several consecutive years. Yearly digitizing of these areas will not be done, but photographic coverage can be obtained should the need arise for reevaluation. These areas may not be shown on the current subsidence map.

Active areas are those currently being mined or that have evidence of movement within a reasonable time period. Active areas are digitized and evaluated for subsidence yearly, until they meet the parameters of a dormant area.

2018 SUBSIDENCE

The 2018 subsidence map (Map 1) was updated using data from current photogrammetric monitoring. Each subsidence area is labeled as an independent block. A brief description of each follows:

AREA 1

This was SUFCO Mine's first subsidence area. Undermining began in June 1976, and continued into 1979. The area is composed of five continuous miner panels that averaged 650 feet in width. Mining height averaged 11 feet with about an 80% extraction ratio.

Subsidence ranged from 4.5 feet to a maximum of 8.5 feet. It was first detected in 1976 and continued until 1985. No surface movement was detected in this entire area from 1986 to 1989. Area 1 has not been digitized since the 1990 subsidence report and is considered dormant.

AREA 2

This is another continuous miner area. The panels here were irregular shaped and the extraction ratio was modest. Undermining ceased in 1984.

Maximum subsidence has been measured at 2 feet. The area has been stable since 1985 and has not been monitored since 1989. This area is dormant.

AREA 3

This area is another continuous miner section, but the extracted area is a portion of mains with protective barriers instead of a panel. Coal recovery was moderate with mined areas which were subcritical. Undermining ceased in 1983.

Maximum subsidence was measured at 2 feet. Because of the limited extraction and subcritical areas, the subsidence occurred slowly with small changes noticeable until 1987. The area appeared stable in 1988 and 1989. It has not been monitored since 1989 and is considered dormant.

AREA 4

This subsidence area is comprised of three continuous miner panels. The mining height averaged 11 feet with a good extraction ratio. Undermining ceased in 1985.

Maximum subsidence was 5 feet with no detectable change in 1989. This area was monitored again in 1993, 1994 and 1995 with no detectable changes. This area was monitored for ten years after undermining ceased. The last detectable subsidence was in 1988. Therefore, this area is considered dormant.

AREA 5

The four continuous miner panels that make up this area were mined from September 1978, to November 1981. Mining height averaged 11 feet with an 80% extraction ratio.

Maximum subsidence was 5 feet with no detectable changes from 1985 through 1991. This area has not been monitored since 1991, and will also remain dormant.

AREA 6

Area 6 is SUFCO Mine's first longwall induced subsidence area. It is comprised of nine longwall panels varying from 540 feet to 700 feet in width and 1,700 feet to 3,900 feet in length. Also, there is a section of recovered mains between two of the longwall blocks. Undermining began in Area 6 during October, 1985, and continued through the mains recovery in March, 1990.

Maximum subsidence measured in areas bounded by the plateau is five feet. There is a location on the map that shows seven feet; but this area is outside the escarpment where the overburden is only 600 feet thick. The subsided escarpment is intentional and is part of a study agreed upon by SUFCO Mine, the Division of Oil, Gas and Mining, the Bureau of Land Management and the U.S. Forest Service. This particular section of escarpment was removed from the "no subsidence zone" to study the effects of longwall mining on the escarpment.

Area 6 has shown no significant changes since 1992. It has been determined that this area is dormant.

AREA 7

Area 7 was originally planned for no subsidence. Pillars were made to support the overburden but began to fail in the north end in 1984 when the underground workings were flooded. The failure progressed towards the south and by 1986 subsidence was detected over the area.

The map shows up to seven feet of subsidence. There was no additional subsidence movement detected from 1988 to 1994. Therefore, this area will also be considered dormant.

AREA 8

Undermining this area began in June 1983, and was sporadic until 1992. Continuous miners were used with extraction ratios over 80% and average mining heights of 10 feet. This area stayed active longer than most due to its proximity to an adjacent active longwall block.

Maximum subsidence is five feet. No noticeable vertical movement has been detected since 1993. This area is dormant.

AREA 9

This area is a longwall mining area that is composed of four panels. The first began in June 1989 and the block was finished in January 1992. The mining height averaged about 11 feet and the maximum subsidence is five feet. There has been no indication of movement since 1996. This area is determined to be dormant.

AREA 10

Area ten is a longwall mining block that began in January 1992. Mining was completed in August 2001. The entire surface area above this block was digitized for base-line elevations during 1991. Maximum subsidence shown to date is seven feet. This area has been mined out since 2001, and monitoring suggests that it has settled. It is now assumed to be dormant.

The experimental mining practice area discussed under "Area 6" was extended, with regulatory approval, to the east side of the canyon under the Southwest corner of "Area 10". An extensive pre-mining survey of this location was conducted late in 1992. A detailed survey of the post-mining subsidence effects was provided in the 1993 report.

AREA 11

Area eleven is an extension of the last longwall panel in Area ten. It extends into a 150-acre modification to lease U-63214. An elevation baseline was established in 1999. Mining under this area began in January 1999 with gate road development. Longwall mining took place from May 2000 thru September 2000. Subsidence to date shows a maximum of six feet. This area has shown no significant movement since 2003 and is considered dormant.

AREA 12

Area twelve is the first longwall mining block on the acquired lease UTU-76195. Due to a mine plan change at the start of 2003, this area now consists of six longwall panels. An elevation baseline was established in 1999, and gate road development began in March 2000. Longwall mining began in September 2001 and ended in February 2007. There has been no significant movement detected in this area since 2007. This area appears to have stabilized and is considered dormant.

AREA 13

Area thirteen is a longwall mining block that originally consisted of seven panels on lease U-63214 and lease ML 49443-OBA. Due to a mine plan change near the end of 2008, this area now consists of eight longwall panels. An elevation baseline for the area included on lease U-

63214 was established in 1991 and the elevation baseline for the area included on lease ML 49443-OBA was established in 2006. Longwall mining began in March 2007 and ended in 2012. This area was considered active in 2007. 2015 will be the last year of monitoring. The boundary of area 13 was trimmed to more closely follow previous mining activities and to exclude future mining areas.

AREA 14

Area 14 consists of a short, single longwall panel on lease U-63214. An elevation baseline for this area was originally established in 1991, and the area was re-flown and checked for any discrepancies in 2011. Gate road development began in 2010 and was completed in 2011. Longwall mining began and ended in 2012. This area has shown little change and 2015 will be the last year of monitoring.

AREA 15

Area 15 is a longwall mining area on lease U-63214, lease U-47080, and fee land. The previous mine plan included two panels. Due to a mine plan change in 2012, a third panel was added that extended into what was Area 17. Upon approval for the third panel, the boundary for Area 15 was adjusted North, to include the third panel. Gate road development in this area began in 2010. Longwall mining began in 2012 and ended in 2015. Base elevation data for this area was partially obtained in previous years, but was completely flown and checked in 2011. Area 15 will continue being monitored.

AREA 16

Area 16 is a longwall mining block currently planned for 3 panels. The westerly modifications of lease U-63214, lease U-47080, and lease SL-062583 for this area were obtained in 2009. Rehab of existing mine entries and development of gate roads began in 2011. An elevation baseline for this area was obtained in 2011. Longwall mining began in June 2017 and finished in February 2018. This area will continue to be monitored.

AREA 17

Area 17 is a planned longwall mining block on lease U-63214, and future lease modifications and acquisitions. Gate road development began in 2015 and longwall mining began in 2017. An elevation baseline was obtained for the current mine plan area in 2011. This area will continue to be monitored.

AREA 18

Area 18 is a planned longwall mining block on leases U-63214 and ML 49443-OBA. Gate road development began in 2015 and longwall mining began in 2017 and finished up in 2018. An elevation baseline was obtained for the current mine plan area in 2015. This area will continue to be monitored.

AREA 19

Area 19 is a planned longwall mining block leases U-63214 and ML 49443-0BA. Gate road development is began in 2017 and longwall mining is scheduled to begin in late 2018. The entire surface area above this block was digitized for the base-line elevations during 1991.

Area 20

Area 20 is a planned longwall mining block on lease UTU-84102. Gate road development is scheduled to begin in 2019 and longwall mining is scheduled to begin in 2020. An elevation baseline was obtained for the current mine plan area in 2018.

DRAW ANGLE SURVEYS

Several draw angle surveys have been performed during the past years. Completed surveys have been over continuous miner areas and have been oriented both parallel and perpendicular to the long axis of the panel. The average of all measurements is 15°. Individual measurements ranged from 10° to 21°.

New longwall draw angle data was obtained in 1995. Draw angle points were installed in May 1986, on the southern end of the first panel in "Area 6". As shown on the subsidence map, survey lines were placed parallel and perpendicular to the axis of the panel. Undermining of this panel was completed in June 1986. Measurements were taken in 1995 and indicate an angle 15.25° for the perpendicular line. An angle for the parallel line was not obtained because the mains underlying the survey line were partially extracted. These findings coincide with the average of 15° as stated above.

SUBSIDENCE TENSION CRACKS

Tension cracks have occurred above most of the subsidence areas. Most have been located by survey and are shown on the map. Their lengths vary from a few feet to a couple thousand feet. Most are oriented either parallel to the natural jointing pattern or to the boundaries of the underground excavation. Vertical displacement along the cracks is uncommon and horizontal displacement varies from hairline to several inches in width depending on the surface topography (rock, hard packed or loose soil).

The U. S. Forest Service completed a tension crack study in 1978. They monitored twenty-two different cracks (located in Area 1) with widths varying from 1/8 inch to six inches. Results show that most cracks self-heal, or close, from 13% to 100% of their original width.

Longwall mining at the top of the 13L4E longwall panel caused some cracking in the escarpment sandstone of upper Box Canyon. The panel was mined parallel and down the

center of a portion of the canyon. Subsidence thus created an inward pull on the canyon walls. These cracks are in the rock along the edge of the escarpment and vary in width and displacement. A monitoring program was initiated in 2004 to observe the behavior of these cracks. These cracks were checked in 2005 and again for the final time in 2008 and show no significant change in width or displacement.

DETAILED LONGWALL SUBSIDENCE PROFILE

In 1998 a project was initiated to monitor longwall subsidence in relation to the advancing face. Preparation consisted of first installing two monitoring points outside the subsidence area. Then two base lines were established one 3000 feet long running parallel down the center and the second 1300 feet long perpendicular across the 967 feet wide panel. Markers were installed along these lines on 100 feet spacing using approximately 2.5 feet long rebar with an aluminum cap or a hardened nail drilled into the exposed rock. Initial horizontal and vertical readings were obtained by shooting each marker with a Topcon GTS-3 distance meter from the monitoring points.

Monitoring was done weekly to gather new readings on markers behind and up to 500 feet ahead of the advancing face. The data collected reveals that vertical movement starts approximately 150 feet ahead of the face with 15 hundredths of a foot of subsidence at the face. It then drops off quickly to 4 feet at 600 feet behind the face and gradually levels off at 4 to 5 feet. Horizontal readings indicate the ground initially moves about 30 hundredths of a foot away from the face, then back toward the face 80 hundredths of a foot.

CONCLUSION

Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12, are all considered to be dormant. Photographic coverage for these areas can be obtained if circumstances deem it necessary. Longwall mining in Area 13 and Area 14 was completed in 2012 with a maximum subsidence detected to date of 7 feet in Area 13 and 5 feet in Area 14. 2015 will be the last year of monitoring for areas 13 and 14, they will be considered dormant going forward. Longwall mining in Area 15 was completed in 2015 with a maximum subsidence detected to date of 12 feet. Subsidence monitoring will continue for this area. Longwall mining in Area 16 was completed in 2016 with a maximum subsidence of 8.2 feet. Subsidence monitoring will continue for this area. Longwall mining in Area 18 was completed in 2018 with a maximum subsidence detected to date of 4 feet. Subsidence monitoring will continue for this area.

JGC:jds

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Date: 3/21/2018

CLIENT: Canyon Fuel Company, LLC.
Project: Quarterly Wasterock
Lab Order: S1802228

CASE NARRATIVE

Report ID: S1802228001

Sample WRDS 1st Quarter Feb 2018 was received on February 19, 2018.

Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600/2-78-054 "Field and Laboratory Methods Applicable to Overburden and Mining Soils", 1978
American Society of Agronomy, Number 9, Part 2, 1982
USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils", 1969
Wyoming Department of Environmental Quality, Land Quality Division, Guideline No. 1, 1984
New Mexico Overburden and Soils Inventory and Handling Guideline, March 1987
State of Utah, Division of Oil, Gas, and Mining: Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April 1988
Montana Department of State Lands, Reclamation Division: Soil, Overburden, and Regraded Spoil Guidelines, December 1994
State of Nevada Modified Sobek Procedure
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

All Quality Control parameters met the acceptance criteria defined by EPA and Inter-Mountain Laboratories except as indicated in this case narrative.

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Canyon Fuel Company, LLC.
397 South 800 West
Salina, UT 84654

Report ID: S1802228001

Project: Quarterly Wasterock
Date Received: 2/19/2018

Date Reported: 3/21/2018
Work Order: S1802228

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Calcium PE	Magnesium PE	Sodium PE	SAR	Alkalinity PE	Boron	Selenium
		s.u.	%	dS/m	meq/L	meq/L	meq/L		ppm	ppm	ppm
S1802228-001	WRDS 1st Quarter Feb 2018	8.0	63.4	1.38	3.81	2.26	8.36	4.80	150	2.10	<0.02

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
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Your Environmental Monitoring Partner

Soil Analysis Report

Canyon Fuel Company, LLC.

397 South 800 West
Salina, UT 84654

Report ID: S1802228001

Project: Quarterly Wasterock

Date Reported: 3/21/2018

Date Received: 2/19/2018

Work Order: S1802228

Lab ID	Sample ID	Total Sulfur %	T.S. AB t/1000t	Neutral. Potential t/1000t	T.S. ABP t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyriticS AB t/1000t	PyriticS ABP t/1000t
S1802228-001	WRDS 1st Quarter Feb 2018	0.37	11.5	66.1	54.6	<0.01	0.11	0.27	3.55	62.6

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor

Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB Sufco 021918

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Canyon Fuel Sufco Mine		Amanda Richard	(435) 286-4489

Report Address
597 South SR 24
Salina, UT 84654

Contact Name
Amanda Richard
Email arichard@bowieresources.com
Phone (435) 286-4489

Invoice Address
597 South SR 24
Salina, UT 84654

Purchase Order # 390277
Quote #

ANALYSES / PARAMETERS

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Soil Alkalinity	Calcium Chloride	Boron/Selenium	Electrical Conductivity	Neutralization Potential	pH	Saturated Paste Cation by EPA	Saturated Percent	Sulfur Forms	REMARKS
1	S1802228-001	02/13/18	~~0:00~~	WRDS 1st Quarter Feb 2018	WR	1	X	X	X	X	X	X	X	X	X	
2			1320													
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
	Amanda Richard AMANDA RICHARD	2/15/18	800	Karen A Secr	2/19/18	1030

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION	ADDITIONAL REMARKS
☒ UPS	Water	WT	**Check desired service**	Compliance Monitoring ? Y / N	
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	
☐ USPS	Solid	SD	☐ **RUSH - 5 Working Days**	PWSID / Permit #	
☐ Hand Carried	Filter	FT	☐ **URGENT - < 2 Working Days**	Chlorinated? Y / N	
☐ Other	Other	OT	***Rush & Urgent Surcharges will be applied***	Sample Disposal: Lab Client	

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Date: 9/4/2018

CLIENT: Canyon Fuel Company, LLC.
Project: Quarterly Wasterock
Lab Order: S1807333

CASE NARRATIVE

Report ID: S1807333001

Sample WRDS 2nd Quarter May 2018 was received on July 20, 2018.

Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600/2-78-054 "Field and Laboratory Methods Applicable to Overburden and Mining Soils", 1978
American Society of Agronomy, Number 9, Part 2, 1982
USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils", 1969
Wyoming Department of Environmental Quality, Land Quality Division, Guideline No. 1, 1984
New Mexico Overburden and Soils Inventory and Handling Guideline, March 1987
State of Utah, Division of Oil, Gas, and Mining: Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April 1988
Montana Department of State Lands, Reclamation Division: Soil, Overburden, and Regraded Spoil Guidelines, December 1994
State of Nevada Modified Sobek Procedure
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

All Quality Control parameters met the acceptance criteria defined by EPA and Inter-Mountain Laboratories except as indicated in this case narrative.

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Canyon Fuel Company, LLC.
397 South 800 West
Salina, UT 84654

Report ID: S1807333001

Project: Quarterly Wasterock
Date Received: 7/20/2018

Date Reported: 9/4/2018
Work Order: S1807333

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Calcium PE	Magnesium PE	Sodium PE	SAR	Alkalinity PE	Boron	Selenium
		s.u.	%	dS/m	meq/L	meq/L	meq/L		ppm	ppm	ppm
S1807333-001	WRDS 2nd Quarter May 2018	8.1	57.5	0.66	1.73	1.35	4.02	3.23	150	2.09	0.02
S1807333-002	WRDS 2nd Quarter May 2018	8.3	55.8	0.64	1.90	1.44	3.93	3.04	150	1.93	<0.02

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Canyon Fuel Company, LLC.

397 South 800 West
Salina, UT 84654

Report ID: S1807333001

Project: Quarterly Wasterock

Date Received: 7/20/2018

Date Reported: 9/4/2018

Work Order: S1807333

Lab ID	Sample ID	Total Sulfur %	T.S. AB t/1000t	Neutral. Potential t/1000t	T.S. ABP t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyriticS AB t/1000t	PyriticS ABP t/1000t
S1807333-001	WRDS 2nd Quarter May 2018	0.42	13.1	42.4	29.4	<0.01	0.03	0.38	0.89	41.5
S1807333-002	WRDS 2nd Quarter May 2018	0.41	12.7	34.8	22.1	0.02	0.05	0.33	1.65	33.1

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor

Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEBsufco072018

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Canyon Fuel Sufco Mine		Amanda Richard	(435) 286-4489

Report Address	Contact Name
597 South SR 24 Salina, UT 84654	Amanda Richard Email: arichard@bowieresources.com Phone: (435) 286-4489

Invoice Address	Purchase Order #	Quote #
597 South SR 24 Salina, UT 84654	390277	

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Soil Alkalinity	Calcium Chloride Boron/Selenium	Electrical Conductivity	Neutralization Potential	pH	Saturated Paste Cation by EPA	Saturated Percent	Sulfur Forms	REMARKS
1	1807333-001 AC	05/16/18	10:05	WRDS 2nd Quarter May 2018	WR	1	X	X	X	X	X	X	X	X	
2	002 AC	05/25/18	12:43	WRDS 2nd Quarter May 2018	WR	1	X	X	X	X	X	X	X	X	
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
	Amanda Richard	7/17/18	930 am	Karen A Secor	7/20/18	1025

SHIPPING INFO
- ☒ UPS
- ☐ FedEx
- ☐ USPS
- ☐ Hand Carried
- ☐ Other

MATRIX CODES

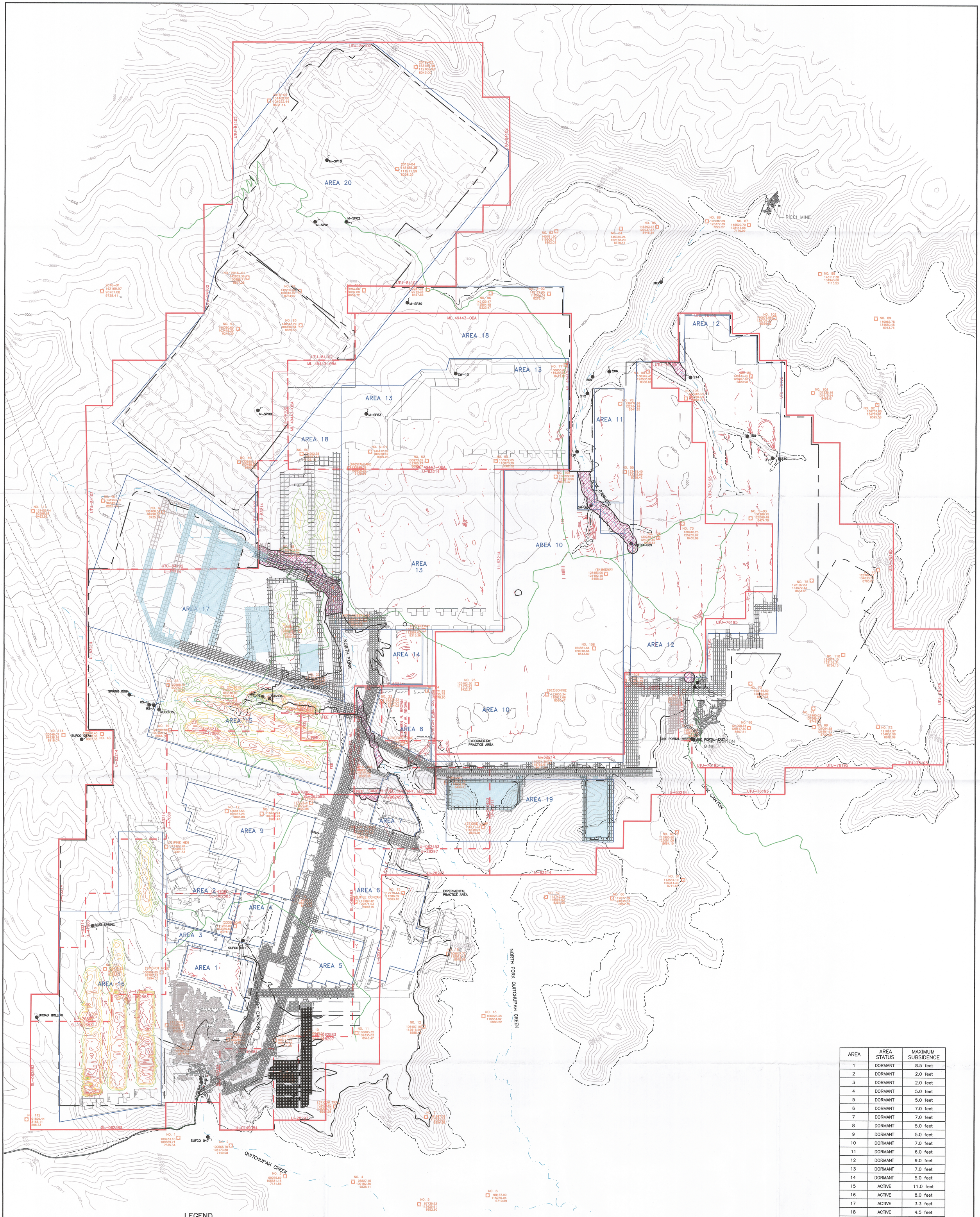
Water	WT
Soil	SL
Solid	SD
Filter	FT
Other	OT

TURN AROUND TIMES
Check desired service
- ☒ Standard turnaround
- ☐ RUSH - 5 Working Days
- ☐ URGENT - < 2 Working Days

Rush & Urgent Surcharges will be applied

COMPLIANCE INFORMATION
Compliance Monitoring ? Y / N
Program (SDWA, NPDES,...)
PWSID / Permit #
Chlorinated? Y / N
Sample Disposal: Lab Client

ADDITIONAL REMARKS



AREA	AREA STATUS	MAXIMUM SUBSIDENCE
1	DORMANT	8.5 feet
2	DORMANT	2.0 feet
3	DORMANT	2.0 feet
4	DORMANT	5.0 feet
5	DORMANT	5.0 feet
6	DORMANT	7.0 feet
7	DORMANT	7.0 feet
8	DORMANT	5.0 feet
9	DORMANT	5.0 feet
10	DORMANT	7.0 feet
11	DORMANT	6.0 feet
12	DORMANT	9.0 feet
13	DORMANT	7.0 feet
14	DORMANT	5.0 feet
15	ACTIVE	11.0 feet
16	ACTIVE	8.0 feet
17	ACTIVE	3.3 feet
18	ACTIVE	4.5 feet
19	ACTIVE	N/A
20	ACTIVE	N/A

LEGEND

- COAL OUTCROP
- OVERBURDEN CONTOUR
- PERENNIAL STREAM
- ESCARPMENT
- FOREST ACCESS ROAD
- TENSION CRACKS
- SUBSIDENCE LIMITS
- U-28297 EXTERIOR LEASE LINE
- SL-062583 INTERIOR LEASE LINE
- AERIAL TARGET
- DRAW ANGLE
- SURVEY STATION
- -0' SUBSIDENCE CONTOUR
- -2' SUBSIDENCE CONTOUR
- -3' SUBSIDENCE CONTOUR
- -4' SUBSIDENCE CONTOUR
- -5' SUBSIDENCE CONTOUR
- -6' SUBSIDENCE CONTOUR
- -7' SUBSIDENCE CONTOUR
- PERENNIAL STREAM BUFFER ZONE
- ONE YEAR PROJECTION
- MONITORED SPRING
- RUNOFF POND

1200 0 1200

I CERTIFY THIS MAP TO BE CORRECT TO THE BEST OF MY KNOWLEDGE.

REVISIONS				
NO.	DATE	REQ. BY	DWG. BY	REMARKS
22	11-14-11	KBB	KBB	ANNUAL UPDATE
23	11-14-11	KBB	KBB	ANNUAL UPDATE
24	09-30-12	TRB	TRB	ANNUAL UPDATE
25	12-11-14	JKM	TRB/JKM	ANNUAL UPDATE
26	12-08-16	JKM	JKM	ANNUAL UPDATE
27	02-02-17	JGC	JGC	ANNUAL UPDATE
28	01-31-18	JGC	JGC	ANNUAL UPDATE
29	03-18-19	JGC	JGC	ANNUAL UPDATE

Canyon Fuel Company, LLC
SUFCO Mine
597 South SR 24 – Salina, UT 84654
(435) 286-4880 Phone
(435) 286-4499 Fax

Sufco Mine Subsidence Map

PEN TBL:	SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
_1Sfndrd-SUFENP1.ctb	1" = 1400'	3/15/2018	J.G.C.	J.D.S.	J.D.S.	Map 1
SHT SET: ####	PROJECT NUMBER: ####	FILE NAME: H:\DRAWINGS\MRP\Subsidence\SUBSIDMAP\dwg\SUBSIDMAP 2018.dwg				

GREENS HOLLOW LEASE

SITLA MUDDY LEASE

QUITCHUPAH LEASE

PINES LEASE

FUTURE LOWER HIAWATHA POINT OF ACCESS FROM UPPER HIAWATHA

RICCI MINE

LINK CANYON MINE

EXPLANATION

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- ESCARPEMENT
- OUTCROP
- PROPOSED LEASE BOUNDARY

MINING LEGEND

- REMAINING 2017
- 1ST QUARTER 2018
- 2ND QUARTER 2018
- 3RD QUARTER 2018
- 4TH QUARTER 2018
- 2019
- 2020
- 2021
- 2022

PROFESSIONAL ENGINEER No. 9073281 JACOB D. SMITH STATE OF UTAH 3/5/19

I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE

1500 0 1500

REVISIONS

NO.	DATE	REQ. BY	DWG. BY	REMARKS
12	4/13/2017	V.M.	B.R.	GREENS HOLLOW
13	12/19/2017	B.B.	B.R.	Add 4R4E Panel
14	3/27/2018	V.M.	B.R.	GREEN HOLLOW TECHNICAL ANALYSIS
15	10/31/2018	V.M./B.B.	J.G.C.	ADDED PROPOSED SOUTH FORK LEASE
16	1/15/2019	V.M.	J.G.C.	ADDED PINE EAST

Canyon Fuel Company, LLC
SUFCO Mine
597 South SR 24 – Salina, UT 84654
(435) 286-4880 Phone
(435) 286-4499 Fax

SUFCO MINE PLAN 5 YEAR PROJECTION

PEN TBL:		SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
_Shdvl-SUFEXPT.ctb		1" = 1,500'	03/01/2000	B.D.H.	JDB	VM	PLATE 5-7
SHT SET: ####	PROJECT NUMBER: ####	FILE NAME: H:\DRAWINGS\MRP\PLATES\PLATE 5-7.dwg					