Williams Fork Mine

2019 ANNUAL HYDROLOGY REPORT
Permit No. C-1981-044

Submitted to:

Colorado Division of Reclamation Mining and Safety
Denver, Colorado

Submitted by:

Moffat County Mining, LLC
Oak Creek, Colorado

March 2020

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2019 ANNUAL HYDROLOGY REPORT

1.0 INTRODUCTION

The following Annual Hydrology Report (AHR) presents hydrologic monitoring data from the Williams Fork underground mine sites near Craig, Colorado for the 2019 calendar year. Site locations are described below. This AHR is provided in fulfillment of reporting requirements under the Colorado State Division of Reclamation, Mining and Safety (DRMS), Permit No. C-81-044. All references to "2019" in this report refer to the 2019 calendar year (January 1, 2019 through December 31, 2019). Monitoring results for prior calendar years (1983 through 2017) are presented in previous AHRs, although selected historical data (period of record – POR) are summarized in some of the tables and figures within this AHR.

Following a discussion of Site Location and Background, this AHR provides a section on the 2019 Hydrologic Monitoring Program, which is further divided into the following subsections:

1) Groundwater Monitoring
2) Surface Water Monitoring

This is followed by the Summary and Conclusions Section. Tables, Figures, and back-up documentation are located in the tabbed sections at the back of this AHR.

2.0 SITE LOCATION AND BACKGROUND

Williams Fork No. 5 and Eagle No. 6 Mines are underground coal mines located approximately seven miles south of Craig, Colorado, on State Highway 13. The mine sites, and adjacent area lie along the northern foot of the Williams Fork Mountains, which trend east to west. The elevation of the permit area ranges from a low of approximately 6,130 feet in the Big Bottom area, to a high of about 7,400 feet in the Williams Fork Mountains. The entire operation is located in Moffat County, Colorado. The general location of the site is shown on Figure 1.

There are two (2) major northwestern Colorado Rivers, which intersect the permit area. These are: 1) the Yampa River and 2) the Williams Fork River. The Yampa River runs from north to south through the permit area, while the Williams Fork River runs from south to north and intersects the Yampa River just north of the mine facilities area. The northern portion of the permit area is dominated by the Big Bottom alluvium, while the southern and eastern portions of the permit area are dominated by the Williams Fork Mountains and the river beds of the Yampa and Williams Fork Rivers.

The Eagle Mine sites are located in an area, which has been historically mined by surface and underground mining. The earliest records of mining indicate that underground mining began in this area in the late 1920's and early 1930's, while surface strip mining began around 1975. The major mines which have operated in the past are: 1) Wise Hill (1,2,3,4), Williams Fork Strip (1,2,3), and Trapper Strip. The Trapper Strip Mine began operations in 1976 and has continued to date.

Underground mining began at the Eagle No. 5 Mine in 1972, under a subsidiary of the Zigler Coal Co. The Cyprus Empire Corporation (CEC), a subsidiary of the Cyprus Coal Company, subsequently acquired the mines from Zigler in 1982, and began operating under an approved Colorado Mine Land Reclamation Board permit in August, 1983. In 1999**,** CEC was acquired by RAG EC. In April 2004, RAG EC was acquired by Peabody Energy, with the mine owned by Peabody's subsidiary, BTU, and the mine name changing to BTU Empire Corporation (BTU EC). In December 2009, the mine name was changed to William's Fork Mine (WFM)

Hydrologic monitoring has been conducted at the mine site since 1980, primarily by CEC/RAG EC/BTU EC/WFM personnel. A private company (Miller Water Monitoring Service) has also been contracted to assist with some of the hydrologic monitoring over the last few years. Water quality samples are currently analyzed by ACZ Laboratories, Inc., of Steamboat Springs, Colorado, an USEPA certified laboratory.

The Eagle No. 5 Mine, mining the "F" Coal Seam of the Cretaceous Age Williams Fork Formation, originally utilized room-and-pillar mining methods until 1985, when economics dictated a change to the longwall mining method. The aerial extent of the underground workings in the Eagle No. 5 Mine was approximately 2,040 acres in early 1990, when the No. 5 mine was sealed and mining moved to the Eagle No. 6 Mine. Full production in the Eagle No. 6 Mine began in late 1990, with coal extraction from the underlying "E" Coal Seam of the Williams Fork Formation. Coal mined at the No. 5 and No. 6 Mines was loaded on unit trains at the mine facility area and hauled by rail to market. The 5A portals and a short section of the No. 5 Mine mains were used for access to the Eagle No. 6 Mine. The aerial extent of the underground workings in the Eagle No. 6 Mine (underlying portions of the No. 5 Mine) was approximately 640 acres at in late 1995, when mining ceased. The mines were subsequently in temporary cessation (TC), until Williams Fork re-activated water monitoring during the second quarter of 2006, in anticipation of WFM considering options for future re-activation of the mine site, and because a bond release application was also being contemplated for the Utah Tract and Williams Fork Strip Pit portions of the mine property.

During the third quarter of 2013, the mine reverted back to TC monitoring (discussed further below). In July 2013 all power was shut down on the mine property. Within a month or so of the shut-down, the site substation was partially dismantled.

In May 2014, copper thieves were discovered on site and apprehended by the Moffat County Sherriff's

department. The thieves activities had resulted in $500,000 to one million dollars-worth of damage between the main warehouse and the multi-services building on site. Security cameras were subsequently installed on site, and a security company was hired to inspect the site daily.

In November 2016, WFM requested deactivation of TC status, in anticipation of upcoming reclamation of the site. Reclamation continued through 2019 and is expected to be finalized in 2020. DRMS will be updated periodically with the status of the reclamation.

3.0 2019 HYDROLOGIC MONITORING PROGRAM

The WFM hydrologic monitoring program includes data collected specifically to meet requirements of the DMG, as well as data collected to meet the requirements of the Colorado Wastewater Discharge Permit System (CDPS). Note that "CDPS" parameters were formerly referred to as National Pollutant Discharge Elimination System (NPDES) parameters in prior AHRs. Specific monitoring locations are illustrated on Figure 2.

In June 2001, Technical Revision TR01-32 was approved, allowing suspension of many DRMS hydrologic monitoring requirements while the mine was in temporary cessation (TC). In 2005 BTU EC began to exam options for future re-activation of the mine site. In view of this considerations, BTU EC reverted back to the active monitoring plan (pages 1 – 14 of Exhibit 29), during the second quarter of 2006. In the third quarter of 2013 the mine reverted back to temporary cessation monitoring, as it was decided that there were no short term plans to reactivate mining.

WFM personnel is responsible for adhering to the monitoring requirements of its CDPS permit. Note that data acquisition required under the TC monitoring plan, only include sites:

- Bedrock well TR-7A,
- Alluvial well AVF-5,
- Surface water sites (Williams Fork) WF-1, WF-2,
- CDPS (Permit CO-0034142) sites:
    - 1) Mine discharge No. 5 Mine sump [CDPS Outfall 003, a.k.a. site 5D];
    - 2) Mine discharge 7 North Angle Well Bore [CDPS Outfall 024, a.k.a. site 9P3], and
    - 3) Spring - No. 1 StripPit [CDPS Outfall 022, a.k.a. site 1SP].

In 2017 TC was lifted and reclamation of the mine site began.

Table 1A presents a summary of hydrologic monitoring requirements for these sites under TC (modified from TR01-32, Appendix D of the TC monitoring plan). Table 1B outlines monitoring and sites required when off

of TC. Water quality monitoring includes field parameters (Table 2), surface water quality parameters under TC (Table 3A), and off of TC (Table 3B). CDPS parameters (Table 4) are the monitoring requirements page from CDPHE CDPS permit CO-0042142.

3.1 Groundwater Monitoring

3.1.1 Bedrock Wells

Three sandstone aquifers are found beneath the subject site. In ascending order, they are: Trout Creek Sandstone, Middle Sandstone, and Twentymile Sandstone. The Eagle No. 5 and Eagle No. 6 Mines are located between the Trout Creek Sandstone and the Middle Sandstone.

Water Levels

Trout Creek Sandstone: Water level measurements in the Trout Creek Sandstone No. 5 Mine well are shown on Figure 3. Historical annual water level fluctuations of 20 to 200 feet have been observed at this well but no seasonal pattern is evident. Note that recent water levels (2006 to date) were lower than levels measured prior to TC. This drop is apparently from consistent subsurface dewatering with the No. 5 mine pump. Levels remained relatively consistent from 2006 through 2008. There was a general rise in water level of about 40 feet in 2009, through 2012. This is due to periodic down time from malfunctions of the No. 5 mine pump. During the last quarter of 2012, the pump failed, resulting in no discharge. The pump was replaced in the spring of 2012, but stopped operating in July 2013 when power was removed from the site. Note the higher water level for No 5 at the end of 2019 indicates how the water level had risen without pump dewatering over the years. The former Okie Plaza Trout Creek well was abandoned in June 1994 as mining advanced through its location.

Middle Sandstone: The water levels in the Middle Sandstone formation as measured in wells TR-4, TR-7a, 81-01, 83-01, 83-02, and 83-03. Historically these show fluctuations which are apparently related to dewatering and past subsidence associated with Mines 5 and 6. Wells TR-4 water levels appear to be slightly rising since about 2008 (Fig. 4). Levels in TR-7A (Fig. 5) have risen about 50 feet since 2013. 81-01 in 2018 is relatively consistent with that seen prior to TC (Fig. 6). The water levels in 83-01 (Fig. 7) have been on the rise since monitoring was reactivated in 2006. The water levels in well 83-02 (Fig. 8) are consistent with those found since monitoring was reactivated in 2006. The water level decline of about 150 feet from 1987 to mid 1990 in well 83-02 was determined to be related to mine dewatering as Mine 5 workings approached the location of the well. The more abrupt 200 foot decline in water levels observed in 1990 is thought to be a drawdown response due to subsidence as it is located only a few hundred feet horizontally from an F seam longwall panel which was mined in a similar time frame. The water level stabilized until 1994 when it recovered to the 1983 levels. Water levels in 83-02 have been stabile since 2006.

Wells TR-4 and 83-03 are located at greater distance horizontally from the active operations for mines 5 and 6. Water levels in Well TR-4 (Fig. 4) historically appear to be related to the fluctuations observed on all three of the down gradient Middle Sandstone Wells: 81-01, 83-01 and 83-02. The water level decline in TR-4

prior to 1984 and the subsequent recovery up to 1988 closely parallels the trends observed in Wells 81-01 and 83-01. The decline during the first part of 1991 also parallels the trend in these two wells. However, the rapid decline during the last part of 1989 and the first part of 1990 appears to follow the trend observed in Well 83-02 although the magnitude of decline is considerably less. Unusually large fluctuations for TR-4 for 1999 through 2000 have been attributed to a faulty pressurized line system.

Well 83-03 (Fig.9) is the Middle Sandstone monitoring well located furthest (more than 1.5 miles) from active underground operations for Mines 5 and 6. The overall trend from 1984 through 2000 and again in 2006 to date suggests a similar trend to the other Middle Sandstone wells. The long term decline could be a pressure response due to the overall drop in potentiometric levels in the Middle Sandstone in the vicinity of Mines 5 and 6. The water levels in the Middle Sandstone wells had either recovered or stabilized in 1995. Note that in early 2008 and 2009 there were drops in the water level. The largest drop being approximately 25 feet in early 2009, after which water levels stabilized and started to rise again in 2012. The reason for the drops is unclear, but the level has stabilized in 2018.

Historically, the groundwater gradient in the Middle Sandstone in the vicinity of the mining operation generally decreases from the southeast to the northwest.

Twentymile Sandstone: Monitoring results to date (Fig. 10) showed no apparent change in the water levels in the Twentymile Sandstone that could be attributable to mining activities. During 2019, wells 259 and 84-01 remained relatively stable as compared to 2006 through 2013, although 84-01 exhibited a slight drop in water level. 9 Mine well exhibited a rise in water elevation in 2011, and re-stabilized through 2019. Note that in 2006 the first reading of the 9 mine well appeared elevated, and subsequently leveled off until rising in 2011 and has been stable through 2019. The elevated reading may be attributed to an error in monitoring equipment, as a pressurized reading was first attempted, and subsequent readings have used a water level meter.

Historically, the groundwater gradient in the Middle Sandstone in the vicinity of the mining operation generally decreases from the southeast to the northwest.

Water Quality

Trout Creek Sandstone: The field parameter data for No. 5 Mine well does not suggest any significant mining related water quality impacts to the Trout Creek Sandstone. The water quality data for this Trout Creek Sandstone well is summarized on Table 5. A plot of field conductivity measurements is presented in Figure 11. Note that conductivity values for the No. 5 Mine well following the 2006 removal from TC appear elevated compared to earlier historical values. This may be related to consistent pumping at this site. Note that the No. 5 dewatering pump was damaged during the fourth quarter of 2010, and was removed and replaced with another pump in June 2012 when the area was dry enough to bring in a crane. In July 2013 all power was removed from the facility, and pumping ceased.

Middle Sandstone: The field parameter data for the three Middle Sandstone wells (TR-4, TR-7A, 81-01) was reviewed. Water quality data are summarized in Tables 6 through 11. Plots of field conductivity for these Middle Sandstone Wells are presented in Figure 12. The conductivity measurements recorded in wells TR-7A , TR-4, and 81-01 remain stable as compared to recent historic values. Note that wells TR-4 and 81-01 exhibited elevated conductivity values after monitoring was re-initiated in 2006 when removed from TC. The reason for that effect is unknown.

Wells TR-7A and TR-4 have historically indicated a slight reduction in concentrations of major ions over time. Historically, all three wells have shown a reduction in concentrations of iron which shows considerable variation in concentrations. The general reduction in iron concentrations may be the result of better purging of well bore volumes prior to sampling.

Twentymile Sandstone: The 2018 field parameter data for the two Twentymile Sandstone wells 259, does not suggest a significant impact or trend. Figure 13 shows historical conductivity data. The 9 Mine well exhibited a rise in conductivity in 2010, appeared to stabilize in mid-2011 and went up again in 2016 but has since stabilized. Water quality data for these Twentymile Sandstone wells are summarized in Tables 12 through 14. Measurements for well 259 during 2012 appeared to follow the 9 mine well increase in conductivity, almost mirroring it. The two jumps in conductivity may be related, however an explanation is unknown at this time. The conductivity at for the 9 Mine well was stable during 2019.

In summary, elevated conductivity values were detected in the Trout Creek and Middle Sandstones. However the overall water quality of these, as well as the Twentymile Sandstone does not indicate obvious adverse impacts related to Mines 5 and 6.

3.1.2 Mine Water Discharge

The 7 North Angle (7NA) well site (associated with CDPS Outfall 024, a.k.a. site 9P3 by DRMS) was a mine dewatering well site that would eventually discharge into the Williams Fork River. The Eagle No. 5 Mine sump discharge is CDPS Outfall 003, a.k.a. site 5D. It is also a mine dewatering pump. Under TC, monitoring of these sites remains the same as in the active mining monitoring plan, however 9P3 has not discharged since 2001, and no near future discharge is anticipated.

Site 5D has not discharged since about July 2013, when power was removed from the site. No near future discharge is anticipated from this site either. Please consult prior AHRs for historical data.

There was no active pumping performed at the mine since July 2013. A plot of the measured discharge for this point is presented in Figure 14. Figure 15 is a historical monthly tabulation of flow measurements.

3.1.3 ALLUVIAL WELLS

Under TC, water data in the Williams Fork River Alluvium is monitored via alluvial well AVF-5, which is located adjacent to the underground discharge sediment ponds area (See Figure 2). Under TC, AVF-5 is measured for water level and field parameters on an annual basis (between July 20th and August 30th) concurrent with the Williams Fork surface water sampling (site WF-1). No water quality analyses were required for AVF-5 under TC.

Out of TC, alluvial wells AVF-3, AVF-5, and AVF-6 require quarterly water quality monitoring (See Table 1B). These wells are located in the general area of the loadout facilities and underground discharge sediment ponds. Historically, groundwater levels in the alluvium have remained fairly regular, with normal seasonal fluctuations, apparently related to changes in river levels. POR groundwater levels are plotted in Figure 16. The data indicates no impact on alluvial water levels related to mining.

Field parameter data for these alluvial wells are presented in Tables 15 through 17. POR water quality data is provided in Tables 15A through 17A. A plot of field electric conductivity versus time is presented in Figure 17. There has been no conclusive evidence of seasonal variation of water quality in the alluvium. The wells were within historic levels in 2019.

3.2 Surface Water Monitoring

3.2.1 Rivers

There are two rivers in the vicinity of the mine site. The Yampa River, flows in a southeasterly direction across the mine site. The Yampa River drains most of the northeast corner of Colorado and part of south-central Wyoming. The second river is the Williams Fork, which is a major tributary of the Yampa River. The Williams Fork River joins the Yampa River on the mine property. Monitoring data is collected for the Williams Fork River. The Williams Fork River gaging station (WF-2) is near the confluence with the Yampa River, downstream of the Eagle No. 5 Mine discharge. The staff gage (WF-1) is located upstream of the mine discharge points. WF-2 is also monitored concurrent with WF-1.

The flow data for WF-2 was historically provided by the United States Geologic Survey (USGS) via one gaging station and one staff gage for collection of Williams Fork River flow data (former site 09249750). however, their monitoring of the Williams Fork stations was discontinued in 2001. In 2010 the State Division of Water Resources (Office of State Engineer) reactivated the site. Data for the former USGS site can be found on the State Water Resources website under station No. WMFKMHCO. A copy of their 2019 daily average flow data is provided at the back of this AHR under Support Data.

Historically, comparisons between up gradient site WF-1, and down gradient site WF-2, have not show any stream depletion impacts from mine dewatering. Summaries of WF-1 and WF-2 water quality data are presented in Tables 18 through 19. POR data is provided in Tables 18A and 19A, respectively. A plot of upstream and downstream dissolved solids measurements for the river is presented in Figure 18. Water quality data does not show any significant variation from expected values. The comparisons of data from the upstream and downstream station on the Williams Fork River indicate that there is no detectable effect of mining on river water quality. As expected, dissolved solids decrease with increasing flow rate in the rivers, due to dilution from runoff.

3.2.2 Springs

There is one active spring on the mine site area, known as the No. 1 Strip Pit Discharge, or 1SP. There are a few other ephemeral springs and local permanent "damp spots" in the area; however, their combined flow is normally less than 5-10 gpm, and therefore are not significant. The 1SP Discharge is a CDPS monitoring

point (Outfall 022). There is no sediment pond associated with this spring. Spring water runs down a narrow path through a vegetative filter, drops down onto an isolated sand bar, and during the spring discharges directly to the Williams Fork River. The POR discharges for the 1SP are presented in Figure 19. 2019 discharge data is presented in Figure 20. The site flows sporadically during the spring. The discharge typically begins in March during the spring melt, and may be dry by the end of June. 1SP is typically dry from July through November, and freezes over from December into February/March.

Table 20 provides 2019 data for this site, while Table 20A provides POR data. A plot of POR total dissolved solids for 1SP is presented in Figure 21, and POR iron concentrations are presented on Figure 22. Figure 21 indicates TDS concentrations that are consistent with historic concentrations. Figure 22 illustrates the variable nature of total recoverable iron concentrations in 1SP discharge. Since 2002 there has been slight general upward trend in iron concentrations, however these levels are still within historic ranges seen for this site. We will continue to monitor this trend.

3.2.3 Ponds

There was no recorded discharge from any on-site sediment ponds in 2019.

4.0 SUMMARY AND CONCLUSIONS

The subject mine site ceased active mining operations in 1995, thus total mined acreage has not changed since then. The mine was subsequently placed in Temporary Cessation in 2001. The TC status ended in the second quarter of 2006, when WFM re-activated full water monitoring activities in anticipation of future re-activation of the mine site, and because a bond release application was also being contemplated for the Utah Tract and Williams Fork Strip Pit portions of the mine property. After the second quarter of 2013, the mine was again placed in TC, as no near future mining activities were anticipated. The site was taken off TC in November 2016 for reclamation and will continue until further notice. DRMS will be notified of our intensions well in advance.

No significant, unpredicted, or adverse environmental impacts were noted during hydrologic monitoring for 2019. All environmental precautions have been taken to a max extent during the reclamation process. BMP are being followed. During 2018 most of the major structures were demolished and removed from site. Final grading started in 2019 and reclamation should be finalized in 2020.

TABLES

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18A.) Historical Data, Site WF1, Williams Fork River Upstream
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19A.) Historical Data, Site WF2, Williams Fork River Downstream
20.) 2019 Monitoring Data, CDPHE Site 1SP, Spoil Spring
20A.) Historical Data, CDPHE Site 1SP, Spoil Spring

TABLE 1A
SUMMARY OF HYDROLOGIC MONITORING STATIONS UNDER TEMPORARY CESSATION

BEDROCK WELLS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	DEPTH (ft)	SCREEN INTERVAL (ft)	FREQUENCY OF MEASUREMENT* WATER LEVEL	FIELD PARAMETER**	FULL QUALITY**	COMMENTS
TR-7A	Middle SS	6,244.30	740	624-725	A	A	NA	

ALLUVIAL WELLS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	DEPTH (ft)	FREQUENCY OF MEASUREMENT* WATER LEVEL	FIELD PARAMETER**	FULL QUALITY**	COMMENTS
AVF-5	Wms. Fk. Alluvial	6,132.59	16	A	A	NA	.

MINE DISCHARGES

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	FREQUENCY OF MEASUREMENT* WATER LEVEL	FIELD PARAMETER**	CDPS	FULL QUALITY**	COMMENTS
No. 5 Mine Sump	F Seam	6,300-5,600	W	W	Outfall 003 (5D)	S/Q	No Discharge in 2014
7 N. Angle Sump	F Seam		W	W	Outfall 024 (9P3)	S/Q	No Discharge in 2014

SURFACE WATERS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	FREQUENCY OF MEASUREMENT* WATER LEVEL	FIELD PARAMETER**	CDPS	FULL QUALITY**	COMMENTS
WF-1	Wms. Fk. Upstrm	6,142.39	A	A	NA	A	
WF-2	Wms. Fk. Dwnstrm	6,119.87	A	A	NA	A	

SPRINGS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	FREQUENCY OF MEASUREMENT* WATER LEVEL	FIELD PARAMETER**	CDPS	FULL QUALITY**	COMMENTS
No. 1 Strip Pit	Spoils	6,120.00	W	W	Outfall 022 (1SP)	S/Q	Limited discharge in 2014

* W=Weekly, S=Semi-Monthly, M=Monthly, Q=Quarterly, A=Annually

** Surface water parameters for surface water stations, and CDPS parameters for mine discharges and No. 1 Strip Pit

TABLE 1B
SUMMARY OF HYDROLOGIC MONITORING STATIONS
BEDROCK WELLS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	DEPTH (ft)	SCREEN INTERVAL (ft)	FREQUENCY OF MEASUREMENT*			COMMENTS	
					FLOW LEVEL	FIELD PARAMETER**	FULL QUALITY**		
No. 5 Mine Well	Trout Creek SS	6,143.62	437	400-437	Q	Q	A	Water Supply	No Power
Okie Plaza Well	Trout Creek SS	6,551.68	800					Abandoned 6/94	
TR-4	Middle SS	6,308.30	1,335	1,230-1,330	Q	Q	A		
TR-7A	Middle SS	6,244.30	740	624-725	Q	Q	A		
81-01	Middle SS	6,413.00	533	384-533	Q	Q	A		
83-01	Middle SS	6,172.13	509	405-509	Q				
83-02	Middle SS	6,678.50	708	620-708	Q				
83-03	Middle SS	6,131.22	1,640	1,520-1,640	Q				
259	Twentymile SS	6,128.00	104	18-104	Q	Q	A		
84-01	Twentymile SS	6,307.47	962	585-959	Q				
No. 9 Mine Well	Twentymile SS	6,383.29	600		Q	Q	A	Water Supply	

* C=Continuous, D=Daily, W=Weekly, S=Semi-Monthly, M=Montly, Q=Quarterly, A=Annually
** Groundwater Parameters

TABLE 1B - CONTINUED
SUMMARY OF HYDROLOGIC MONITORING STATIONS

ALLUVIAL WELLS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	DEPTH (ft)	FREQUENCY OF MEASUREMENT* FLOW LEVEL	FIELD PARAMETER**	FULL QUALITY**	COMMENTS
AVF-3	Wms. Fk. Alluvial	6,137.95	17	Q	Q	Q	
AVF-5	Wms. Fk. Alluvial	6,132.59	16	Q	Q	Q	Replaced AVF-5 9/82
AVF-6	Wms. Fk. Alluvial	6,146.23	16	Q	Q	Q	

MINE DISCHARGES

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	FREQUENCY OF MEASUREMENT* FLOW LEVEL	FIELD PARAMETER**	NPDES	FULL QUALITY**	COMMENTS	
No. 5 Mine Sump	F Seam	6,300-5,600	W	W	S/Q	--	NPDES # 003	NO Flow 2019
7 N. Angle Sump	F Seam		W	W	S/Q		NPDES #024 (9P3)	NO Flow 2019

SURFACE WATERS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	FREQUENCY OF MEASUREMENT* FLOW LEVEL	FIELD PARAMETER**	NPDES	FULL QUALITY**	COMMENTS
WF-1	Wms. Fk. Upstrm	6,142.39	M	M	--	Q	
WF-2	Wms. Fk. Dwnstrm	6,119.87	C	M	--	Q	

SPRINGS

STATION NAME	WATER SOURCE	DATUM ELEVATION (ft)	FREQUENCY OF MEASUREMENT* FLOW LEVEL	FIELD PARAMETER**	NPDES	FULL QUALITY**	COMMENTS
No. 1 Strip Pit	Spoils	6,120.00	W	W	S/Q	--	NPDES #022

* C=Continuous, D=Daily, W=Weekly, S=Semi-Monthly, M=Monthly, Q=Quarterly, A=Annually

** Surface water parameters for surface water stations, ground water parameters for spring stations, and NPDES parameters for mine discharges and No. 1 Strip Pit

TABLE 2
FIELD PARAMETERS

PARAMETER	SAMPLE SOURCE		
	Ground Water	Surface Water	NPDES
Temperature	X	X	X
Conductivity	X	X	X
pH	X	X	X
Suspended Solids		X	
Flow		X	X
Depth	X		

TABLE 3A
FULL SUITE OF WATER QUALITY ANALYSES
UNDER TEMPORARY CESSATION

PARAMETER	SURFACE WATER
Conductivity	**X**
pH	**X**
Acidity (as CaCO3)	**X**
Solids, Total Dissolved	**X**
Solids, Total Suspended	**X**
Chloride	**X**
Iron, Total Recoverable	**X**
Manganese, Total Recoverable	**X**

TABLE 3B
FULL SUITE OF WATER QUALITY ANALYSES

PARAMETER	GROUND WATER	SURFACE WATER
Conductivity*	X	X
pH	X	X
Alkalinity (CaCO3)	X	
Acidity (as CaCO3)		X
Solids, Dissolved		X
Suspended		X
Calcium	X	
Magnesium	X	
Bicarbonate (as HCO3)	X	
Carbonate (as CO3)	X	
Chloride	X	
Sulfate	X	X
Hydroxide	X	
Arsenic	X	
Cadmium	X	
Lead	X	
Mercury	X	
Selenium	X	
Iron	X	X
Manganese	X	X
Zinc	X	
Boron	X	
Molybdenum	X	
Nitrate (as N)	X	

* umhos/cm3 @ 25 C

TABLE 4
NPDES PARAMETERS

PARAMETER	WEEKLY	BI-MONTHLY	MONTHLY	QUARTERLY	ANNUAL
Discharge Points 003, 022, and 024					
Flow	X				
pH	X				
Solids, Total Suspended		X			
Oil and Grease		X			
Solids, Total Dissolved				X	
Arsenic, Total			X		
Arsenic, PD			X		
Cadmium, PD			X		
Chromium, PD			X		
Chromium- Tri, TR			X		
Copper, PD			X		
Iron, TR		X			
Lead, PD			X		
Manganese, PD			X		
Mercury, Total			X		
Nickel, PD			X		
Selenium, PD			X		
Silver, PD			X		
Zinc, Total Recoverable		X	X		
Sulfide			X		
WET, Chronic					**X**

Table: 5
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 5MN, NO. 5 Mine Well, Trout Creek Sandstone Datum: 6143.62

Date	2/13/2019	5/13/2019	9/5/2019	11/12/2019
Depth to Water (FT)	54.09	54.13	46.46	45.23

Power has been disconnected and water level is low, unable to obtain sample.

Table: 6
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: T4, Well TR-4, Middle Sandstone Datum: 6308.3

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	23.68		18.21		19.32		20.47	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L			468.00	Y				
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L			112.00	Y				
ANION	Chloride	N	MG/L			36.80	Y				
ANION	Sulfates	N	MG/L			548.00	Y				
CATION	Calcium	D	MG/L			4.60	Y				
CATION	Magnesium	D	MG/L			2.80	Y				
CATION	Sodium	D	MG/L			503.00	Y				
FIELD	pH, Field	N	S.U.	8.81	Y	8.83	Y	8.78	Y	8.79	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	2210.00	Y	2210.00	Y	2200.00	Y	2200.00	Y
FIELD	Temperature, Field	N	DEG-C	10.30	Y	11.80	Y	12.10	Y	11.40	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L			0.10	N				
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L			580.00	Y				
PHYSICAL	Hardness	N	MG/L			23.00	Y				
PHYSICAL	Hydroxide as OH	N	MG/L			20.00	N				
PHYSICAL	pH, Lab	N	S.U.			9.10	Y				
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			2200.00	Y				
PRIMARY	Arsenic	D	UG/L			1.00	N				
PRIMARY	Cadmium	D	UG/L			0.30	N				
PRIMARY	Lead	D	UG/L			0.40	Y				
PRIMARY	Mercury	D	UG/L			1.00	N				
PRIMARY	Selenium	D	UG/L			0.30	N				
SECONDARY	Iron	D	UG/L			350.00	Y				
SECONDARY	Manganese	D	UG/L			50.00	N				
SECONDARY	Zinc	D	UG/L			50.00	N				
TRACE	Boron	D	UG/L			200.00	Y				
TRACE	Molybdenum	D	UG/L			100.00	N				

Table: 6A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: T4, Well TR-4, Middle Sandstone Datum: 6308.3

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	5/20/2009	5/3/2019	6	596.00	588.00	690.00	468.00	85.40
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	6/27/1996	5/3/2019	5	42.20	37.00	112.00	2.00	41.70
ANION	Chloride	N	MG/L	3/30/1981	5/3/2019	35	10.80	3.00	41.00	1.00	15.30
ANION	Sulfates	N	MG/L	3/30/1981	5/3/2019	35	153.00	33.00	620.00	2.00	234.00
CATION	Calcium	D	MG/L	7/8/1983	5/3/2019	27	7.80	4.00	100.00	2.00	19.00
CATION	Magnesium	D	MG/L	7/8/1983	5/3/2019	27	14.20	7.00	51.30	1.00	12.20
CATION	Sodium	D	MG/L	7/8/1983	5/3/2019	27	178.00	39.40	553.00	16.30	220.00
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	96	8.55	8.65	9.50	6.97	0.51
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	96	651.15	347.00	2410.00	180.00	664.85
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	92	11.50	11.00	26.50	4.50	2.97
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	3/30/1981	5/3/2019	35	0.05	0.03	0.10	0.02	0.04
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	3/30/1981	5/3/2019	31	318.00	239.00	630.00	117.00	180.00
PHYSICAL	Hardness	N	MG/L	5/5/2011	5/3/2019	7	31.00	33.00	42.00	18.00	8.60
PHYSICAL	Hydroxide as OH	N	MG/L	6/11/1992	5/3/2019	11	10.00	20.00	20.00	0.00	10.00
PHYSICAL	pH, Lab	N	S.U.	3/30/1981	5/3/2019	35	8.54	8.60	10.30	6.90	0.64
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	3/30/1981	5/3/2019	35	832.00	470.00	2340.00	180.00	810.00
PRIMARY	Arsenic	D	UG/L	7/8/1983	5/3/2019	27	3.00	1.00	40.00	1.00	8.00
PRIMARY	Cadmium	D	UG/L	7/8/1983	5/3/2019	27	5.00	5.00	50.00	0.30	9.00
PRIMARY	Lead	D	UG/L	7/8/1983	5/3/2019	27	18.00	20.00	50.00	0.10	14.00
PRIMARY	Mercury	D	UG/L	7/8/1983	5/3/2019	27	0.40	0.20	1.00	0.10	0.40
PRIMARY	Selenium	D	UG/L	7/8/1983	5/3/2019	27	1.00	1.00	2.00	0.20	0.50
SECONDARY	Iron	D	UG/L	3/5/1985	5/3/2019	26	336.00	85.00	1510.00	10.00	469.00
SECONDARY	Manganese	D	UG/L	7/8/1983	5/3/2019	27	17.00	10.00	54.00	5.00	12.00
SECONDARY	Zinc	D	UG/L	7/8/1983	5/3/2019	27	57.00	10.00	990.00	5.00	190.00
TRACE	Boron	D	UG/L	7/8/1983	5/3/2019	27	83.00	40.00	210.00	10.00	78.00
TRACE	Molybdenum	D	UG/L	7/8/1983	5/3/2019	27	60.00	50.00	200.00	5.00	50.00

Table: 7
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: T7A, Well TR-7A, Middle Sandstone Datum: 6244.3

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	108.14		102.11		103.07		104.2	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L			189.00	Y				
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L			24.80	Y				
ANION	Sulfates	N	MG/L			5.00	N				
ANION	Chloride	N	MG/L			2.00	Y				
CATION	Calcium	D	MG/L			7.00	Y				
CATION	Sodium	D	MG/L			31.30	Y				
CATION	Magnesium	D	MG/L			29.50	Y				
FIELD	pH, Field	N	S.U.	8.51	Y	8.08	Y	8.21	Y	8.36	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	400.00	Y	420.00	Y	410.00	Y	400.00	Y
FIELD	Temperature, Field	N	DEG-C	9.40	Y	11.20	Y	11.40	Y	11.10	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L			0.10	N				
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L			214.00	Y				
PHYSICAL	Hardness	N	MG/L			139.00	Y				
PHYSICAL	Hydroxide as OH	N	MG/L			20.00	N				
PHYSICAL	pH, Lab	N	S.U.			8.70	Y				
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			376.00	Y				
PRIMARY	Arsenic	D	UG/L			1.00	N				
PRIMARY	Cadmium	D	UG/L			0.30	N				
PRIMARY	Lead	D	UG/L			0.80	Y				
PRIMARY	Mercury	D	UG/L			1.00	N				
PRIMARY	Selenium	D	UG/L			0.30	N				
SECONDARY	Iron	D	UG/L			80.00	Y				
SECONDARY	Manganese	D	UG/L			20.00	Y				
SECONDARY	Zinc	D	UG/L			30.00	Y				
TRACE	Boron	D	UG/L			50.00	Y				
TRACE	Molybdenum	D	UG/L			100.00	N				

Table: 7A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: T7A, Well TR-7A, Middle Sandstone Datum: 6244.3

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	5/20/2009	5/3/2019	6	214.00	211.00	250.00	189.00	20.90
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	6/25/1996	5/3/2019	5	21.20	18.30	33.00	12.00	7.99
ANION	Chloride	N	MG/L	3/30/1981	5/3/2019	35	3.40	2.00	8.00	1.00	2.00
ANION	Sulfates	N	MG/L	3/30/1981	5/3/2019	35	22.90	12.00	85.00	1.00	21.90
CATION	Calcium	D	MG/L	6/29/1983	5/3/2019	27	7.30	5.00	28.00	2.00	5.90
CATION	Magnesium	D	MG/L	6/29/1983	5/3/2019	27	26.00	27.40	32.00	14.00	5.62
CATION	Sodium	D	MG/L	6/29/1983	5/3/2019	27	36.70	33.00	63.00	19.60	10.60
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	99	8.65	8.70	10.10	7.10	0.50
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	99	406.00	385.00	1320.00	122.00	123.00
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	94	11.70	11.80	21.00	5.40	2.49
NUTRIENT	Nitrate Nitrogen	N	MG/L	3/5/1985	4/11/2017	22	0.03	0.02	0.05	0.02	0.01
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	3/30/1981	5/3/2019	36	0.07	0.05	0.35	0.02	0.07
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	3/30/1981	5/3/2019	32	184.00	192.00	231.00	127.00	29.70
PHYSICAL	Hardness	N	MG/L	5/5/2011	5/3/2019	7	132.00	133.00	146.00	120.00	9.75
PHYSICAL	Hydroxide as OH	N	MG/L	6/11/1992	5/3/2019	11	10.00	20.00	20.00	0.00	10.00
PHYSICAL	pH, Lab	N	S.U.	3/30/1981	5/3/2019	35	8.72	8.80	10.14	6.50	0.58
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	3/30/1981	5/3/2019	35	379.00	370.00	600.00	265.00	61.10
PRIMARY	Arsenic	D	UG/L	6/29/1983	5/3/2019	27	3.00	1.00	40.00	1.00	8.00
PRIMARY	Cadmium	D	UG/L	6/29/1983	5/3/2019	27	4.00	5.00	10.00	0.10	2.00
PRIMARY	Lead	D	UG/L	6/29/1983	5/3/2019	27	27.00	20.00	290.00	0.70	54.00
PRIMARY	Mercury	D	UG/L	6/29/1983	5/3/2019	27	0.40	0.20	1.00	0.10	0.40
PRIMARY	Selenium	D	UG/L	6/29/1983	5/3/2019	27	1.00	1.00	2.00	0.30	0.50
SECONDARY	Iron	D	UG/L	3/5/1985	5/3/2019	26	283.00	60.00	3780.00	10.00	732.00
SECONDARY	Manganese	D	UG/L	6/29/1983	5/3/2019	27	24.00	20.00	50.00	10.00	11.00
SECONDARY	Zinc	D	UG/L	6/29/1983	5/3/2019	27	19.00	10.00	50.00	5.00	16.00
TRACE	Boron	D	UG/L	6/29/1983	5/3/2019	27	40.00	40.00	100.00	10.00	20.00
TRACE	Molybdenum	D	UG/L	6/29/1983	5/3/2019	27	60.00	50.00	200.00	10.00	50.00

Table: 8
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 01, Well 81-01, Middle Sandstone Datum: 6413.0

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	255.63		253.95		254.19		254.97	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L			306.00	Y				
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L			20.00	N				
ANION	Sulfates	N	MG/L			421.00	Y				
ANION	Chloride	N	MG/L			42.20	Y				
CATION	Calcium	D	MG/L			102.00	Y				
CATION	Sodium	D	MG/L			35.40	Y				
CATION	Magnesium	D	MG/L			111.00	Y				
FIELD	pH, Field	N	S.U.	7.28	Y	7.16	Y	7.23	Y	7.26	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1300.00	Y	1310.00	Y	1310.00	Y	1300.00	Y
FIELD	Temperature, Field	N	DEG-C	10.80	Y	10.90	Y	11.60	Y	11.00	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L			0.10	N				
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L			306.00	Y				
PHYSICAL	Hardness	N	MG/L			712.00	Y				
PHYSICAL	Hydroxide as OH	N	MG/L			20.00	N				
PHYSICAL	pH, Lab	N	S.U.			8.00	Y				
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			1320.00	Y				
PRIMARY	Arsenic	D	UG/L			1.00	N				
PRIMARY	Cadmium	D	UG/L			0.30	N				
PRIMARY	Lead	D	UG/L			0.20	Y				
PRIMARY	Mercury	D	UG/L			1.00	N				
PRIMARY	Selenium	D	UG/L			0.30	N				
SECONDARY	Iron	D	UG/L			3380.00	Y				
SECONDARY	Manganese	D	UG/L			180.00	Y				
SECONDARY	Zinc	D	UG/L			50.00	N				
TRACE	Boron	D	UG/L			40.00	Y				
TRACE	Molybdenum	D	UG/L			100.00	N				

Table: 8A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: 01, Well 81-01, Middle Sandstone Datum: 6413.0

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	5/20/2009	5/3/2019	6	397.00	398.00	480.00	306.00	67.80
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	5/20/2009	5/3/2019	3	10.00	20.00	20.00	1.00	10.00
ANION	Chloride	N	MG/L	5/20/2009	5/3/2019	8	34.50	40.00	44.30	7.00	13.10
ANION	Sulfates	N	MG/L	5/20/2009	5/3/2019	8	325.00	349.00	421.00	170.00	81.20
CATION	Calcium	D	MG/L	5/20/2009	5/3/2019	8	100.00	104.00	120.00	69.00	17.30
CATION	Magnesium	D	MG/L	5/20/2009	5/3/2019	8	95.80	103.00	111.00	54.00	18.70
CATION	Sodium	D	MG/L	5/20/2009	5/3/2019	8	34.70	34.60	48.70	22.00	7.42
FIELD	pH, Field	N	S.U.	2/13/2019	11/12/2019	4	7.23	7.25	7.28	7.16	0.05
FIELD	Specific Conductivity, Field	N	UMHOS/CM	2/13/2019	11/12/2019	4	1310.00	1310.00	1310.00	1300.00	5.77
FIELD	Temperature, Field	N	DEG-C	2/13/2019	11/12/2019	4	11.10	11.00	11.60	10.80	0.36
NUTRIENT	Nitrate Nitrogen	N	MG/L	5/20/2009	4/11/2017	4	0.05	0.05	0.05	0.05	0.00
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	5/5/2011	5/3/2019	14	0.09	0.10	0.10	0.03	0.03
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	5/20/2009	5/3/2019	8	342.00	345.00	390.00	283.00	37.70
PHYSICAL	Hardness	N	MG/L	5/5/2011	5/3/2019	7	662.00	663.00	736.00	588.00	53.20
PHYSICAL	Hydroxide as OH	N	MG/L	5/5/2011	5/3/2019	7	20.00	20.00	20.00	20.00	0.00
PHYSICAL	pH, Lab	N	S.U.	5/20/2009	5/3/2019	8	8.06	8.10	8.30	7.75	0.17
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	5/20/2009	5/3/2019	8	1210.00	1240.00	1370.00	880.00	165.00
PRIMARY	Arsenic	D	UG/L	5/20/2009	5/3/2019	8	1.00	1.00	2.00	1.00	0.50
PRIMARY	Cadmium	D	UG/L	5/20/2009	5/3/2019	8	0.50	0.50	0.50	0.30	0.07
PRIMARY	Lead	D	UG/L	5/20/2009	5/3/2019	8	0.90	0.40	5.00	0.10	2.00
PRIMARY	Mercury	D	UG/L	5/20/2009	5/3/2019	8	0.90	1.00	1.00	0.20	0.30
PRIMARY	Selenium	D	UG/L	5/20/2009	5/3/2019	8	0.71	0.30	2.00	0.30	0.74
SECONDARY	Iron	D	UG/L	5/20/2009	5/3/2019	8	5760.00	5740.00	12800.00	30.00	3640.00
SECONDARY	Manganese	D	UG/L	5/20/2009	5/3/2019	8	240.00	244.00	372.00	98.00	97.00
SECONDARY	Zinc	D	UG/L	5/20/2009	5/3/2019	8	40.00	50.00	50.00	5.00	20.00
TRACE	Boron	D	UG/L	5/20/2009	5/3/2019	8	40.00	40.00	80.00	20.00	20.00
TRACE	Molybdenum	D	UG/L	5/20/2009	5/3/2019	8	80.00	100.00	100.00	50.00	30.00

Table: 9
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 301, Well 83-01, Middle Sandstone Datum: 6172.13

Date	2/13/2019	5/3/2019	9/5/2019	11/12/2019
DEPTH TO WATER	36.89	31.54	33.86	36.12

Table: 10
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 302, Well 83-02, Middle Sandstone Datum: 6678.50

Date	2/13/2019	5/3/2019	9/5/2019	11/12/2019
DEPTH TO WATER	87.06	84.12	96.47	88.03

Table: 11
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 303, Well 83-03, Middle Sandstone Datum: 6131.22

Date	2/13/2019	5/3/2019	9/5/2019	11/12/2019
DEPTH TO WATER	78.54	80.85	78.54	78.54

Table: 12
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 259, Well 259, Twentymile Sandstone Datum: 6128.0

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	1.155		5.77		4.62		0.87	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L			37.40	Y				
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L			20.00	N				
ANION	Sulfates	N	MG/L			3.20	Y				
ANION	Chloride	N	MG/L			16.00	Y				
CATION	Calcium	D	MG/L			5.50	Y				
CATION	Sodium	D	MG/L			16.90	Y				
CATION	Magnesium	D	MG/L			2.70	Y				
FIELD	pH, Field	N	S.U.	7.81	Y	7.67	Y	7.79	Y	7.81	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	190.00	Y	160.00	Y	180.00	Y	190.00	Y
FIELD	Temperature, Field	N	DEG-C	10.90	Y	11.00	Y	12.20	Y	11.40	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L			0.10	N				
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L			44.30	Y				
PHYSICAL	Hardness	N	MG/L			25.00	Y				
PHYSICAL	Hydroxide as OH	N	MG/L			20.00	N				
PHYSICAL	pH, Lab	N	S.U.			8.90	Y				
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			136.00	Y				
PRIMARY	Arsenic	D	UG/L			1.00	N				
PRIMARY	Cadmium	D	UG/L			0.06	Y				
PRIMARY	Lead	D	UG/L			0.10	Y				
PRIMARY	Mercury	D	UG/L			1.00	N				
PRIMARY	Selenium	D	UG/L			0.30	N				
SECONDARY	Iron	D	UG/L			80.00	N				
SECONDARY	Manganese	D	UG/L			50.00	N				
SECONDARY	Zinc	D	UG/L			50.00	N				
TRACE	Boron	D	UG/L			70.00	Y				
TRACE	Molybdenum	D	UG/L			100.00	N				

Table: 12A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: 259, Well 259, Twentymile Sandstone Datum: 6128.0

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	5/20/2009	5/3/2019	7	55.80	37.40	220.00	8.20	74.80
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	11/25/1996	5/3/2019	5	5.50	2.00	20.00	1.00	8.20
ANION	Chloride	N	MG/L	3/30/1981	5/3/2019	33	7.34	4.00	30.60	1.00	7.46
ANION	Sulfates	N	MG/L	3/30/1981	5/3/2019	33	35.00	43.00	95.00	1.00	29.00
CATION	Calcium	D	MG/L	6/29/1983	5/3/2019	25	23.70	9.90	76.00	2.40	21.90
CATION	Magnesium	D	MG/L	6/29/1983	5/3/2019	25	11.50	6.30	24.20	1.10	9.03
CATION	Sodium	D	MG/L	6/29/1983	5/3/2019	25	22.10	19.90	39.30	4.70	11.10
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	94	7.58	7.69	9.21	6.00	0.69
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	94	398.80	405.00	1440.00	109.20	254.40
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	90	10.90	11.00	18.90	4.00	2.87
NUTRIENT	Nitrate Nitrogen	N	MG/L	3/5/1985	4/11/2017	20	0.03	0.02	0.09	0.01	0.02
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	3/30/1981	5/3/2019	35	0.06	0.03	0.26	0.02	0.05
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	3/30/1981	5/3/2019	32	137.00	159.00	245.00	6.80	91.80
PHYSICAL	Hardness	N	MG/L	5/5/2011	5/3/2019	7	55.30	35.00	195.00	25.00	61.80
PHYSICAL	Hydroxide as OH	N	MG/L	6/11/1992	5/3/2019	11	10.00	20.00	20.00	0.00	9.00
PHYSICAL	pH, Lab	N	S.U.	6/29/1981	5/3/2019	32	7.74	7.81	9.20	5.90	0.77
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	3/30/1981	5/3/2019	33	344.00	440.00	570.00	67.00	190.00
PRIMARY	Arsenic	D	UG/L	6/29/1983	5/3/2019	25	3.00	1.00	40.00	1.00	8.00
PRIMARY	Cadmium	D	UG/L	6/29/1983	5/3/2019	25	3.00	5.00	10.00	0.06	2.00
PRIMARY	Lead	D	UG/L	6/29/1983	5/3/2019	25	32.00	20.00	380.00	0.10	74.00
PRIMARY	Mercury	D	UG/L	6/29/1983	5/3/2019	25	0.40	0.20	1.00	0.10	0.40
PRIMARY	Selenium	D	UG/L	6/29/1983	5/3/2019	25	1.00	1.00	6.00	0.30	1.00
SECONDARY	Iron	D	UG/L	3/5/1985	5/3/2019	24	982.00	65.00	7400.00	10.00	2100.00
SECONDARY	Manganese	D	UG/L	6/29/1983	5/3/2019	25	108.00	58.00	330.00	7.00	97.20
SECONDARY	Zinc	D	UG/L	6/29/1983	5/3/2019	25	56.30	20.00	540.00	5.00	107.00
TRACE	Boron	D	UG/L	6/29/1983	5/3/2019	25	64.00	50.00	240.00	10.00	47.00
TRACE	Molybdenum	D	UG/L	6/29/1983	5/3/2019	25	60.00	50.00	200.00	10.00	50.00

Table: 13
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 401, Well 84-01, Twentymile Sandstone Datum: 6307.47

Date	2/13/2019	5/3/2019	9/5/2019	11/12/2019
DEPTH TO WATER	39.27	45.32	41.65	42.35

Table: 14
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 9MN, #9 Mine Well, Twentymile Sandstone Datum: 6383.29

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	63.92		64.86		64.98		65.58	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L			441.00	Y				
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L			20.00	N				
ANION	Sulfates	N	MG/L			365.00	Y				
ANION	Chloride	N	MG/L			54.70	Y				
CATION	Calcium	D	MG/L			163.00	Y				
CATION	Sodium	D	MG/L			43.50	Y				
CATION	Magnesium	D	MG/L			87.30	Y				
FIELD	pH, Field	N	S.U.	7.58	Y	6.89	Y	7.04	Y	7.18	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1180.00	Y	1140.00	Y	1150.00	Y	1160.00	Y
FIELD	Temperature, Field	N	DEG-C	10.30	Y	11.00	Y	14.10	Y	12.90	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L			0.04	Y				
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L			441.00	Y				
PHYSICAL	Hardness	N	MG/L			767.00	Y				
PHYSICAL	Hydroxide as OH	N	MG/L			20.00	N				
PHYSICAL	pH, Lab	N	S.U.			8.10	Y				
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			1470.00	Y				
PRIMARY	Arsenic	D	UG/L			0.80	Y				
PRIMARY	Cadmium	D	UG/L			0.30	N				
PRIMARY	Lead	D	UG/L			0.10	Y				
PRIMARY	Mercury	D	UG/L			1.00	N				
PRIMARY	Selenium	D	UG/L			0.20	Y				
SECONDARY	Iron	D	UG/L			980.00	Y				
SECONDARY	Manganese	D	UG/L			300.00	Y				
SECONDARY	Zinc	D	UG/L			20.00	Y				
TRACE	Boron	D	UG/L			90.00	Y				
TRACE	Molybdenum	D	UG/L			100.00	N				

Table: 14A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: 9MN, #9 Mine Well, Twentymile Sandstone Datum: 6383.29

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	5/20/2009	5/3/2019	6	403.00	417.00	480.00	260.00	77.80
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	6/13/1996	5/3/2019	4	10.00	10.00	20.00	1.00	10.00
ANION	Chloride	N	MG/L	3/30/1981	5/3/2019	29	11.90	3.00	54.70	2.00	15.60
ANION	Sulfates	N	MG/L	3/30/1981	5/3/2019	29	81.00	47.00	365.00	4.00	84.90
CATION	Calcium	D	MG/L	6/29/1983	5/3/2019	22	81.10	79.20	163.00	35.10	30.70
CATION	Magnesium	D	MG/L	6/29/1983	5/3/2019	22	39.00	32.00	87.30	22.00	15.80
CATION	Sodium	D	MG/L	6/29/1983	5/3/2019	22	19.74	15.80	43.50	9.90	8.77
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	95	7.39	7.34	8.70	6.60	0.43
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	95	757.00	632.00	3500.00	428.00	379.00
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	91	13.30	13.00	23.10	9.70	2.87
NUTRIENT	Nitrate Nitrogen	N	MG/L	3/5/1985	4/11/2017	17	0.03	0.02	0.08	0.02	0.02
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	3/30/1981	5/3/2019	33	0.05	0.04	0.12	0.02	0.03
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	3/30/1981	5/3/2019	29	303.00	298.00	441.00	193.00	46.90
PHYSICAL	Hardness	N	MG/L	5/5/2011	5/3/2019	7	519.00	496.00	767.00	358.00	129.00
PHYSICAL	Hydroxide as OH	N	MG/L	6/4/1992	5/3/2019	11	10.00	20.00	20.00	0.00	9.00
PHYSICAL	pH, Lab	N	S.U.	3/30/1981	5/3/2019	30	7.88	7.88	9.10	7.00	0.42
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	3/30/1981	5/3/2019	30	709.00	618.00	1470.00	380.00	263.00
PRIMARY	Arsenic	D	UG/L	6/29/1983	5/3/2019	22	4.00	1.70	40.00	0.50	8.40
PRIMARY	Cadmium	D	UG/L	6/29/1983	5/3/2019	22	3.00	3.00	10.00	0.30	3.00
PRIMARY	Lead	D	UG/L	6/29/1983	5/3/2019	22	20.00	20.00	50.00	0.10	10.00
PRIMARY	Mercury	D	UG/L	6/29/1983	5/3/2019	22	0.50	0.20	1.00	0.10	0.40
PRIMARY	Selenium	D	UG/L	6/29/1983	5/3/2019	22	1.00	1.00	4.00	0.20	0.90
SECONDARY	Iron	D	UG/L	3/5/1985	5/3/2019	21	602.00	80.00	3760.00	10.00	1030.00
SECONDARY	Manganese	D	UG/L	6/29/1983	5/3/2019	22	162.00	60.50	842.00	40.00	198.00
SECONDARY	Zinc	D	UG/L	6/29/1983	5/3/2019	22	278.00	169.00	1200.00	10.00	303.00
TRACE	Boron	D	UG/L	6/29/1983	5/3/2019	22	40.00	30.00	90.00	20.00	20.00
TRACE	Molybdenum	D	UG/L	6/29/1983	5/3/2019	22	60.00	50.00	200.00	10.00	50.00

Table: 15
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: AV3, Well AVF-3, Williams Fork Alluvium Datum: 6137.95

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	6.47		4.25		5.79		7.68	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	511.00	Y	514.00	Y	471.00	Y	515.00	Y
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	20.00	N	20.00	N	18.90	Y	20.00	N
ANION	Sulfates	N	MG/L	232.00	Y	239.00	Y	233.00	Y	240.00	Y
ANION	Chloride	N	MG/L	170.00	Y	126.00	Y	96.00	Y	120.00	Y
CATION	Calcium	D	MG/L	111.00	Y	105.00	Y	97.10	Y	105.00	Y
CATION	Sodium	D	MG/L	167.00	Y	157.00	Y	161.00	Y	161.00	Y
CATION	Magnesium	D	MG/L	99.00	Y	65.90	Y	59.80	Y	65.60	Y
FIELD	pH, Field	N	S.U.	7.54	Y	7.52	Y	7.51	Y	7.45	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1640.00	Y	1590.00	Y	1550.00	Y	1670.00	Y
FIELD	Temperature, Field	N	DEG-C	8.80	Y	9.30	Y	11.20	Y	12.40	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	0.10	N	0.10	N	0.10	N	0.07	Y
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	624.00	Y	514.00	Y	490.00	Y	515.00	Y
PHYSICAL	Hardness	N	MG/L	571.00	Y	534.00	Y	489.00	Y	532.00	Y
PHYSICAL	Hydroxide as OH	N	MG/L	20.00	N	20.00	N	20.00	N	20.00	N
PHYSICAL	pH, Lab	N	S.U.	7.70	Y	8.20	Y	8.40	Y	8.20	Y
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	1750.00	Y	1620.00	Y	1520.00	Y	1650.00	Y
PRIMARY	Arsenic	D	UG/L	1.00	N	0.30	Y	0.80	Y	0.50	Y
PRIMARY	Cadmium	D	UG/L	0.30	N	0.30	N	0.30	N	0.30	N
PRIMARY	Lead	D	UG/L	0.20	Y	0.50	N	0.50	N	0.10	Y
PRIMARY	Mercury	D	UG/L	1.00	N	1.00	N	1.00	N	1.00	N
PRIMARY	Selenium	D	UG/L	0.30	N	0.30	N	0.30	N	0.30	N
SECONDARY	Iron	D	UG/L	140.00	Y	200.00	Y	80.00	N	250.00	Y
SECONDARY	Manganese	D	UG/L	99.00	Y	120.00	Y	190.00	Y	170.00	Y
SECONDARY	Zinc	D	UG/L	50.00	N	50.00	N	50.00	N	50.00	N
TRACE	Boron	D	UG/L	120.00	Y	140.00	Y	250.00	Y	220.00	Y
TRACE	Molybdenum	D	UG/L	100.00	N	100.00	N	100.00	N	100.00	N

Table: 15A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: AV3, Well AVF-3, Williams Fork Alluvium Datum: 6137.95

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	3/16/2009	11/12/2019	18	516.00	515.00	601.00	441.00	34.30
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	3/16/1996	11/12/2019	18	5.55	2.00	20.00	1.00	7.81
ANION	Chloride	N	MG/L	6/29/1981	11/12/2019	104	214.00	190.00	2300.00	9.00	231.00
ANION	Sulfates	N	MG/L	6/29/1981	11/12/2019	104	307.00	290.00	531.00	120.00	89.00
CATION	Calcium	D	MG/L	3/30/1983	11/12/2019	97	117.00	115.00	167.00	81.30	18.50
CATION	Magnesium	D	MG/L	3/30/1983	11/12/2019	97	74.80	74.50	104.00	39.50	11.90
CATION	Sodium	D	MG/L	3/30/1983	11/12/2019	97	192.00	185.00	288.00	106.00	36.80
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	143	7.42	7.40	8.70	6.80	0.28
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	143	1694.68	1661.13	2750.00	880.00	289.19
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	139	9.32	9.00	18.50	3.70	2.92
NUTRIENT	Nitrate Nitrogen	N	MG/L	3/26/1984	11/15/2017	81	0.14	0.08	0.71	0.02	0.15
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	6/29/1981	11/12/2019	98	0.23	0.10	1.99	0.01	0.29
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	6/29/1981	11/12/2019	97	427.00	418.00	980.00	322.00	87.70
PHYSICAL	Hardness	N	MG/L	3/16/1992	11/12/2019	20	547.00	541.00	661.00	489.00	37.40
PHYSICAL	Hydroxide as OH	N	MG/L	8/14/1991	11/12/2019	42	10.00	2.00	20.00	0.00	10.00
PHYSICAL	pH, Lab	N	S.U.	6/29/1981	11/12/2019	104	7.77	7.70	8.40	7.18	0.33
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	6/29/1981	11/12/2019	104	1787.00	1780.00	2700.00	920.00	322.60
PRIMARY	Arsenic	D	UG/L	3/30/1983	11/12/2019	97	2.00	1.00	40.00	0.20	6.00
PRIMARY	Cadmium	D	UG/L	3/30/1983	11/12/2019	97	4.00	5.00	10.00	0.10	2.00
PRIMARY	Lead	D	UG/L	3/30/1983	11/12/2019	97	20.00	20.00	100.00	0.10	20.00
PRIMARY	Mercury	D	UG/L	3/30/1983	11/12/2019	97	0.50	0.20	10.00	0.10	1.00
PRIMARY	Selenium	D	UG/L	3/30/1983	11/12/2019	97	1.00	1.00	8.00	0.10	1.00
SECONDARY	Iron	D	UG/L	3/26/1984	11/12/2019	93	197.00	50.00	2160.00	5.00	417.00
SECONDARY	Manganese	D	UG/L	3/30/1983	11/12/2019	97	118.00	120.00	273.00	5.00	58.50
SECONDARY	Zinc	D	UG/L	3/30/1983	11/12/2019	97	23.00	10.00	190.00	5.00	28.00
TRACE	Boron	D	UG/L	3/30/1983	11/12/2019	96	120.00	110.00	280.00	10.00	46.00
TRACE	Molybdenum	D	UG/L	3/30/1983	11/12/2019	97	60.00	50.00	200.00	10.00	50.00

Table: 16
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: AV5, Well AVF-5, Williams Fork Alluvium Datum: 6132.59

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	8.39		6.55		7.88		8.13	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	691.00	Y	637.00	Y	661.00	Y	721.00	Y
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	23.40	Y	11.70	Y	43.60	Y	20.00	N
ANION	Sulfates	N	MG/L	236.00	Y	282.00	Y	350.00	Y	331.00	Y
ANION	Chloride	N	MG/L	29.00	Y	32.70	Y	33.00	Y	31.80	Y
CATION	Calcium	D	MG/L	36.40	Y	37.30	Y	43.30	Y	41.70	Y
CATION	Sodium	D	MG/L	357.00	Y	355.00	Y	406.00	Y	380.00	Y
CATION	Magnesium	D	MG/L	17.60	Y	16.60	Y	19.10	Y	19.40	Y
FIELD	pH, Field	N	S.U.	7.60	Y	7.64	Y	7.52	Y	7.40	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1670.00	Y	1730.00	Y	2040.00	Y	1960.00	Y
FIELD	Temperature, Field	N	DEG-C	7.20	Y	9.50	Y	11.40	Y	10.40	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	0.09	Y	5.33	Y	0.03	Y	0.10	N
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	844.00	Y	649.00	Y	705.00	Y	721.00	Y
PHYSICAL	Hardness	N	MG/L	163.00	Y	161.00	Y	187.00	Y	184.00	Y
PHYSICAL	Hydroxide as OH	N	MG/L	20.00	N	20.00	N	20.00	N	20.00	N
PHYSICAL	pH, Lab	N	S.U.	8.40	Y	8.30	Y	8.50	Y	8.20	Y
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	1740.00	Y	1740.00	Y	1980.00	Y	1940.00	Y
PRIMARY	Arsenic	D	UG/L	0.50	Y	0.60	Y	0.70	Y	0.70	Y
PRIMARY	Cadmium	D	UG/L	0.30	N	0.30	N	0.07	Y	0.30	N
PRIMARY	Lead	D	UG/L	0.50	N	0.50	N	0.50	N	0.50	N
PRIMARY	Mercury	D	UG/L	1.00	N	1.00	N	1.00	N	1.00	N
PRIMARY	Selenium	D	UG/L	1.70	Y	27.80	Y	0.30	Y	0.20	Y
SECONDARY	Iron	D	UG/L	80.00	Y	40.00	Y	80.00	N	60.00	Y
SECONDARY	Manganese	D	UG/L	791.00	Y	200.00	Y	1050.00	Y	1390.00	Y
SECONDARY	Zinc	D	UG/L	50.00	N	50.00	N	50.00	N	50.00	N
TRACE	Boron	D	UG/L	280.00	Y	260.00	Y	400.00	Y	350.00	Y
TRACE	Molybdenum	D	UG/L	100.00	N	100.00	N	100.00	N	100.00	N

Table: 16A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: AVF, Well AVF-5, Williams Fork Alluvium Datum: 6132.59

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	3/16/2009	11/12/2019	18	935.00	927.00	1200.00	637.00	163.00
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	3/16/1996	11/12/2019	18	6.46	2.00	43.60	1.00	11.20
ANION	Chloride	N	MG/L	6/29/1981	11/12/2019	104	26.60	26.50	45.00	7.00	7.07
ANION	Sulfates	N	MG/L	6/29/1981	11/12/2019	104	188.00	162.00	733.00	4.00	173.00
CATION	Calcium	D	MG/L	3/30/1983	11/12/2019	97	72.00	50.00	225.00	28.30	44.40
CATION	Magnesium	D	MG/L	3/30/1983	11/12/2019	97	46.30	34.00	149.00	12.20	31.00
CATION	Sodium	D	MG/L	3/30/1983	11/12/2019	97	300.00	330.00	967.00	59.40	118.00
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	142	7.43	7.40	9.70	6.30	0.36
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	142	1730.66	1672.50	3700.00	952.00	451.36
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	138	10.20	10.20	18.70	2.00	3.76
NUTRIENT	Nitrate Nitrogen	N	MG/L	3/26/1984	11/19/2017	81	0.55	0.05	26.40	0.01	3.00
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	6/29/1981	11/12/2019	98	1.24	0.08	74.00	0.02	7.61
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	6/29/1981	11/12/2019	98	793.70	840.00	1215.00	243.00	183.20
PHYSICAL	Hardness	N	MG/L	3/16/1992	11/12/2019	20	184.00	184.00	260.00	121.00	36.40
PHYSICAL	Hydroxide as OH	N	MG/L	8/14/1991	11/12/2019	41	10.00	2.00	20.00	0.00	10.00
PHYSICAL	pH, Lab	N	S.U.	6/29/1981	11/12/2019	104	7.83	7.80	9.72	7.00	0.41
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	6/29/1981	11/12/2019	104	1683.00	1700.00	2580.00	860.00	271.10
PRIMARY	Arsenic	D	UG/L	3/30/1983	11/12/2019	97	2.30	1.00	40.00	0.30	5.70
PRIMARY	Cadmium	D	UG/L	3/30/1983	11/12/2019	97	4.00	5.00	10.00	0.07	2.00
PRIMARY	Lead	D	UG/L	3/30/1983	11/12/2019	97	26.00	20.00	310.00	0.10	34.00
PRIMARY	Mercury	D	UG/L	3/30/1983	11/12/2019	97	0.40	0.20	1.00	0.10	0.40
PRIMARY	Selenium	D	UG/L	3/30/1983	11/12/2019	97	2.04	1.40	27.80	0.10	2.94
SECONDARY	Iron	D	UG/L	3/26/1984	11/12/2019	92	90.60	31.00	1230.00	10.00	183.00
SECONDARY	Manganese	D	UG/L	3/30/1983	11/12/2019	97	258.00	140.00	1390.00	5.00	302.00
SECONDARY	Zinc	D	UG/L	3/30/1983	11/12/2019	97	19.00	10.00	60.00	5.00	16.00
TRACE	Boron	D	UG/L	3/30/1983	11/12/2019	97	240.00	260.00	440.00	30.00	110.00
TRACE	Molybdenum	D	UG/L	3/30/1983	11/12/2019	97	60.00	50.00	200.00	10.00	50.00

Table: 17
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: AV6, Well AVF-6, Williams Fork Alluvium Datum: 6146.23

Date				2/13/2019		5/3/2019		9/5/2019		11/12/2019	
			DEPTH TO WATER	WELL DAMAGED		6.44		8.13		8.04	
Type	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L			284.00	Y	376.00	Y	366.00	Y
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L			20.00	N	7.90	Y	20.00	N
ANION	Sulfates	N	MG/L			131.00	Y	223.00	Y	88.70	Y
ANION	Chloride	N	MG/L			5.30	Y	8.70	Y	5.30	Y
CATION	Calcium	D	MG/L			66.40	Y	101.00	Y	64.10	Y
CATION	Sodium	D	MG/L			35.90	Y	41.40	Y	55.00	Y
CATION	Magnesium	D	MG/L			39.80	Y	58.50	Y	39.40	Y
FIELD	pH, Field	N	S.U.			7.57	Y	7.31	Y	7.41	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM			780.00	Y	1110.00	Y	830.00	Y
FIELD	Temperature, Field	N	DEG-C			9.80	Y	11.10	Y	13.00	Y
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L			0.10	N	0.10	N	0.10	N
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L			284.00	Y	384.00	Y	366.00	Y
PHYSICAL	Hardness	N	MG/L			330.00	Y	493.00	Y	322.00	Y
PHYSICAL	Hydroxide as OH	N	MG/L			20.00	N	20.00	N	20.00	N
PHYSICAL	pH, Lab	N	S.U.			8.20	Y	8.30	Y	8.20	Y
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			740.00	Y	1040.00	Y	808.00	Y
PRIMARY	Arsenic	D	UG/L			1.00	N	1.00	N	1.00	N
PRIMARY	Cadmium	D	UG/L			0.30	N	0.30	N	0.30	N
PRIMARY	Lead	D	UG/L			0.50	N	0.50	N	0.50	N
PRIMARY	Mercury	D	UG/L			1.00	N	1.00	N	1.00	N
PRIMARY	Selenium	D	UG/L			0.20	Y	0.30	N	0.10	Y
SECONDARY	Iron	D	UG/L			80.00	N	80.00	N	110.00	Y
SECONDARY	Manganese	D	UG/L			60.00	Y	170.00	Y	130.00	Y
SECONDARY	Zinc	D	UG/L			50.00	N	50.00	N	50.00	N
TRACE	Boron	D	UG/L			70.00	Y	110.00	Y	130.00	Y
TRACE	Molybdenum	D	UG/L			100.00	N	100.00	N	100.00	N

Table: 17A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: AV6, Well AVF-6, Williams Fork Alluvium Datum: 6146.23

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
ANION	Alkalinity, Bicarbonate as CaCO3	N	MG/L	3/16/2009	11/12/2019	18	473.00	495.00	590.00	284.00	89.10
ANION	Alkalinity, Carbonate as CaCO3	N	MG/L	3/16/1996	11/12/2019	18	4.90	2.00	20.00	1.00	7.10
ANION	Chloride	N	MG/L	6/29/1981	11/12/2019	104	25.00	21.00	92.00	3.20	19.00
ANION	Sulfates	N	MG/L	6/29/1981	11/12/2019	104	330.00	330.00	759.00	10.00	183.00
CATION	Calcium	D	MG/L	3/30/1983	11/12/2019	97	127.00	132.00	234.00	30.30	46.50
CATION	Magnesium	D	MG/L	3/30/1983	11/12/2019	97	70.30	72.00	123.00	19.50	22.50
CATION	Sodium	D	MG/L	3/30/1983	11/12/2019	97	141.00	122.00	451.00	30.00	84.20
FIELD	pH, Field	N	S.U.	1/26/1982	11/12/2019	142	7.38	7.40	8.22	6.80	0.25
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	11/12/2019	142	1541.60	1596.50	3000.00	630.00	314.91
FIELD	Temperature, Field	N	DEG-C	5/27/1982	11/12/2019	138	10.30	10.50	23.10	4.00	3.55
NUTRIENT	Nitrate Nitrogen	N	MG/L	3/26/1984	11/19/2017	81	0.05	0.02	0.50	0.02	0.07
NUTRIENT	NO3-NO2 Nitrogen	N	MG/L	6/29/1981	11/12/2019	98	0.07	0.04	0.47	0.02	0.08
NUTRIENT	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	6/29/1981	11/12/2019	98	536.00	540.00	917.00	263.00	126.00
PHYSICAL	Hardness	N	MG/L	3/16/1992	11/12/2019	20	464.00	480.00	732.00	258.00	127.00
PHYSICAL	Hydroxide as OH	N	MG/L	8/14/1991	11/12/2019	42	10.00	2.00	20.00	0.00	10.00
PHYSICAL	pH, Lab	N	S.U.	6/29/1981	11/12/2019	103	7.72	7.70	8.60	6.80	0.35
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	6/29/1981	11/12/2019	104	1463.00	1495.00	2230.00	556.00	378.00
PRIMARY	Arsenic	D	UG/L	3/30/1983	11/12/2019	97	2.00	1.00	40.00	0.20	6.00
PRIMARY	Cadmium	D	UG/L	3/30/1983	11/12/2019	97	3.80	5.00	11.00	0.30	2.20
PRIMARY	Lead	D	UG/L	3/30/1983	11/12/2019	97	24.00	20.00	130.00	0.10	20.00
PRIMARY	Mercury	D	UG/L	3/30/1983	11/12/2019	97	0.40	0.20	1.00	0.10	0.40
PRIMARY	Selenium	D	UG/L	3/30/1983	11/12/2019	97	2.30	1.00	32.00	0.10	5.20
SECONDARY	Iron	D	UG/L	3/26/1984	11/12/2019	93	154.00	50.00	1600.00	5.00	244.00
SECONDARY	Manganese	D	UG/L	3/30/1983	11/12/2019	97	143.00	120.00	769.00	8.00	125.00
SECONDARY	Zinc	D	UG/L	3/30/1983	11/12/2019	97	19.00	10.00	100.00	5.00	19.00
TRACE	Boron	D	UG/L	3/30/1983	11/12/2019	97	110.00	90.00	390.00	20.00	76.00
TRACE	Molybdenum	D	UG/L	3/30/1983	11/12/2019	97	60.00	50.00	200.00	10.00	50.00

Table: 18
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site:WF1, Williams Fork River, Upstream Datum: 6142.39

Date				1/10/2019		2/13/2019		3/14/2019		4/16/2019		5/3/2019		6/6/2019		7/15/2019		8/25/2
ANION	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**
FIELD	pH, Field	N	S.U.	8.02	Y	7.51	Y	7.67	Y	7.89	Y	7.79	Y	7.61	Y	7.83	Y	8.16
FIELD	Temperature, Field	N	DEG-C	4.00	Y	3.60	Y	5.40	Y	9.00	Y	10.20	Y	13.10	Y	14.20	Y	23.50
FIELD	Specific Conductivity, Field	N	UMHOS/CM	560.00	Y	560.00	Y	590.00	Y	630.00	Y	400.00	Y	240.00	Y	290.00	Y	420.00
PHYSICAL	Acidity	N	MG/L			20.00	N					20.00	N					
PHYSICAL	pH, Lab	N	S.U.			8.40	Y					8.50	Y					
PHYSICAL	Solids, Total Suspended	N	MG/L			20.00	N			46.00	Y	86.00	Y	245.00	Y	25.00	Y	20.00
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L			322.00	Y					252.00	Y					
SECONDARY	Iron	TR	UG/L			110.00	Y					2330.00	Y					
SECONDARY	Manganese	TR	UG/L			5.00	Y					60.00	Y					

Table: 18
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site:WF1, Williams Fork River, Upstream Datum: 6142.39

Date				2019	9/5/2019		10/21/2019		11/12/2019		12/16/2019	
ANION	**Parameter**	**Fraction**	**Units**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
FIELD	pH, Field	N	S.U.	Y	8.58	Y	8.54	Y	8.34	Y	8.36	Y
FIELD	Temperature, Field	N	DEG-C	Y	16.80	Y	4.30	Y	1.80	Y	3.10	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	Y	540.00	Y	560.00	Y	530.00	Y	640.00	Y
PHYSICAL	Acidity	N	MG/L		20.00	N			20.00	N		
PHYSICAL	pH, Lab	N	S.U.		8.50	Y			8.40	Y		
PHYSICAL	Solids, Total Suspended	N	MG/L	N	5.00	Y	20.00	N	20.00	N	6.00	Y
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L		312.00	Y			292.00	Y		
SECONDARY	Iron	TR	UG/L		170.00	Y			150.00	Y		
SECONDARY	Manganese	TR	UG/L		50.00	N			50.00	N		

Table: 18A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site:WF1, Williams Fork River, Upstream Datum: 6142.39

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
FIELD	pH, Field	N	S.U.	1/26/1982	12/16/2019	286	9.89	8.10	524.00	7.11	30.50
FIELD	Temperature, Field	N	DEG-C	5/27/1982	12/16/2019	281	8.77	8.00	27.80	0.00	7.12
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	12/16/2019	285	545.25	560.00	1125.00	8.77	164.55
ANION	Sulfates	N	MG/L	6/19/1981	5/31/1990	13	76.00	66.00	138.00	21.00	40.40
PHYSICAL	Acidity	N	MG/L	3/23/1984	11/12/2019	95	2.41	1.00	20.00	-241.00	26.50
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	6/19/1981	2/12/1997	14	163.00	180.00	225.00	69.00	52.10
PHYSICAL	pH, Lab	N	S.U.	6/19/1981	11/12/2019	106	8.20	8.29	8.79	7.30	0.31
PHYSICAL	Solids, Total Suspended	N	MG/L	6/19/1981	12/16/2019	284	86.17	12.50	2810.00	2.00	262.40
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L	6/19/1981	11/12/2019	110	326.00	338.00	588.00	94.00	115.00
SECONDARY	Iron	TR	UG/L	3/23/1984	11/12/2019	76	1580.00	370.00	19500.00	60.00	3330.00
SECONDARY	Manganese	TR	UG/L	6/19/1981	11/12/2019	88	57.50	35.00	336.00	5.00	64.00

Table: 19
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site:WF2, Williams Fork River, Upstream Datum: 6119.87

Date				1/10/2019		2/13/2019		3/14/2019		4/16/2019		5/3/2019		6/6/2019		7/15/2019		8/25/2
ANION	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**
FIELD	pH, Field	N	S.U.	8.01	Y	7.49	Y	7.65	Y	7.86	Y	7.43	Y	7.61	Y	7.84	Y	8.18
FIELD	Temperature, Field	N	DEG-C	3.90	Y	3.40	Y	5.50	Y	8.80	Y	9.70	Y	13.10	Y	14.40	Y	23.20
FIELD	Specific Conductivity, Field	N	UMHOS/CM	540.00	Y	550.00	Y	580.00	Y	620.00	Y	390.00	Y	220.00	Y	300.00	Y	420.00
PHYSICAL	Acidity	N	MG/L			20.00	N					20.00	N					
PHYSICAL	pH, Lab	N	S.U.			8.40	Y					8.40	Y					
PHYSICAL	Solids, Total Suspended	N	MG/L			20.00	N			34.00	Y	87.00	Y	195.00	Y	27.00	Y	20.00
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L			318.00	Y					254.00	Y					
SECONDARY	Iron	TR	UG/L			120.00	Y					1340.00	Y					
SECONDARY	Manganese	TR	UG/L			8.00	Y					60.00	Y					

Table: 19
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site:WF2, Williams Fork River, Upstream Datum: 6119.87

Date				019	9/5/2019		10/21/2019		11/12/2019		12/16/2019	
ANION	**Parameter**	**Fraction**	**Units**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
FIELD	pH, Field	N	S.U.	Y	8.59	Y	8.53	Y	8.28	Y	8.29	Y
FIELD	Temperature, Field	N	DEG-C	Y	16.40	Y	4.10	Y	2.50	Y	2.70	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	Y	530.00	Y	540.00	Y	540.00	Y	610.00	Y
PHYSICAL	Acidity	N	MG/L		20.00	N			20.00	N		
PHYSICAL	pH, Lab	N	S.U.		8.50	Y			8.40	Y		
PHYSICAL	Solids, Total Suspended	N	MG/L	N	6.00	Y	20.00	N	20.00	N	20.00	N
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L		322.00	Y			296.00	Y		
SECONDARY	Iron	TR	UG/L		190.00	Y			150.00	Y		
SECONDARY	Manganese	TR	UG/L		50.00	N			10.00	Y		

Table: 19A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site:WF2, Williams Fork River, Upstream Datum: 6119.87

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
FIELD	Temperature, Field	N	DEG-C	5/27/1982	12/16/2019	287	8.72	8.00	27.80	0.00	6.98
FIELD	pH, Field	N	S.U.	1/26/1982	12/16/2019	292	8.07	8.10	8.83	6.77	0.38
FIELD	Specific Conductivity, Field	N	UMHOS/CM	1/26/1982	12/16/2019	291	553.40	570.00	1200.00	174.90	169.29
ANION	Sulfates	N	MG/L	6/19/1981	12/7/1983	12	80.90	85.00	144.00	21.00	39.00
PHYSICAL	Acidity	N	MG/L	3/23/1984	11/12/2019	97	2.37	1.00	20.00	-245.00	26.60
PHYSICAL	Alkalinity as CaCO3, @ pH 4.5	N	MG/L	6/19/1981	2/12/1997	13	179.00	203.00	223.00	71.00	51.70
PHYSICAL	pH, Lab	N	S.U.	6/19/1981	11/12/2019	108	8.21	8.24	8.70	7.10	0.28
PHYSICAL	Solids, Total Suspended	N	MG/L	6/19/1981	12/16/2019	287	85.50	12.00	2800.00	2.00	252.00
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L	6/19/1981	11/12/2019	112	335.00	346.00	602.00	85.00	116.00
SECONDARY	Iron	TR	UG/L	3/23/1984	11/12/2019	78	1610.00	315.00	22400.00	100.00	3770.00
SECONDARY	Manganese	TR	UG/L	6/19/1981	11/12/2019	89	57.60	30.00	423.00	5.00	71.50

Table: 20
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 1SP, Spoil Spring Datum: 6120.0

Date				3/19/2019		3/26/2019		4/5/2019		4/10/2019		4/17/2019		4/23/2019		5/2/2019	
ANION	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
FIELD	Flow	N	CFS	0.00	Y	0.00	Y	0.05	Y	0.08	Y	0.03	Y	0.03	Y	0.03	Y
FIELD	pH, Field	N	S.U.	7.20	Y	6.90	Y	7.50	Y	7.40	Y	7.20	Y	7.30	Y	7.40	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	3080.00	Y	2760.00	Y	2170.00	Y	2300.00	Y	2090.00	Y	2140.00	Y	2140.00	Y
FIELD	Temperature, Field	N	DEG-C	7.40	Y	9.30	Y	13.20	Y			15.00	Y	15.60	Y	14.30	Y
PRIMARY	Arsenic	PD	UG/L	1.20	Y					0.50	Y						
PRIMARY	Arsenic	T	UG/L	1.20	Y					0.50	Y						
PRIMARY	Cadmium	PD	UG/L	0.30	N					0.30	N						
PRIMARY	Chromium	TR	UG/L	50.00	N					50.00	N						
PRIMARY	Copper	PD	UG/L	50.00	N					50.00	N						
PRIMARY	Lead	PD	UG/L	0.10	Y					0.50	N						
PRIMARY	Mercury	T	UG/L	1.00	N					1.00	N						
PRIMARY	Selenium	PD	UG/L	2.50	Y					1.20	Y						
TRACE	Nickel	PD	UG/L	40.00	N					40.00	N						
TRACE	Sulfide	N	UG/L	100.00	N					100.00	N						
SECONDARY	Iron	TR	UG/L	1880.00	Y					140.00	Y			80.00	Y		
SECONDARY	Manganese	PD	UG/L	973.00	Y					100.00	Y						
SECONDARY	Silver	PD	UG/L	30.00	N					30.00	N						
SECONDARY	Zinc	PD	UG/L	50.00	N					50.00	N						
PHYSICAL	pH, Lab	N	S.U.	8.00	Y					8.30	Y						
PHYSICAL	Solids, Total Suspended	N	MG/L	10.00	Y					20.00	N			20.00	N		
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	2670.00	Y					2110.00	Y						
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L											1620.00	Y		

Table: 20
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 1SP, Spoil Spring Datum: 6120.0

Date				5/8/2019		5/17/2019		5/22/2019		5/30/2019		6/6/2019		6/12/2019		6/18/2019	
ANION	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
FIELD	Flow	N	CFS	0.02	Y	0.03	Y	0.01	Y	0.03	Y	0.03	Y	0.03	Y	0.03	Y
FIELD	pH, Field	N	S.U.	7.40	Y	7.40	Y	7.30	Y	7.10	Y	7.30	Y	7.20	Y	6.70	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	2140.00	Y	2060.00	Y	2030.00	Y	1910.00	Y	1840.00	Y	2010.00	Y	2590.00	Y
FIELD	Temperature, Field	N	DEG-C	12.20	Y	10.60	Y	11.10	Y	10.30	Y	19.00	Y	18.30	Y	20.60	Y
PRIMARY	Arsenic	PD	UG/L					0.60	Y					0.70	Y		
PRIMARY	Arsenic	T	UG/L					0.50	Y					0.80	Y		
PRIMARY	Cadmium	PD	UG/L					0.30	N					0.30	N		
PRIMARY	Chromium	TR	UG/L					50.00	N					50.00	N		
PRIMARY	Copper	PD	UG/L					50.00	N					50.00	N		
PRIMARY	Lead	PD	UG/L					0.50	N					0.50	N		
PRIMARY	Mercury	T	UG/L					1.00	N					1.00	N		
PRIMARY	Selenium	PD	UG/L					0.30	Y					0.20	Y		
TRACE	Nickel	PD	UG/L					40.00	N					40.00	N		
TRACE	Sulfide	N	UG/L					100.00	N					100.00	N		
SECONDARY	Iron	TR	UG/L	100.00	Y			240.00	Y					510.00	Y	1240.00	Y
SECONDARY	Manganese	PD	UG/L					210.00	Y					440.00	Y		
SECONDARY	Silver	PD	UG/L					30.00	N					30.00	N		
SECONDARY	Zinc	PD	UG/L					50.00	N					330.00	Y		
PHYSICAL	pH, Lab	N	S.U.					8.20	Y					8.20	Y		
PHYSICAL	Solids, Total Suspended	N	MG/L	5.00	Y			20.00	N					5.00	Y	5.00	Y
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM					2100.00	Y					2280.00	Y		
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L	1640.00	Y											1670.00	Y

Table: 20
Williams Fork Mine
2019 Annual Hydrology Report
Water Year Monitoring Data

Site: 1SP, Spoil Spring Datum: 6120.0

Date				6/27/2019		7/1/2019		7/16/2019	
ANION	**Parameter**	**Fraction**	**Units**	**Result**	**DETN**	**Result**	**DETN**	**Result**	**DETN**
FIELD	Flow	N	CFS	0.01	Y	0.01	Y	0.00	Y
FIELD	pH, Field	N	S.U.	7.30	Y	7.50	Y	7.20	Y
FIELD	Specific Conductivity, Field	N	UMHOS/CM	2080.00	Y	2290.00	Y	2330.00	Y
FIELD	Temperature, Field	N	DEG-C	21.00	Y	23.00	Y	21.60	Y
PRIMARY	Arsenic	PD	UG/L			0.90	Y		
PRIMARY	Arsenic	T	UG/L			1.00	Y		
PRIMARY	Cadmium	PD	UG/L			0.30	N		
PRIMARY	Chromium	TR	UG/L			50.00	N		
PRIMARY	Copper	PD	UG/L			50.00	N		
PRIMARY	Lead	PD	UG/L			0.10	Y		
PRIMARY	Mercury	T	UG/L			1.00	N		
PRIMARY	Selenium	PD	UG/L			0.10	Y		
TRACE	Nickel	PD	UG/L			10.00	Y		
TRACE	Sulfide	N	UG/L			100.00	N		
SECONDARY	Iron	TR	UG/L			880.00	Y	1540.00	Y
SECONDARY	Manganese	PD	UG/L			580.00	Y		
SECONDARY	Silver	PD	UG/L			30.00	N		
SECONDARY	Zinc	PD	UG/L			50.00	N		
PHYSICAL	pH, Lab	N	S.U.			8.20	Y		
PHYSICAL	Solids, Total Suspended	N	MG/L			9.00	Y	9.00	Y
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM			2270.00	Y		
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L					1850.00	Y

Table: 20A
Williams Fork Mine
2019 Annual Hydrology Report
Period of Record

Site: 1SP, Spoil Spring Datum: 6120.0

Type	Parameter	Fraction	Units	Start Date	End Date	Count	Average	Median	MAX	MIN	STDEV
FIELD	Flow	N	CFS	1/3/1984	7/16/2019	495	0.06	0.04	0.67	0.00	0.07
FIELD	pH, Field	N	S.U.	5/28/1982	7/16/2019	1212	8.04	8.04	9.06	6.70	0.31
FIELD	Specific Conductivity, Field	N	UMHOS/CM	5/28/1982	7/16/2019	1211	1617.17	1624.00	3080.00	585.00	235.56
FIELD	Temperature, Field	N	DEG-C	5/28/1982	7/16/2019	1208	9.25	9.40	30.00	0.00	5.66
PRIMARY	Arsenic	PD	UG/L	11/20/2012	7/1/2019	34	0.77	0.60	5.00	0.30	0.79
PRIMARY	Arsenic	T	UG/L	9/22/1983	7/1/2019	36	0.90	0.85	2.00	0.40	0.35
PRIMARY	Cadmium	PD	UG/L	11/20/2012	7/1/2019	34	0.50	0.50	3.00	0.10	0.50
PRIMARY	Chromium	TR	UG/L	11/20/2012	7/1/2019	34	50.00	50.00	50.00	50.00	0.00
PRIMARY	Copper	PD	UG/L	11/20/2012	7/1/2019	34	50.00	50.00	100.00	50.00	9.00
PRIMARY	Lead	PD	UG/L	11/20/2012	7/1/2019	34	0.50	0.50	3.00	0.10	0.50
PRIMARY	Mercury	T	UG/L	1/17/1983	7/1/2019	40	0.70	0.50	1.00	0.10	0.30
PRIMARY	Selenium	PD	UG/L	11/20/2012	7/1/2019	34	0.55	0.30	2.50	0.10	0.61
TRACE	Nickel	PD	UG/L	11/20/2012	7/1/2019	34	40.00	40.00	80.00	10.00	12.00
TRACE	Sulfide	N	UG/L	5/31/1990	7/1/2019	34	94.00	100.00	210.00	10.00	34.00
SECONDARY	Iron	TR	UG/L	3/23/1984	7/16/2019	312	410.00	230.00	2350.00	0.16	446.00
SECONDARY	Manganese	PD	UG/L	11/20/2012	7/1/2019	34	541.00	500.00	1450.00	20.00	364.00
SECONDARY	Silver	PD	UG/L	11/20/2012	7/1/2019	34	30.00	30.00	50.00	30.00	3.00
SECONDARY	Zinc	PD	UG/L	11/20/2012	7/1/2019	34	58.00	50.00	330.00	10.00	50.00
PHYSICAL	pH, Lab	N	S.U.	9/28/1981	7/1/2019	169	8.10	8.10	8.50	7.08	0.23
PHYSICAL	Solids, Total Suspended	N	MG/L	9/28/1981	7/16/2019	630	10.00	6.00	76.00	1.00	9.30
PHYSICAL	Specific Conductivity, Lab	N	UMHOS/CM	9/28/1981	7/1/2019	169	2011.00	2080.00	2680.00	7.80	360.10
PHYSICAL	Total Dissolved Solids, Lab	N	MG/L	9/28/1981	7/16/2019	189	1275.00	1138.00	5160.00	820.00	424.00

FIGURES

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7.) Well 83-01, Middle Sandstone, Water Level Plot
8.) Well 83-02, Middle Sandstone, Water Level Plot
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20.) No. 1 Strip Pit, Water Year Discharge
21.) No. 1 Strip Pit, TDS
22.) No. 1 Strip Pit, Iron
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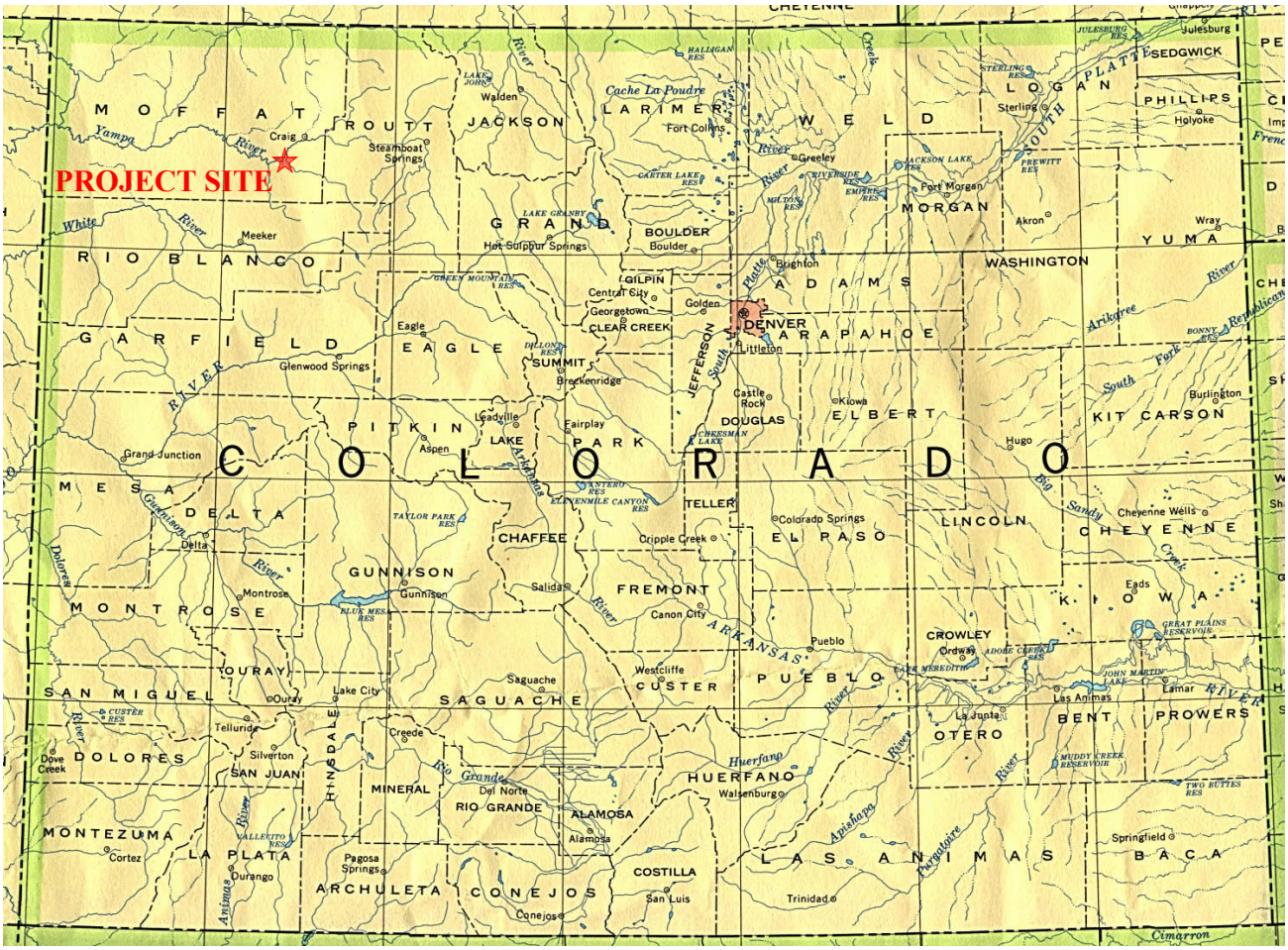


SCALE

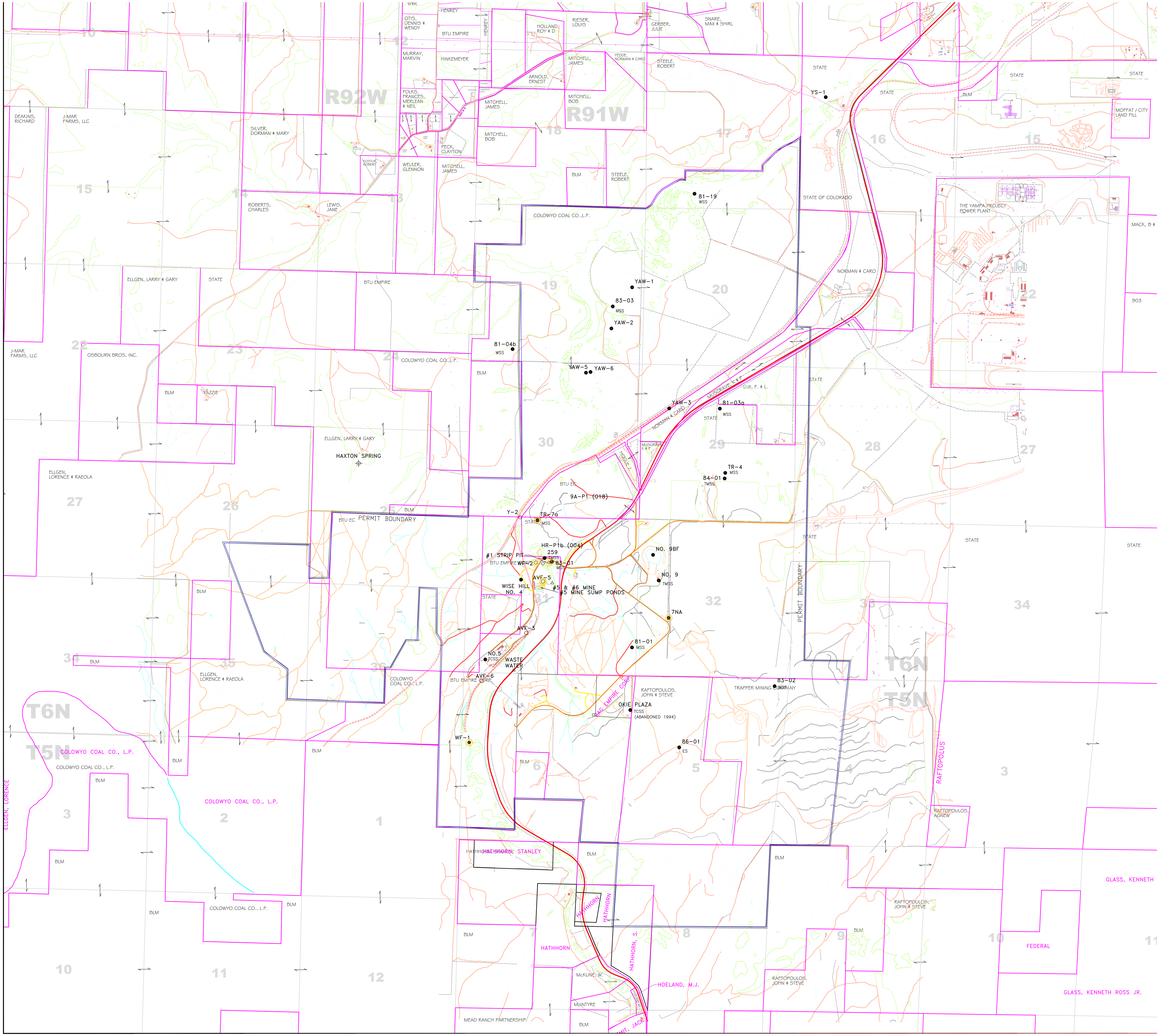
0 50 100

MILES

GENERAL LOCATION MAP

I:\Environmental\CDMG - CDRMS\AHR\WF FIGURE 1.doc

FIGURE 1



LEGEND

PERMIT BOUNDARY

86-01 GROUNDWATER MONITOR WELL

AVF-6 ALLUVIAL MONITOR WELL

WF-6 STREAM WATER QUALITY MONITOR

WF-1 STREAM QUALITY & QUANTITY MONITOR

A MINE DISCHARGE LOCATION

1 STREAM GAUGE

HAXTON SPRING SPRING

WSS WHITE SANDSTONE

TMSS TWENTYMILE SANDSTONE

MSS MIDDLE SANDSTONE

TCSS TROUT CREEK SANDSTONE

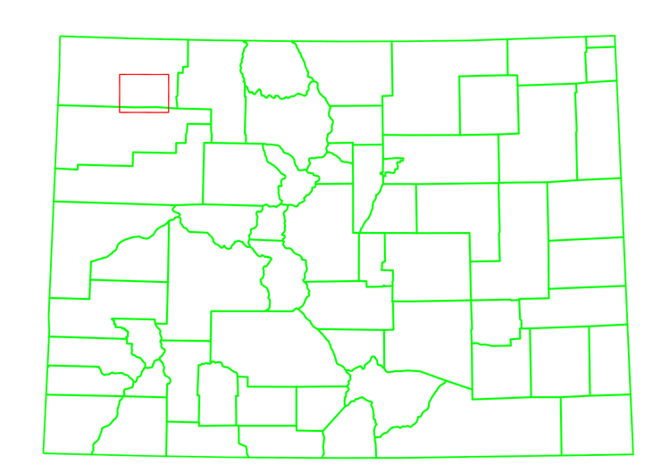
ES "E" SEAM

9A-P1 POND

SITES MONITORED UNDER TEMPORARY CESSATION TR01-32

WF-1 TC SITES HIGHLIGHTED CIRCLE

N



MOFFAT COUNTY MINING, LLC

Peabody ENERGY

FIGURE 2
WILLIAMS FORK MINES
HYDROLOGIC MONITORING PROGRAM
LOCATION MAP

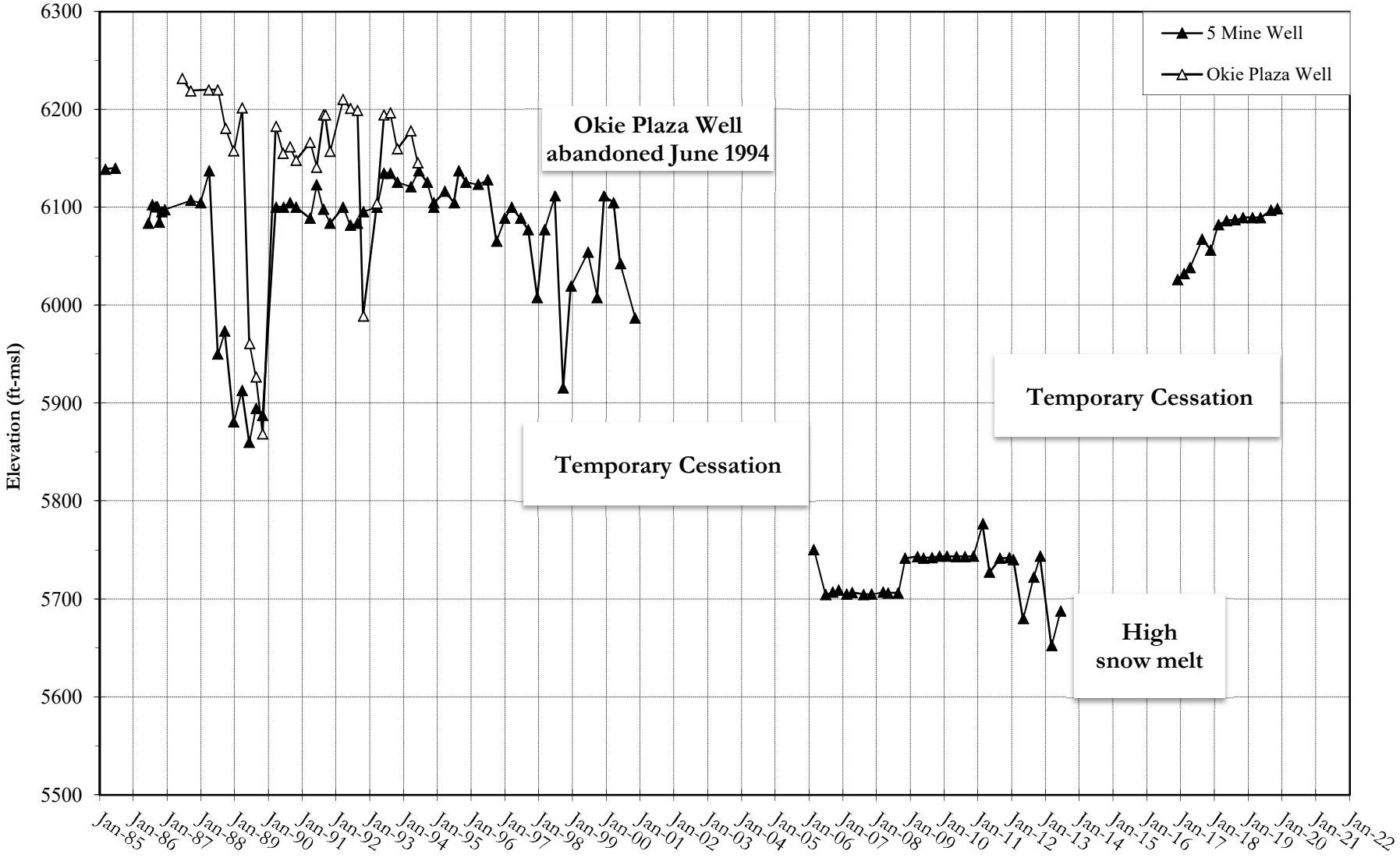
DESIGNED BY:	FJJ	COUNTRY:	USA
DRAWN BY:	KEC	STATE/PROVINCE:	Colorado
APPROVED BY:	Supervisor	GCS:	T 6 N, R 91 W
DATE:	2018 03 06	DRAWING/SHEET:	1 of 1
SCALE:	1" =1000'	C.I.:	0'

0 1000 2000 3000 FEET

I:\Miranda\FIG 2 2017.dwg

PLOT OF WATER LEVELS

Trout Creek Sandstone Wells



I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\3 TROUT CREEK SS WL

FIGURE 3

PLOT OF WATER LEVELS

Well TR-4, Middle Sandstone

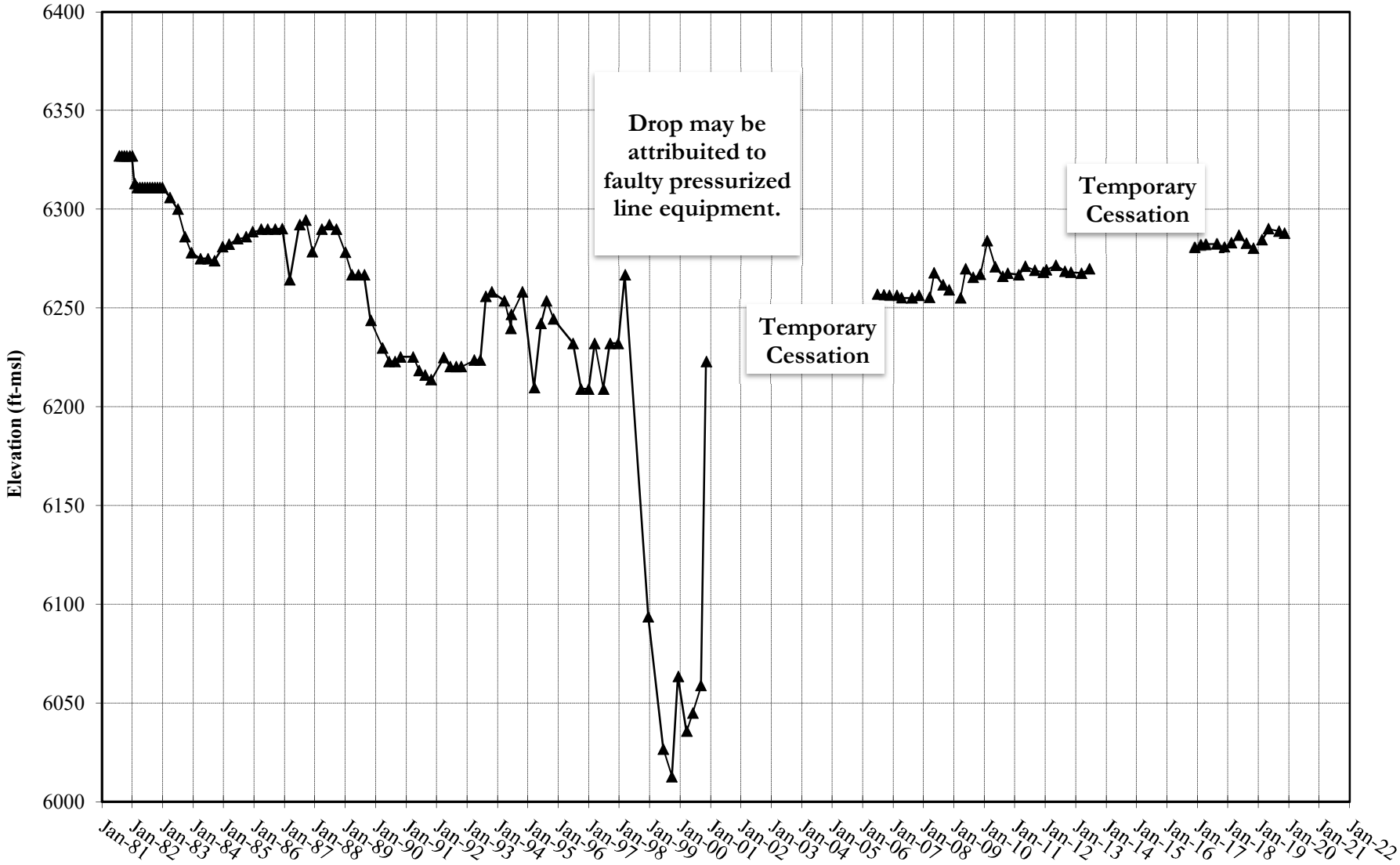


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FIGURE 4

PLOT OF WATER LEVELS

Well TR-7a, Middle Sandstone

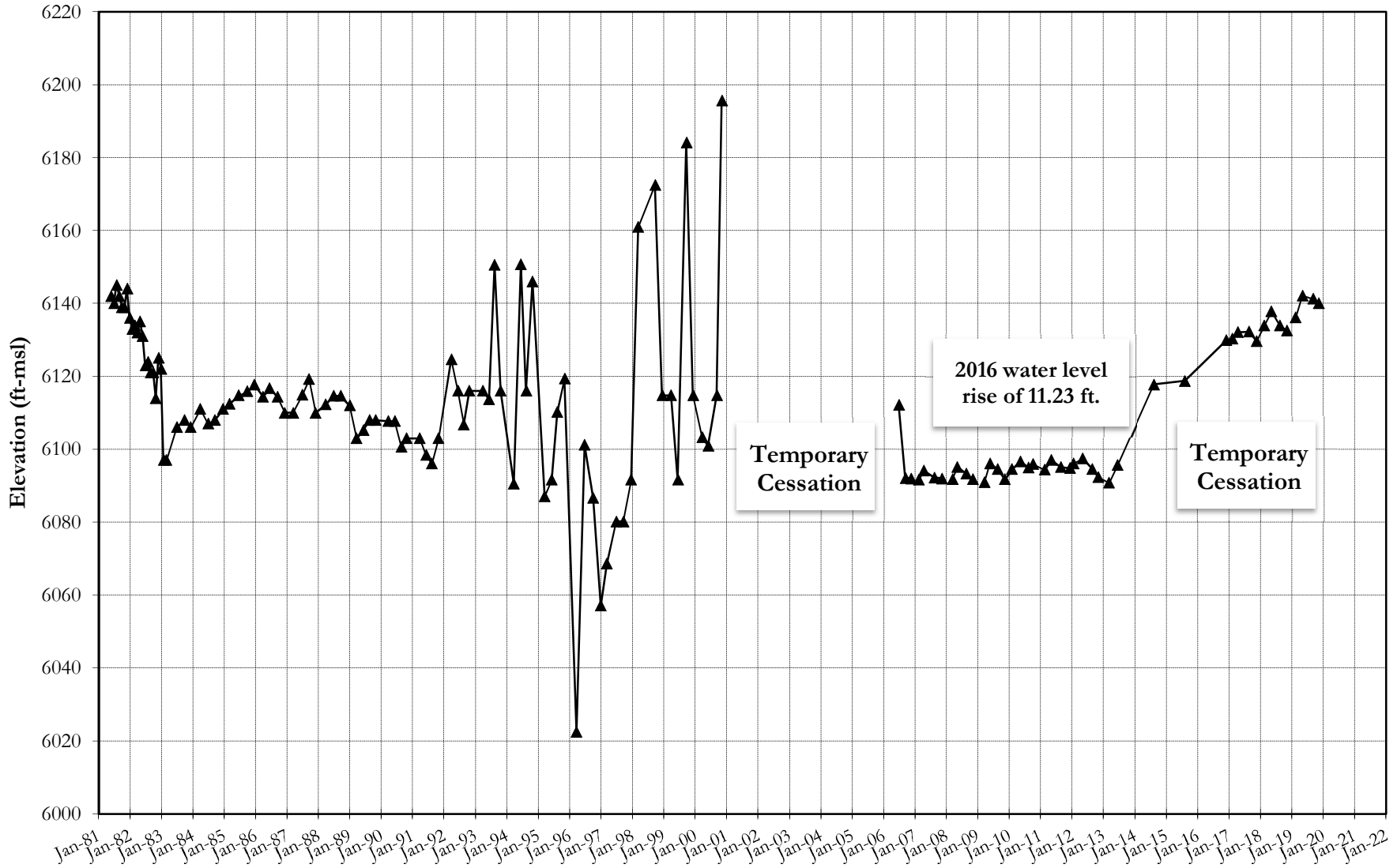

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FIGURE 5

PLOT OF WATER LEVELS

Well 81-01, Middle Sandstone

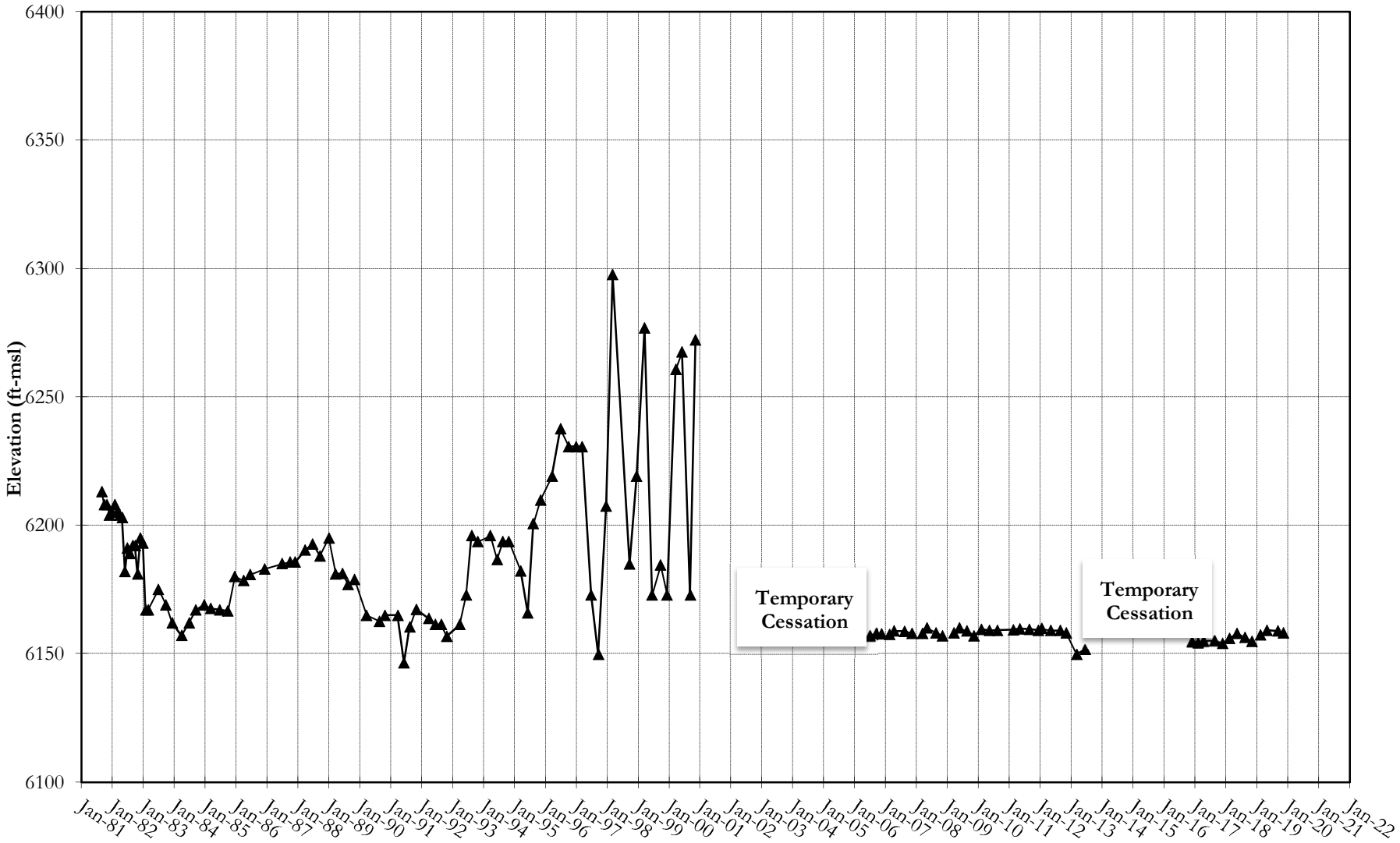

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FIGURE 6

PLOT OF WATER LEVELS

Well 83-01, Middle Sandstone

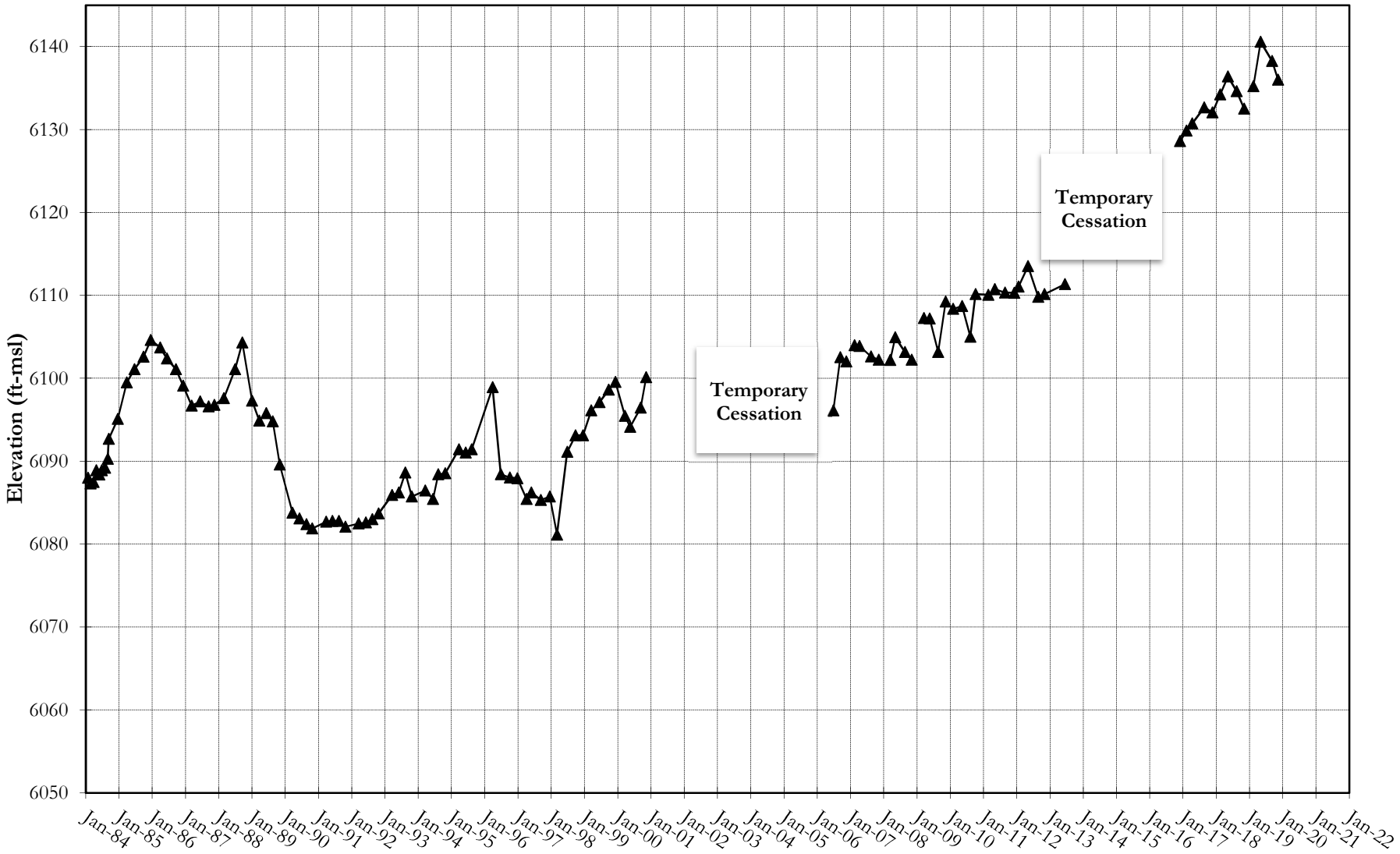

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FIGURE 7

PLOT OF WATER LEVELS

Well 83-02, Middle Sandstone

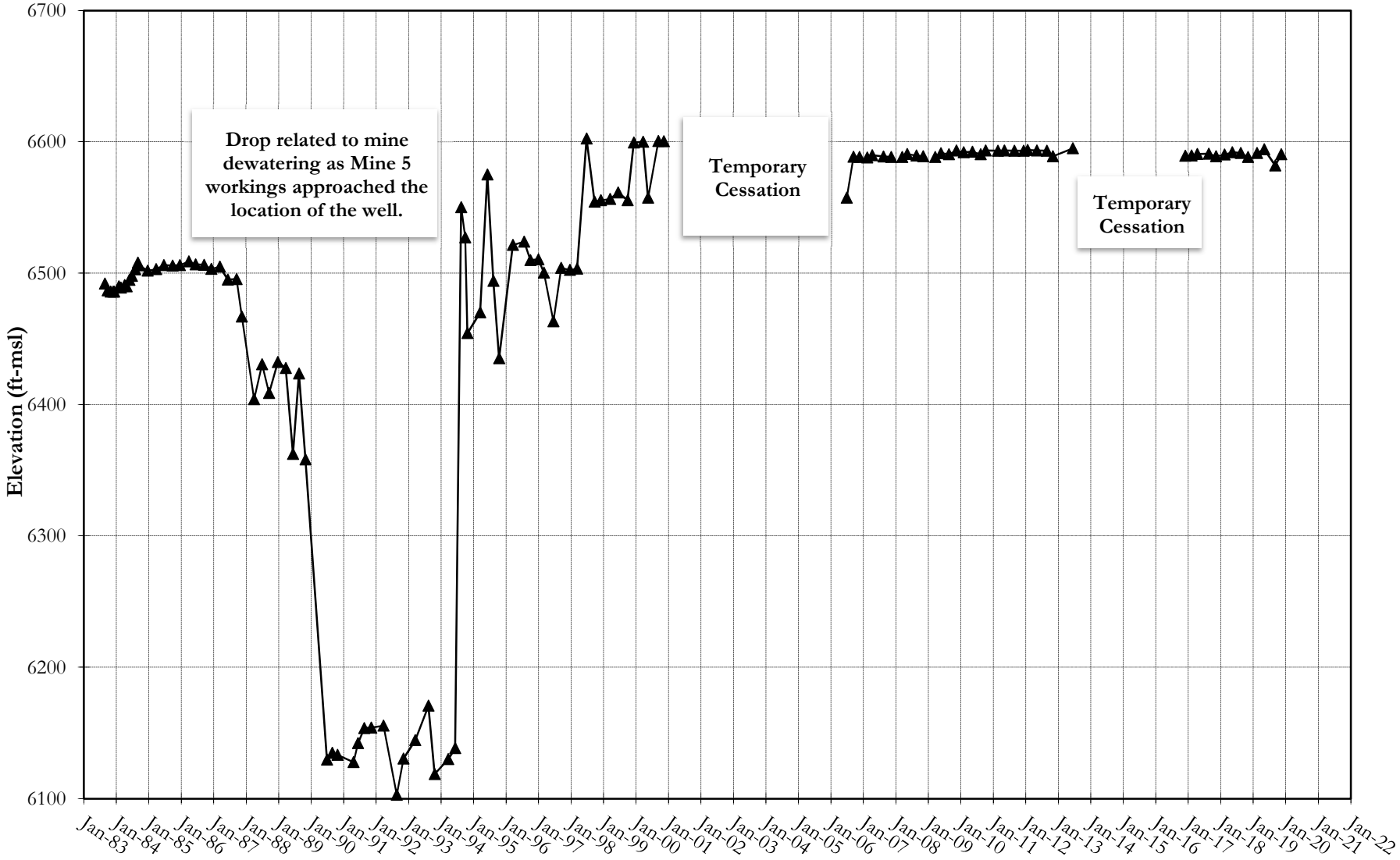

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FIGURE 8

PLOT OF WATER LEVELS

Well 83-03, Middle Sandstone

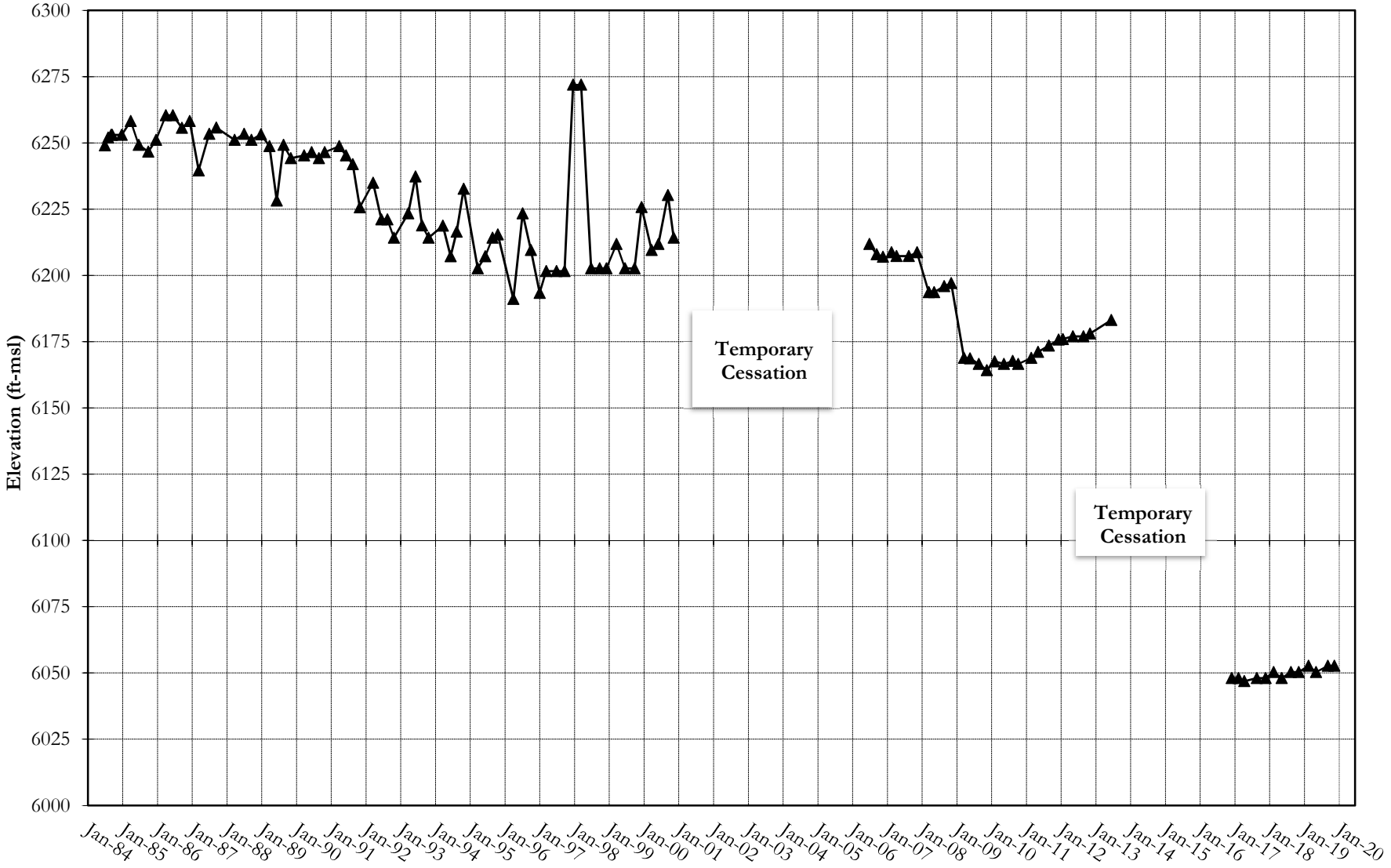

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FIGURE 9

PLOT OF WATER LEVELS

Twentymile Sandstone Wells

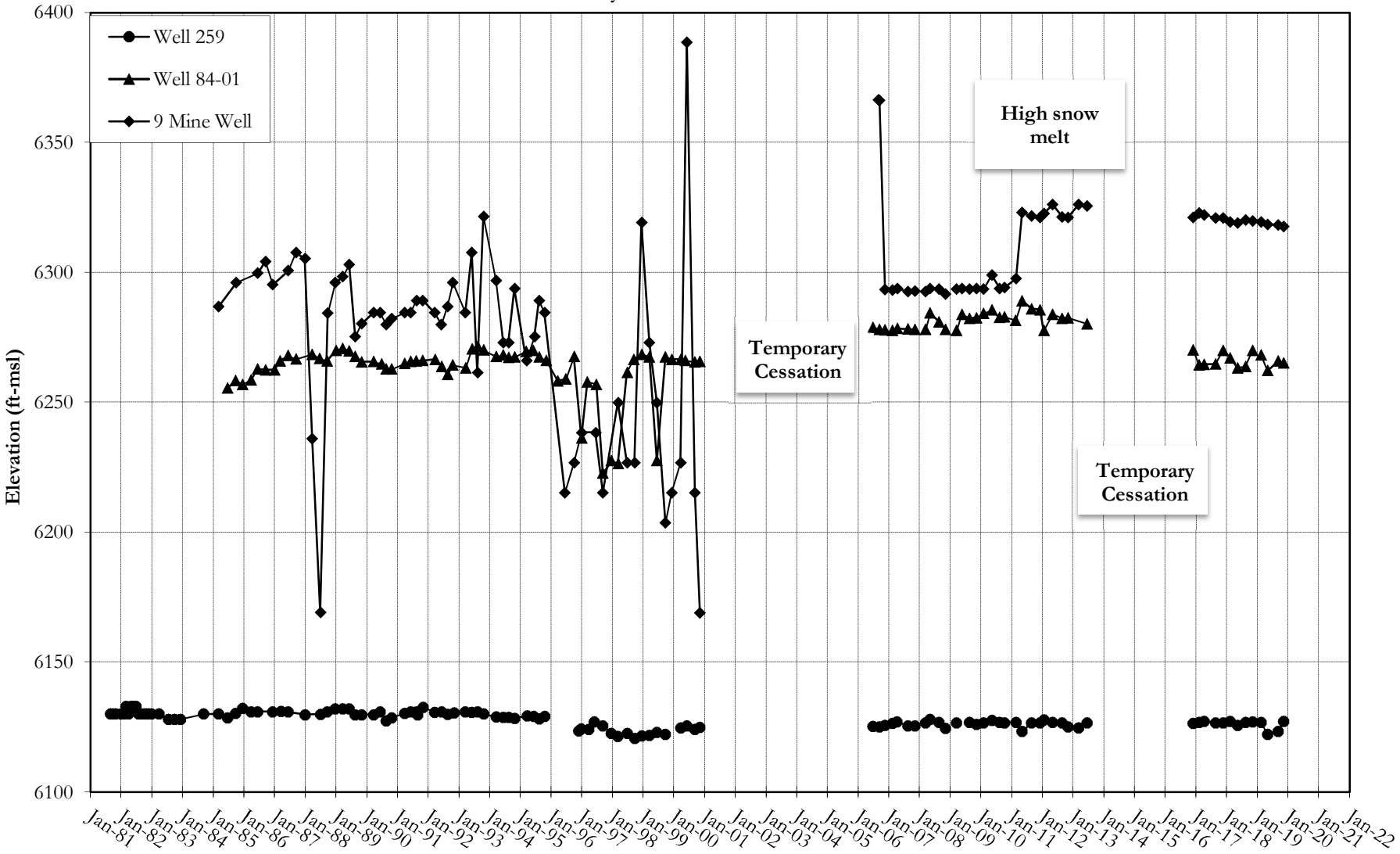

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FIGURE 10

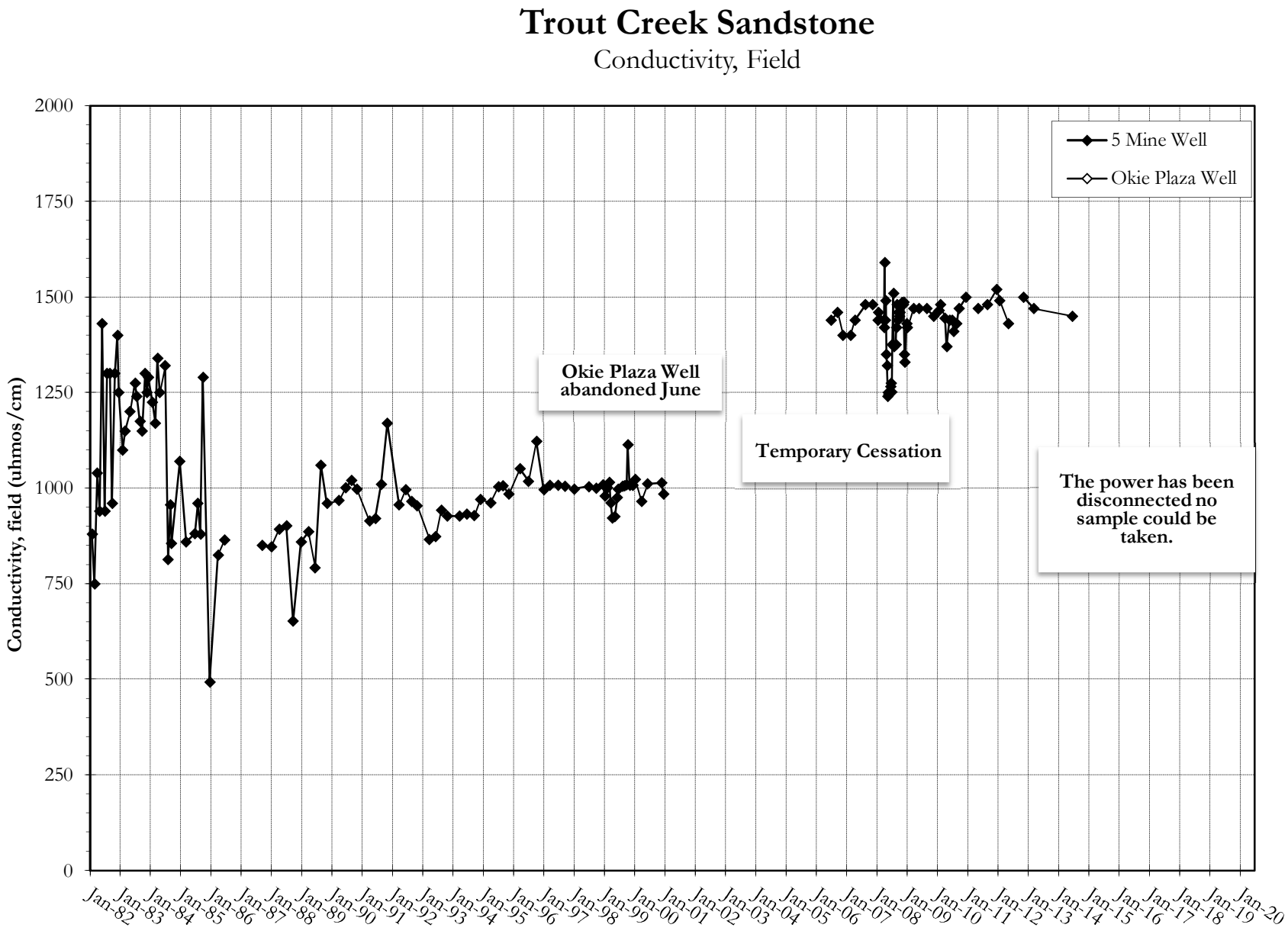

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FIGURE 11

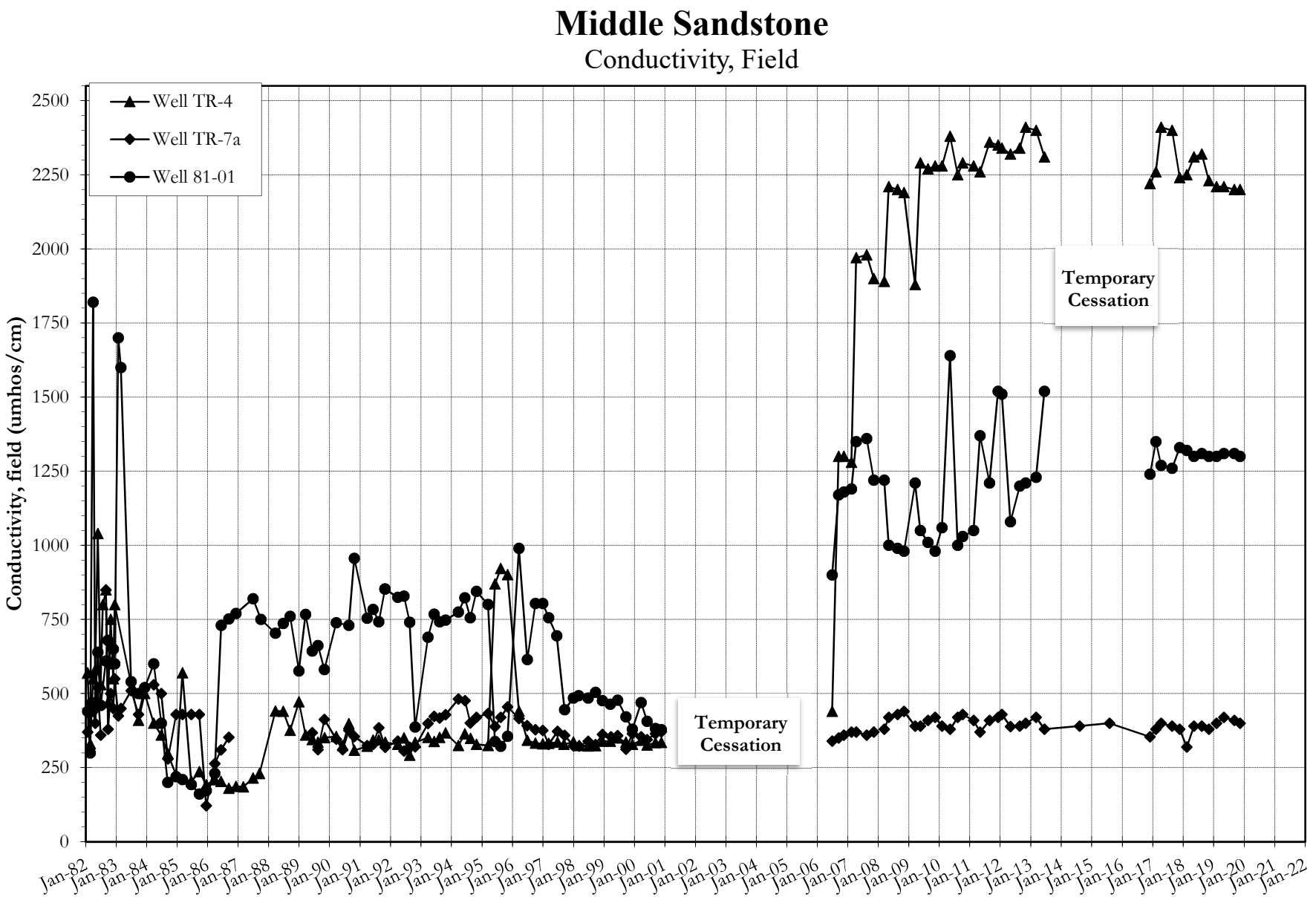
Middle Sandstone
Conductivity, Field
Well TR-4
Well TR-7a
Well 81-01
Conductivity, field (umhos/cm)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
Temporary Cessation
Temporary Cessation
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22

FIGURE 12

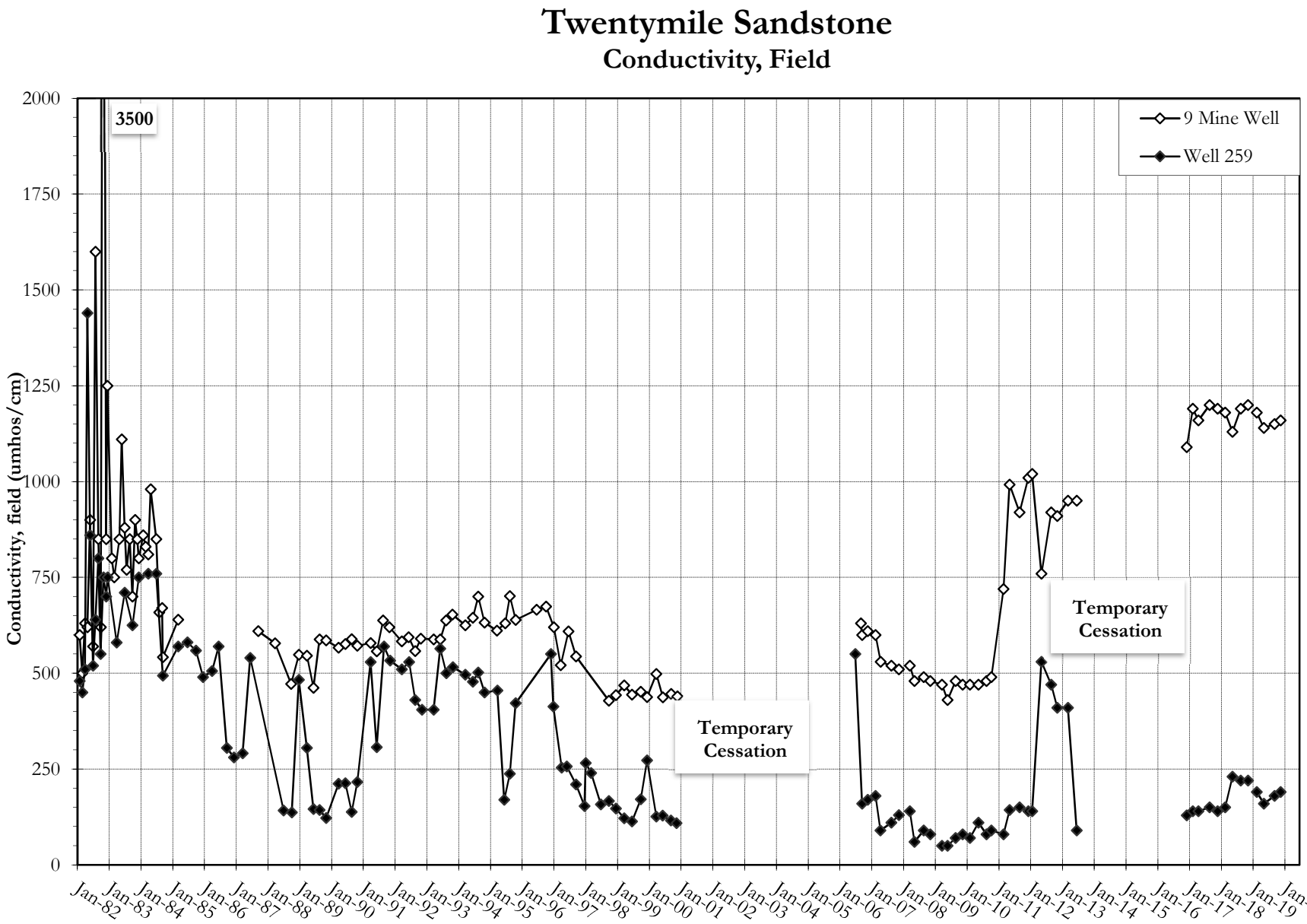

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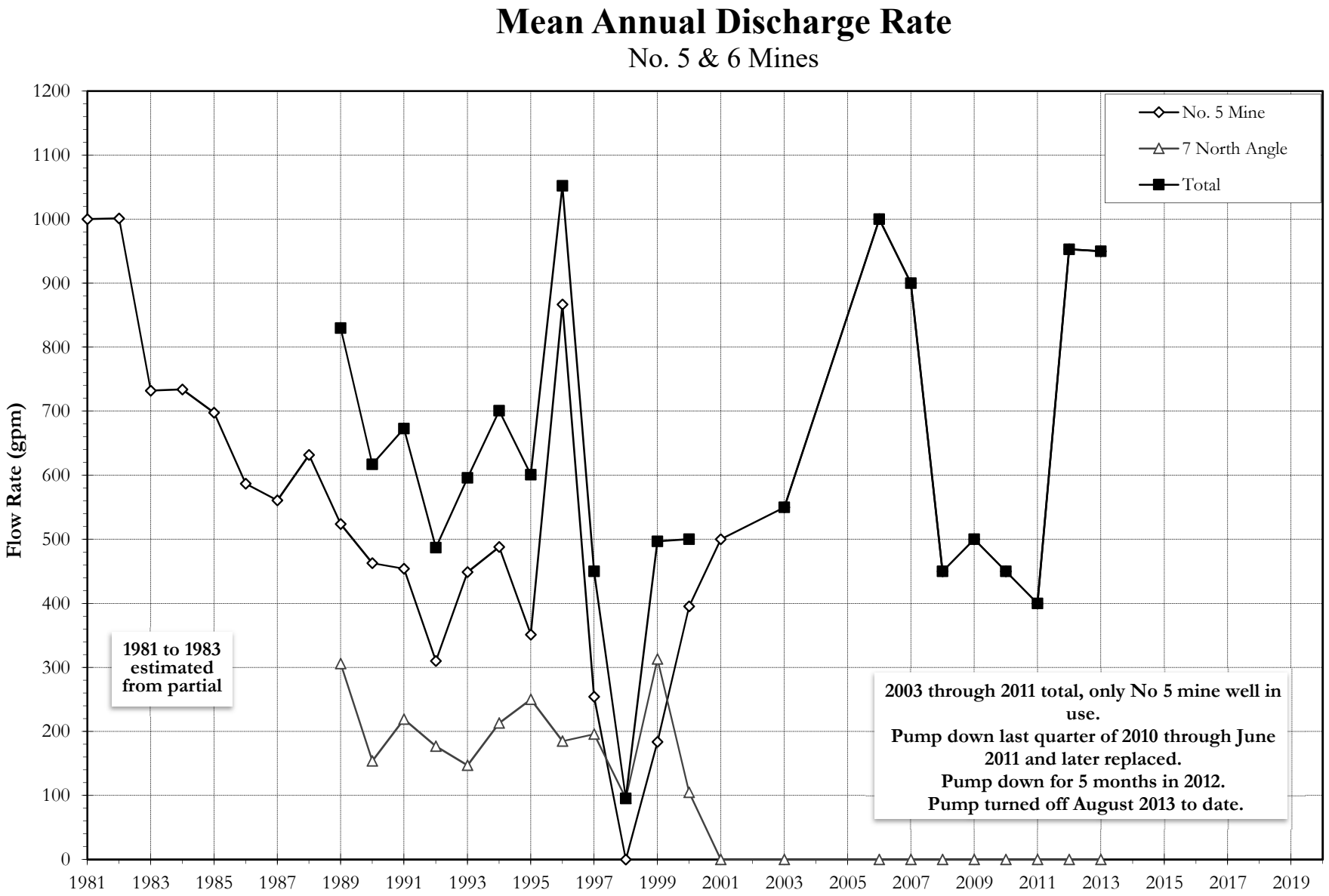
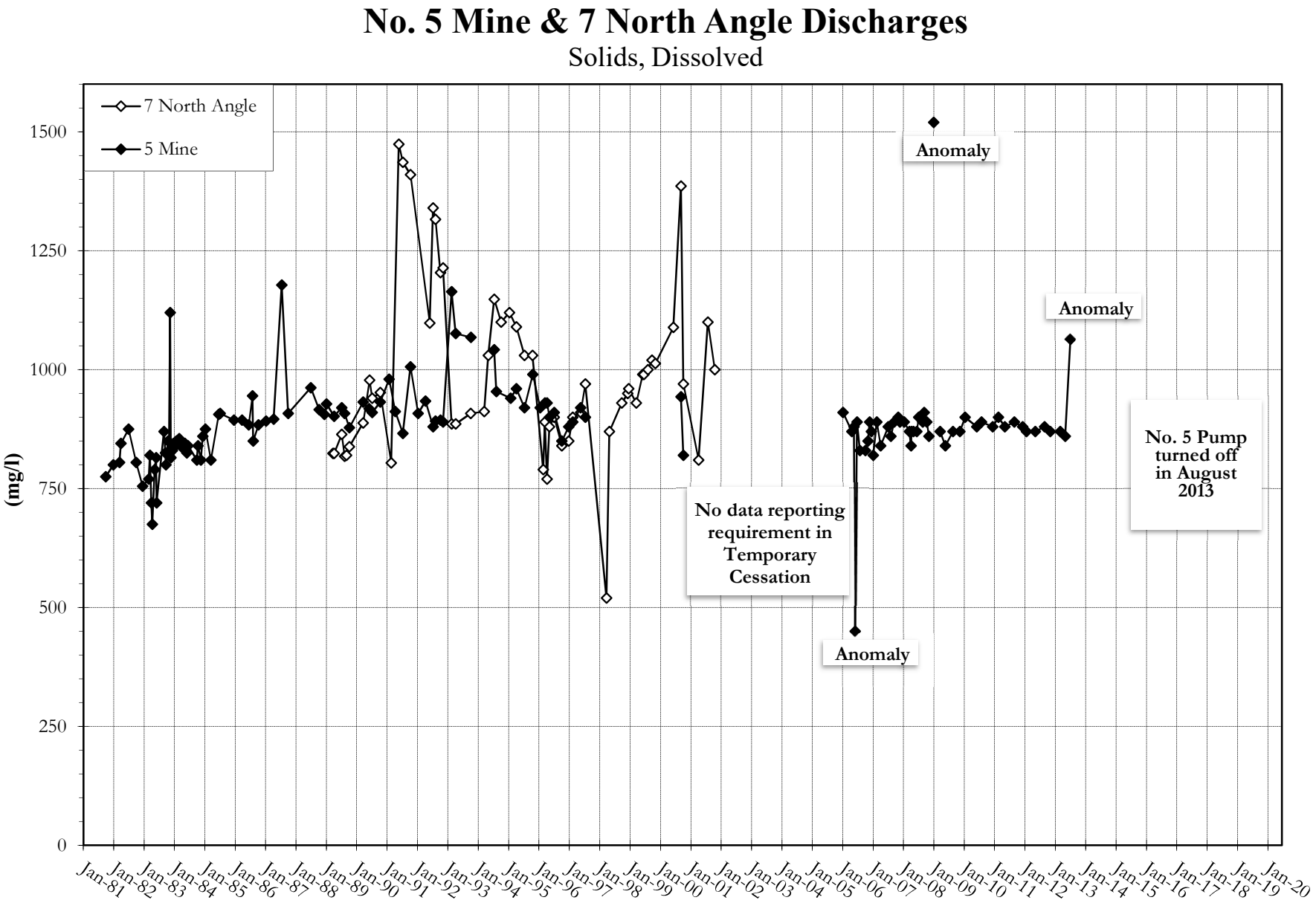
FIGURE 13



I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\14 5 & 6 DISCHARGE 2012

FIGURE 14

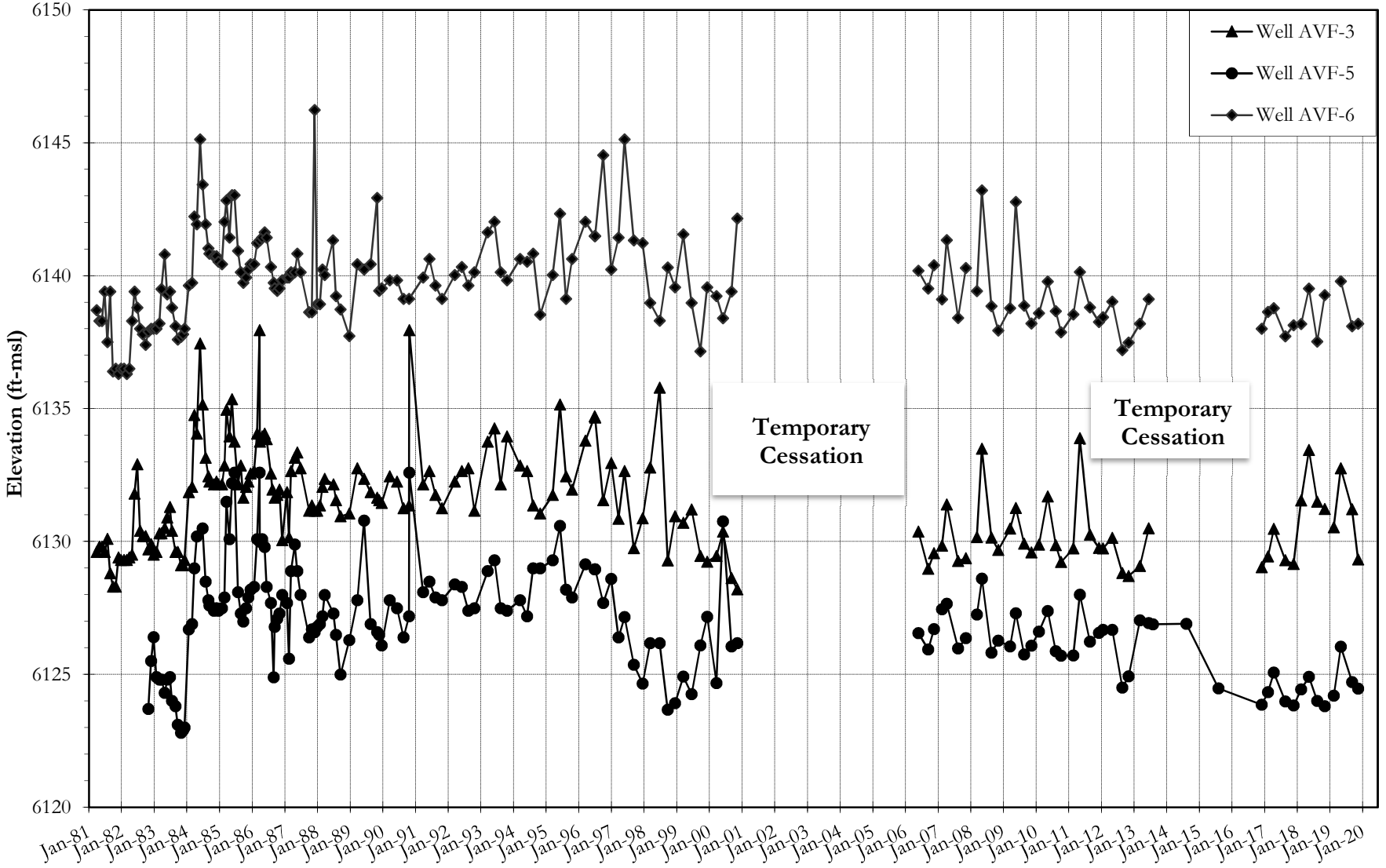


I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\15 5MN & 7NA POR TDS

FIGURE 15

PLOT OF WATER LEVELS

Williams Fork Alluvium



I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\16 WILLIAMS FK ALLUVIUM POR WL

FIGURE 16

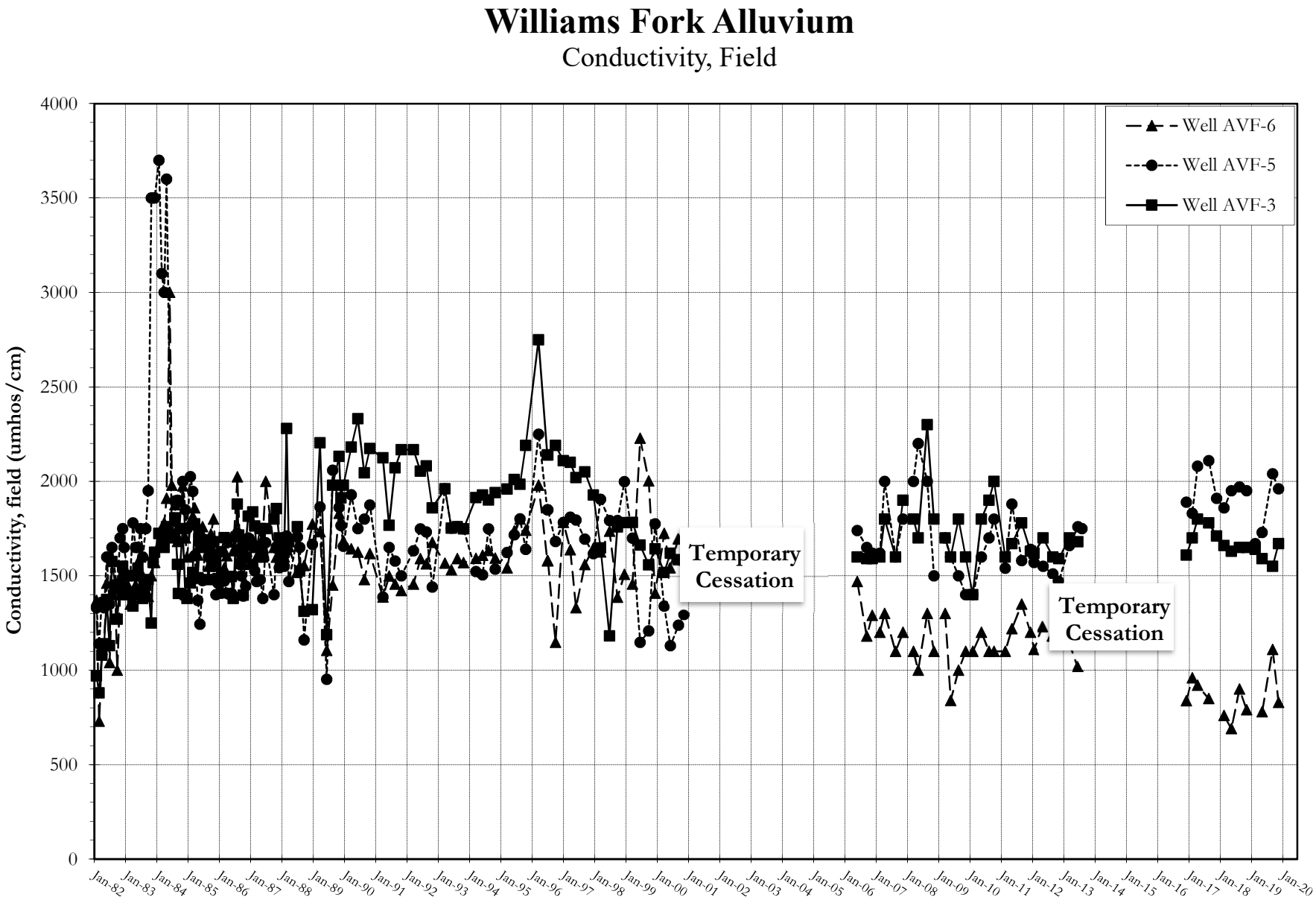
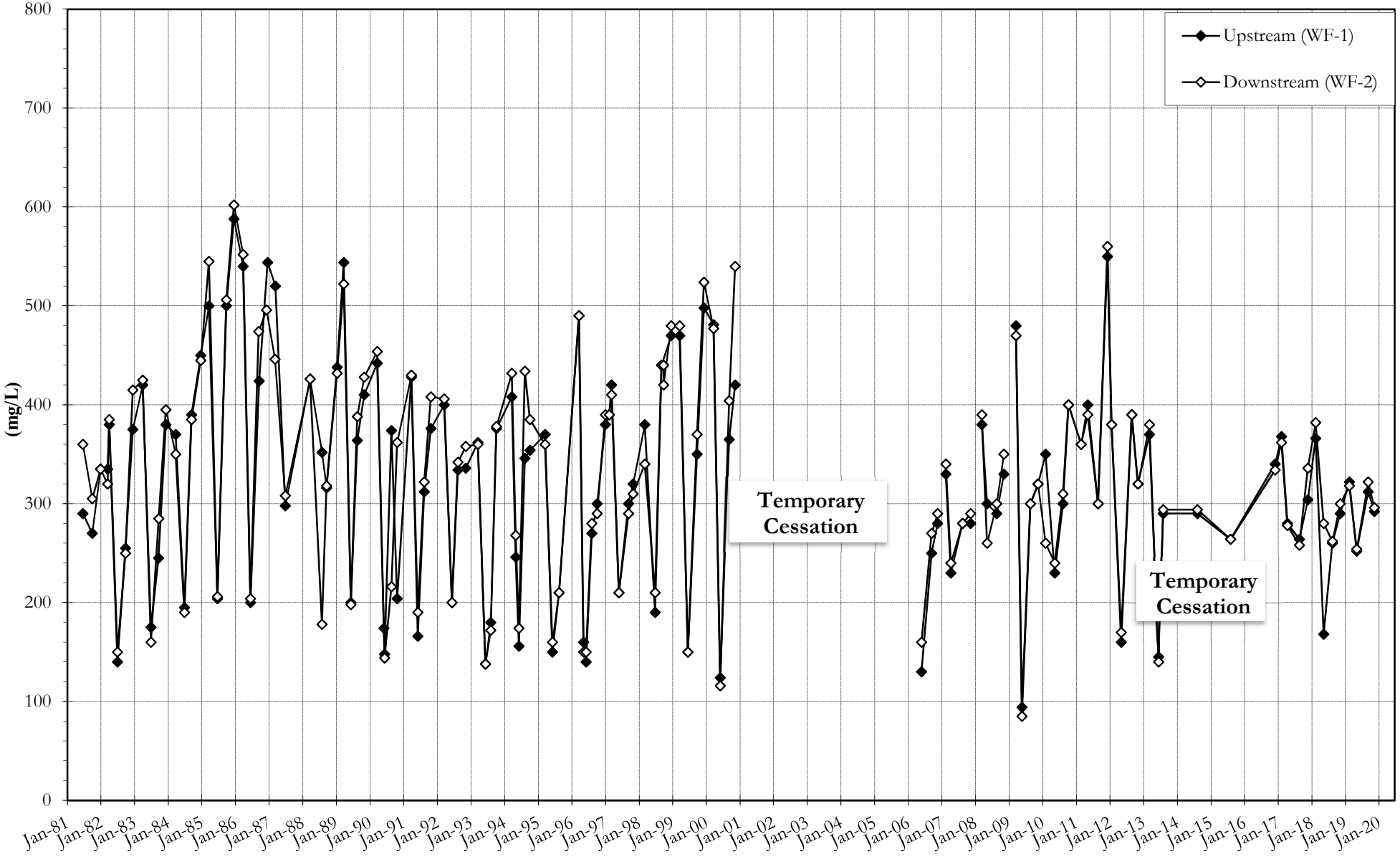

Williams Fork Alluvium
Conductivity, Field
Conductivity, field (umhos/cm)
4000
3500
3000
2500
2000
1500
1000
500
0
Well AVF-6
Well AVF-5
Well AVF-3
Temporary Cessation
Temporary Cessation
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20

FIGURE 17

Williams Fork River

Solids, Total Dissolved

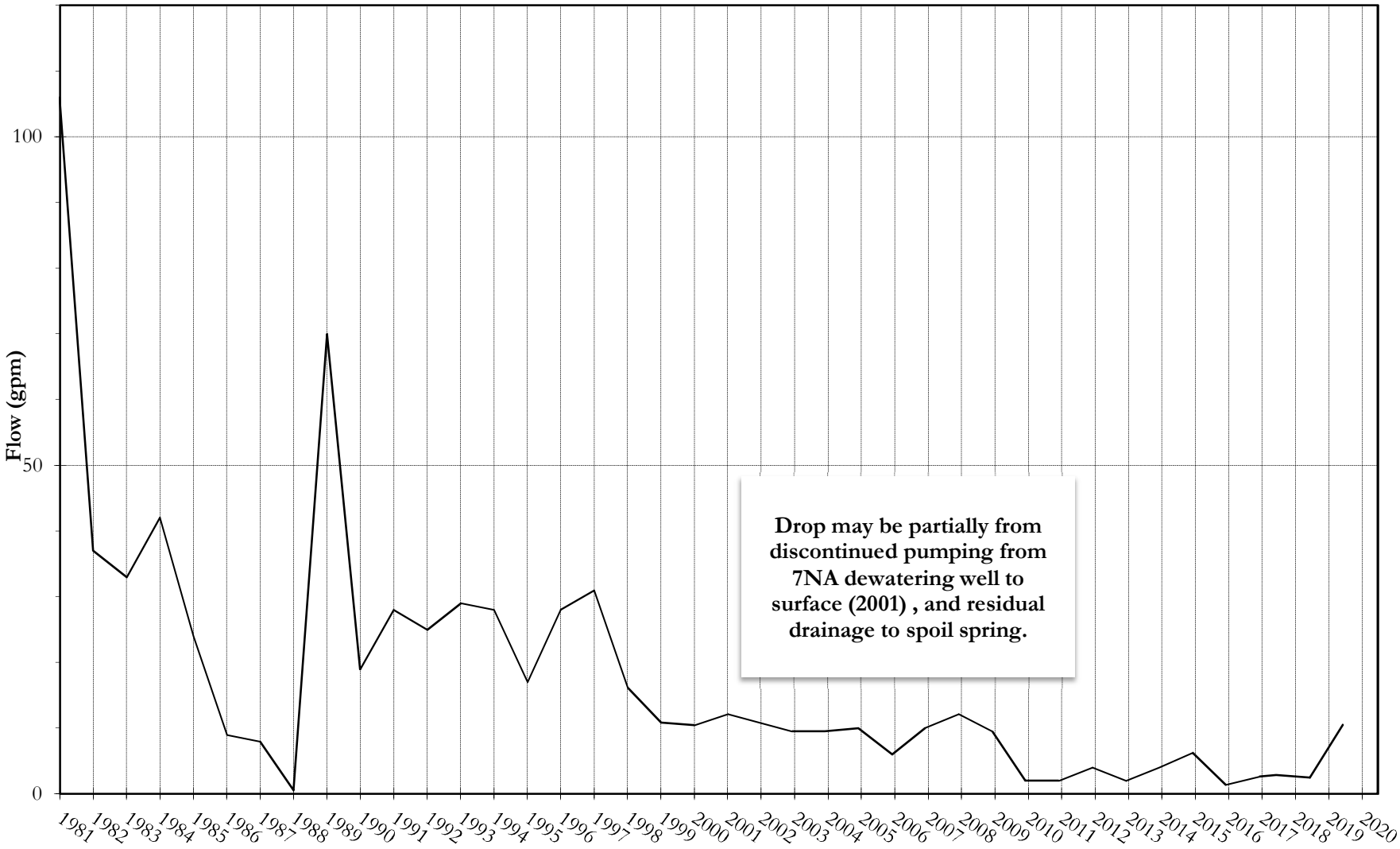


I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\18 WILLIAMS FK RIVER POR TDS

FIGURE 18

Average Discharge From No. 1 Strip Pit

Period of Record

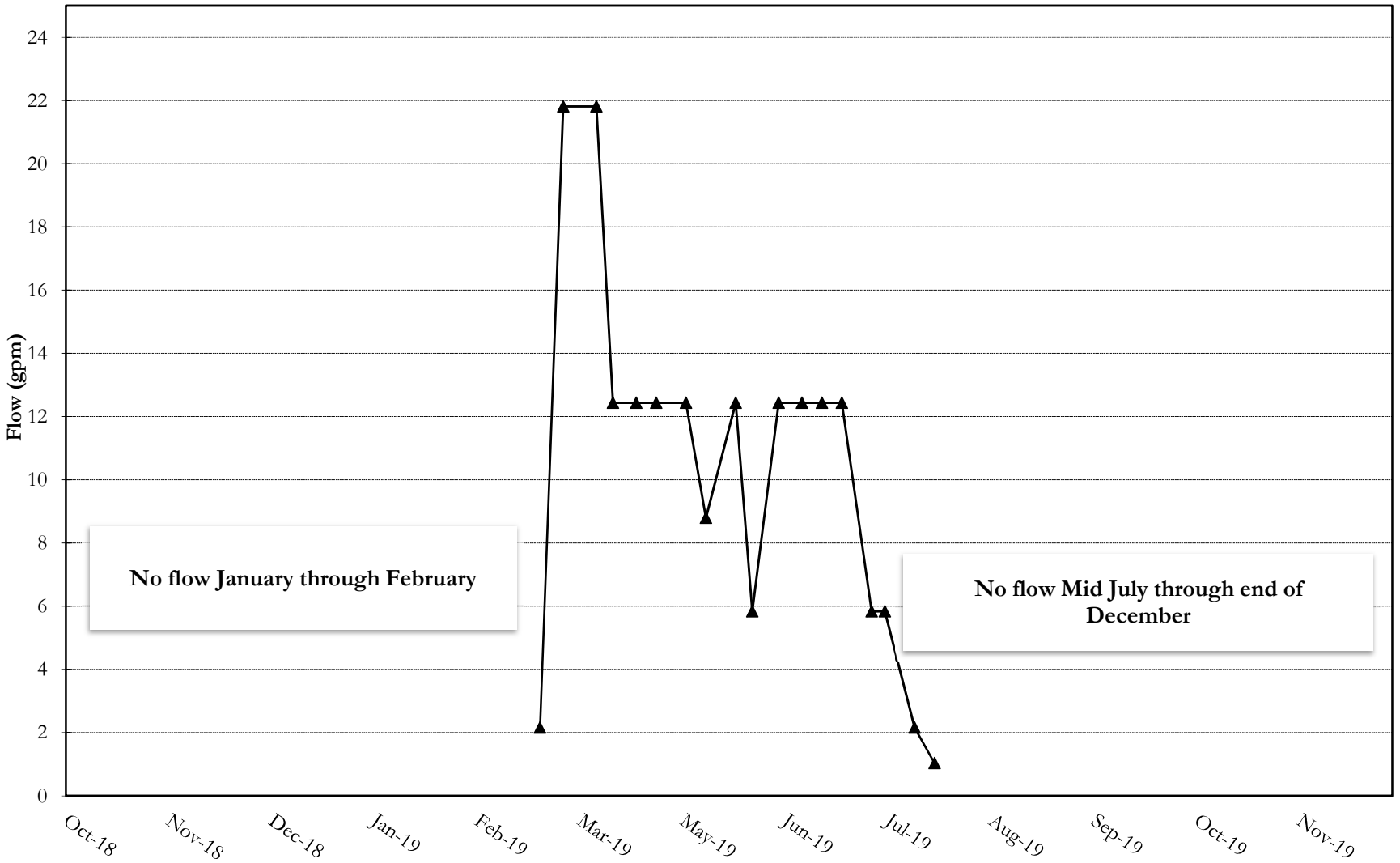


I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\19 STRIP PIT 1, 1SP POR DISCHARGE

FIGURE 19

Plot of Flow Rates

No. 1 Strip Pit Discharge, 2019 Water Year



I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\20 STRIP PIT 1, 1SP WY DISCHARGE

FIGURE 20

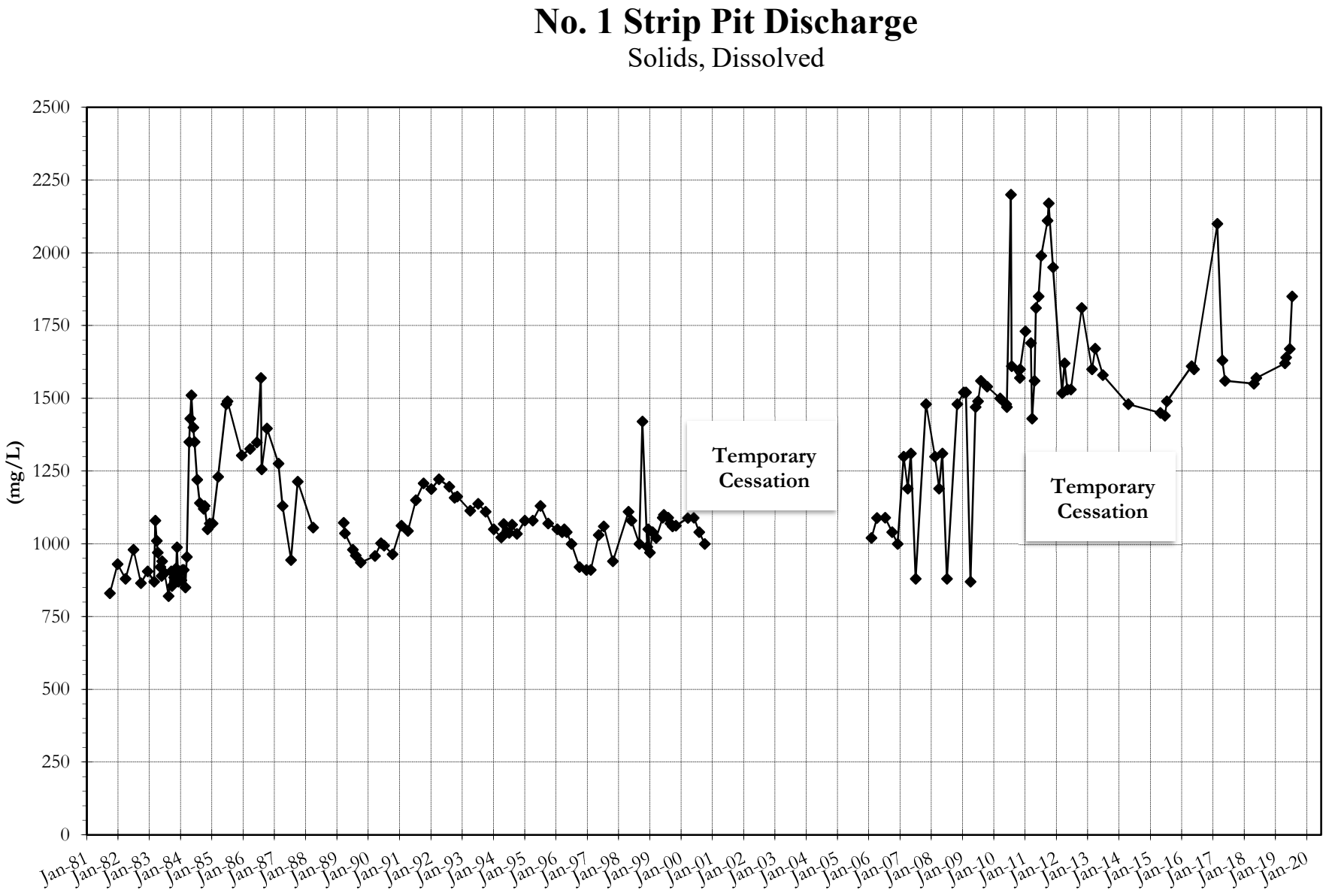
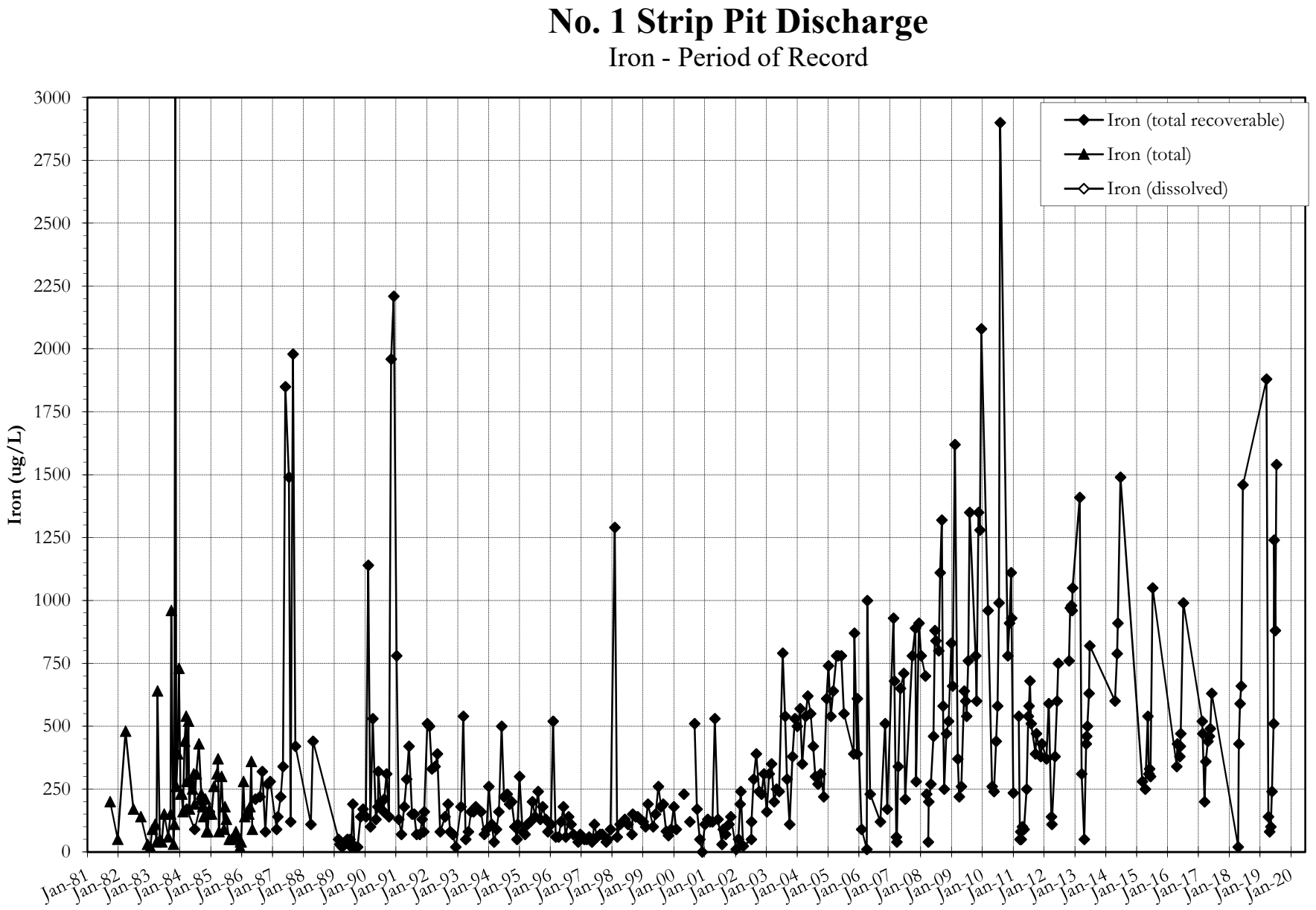

No. 1 Strip Pit Discharge
Solids, Dissolved
(mg/L)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
Temporary Cessation
Temporary Cessation
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20

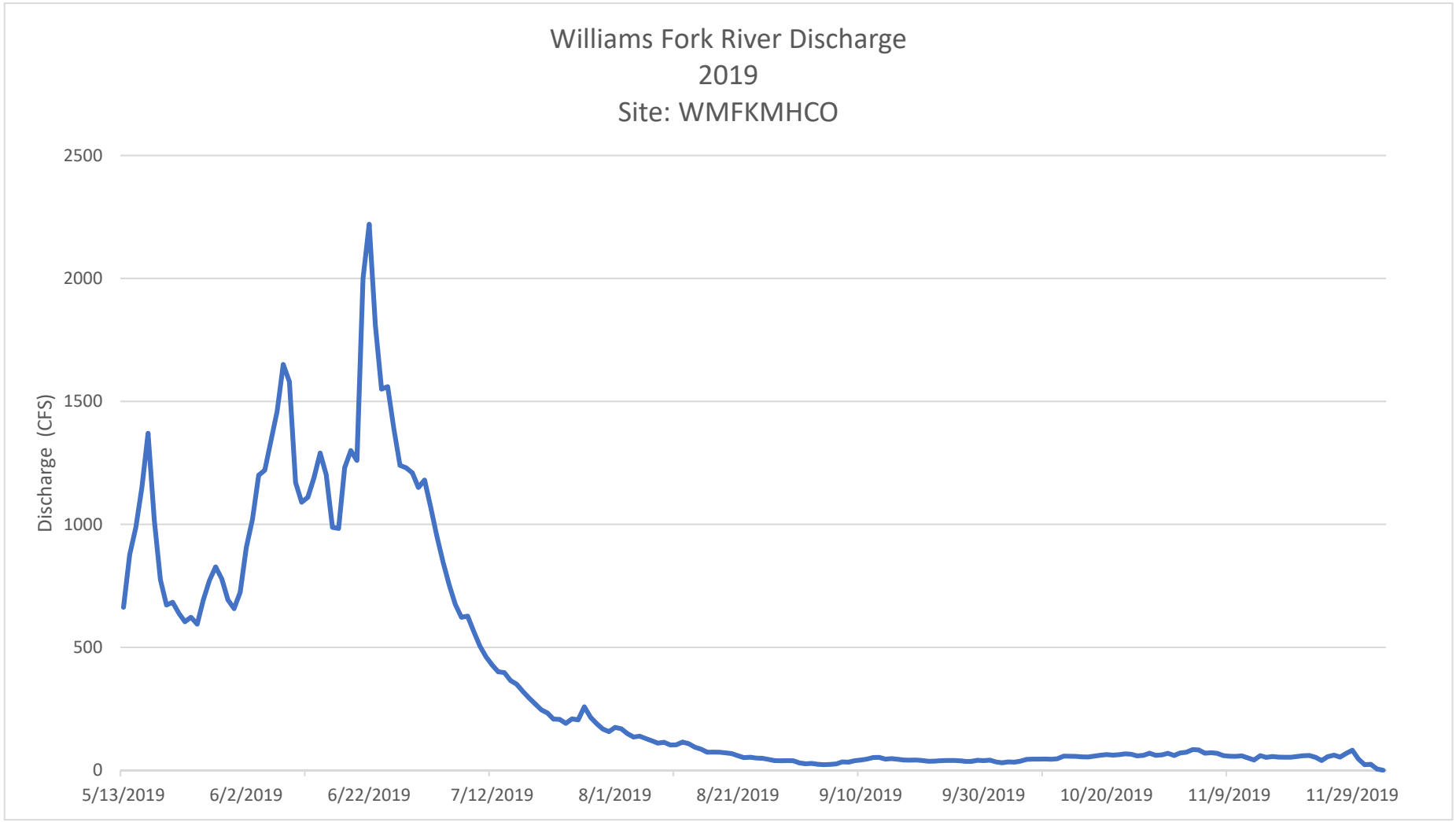
FIGURE 21



I:\Environmental\CDMG - CDRMS\AHR\2019\Williams Fork\Figures 2019\22 STRIP PIT 1, 1SP POR FE

FIGURE 22

SUPPORTING DATA


Williams Fork River Discharge
2019
Site: WMFKMHCO
Discharge (CFS)
2500
2000
1500
1000
500
0
5/13/2019
6/2/2019
6/22/2019
7/12/2019
8/1/2019
8/21/2019
9/10/2019
9/30/2019
10/20/2019
11/9/2019
11/29/2019

Williams Fork River Discharge Data 2019
Station: Williams Fork at Moth Near Hamilton
WMFKMHCO

Date/Time	DISCHARGE (cfs)
5/13/2019	663
5/14/2019	877
5/15/2019	987
5/16/2019	1150
5/17/2019	1370
5/18/2019	1020
5/19/2019	775
5/20/2019	672
5/21/2019	683
5/22/2019	639
5/23/2019	604
5/24/2019	622
5/25/2019	594
5/26/2019	692
5/27/2019	772
5/28/2019	827
5/29/2019	779
5/30/2019	693
5/31/2019	657
6/1/2019	724
6/2/2019	907
6/3/2019	1020
6/4/2019	1200
6/5/2019	1220
6/6/2019	1340
6/7/2019	1460
6/8/2019	1650
6/9/2019	1580
6/10/2019	1170
6/11/2019	1090
6/12/2019	1110
6/13/2019	1190
6/14/2019	1290
6/15/2019	1200
6/16/2019	988
6/17/2019	983
6/18/2019	1230
6/19/2019	1300
6/20/2019	1260
6/21/2019	2000
6/22/2019	2220
6/23/2019	1810

Williams Fork River Discharge Data 2019
Station: Williams Fork at Moth Near Hamilton
WMFKMHCO

Date/Time	DISCHARGE (cfs)
6/24/2019	1550
6/25/2019	1560
6/26/2019	1390
6/27/2019	1240
6/28/2019	1230
6/29/2019	1210
6/30/2019	1150
7/1/2019	1180
7/2/2019	1070
7/3/2019	952
7/4/2019	847
7/5/2019	754
7/6/2019	675
7/7/2019	622
7/8/2019	627
7/9/2019	565
7/10/2019	505
7/11/2019	461
7/12/2019	428
7/13/2019	400
7/14/2019	397
7/15/2019	365
7/16/2019	350
7/17/2019	321
7/18/2019	294
7/19/2019	270
7/20/2019	246
7/21/2019	233
7/22/2019	208
7/23/2019	207
7/24/2019	191
7/25/2019	209
7/26/2019	205
7/27/2019	258
7/28/2019	216
7/29/2019	190
7/30/2019	168
7/31/2019	157
8/1/2019	174
8/2/2019	169
8/3/2019	149
8/4/2019	135

Williams Fork River Discharge Data 2019
Station: Williams Fork at Moth Near Hamilton
WMFKMHCO

Date/Time	DISCHARGE (cfs)
8/5/2019	139
8/6/2019	129
8/7/2019	120
8/8/2019	110
8/9/2019	114
8/10/2019	103
8/11/2019	104
8/12/2019	115
8/13/2019	108
8/14/2019	94
8/15/2019	85.4
8/16/2019	73.4
8/17/2019	74
8/18/2019	73.6
8/19/2019	70.8
8/20/2019	68
8/21/2019	58.9
8/22/2019	51.4
8/23/2019	53
8/24/2019	49.9
8/25/2019	48.6
8/26/2019	44
8/27/2019	39.5
8/28/2019	38.5
8/29/2019	39.1
8/30/2019	38.5
8/31/2019	30
9/1/2019	26.4
9/2/2019	27.7
9/3/2019	24.4
9/4/2019	22.4
9/5/2019	23.7
9/6/2019	25.8
9/7/2019	33.9
9/8/2019	33
9/9/2019	38.6
9/10/2019	41.7
9/11/2019	45.6
9/12/2019	51.7
9/13/2019	52.5
9/14/2019	45.7
9/15/2019	47.5

Williams Fork River Discharge Data 2019
Station: Williams Fork at Moth Near Hamilton
WMFKMHCO

Date/Time	DISCHARGE (cfs)
9/16/2019	45
9/17/2019	41.9
9/18/2019	41.2
9/19/2019	42
9/20/2019	40
9/21/2019	36.6
9/22/2019	37.3
9/23/2019	39.5
9/24/2019	40
9/25/2019	40
9/26/2019	39.1
9/27/2019	35.9
9/28/2019	36.2
9/29/2019	40.8
9/30/2019	39.4
10/1/2019	41.1
10/2/2019	34
10/3/2019	30.4
10/4/2019	33.8
10/5/2019	33.1
10/6/2019	37.2
10/7/2019	44.7
10/8/2019	45.3
10/9/2019	45.6
10/10/2019	46.1
10/11/2019	45.1
10/12/2019	47.1
10/13/2019	57.7
10/14/2019	57
10/15/2019	56.2
10/16/2019	54.5
10/17/2019	54
10/18/2019	57.3
10/19/2019	61.2
10/20/2019	63.7
10/21/2019	61.5
10/22/2019	63.4
10/23/2019	66.7
10/24/2019	65.1
10/25/2019	58.4
10/26/2019	60.4
10/27/2019	69.3

Williams Fork River Discharge Data 2019
Station: Williams Fork at Moth Near Hamilton
WMFKMHCO

Date/Time	DISCHARGE (cfs)
10/28/2019	60.8
10/29/2019	62.9
10/30/2019	68.9
10/31/2019	60.2
11/1/2019	70.7
11/2/2019	73.8
11/3/2019	84.1
11/4/2019	82.5
11/5/2019	69.5
11/6/2019	71.4
11/7/2019	69
11/8/2019	59.6
11/9/2019	56.9
11/10/2019	56.7
11/11/2019	58.6
11/12/2019	50.3
11/13/2019	42
11/14/2019	59.4
11/15/2019	52.1
11/16/2019	55.8
11/17/2019	53.1
11/18/2019	52.7
11/19/2019	52.6
11/20/2019	55.7
11/21/2019	59.2
11/22/2019	60.3
11/23/2019	52.8
11/24/2019	39.9
11/25/2019	55.4
11/26/2019	61.6
11/27/2019	53.9
11/28/2019	68.4
11/29/2019	81.4
11/30/2019	45.7
12/1/2019	22.4
12/2/2019	24.4
12/3/2019	5.39
12/4/2019	0