STATE OF COLORADO

Musick - DNR, Jason <jason.musick@state.co.us>

Seneca IIW 2016 AHR

1 message

Watterson, Brian <BWatterson@peabodyenergy.com> Thu, Mar 30, 2017 at 11:11 AM
To: "Musick - DNR, Jason <jason.musick@state.co.us> (jason.musick@state.co.us)" <jason.musick@state.co.us>

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Seneca Coal Company
Peabody Energy
PO Box 670
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February 24, 2017

Jason Musick
Colorado Division of Reclamation, Mining and Safety
1313 Sherman Street, Room 215
Denver, CO 80203-2273

RE: SIIW AHR, Permit C-82-057

Dear Jason,

Enclosed is the 2016 Annual Hydrology Report (AHR) for the Seneca II-W Mine (SIIW). This report contains a compilation and analysis of hydrologic data collected during the period extending from October 1, 2015 through September 30, 2016.

Please contact me with any comments and/or questions.

Sincerely,

Brian Watterson
Geologist

TNS/*tns*
Enclosure: SIIW AHR

cc: Alan Boehms, OSMRE
Jennifer Maiolo, BLM

Seneca Coal Company
PO Box 670
36600 Routt County Road 27
Hayden, CO. 81639

2016 WATER YEAR

ANNUAL HYDROLOGY REPORT

SENECA II-W MINE

FEBRUARY 2017

2016 ANNUAL HYDROLOGY REPORT
SENECA II-W MINE

2016 WATER YEAR

ANNUAL HYDROLOGY REPORT

SENECA II-W MINE

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LIST OF APPENDICES

TABLE A

Hydrologic Monitoring Site Numbering System

Bedrock well site syntax:	**mine/aquifer/site #**
Alluvial well site syntax:	**mine/drainage/aquifer/site #**
Stream station syntax:	**mine/S "for stream"/drainage/site #**
Spring site syntax:	**mine/spring abbr./site #**
NPDES site syntax:	**NPDES/site#**

Mine designations: Yoast - Y; Seneca II-W = W; Seneca II = S

Aquifer designations:

Wadge Overburden	**= OV**	**Lennox Overburden**	**= LOV**
Wadge Coal	**= W**	**Trout Creek**	**= TC**
Wadge Underburden	**= WU**	**Spoil**	**= SP**
Wolf Creek	**= WC**	**Spring**	**= SPG**
Wolf Creek Under	**= WCU**	**Spoil Spring**	**= SSPG**
Lennox Coal	**= L**	**Alluvium**	**= AL preceded by drainage designation**

Drainage designations:

Grassy Creek	**= G**	**Watering Trough**	**= WT**
Little Grassy Creek	**= LG**	**Fish Creek**	**= F**
Sage Creek	**= S**	**Cow Camp**	**= C**
Dry Creek	**= D**	**Bond Creek**	**= B**
Hubberson	**= H**	**N. of Bond Creek**	**= NB**
Annand Draw	**= A**		

NOTE: An "F" that follows the drainage designation on stream sites indicate the presence of a flume (see examples).

Examples:

II-W Overburden Site 4-02	**WOV4-2**	**Yoast Stream Site 3 on Sage**	**YSS3**
Yoast Annand Draw Alluv. Site 14	**YAAL14**	**Seneca Spoil Spring #8**	**SSSPG8**
Yoast flume Site 5 on Grassy	**YSGF5**		

Introduction

The information assembled in this 2016 Annual Hydrology Report (AHR) includes data collected from approved monitoring sites established at Seneca Coal Company's (SCC) Seneca II-W Mine (State Permit No. C-82-057). Locations of monitoring sites discussed in this report can be found by referring to Exhibit 7-1, Hydrology Monitoring Map, provided in the Seneca II-W Permit Application Package (PAP). In addition, NPDES ponds and surface water sites are depicted on Figures 1 and 2, Appendix A. A map of ground water monitor wells is provided in Figure 3.

All references to 2016 (or to “this year”) will be for Water Year 2016 (October 1, 2015 through September 30, 2016) unless otherwise noted. All tables referred to in the following text can be found in Appendix A. In addition, a table of contents for Appendix A is given at the beginning of that appendix. Mining began at Seneca II-W in August 1990. The last of the coal at Seneca II-W was removed in January 2006.

Field conductivity and pH meters were calibrated prior to each day’s use. The conductivity meter is calibrated using a potassium chloride solution with an electrical conductivity in the 1000 to 3000 umhos/cm range. The pH meter is calibrated using NBS traceable buffers with pH values of 7 and 10.

Prior to October 1, 1989, all field conductivity values collected at Seneca II-W monitoring sites were not corrected for temperature (i.e., 25° C). Field conductivity data starting on October 1, 1989 were temperature corrected to 25° C. The formula for correcting non-corrected conductivity data may be found in the 1990 through 1992 AHRs.

SCC instituted in 1995 a new monitoring site numbering system for its new Paradox™ water quality database. This revised system is detailed in Table A. For convenience sake, this table has been placed at the end of the Table of Contents (see previous page). In addition, Table 3, Summary of Ground Water Monitoring Wells; Table 8, Summary of Surface Water Monitoring Sites; and the Table of Contents of Appendices C through E

have all been revised to correlate the old site (and map) name to the new (Paradox) computer name. The revised computer name will be used throughout the following text.

The Tie-Across Haul Road (formerly associated with the Seneca II-W Mine) was transferred to the Hayden Gulch Terminal (CDRMS Permit C-92-081) on January 4, 2012.

Meteorological Data

Data from the National Climatic Data Center's (NCDC) Hayden Station are used to evaluate the precipitation trend. These data are provided in Appendix B. For this year, 18.43 inches of precipitation were measured, which is 0.17 inch (1%) above the 1981-2015 average, 18.26 inches. November, December, January, April and May exhibited above average precipitation. Snowpack runoff, as estimated by totaling November through March precipitation values, was 9.66 inches, which was 2.29 inches (31%) above the 1981-2015 average, 7.37 inches.

Ground Water

Water Levels.

Water levels (i.e., depth to water from ground surface) for all wells that are in the current monitoring program are presented in Appendix C. Hydrographs of all historic data for each well are presented prior to the water level reports (for all data since 2004) for each respective well in the same appendix. By presenting all historic data, trends related to seasonal and annual variability are more evident. Water level measurements are taken with an electrical water level indicator, or in the case of a few shallow alluvial wells, directly from a steel tape. Site information, including sampling frequencies, is presented in Table 3, Ground Water Monitoring Site Summary. Ground water level monitoring frequencies are listed in Table 1 of Appendix 15-3a in the Seneca II-W PAP.

Ground Water Level Summary.

This year, water levels at all wells were within historic ranges, with the following exceptions: WSOV-25 displayed the highest water level on record. WWCU-25 displayed the lowest water level on record this year. All W-25 series wells were drilled in 2004 and exist in the south pit area downgradient of the last mining area at this mine.

Most aquifers at Seneca II-W exhibit a typical seasonal fluctuation. Water levels are highest after the spring runoff, which recharges the aquifer. Often, bedrock aquifers exhibit a lag time between spring runoff and highest water levels. Water levels then decrease as late summer or fall approaches.

Ground Water Quality.

Table 3, Summary of Ground Water Monitoring Wells, describes the wells that have been sampled in the past and site characteristics. Table 4a and 4b show the new (2010) ground water parameter lists. ACZ Laboratory in Steamboat Springs, Colorado has performed analyses since May 31, 1983. ACZ Laboratory performs all analyses by EPA or equivalent methods. Samples are delivered the day of collection to the lab in an iced

cooler. Monitoring frequencies for ground water quality may be found in Table 1 of Appendix 15-3a in the Seneca II-W PAP.

The following discussion of the analytical data collected during the reporting period is arranged by strata being monitored and coincides with the format (by aquifer type) in which the analytical data are presented in Appendix D. The following discussion of water quality is limited to a description of total dissolved solids (TDS). A separate section, Comparison of Ground Water Quality to Water Use Standards, lists those samples that exceed water use standards.

Data for each well in Appendix D begin with a listing of the water quality data collected during the past two years, followed by remarks explaining the sampling procedure. This is followed by a plot of TDS versus time for the entire period of record. The regression line on this plot is generated by a method known as LOWESS, which is an acronym for Locally Weighted Scatter Plot Smoothing (Cleveland, 1979). Unless otherwise noted, a smoothness factor (SF) of 1 (on a scale of 0 to 1) was used, which gives maximum smoothing. A statistical report representing baseline (i.e., pre-mining) data for each well (when available) is presented in Appendix D1 of the 2010 AHR. In this statistics report, "censored data" refers to analytical values that were below the detection limit, and consequently censored from the min/max/mean calculations. The period for baseline conditions is listed under "conditions specified" at the bottom of each page.

Alluvium.

One well currently monitors the Hubberson Gulch alluvium. Well WHAL7-2 exists on Hubberson Gulch downstream of mine discharges from NPDES 006, 016 and 017. Its TDS plot shows a slightly increasing trend (SF 0.5), with values generally decreasing since May 2005. A discussion of water quality from Dry Creek Alluvial Well DCAL-02 is found in the following Ground Water Point of Compliance Section.

Wadge Overburden.

Three wells monitor the Wadge overburden. North area Well WOV14 exhibits an increasing TDS trend. Middle area Well WOV17 overall exhibits a decreasing TDS trend, but with an unusually high values in 2008, 2009 and 2011. South area Well WOV25 was drilled in September 2004. It displays a recently decreasing TDS trend.

Wadge Coal.

Three wells monitor the Wadge coal seam. North area Well WW14 exhibits a slightly increasing TDS trend. Middle area Well WW17 exhibits a nearly level TDS trend. South area Well WW25 was drilled in September 2004. TDS values at this well recently display a stable trend.

Sage Creek Tributary Alluvium.

One well monitors the Sage Creek Tributary Alluvium. Well WSAL14 displays a decreasing TDS trend. All TDS values have been at or below 600 mg/l.

Sage Creek Overburden.

This unit exits between the Wadge and Wolf Creek coal seams. Mining of the Sage Creek coal seam began in September 2003. Well WSOV24 was drilled in August 2001 in the II-W South area. Only five samples were collected until this well failed due to a landslide that occurred in April 2003. A replacement well, WSOV25, was drilled in September 2004. TDS values at this well displayed a stable trend; however, an elevated spike of 1180 mg/l and 1410 mg/l occurred in 2011 and 2016 respectively. All other values have been below 800 mg/l.

Sage Creek Coal.

Mining of the Sage Creek coal seam began in September 2003. Well WSC24 was drilled in August 2001 in the II-W South area. Only five samples were collected until this well failed due to a landslide that occurred in April 2003. A replacement well, WSC25, was drilled in September 2004. TDS values at this well display an increasing trend. All values have been below 700 mg/l.

Wolf Creek Overburden.

Well WWCOV24 was drilled in August 2001 in the II-W South area. Only five samples were collected until it failed due to a landslide that occurred in April 2003. Replacement well WWCOV25 was drilled in September 2004. TDS values at this well display an increasing trend, with the high TDS value of 1620 mg/l occurring in May 2016.

Wolf Creek Coal.

Mining of the Wolf Creek coal seam began in October 2003. One well monitors the water quality in this coal seam in the II-W South area. Well WWC24 was drilled in August 2001 in the II-W South area. Only five samples were collected until this well failed due to a landslide that occurred in April 2003. A replacement well, WWC25, was drilled in September 2004. TDS values at this well display an increasing trend, with peaks occurring in 2016. All TDS values have been below 1500 mg/l.

Wolf Creek Underburden.

Well WWCU24 was drilled in August 2001 in the II-W South area. Only five samples were collected until it failed due to a landslide that occurred in April 2003. Replacement well WWCU25 was drilled in September 2004. TDS values at this well display a recently stable trend, with the peak occurring in 2007. All values have been below 1400 mg/l.

Trout Creek Sandstone.

Well WTC201 is used as the water supply well for the mine facilities. It displays an increasing TDS trend; however, the peak TDS value occurred in June 1999 and this year is sampling displayed unusually low TDS values. It is unlikely that the TDS increases observed at this well are due to mining impacts, since confining layers of shale separated this aquifer from mined seams. All TDS values have been at or below 700 mg/l.

Comparison of Ground Water Quality to Water Use Standards.

SCC has compiled a list of ground water standards for agricultural uses (Table 5). This list is composed of Colorado Department of Public Health and Environment ground water standards (CDPHE, Reg. 41, May 2004).

Table 6 provides a comparison of ground water quality collected this year to agricultural standards. This Paradox database-generated table does not include the units of concentration (mg/l or ug/l) for each parameter. The units used for each parameter are the same as those listed on the standards table (Table 5) and are the same as those used in the water quality reports. The frequency column on Table 6 indicates, in this order: uncensored, that is, the number of exceedances above the Method Detection Limit (MDL) / the number of exceedances between the MDL and the Practical Quantitation Level (PQL) / censored, that is, the number of sample values below the MDL but the MDL was higher than the standard / the total number of samples. Below is a summary of standards that were exceeded in the 2016 water year. Given in parenthesis is the source and use of each standard.

Parameter	# of Wells / # of Excursions
pH (CDPHE, irrigation)	1/1
Iron (CDPHE, irrigation)	2/2
Manganese (CDPHE, irrigation)	4/4

Elevated levels of iron (i.e., greater than 5 mg/l) may be attributed to natural (i.e., not mining related) conditions. The one bedrock well (WW14) that often exhibits high levels (19.10 mg/l this year) may have higher than usual concentrations of iron pyrite in the rock. The high levels of iron displayed in the alluvial wells this year may be the result of organic matter and plant debris present in the alluvium (Hem, 1985, pg. 77).

High manganese values may, in part, be due to recharge from the spoil aquifer, although high values are often common due to naturally occurring geochemical conditions, especially in alluvial material (Hem, 1989, pgs. 86-89). This standard is used to protect crops grown in soils with a pH value lower than 6.0. In January 2008, CDPHE revised their ground water agricultural standard to reflect this pH qualifier. In soils with a higher pH (as are found in the Seneca II-W region), a more appropriate standard would be 10 mg/l (EPA, 1976). This year, none of the Seneca II-W wells displayed a value higher than 1.48 mg/l.

At the Seneca II-W shop well, Well 201TC, CDPHE drinking water standards were used to determine its suitability. No human health standards were exceeded. Bottled water is consumed at Seneca II-W. In addition, since the aquifer for the shop well (Trout Creek Sandstone) starts at 280 feet below the Wadge Coal and is separated by confining shale layers, water from this well should not be affected by mining and, therefore, reflects the natural characteristics of the aquifer.

Ground Water Points of Compliance (GWPOC)

A GWPOC has been established in the Dry Creek alluvium for the Seneca II-W Mine. Appendix 15-3B of the Seneca II-W PAP provides the details. The ground water standards for Dry Creek Alluvial Well DCAL-02 are provided in this AHR on Table 7. One exceedance of these standards occurred this year. The ambient-based standard for iron (8.06 mg/l) was exceeded once with a value of 10.10 mg/l. However, see the discussion of iron in the previous section. This well displays an increasing TDS trend, with the peak occurring in May 2009. All values are less than 1700 mg/l.

Ground Water Quality Summary.

Increasing TDS trends were observed at seven wells downgradient of mining. Eight downgradient wells exhibit stable or decreasing TDS trends. The GWPOC well for the Dry Creek Alluvium, DCAL-02, did not exceed the TDS GWPOC standard, 3195 mg/l, but did exceed the ambient-based iron standard.

In the Probable Hydrological Consequences (PHC, Tab 17) section of the Seneca II-W Mine PAP, predictions were made as to the expected TDS increases to be observed at various monitoring wells. The following table outlines these predictions along with this year’s observed average values (annual average for bedrock wells, May-September average for alluvial wells).

Well	Predicted TDS values (mg/l)	This year's average TDS (mg/l)
WHAL7-2	1299	790
WOV14	4385	4020
WOV17	4295	5690*
WOV25	none	1510
WW14	2630	4780*
WW17	3002	652
WW25	none	874

* indicates value above prediction

For Well Wadge Overburden WOV17, a value of 4295 mg/l was predicted, while a value of 5690 mg/l was observed in this year. The predicted value for Well WOV17 was predicated on a 5.5% increase of the pre-mining (prior to August 1990 for the central area) value of 4072 mg/l, which is an average of several overburden wells. However, Well WOV17 exhibited a pre-mining TDS average value of 8043 mg/l, while the next highest TDS Wadge overburden well (WOV15) had a baseline TDS average of 3741 mg/l. Well WOV17 also exhibited a high degree of baseline TDS variability (min. = 6860, max. = 8586 mg/l). The TDS value in this year, 5690 mg/l, was below the PHC prediction using the average baseline value (8043 + 5.5% = 8485 mg/l), and is below a 5.5% increase of the maximum baseline TDS value (8586 + 5.5% = 9058 mg/l). In 2008, 2009 and 2011, unusually high TDS values (over 10,000 mg/l) were observed at this well. These values were over the pre-mining average, 8043 mg/l, for this well. The TDS value for this well in 2010, 2012, 2013, 2014, 2015 and 2016 dropped back down to a value within the 1988-2007 range (3766 to 9580 mg/l). The overall TDS trend for this well is decreasing.

The Seneca II-W PHC predicts an annual average TDS value of 2630 mg/l for Wadge Coal Well WW14, while a value of 4780 mg/l was observed this year. This prediction was based on several assumptions. 1) Baseline water quality values were an average of all Wadge coal wells at Seneca II-W. 2) Aquifer characteristics were an average of all Wadge coal wells at Seneca II-W. 3) The Wadge coal seam was saturated for its entire thickness (11.8 feet). These assumptions, however, do not hold true for Well WW14. Prior to mining in the north area (November 1992), this well

was almost always dry (see the 1993 AHR for a complete listing of earlier water level data). Since this particular portion of the Wadge seam was dry prior to mining, spoils water will now contribute much of the water present. In addition, the average water level this year, 3.09 feet, indicates that additional strata are being saturated, which may also explain the elevated TDS value.

Agricultural ground water standards were exceeded this year at certain monitoring wells. Table 7 of the Seneca II-W PAP contains a section that discusses the suitability of using water from the various aquifers monitored at the Seneca II-W Mine for irrigation or livestock watering. The discussion mentions that, prior to mining, all aquifers at the Seneca II-W Mine exhibited several parameter concentrations in excess of both irrigation and livestock standards, rendering them questionable regarding their suitability for either irrigation or livestock. All bedrock aquifers affected by mining have been determined to have transmissivities less than 100 ft^2/day, which would also preclude their use for yielding sufficient water for irrigation, or even livestock.

Surface Water

A summary of surface water monitoring sites and sampling history is presented in Table 8. Tables 9a and 9b show the 2010 surface water parameter lists. At Seneca II-W, all stream sites (unless otherwise noted) are monitored for flow and field parameters (flow, temperature, pH, and electrical conductivity) and one of the new surface water parameter lists during spring runoff and summer baseflow. All six NPDES sites are monitored monthly for NPDES parameters and field parameters. Springs are monitored annually (May-July) for flow, field parameters, and, if flow exceeds five gpm (0.011 cfs), one of the new surface water parameter lists. Monitoring frequencies for surface water sites may be found in Table 1 of Appendix 15-3a in the Seneca II-W PAP.

All surface water data are found in Appendix E. Data for each site begin with a flow hydrograph of all historic data (plus an annual hydrograph for NPDES sites), followed by a listing of individual water quality and quantity data for the current water year, followed by an instantaneous flow measurement report, and followed by remarks if present. A TDS regression plot using the LOWESS method (see the Ground Water Quality section) follows this. A statistical report representing baseline (i.e., pre-mining) data for each site downstream of mining (when available) is provided in Appendix E1 of the 2010 AHR. On this statistics report, "censored data" refers to analytical values that were below the detection limit, which were censored from the min/max/mean calculations. The period for baseline conditions is listed under "conditions specified" at the bottom of each page.

The following discussion of water quality is limited to a description of TDS trends. A separate section, Comparison of Surface Water Quality to Water Use Standards, will lists those samples that exceed water use standards. Lab samples are handled in a matter identical to that discussed earlier in the ground water section. For the sake of brevity, the prefix that precedes all surface water site names will often be dropped throughout this report. As an example, Site SW-S2W-SG7 (WSH7) will be referred to as Site 7.

Hubberson Gulch / Dry Creek

Surface Water Site SW-S2W-SG9 (WSH9).

This Hubberson Gulch site is upstream of NPDES17 and all other mine-related discharges in the II-W South Expansion area. Monitoring at this site began in August 1997. No monitoring was performed in the 1999 calendar year, but was resumed in 2000. This site is monitored in June and September. This site displays a stable TDS trend.

NPDES 017 (NPDES17).

This site exists on Hubberson Gulch in the II-W South Expansion area. Construction of Pond 017 began on October 14, 2002 and was completed in December 2002. It was monitored weekly (except when inaccessible by truck), but is now monitored monthly. Average flow values for each water year are:

2016	0.113 cfs (monthly measurements)
2015	0.173 cfs (monthly measurements)
2014	0.199 cfs (monthly measurements)
2013	0.151 cfs (monthly measurements)
2012	0.053 cfs (monthly measurements)
2011	0.681 cfs (monthly measurements)
2010	0.225 cfs (weekly measurements till 7/1, then monthly)
2009	0.245 cfs (weekly measurements)
2008	0.272 cfs "
2007	0.163 cfs "
2006	0.162 cfs "
2005	0.119 cfs "
2004	0.080 cfs "
2003	0.187 cfs "

This year’s average flow was 45.7% below the average historic (2003-2015) flow, 0.208 cfs. The timing of when flow values are collected affects these averages. Also affecting the historic flow average is a large number of ‘no flows’ that occurred up thru 2007. This site now normally flows continuously. The TDS values at this site are increasing.

NPDES 016 (NPDES16).

This site exists on a Hubberson Gulch tributary in the II-W South area. Pond 016 was nearly complete in September 2000, and first discharged in April 2001. It is now monitored monthly. Average flow values for each water year are:

2016	0.229 cfs (monthly measurements)
2015	0.129 cfs (monthly measurements)
2014	0.098 cfs (monthly measurements)
2013	0.130 cfs (monthly measurements)
2012	0.045 cfs (monthly measurements)
2011	0.317 cfs (monthly measurements)
2010	0.104 cfs (monthly measurements)
2009	0.102 cfs (monthly measurements)
2008	0.141 cfs (monthly measurements)
2007	0.081 cfs (weekly measurements)
2006	0.103 cfs "
2005	0.044 cfs "
2004	0.037 cfs "
2003	0.090 cfs "
2002	0.037 cfs "
2001	0.019 cfs "

This year’s average flow was 133.7% above the average historic (2001-2015) flow, 0.098 cfs. The timing of when flow values are collected affects these averages. Mine pit pumping into this pond was responsible for many of the high peaks present on the hydrograph in previous years. An upper pond, 016A, was constructed in 2004. The discharge culvert for Pond 016A failed in April 2011. It was not repaired, and the pond was removed later in 2011. Pond 016 was cleaned out in October of 2012. The TDS trend at this site is decreasing, with the peak occurring in August 2005. Baseline data from Site SW-S2W-SG16 (WSH16) have been provided in Appendix E1 of the 2010 AHR.

Surface Water Site SW-S2W-SG7 (WSH7).

This site is located on Hubberson Gulch upstream of the confluence of mine discharges contained in the 006 Gulch, but is downstream of Ponds 016 and 017. Monitoring here began in April 1987. Monitoring at this site was suspended, as permitted in TR 69, in May 2010. It is now being monitored as part of a CDPHE water quality assessment for total recoverable iron. This site displays an increasing TDS trend; however, the peak value occurred in September 2005.

NPDES 006 (NPDES6).

This site is located on a tributary to Hubberson Gulch referred to as the 006 Gulch. Construction of the 006 Pond was completed October 1989. This pond collects all mine discharges from the central mining area. The first hydrograph supplied shows all data collected since the site began discharging; the second shows data for this year. Review of the flow hydrographs indicates typical seasonal variation due to snowmelt runoff in the spring, with additional peaks due to pit pumpage, pond clean out, and rainfall events. Average flow values for each water year are:

2016	0.139 cfs	(monthly measurements)
2015	0.149 cfs	(monthly measurements)
2014	0.182 cfs	(monthly measurements)
2013	0.168 cfs	(monthly measurements)
2012	0.101 cfs	(monthly measurements)
2011	0.571 cfs	(monthly measurements)
2010	0.196 cfs	(monthly measurements)
2009	0.215 cfs	(monthly measurements)
2008	0.446 cfs	(monthly measurements)
2007	0.164 cfs	(monthly measurements)
2006	0.185 cfs	(monthly measurements)
2005	0.117 cfs	(monthly measurements)
2004	0.509 cfs	(monthly measurements)
2003	0.198 cfs	(monthly measurements)
2002	0.186 cfs	(monthly measurements)
2001	0.080 cfs	(monthly measurements)
2000	0.099 cfs	(from monthly measurements as of 12/99)

1999	0.184 cfs	(weekly measurements)
1998	0.317 cfs	"
1997	0.343 cfs	"
1996	0.144 cfs	"
1995	0.106 cfs	"
1994	0.010 cfs	"
1993	0.127 cfs	"
1992	0.036 cfs	"
1991	0.062 cfs	"
1990	0.055 cfs	(pond did not completely fill until March 29, 1990).

This year's average flow value is 52% below the historic (1990-2016) average flow value, 0.290 cfs. The timing of when flow values are collected affects these averages. Flow values for this pond have been affected by a 3.4-foot increase in spillway elevation on July 31, 1991, the installation of a 4-inch orifice on the riser pipe on November 2, 1995, and the dredging of the pond that occurred in the summer of 1996 and the fall of 1997. An upstream pre-settling pond was added in March 1998. The principle spillway elevation was changed again, and the dewatering orifice removed, in August 1998. In August 2003, an 18-inch riser pipe was installed on the discharge culvert, and the presettling pond was removed. Additional dredging (and dewatering) occurred in the fall of 2004. Also affecting discharges from this pond was the pumping of water from this pond for water trucks (last significant amounts were in 2007) and the pumping of water into this pond from the mine water supply well, WTC201 (last significant amounts were in 2000). Review of the TDS plot indicates an increasing trend. Baseline data for this site (WSH6) has been provided in Appendix E1 of the 2010 AHR.

Surface Water Site SW-S2W-FG1 (WSHF1).

This site is located on Hubberson Gulch downstream of the 006 Gulch confluence. It has been monitored since July 1979. Irrigation ditches were established adjacent to this site in July 1999. The TDS plot indicates an increasing trend, with the peak TDS value occurring in

August of 2013. Baseline water quality statistics have been provided in Appendix E1 of the 2010 AHR.

NPDES 005 (NPDES5).

This sediment pond is located in the north mining area on a tributary to Dry Creek referred to as the 005 Gulch. Mining in this basin started in November 1992. Construction of this pond was completed in July 1992 and the first discharge occurred on April 22, 1993. This pond was dredged in the summers of 1998 and 2001. The water year average flows values since this pond began to discharge are:

2016	0.253 cfs	(monthly measurements)
2015	0.012 cfs	(monthly measurements)
2014	0.033 cfs	(monthly measurements)
2013	0.044 cfs	(monthly measurements)
2012	0.003 cfs	(monthly measurements)
2011	0.214 cfs	(monthly measurements)
2010	0.018 cfs	(monthly measurements)
2009	0.060 cfs	(monthly measurements)
2008	0.083 cfs	(monthly measurements)
2007	0.038 cfs	(monthly measurements)
2006	0.038 cfs	(monthly measurements)
2005	0.021 cfs	(monthly measurements)
2004	0.017 cfs	(monthly measurements)
2003	0.026 cfs	(monthly measurements)
2002	0.016 cfs	(monthly measurements)
2001	0.018 cfs	(monthly measurements)
2000	0.024 cfs	(from monthly measurements as of 12/99)
1999	0.057 cfs	(weekly measurements)
1998	0.110 cfs	"
1997	0.033 cfs	"
1996	0.015 cfs	"
1995	0.015 cfs	"
1994	no flow	(very low snowpack runoff this year)
1993	0.114 cfs	(pond was dewatered to repair a leaking dewatering line)

This year's average flow value is 406% above the historic (1993-2016) average flow value, 0.05 cfs. The timing of when flow values are collected affects these averages. This year, flow was observed March through July only. Review of this site's TDS plot indicates a slightly increasing trend; the peak TDS occurred in March 1998. Baseline data for this site (WSD8) has been provided in Appendix E1 of the 2010 AHR.

Surface Water Site SW-S2W-SG5 (WSD5).
This site is located on Dry Creek and is the furthest downstream surface water site for this side of Seneca II-W. Monitoring at this site began in March 1983. The TDS plot indicates an increasing trend. The peak TDS value occurred in October 2012.

Sage Creek

NPDES 015 (NPDES15).
This site is located on the southern Sage Creek tributary in the II-W South area. It is now monitored monthly, except when inaccessible by truck. Pond 015 was completed in late August 1999 and began to discharge in February 2000. Average flow values for each water year are:

2016	0.113 cfs	(monthly measurements)
2015	0.051 cfs	(monthly measurements)
2014	0.027 cfs	(monthly measurements)
2013	0.040 cfs	(monthly measurements)
2012	0.011 cfs	(monthly measurements)
2011	0.300 cfs	(monthly measurements)
2010	0.069 cfs	(monthly measurements)
2009	0.064 cfs	(monthly measurements)
2008	0.350 cfs	(monthly measurements)
2007	0.044 cfs	(weekly measurements)
2006	0.054 cfs	"
2005	0.027 cfs	"
2004	0.014 cfs	"
2003	0.029 cfs	"
2002	0.006 cfs	"

2001	0.015 cfs	"
2000	0.051 cfs	"

This year’s average flow value is 126% above the historic (2000-2016) average flow value, 0.05 cfs. This year, flows reflected seasonal variability, with the max discharge occurring in June. The timing of flow value collection affects these averages. The TDS plot indicates a decreasing trend, with the peak occurring in February 2000. This pond receives stormwater only (i.e., no spoils water). Baseline data from Site WSSC1 has been provided in Appendix E1 of the 2010 AHR.

NPDES 009 (NPDES9).

This site is located on the northern Sage Creek tributary and was constructed in October 1991. This site first discharged on April 16, 1996. The water year average flow values since this pond began to discharge are:

2016	.008 cfs	(monthly measurements)
2015	no flow	(monthly measurements)
2014	no flow	(monthly measurements)
2013	no flow	(monthly measurements)
2012	no flow	(monthly measurements)
2011	0.242 cfs	(monthly measurements)
2010	no flow	(monthly measurements)
2009	0.030 cfs	(monthly measurements)
2008	0.138 cfs	(monthly measurements)
2007	no flow	(monthly measurements)
2006	0.048 cfs	(monthly measurements)
2005	no flow	(monthly measurements)
2004	no flow	(monthly measurements)
2003	no flow	(monthly measurements)
2002	no flow	(monthly measurements)
2001	no flow	(monthly measurements)
2000	no flow	(monthly measurements)
1999	0.005 cfs	(weekly measurements)
1998	0.165 cfs	"

1997	0.095 cfs	"
1996	0.065 cfs	"

This year's flow was 85% lower than the historic (1996-2016) average flow value is 0.054 cfs. The timing of flow value are collection affects these averages. Review of this site's TDS plot indicates an increasing trend, with the peak occurring in August 1998. This pond receives stormwater only (i.e., no spoils water). Baseline data for this site (WSS3) has been provided in Appendix E1 of the 2010 AHR.

Surface Water Site SW-S2W-FG4 (WSSF3).
This site is situated on Sage Creek downstream of the impacts from the Seneca II-W Mine (NPDES 009 and 015). Monitoring of this site commenced in September 1990. No flow was observed during the October site visit this year. This site displays an increasing TDS trend, with the peak value occurring in April 2009. Baseline data for this site has been provided in Appendix E1 of the 2010 AHR.

Springs.
Spring data may be found after surface water data in Appendix E. Data provided are a water quality report for the past year, historic flow hydrographs and a LOWESS plot of TDS. Baseline water quality statistics for springs downstream of mining (when available) has been provided in Appendix E1 of the 2010 AHR. Springs with a flow less than 5 gpm (0.011 cfs) are analyzed for field parameters only. In Appendix E, all native springs have a WSPG prefix (e.g., Spring S-45 = WSPG45) while all spoil springs have a WSSPG prefix.

Spring S-46 is a developed spring first monitored during the 1979 spring survey. This spring became part of the required monitoring program in 2000. It is located immediately below the 005 Pond. The TDS plot indicates an increasing trend with the peak occurring in June 2014.

Spring S-47 was first discovered by SCC personal in 1989 and was initially monitored in June 1990. It is a developed spring existing alongside the mine entrance haul road just to the west of the Seneca II-

W Meteorological Station. This spring became part of the required monitoring program in 2000. Its TDS plot indicates an increasing trend and displayed an abnormally high TDS value this year (3890 mg/l).

Spring S-50 is the discharge of the french drain that collects water from the W-24 series monitor wells (located below Pond 16A) that failed in 2003. This water was first sampled in September 2005. The W-24 wells were finally abandoned in August 2007. The entire area around this spring was regraded in 2012. Its TDS plot indicates a decreasing trend; however, the peak value to date occurred this year (6500 mg/l).

Spring S-7 in an alluvial clearwell located adjacent to Hubberson Gulch. It serves as the non-potable water supply at the Smith ranch. Due to the taste and possible coliform contamination of the spring, bottled water is used for drinking. Sampling at this spring was discontinued in 1990, but was reestablished in 1999 since it is downstream of mining at the Seneca II-W South area. Its TDS plot indicates an increasing trend; however, the peak value occurred in September 2006.

The hydrology monitoring program at the Seneca II-W Mine requires a spoil spring survey every year after the spring snowpack runoff. Spoil Spring 1 (WSSPG1, not to be confused with WSPG1) was discovered in 1998 above the NPDES 005 pond (D pit area). It existed approximately 800 feet southeast of Well GW-S2W-14W. Its TDS plot indicates a recently decreasing trend, with the peak occurring in June 2011.

Spoil Spring 2 (WSSPG2) was discovered in June 1999. It is located in the main stream channel above Pond 006 adjacent to the oil well. Its TDS plot indicates an increasing trend, with the peak occurring this year (3620 mg/l).

Spoil Spring 3 (WSSPG3) was discovered in September 1999. It is located immediately to the east of Pond 006. Its TDS plot indicates a slightly increasing trend, with the peak occurring in July 2011.

Spoil Spring 4 (WSSPG4) was first sampled in 2003. It contains the combined discharges of the backfilled A and B pits. It is sampled at the outlet of the haul road culvert just above Pond 006. Its TDS plot indicates an increasing trend with the peak occurring this year (4100 mg/l).

Spoil Spring 5 (WSSPG5) was first sampled in June 2006. It is located above the large culvert that feeds into Pond 016. Its TDS plot indicates a decreasing trend, with the peak occurring in May 2007.

Comparison of Surface Water Quality to Water Use Standards.
SCC has compiled a list of surface water standards for agricultural uses (Table 10). This list is composed of CDPHE surface water agricultural use standards (CDPHE, Reg.31, November 2009).

Table 11 provides a comparison of this year's surface water quality, including springs, to agricultural standards. This Paradox database-generated table does not include the units of concentration (mg/l or ug/l) for each parameter. The units used for each parameter are the same as those listed on the standards table (Table 10) and are the same as those used in the water quality reports. The frequency column on Table 11 indicates, in this order: uncensored, that is, the number of exceedances above the Method Detection Limit (MDL) / the number of exceedances between the MDL and the Practical Quantitation Level (PQL) / censored, that is, the number of sample values below the MDL but the MDL was higher than the standard / the total number of samples. Below is a summary of standards that were exceeded. Given in parenthesis is the source and use of each standard. Although the CDPHE does not differentiate between livestock and irrigation uses in their surface water agricultural standards, they have done so in their similar ground water agricultural standards (see Table 5). For the sake of discussion, SCC chooses to use those ground water use standards classifications (livestock or irrigation) for surface water use evaluation. Of all the surface water sites downstream of Seneca II-W, only Sites WSD5 (Dry Creek), WSSF3 (Sage Creek), WSH7 (mid-Hubberson Gulch) and WSHF1 (lower

Hubberson Gulch) have their waters used for irrigation. Following is a list of standards exceeded this year.

Parameter	# of Sites / # of Excursions
Manganese (CDPHE irrigation)	6/6
Selenium	1/1

This summary indicates that only two of the CDPHE surface water agricultural use standards were exceeded. The manganese standard was exceeded at six sites. However, as indicated in the recently revised CDPHE Regulation 31, the standard of 0.2 mg/l, applies to plants grown in acidic (<6.0 pH) soils. In alkaline soils, as are found in the Seneca II-W region, a more appropriate (EPA) standard would be 10 mg/l. The maximum manganese value for any surface water site observed this year was 2.05 mg/l at site NPDES6. Pre-mining manganese values often exceeded the 0.2 mg/l standard.

Table 12 shows the CDPHE receiving stream standards for upper Dry Creek (Yampa Segment 13d) and Table 14 shows the Sage Creek (Yampa Segment 13e). Sage Creek was resegmented by the CDPHE in 2003. Regulation 33 was further revised in 2005, 2008 and 2015. These standards were based on the presence of fish in the lower portions of the creeks. However, the upper portions that Seneca II-W discharges into have no fish present. Tables 13 (Yampa Segment 13d) and 15 (Yampa Segment 13e) provide a comparison of those standards to water quality data collected this year from NPDES and stream sites in those basins. Standards that were exceeded are:

Parameter	# of Sites / # of Excursions
Iron, Total Recoverable (TR)	4/11
Mercury	11/11
Nitrite, Nitrogen N	1/1
Selenium	3/3

The aquatic life ammonia standard is dependent on pH and temperature. The detection limit for ammonia is 0.05 mg/l. All values above detection

limit are compared to table standards found on this website, page 87: http://www.epa.gov/waterscience/criteria/ammonia/99update.pdf
No ammonia excursions occurred this year.

Iron excursions were likely the result of high-suspended solids (TSS) and are generally observed during snowmelt runoff. This strict aquatic life standard (1.11 mg/l) was exceeded in over half of the pre-mining stream samples.

The drinking water standard for mercury is 2 ug/l. The aquatic life standard for mercury is 0.01 ug/l, which is set to protect the average human consumer of fish. SCC's lab uses a method with a detection limit of 0.2 ug/l. None of the samples collected this year were above the detection limit. During the last NPDES permit renewal, the CDPHE performed a reasonable potential analysis on SCC's outfalls. It determined that there was no reasonable potential for SCC's outfalls to exceed the mercury limit; therefore, mercury monitoring is no longer required for SCC's outfalls.

The nitrite standard (0.05 mg/l) was exceeded in May at Site WSSPG4 with a value of 0.10 mg/l. Nitrites are unstable in aerated water (Hem, 1985), and will oxidize to nitrates.

Three sites exhibited the chronic selenium receiving stream standard this year, 4.6 ug/l (potentially dissolved), with values of 6.2 ug/l, 10.8 ug/l and 26.8 ug/l. Values were no greater than 2 ug/l for the rest of the year. The acute receiving stream standard, 18.4 ug/l (potentially dissolved), was exceeded at WSD5 in April. There were no NPDES Effluent excursions this year.

NPDES Effluent Criteria (Permit No. CO-0000221).
No excursions of NPDES limits occurred this year.

Surface Water Summary.

Flow values from 005, 015, and 016 were above average this year. The flow values for 006, 009 and 017 were below average. TDS values at all NPDES Ponds (except 016 and 015) are increasing. TDS values at downstream surface water Sites WSH7, WSHF1, WSD5 and WSSF3 are increasing. All Spoil Springs, with the exception of Spoil Spring 1 and 5 are displaying increasing TDS trends. The TDS trend is stable at upstream site WSH9. NPDES discharges are normally suitable for livestock and irrigation, but sometimes exceed water quality standards for aquatic life.

In the Probable Hydrological Consequences (PHC, Tab 17, Table 17-42b) section of the Seneca II-W Mine PAP, predictions were made as to the expected TDS increases to be observed at various surface water sites. The following table outlines these predictions along with this year's observed average values (irrigation season, June-September).

Site	Predicted TDS values (mg/l)	This year's average TDS (mg/l)
WSHF1	2527	2067
WSD5	2451	1987
WSSF3	676	839*

* indicates value above prediction

Only one site, WSSF3 on Sage Creek, exceeded PHC predictions, and that was by only 163 mg/l.

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APPENDIX A

Figures and Tables

APPENDIX A

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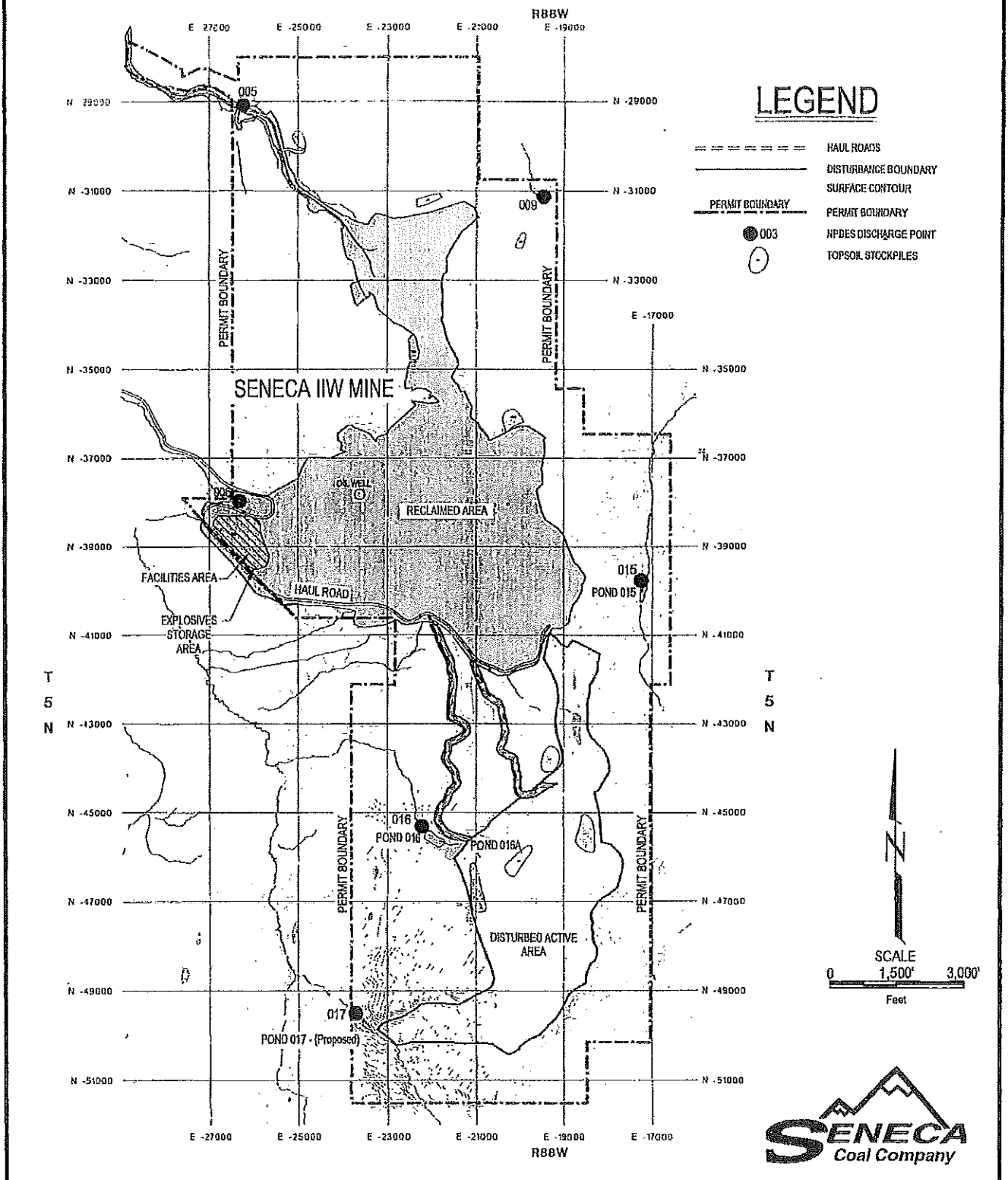


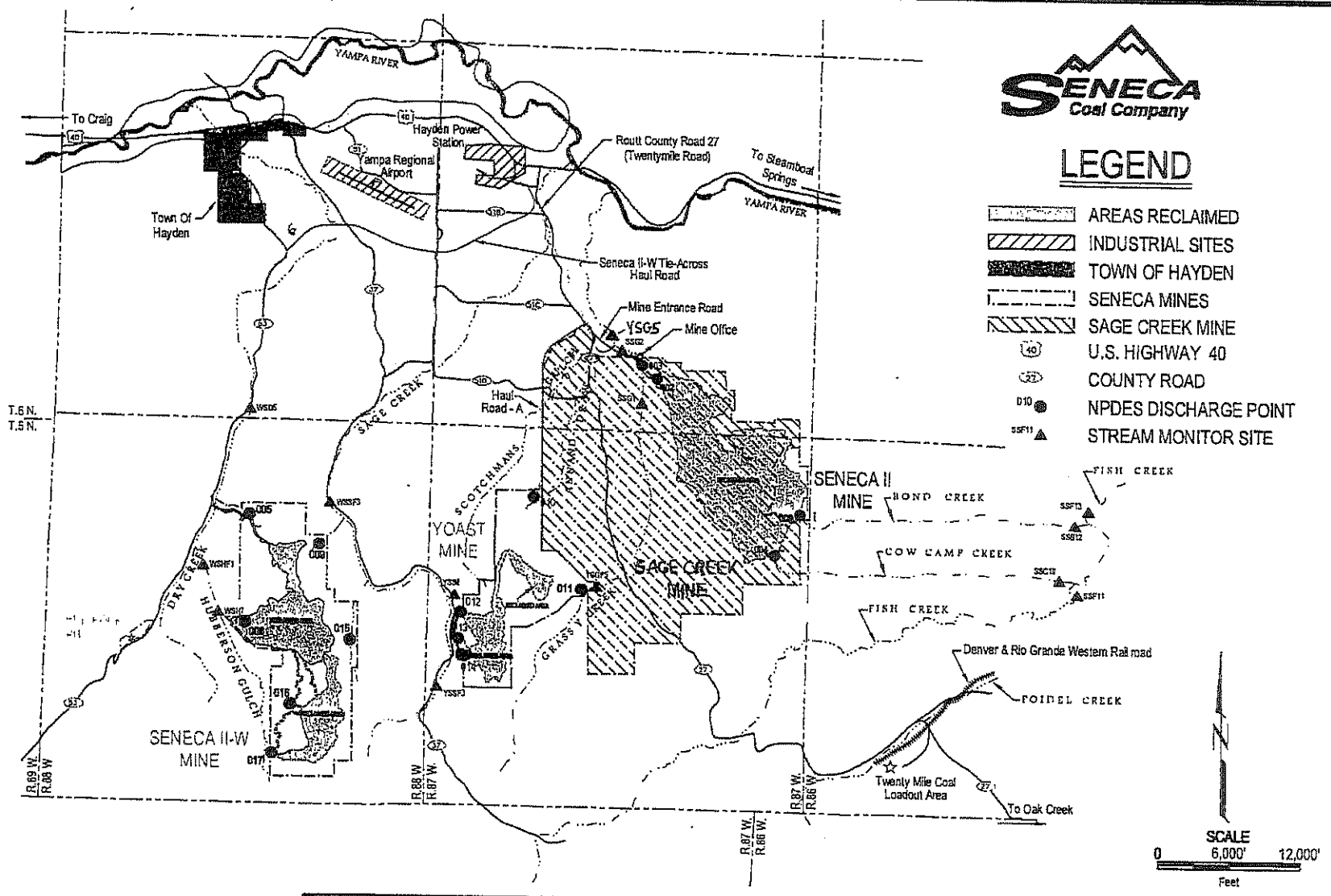
REV No.	REVISIONS	REV DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
0	Issued For Draft Report	03/02	J.Jamas	M.Mathisen	J.Jamas

MWH
MONTGOMERY WATSON HARZA

PROJECT No 2370108
AutoCAD FILE GENLOC-SENECA.MW
SCALE: See Scale Bar
FIGURE No 1

SENECA COAL COMPANY

SENECA IIW MINE
GENERAL LOCATION MAP



SENECA Coal Company

LEGEND

- AREAS RECLAIMED
- INDUSTRIAL SITES
- TOWN OF HAYDEN
- SENECA MINES
- SAGE CREEK MINE
- U.S. HIGHWAY 40
- COUNTY ROAD
- D10 NPDES DISCHARGE POINT
- SSF11 STREAM MONITOR SITE

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

PROJECT No.:
AutoCAD FILE: SAGE-GENLOC
SCALE: See Scale Bar
FIGURE No.: 1

SENECA COAL COMPANY

GENERAL LOCATION

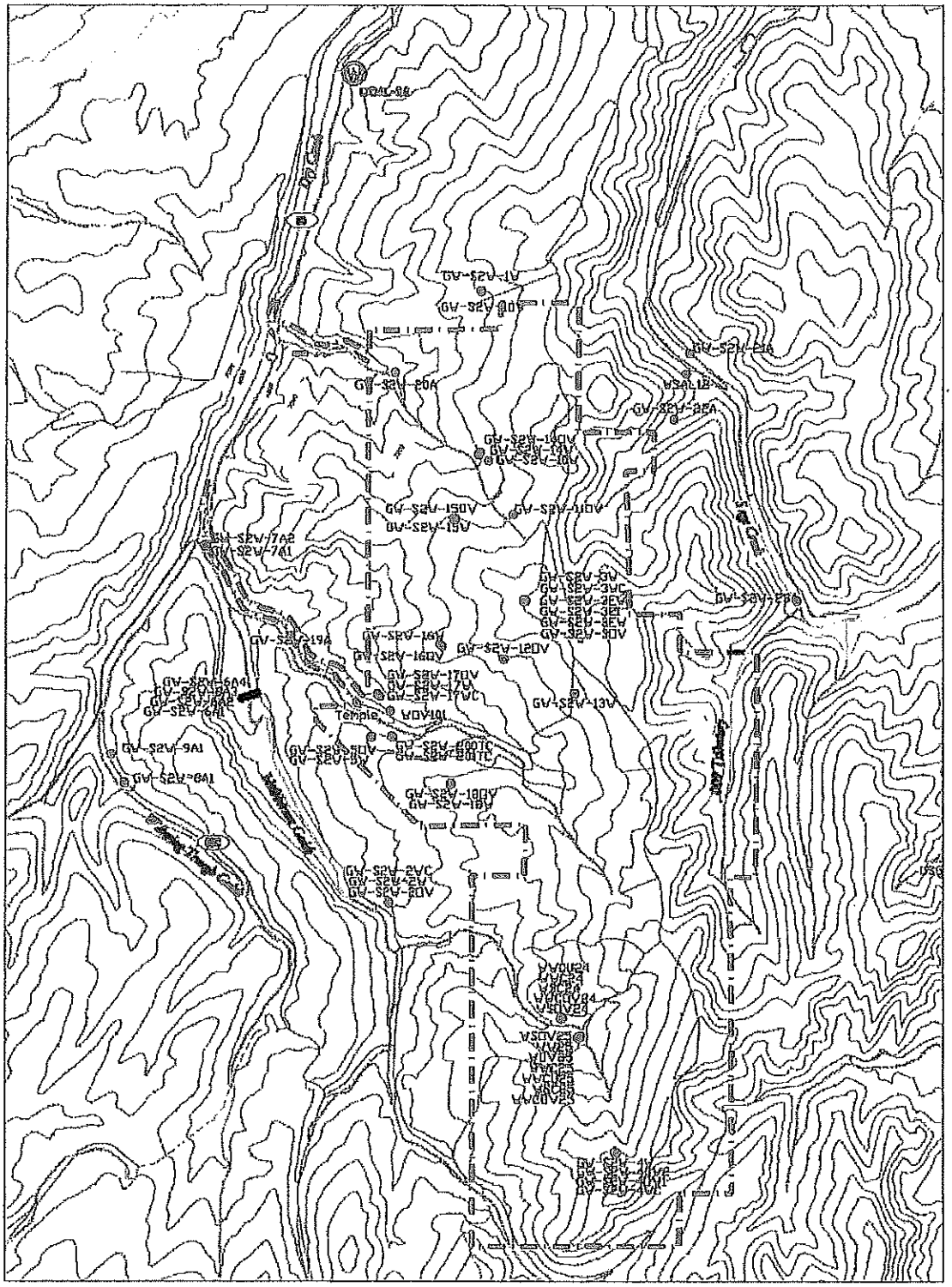
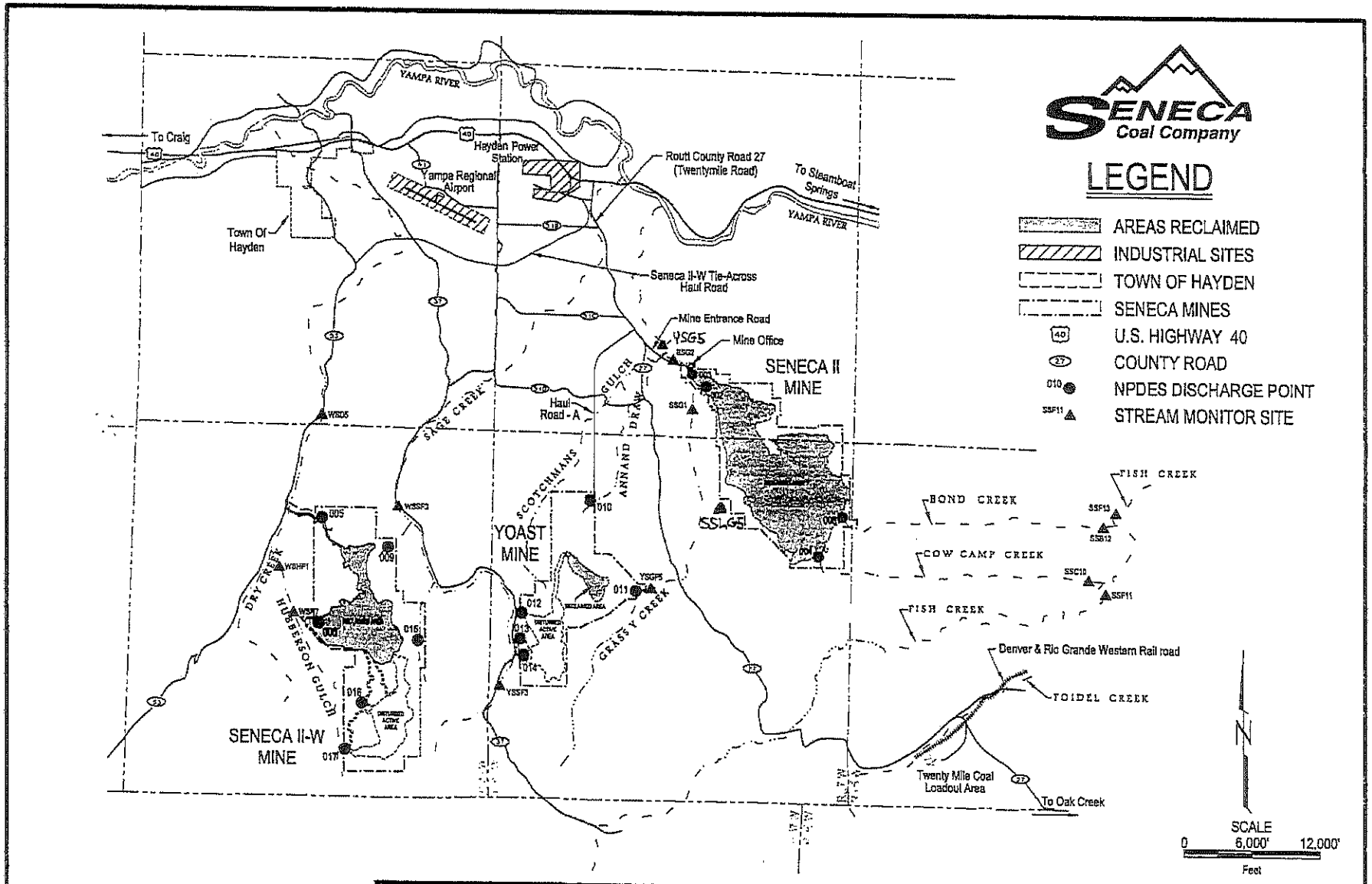


Figure 3: Map showing monitoring well locations at Seneca IIW.



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0	Issued For NPDES Report	03/02	J.James	M.Mathison	J.James

MWH
MONTGOMERY WATSON HARZA

PROJECT No. 2470102
AutoCAD FILE: GENLOC-NPDES
SCALE: See Scale Bar
FIGURE No. 1

SENECA COAL COMPANY

GENERAL LOCATION

TABLE 2
Total Precipitation in Inches 1981-2016 Water Years
Seneca II-W Mine, Routt County, Colorado

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total
2016	1.39	1.9	2.55	2.65	1.16	1.40	3.02	1.94	.40	.81	.19	1.02	18.43
2015	1.60	2.10	1.84	0.55	1.02	1.30	1.60	4.36	0.61	2.36	1.53	0.90	19.77
2014	2.69	1.75	1.42	2.02	0.78	1.96	1.19	2.58	0.72	1.50	3.77	0.87	21.25
2013	0.86	0.46	3.21	1.02	0.73	1.29	3.58	1.67	0.06	0.46	1.48	2.76	17.58
2012	1.41	1.65	0.36	0.87	1.97	0.50	1.13	0.22	0.15	2.43	0.55	1.56	12.80
2011	2.18	1.91	2.98	1.59	2.09	2.52	4.50	3.56	0.85	1.82	0.65	1.14	25.79
2010	1.22	0.77	1.24	0.75	0.90	0.73	1.98	2.80	1.34	1.19	1.56	0.62	15.10
2009	0.53	1.16	1.38	2.80	0.60	1.32	1.40	1.89	2.08	0.51	1.04	0.48	15.19
2008	1.41	0.13	3.36	2.51	1.70	1.64	0.94	1.68	0.37	0.57	0.75	0.91	15.97
2007	2.64	0.76	0.86	1.04	1.34	1.46	0.62	0.87	0.33	0.52	1.12	2.72	14.28
2006	2.27	2.04	2.01	1.78	0.58	1.06	0.95	0.93	0.24	1.48	2.71	2.75	18.80
2005	1.34	1.68	0.50	1.49	0.84	0.99	1.97	1.41	3.36	0.57	1.57	1.30	17.02
2004	0.44	2.90	1.58	0.74	1.64	0.40	1.57	1.26	0.86	1.00	1.44	2.76	16.59
2003	1.88	1.09	1.28	0.74	1.95	0.99	2.57	1.15	1.33	0.47	0.62	1.83	15.90
2002	1.14	1.17	0.54	0.88	0.92	1.06	1.39	0.40	0.37	0.78	1.26	1.94	11.86
2001	0.67	1.60	1.16	0.96	1.41	1.07	1.28	1.15	0.85	1.11	2.06	1.66	14.98
2000	0.43	0.61	1.66	1.66	1.68	1.46	1.84	1.94	0.54	0.75	2.38	2.00	16.95
1999	1.85	0.81	1.13	2.13	0.99	0.57	3.21	2.00	1.39	2.10	1.85	0.78	18.81
1998	2.37	1.08	0.95	1.34	1.93	1.77	1.77	0.62	2.51	1.50	0.48	1.50	17.82
1997	1.79	2.39	1.69	2.88	0.97	0.48	3.19	2.75	1.60	1.05	3.57	5.48	27.84
1996	1.32	2.20	1.26	3.60	2.19	0.99	1.34	2.10	1.00	1.33	0.35	1.37	19.05
1995	0.95	2.09	0.68	1.47	0.97	0.82	3.36	4.48	1.54	1.23	0.73	2.69	21.01
1994	3.02	1.61	1.16	0.69	1.13	0.56	1.85	1.07	0.43	0.24	0.98	0.72	13.46
1993	1.46	1.48	1.33	2.28	1.66	1.53	2.55	1.14	1.29	0.65	1.37	1.39	18.13
1992	1.18	2.79	0.85	0.88	1.16	1.20	1.66	3.08	1.15	4.38	0.95	0.98	20.26
1991	3.20	1.71	1.18	1.75	0.86	2.42	1.09	0.96	1.74	1.59	2.00	1.32	19.82
1990	0.77	1.38	2.08	0.65	1.64	1.54	1.36	1.12	1.38	1.14	0.51	1.22	14.79
1989	0.13	2.79	1.13	1.02	2.50	1.38	0.45	1.39	0.53	1.82	1.33	1.52	15.99
1988	1.27	1.22	2.32	2.80	0.70	1.31	0.83	1.85	1.93	0.60	1.03	2.31	18.17
1987	2.65	1.00	0.56	1.28	1.35	1.50	1.60	1.92	0.64	1.78	1.35	0.46	16.09
1986	3.51	4.19	1.34	0.79	3.01	1.59	2.70	0.99	1.00	1.65	1.96	2.12	24.85
1985	2.61	1.68	1.80	2.40	1.01	2.40	3.77	1.40	0.68	1.28	0.64	1.17	20.84
1984	2.16	2.82	5.03	0.59	0.43	2.31	2.68	1.33	2.36	1.84	2.61	1.31	25.47
1983	1.64	1.52	1.03	1.10	1.66	2.17	2.28	1.57	2.76	1.88	1.08	0.79	19.48
1982	3.76	0.78	2.51	1.71	0.62	2.64	1.92	0.97	0.46	1.60	1.19	2.64	20.80
1981	1.09	0.33	0.43	0.53	0.45	2.50	0.69	3.97	1.65	2.24	1.12	1.33	16.33
Average	1.69	1.6	1.57	1.5	1.29	1.41	1.94	1.79	1.13	1.34	1.38	1.62	18.26

Data October 80 to February 82, and 2011 Water Year and later, from U.S. Department of Commerce - NOAA - Hayden Station. All other data from Seneca II Mine Meteorological Station with Belfort Weighing Bucket Rain Gage. Site relocated to USGS site on 8/31/91.

TABLE 3
Ground Water Monitoring Site Summary
Seneca II-W Mine

Well No. (Computer ID)	Coordinates South	Coordinates West	Formation Completed In	Well Depth (ft)	Casing Diameter (in)	Surface Elevation (ft)	Remarks	Ground Water Quality Sample
GW-S2W-1W (WW1)	27404.38	23603.40	Wadge Coal	408.1	5	7246.62	Annular seal failed, Well abandoned 9/94	Yes
GW-S2W-1OV (WOV1)	27404.38	23603.40	Lennox Overburden	183.0	1	7246.62	Annular seal failed, Well abandoned 9/94	No
GW-S2W-2WC (WWC2)	42794.55	25920.93	Wolf Creek Coal	782.0	2	7105.70	Annular seal failed, Well abandoned 9/94	No
GW-S2W-2W (WW2)	42794.55	25920.93	Wadge Coal	594.5	2	7105.44	Annular seal failed, Well abandoned 9/94	Yes
GW-S2W-2OV (WOV2)	42794.55	25920.93	Lennox Overburden	321.0	1	7105.44	Annular seal failed, Well abandoned 9/94	Yes
GW-S2W-3EW (WW3E)	35183.35	22467.27	Wadge Coal	246.2	2	7780.00	Annular seal failed, Well abandoned 9/94	No
GW-S2W-3EI (WWU3E)	35183.35	22467.27	Wadge-Wolf Creek Interburden	392.0	0.75	7780.00	Annular seal failed, Well abandoned 9/94	No
GW-S2W-3EWC (WWC3E)	35183.35	22467.27	Wolf Creek Coal	450.9	2	7780.00	Annular seal failed, Well abandoned 9/94	No
GW-S2W-3WC (WWC3)	35204.65	22519.69	Wolf Creek Coal	458.6	5	7779.22		Yes
GW-S2W-3W (WW3)	35184.00	22523.32	Wadge Coal	257.0	4	7779.17		Yes
GW-S2W-3OV (WOV3)	35184.00	22523.32	Wadge Overburden	124.0	0.75	7779.17	Dry well, Monitoring stopped 10/88	No
GW-S2W-4W (WW4)	49034.05	20175.61	Wadge Coal	132.6	4	8105.77	Monitoring stopped 10/86, resumed 1997.Abandoned 8/03	Yes
GW-S2W-4OV1 (WOV4-1)	49034.05	20175.61	Wadge Overburden	117.7	0.75	8105.77	Monitoring stopped 10/86, resumed 1997.Abandoned 8/03	Yes
GW-S2W-4WC (WWC4)	49057.77	20149.75	Wolf Creek Coal and Wadge-Wolf Creek Interburden	306.9	5	8108.28	Monitoring stopped 10/86, resumed 1997.Abandoned 8/03	Yes
GW-S2W-4OV2 (WOV4-2)	49057.77	20149.75	Wadge Overburden	79.0	0.75	8108.28	Monitoring stopped 10/86, resumed 1997.Abandoned 8/03	No

TABLE 3
(Continued)

Well No. (Computer ID)	Coordinates South	Coordinates West	Formation Completed In	Well Depth (ft)	Casing Diameter (in)	Surface Elevation (ft)	Remarks	Ground Water Quality Sample
GW-S2W-5W (WW5)	38616.97	26400.64	Wadge Coal	361.0	5	7242.48	Annular seal failed, Well abandoned 9/94	No
GW-S2W-5OV (WOV5)	38616.97	26400.64	Wadge Overburden	325.9	1	7242.48	Annular seal failed, Well abandoned 9/94	Yes
GW-S2W-6A1 (WHAL6-1)	37636.86	29665.90	Hubberson Gulch Alluvium	28.1	2	6851.31		No
GW-S2W-6A2 (WHAL6-2)	37596.91	29540.45	Hubberson Gulch Alluvium	29.8	4	6852.26		Yes
GW-S2W-6A3 (WHAL6-3)	37547.44	29394.59	Hubberson Gulch Alluvium	29.7	2	6853.96		No
GW-S2W-6A4 (WHAL6-4)	37517.99	29291.09	Hubberson Gulch Alluvium	12.5	2	6859.43		No
GW-S2W-7A1 (WHAL7-1)	33796.13	30640.16	Hubberson Gulch Alluvium	50.0	2	6795.23	Well failed 2/95 Abandoned 10/96	Yes
GW-S2W-7A2 (WHAL7-2)	33774.25	30575.40	Hubberson Gulch Alluvium	62.0	4	6795.61		Yes
GW-S2W-8A1 (WWTAL8)	39776.29	32652.17	Watering Trough Gulch Alluvium	49.0	4	6961.43	Well upstream of mining, Monitoring stopped 11/93	Yes
GW-S2W-9A1 (WWTAL9)	39052.15	33001.66	Watering Trough Gulch Alluvium	42.0	4	6932.91	Well upstream of mining, Monitoring stopped 11/93	Yes
GW-S2W-10W (WW10)	31659.19	23411.43	Wadge Coal	97.3	1	7300.88	Well plugged w/ mineral deposits, discontinued 5/86	No
GW-S2W-11OV (WOV11)	33013.57	22789.33	Wadge Overburden	67.9	1	7486.34	Removed by mining 12/92	No
GW-S2W-12OV (WOV12)	36664.31	23022.68	Wadge Overburden	110.0	1	7564.38	Removed by mining 12/91	No
GW-S2W-13W (WW13)	37523.45	21222.29	Wadge Coal	57.7	1	7629.86	Removed by mining 10/91	No
Temple Well (WOV101)	37956.11	25877.60	Wadge Coal and Overburden	120.0	3	7089.53	Abandoned 6/89	Yes
GW-S2W-14OV (WOV14)	31444.34	23625.44	Wadge Overburden	99.0	2	7258.90		Yes

TABLE 3
(Continued)

Well No. (Computer ID)	Coordinates South	Coordinates West	Formation Completed In	Well Depth (ft)	Casing Diameter (in)	Surface Elevation (ft)	Remarks	Ground Water Quality Sample
GW-S2W-14W (WW14)	31509.60	23655.10	Wadge Coal	116.6	2	7261.60		Yes
GW-S2W-15OV (WW15)	33115.97	24288.65	Wadge Overburden	341.2	2	7514.64	Well failed 5/95 Monitoring stopped 10/95	Yes
GW-S2W-15W (WW15)	33124.60	24227.26	Wadge Coal	347.0	2	7514.42	Well failed 5/95 Monitoring stopped 10/95	Yes
GW-S2W-16OV (WOV16)	36338.24	24563.12	Wadge Overburden	318.2	2	7541.85	WQ monitoring stopped 5/06	Yes
GW-S2W-16W (WW16)	36283.08	24624.89	Wadge Coal	340.8	2	7543.38	WQ monitoring stopped 5/06	Yes
GW-S2W-17OV (WW17)	37536.19	26241.54	Wadge Overburden	195.0	2	7132.34		Yes
GW-S2W-17W (WW17)	37565.93	26201.80	Wadge Coal	208.4	2	7131.66		Yes
GW-S2W-17WC (WWC17)	37595.53	26161.98	Wolf Creek Coal	415.5	2	7133.65		Yes
GW-S2W-18OV (WOV18)	39795.95	24325.16	Wadge Overburden	352.0	2	7463.33	WQ monitoring stopped 10/95	Yes
GW-S2W-18W (WW18)	39825.96	24355.80	Wadge Coal	402.5	2	7463.80	WQ monitoring stopped 10/95	Yes
GW-S2W-19A (WHAL10)	36058.39	28429.34	Hubberson Gulch 006 Tributary Alluvium	30.0	4	6901.31		Yes
GW-S2W-200TC (WTC200)	38623.23	25802.49	Trout Creek Sandstone	757.5	1.5	7196.73	Observation Well for Shop Well (201TC)	No
GW-S2W-201TC (WTC201)	38597.47	25836.17	Trout Creek Sandstone	760.0	5	7196.67	Shop Well	Yes
GW-S2W-20A (WDAL11)	29437.47	25762.75	Dry Creek 005 Tributary Alluvium	12.5	4	6908.95		Yes
GW-S2W-21A (WSAL12)	28958.95	18280.44	Lower Sage Creek Alluvium	21.0	4	6859.14		Yes
GW-S2W-22A (WSAL13)	30620.66	18665.29	Sage Creek 009 Tributary Alluvium	30.0	4	7000.16		Yes

TABLE 3
(Continued)

Well No. (Computer ID)	Coordinates South	Coordinates West	Formation Completed In	Well Depth (ft)	Casing Diameter (in)	Surface Elevation (ft)	Remarks	Ground Water Quality Sample
GW-S2W-23A (WSAL14)	35178.72	15549.72	Sage Creek 015 Tributary Alluvium	23.5	4	7057.57	Monitoring stopped 10/95, resumed 1998	Yes
USGS A1 (YSAL1)	35180.90	9544.48	Sage Creek Alluvium	39.1	4	7174.93	Yoast Mine monitoring well	Yes
USGS A3 (YSAL3)	36967.39	8585.95	Sage Creek Alluvium	44.0	2	7223.53	Yoast Mine monitoring well	Yes
USGS A8 (YSAL8)	39707.34	8840.15	Sage Creek Alluvium	20.0	4	7324.76	Yoast Mine monitoring well	Yes
USGS A12 (YSAL12)	41972.54	9052.38	Sage Creek Alluvium	40.0	4	7381.13	Yoast Mine monitoring well	Yes
WSOV24	45686.39	21523.05	Sage Creek Coal Overburden	238.4	3	7506.98	Drilled 2001. Failed 5/03 Abandoned 8/07	Yes
WSC24	45687.28	21532.77	Sage Creek Coal	252.9	3	7506.90	" "	Yes
WWCOV24	45687.64	21541.83	Wolf Creek Coal Overburden	347.2	3	7506.56	" "	Yes
WWC24	45688.77	21551.89	Wolf Creek Coal	383.0	3	7506.38	" "	Yes
WWCU24	45689.23	21562.00	Wolf Creek Coal Underburden	418.5	3	7506.16	" "	Yes
WOV25	46176.13	21131.20	Wadge Coal Overburden	129.3	3	7583.78	Drilled in 2004.	Yes
WW25	46169.50	21121.80	Wadge Coal	144.9	3	7584.06	Drilled in 2004.	Yes
WSOV25	46162.98	21111.80	Sage Creek Coal Overburden	196.4	3	7584.26	Drilled in 2004.	Yes
WSC25	46157.10	21102.00	Sage Creek Coal	206.4	3	7584.98	Drilled in 2004.	Yes
WWCOV25	46151.60	21092.60	Wolf Creek Coal Overburden	290.1	3	7585.29	Drilled in 2004.	Yes
WWC25	46146.50	21084.30	Wolf Creek Coal	321.2	3	7585.49	Drilled in 2004.	Yes
WWCU25	46141.90	21076.90	Wolf Creek Coal Underburden	396.8	3	7585.68	Drilled in 2004.	Yes
DCAL-02	(T5N,R88W,4AD)		Dry Creek Alluvium	50	2	6614.80	Drilled in 1998. Point of Compliance Well	Yes

Table 4a

Ground Water Parameter New Long List

Seneca Coal Company

Parameter	Analysis Technique	Units
Field		
Conductivity	Direct Measurement	umhos/cm
pH	Direct Measurement	units
Temperature	Direct Measurement	°C
Laboratory		
~~Alkalinity as $CaCO_3$~~	~~Dissolved~~	~~mg/l~~
~~Aluminum~~	~~Dissolved~~	~~mg/l~~
~~Arsenic~~	~~Dissolved~~	~~ug/l~~
~~Bicarbonate~~	~~Dissolved~~	~~mg/l~~
~~Boron~~	~~Dissolved~~	~~ug/l~~
~~Cadmium~~	~~Dissolved~~	~~ug/l~~
~~Calcium~~	~~Dissolved~~	~~mg/l~~
~~Carbonate~~	~~Dissolved~~	~~mg/l~~
~~Chloride~~	~~Dissolved~~	~~mg/l~~
~~Chromium~~	~~Dissolved~~ (~~+3 & +6 valences combined~~)	~~ug/l~~
~~Conductivity at 25°C~~	~~Direct Measurement~~	~~umhos/cm~~
~~Copper~~	~~Dissolved~~	~~ug/l~~
Fluoride	Dissolved	mg/l
~~Hardness as $CaCO_3$~~	~~Dissolved~~	~~mg/l~~
Iron	Dissolved	mg/l
~~Lead~~	~~Dissolved~~	~~ug/l~~
~~Magnesium~~	~~Dissolved~~	~~mg/l~~
Manganese	Dissolved	mg/l

Table 4a (cont.)

Ground Water Parameter New Long List

Seneca Coal Company

Parameter	Analysis Technique	Units
~~Mercury~~	~~Dissolved~~	~~ug/l~~
~~Nickel~~	~~Dissolved~~	~~ug/l~~
Nitrogen, Nitrate	Dissolved	mg/l
Nitrogen, Nitrite	Dissolved	mg/l
~~pH~~	~~Direct Measurement~~	~~units~~
~~Potassium~~	~~Dissolved~~	~~mg/l~~
Selenium	Dissolved	ug/l
~~Sodium~~	~~Dissolved~~	~~mg/l~~
~~Sodium Adsorption Ratio~~	~~Calculated~~	~~unitless~~
Sulfate	Dissolved	mg/l
~~Sulfide~~	~~Total~~	~~mg/l~~
~~Suspended Solids~~	~~Total~~	~~mg/l~~
~~Zinc~~	~~Dissolved~~	~~mg/l~~
~~Cation/Anion Balance~~	~~Calculated~~	~~percent~~
Total Dissolved Solids at 180°C	Dissolved	mg/l
~~Total Dissolved Solids Calculated~~	~~Calculated~~	~~mg/l~~

Parameters crossed out were suspended in 2010 TR 69. These parameters will be analyzed again one year prior to final bond release.

Table 4b

Ground Water Short Parameter List

Seneca Coal Company

Parameter	Analysis Technique	Units
Field		
Conductivity	Direct Measurement	umhos/cm
pH	Direct Measurement	units
Temperature	Direct Measurement	°C
Laboratory		
Iron	Dissolved	mg/l
Manganese	Dissolved	mg/l
Total Dissolved Solids at 180°C	Dissolved	mg/l

TABLE 5

CDOH 2008 Ground Water Agricultural Use Standards

Aluminum, mg/l [A]	5.0
Arsenic, ug/l	100.0
Boron, ug/l [B]	750.0
Cadmium, ug/l	10.0
Chromium, ug/l	100.0
Copper, ug/l	200.0
Fluoride, mg/l	2.0
Iron, mg/l	5.0
Lead, ug/l [A]	100.0
Manganese, mg/l [C]	0.2
Mercury, ug/l [A]	10.0
Nickel, ug/l	200.0
Nitrate/Nitrite as N, mg/l [A]	100.0
Nitrite as N, mg/l [A]	10.0
pH (S.U.)	6.5-8.5
Selenium, ug/l	20.0
Zinc, mg/l	2.0

A : CDOH livestock standard, without this footnote indicates a CDOH irrigation standard. Irrigation standard for lead is 5000 ug/l.

B : CDOH standard is set to protect plant sensitive species. Standard for most species found in Routt County is 5000 ug/l.

C : This standard in only appropriate where irrigation water is applied to soils with pH values lower than 6.0.

Table 6
Comparison of Ground Water Quality to Agricultural Use Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
CDOH (5/08) AGRICULTURAL GROUNDWATER STANDARDS ONLY - AHRGW.STD								
Aluminum, Dissolved	0.0000 - 5.0000	0	none					
Arsenic, Dissolved	0.0000 - 100.0000	0	none					
Boron, Dissolved	0.0000 - 750.0000	0	none					
Boron, Dissolved	0.0000 - 5000.0000	0	none					
Cadmium, Dissolved	0.0000 - 10.0000	0	none					
Chromium, Dissolved	0.0000 - 100.0000	0	none					
Copper, Dissolved	0.0000 - 200.0000	0	none					
Field Ph	6.5000 - 8.5000	1	WWCU25	1/0/0/1	05/12/16-05/12/16	8.5900 - 8.5900	8.5900	
Fluoride	0.0000 - 2.0000	0	none					
Iron, Dissolved	0.0000 - 5.0000	2	DCAL-02	1/0/0/1	05/11/16-05/11/16	10.1000 - 10.1000	10.1000	
			WW14	1/0/0/1	05/11/16-05/11/16	19.1000 - 19.1000	19.1000	
Lead, Dissolved	0.0000 - 100.0000	0	none					
Manganese, Dissolved	0.0000 - 0.2000	4	DCAL-02	1/0/0/1	05/11/16-05/11/16	1.4800 - 1.4800	1.4800	
			WHAL7-2	1/0/0/1	05/11/16-05/11/16	0.2700 - 0.2700	0.2700	
			WOV14	1/0/0/1	05/11/16-05/11/16	1.1300 - 1.1300	1.1300	
			WW14	1/0/0/1	05/11/16-05/11/16	1.2200 - 1.2200	1.2200	
Mercury, Dissolved	0.0000 - 10.0000	0	none					
Nickel, Dissolved	0.0000 - 200.0000	0	none					
Nitrate/Nitrite Nitrogen_N	0.0000 - 100.0000	0	none					
Nitrite Nitrogen_N	0.0000 - 10.0000	0	none					
Selenium, Dissolved	0.0000 - 20.0000	0	none					
Zinc, Dissolved	0.0000 - 2.0000	0	none					

Frequency = uncensored/between MDL&PQL/censored/no. samples, (B) = Between MDL&PQL range, (<) = Censored range

Table 6
Comparison of Ground Water Quality to Agricultural Use Standards

---- Water Use Summary Report ----

Site	CDOH
DCAL-02	Iron, Dissolved(1/1)
	Manganese, Dissolved(1/1)
WHAL7-2	Manganese, Dissolved(1/1)
WOV14	Manganese, Dissolved(1/1)
WOV17	
WOV25	
WSC25	
WSOV25	
WW14	Iron, Dissolved(1/1)
	Manganese, Dissolved(1/1)
WW17	
WW25	
WWC25	
WWCOV25	
WWCU25	Field Ph(1/1)

TABLE 7

Ground Water Point of Compliance Standards
Dry Creek Alluvial Well DCAL-02
As Provided in Permit Appendix 15-3B, Table 1

Aluminum, mg/l	5.0
Arsenic, ug/l	50.0
Boron, ug/l	750.0
Cadmium, ug/l	8.0
Chloride, mg/l	250.0
Chromium, ug/l	100.0
Copper, ug/l	200.0
Fluoride, mg/l	2.0
Iron, mg/l	8.06
Lead, ug/l	70.0
Manganese, mg/l	2.55
Mercury, ug/l	2.0
Nickel, ug/l	100.0
Nitrate as N, mg/l	10.0
Nitrite as N, mg/l	1.0
Nitrate/Nitrite as N, mg/l	10.0
Selenium, ug/l	20.0
Sulfate, mg/l	1511.0
Zinc, mg/l	2.0
pH (S.U.)	6.5-8.5
TDS, mg/l (from Table 3)	3195.0

TABLE 8
Historical and Descriptive Summary of
Surface Water Monitoring Sites, Seneca II-W Mine

Site Number (Computer ID)	Location	Date Established/ Instrumentation	Periods of Operation	Comments, Etc.
SW-S2W-SG1 (YSS1)	Upper Sage Creek at 7,620 ft. elevation (5N88W25CDB)	1979; none associated	08/80-09/82	No flow measurements made due to beaver dam obstructions in stream channel. Discontinued in 1982.
SW-S2W-SG2 (WSWT2)	Upper Watering Trough Gulch at 7,260 ft. elevation (5N88W28CAD)	1979; none associated	None	No data collected. Discontinued in 1982 due to change in mine plan.
SW-S2W-SG3 (WSS3)	North (009) tributary of Sage Creek at 6,900 ft elevation (5N8811DBA)	1979; none associated (high Q=VA; low Q= B&S)	07/79-11/83 05-11/84;03-11/85 03-05/86	Access problems in 1984 forced relocation 1/2 mile downstream. Discontinued in 1986. Baseline site for NPDES 009.
SW-S2W-SG4 (WSS4)	Lower Sage Creek at 6,820 ft. elevation (5N88W11BAB)	1979; none associated (Q=VA)	11/79-12/85 03/05/86	Discontinued in 1986.
SW-S2W-SG5 (WSD5)	Dry Creek at 6,570 ft. elevation (6N88W34CCC)	1983; none associated (Q=VA)	03/83-12/85 03-11/86;03-12/87 03-12/88; 03-12/89 03/90-present	Limited winter monitoring data. Monthly discharge data.
SW-S2W-SG6 (WSH6)	Lower (006) tributary to Hubberson Gulch at 7,070 ft. elevation (5N88W22BBC)	1986; none associated (Q=VA)	06-11/86;02-12/87 03-12/88;03-09/89	Site provided baseline data for construction and operation of Pond 006. Discontinued in 1989 due to construction of Pond 006. Replaced by NPDES 006.
SW-S2W-SG7 (WSH7)	Middle Hubberson Gulch at 6,825 ft. elevation (5N88W16CDA)	1987; none associated (high Q=VA; low Q= B&S)	03-11/87;03-11/88 03-11/89;03/90-present	Limited winter monitoring data. Monthly/triannual discharge data.
SW-S2W-SG8 (WSD8)	005 Tributary to Dry Creek at 7,170 ft. elevation (5N88W10CDC)	1990; none associated (high Q=VA; low Q=B&S)	04/90-07/92	Site to provide data at proposed 005 Pond. Discontinued 07/92 upon construction of Pond 005. Replaced by NPDES 005.
SW-S2W-SG9 (WSH9)	Upper Hubberson Gulch at 7,440 ft. elevation (5N88W34DBA)	1997; none associated	8/97-present	Upstream of Ponds 016 and 017 Monitored June and September
SW-S2W-SG16 (WSH16)	Upper (016) tributary of Hubberson Gulch at 7,450 ft. elevation (5N88W27DAD)	1997; none associated	8/97-9/2000	Baseline site for Pond 016
SW-S2W-SG17 (WSH17)	Hubberson Gulch at Pond 017 at 7,390 ft. elev. (5N88W34ACC)	1997; none associated	8/97-9/2002	Baseline site for Pond 017

TABLE 8
Historical and Descriptive Summary of
Surface Water Monitoring Sites, Seneca II-W Mine

Site Number (Computer ID)	Location	Date Established/ Instrumentation	Periods of Operation	Comments, Etc.
SW-S2W-CG1 (WSSC1)	South (015) tributary of Sage Creek at 7,160 ft. elevation (5N88W14DDC)	1979; crest stage gage (Q=VA)	06/79-11/83 05-11/84;03-11/85 03-05/86;07/97-10/98	Discontinued in 1986. Resumed monitoring in 1997. Relocated appx. 500 ft. above old site due to access problem. Discontinued in 1998 upon construction of Pond 015
SW-S2W-CG2 (WSWTC2)	Mid-Watering Trough Gulch at 6,980 ft. elevation (5N88W20DAD)	1979; crest stage gage (Q=B&S)	08/80-11/82	Data limited. Discontinued in 1982 due to change in mine plan.
SW-S2W-FG1 (WSHF1)	Mouth of Hubberson Gulch at 6,795 ft. elevation (5N88W16BCD)	1979; flume gage, 2.5-ft throat width Parshall flume w/ continuous level recorder. (Q=VA)	07/79-present	Continuous discharge data (except in winter)
SW-S2W-FG2 (WSWTF2)	Lower Watering Trough Gulch at 6,920 ft. elevation (5N88W20ACD)	1979; flume gage, 0.75-ft throat width Parshall flume w/ continuous level recorder. (Q=VA)	08/80-11/85 04/87-10/93	Site is upstream of mining, Monitoring discontinued 10/93
SW-S2W-FG3 (YSSF1)	Middle of reach on Sage Creek at 7,220 ft. elevation (5N87W18CDD)	1981; flume gage 2.5-ft throat width in Parshall flume with continuous recorder (Q=VA)	04/81-09/83	U.S. Geological Survey discontinued monitoring at site in 1983.
SW-S2W-FG4 (WSSF3)	Lower Sage Creek at 6,860 ft. elevation (5N87W11ACC)	1990; flume gage 3.0-ft throat width Parshall flume w/ continuous recorder (Q=VA)	09/90-present	New site installed late summer 1990 Continuous discharge data (except in winter).
SW-S2W-FG5 (YSSF3)	Upper Sage Creek at 7,385 ft elevation (5N87W30BB)	1990; flume gage 2.5-ft throat width Parshall flume with continuous recorder (Q=VA)	09/90-present	New site installed late summer 1990 Continuous discharge data (except in winter). Yoast Mine site
S-1 (WSPG1)	Tributary to Sage Creek (5N88W14CBB) 7,425 ft.	-/none associated Q=B&S	1979, 1983 1986-2004	Flow and water quality of spring fed creek are monitored immediately upstream of unregistered stock pond. Discontinued 2005.
S-5 (WSPG5)	Tributary to Hubberson Creek (5N88W22ACB)	-/none associated Q=B&S 7,225 ft.	1979, 1983 1986-2003	Flow sampled immediately upstream from where road crosses creek. Discontinued 2004.

TABLE 8
Historical and Descriptive Summary of
Surface Water Monitoring Sites, Seneca II-W Mine

Site Number (Computer ID)	Location	Date Established/ Instrumentation	Periods of Operation	Comments, Etc.
S-7 (WSPG7)	Hubberson Gulch (5N88W21BDA) 6,865 ft.	-/none associated Q=B&S	1979, 1983, 1987, 1989, 1990, 1999-present	Two springs exist in this area and both have been referred to as S-7. Data from 1983 is from the "Peter Spring" which has a very low flow (max. observed = 0.04 gpm) and is currently not in use. It is located approx. 250 ft. WSW of the homestead and issues from an iron pipe from the side of the hill. Data beginning in 1987 (& also possibly the original 1979 spring survey) is from an infiltration gallery placed in the alluvium and discharging into a clear well. It is referred to as the "Joshua Spring" and has a maximum observed flow of 13 gpm. It is located approx. 30 ft. WSW of the homestead.
S-23 (WSPG23)	Tributary to Hubberson Gulch (5N88W22DAD) 7,470 ft.	-/none associated Q=B&S	1979, 1983 1986-present	Flow of spring fed creek sampled 100 yards upstream of stock pond.
S-41 (WSPG41)	Tributary to Hubberson Gulch (5N88W22ADC) 7,315 ft.	-/none associated Q=B&S	1979, 1983 1986-1998	Composite of several seeps are monitored in spring fed stream channel. Buried in spoils in 1998.
S-45 (WSPG45)	Dry Creek (5N88W9CDC) 6,740 ft.	-/none associated	1979, 1983 1985-2004	Flow never observed; sampled from alluvial clear well; site also known as Olson Spring. Discontinued 2005.
S-46 (WSPG46)	005 Gulch 6,844 Ft. (5N88W10CBA)	-/none associated Q=B&S	1979, 1983 1992-present	Developed spring below 005 Pond dam
S-47 (WSPG47)	006 Gulch 6,850 ft (5N88W16CDA)	-/none associated Q=B&S	1990, 1992-present	Developed spring west of weather station, not part of 1979 survey
S-48 (WSPG48)	009 Gulch 7,100 ft. (5N88W14BAB)	-/none associated Q=B&S	1994-present	Developed spring approx. 500 ft. upstream of 009 dam, not part of 1979 survey
S-49 (WSPG49)	Tributary to Hubberson Gulch above Pond 016 7,580 ft. (5N88W26CBC)	-/none associated Q=B&S	1997-2001	Developed spring flowing out of 4 inch PVC pipe Abandoned 8/2001, mined out later.
S-50 (WSPG50)	Above Pond 016 7,500 ft. (5N88W27DAD)	Q=B&S	2005-present	Monitor discharge from french drain at abandoned Wells W-24 site
Spoil Spring 1 (WSSPG1)	005 Gulch (5N88W15ABB)	Q=B&S	1998-present	Bottom of reclaimed 'D' Pit
Spoil Spring 2 (WSSPG2)	006 Gulch (5N88W22BDA)	Q=B&S	1999-present	Adjacent to Spring S-5

TABLE 8
Historical and Descriptive Summary of
Surface Water Monitoring Sites, Seneca II-W Mine

Site Number (Computer ID)	Location	Date Established/ Instrumentation	Periods of Operation	Comments, Etc.
Spoil Spring 3 (WSSPG3)	006 Pond (5N88W22BCB)	Q=B&S	1999-present	Immediately above Pond 006 (in cattails)
Spoil Spring 4 (WSSPG4)	006 Pond (5N88W22BCA)	Q=B&S	2003-present	Immediately above Pond 006 (haul road culvert)
Spoil Spring 5 (WSSPG4)	016 Pond (5N88W27DAD)	Q=B&S	2006-present	Immediately above Pond 016 (haul road culvert)
NPDES 005 (NPDES5)	Unnamed tributary to Dry Creek at 6,842 ft. elevation (5N88W10CBA)	1992; 1.5-ft H-flume (high Q=VA, low Q-B&S)	07/92-present	Constructed 07/92. Flow is continuously monitored except during winter (November - February).
NPDES 006 (NPDES6)	Tributary to Hubberson Gulch (5N88W22BBC) 7,056 ft.	1989; flume gage, 1.5-ft throat width Parshall flume w/continuous recorder (high Q=VA; low Q=B&S)	10/89-present	Pond 006 constructed 10/89. Flow is continuously monitored except during winter (November - February).
NPDES 009 (NPDES9)	North tributary of Sage Creek, 7,071 ft. elev. (5N88W11CD)	1991; 1.5-ft throat width Parshall flume w/continuous recorder (high Q=VA, low Q=B&S)	10/91-present	Constructed 10/91. Flow is continuously monitored except during winter (November - February).
NPDES 015 (NPDES15)	South tributary of Sage Creek, 7,370 ft. elev. (5N88W23ADB)	1-ft. H-flume w/ continuous recorder	1999-present	Constructed 8/99
NPDES 016 (NPDES16)	Upper tributary of Hubberson Gulch, 7,463 ft. elevation (5N88W27DAD)	3-ft. H-flume w/ continuous recorder	2000-present	Constructed 9/00
NPDES 017 (NPDES17)	Hubberson Gulch at 7,375 ft. elevation (5N88W34ACC)	3-ft. H-flume w/ continuous recorder	2002-present	Constructed 12/02

[1]Q=VA means that flow (Q) is calculated by multiplying measured stream velocity (V) times cross sectional area (A); Q=B&S means that Q is determined by use of a bucket (B) and stopwatch (S).

[2]Up to the end of 1983, stream velocities were measured using surface floats without a velocity correction factor. Beginning in 1984, surface float velocities were taken times 0.8 per Brakensiek and others (1979) "Field Manual for Research in Agricultural Hydrology" and Buchanan and Sumers' 1968) "Discharge Measurements at Gaging Stations". Since August of 1986, velocities are measured with an electronic flow meter.

Location Key : First Number = Township, Second Number = Range, Third Number = Section
A = Northeast quarter, B = Northwest, C = Southwest, D = Southeast

TABLE 9a

Surface Water Parameter New Long List

Seneca Coal Company

Parameter	Analysis Technique	Units
Field		
Conductivity	Direct Measurement	umhos/cm
pH	Direct Measurement	units
Temperature	Direct Measurement	°C
Laboratory		
~~Alkalinity as $CaCO_3$~~	~~Dissolved~~	~~mg/l~~
~~Arsenic~~	~~Total Recoverable~~	~~ug/l~~
~~Bicarbonate~~	~~Dissolved~~	~~mg/l~~
~~Boron~~	~~Dissolved~~	~~ug/l~~
~~Cadmium~~	~~Potentially Dissolved~~	~~ug/l~~
~~Calcium~~	~~Dissolved~~	~~mg/l~~
~~Carbonate~~	~~Dissolved~~	~~mg/l~~
~~Chloride~~	~~Dissolved~~	~~mg/l~~
~~Chromium~~	~~Potentially Dissolved (+3 & +6 valences)~~	~~ug/l~~
~~Conductivity at 25°C~~	~~Direct Measurement~~	~~umhos/cm~~
~~Copper~~	~~Potentially Dissolved~~	~~ug/l~~
~~Hardness as $CaCO_3$~~	~~Dissolved~~	~~mg/l~~
Iron	Total Recoverable*	mg/l
~~Lead~~	~~Potentially Dissolved~~	~~ug/l~~
~~Magnesium~~	~~Dissolved~~	~~mg/l~~
Manganese	~~Potentially~~ Dissolved	mg/l

TABLE 9a (cont.)

Surface Water Parameter New Long List

Seneca Coal Company

Parameter	Analysis Technique	Units
Mercury	Total	ug/l
~~Nickel~~	~~Potentially Dissolved~~	~~ug/l~~
Nitrogen, Ammonia	Total	mg/l
Nitrogen, Nitrate	Dissolved	mg/l
Nitrogen, Nitrite	Dissolved	mg/l
~~pH~~	~~Direct Measurement~~	~~units~~
~~Potassium~~	~~Dissolved~~	~~mg/l~~
Selenium	~~Potentially~~ Dissolved	ug/l
~~Silver~~	~~Potentially Dissolved~~	~~ug/l~~
~~Sodium~~	~~Dissolved~~	~~mg/l~~
~~Sodium Adsorption Ratio~~	~~Calculated~~	~~unitless~~
Sulfate	Dissolved	mg/l
Sulfide	Total	mg/l
Suspended Solids	Total	mg/l
~~Zinc~~	~~Potentially Dissolved~~	~~mg/l~~
~~Cation/Anion Balance~~	~~Calculated~~	~~percent~~
Total Dissolved Solids at 180°C	Dissolved	mg/l
~~Total Dissolved Solids Calculated~~	~~Calculated~~	~~mg/l~~

Parameters crossed out were suspended in 2010 TR 69. These parameters will be analyzed again one year prior to final bond release. Also, the 'Potentially Dissolved' analytical technique will be changed to 'Dissolved' as recommended by the CDPHE.

* If Colorado Water Quality Control Commission changes the required analytical technique for iron (for aquatic life) from total recoverable to another technique, then Seneca Coal Company will do likewise.

TABLE 9b

Surface Water Short Parameter List

Seneca Coal Company

Parameter	Analysis Technique	Units
Field		
Conductivity	Direct Measurement	umhos/cm
pH	Direct Measurement	units
Temperature	Direct Measurement	°C
Laboratory		
Iron	Total Recoverable*	mg/l
Manganese	Dissolved	mg/l
Suspended Solids	Total	mg/l
Total Dissolved Solids at 180°C	Dissolved	mg/l

* If Colorado Water Quality Control Commission changes the required analytical technique for iron (for aquatic life) from total recoverable to another technique, then Seneca Coal Company will do likewise.

TABLE 10

CDOH Surface Water Agricultural Use Standards

Arsenic, ug/l [A]	100.0
Boron, ug/l [B]	750.0
Cadmium, ug/l [A]	10.0
Chromium, ug/l [A]	100.0
Copper, ug/l [A]	200.0
Lead, ug/l [C]	100.0
Manganese, mg/l [A,D]	0.2
Nickel, ug/l [A]	200.0
Nitrate, Nitrogen, mg/l [C]	100.0
Nitrite, Nitrogen, mg/l [C]	10.0
Selenium, ug/l [A]	20.0
Zinc, mg/l [A]	2.0

A : CDOH surface water agricultural standard. Same as the CDOH groundwater irrigation standard.

B : CDOH surface water standard is set to protect sensitive plant species. Standard for plant species grown in Routt County is 5000 ug/l.

C : CDOH surface water agricultural standard. Same as the CDOH groundwater livestock standard.

D : This standard in only appropriate where irrigation water is applied to soils with pH values lower than 6.0.

Table 11
Comparison of Surface Water Quality to Agricultural Use Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
CDOH (11/09) AG. SURFACE WATER STANDARDS ONLY! ADDED DISSOLVED METALS!!!! - NEWAHRSW.STD								
Arsenic, Total Rec.	0.0000 - 100.0000	0	none					
Boron, Dissolved	0.0000 - 750.0000	0	none					
Cadmium, Pot. Diss.	0.0000 - 10.0000	0	none					
Cadmium, Total Rec.	0.0000 - 10.0000	0	none					
Chromium, Dissolved	0.0000 - 100.0000	0	none					
Chromium, Pot. Diss.	0.0000 - 100.0000	0	none					
Chromium, Total Rec.	0.0000 - 100.0000	0	none					
Copper, Dissolved	0.0000 - 200.0000	0	none					
Copper, Pot. Diss.	0.0000 - 200.0000	0	none					
Copper, Total Rec.	0.0000 - 200.0000	0	none					
Lead, Dissolved	0.0000 - 100.0000	0	none					
Lead, Pot. Diss.	0.0000 - 100.0000	0	none					
Lead, Total Rec.	0.0000 - 100.0000	0	none					
Manganese, Dissolved	0.0000 - 0.2000	0	none					
Manganese, Pot. Diss.	0.0000 - 0.2000	6	NPDES6	1/0/0/4	01/13/16-01/13/16	2.0500 -	2.0500	2.0500
			WSHF1	1/0/0/3	09/07/16-09/07/16	0.2470 -	0.2470	0.2470
			WSSPG1	1/0/0/1	05/31/16-05/31/16	1.7000 -	1.7000	1.7000
			WSSPG3	1/0/0/1	05/31/16-05/31/16	0.4263 -	0.4263	0.4263
			WSSPG4	1/0/0/1	05/31/16-05/31/16	0.7705 -	0.7705	0.7705
			WSSPG5	1/0/0/1	05/31/16-05/31/16	1.1300 -	1.1300	1.1300
Manganese, Total	0.0000 - 0.2000	0	none					
Nickel, Dissolved	0.0000 - 200.0000	0	none					
Nickel, Pot. Diss.	0.0000 - 200.0000	0	none					
Nickel, Total Rec.	0.0000 - 200.0000	0	none					
Nitrate Nitrogen_N	0.0000 - 100.0000	0	none					
Nitrite Nitrogen_N	0.0000 - 10.0000	0	none					
Selenium, Dissolved	0.0000 - 20.0000	1	WSD5	1/0/0/3	04/20/16-04/20/16	26.8000 -	26.8000	26.8000
Selenium, Pot. Diss.	0.0000 - 20.0000	1	WSD5	1/0/0/3	04/20/16-04/20/16	25.9000 -	25.9000	25.9000

Table 11
Comparison of Surface Water Quality to Agricultural Use Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
Selenium, Total Rec.	0.0000 - 20.0000	1	WSD5	1/0/0/3	04/20/16-04/20/16	25.7000 - 25.7000	25.7000	
Zinc, Dissolved	0.0000 - 2.0000	0	none					
Zinc, Pot. Diss.	0.0000 - 2.0000	0	none					
Zinc, Total Rec.	0.0000 - 2.0000	0	none					

Frequency = uncensored/between MDL&PQL/censored/no. samples, (B) = Between MDL&PQL range, (<) = Censored range

Table 11
Comparison of Surface Water Quality to Agricultural Use Standards

---- Water Use Summary Report ----

Site	CDOH
NPDES16	
NPDES17	
NPDES5	
NPDES6	Manganese, Pot. Diss.(1/4)
WSD5	Selenium, Dissolved(1/3)
	Selenium, Pot. Diss.(1/3)
	Selenium, Total Rec.(1/3)
WSH7	
WSH9	
WSHF1	Manganese, Pot. Diss.(1/3)
WSPG46	
WSPG47	
WSPG50	
WSPG7	
WSSF3	
WSSPG1	Manganese, Pot. Diss.(1/1)
WSSPG2	
WSSPG3	Manganese, Pot. Diss.(1/1)
WSSPG4	Manganese, Pot. Diss.(1/1)
WSSPG5	Manganese, Pot. Diss.(1/1)

TABLE 12

CDOH Yampa Segment 13d (upper Dry Creek) Standards

FIELD PH	6.5 - 9.0
AMMONIA, NITROGEN, MG/L	0.05[A]
ARSENIC, TOTAL REC., UG/L	340.0 (acute)
ARSENIC, TOTAL REC., UG/L	100.0 (chronic)
BORON, DISSOLVED, UG/L	750.0
CADMIUM, UG/L	9.2 (acute)
CADMIUM, UG/L	1.2 (chronic)
CHROMIUM, UG/L	1773 (acute)
CHROMIUM, UG/L	231 (chronic)
COPPER, UG/L	50.0 (acute)
COPPER, UG/L	29.0 (chronic)
IRON, TOTAL REC., MG/L	3.04[A1]
IRON, TOTAL REC., MG/L	1.11[A1]
LEAD, UG/L	281.0 (acute)
LEAD, UG/L	11.0 (chronic)
MANGANESE, MG/L	4.738 (acute)
MANGANESE, MG/L	2.618 (chronic)
MERCURY, TOTAL, UG/L	0.01[B]
NICKEL, UG/L	1513.0 (acute)
NICKEL, UG/L	168.0 (chronic)
NITRITE, NITROGEN, MG/L	0.05
NITRATE, NITROGEN, MG/L	100.0
SELENIUM, UG/L	18.4 (acute)
SELENIUM, UG/L	4.6[C] (chronic)
SULFIDE, MG/L	0.02[D]
SILVER, UG/L	22.0 (acute)
SILVER, UG/L	3.5 (chronic)
ZINC, MG/L	0.565 (acute)
ZINC, MG/L	0.428 (chronic)

Acute = one day max., Chronic = 30 day average. These values were taken from Table IV, CDOH Reg. 31, using a mean hardness of 400 mg/l. All acute/chronic values are the 'dissolved' form.

A = Detection limit is 0.05 mg/l. All values above detection limit are compared to table standards found on this website: http://nepis.epa.gov/Adobe/PDF/2000303L.pdf

TABLE 12 (cont.)

A1 = Seasonal iron standard: Mar-Apr = 3.04 mg/l, May-Feb = 1.11 mg/l.

Temporary Modification Mar-Apr: "current conditions" expires 12/31/17

B = Detection limit for stream and spring sites is 0.2 ug/l.

C = Temporary Modification Se(ch): "current conditions" expires 12/31/18

D = Standard is 0.002 mg/l (un-ionized). Detection limit is 0.02 mg/l.

Table 13
Comparison of Surface Water Quality to Yampa Segment 13d Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
RECEIVING STREAM STANDARDS, 13D UP DRYCR JUNE 2014 DISS.STD								
Ammonia Nitrogen_N	0.0000 - 0.0500	3	WSPG46	1/0/0/1	05/31/16-05/31/16	0.5300 -	0.5300	0.5300
			WSSPG4	0/1/0/1	05/31/16-05/31/16(B)	0.0700 -	0.0700	0.0700
			WSSPG5	1/0/0/1	05/31/16-05/31/16	0.4100 -	0.4100	0.4100
Arsenic, Total Rec.	0.0000 - 100.0000	0	none					
Arsenic, Total Rec.	0.0000 - 340.0000	0	none					
Boron, Dissolved	0.0000 - 750.0000	0	none					
Cadmium, Dissolved	0.0000 - 1.2000	0	none					
Cadmium, Dissolved	0.0000 - 9.2000	0	none					
Cadmium, Pot. Diss.	0.0000 - 1.2000	0	none					
Cadmium, Pot. Diss.	0.0000 - 9.2000	0	none					
Chromium, Dissolved	0.0000 - 231.0000	0	none					
Chromium, Dissolved	0.0000 - 1773.0000	0	none					
Chromium, Pot. Diss.	0.0000 - 231.0000	0	none					
Chromium, Pot. Diss.	0.0000 - 1773.0000	0	none					
Copper, Dissolved	0.0000 - 29.0000	0	none					
Copper, Dissolved	0.0000 - 50.0000	0	none					
Copper, Pot. Diss.	0.0000 - 29.0000	0	none					
Copper, Pot. Diss.	0.0000 - 50.0000	0	none					
Field Ph	6.5000 - 9.0000	0	none					
Iron, Total Rec.	0.0000 - 1.1100	4	NPDES5	1/0/0/5	04/20/16-04/20/16	1.8200 -	1.8200	1.8200
			WSH7	3/0/0/3	04/20/16-09/07/16	2.2900 -	20.3000	4.1800
			WSHF1	2/0/0/3	04/20/16-09/07/16	2.7900 -	11.5000	7.1450
			WSPG46	1/0/0/1	05/31/16-05/31/16	7.2600 -	7.2600	7.2600
Iron, Total Rec.	0.0000 - 3.0400	3	WSH7	2/0/0/3	04/20/16-06/22/16	4.1800 -	20.3000	12.2400
			WSHF1	1/0/0/3	04/20/16-04/20/16	11.5000 -	11.5000	11.5000
			WSPG46	1/0/0/1	05/31/16-05/31/16	7.2600 -	7.2600	7.2600
Lead, Dissolved	0.0000 - 11.0000	0	none					
Lead, Dissolved	0.0000 - 281.0000	0	none					
Lead, Pot. Diss.	0.0000 - 11.0000	0	none					

Table 13
Comparison of Surface Water Quality to Yampa Segment 13d Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
Lead, Pot. Diss.	0.0000 - 281.0000	0	none					
Manganese, Dissolved	0.0000 - 2.6180	0	none					
Manganese, Dissolved	0.0000 - 4.7380	0	none					
Manganese, Pot. Diss.	0.0000 - 2.6180	0	none					
Manganese, Pot. Diss.	0.0000 - 4.7380	0	none					
Mercury, Total	0.0000 - 0.0100	11	NPDES5	0/0/1/2	04/20/16-04/20/16(<)	0.2000 -	0.2000	0.2000
			WSD5	0/0/2/2	04/20/16-06/22/16(<)	0.2000 -	0.2000	0.2000
			WSHF1	0/0/2/2	04/20/16-06/22/16(<)	0.2000 -	0.2000	0.2000
			WSPG46	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSPG50	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSPG7	0/0/1/1	06/01/16-06/01/16(<)	0.2000 -	0.2000	0.2000
			WSSF3	0/0/2/2	04/21/16-06/21/16(<)	0.2000 -	0.2000	0.2000
			WSSPG2	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSSPG3	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSSPG4	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSSPG5	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
Mercury, Total	0.0000 - 0.2000	0	none					
Nickel, Dissolved	0.0000 - 168.0000	0	none					
Nickel, Dissolved	0.0000 - 1513.0000	0	none					
Nickel, Pot. Diss.	0.0000 - 168.0000	0	none					
Nickel, Pot. Diss.	0.0000 - 1513.0000	0	none					
Nitrate Nitrogen_N	0.0000 - 100.0000	0	none					
Nitrite Nitrogen_N	0.0000 - 0.0500	1	WSSPG4	1/0/0/1	05/31/16-05/31/16	0.1000 -	0.1000	0.1000
Selenium, Dissolved	0.0000 - 4.6000	3	WSD5	1/0/0/3	04/20/16-04/20/16	26.8000 -	26.8000	26.8000
			WSPG50	1/0/0/1	05/31/16-05/31/16	10.8000 -	10.8000	10.8000
			WSSPG2	1/0/0/1	05/31/16-05/31/16	6.2000 -	6.2000	6.2000
Selenium, Dissolved	0.0000 - 18.4000	1	WSD5	1/0/0/3	04/20/16-04/20/16	26.8000 -	26.8000	26.8000
Selenium, Pot. Diss.	0.0000 - 4.6000	3	WSD5	1/0/0/3	04/20/16-04/20/16	25.9000 -	25.9000	25.9000
			WSPG50	1/0/0/1	05/31/16-05/31/16	13.0000 -	13.0000	13.0000
			WSSPG2	1/0/0/1	05/31/16-05/31/16	6.6000 -	6.6000	6.6000
Selenium, Pot. Diss.	0.0000 - 18.4000	1	WSD5	1/0/0/3	04/20/16-04/20/16	25.9000 -	25.9000	25.9000
Selenium, Total Rec.	0.0000 - 4.6000	3	WSD5	1/0/0/3	04/20/16-04/20/16	25.7000 -	25.7000	25.7000
			WSPG50	1/0/0/1	05/31/16-05/31/16	13.0000 -	13.0000	13.0000
			WSSPG2	1/0/0/1	05/31/16-05/31/16	6.6000 -	6.6000	6.6000

Table 13
Comparison of Surface Water Quality to Yampa Segment 13d Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
Selenium, Total Rec.	0.0000 - 18.4000	1	WSD5	1/0/0/3	04/20/16-04/20/16	25.7000 - 25.7000	25.7000	25.7000
Silver, Dissolved	0.0000 - 3.5000	0	none					
Silver, Dissolved	0.0000 - 22.0000	0	none					
Silver, Pot. Diss.	0.0000 - 3.5000	0	none					
Silver, Pot. Diss.	0.0000 - 22.0000	0	none					
Sulfide	0.0000 - 0.0200	0	none					
Zinc, Dissolved	0.0000 - 0.4280	0	none					
Zinc, Dissolved	0.0000 - 0.5650	0	none					
Zinc, Pot. Diss.	0.0000 - 0.4280	0	none					
Zinc, Pot. Diss.	0.0000 - 0.5650	0	none					

Frequency = uncensored/between MDL&PQL/censored/no. samples, (B) = Between MDL&PQL range, (<) = Censored range

Table 13
Comparison of Surface Water Quality to Yampa Segment 13d Standards

---- Water Use Summary Report ----

Site	RECEIVING
NPDES15	
NPDES16	
NPDES17	
NPDES5	Iron, Total Rec.(1/10)
	Mercury, Total(1/4)
NPDES6	
NPDES9	
WSD5	Mercury, Total(2/4)
	Selenium, Dissolved(2/6)
	Selenium, Pot. Diss.(2/6)
	Selenium, Total Rec.(2/6)
WSH7	Iron, Total Rec.(5/6)
WSH9	
WSHF1	Iron, Total Rec.(3/6)
	Mercury, Total(2/4)
WSPG46	Iron, Total Rec.(2/2)
	Mercury, Total(1/2)
	Ammonia Nitrogen_N(1/1)
WSPG47	
WSPG50	Mercury, Total(1/2)
	Selenium, Dissolved(1/2)
	Selenium, Pot. Diss.(1/2)
	Selenium, Total Rec.(1/2)
WSPG7	Mercury, Total(1/2)
WSSF3	Mercury, Total(2/4)
WSSPG1	
WSSPG2	Mercury, Total(1/2)
	Selenium, Dissolved(1/2)
	Selenium, Pot. Diss.(1/2)
	Selenium, Total Rec.(1/2)
WSSPG3	Mercury, Total(1/2)
WSSPG4	Mercury, Total(1/2)
	Nitrite Nitrogen_N(1/1)
	Ammonia Nitrogen_N(1/1)
WSSPG5	Mercury, Total(1/2)
	Ammonia Nitrogen_N(1/1)

TABLE 14

CDOH Yampa Segment 13e (Sage Creek) Standards

FIELD PH	6.5 - 9.0
AMMONIA, NITROGEN, MG/L	0.05[A]
ARSENIC, TOTAL REC., UG/L	340.0 (acute)
ARSENIC, TOTAL REC., UG/L	100.0 (chronic)
BORON, DISSOLVED, UG/L	750.0
CADMIUM, UG/L	9.2 (acute)
CADMIUM, UG/L	1.2 (chronic)
CHROMIUM, UG/L	1773 (acute)
CHROMIUM, UG/L	231 (chronic)
COPPER, UG/L	50.0 (acute)
COPPER, UG/L	29.0 (chronic)
IRON, TOTAL REC., MG/L	1.25[A1]
IRON, TOTAL REC., MG/L	1.00[A1]
LEAD, UG/L	281.0 (acute)
LEAD, UG/L	11.0 (chronic)
MANGANESE, MG/L	4.738 (acute)
MANGANESE, MG/L	2.618 (chronic)
MERCURY, TOTAL, UG/L	0.01[B]
NICKEL, UG/L	1513.0 (acute)
NICKEL, UG/L	168.0 (chronic)
NITRITE, NITROGEN, MG/L	0.05
NITRATE, NITROGEN, MG/L	100.0
SELENIUM, UG/L	18.4 (acute)
SELENIUM, UG/L	4.6[C] (chronic)
SULFIDE, MG/L	0.02[D]
SILVER, UG/L	22.0 (acute)
SILVER, UG/L	3.5 (chronic)
ZINC, MG/L	0.565 (acute)
ZINC, MG/L	0.428 (chronic)

Acute = one day max., Chronic = 30 day average. These values were taken from Table IV, CDOH Reg. 31, using a mean hardness of 400 mg/l. All acute/chronic values are the 'dissolved' form.

A = Detection limit is 0.05 mg/l. All values above detection limit are compared to table standards found on this website: http://nepis.epa.gov/Adobe/PDF/2000303L.pdf

TABLE 14 (cont.)

A1 = Upper Sage Creek iron standard = 1.25 mg/l. Lower Sage Creek = 1.00 mg/l. Break between two sections is upper edge of old Sage Creek Res.. All Seneca IIW outfalls discharge into Lower Sage Creek.

B = Detection limit for stream and spring sites is 0.2 ug/l.

C = Temporary Modification Se(ch): "current conditions" expires 12/31/18

D = Standard is 0.002 mg/l (un-ionized). Detection limit is 0.02 mg/l.

Table 15
Comparison of Surface Water Quality to Yampa Segment 13e Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
RECEIVING STREAM STANDARDS, 13E SAGECR JUNE 2014 DISS.STD								
Ammonia Nitrogen_N	0.0000 - 0.0500	3	WSPG46	1/0/0/1	05/31/16-05/31/16	0.5300 -	0.5300	0.5300
			WSSPG4	0/1/0/1	05/31/16-05/31/16(B)	0.0700 -	0.0700	0.0700
			WSSPG5	1/0/0/1	05/31/16-05/31/16	0.4100 -	0.4100	0.4100
Arsenic, Total Rec.	0.0000 - 100.0000	0	none					
Arsenic, Total Rec.	0.0000 - 340.0000	0	none					
Boron, Dissolved	0.0000 - 750.0000	0	none					
Cadmium, Dissolved	0.0000 - 1.2000	0	none					
Cadmium, Dissolved	0.0000 - 9.2000	0	none					
Cadmium, Pot. Diss.	0.0000 - 1.2000	0	none					
Cadmium, Pot. Diss.	0.0000 - 9.2000	0	none					
Chromium, Dissolved	0.0000 - 231.0000	0	none					
Chromium, Dissolved	0.0000 - 1773.0000	0	none					
Chromium, Pot. Diss.	0.0000 - 231.0000	0	none					
Chromium, Pot. Diss.	0.0000 - 1773.0000	0	none					
Copper, Dissolved	0.0000 - 29.0000	0	none					
Copper, Dissolved	0.0000 - 50.0000	0	none					
Copper, Pot. Diss.	0.0000 - 29.0000	0	none					
Copper, Pot. Diss.	0.0000 - 50.0000	0	none					
Field Ph	6.5000 - 9.0000	0	none					
Iron, Total Rec.	0.0000 - 1.0000	4	NPDES5	1/0/0/5	04/20/16-04/20/16	1.8200 -	1.8200	1.8200
			WSH7	3/0/0/3	04/20/16-09/07/16	2.2900 -	20.3000	4.1800
			WSHF1	3/0/0/3	04/20/16-09/07/16	1.0800 -	11.5000	2.7900
			WSPG46	1/0/0/1	05/31/16-05/31/16	7.2600 -	7.2600	7.2600
Iron, Total Rec.	0.0000 - 1.2500	4	NPDES5	1/0/0/5	04/20/16-04/20/16	1.8200 -	1.8200	1.8200
			WSH7	3/0/0/3	04/20/16-09/07/16	2.2900 -	20.3000	4.1800
			WSHF1	2/0/0/3	04/20/16-09/07/16	2.7900 -	11.5000	7.1450
			WSPG46	1/0/0/1	05/31/16-05/31/16	7.2600 -	7.2600	7.2600
Lead, Dissolved	0.0000 - 11.0000	0	none					
Lead, Dissolved	0.0000 - 281.0000	0	none					

Table 15
Comparison of Surface Water Quality to Yampa Segment 13e Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
Lead, Pot. Diss.	0.0000 - 11.0000	0	none					
Lead, Pot. Diss.	0.0000 - 281.0000	0	none					
Manganese, Dissolved	0.0000 - 2.6180	0	none					
Manganese, Dissolved	0.0000 - 4.7380	0	none					
Manganese, Pot. Diss.	0.0000 - 2.6180	0	none					
Manganese, Pot. Diss.	0.0000 - 4.7380	0	none					
Mercury, Total	0.0000 - 0.0100	11	NPDES5	0/0/1/2	04/20/16-04/20/16(<)	0.2000 -	0.2000	0.2000
			WSD5	0/0/2/2	04/20/16-06/22/16(<)	0.2000 -	0.2000	0.2000
			WSHF1	0/0/2/2	04/20/16-06/22/16(<)	0.2000 -	0.2000	0.2000
			WSPG46	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSPG50	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSPG7	0/0/1/1	06/01/16-06/01/16(<)	0.2000 -	0.2000	0.2000
			WSSF3	0/0/2/2	04/21/16-06/21/16(<)	0.2000 -	0.2000	0.2000
			WSSPG2	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSSPG3	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSSPG4	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
			WSSPG5	0/0/1/1	05/31/16-05/31/16(<)	0.2000 -	0.2000	0.2000
Mercury, Total	0.0000 - 0.2000	0	none					
Nickel, Dissolved	0.0000 - 168.0000	0	none					
Nickel, Dissolved	0.0000 - 1513.0000	0	none					
Nickel, Pot. Diss.	0.0000 - 168.0000	0	none					
Nickel, Pot. Diss.	0.0000 - 1513.0000	0	none					
Nitrate Nitrogen_N	0.0000 - 100.0000	0	none					
Nitrite Nitrogen_N	0.0000 - 0.0500	1	WSSPG4	1/0/0/1	05/31/16-05/31/16	0.1000 -	0.1000	0.1000
Selenium, Dissolved	0.0000 - 4.6000	3	WSD5	1/0/0/3	04/20/16-04/20/16	26.8000 -	26.8000	26.8000
			WSPG50	1/0/0/1	05/31/16-05/31/16	10.8000 -	10.8000	10.8000
			WSSPG2	1/0/0/1	05/31/16-05/31/16	6.2000 -	6.2000	6.2000
Selenium, Dissolved	0.0000 - 18.4000	1	WSD5	1/0/0/3	04/20/16-04/20/16	26.8000 -	26.8000	26.8000
Selenium, Pot. Diss.	0.0000 - 4.6000	3	WSD5	1/0/0/3	04/20/16-04/20/16	25.9000 -	25.9000	25.9000
			WSPG50	1/0/0/1	05/31/16-05/31/16	13.0000 -	13.0000	13.0000
			WSSPG2	1/0/0/1	05/31/16-05/31/16	6.6000 -	6.6000	6.6000
Selenium, Pot. Diss.	0.0000 - 18.4000	1	WSD5	1/0/0/3	04/20/16-04/20/16	25.9000 -	25.9000	25.9000
Selenium, Total Rec.	0.0000 - 4.6000	3	WSD5	1/0/0/3	04/20/16-04/20/16	25.7000 -	25.7000	25.7000
			WSPG50	1/0/0/1	05/31/16-05/31/16	13.0000 -	13.0000	13.0000
			WSSPG2	1/0/0/1	05/31/16-05/31/16	6.6000 -	6.6000	6.6000

Table 15
Comparison of Surface Water Quality to Yampa Segment 13e Standards

Analyte	Standard	No. Sites	Sites	Frequency	Exceedence Date Range	Exceedence Value Range	Exceedence Median	
Selenium, Total Rec.	0.0000 - 18.4000	1	WSD5	1/0/0/3	04/20/16-04/20/16	25.7000 - 25.7000	25.7000	
Silver, Dissolved	0.0000 - 3.5000	0	none					
Silver, Dissolved	0.0000 - 22.0000	0	none					
Silver, Pot. Diss.	0.0000 - 3.5000	0	none					
Silver, Pot. Diss.	0.0000 - 22.0000	0	none					
Sulfide	0.0000 - 0.0200	0	none					
Zinc, Dissolved	0.0000 - 0.4280	0	none					
Zinc, Dissolved	0.0000 - 0.5650	0	none					
Zinc, Pot. Diss.	0.0000 - 0.4280	0	none					
Zinc, Pot. Diss.	0.0000 - 0.5650	0	none					

Frequency = uncensored/between MDL&PQL/censored/no. samples, (B) = Between MDL&PQL range, (<) = Censored range

Table 15
Comparison of Surface Water Quality to Yampa Segment 13e Standards

---- Water Use Summary Report ----

Site	RECEIVING
NPDES15	
NPDES16	
NPDES17	
NPDES5	Iron, Total Rec.(2/10)
	Mercury, Total(1/4)
NPDES6	
NPDES9	
WSD5	Mercury, Total(2/4)
	Selenium, Dissolved(2/6)
	Selenium, Pot. Diss.(2/6)
	Selenium, Total Rec.(2/6)
WSH7	Iron, Total Rec.(6/6)
WSH9	
WSHF1	Iron, Total Rec.(5/6)
	Mercury, Total(2/4)
WSPG46	Iron, Total Rec.(2/2)
	Mercury, Total(1/2)
	Ammonia Nitrogen_N(1/1)
WSPG47	
WSPG50	Mercury, Total(1/2)
	Selenium, Dissolved(1/2)
	Selenium, Pot. Diss.(1/2)
	Selenium, Total Rec.(1/2)
WSPG7	Mercury, Total(1/2)
WSSF3	Mercury, Total(2/4)
WSSPG1	
WSSPG2	Mercury, Total(1/2)
	Selenium, Dissolved(1/2)
	Selenium, Pot. Diss.(1/2)
	Selenium, Total Rec.(1/2)
WSSPG3	Mercury, Total(1/2)
WSSPG4	Mercury, Total(1/2)
	Nitrite Nitrogen_N(1/1)
	Ammonia Nitrogen_N(1/1)
WSSPG5	Mercury, Total(1/2)
	Ammonia Nitrogen_N(1/1)

APPENDIX B

HAYDEN NOAA WEATHER STATION DATA

APPENDIX A1

HAYDEN NOAA WEATER STATION DATA

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
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Record of Climatological Observations

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National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 6467 ft. Lat: 40.493° N Lon: 107.255° W
Station: **HAYDEN, CO US GHCND:USC00053867**

Observation Time Temperature: 1800 Observation Time Precipitation: 1800

Preliminary	Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2015	10	1	81	51	68	0.00		0.0		0.0								
	2015	10	2	80	44	55	0.00		0.0		0.0								
	2015	10	3	67	37	62	0.00		0.0		0.0								
	2015	10	4	76	37	66	0.00		0.0		0.0								
	2015	10	5	66	39	55	0.01		0.0		0.0								
	2015	10	6	64	42	55	0.00		0.0		0.0								
	2015	10	7	71	36	61	0.00		0.0		0.0								
	2015	10	8	70	33	62	0.00		0.0		0.0								
	2015	10	9	73	35	64	0.00		0.0		0.0								
	2015	10	10	78	37	70	0.00		0.0		0.0								
	2015	10	11	76	37	69	0.00		0.0		0.0								
	2015	10	12	72	31	65	0.00		0.0		0.0								
	2015	10	13	75	31	67	0.00		0.0		0.0								
	2015	10	14	76	32	69	0.00		0.0		0.0								
	2015	10	15	76	30	68	0.00		0.0		0.0								
	2015	10	16	73	32	65	0.00		0.0		0.0								
	2015	10	17	75	37	67	0.00		0.0		0.0								
	2015	10	18	67	48	59	T		0.0		0.0								
	2015	10	19	67	44	55	0.02		0.0		0.0								
	2015	10	20	62	39	52	0.05		0.0		0.0								
	2015	10	21	65	41	55	0.00		0.0		0.0								
	2015	10	22	55	32	42	0.47		0.0		0.0								
	2015	10	23	56	40	48	0.50		0.0		0.0								
	2015	10	24	59	30	55	0.00		0.0		0.0								
	2015	10	25	63	32	55	0.00		0.0		0.0								
	2015	10	26	59	43	50	0.15		0.0		0.0								
	2015	10	27	50	34	40	0.06		0.0		0.0								
	2015	10	28	53	23	46	0.00		0.0		0.0								
	2015	10	29	57	33	48	0.00		0.0		0.0								
	2015	10	30	48	36	41	0.13		0.0		0.0								
	2015	10	31	55	33	49	0.00		0.0		0.0								
			Summary	67	36		1.39		0.0										

The '*' flags in Preliminary indicate the data have not completed processing and qualitycontrol and may not be identical to the original observation
Empty, or blank, cells indicate that a data observation was not reported.
***Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown**
"s" This data value failed one of NCDC's quality control tests.
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Observation Time Temperature: 1800 Observation Time Precipitation: 1800

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				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2015	11	1	62	28	51	0.00		0.0		0.0								
	2015	11	2	67	32	57	0.00		0.0		0.0								
	2015	11	3	65	29	55	0.00		0.0		0.0								
	2015	11	4	55	32	35	0.35		1.0		0.0								
	2015	11	5	36	28	29	0.19		2.0		1.0								
	2015	11	6	37	26	30	0.23		2.0		2.0								
	2015	11	7	39	16	29	0.00		0.0		1.0								
	2015	11	8	46	18	36	0.00		0.0		1.0								
	2015	11	9	53	24	42	0.00		0.0		0.0								
	2015	11	10	50	24	37	0.00		0.0		0.0								
	2015	11	11	37	25	26	0.28		2.0		2.0								
	2015	11	12	39	16	29	0.00		0.0		1.0								
	2015	11	13	43	15	34	0.00		0.0		1.0								
	2015	11	14	51	19	34	0.00		0.0		0.0								
	2015	11	15	54	22	35	0.00		0.0		0.0								
	2015	11	16	35	24	32	0.16		2.0		1.0								
	2015	11	17	34	24	29	0.00		0.0		1.0								
	2015	11	18	41	26	34	T		0.0		0.0								
	2015	11	19	40	27	37	0.00		0.0		0.0								
	2015	11	20	41	27	27	0.01		0.0		0.0								
	2015	11	21	36	8	27	0.00		0.0		0.0								
	2015	11	22	47	12	35	0.00		0.0		0.0								
	2015	11	23	50	19	33	0.00		0.0		0.0								
	2015	11	24	54	19	40	0.00		0.0		0.0								
	2015	11	25	46	27	36	0.00		0.0		0.0								
	2015	11	26	37	14	15	0.35		7.0		6.0								
	2015	11	27	18	5	11	T		0.5		6.0								
	2015	11	28	25	4	14	0.07		0.8		5.0								
	2015	11	29	25	8	16	0.16		2.0		6.0								
	2015	11	30	21	7	16	0.10		1.5		7.0								
			Summary	43	20		1.90		20.8										

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				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2015	12	1	22	-2	12	0.02		0.3		7.0								
	2015	12	2	27	1	18	0.00		0.0		7.0								
	2015	12	3	39	17	24	0.00		0.0		6.0								
	2015	12	4	40	16	29	0.00		0.0		5.0								
	2015	12	5	34	21	21	T		T		5.0								
	2015	12	6	37	13	24	0.00		0.0		5.0								
	2015	12	7	37	11	28	0.00		0.0		5.0								
	2015	12	8	45	24	35	0.00		0.0		4.0								
	2015	12	9	40	21	31	0.00		0.0		4.0								
	2015	12	10	38	19	33	0.00		0.0		3.0								
	2015	12	11	35	22	24	0.54		7.0		10.0								
	2015	12	12	26	22	23	0.30		3.0		8.0								
	2015	12	13	24	2	13	0.00		0.0		8.0								
	2015	12	14	29	7	25	0.03		0.5		7.0								
	2015	12	15	26	16	16	0.25		3.5		9.0								
	2015	12	16	23	11	11	0.15		2.0		10.0								
	2015	12	17	23	7	7	0.14		2.0		11.0								
	2015	12	18	27	3	21	0.00		0.0		10.0								
	2015	12	19	26	8	18	0.00		0.0		10.0								
	2015	12	20	26	8	26	0.00		0.0		10.0								
	2015	12	21	34	25	29	0.13		2.0		10.0								
	2015	12	22	34	23	23	0.20		3.5		12.0								
	2015	12	23	25	15	15	0.46		10.0		16.0								
	2015	12	24	15	-4	4	0.00		0.0		16.0								
	2015	12	25	21	-1	15	0.13		2.0		18.0								
	2015	12	26	15	-2	-2	0.12		1.0		18.0								
	2015	12	27	-2	-23	-11	0.00		0.0		18.0								
	2015	12	28	4	-24	-1	0.00		0.0		17.0								
	2015	12	29	11	-4	5	T		T		17.0								
	2015	12	30	13	2	3	0.08		1.0		15.0								
	2015	12	31	4	-10	-5	0.00		0.0		15.0								
			Summary	26	8		2.55		37.8										

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				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	1	1	-5	-24	-14	0.00		0.0		15.0								
	2016	1	2	9	-21	-1	0.00		0.0		15.0								
	2016	1	3	14	-9	6	0.00		0.0		15.0								
	2016	1	4	16	-3	11	0.00		0.0		15.0								
	2016	1	5	28	2	24	0.00		0.0		15.0								
	2016	1	6	33	19	27	0.00		0.0		13.0								
	2016	1	7	34	24	28	0.22		2.0		14.0								
	2016	1	8	29	17	20	0.09		1.0		14.0								
	2016	1	9	23	13	15	0.05		1.0		15.0								
	2016	1	10	22	8	8	0.06		1.0		16.0								
	2016	1	11	13	-8	4	0.00		0.0		16.0								
	2016	1	12	15	-8	10	0.00		0.0		16.0								
	2016	1	13	22	-1	8	0.00		0.0		15.0								
	2016	1	14	23	-6	20	0.00		0.0		15.0								
	2016	1	15	27	13	22	0.10		2.6		16.0								
	2016	1	16	22	3	17	0.06		1.0		16.0								
	2016	1	17	33	17	19	0.69		12.0		24.0								
	2016	1	18	31	7	24	0.00		0.0		22.0								
	2016	1	19	35	7	17	0.20		2.0		22.0								
	2016	1	20	30	11	19	0.20		2.4		23.0								
	2016	1	21	27	11	11	0.03		1.5		23.0								
	2016	1	22	27	7	17	0.00		0.0		21.0								
	2016	1	23	28	6	19	0.00		0.0		21.0								
	2016	1	24	29	13	26	0.12		1.3		22.0								
	2016	1	25	27	14	14	0.19		3.3		24.0								
	2016	1	26	19	2	8	0.00		0.0		24.0								
	2016	1	27	25	2	14	0.00		0.0		23.0								
	2016	1	28	29	4	18	0.00		0.0		23.0								
	2016	1	29	34	9	27	0.17		2.5		22.0								
	2016	1	30	42	27	27	0.37		4.0		24.0								
	2016	1	31	27	11	19	0.10		2.5		27.0								
			Summary	25	5		2.65		40.1										

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151 Patton Avenue
Asheville, North Carolina 28801

Elev: 6467 ft. Lat: 40.493° N Lon: 107.255° W
Station: **HAYDEN, CO US GHCND:USC00053867**

Observation Time Temperature: 1800 Observation Time Precipitation: 1800

Preliminary	Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	2	1	23	15	17	0.36		4.5		31.0								
	2016	2	2	23	11	15	0.11		1.4		31.0								
	2016	2	3	17	3	6	0.05		0.8		31.0								
	2016	2	4	15	-11	11	T		T		31.0								
	2016	2	5	24	8	11	0.23		5.5		34.0								
	2016	2	6	22	0	12	0.00		0.0		33.0								
	2016	2	7	26	4	15	0.00		0.0		31.0								
	2016	2	8	28	5	14	0.00		0.0		31.0								
	2016	2	9	30	7	21	0.00		0.0		29.0								
	2016	2	10	31	10	21	0.00		0.0		29.0								
	2016	2	11	34	8	25	0.00		0.0		28.0								
	2016	2	12	34	13	26	0.00		0.0		28.0								
	2016	2	13	35	12	25	0.00		0.0		28.0								
	2016	2	14	34	12	29	0.08		1.5		28.0								
	2016	2	15	42	28	38	0.01		T		26.0								
	2016	2	16	45	32	34	0.00		0.0		25.0								
	2016	2	17	40	21	35	0.00		0.0		25.0								
	2016	2	18	49	28	28	0.29		3.0		27.0								
	2016	2	19	31	12	26	T		0.0		27.0								
	2016	2	20	38	15	31	0.00		0.0		25.0								
	2016	2	21	36	12	27	0.00		0.0		24.0								
	2016	2	22	34	11	28	0.00		0.0		24.0								
	2016	2	23	33	21	23	0.00		0.0		24.0								
	2016	2	24	28	4	19	0.00		0.0		24.0								
	2016	2	25	35	8	25	0.00		0.0		24.0								
	2016	2	26	36	10	30	0.00		0.0		24.0								
	2016	2	27	44	14	40	0.00		0.0		24.0								
	2016	2	28	42	18	33	0.00		0.0		24.0								
	2016	2	29	39	17	34	0.03		T		23.0								
			Summary	33	12		1.16		16.7										

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Station: **HAYDEN, CO US GHCND:USC00053867**

Observation Time Temperature: 1800 Observation Time Precipitation: 1800

Preliminary	Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	3	1	40	16	34	0.00		0.0		23.0								
	2016	3	2	46	26	39	0.02		0.0		23.0								
	2016	3	3	44	21	35	0.00		0.0		22.0								
	2016	3	4	44	22	35	0.00		0.0		22.0								
	2016	3	5	48	27	41	0.00		0.0		21.0								
	2016	3	6	43	26	36	0.02		0.0		21.0								
	2016	3	7	36	29	29	0.33		1.0		21.0								
	2016	3	8	37	22	29	0.05		0.5		21.0								
	2016	3	9	36	18	29	0.04		T		21.0								
	2016	3	10	47	16	40	0.00		0.0		20.0								
	2016	3	11	53	28	43	0.00		0.0		20.0								
	2016	3	12	52	33	42	0.00		0.0		19.0								
	2016	3	13	47	29	42	0.00		0.0		18.0								
	2016	3	14	46	29	30	0.10		0.5		16.0								
	2016	3	15	36	16	30	0.09		1.0		16.0								
	2016	3	16	35	19	32	0.01		T		15.0								
	2016	3	17	38	26	31	0.01		T		15.0								
	2016	3	18	35	14	30	0.00		0.0		15.0								
	2016	3	19	37	9	32	0.00		0.0		15.0								
	2016	3	20	48	13	42	0.00		0.0		12.0								
	2016	3	21	57	23	51	0.00		0.0		10.0								
	2016	3	22	56	30	30	T		T		8.0								
	2016	3	23	38	26	34	0.20		2.0		10.0								
	2016	3	24	41	22	40	0.00		0.0		10.0								
	2016	3	25	40	27	32	0.11		0.7		8.0								
	2016	3	26	41	15	35	0.00		0.0		4.0								
	2016	3	27	50	15	44	0.00		0.0		2.0								
	2016	3	28	59	27	50	0.00		0.0		T								
	2016	3	29	54	31	31	0.16		0.5		1.0								
	2016	3	30	41	23	30	0.09		0.5		0.0								
	2016	3	31	40	25	36	0.17		1.5		0.0								
			Summary	44	23		1.40		8.2										

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Observation Time Temperature: 1800 Observation Time Precipitation: 1800

Preliminary	Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	4	1	43	20	39	0.00		0.0		0.0								
	2016	4	2	54	23	50	0.00		0.0		0.0								
	2016	4	3	60	26	54	0.00		0.0		0.0								
	2016	4	4	67	34	59	0.00		0.0		0.0								
	2016	4	5	59	34	44	T		T		0.0								
	2016	4	6	59	23	56	0.00		0.0		0.0								
	2016	4	7	64	29	58	0.00		0.0		0.0								
	2016	4	8	67	32	62	0.00		0.0		0.0								
	2016	4	9	62	34	49	T		0.0		0.0								
	2016	4	10	62	36	50	0.13		T		0.0								
	2016	4	11	61	37	57	0.05		0.0		0.0								
	2016	4	12	64	35	50	T		T		0.0								
	2016	4	13	67	40	53	0.03		0.0		0.0								
	2016	4	14	69	34	57	0.00		0.0		0.0								
	2016	4	15	57	29	34	1.27		12.0		6.0								
	2016	4	16	37	31	31	0.02		T		3.0								
	2016	4	17	34	27	32	0.10		T		0.0								
	2016	4	18	48	27	44	0.00		0.0		0.0								
	2016	4	19	47	25	40	T		0.0		0.0								
	2016	4	20	57	34	52	0.07		0.0		0.0								
	2016	4	21	66	31	63	0.00		0.0		0.0								
	2016	4	22	75	38	71	0.00		0.0		0.0								
	2016	4	23	71	37	38	0.16		0.0		0.0								
	2016	4	24	56	35	51	0.04		0.0		0.0								
	2016	4	25	65	33	51	0.00		0.0		0.0								
	2016	4	26	51	32	35	0.60		T		0.0								
	2016	4	27	48	31	44	0.12		T		0.0								
	2016	4	28	47	31	34	0.24		0.5		0.0								
	2016	4	29	45	32	41	0.08		0.0		0.0								
	2016	4	30	45	30	41	0.11		0.5		0.0								
			Summary	57	31		3.02		13.0										

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Observation Time Temperature: 1800 Observation Time Precipitation: 1800

Preliminary	Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	5	1	54	29	52	0.00		0.0		0.0								
	2016	5	2	60	29	57	0.00		0.0		0.0								
	2016	5	3	68	28	65	0.00		0.0		0.0								
	2016	5	4	73	37	70	0.00		0.0		0.0								
	2016	5	5	78	40	73	0.00		0.0		0.0								
	2016	5	6	74	44	64	0.02		0.0		0.0								
	2016	5	7	64	38	39	0.30		0.0		0.0								
	2016	5	8	48	35	40	0.20		0.0		0.0								
	2016	5	9	56	33	55	0.74		0.5		0.0								
	2016	5	10	55	37	50	0.15		0.0		0.0								
	2016	5	11	55	29	52	0.00		0.0		0.0								
	2016	5	12	66	28	64	0.00		0.0		0.0								
	2016	5	13	74	32	71	0.00		0.0		0.0								
	2016	5	14	75	35	61	0.00		0.0		0.0								
	2016	5	15	63	44	53	0.23		T		0.0								
	2016	5	16	54	39	48	0.20		0.0		0.0								
	2016	5	17	63	34	56	0.02		0.0		0.0								
	2016	5	18	66	35	63	0.00		0.0		0.0								
	2016	5	19	69	42	63	0.00		0.0		0.0								
	2016	5	20	76	44	71	0.00		0.0		0.0								
	2016	5	21	73	42	67	0.00		0.0		0.0								
	2016	5	22	67	34	51	0.01		0.0		0.0								
	2016	5	23	65	28	58	0.00		0.0		0.0								
	2016	5	24	71	36	65	0.00		0.0		0.0								
	2016	5	25	67	39	63	0.00		0.0		0.0								
	2016	5	26	68	33	55	0.00		0.0		0.0								
	2016	5	27	66	35	47	0.03		0.0		0.0								
	2016	5	28	68	37	66	0.04		0.0		0.0								
	2016	5	29	72	38	66	0.00		0.0		0.0								
	2016	5	30	72	38	65	0.00		0.0		0.0								
	2016	5	31	70	38	69	0.00		0.0		0.0								
			Summary	66	36		1.94		0.5										

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Observation Time Temperature: 1800 Observation Time Precipitation: 1800

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				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	6	1	75	37	71	0.00		0.0		0.0								
	2016	6	2	79	37	75	0.00		0.0		0.0								
	2016	6	3	78	41	74	0.00		0.0		0.0								
	2016	6	4	83	43	79	0.00		0.0		0.0								
	2016	6	5	85	46	82	0.00		0.0		0.0								
	2016	6	6	87	51	70	0.00		0.0		0.0								
	2016	6	7	83	49	68	0.00		0.0		0.0								
	2016	6	8	80	47	68	0.00		0.0		0.0								
	2016	6	9	85	50	75	0.00		0.0		0.0								
	2016	6	10	88	50	82	0.00		0.0		0.0								
	2016	6	11	85	52	67	0.00		0.0		0.0								
	2016	6	12	78	46	70	0.07		0.0		0.0								
	2016	6	13	72	45	65	0.01		0.0		0.0								
	2016	6	14	75	39	70	0.00		0.0		0.0								
	2016	6	15	85	46	80	0.00		0.0		0.0								
	2016	6	16	82	40	78	0.00		0.0		0.0								
	2016	6	17	87	47	82	0.00		0.0		0.0								
	2016	6	18	89	45	85	0.00		0.0		0.0								
	2016	6	19	88	48	82	0.00		0.0		0.0								
	2016	6	20	94	45	90	0.00		0.0		0.0								
	2016	6	21	96	52	90	0.00		0.0		0.0								
	2016	6	22	90	48	72	0.07		T		0.0								
	2016	6	23	82	54	79	0.00		0.0		0.0								
	2016	6	24	91	54	81	0.06		0.0		0.0								
	2016	6	25	82	52	78	0.00		0.0		0.0								
	2016	6	26	85	40	82	0.00		0.0		0.0								
	2016	6	27	89	45	82	0.00		0.0		0.0								
	2016	6	28	93	50	80	0.00		0.0		0.0								
	2016	6	29	90	49	72	0.02		0.0		0.0								
	2016	6	30	74	53	62	0.17		0.0		0.0								
			Summary	84	47		0.40		0.0										

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				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	7	1	74	55	65	0.07		0.0		0.0								
	2016	7	2	77	53	61	0.34		0.0		0.0								
	2016	7	3	82	50	72	0.06		0.0		0.0								
	2016	7	4	84	50	77	0.00		0.0		0.0								
	2016	7	5	82	54	68	0.16		T		0.0								
	2016	7	6	85	51	82	0.04		0.0		0.0								
	2016	7	7	85	45	83	0.00		0.0		0.0								
	2016	7	8	87	46	83	0.00		0.0		0.0								
	2016	7	9	88	49	83	0.00		0.0		0.0								
	2016	7	10	87	52	85	0.00		0.0		0.0								
	2016	7	11	85	44	77	0.00		0.0		0.0								
	2016	7	12	84	36	80	0.00		0.0		0.0								
	2016	7	13	85	43	82	0.00		0.0		0.0								
	2016	7	14	85	40	83	0.00		0.0		0.0								
	2016	7	15	87	43	83	0.00		0.0		0.0								
	2016	7	16	86	56	81	0.00		0.0		0.0								
	2016	7	17	89	53	87	0.00		0.0		0.0								
	2016	7	18	87	58	71	T		0.0		0.0								
	2016	7	19	85	58	81	0.00		0.0		0.0								
	2016	7	20	83	53	75	0.00		0.0		0.0								
	2016	7	21	84	58	70	0.00		0.0		0.0								
	2016	7	22	89	51	79	0.00		0.0		0.0								
	2016	7	23	88	53	83	0.00		0.0		0.0								
	2016	7	24	89	56	79	0.00		0.0		0.0								
	2016	7	25	91	48	86	0.00		0.0		0.0								
	2016	7	26	91	53	73	0.02		0.0		0.0								
	2016	7	27	91	51	89	0.00		0.0		0.0								
	2016	7	28	90	45	82	0.00		0.0		0.0								
	2016	7	29	88	46	81	0.00		0.0		0.0								
	2016	7	30	90	47	81	0.00		0.0		0.0								
	2016	7	31	83	51	65	0.12		0.0		0.0								
			Summary	86	50		0.81		0.0										

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 02/08/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 6467 ft. Lat: 40.493° N Lon: 107.255° W
Station: **HAYDEN, CO US GHCND:USC00053867**

Observation Time Temperature: 1800 Observation Time Precipitation: 1800

Preliminary	Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	8	1	88	50	83	0.00		0.0		0.0								
	2016	8	2	89	51	84	0.00		0.0		0.0								
	2016	8	3	89	53	73	0.00		0.0		0.0								
	2016	8	4	76	55	65	0.00		0.0		0.0								
	2016	8	5	84	53	75	0.00		0.0		0.0								
	2016	8	6	80	54	70	0.02		0.0		0.0								
	2016	8	7	85	50	79	0.00		0.0		0.0								
	2016	8	8	83	53	80	0.09		0.0		0.0								
	2016	8	9	88	56	85	0.00		0.0		0.0								
	2016	8	10	85	51	78	T		0.0		0.0								
	2016	8	11	80	48	71	0.00		0.0		0.0								
	2016	8	12	79	43	73	0.00		0.0		0.0								
	2016	8	13	83	41	79	0.00		0.0		0.0								
	2016	8	14	85	43	84	0.00		0.0		0.0								
	2016	8	15	86	47	77	0.00		0.0		0.0								
	2016	8	16	87	46	82	0.00		0.0		0.0								
	2016	8	17	84	51	74	0.00		0.0		0.0								
	2016	8	18	81	48	68	0.03		0.0		0.0								
	2016	8	19	81	44	74	0.00		0.0		0.0								
	2016	8	20	78	39	75	0.00		0.0		0.0								
	2016	8	21	85	41	80	0.00		0.0		0.0								
	2016	8	22	81	45	68	0.00		0.0		0.0								
	2016	8	23	80	43	73	0.00		0.0		0.0								
	2016	8	24	78	47	71	0.04		0.0		0.0								
	2016	8	25	71	39	65	0.00		0.0		0.0								
	2016	8	26	75	41	68	0.00		0.0		0.0								
	2016	8	27	78	42	73	0.01		0.0		0.0								
	2016	8	28	83	43	75	0.00		0.0		0.0								
	2016	8	29	80	45	74	0.00		0.0		0.0								
	2016	8	30	85	45	77	0.00		0.0		0.0								
	2016	8	31	87	52	83	0.00		0.0		0.0								
			Summary	82	47		0.19		0.0										

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				24 hrs. ending at observation time		at Observation	24 Hour Amounts ending at observation time				At Obs Time			4 in depth			8 in depth		
				Max.	Min.		Rain, melted snow, etc. (in)	Flag	Snow, ice pellets, hail (in)	Flag	Snow, ice pellets, hail, ice on ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
	2016	9	1	85	49	76	0.00		0.0		0.0								
	2016	9	2	80	55	75	0.03		0.0		0.0								
	2016	9	3	79	54	60	0.04		0.0		0.0								
	2016	9	4	73	47	72	0.15		0.0		0.0								
	2016	9	5	79	41	75	0.00		0.0		0.0								
	2016	9	6	80	37	77	0.00		0.0		0.0								
	2016	9	7	77	39	72	0.00		0.0		0.0								
	2016	9	8	78	38	75	0.00		0.0		0.0								
	2016	9	9	75	38	65	0.00		0.0		0.0								
	2016	9	10	77	35	75	0.00		0.0		0.0								
	2016	9	11	83	33	75	0.00		0.0		0.0								
	2016	9	12	79	50	71	0.00		0.0		0.0								
	2016	9	13	78	43	69	0.01		0.0		0.0								
	2016	9	14	73	48	60	0.01		0.0		0.0								
	2016	9	15	63	37	60	0.01		0.0		0.0								
	2016	9	16	68	32	63	0.00		0.0		0.0								
	2016	9	17	71	32	67	0.00		0.0		0.0								
	2016	9	18	79	35	74	0.00		0.0		0.0								
	2016	9	19	85	39	78	0.00		0.0		0.0								
	2016	9	20	82	44	73	0.00		0.0		0.0								
	2016	9	21	73	49	63	0.01		0.0		0.0								
	2016	9	22	83	52	65	0.03		0.0		0.0								
	2016	9	23	65	41	45	0.32		0.0		0.0								
	2016	9	24	48	37	44	0.16		0.0		0.0								
	2016	9	25	62	32	57	0.10		0.0		0.0								
	2016	9	26	71	34	65	0.00		0.0		0.0								
	2016	9	27	76	36	70	0.00		0.0		0.0								
	2016	9	28	81	40	73	0.00		0.0		0.0								
	2016	9	29	73	42	58	0.00		0.0		0.0								
	2016	9	30	69	50	60	0.15		0.0		0.0								
			Summary	75	41		1.02		0.0										

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APPENDIX C

GROUND WATER LEVEL REPORTS

AND HYDROGRAPHS

APPENDIX C

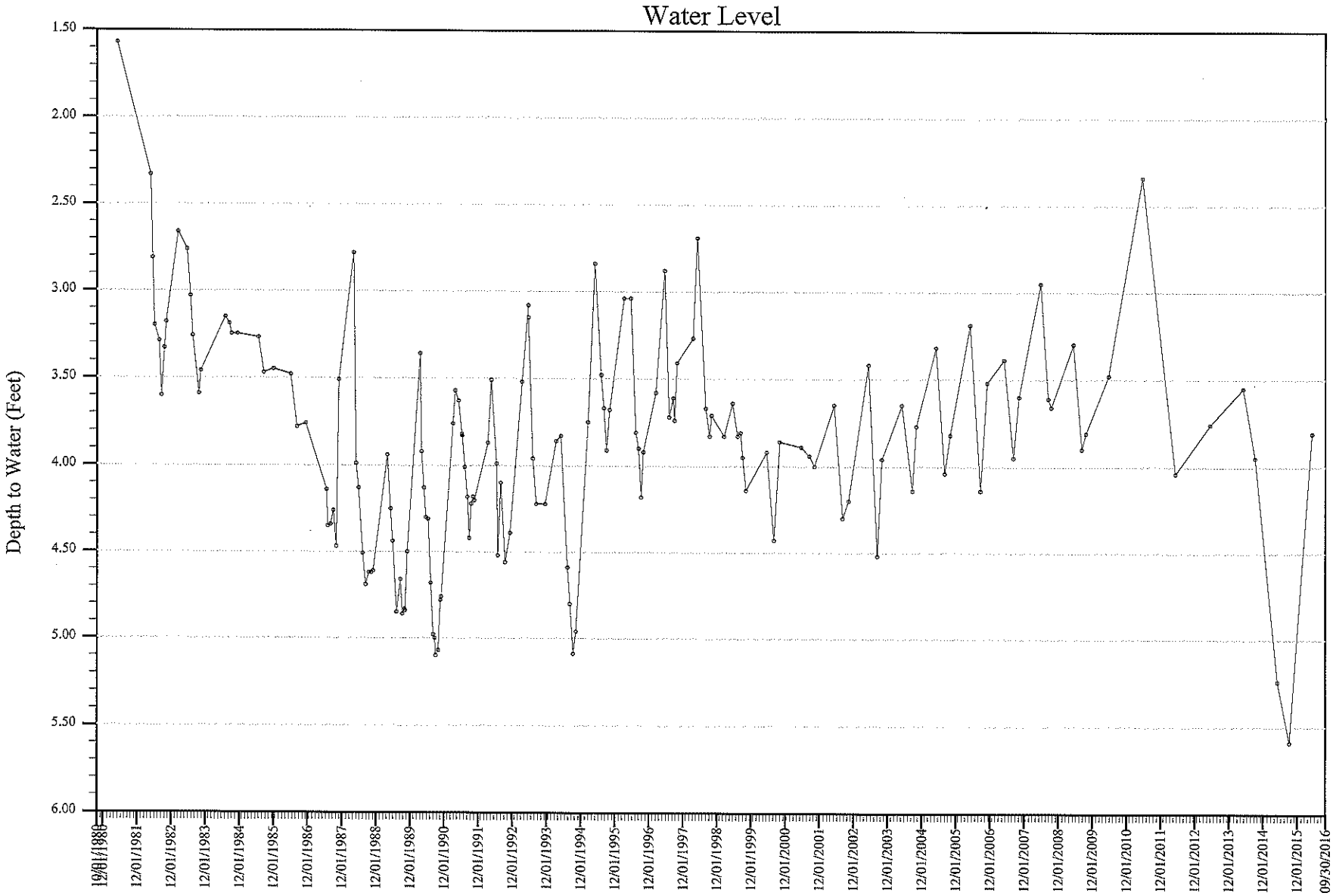
GROUND WATER LEVEL REPORTS AND HYDROGRAPHS

Table of Contents

Water Level Report
WHAL7-2 - GW-S2W-7A2
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/11/2016	11:05:00	MANF	3.81	6791.80	0.00	

Average water level = 0.00 feet
Minimum water level 3.81 feet at 05/11/2016-11:05:00
Maximum water level 3.81 feet at 05/11/2016-11:05:00


Water Level
Depth to Water (Feet)
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
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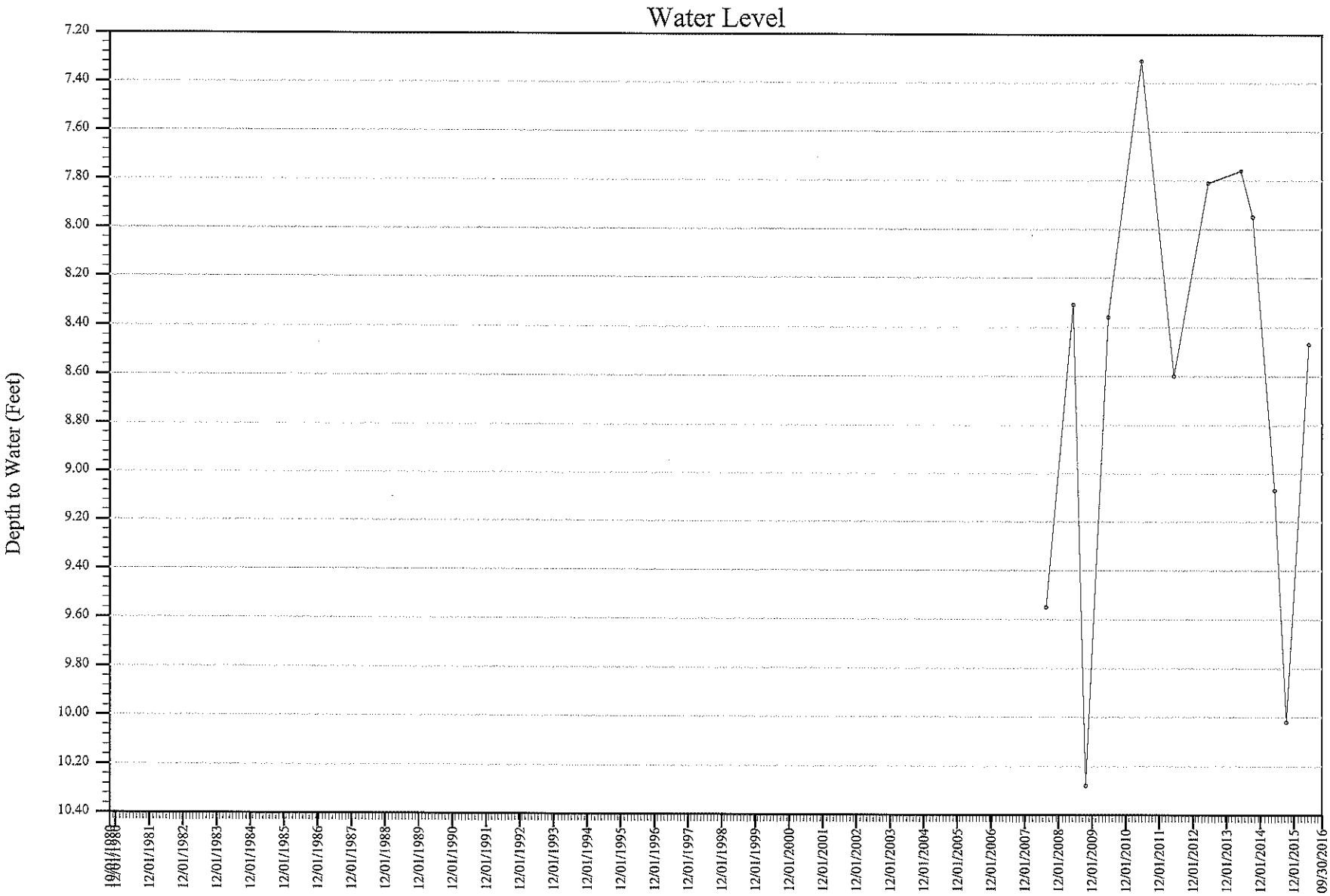
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WHAL7-2

Water Level Report
DCAL-02 - Dry Creek Alluvium
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/11/2016	09:40:00	MANF	8.47	6606.33	0.00	

Average water level = 0.00 feet
Minimum water level 8.47 feet at 05/11/2016-09:40:00
Maximum water level 8.47 feet at 05/11/2016-09:40:00


Water Level
Depth to Water (Feet)
7.20
7.40
7.60
7.80
8.00
8.20
8.40
8.60
8.80
9.00
9.20
9.40
9.60
9.80
10.00
10.20
10.40
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
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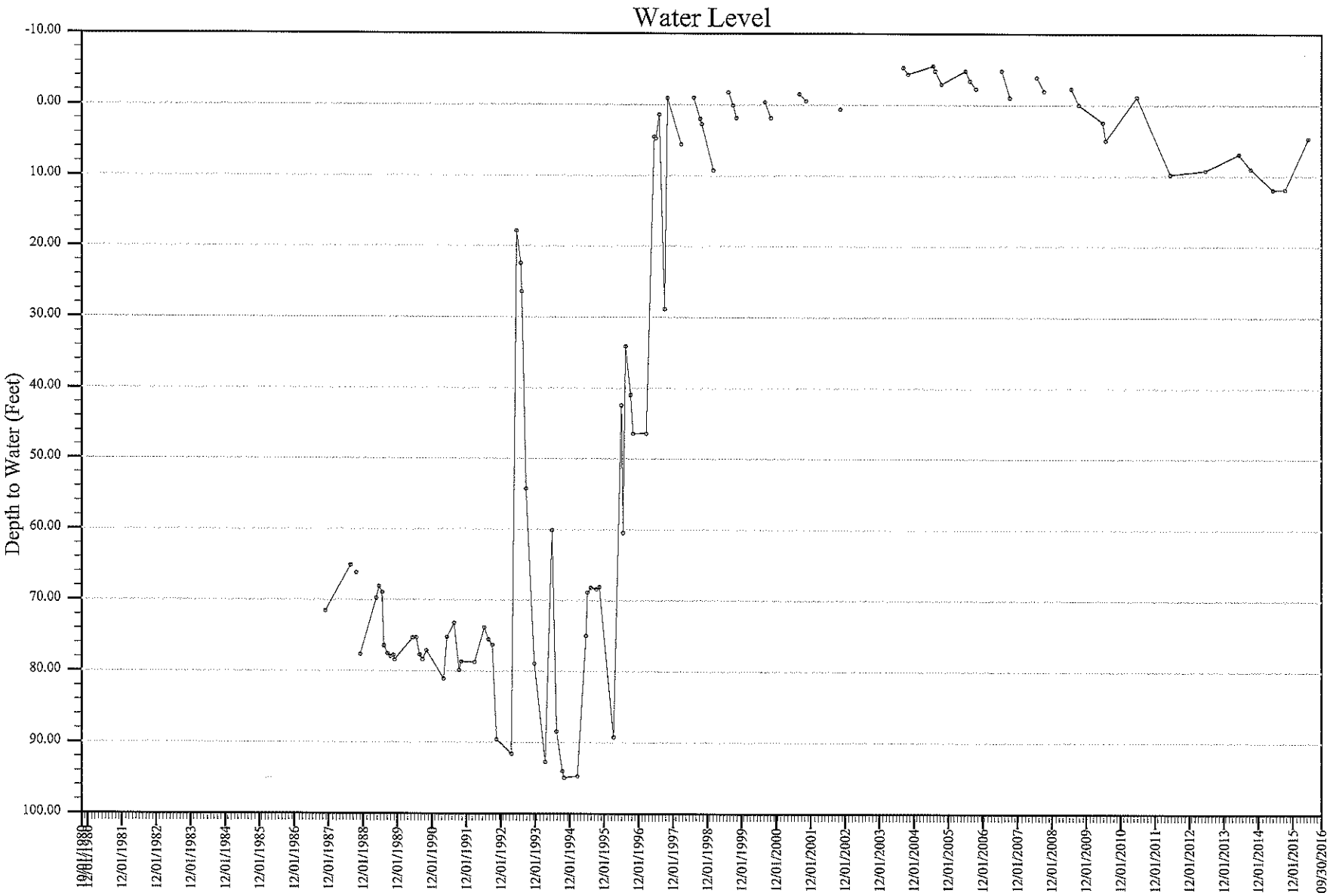
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

DCAL-02

Water Level Report
WOV14 - GW-S2W-14OV
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/11/2016	10:10:00	MANF	4.71	7254.19	0.00	

Average water level = 0.00 feet
Minimum water level 4.71 feet at 05/11/2016-10:10:00
Maximum water level 4.71 feet at 05/11/2016-10:10:00


Water Level
Depth to Water (Feet)
-10.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
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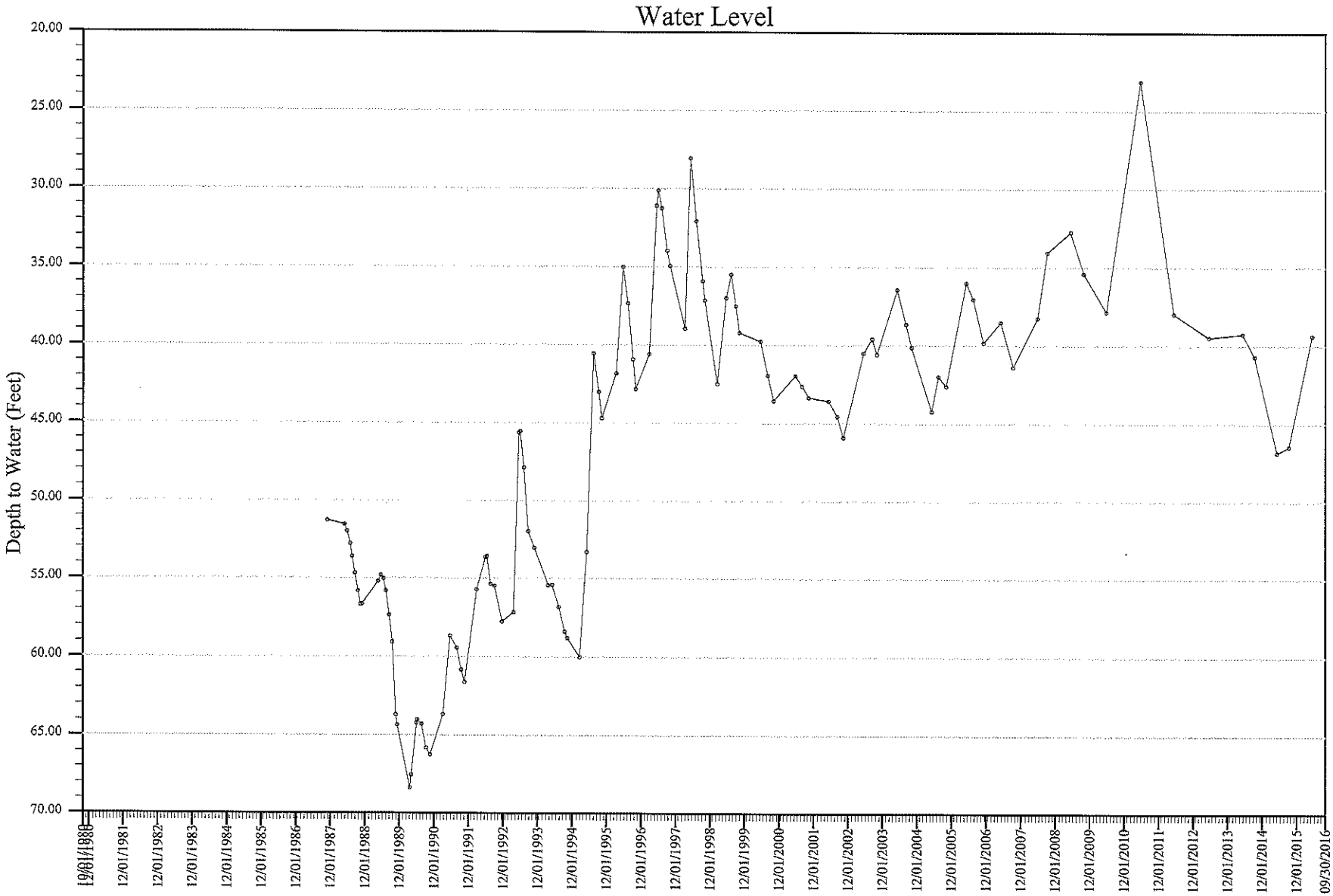
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WOV14

Water Level Report
WOV17 - GW-S2W-17OV
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	08:10:00	MANF	39.38	7092.96	0.00	

Average water level = 0.00 feet
Minimum water level 39.38 feet at 05/12/2016-08:10:00
Maximum water level 39.38 feet at 05/12/2016-08:10:00


Water Level
Depth to Water (Feet)
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
65.00
70.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
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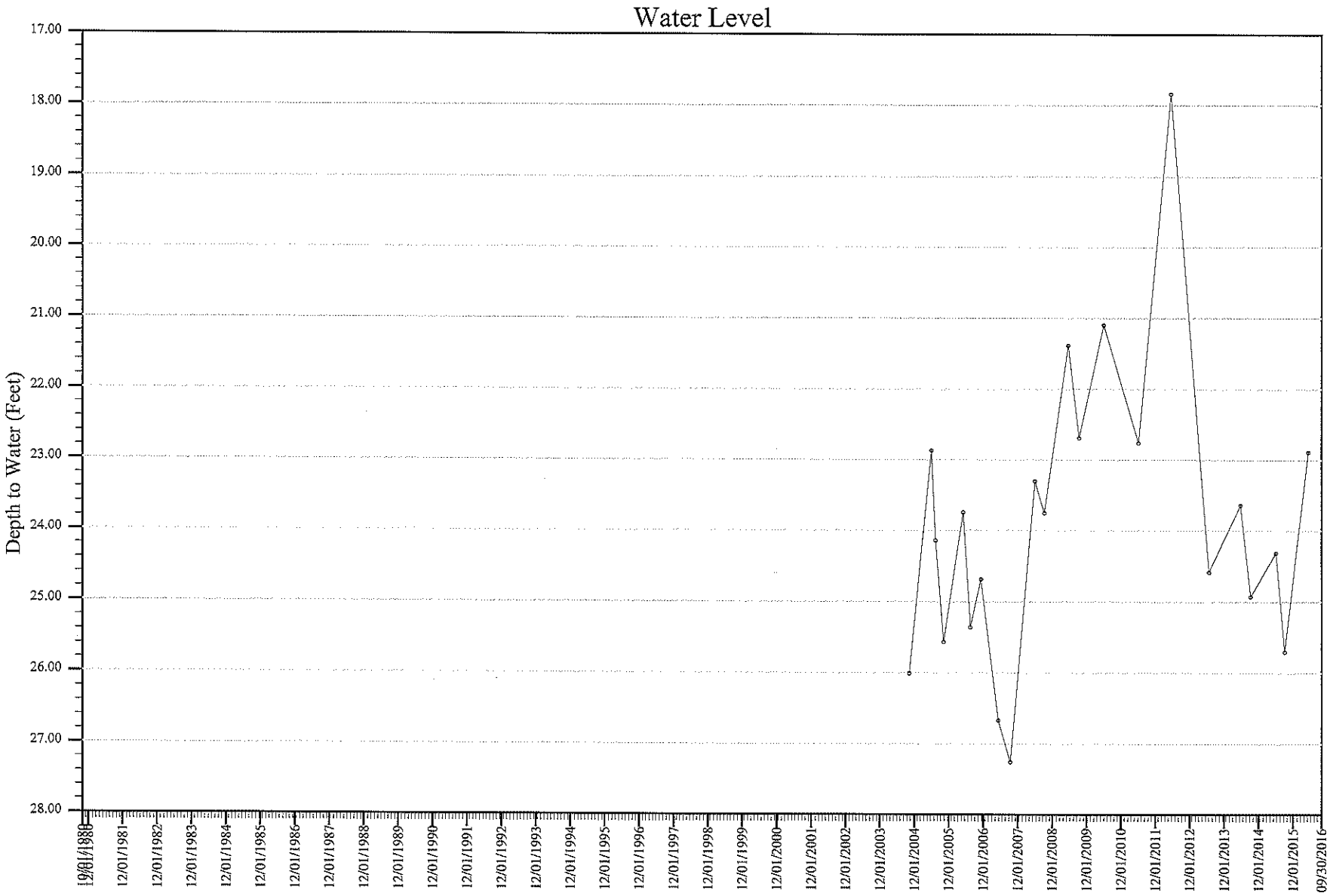
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WOV17

Water Level Report
WOV25 - Wadge Overburden
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	08:50:00	MANF	22.89	7560.89	0.00	

Average water level = 0.00 feet
Minimum water level 22.89 feet at 05/12/2016-08:50:00
Maximum water level 22.89 feet at 05/12/2016-08:50:00


Water Level
Depth to Water (Feet)
17.00
18.00
19.00
20.00
21.00
22.00
23.00
24.00
25.00
26.00
27.00
28.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
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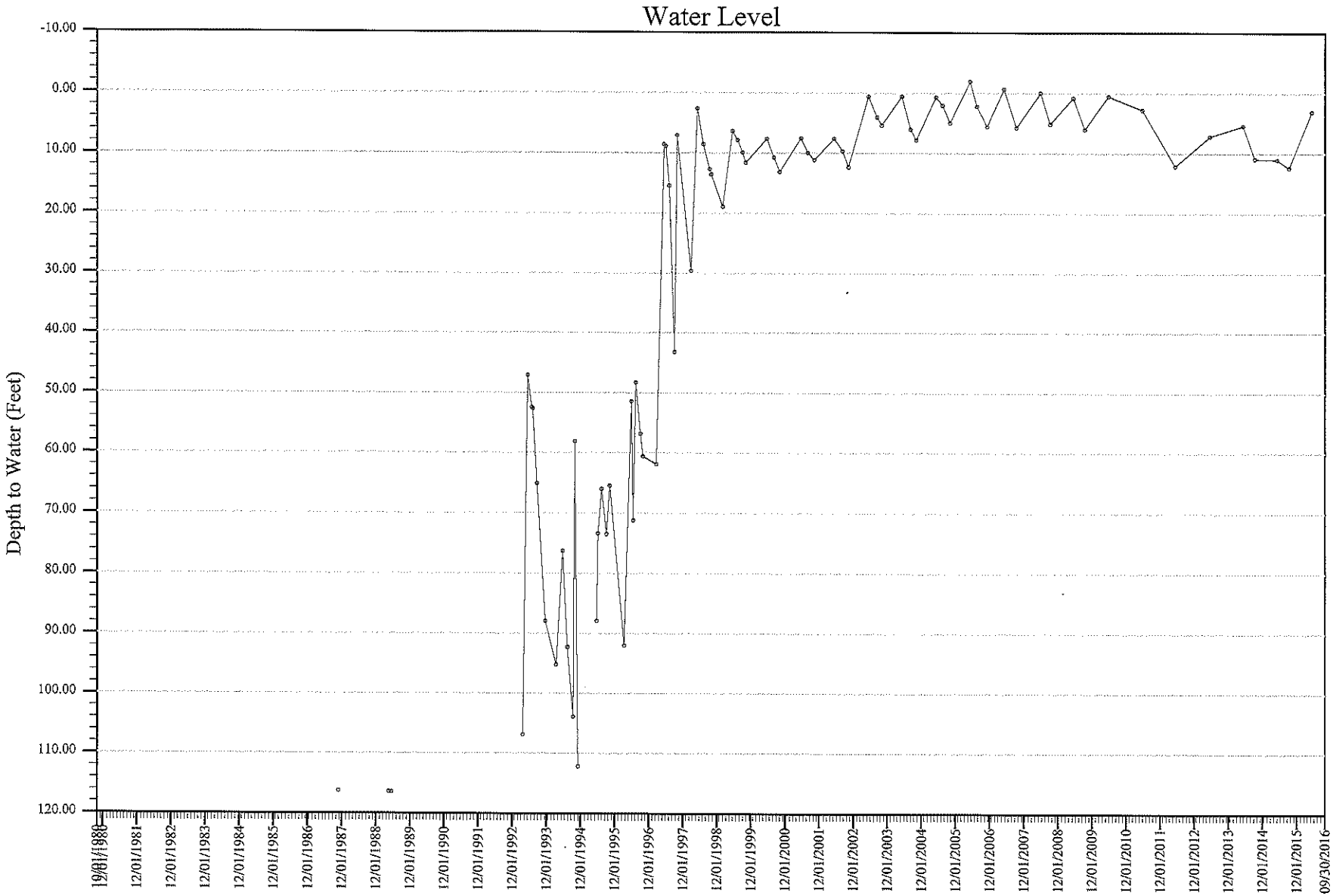
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WOV25

Water Level Report
WW14 - GW-S2W-14W
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/11/2016	10:30:00	MANF	3.09	7258.51	0.00	

Average water level = 0.00 feet
Minimum water level 3.09 feet at 05/11/2016-10:30:00
Maximum water level 3.09 feet at 05/11/2016-10:30:00


Water Level
Depth to Water (Feet)
-10.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
110.00
120.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
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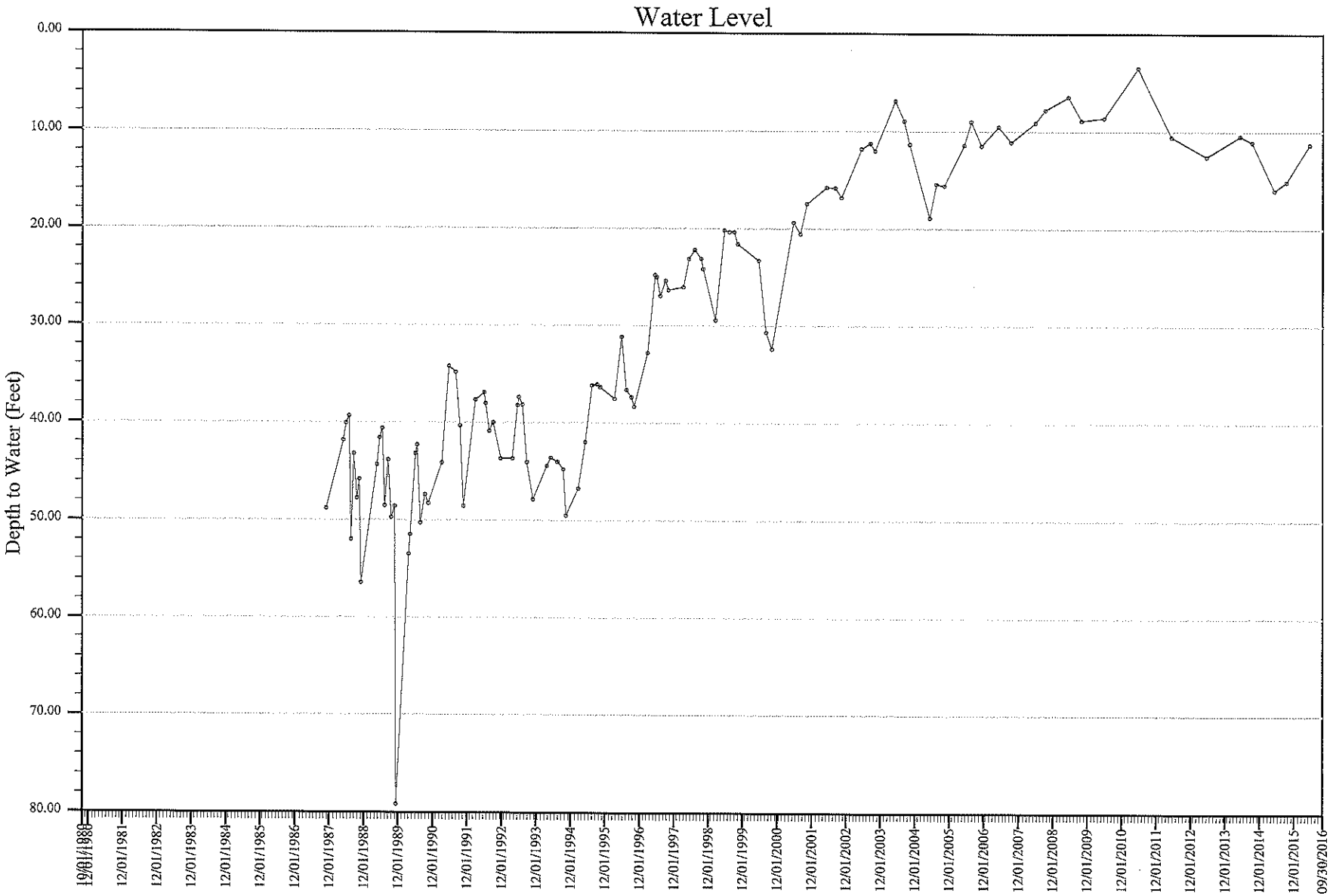
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WW14

Water Level Report
WW17 - GW-S2W-17W
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	07:30:00	MANF	11.29	7120.37	0.00	

Average water level = 0.00 feet
Minimum water level 11.29 feet at 05/12/2016-07:30:00
Maximum water level 11.29 feet at 05/12/2016-07:30:00


Water Level
Depth to Water (Feet)
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
12/01/1980
12/01/1981
12/01/1982
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12/01/1984
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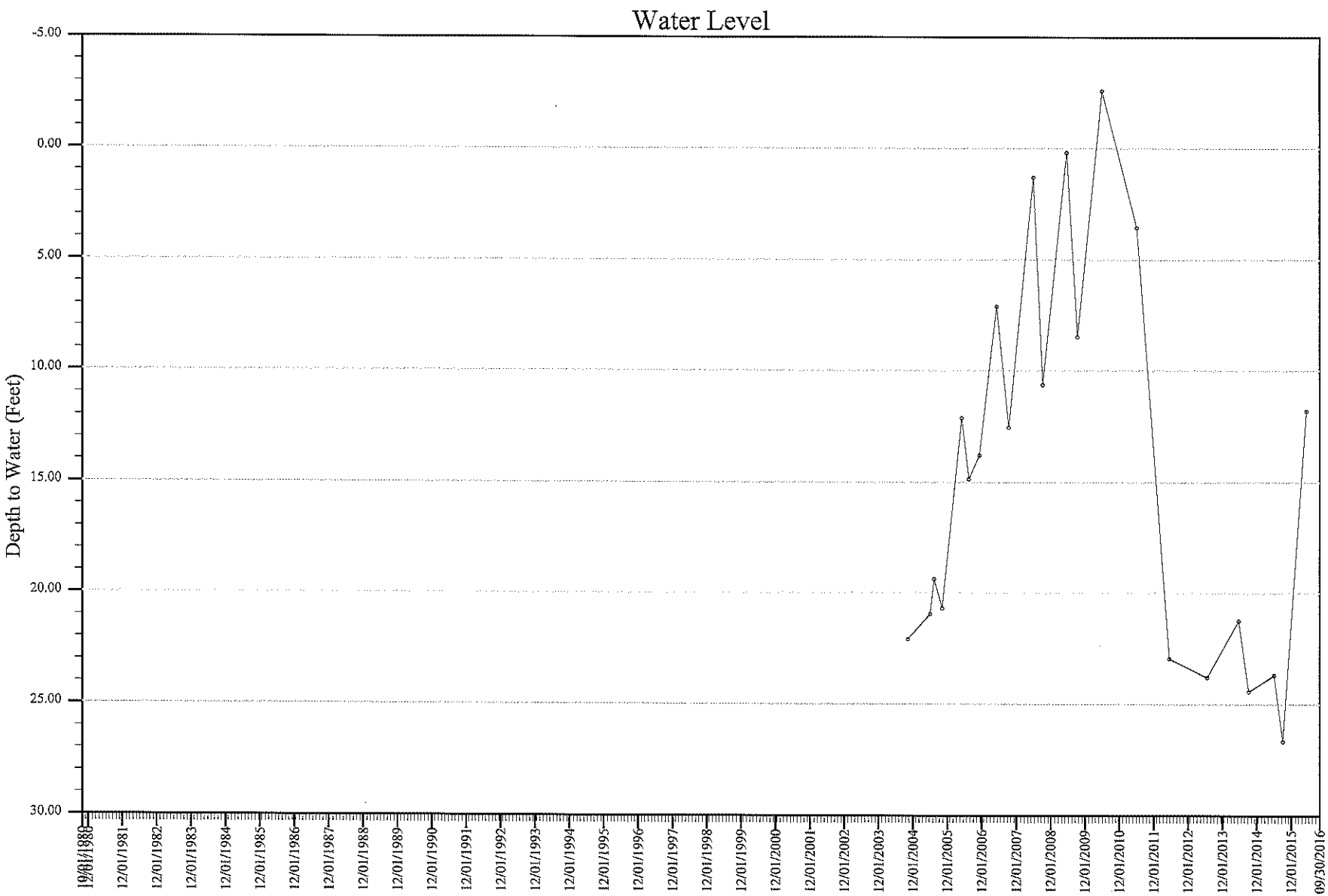
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WW17

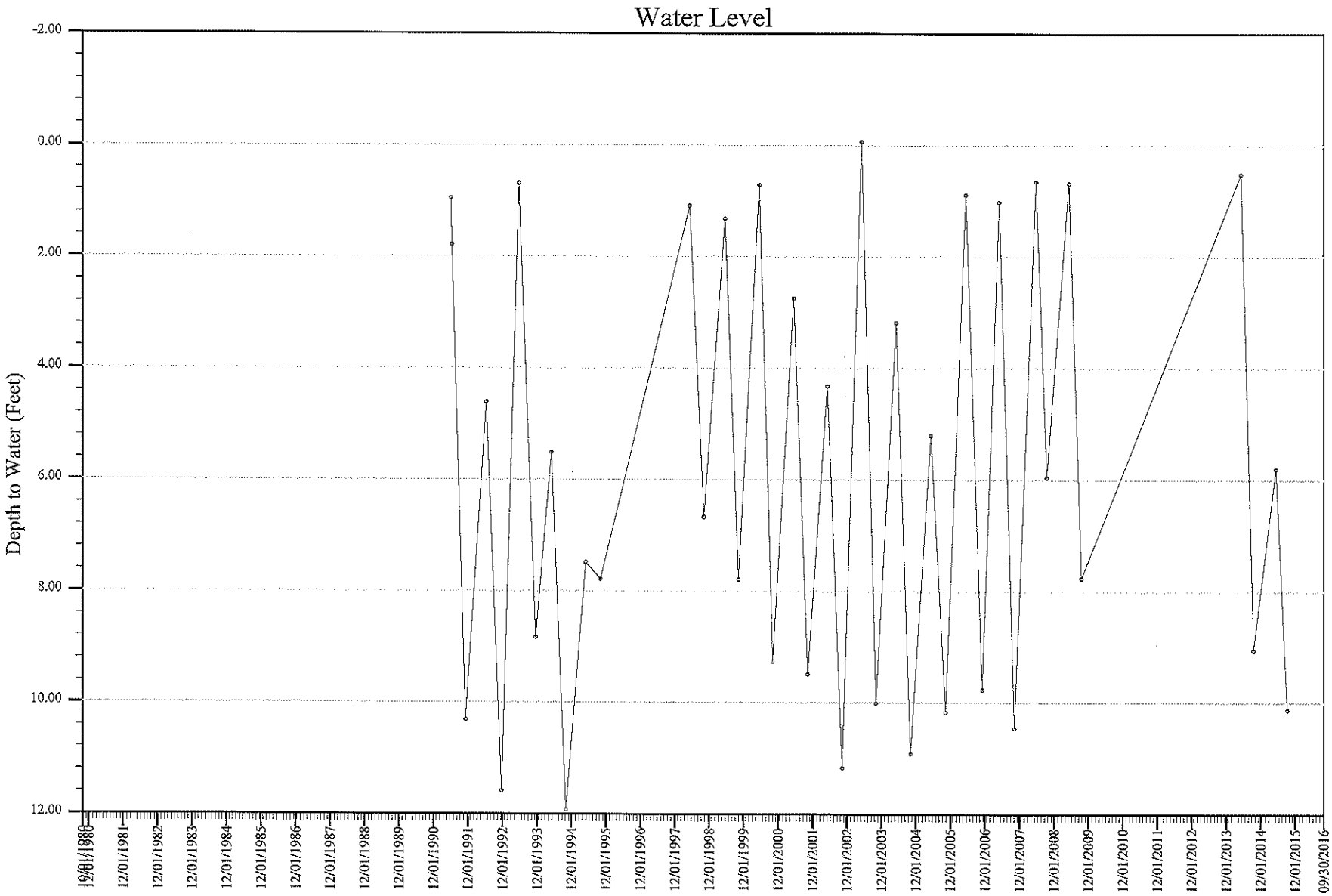
Water Level Report
WW25 - Wadge Coal
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	09:10:00	MANF	11.80	7572.26	0.00	

Average water level = 0.00 feet
Minimum water level 11.80 feet at 05/12/2016-09:10:00
Maximum water level 11.80 feet at 05/12/2016-09:10:00


Water Level
Depth to Water (Feet)
-5.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WW25

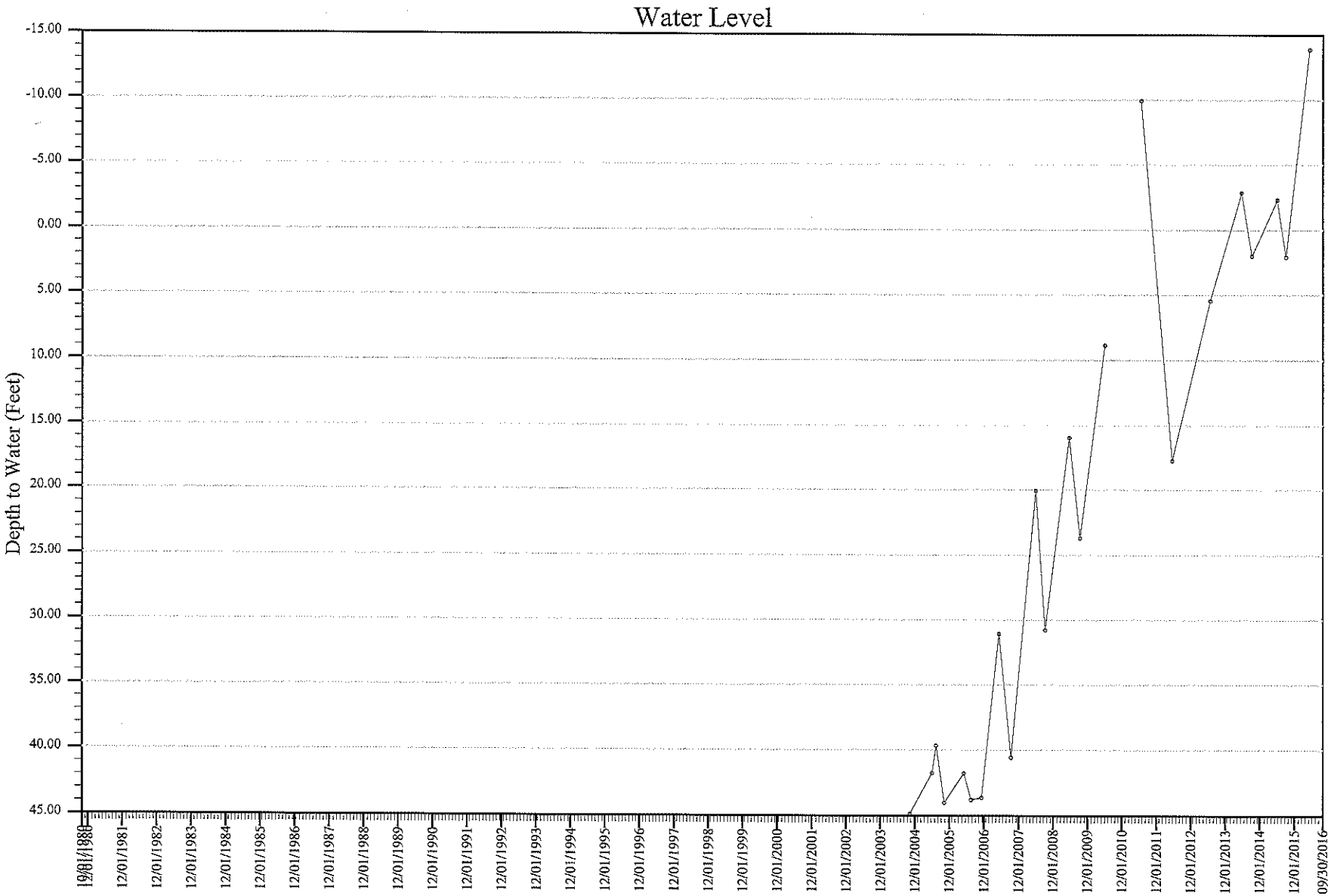

Water Level
Depth to Water (Feet)
-2.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WSAL14

Water Level Report
WSOV25 - Sage Creek Overburden
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	09:50:00	MANF	-13.86	7598.12	0.00	

Average water level = 0.00 feet
Minimum water level -13.86 feet at 05/12/2016-09:50:00
Maximum water level -13.86 feet at 05/12/2016-09:50:00

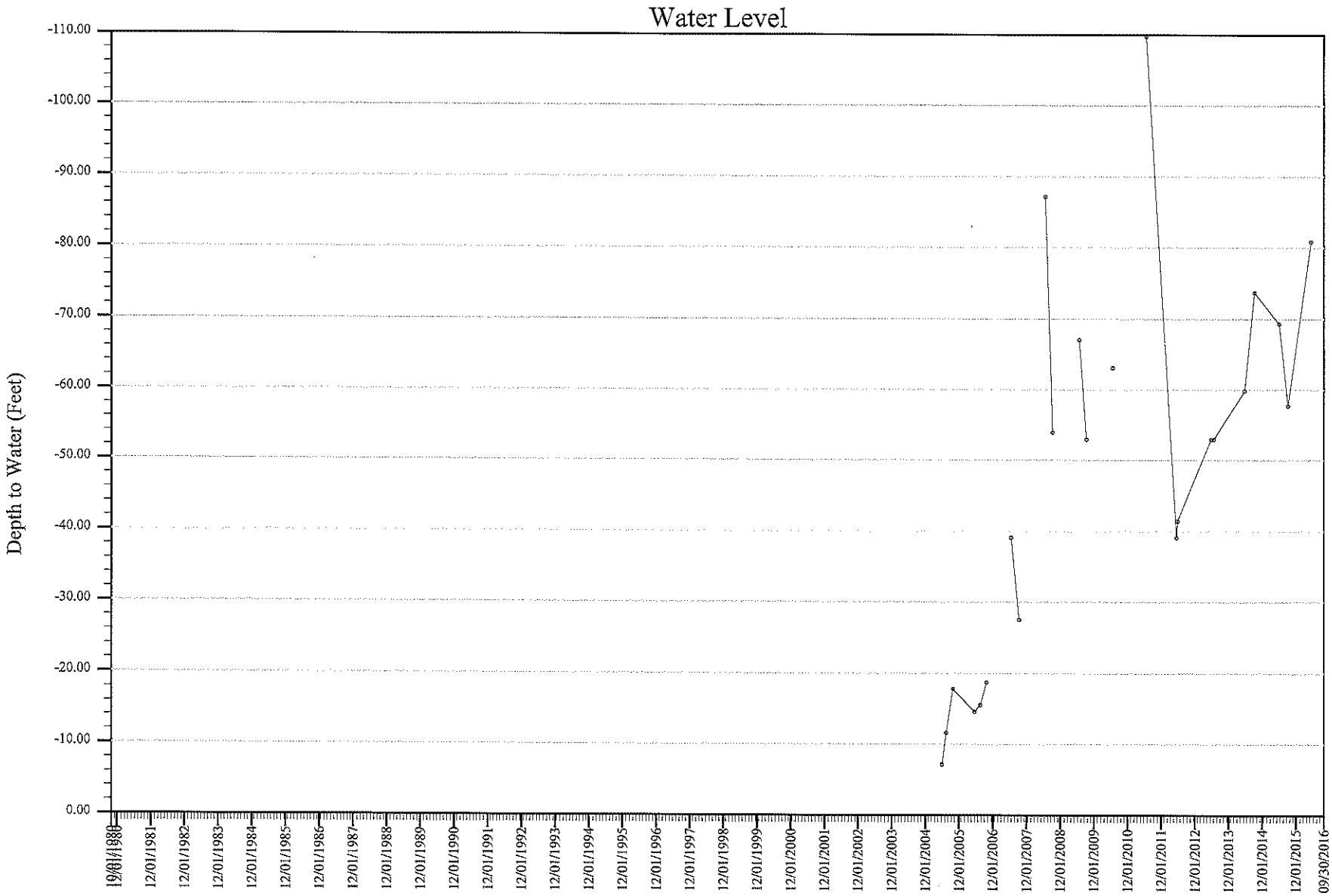

Water Level
Depth to Water (Feet)
-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WSOV25

Water Level Report
WSC25 - Sage Creek Coal
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	10:45:00	MANF	-80.85	7665.83	0.00	

Average water level = 0.00 feet
Minimum water level -80.85 feet at 05/12/2016-10:45:00
Maximum water level -80.85 feet at 05/12/2016-10:45:00

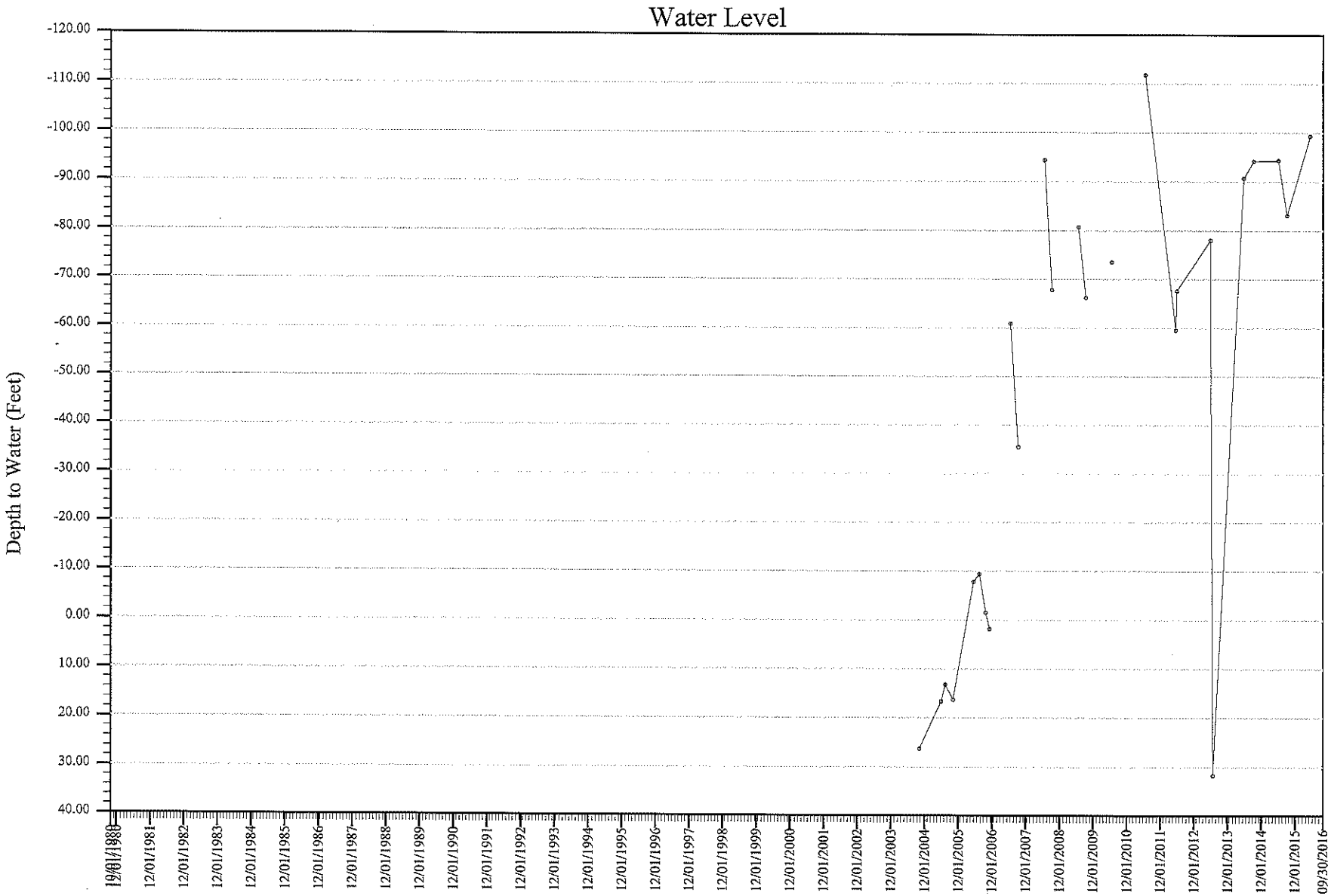

Water Level
Depth to Water (Feet)
-110.00
-100.00
-90.00
-80.00
-70.00
-60.00
-50.00
-40.00
-30.00
-20.00
-10.00
0.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WSC25

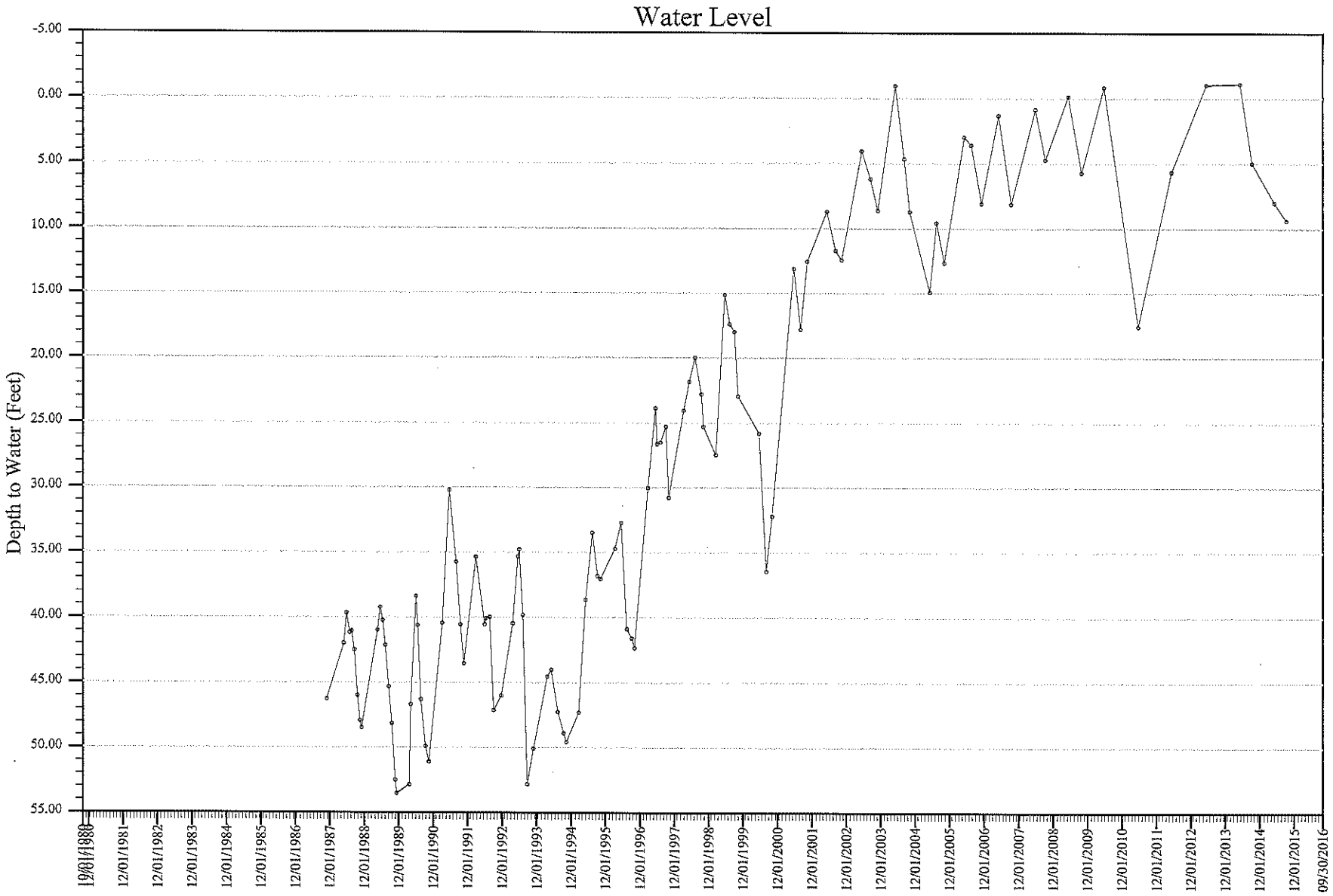
Water Level Report
WWCOV25 - Wolf Creek Overburden
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	09:30:00	MANF	-99.33	7684.62	0.00	

Average water level = 0.00 feet
Minimum water level -99.33 feet at 05/12/2016-09:30:00
Maximum water level -99.33 feet at 05/12/2016-09:30:00


Water Level
Depth to Water (Feet)
-120.00
-110.00
-100.00
-90.00
-80.00
-70.00
-60.00
-50.00
-40.00
-30.00
-20.00
-10.00
0.00
10.00
20.00
30.00
40.00
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WWCOV25


Water Level
Depth to Water (Feet)
-5.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
10/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
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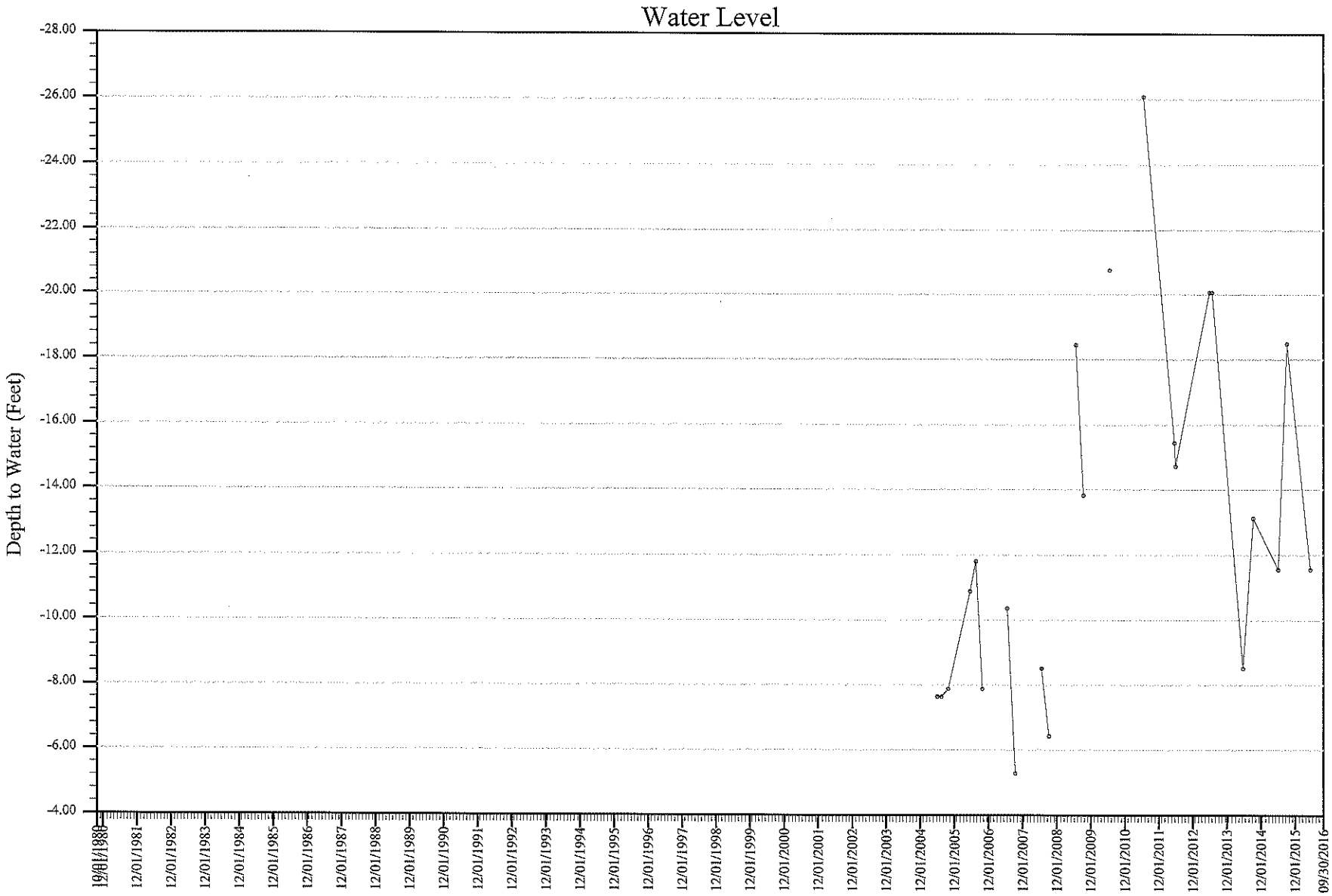
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WWC17

Water Level Report
WWC25 - Wolf Creek Coal
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	09:25:00	MANF	-11.55	7597.04	0.00	

Average water level = 0.00 feet
Minimum water level -11.55 feet at 05/12/2016-09:25:00
Maximum water level -11.55 feet at 05/12/2016-09:25:00

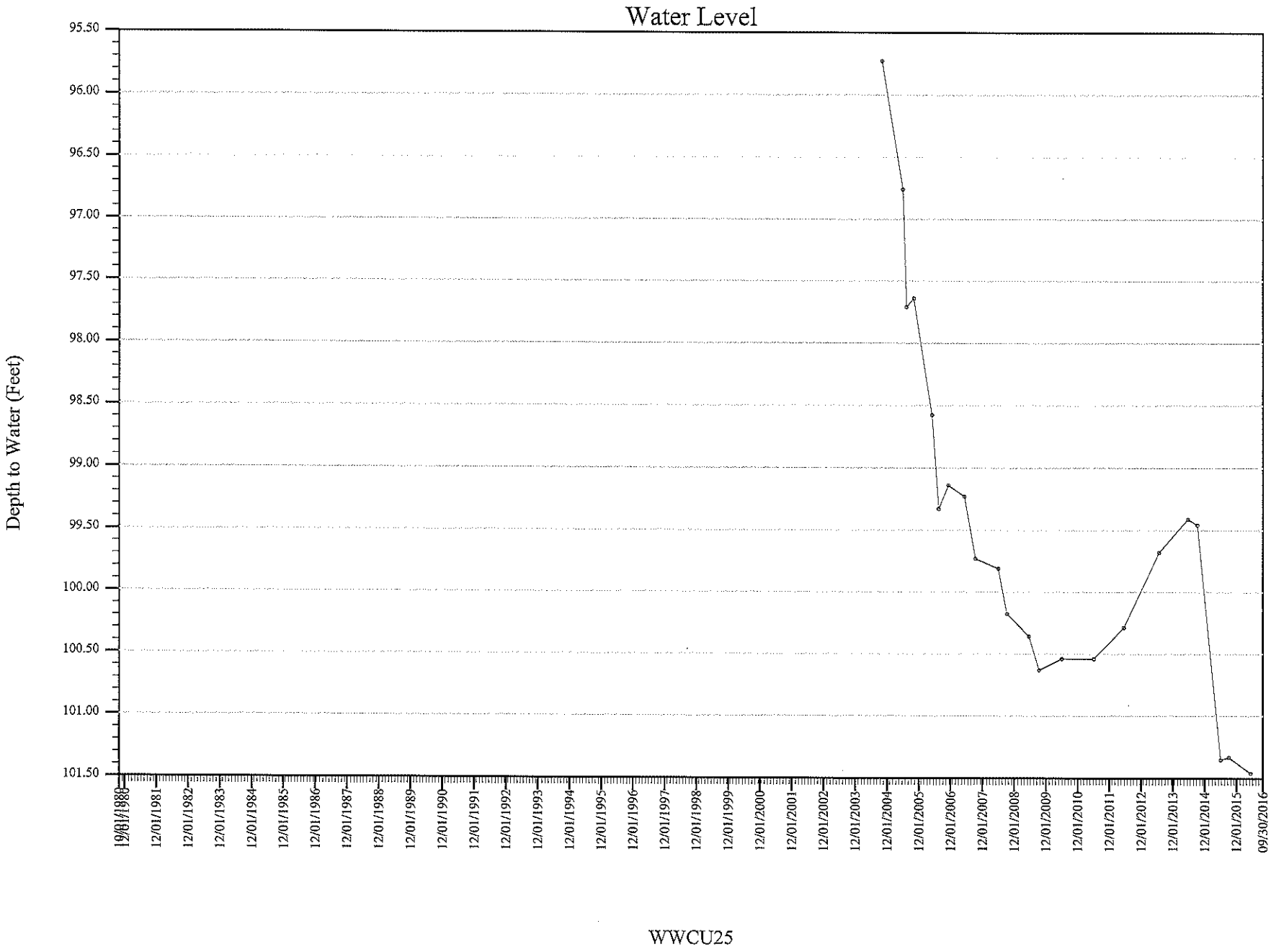

Water Level
Depth to Water (Feet)
-28.00
-26.00
-24.00
-22.00
-20.00
-18.00
-16.00
-14.00
-12.00
-10.00
-8.00
-6.00
-4.00
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WWC25

Water Level Report
WWCU25 - Wolf Creek Underburden
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Water Level	Elevation	Correction	Status
05/12/2016	10:10:00	MANF	101.46	7484.22	0.00	

Average water level = 0.00 feet
Minimum water level 101.46 feet at 05/12/2016-10:10:00
Maximum water level 101.46 feet at 05/12/2016-10:10:00


Water Level
Depth to Water (Feet)
95.50
96.00
96.50
97.00
97.50
98.00
98.50
99.00
99.50
100.00
100.50
101.00
101.50
12/01/1980
12/01/1981
12/01/1982
12/01/1983
12/01/1984
12/01/1985
12/01/1986
12/01/1987
12/01/1988
12/01/1989
12/01/1990
12/01/1991
12/01/1992
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
09/30/2016

WWCU25

APPENDIX D

GROUND WATER QUALITY DATA

APPENDIX D

GROUND WATER QUALITY DATA

Table of Contents

On water quality reports: < indicates an analytical value below the Method Detection Limit

B indicates an analytical value between the Method Detection Limit and the Practical Quantitation Limit

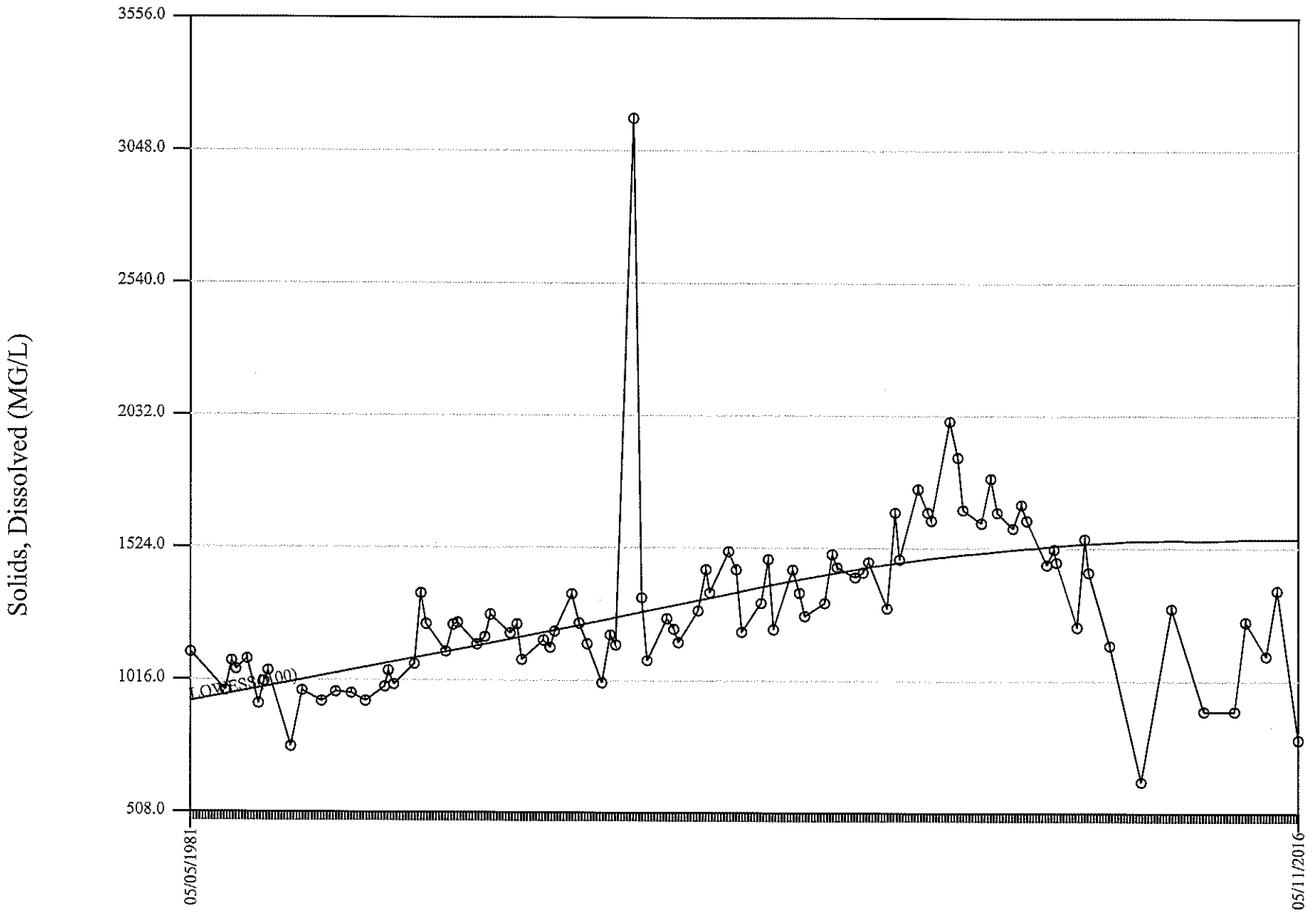
Water Quality Report
WHAL7-2 - GW-S2W-7A2
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/11/2016 11:05
Field Parameters		
Field Ph	S.U.	7.4500
Temperature	C	7.6000
Field Conductivity	UMHOS/CM	1300.0000
Laboratory Parameters		
Fluoride	MG/L	0.3200
Iron, Dissolved	MG/L	0.4000
Manganese, Dissolved	MG/L	0.2700
Nitrate Nitrogen_N	MG/L	1.7500
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	1.7500
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	790.0000
Sulfate	MG/L	140.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WHAL7-2 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/11/2016-11:05	PUMP GAL/GPM: 50/5


Solids, Dissolved (MG/L)
3556.0
3048.0
2540.0
2032.0
1524.0
1016.0
508.0
05/05/1981
05/11/2016
92 samples

WHAL7-2

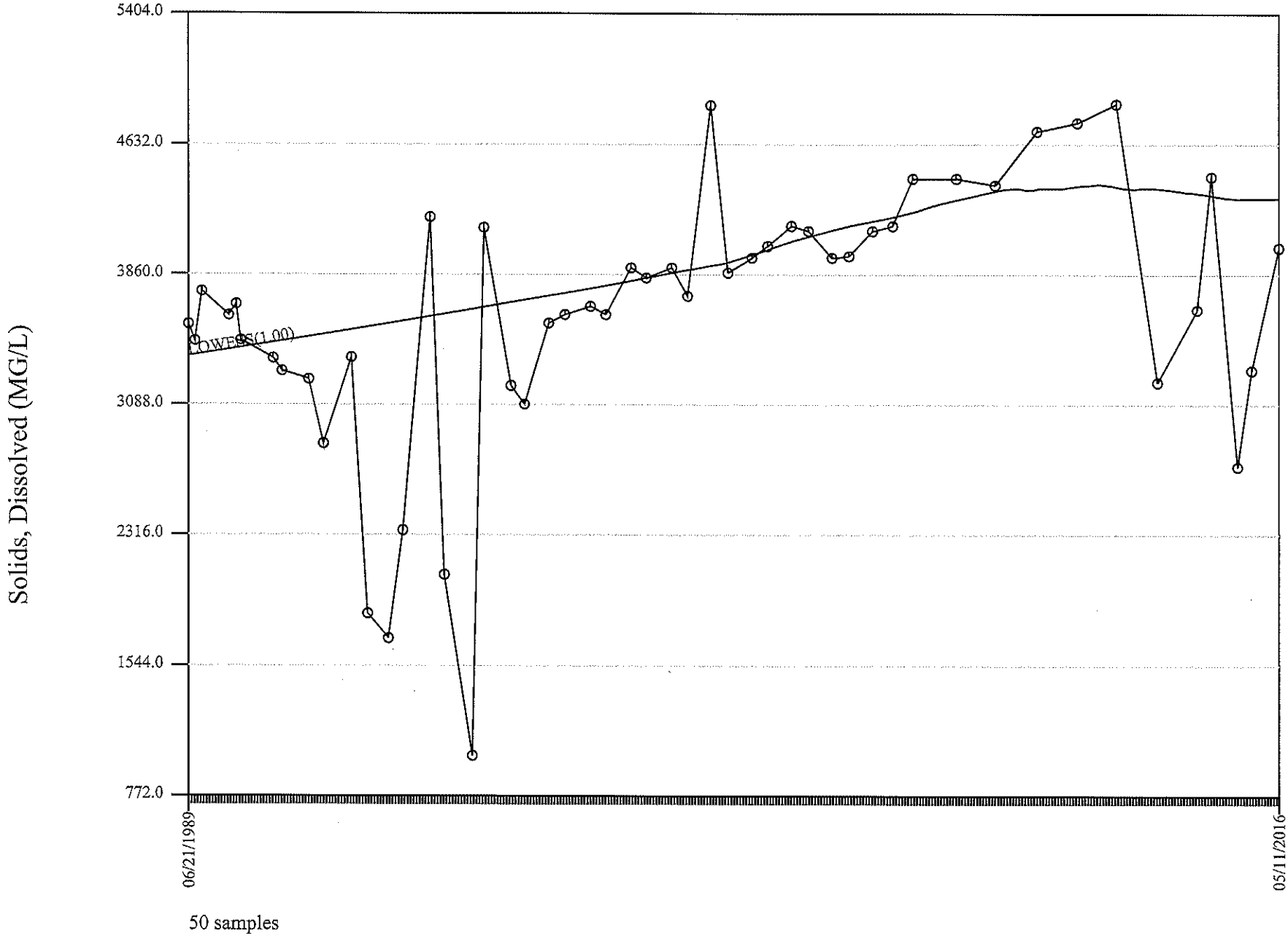
Water Quality Report
WOV14 - GW-S2W-14OV
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/11/2016 10:10
Field Parameters		
Field Ph	S.U.	7.0500
Temperature	C	8.2000
Field Conductivity	UMHOS/CM	3970.0000
Laboratory Parameters		
Fluoride	MG/L	0.4700
Iron, Dissolved	MG/L	0.1400
Manganese, Dissolved	MG/L	1.1300
Nitrate Nitrogen_N	MG/L	1.4000
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	1.4000
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	4020.0000
Sulfate	MG/L	2490.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WOV14 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/11/2016-10:10	PUMP GAL/GPM: 50/5


Solids, Dissolved (MG/L)
5404.0
4632.0
3860.0
3088.0
2316.0
1544.0
772.0
LOWESS(1.00)
06/21/1989
05/11/2016
50 samples
WOV14

Water Quality Report
WOV17 - GW-S2W-17OV
10/01/2015-00:00 to 09/30/2016-23:59

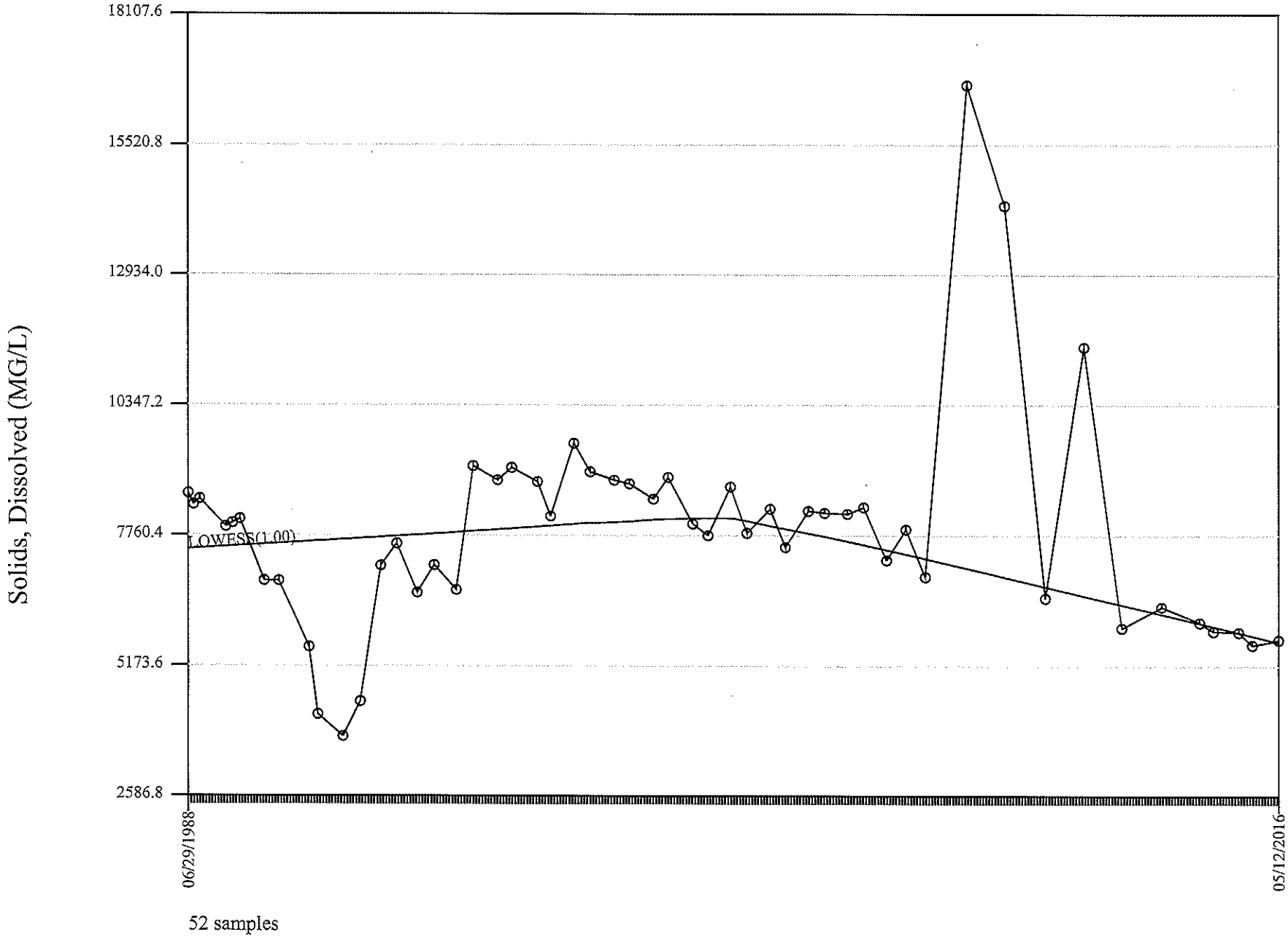
Parameters	Units	05/12/2016 08:10
Field Parameters		
Field Ph	S.U.	7.0200
Temperature	C	10.2000
Field Conductivity	UMHOS/CM	6630.0000
Laboratory Parameters		
Iron, Dissolved	MG/L	1.9400
Manganese, Dissolved	MG/L	0.0870
Solids, Dissolved	MG/L	5690.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WOV17 Sample Remarks

10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-08:10	PUMP GAL/GPM: 90/3


18107.6
15520.8
12934.0
10347.2
7760.4
5173.6
2586.8
Solids, Dissolved (MG/L)
LOWESS(1.00)
06/29/1988
05/12/2016
52 samples
WOV17

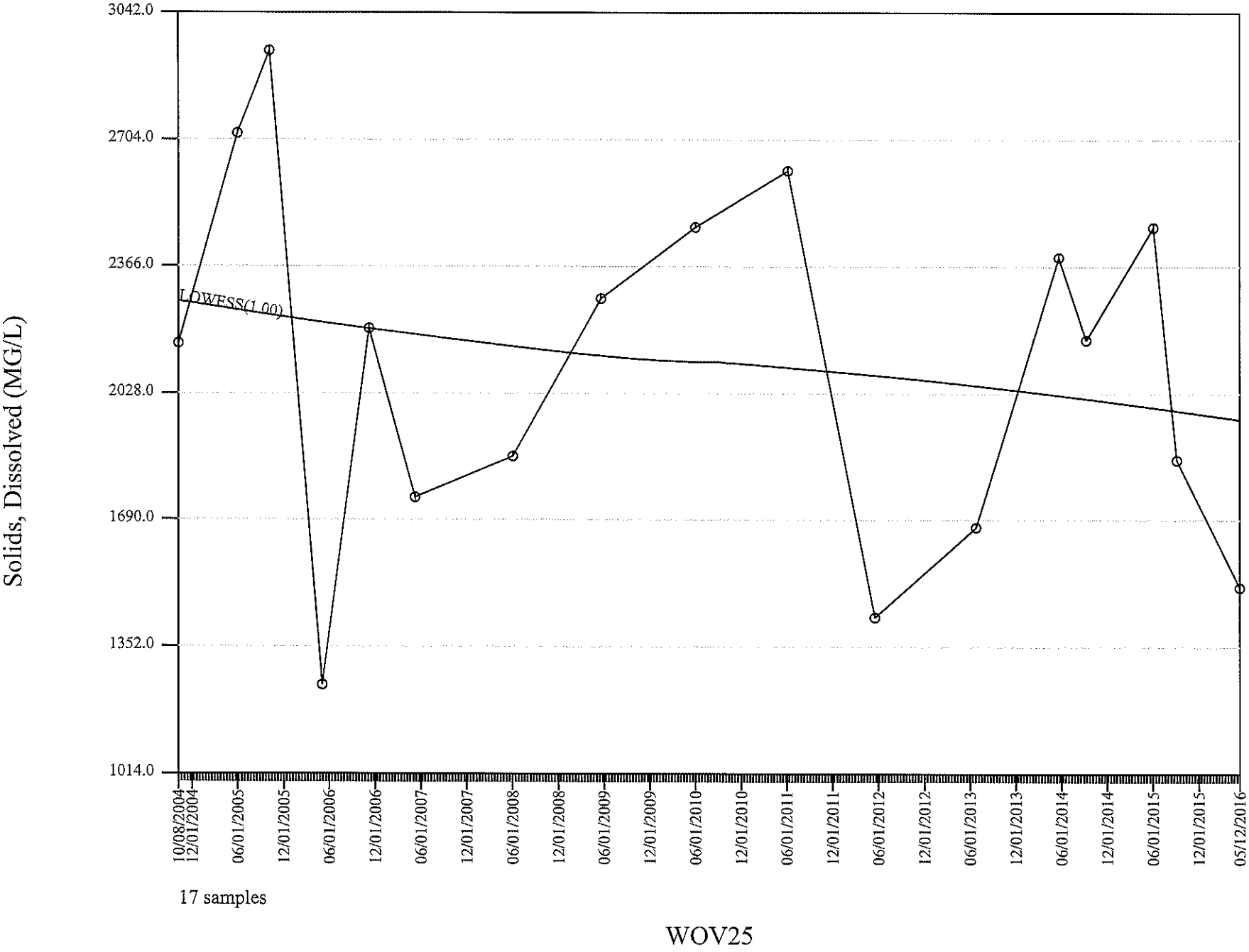
Water Quality Report
WOV25 - Wadge Overburden
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/12/2016 08:50
Field Parameters		
Field Ph	S.U.	7.0300
Temperature	C	8.5000
Field Conductivity	UMHOS/CM	1890.0000
Laboratory Parameters		
Fluoride	MG/L	B 0.1500
Iron, Dissolved	MG/L	0.8800
Manganese, Dissolved	MG/L	0.0540
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	1510.0000
Sulfate	MG/L	730.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WOV25 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-08:50	PUMP GAL/GPM: 45/3


Solids, Dissolved (MG/L)
3042.0
2704.0
2366.0
2028.0
1690.0
1352.0
1014.0
LOWESS(1.00)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WOV25

Water Quality Report
WW14 - GW-S2W-14W
10/01/2015-00:00 to 09/30/2016-23:59

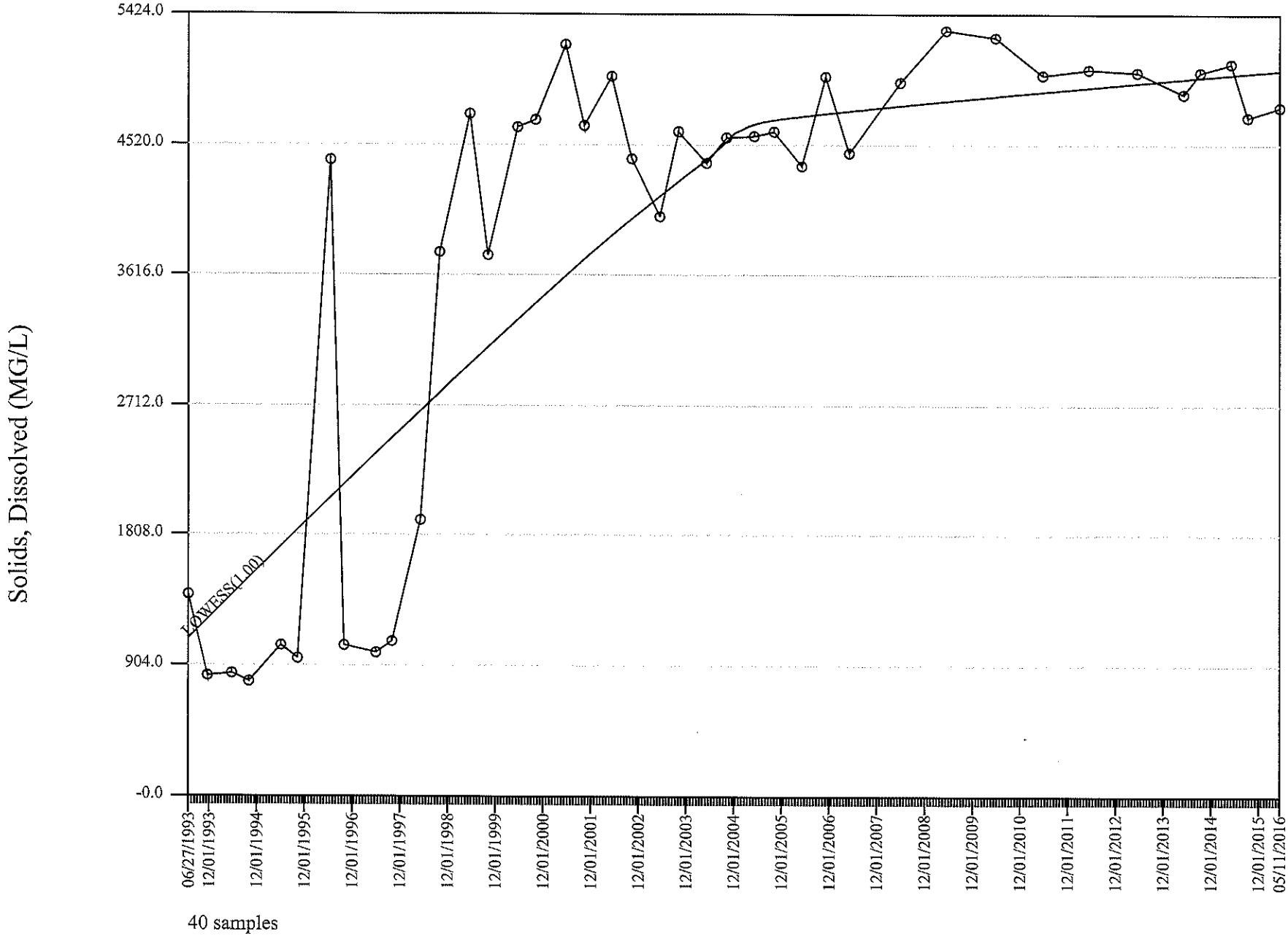
Parameters	Units	05/11/2016 10:30
Field Parameters		
Field Ph	S.U.	6.6700
Temperature	C	8.7000
Field Conductivity	UMHOS/CM	4570.0000
Laboratory Parameters		
Fluoride	MG/L	1.0600
Iron, Dissolved	MG/L	19.1000
Manganese, Dissolved	MG/L	1.2200
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	4780.0000
Sulfate	MG/L	2990.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WW14 Sample Remarks

10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/11/2016-10:30	PUMP GAL/GPM: 60/5


Solids, Dissolved (MG/L)
5424.0
4520.0
3616.0
2712.0
1808.0
904.0
-0.0
LOWESS(1.00)
06/27/1993
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
05/11/2016
40 samples

WW14

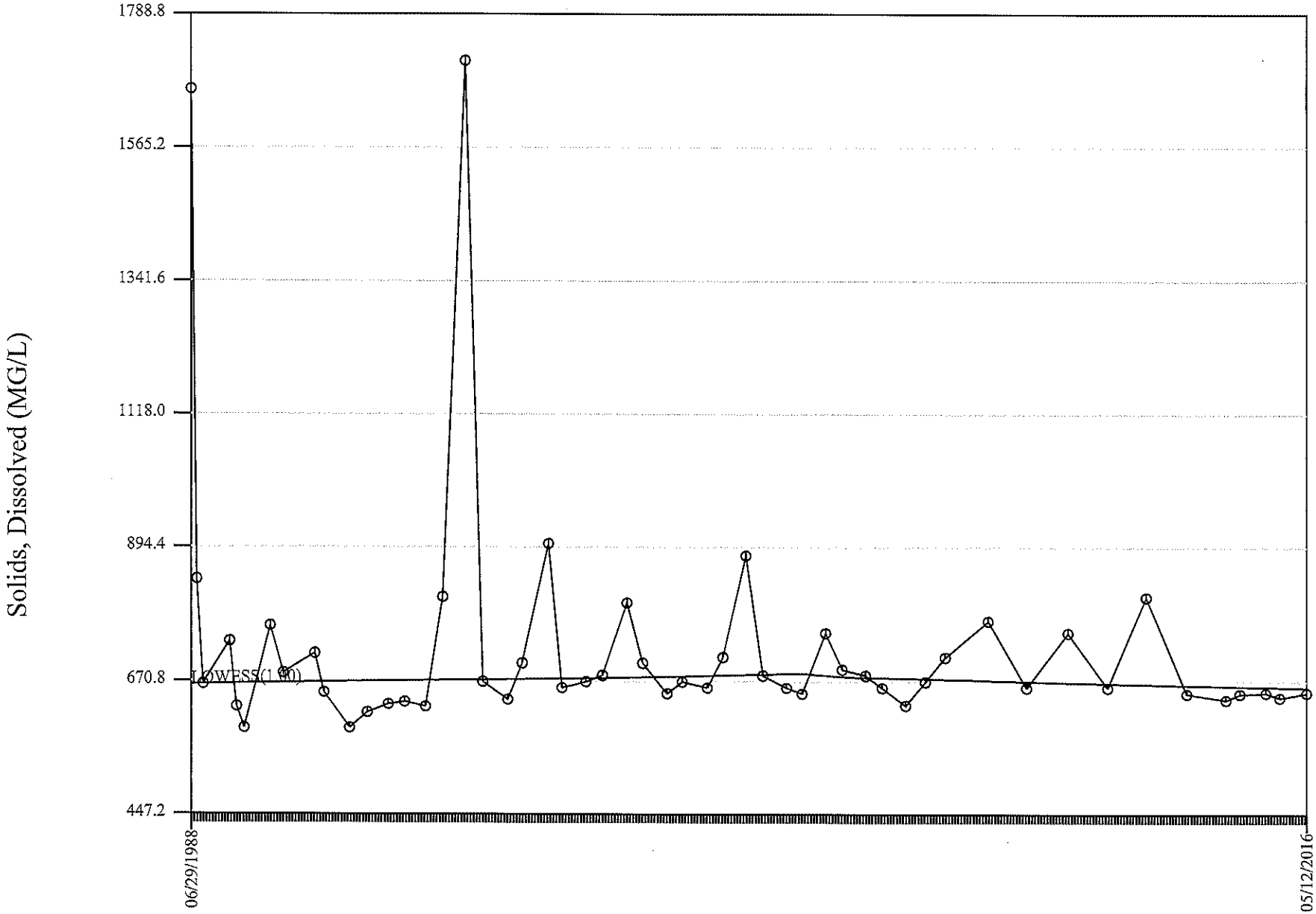
Water Quality Report
WW17 - GW-S2W-17W
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/12/2016 07:30
Field Parameters		
Field Ph	S.U.	8.2400
Temperature	C	9.6000
Field Conductivity	UMHOS/CM	1100.0000
Laboratory Parameters		
Iron, Dissolved	MG/L	< 0.0200
Manganese, Dissolved	MG/L	0.0510
Solids, Dissolved	MG/L	652.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WW17 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-07:30	PUMP GAL/GPM: 15/.5


Solids, Dissolved (MG/L)
1788.8
1565.2
1341.6
1118.0
894.4
670.8
447.2
LOWESS(1.00)
06/29/1988
05/12/2016
52 samples

WW17

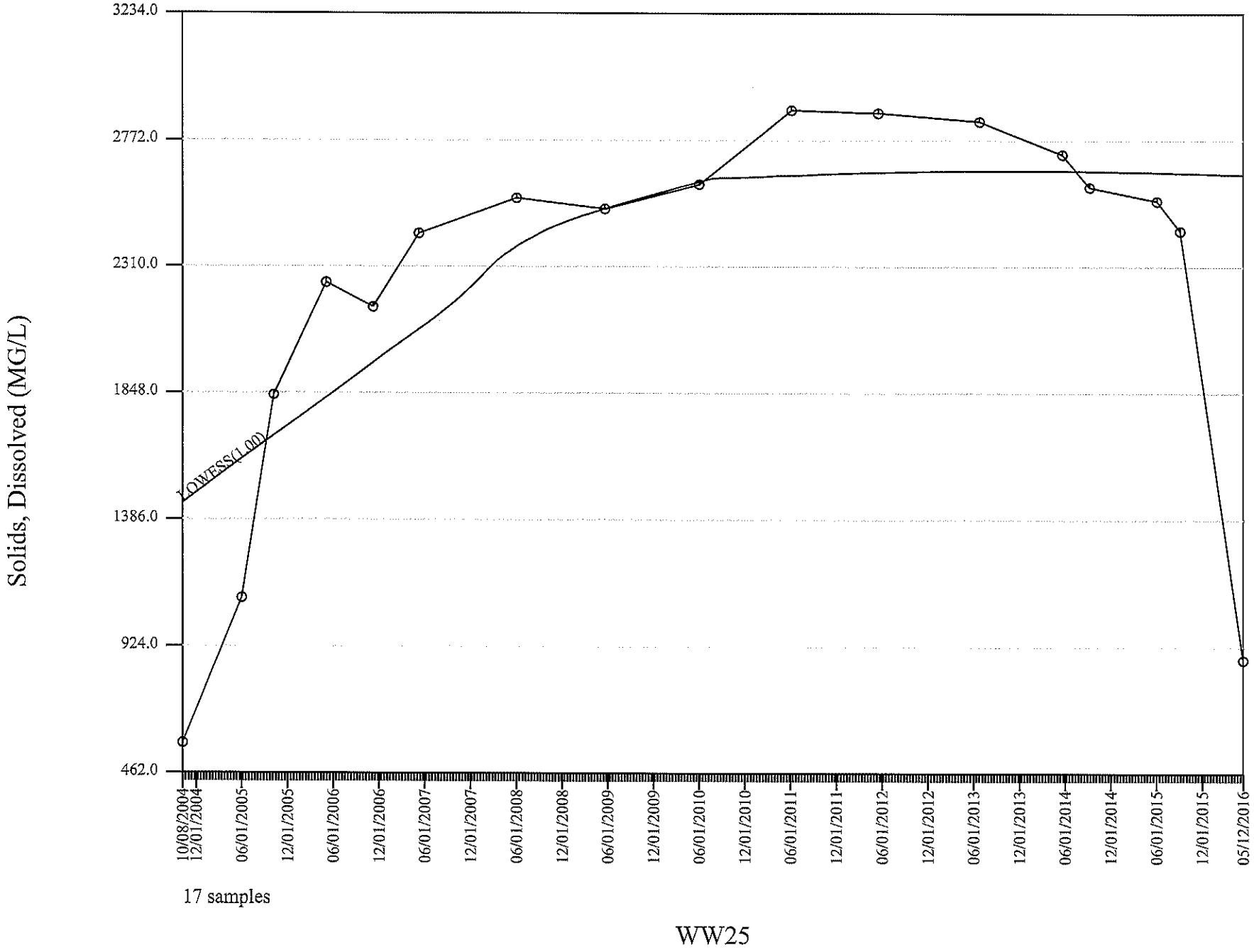
Water Quality Report
WW25 - Wadge Coal
10/01/2015-00:00 to 09/30/2016-23:59

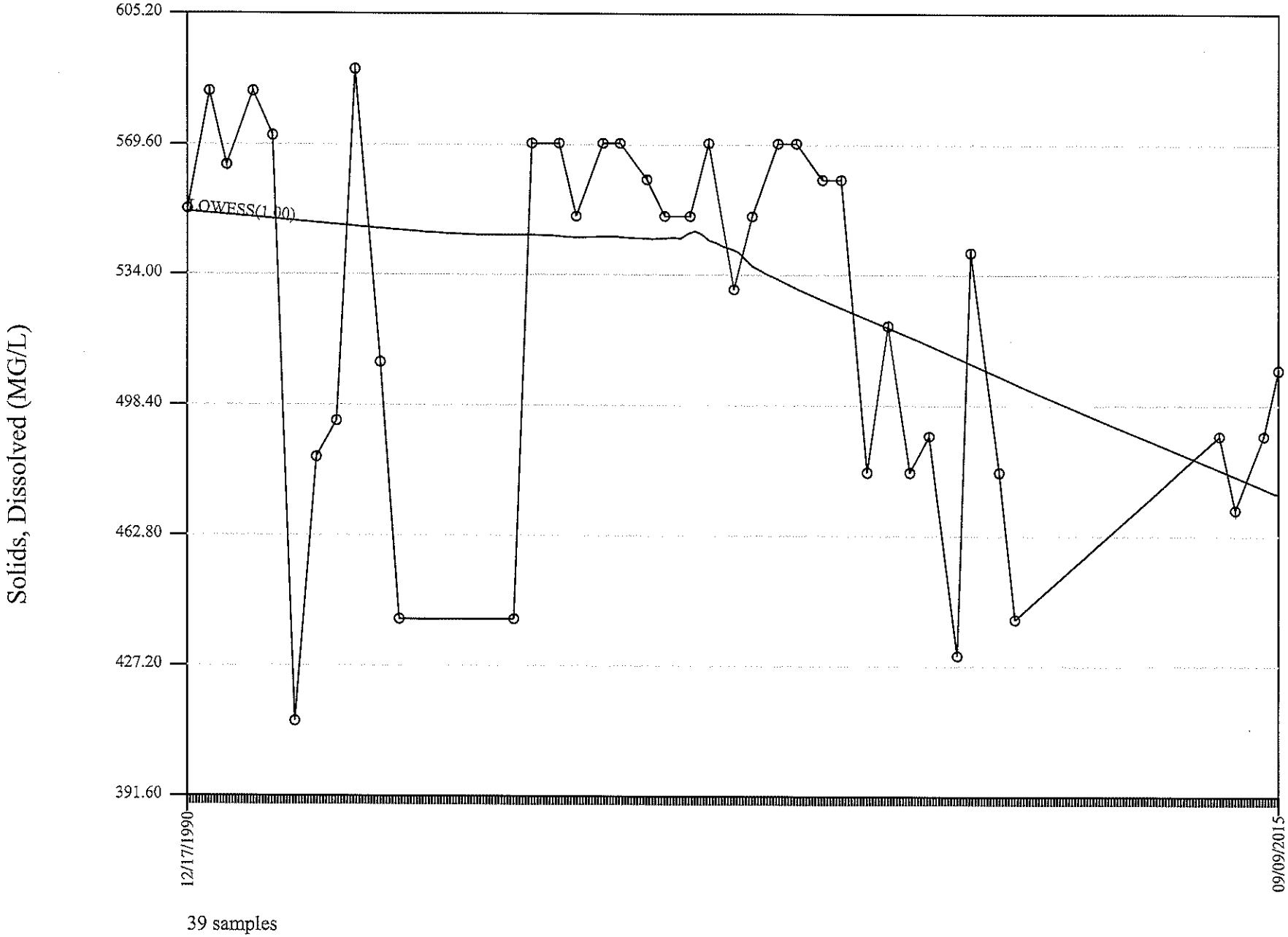
Parameters	Units	05/12/2016 09:10
Field Parameters		
Field Ph	S.U.	7.9900
Temperature	C	8.5000
Field Conductivity	UMHOS/CM	1170.0000
Laboratory Parameters		
Fluoride	MG/L	1.9000
Iron, Dissolved	MG/L	< 0.0200
Manganese, Dissolved	MG/L	< 0.0050
Nitrate Nitrogen_N	MG/L	0.3600
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	0.3600
Selenium, Dissolved	UG/L	B 3.0000
Solids, Dissolved	MG/L	874.0000
Sulfate	MG/L	460.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WW25 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-09:10	PUMP GAL/GPM: 45/3


Solids, Dissolved (MG/L)
3234.0
2772.0
2310.0
1848.0
1386.0
924.0
462.0
LOWESS(1.00)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WW25


605.20
569.60
534.00
498.40
462.80
427.20
391.60
LOWESS(1.00)
Solids, Dissolved (MG/L)
12/17/1990
09/09/2015
39 samples

WSAL14

Water Quality Report
WSOV25 - Sage Creek Overburden
10/01/2015-00:00 to 09/30/2016-23:59

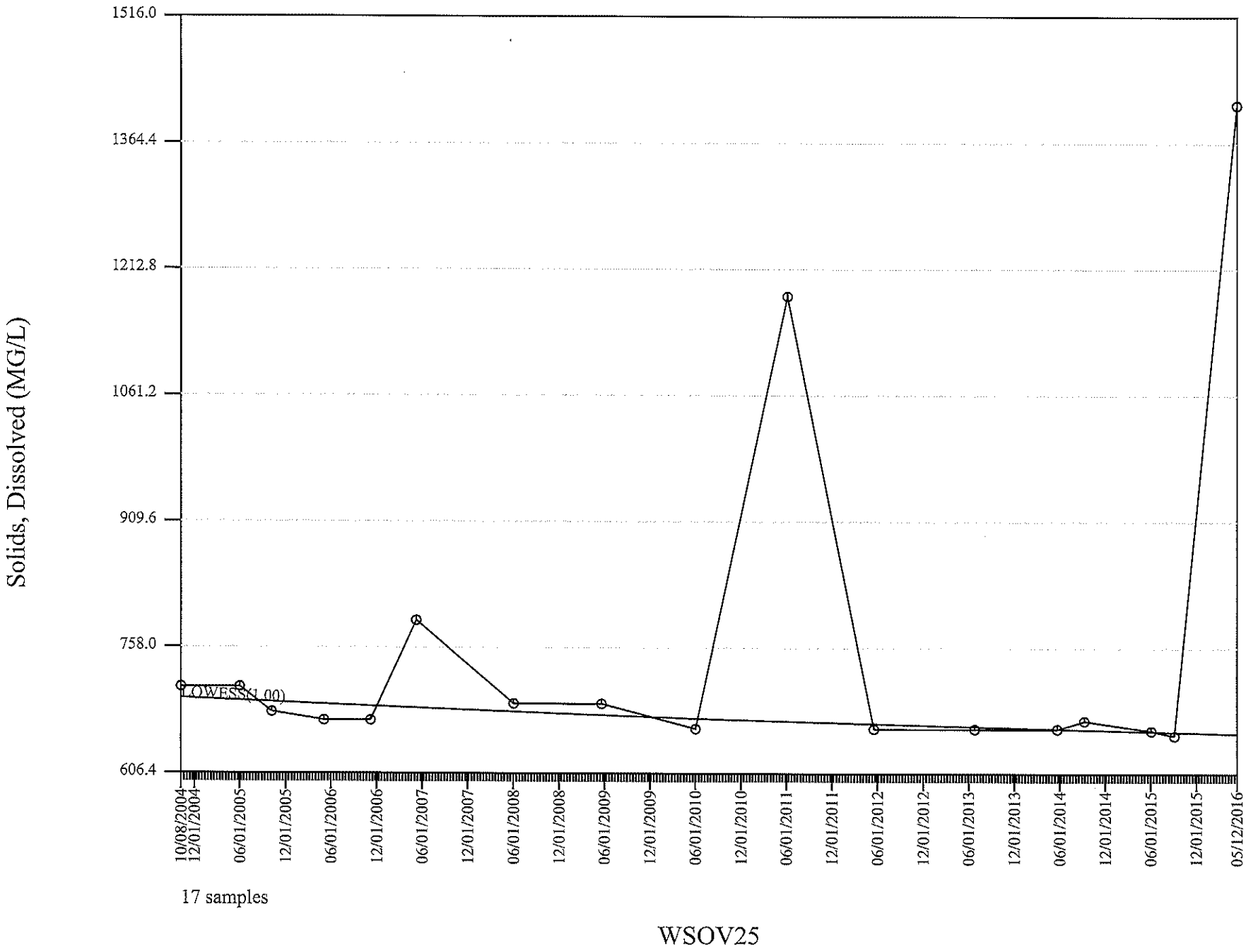
Parameters	Units	05/12/2016 09:50
Field Parameters		
Field Ph	S.U.	6.9100
Temperature	C	8.9000
Field Conductivity	UMHOS/CM	1800.0000
Laboratory Parameters		
Fluoride	MG/L	B 0.1400
Iron, Dissolved	MG/L	1.4800
Manganese, Dissolved	MG/L	0.1390
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	1410.0000
Sulfate	MG/L	590.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WSOV25 Sample Remarks

10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-09:50	NITROGEN LIFT SAMPLE, PURGE 1 CV THEN SAMPLE


1516.0
1364.4
1212.8
1061.2
909.6
758.0
606.4
Solids, Dissolved (MG/L)
LOWESS(1.00)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WSOV25

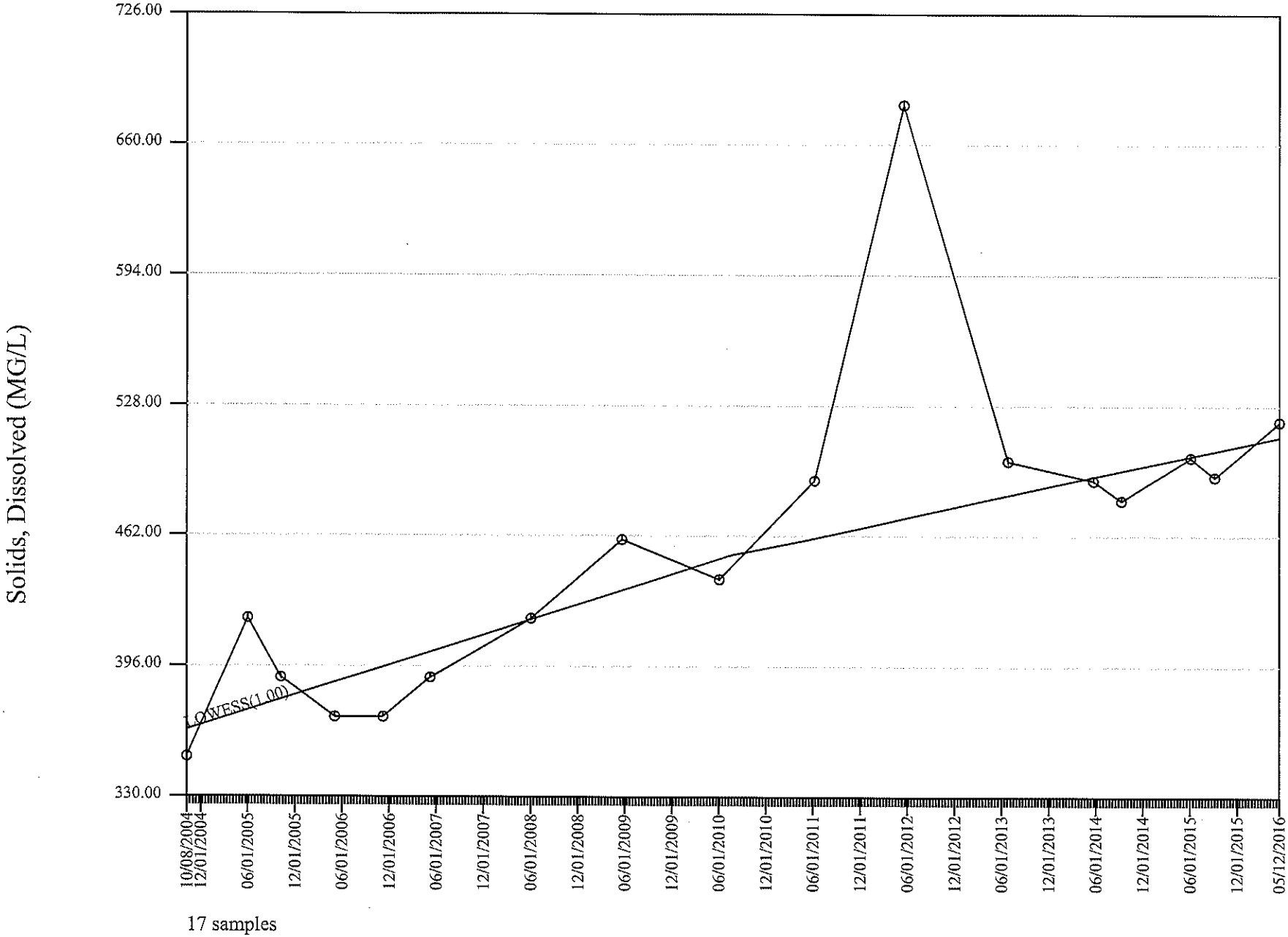
Water Quality Report
WSC25 - Sage Creek Coal
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/12/2016 10:45
Field Parameters		
Field Ph	S.U.	7.2500
Temperature	C	8.8000
Field Conductivity	UMHOS/CM	850.0000
Laboratory Parameters		
Fluoride	MG/L	B 0.1300
Iron, Dissolved	MG/L	0.1100
Manganese, Dissolved	MG/L	B 0.0100
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	520.0000
Sulfate	MG/L	110.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WSC25 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-10:45	NITROGEN LIFT SAMPLE, PURGE 1 CV THEN SAMPLE


Solids, Dissolved (MG/L)
726.00
660.00
594.00
528.00
462.00
396.00
330.00
LOWESS(1.00)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WSC25

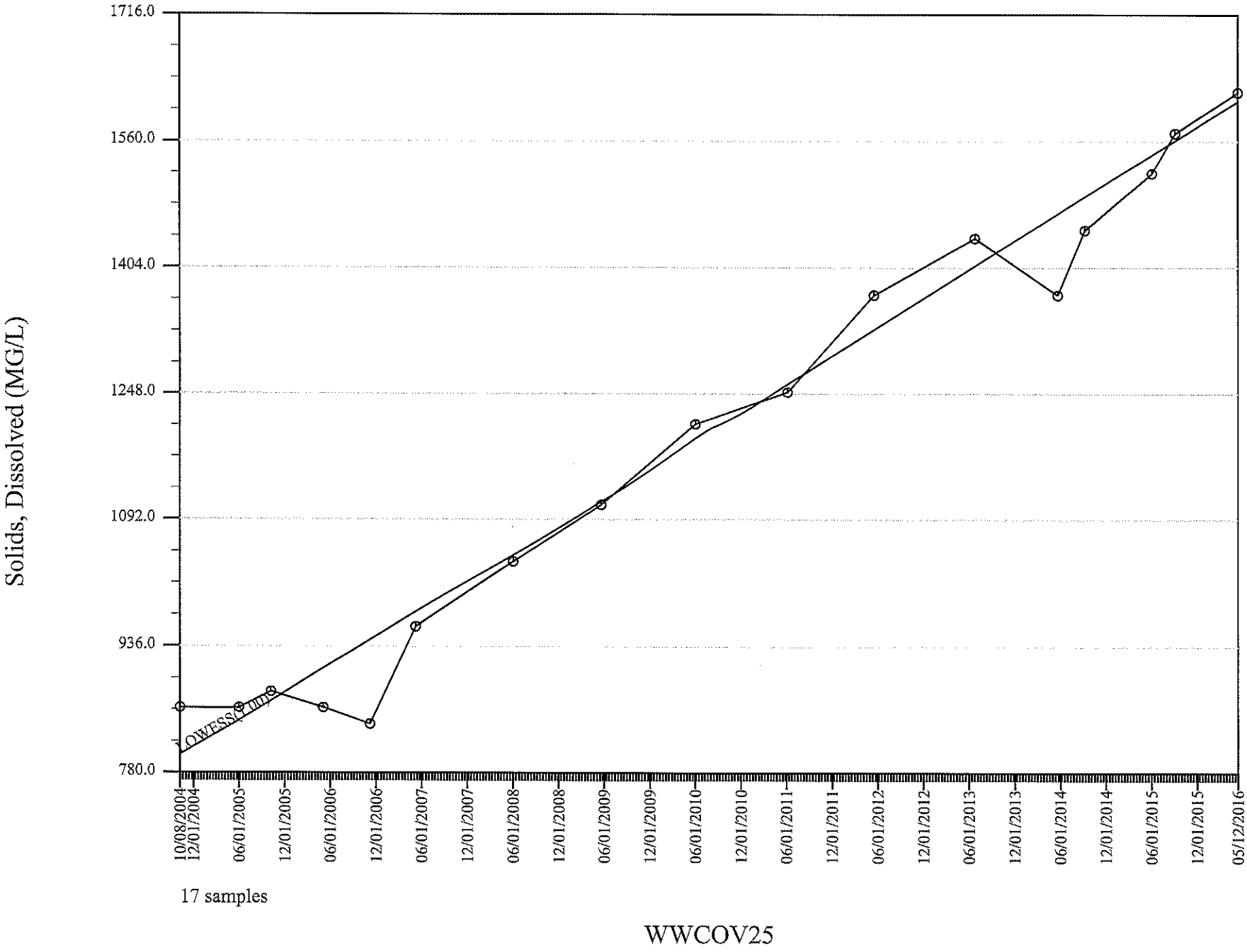
Water Quality Report
WWCOV25 - Wolf Creek Overburden
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/12/2016 09:30
Field Parameters		
Field Ph	S.U.	7.1900
Temperature	C	9.7000
Field Conductivity	UMHOS/CM	2010.0000
Laboratory Parameters		
Fluoride	MG/L	B 0.2300
Iron, Dissolved	MG/L	1.4500
Manganese, Dissolved	MG/L	0.1530
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	1620.0000
Sulfate	MG/L	700.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WWCOV25 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-09:30	NITROGEN LIFT SAMPLE, PURGE 1 CV THEN SAMPLE


Solids, Dissolved (MG/L)
1716.0
1560.0
1404.0
1248.0
1092.0
936.0
780.0
LOWESS(1.0)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WWCOV25

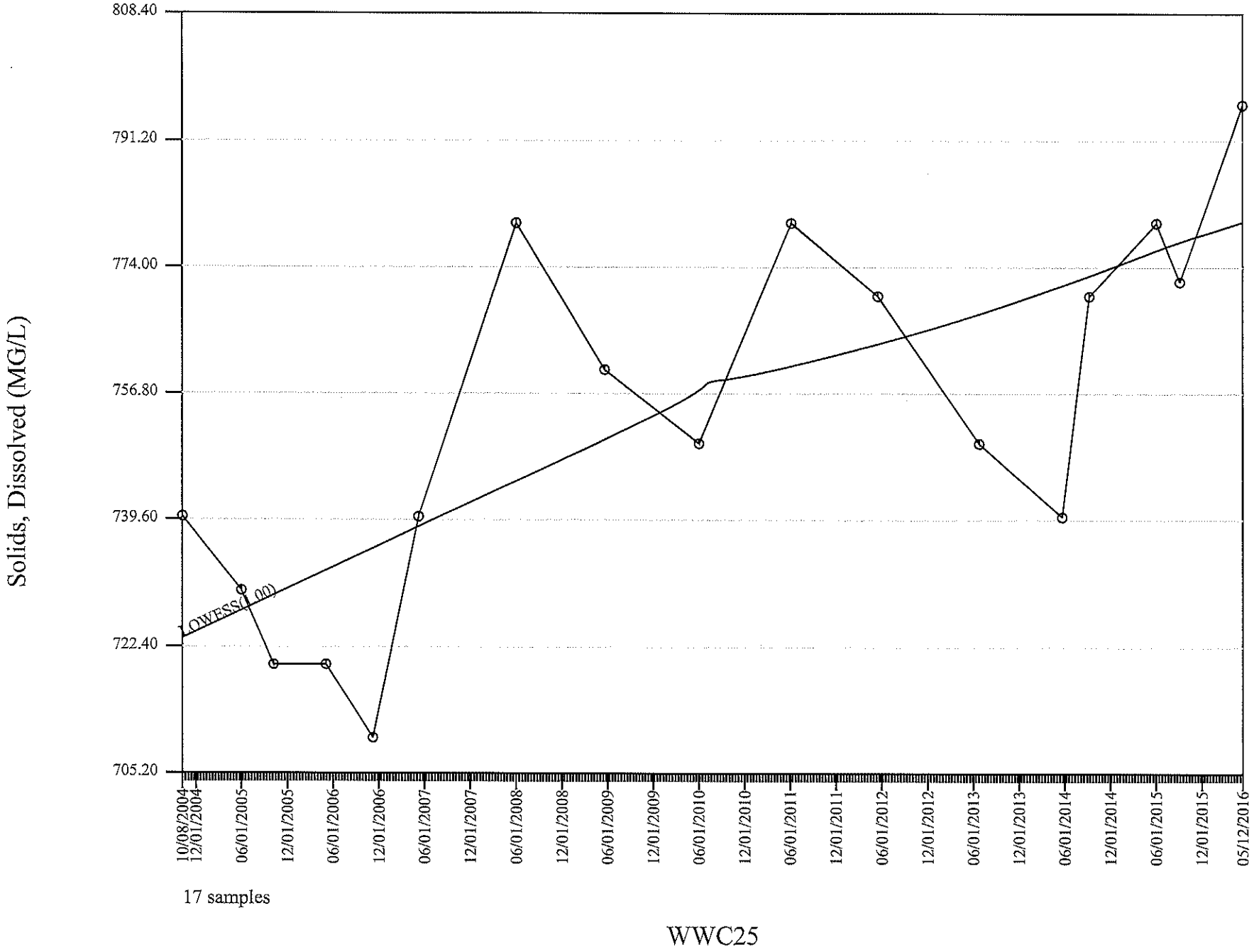
Water Quality Report
WWC25 - Wolf Creek Coal
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/12/2016 09:25
Field Parameters		
Field Ph	S.U.	8.4300
Temperature	C	9.4000
Field Conductivity	UMHOS/CM	1320.0000
Laboratory Parameters		
Fluoride	MG/L	0.5600
Iron, Dissolved	MG/L	0.0900
Manganese, Dissolved	MG/L	< 0.0050
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	796.0000
Sulfate	MG/L	140.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WWC25 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-09:25	NITROGEN LIFT SAMPLE, PURGE 1 CV THEN SAMPLE


Solids, Dissolved (MG/L)
808.40
791.20
774.00
756.80
739.60
722.40
705.20
LOWESS(1.00)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WWC25

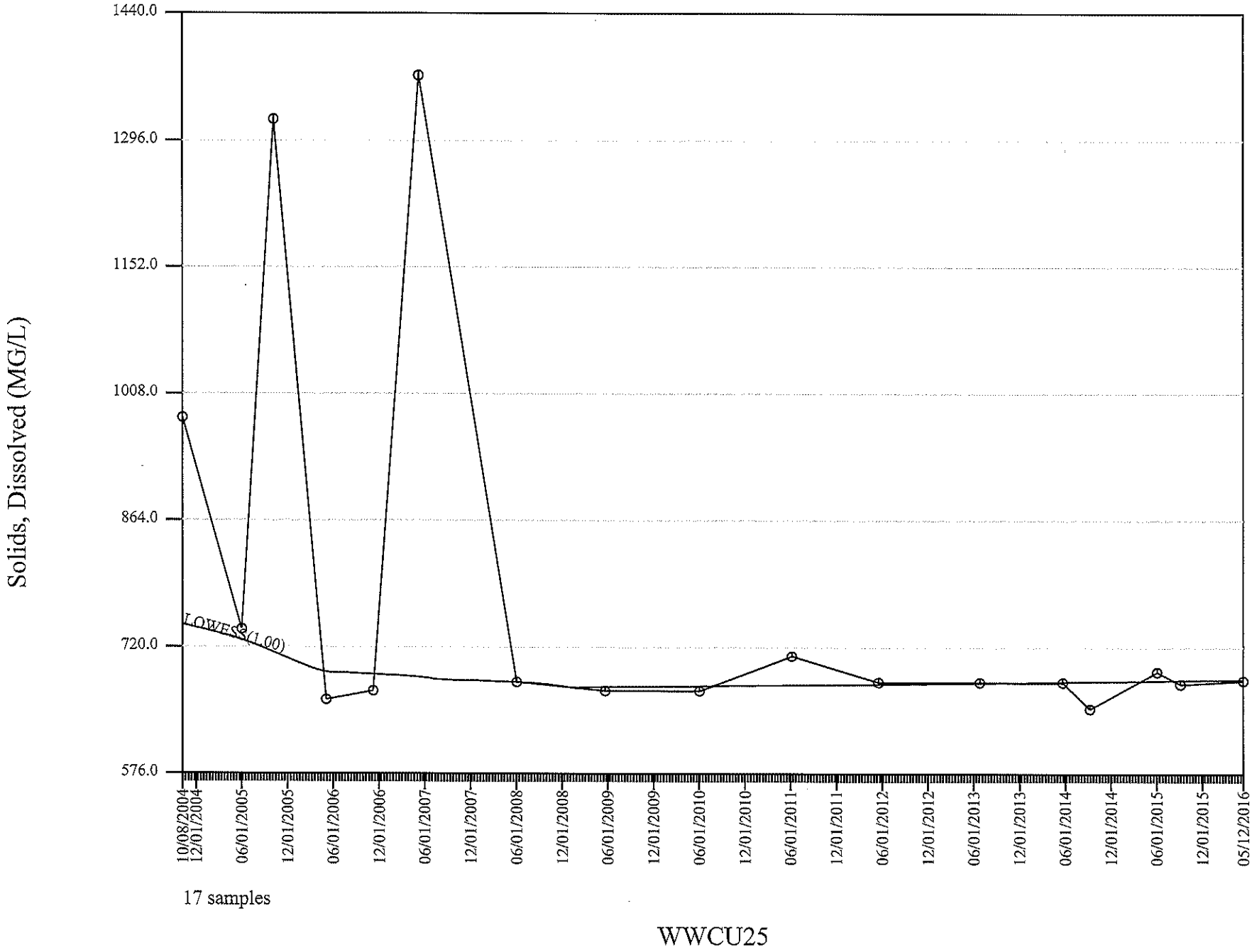
Water Quality Report
WWCU25 - Wolf Creek Underburden
10/01/2015-00:00 to 09/30/2016-23:59

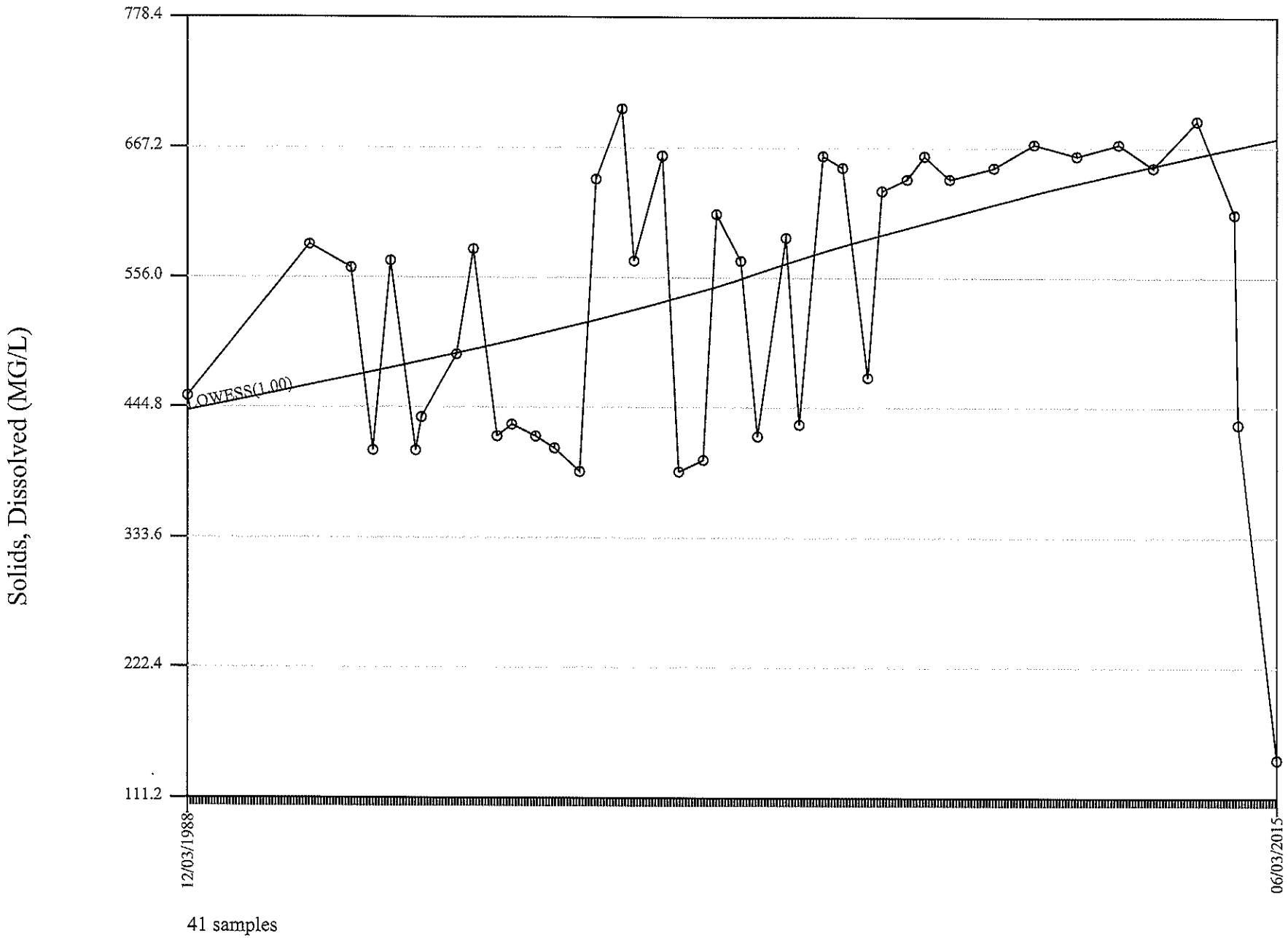
Parameters	Units	05/12/2016 10:10
Field Parameters		
Field Ph	S.U.	8.5900
Temperature	C	8.9000
Field Conductivity	UMHOS/CM	1110.0000
Laboratory Parameters		
Fluoride	MG/L	1.1900
Iron, Dissolved	MG/L	< 0.0200
Manganese, Dissolved	MG/L	< 0.0050
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 1.0000
Solids, Dissolved	MG/L	682.0000
Sulfate	MG/L	100.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

WWCU25 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/12/2016-10:10	PUMP GAL/GPM: 100/2


Solids, Dissolved (MG/L)
1440.0
1296.0
1152.0
1008.0
864.0
720.0
576.0
LOWESS(1.00)
10/08/2004
12/01/2004
06/01/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/12/2016
17 samples
WWCU25


778.4
667.2
556.0
444.8
333.6
222.4
111.2
Solids, Dissolved (MG/L)
LOWESS(1.00)
12/03/1988
06/03/2015
41 samples

WTC201

Water Quality Report
DCAL-02 - Dry Creek Alluvium
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/11/2016 09:40
Field Parameters		
Field Ph	S.U.	7.6000
Temperature	C	10.0000
Field Conductivity	UMHOS/CM	2130.0000
Laboratory Parameters		
Alk As CaCO3, Ph 4.5	MG/L	528.0000
Alk, Bicarb As CaCO3	MG/L	528.0000
Alk, Carb As CaCO3	MG/L	< 2.0000
Alk, Hydrox As CaCO3	MG/L	< 2.0000
Aluminum, Dissolved	MG/L	< 0.0300
Arsenic, Dissolved	UG/L	6.4000
Boron, Dissolved	UG/L	120.0000
Cadmium, Dissolved	UG/L	< 5.0000
Calcium, Dissolved	MG/L	183.0000
Chloride	MG/L	34.8000
Chromium, Dissolved	UG/L	< 10.0000
Conductivity	UMS/CM2	2040.0000
Copper, Dissolved	UG/L	< 10.0000
Fluoride	MG/L	B 0.2900
Hardness As CaCO3	MG/L	918.0000
Iron, Dissolved	MG/L	10.1000
Lead, Dissolved	UG/L	< 30.0000
Magnesium, Dissolved	MG/L	112.0000
Manganese, Dissolved	MG/L	1.4800
Mercury, Dissolved	UG/L	< 0.2000
Nickel, Dissolved	UG/L	< 8.0000
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Ph At 25 Deg. Cent.	S.U.	8.1000
Potassium, Dissolved	MG/L	5.1000
Selenium, Dissolved	UG/L	< 1.0000
Sodium, Dissolved	MG/L	158.0000
Solids, Dissolved	MG/L	1610.0000
Solids, Suspended	MG/L	186.0000
Sulfate	MG/L	790.0000
Sulfide	MG/L	< 0.0200
Zinc, Dissolved	MG/L	< 0.0100
Bicarbonate As HCO3	MG/L	645.0000
Carbonate As CO3	MG/L	< 2.0000
Hydroxide As OH	MG/L	< 2.0000
Cation_Anion Balance	PERCENT	< -3.7000
Sar	RATIO	2.3000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

Water Quality Report
DCAL-02 - Dry Creek Alluvium
10/01/2015-00:00 to 09/30/2016-23:59

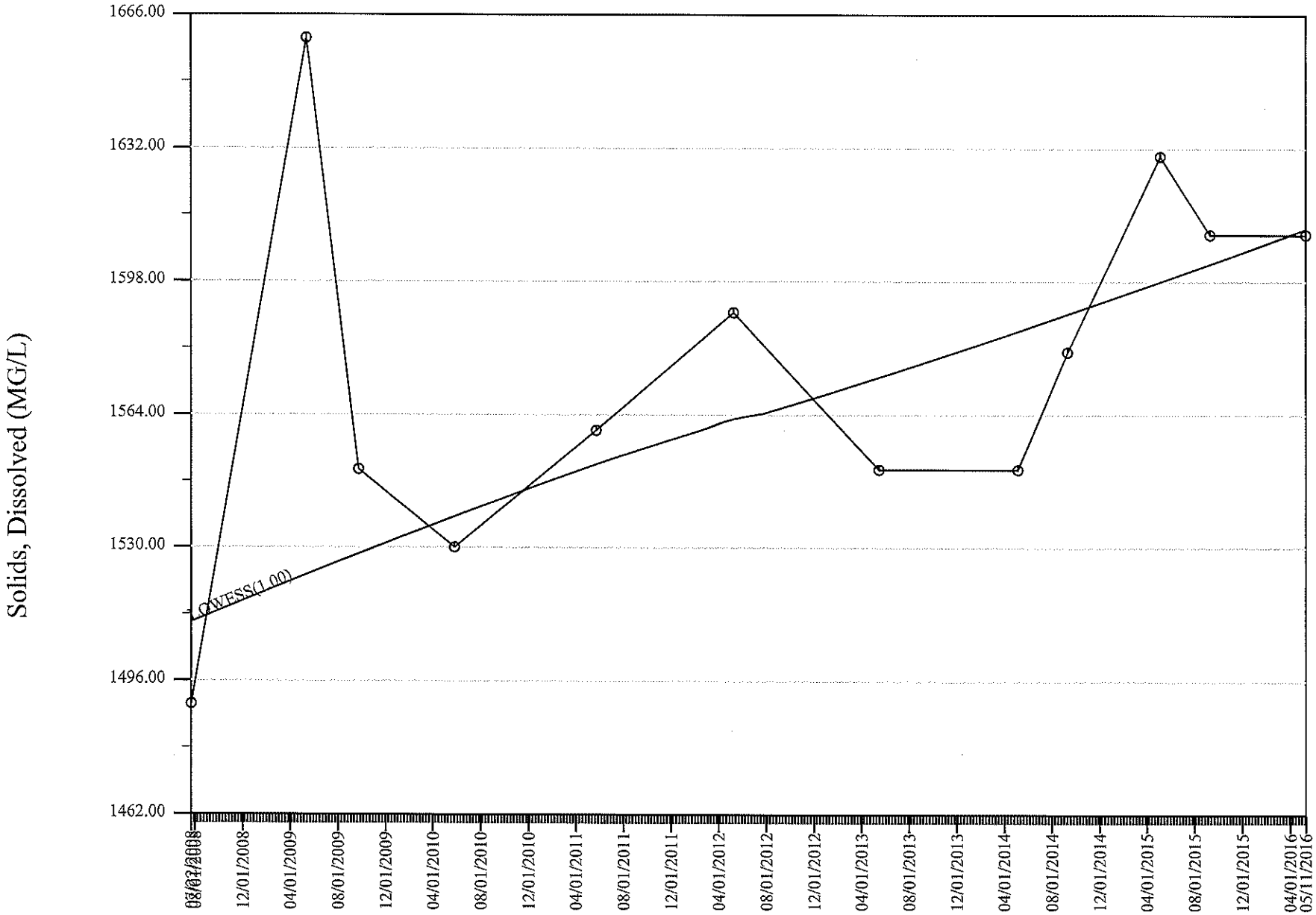
Parameters	Units	05/11/2016 09:40
Laboratory Parameters		
Solids, Diss. (Calc)	MG/L	1620.0000
Sum Of Anions	MEQ/L	28.0000
Sum Of Cations	MEQ/L	26.0000
Tds Ratio	ANAL/CALC	0.9900

"B" -- Between MDL and PQL, "<" -- Less than detection limit

DCAL-02 Sample Remarks

10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/11/2016-09:40	PUMP GAL/GPM: 30/3


Solids, Dissolved (MG/L)
1666.00
1632.00
1598.00
1564.00
1530.00
1496.00
1462.00
QWESS(1.00)
12/01/2008
04/01/2009
08/01/2009
12/01/2009
04/01/2010
08/01/2010
12/01/2010
04/01/2011
08/01/2011
12/01/2011
04/01/2012
08/01/2012
12/01/2012
04/01/2013
08/01/2013
12/01/2013
04/01/2014
08/01/2014
12/01/2014
04/01/2015
08/01/2015
12/01/2015
04/01/2016
05/11/2016
12 samples
DCAL-02

APPENDIX E

SURFACE WATER QUALITY AND HYDROGRAPHS

APPENDIX E

SURFACE WATER QUALITY AND HYDROGRAPHS

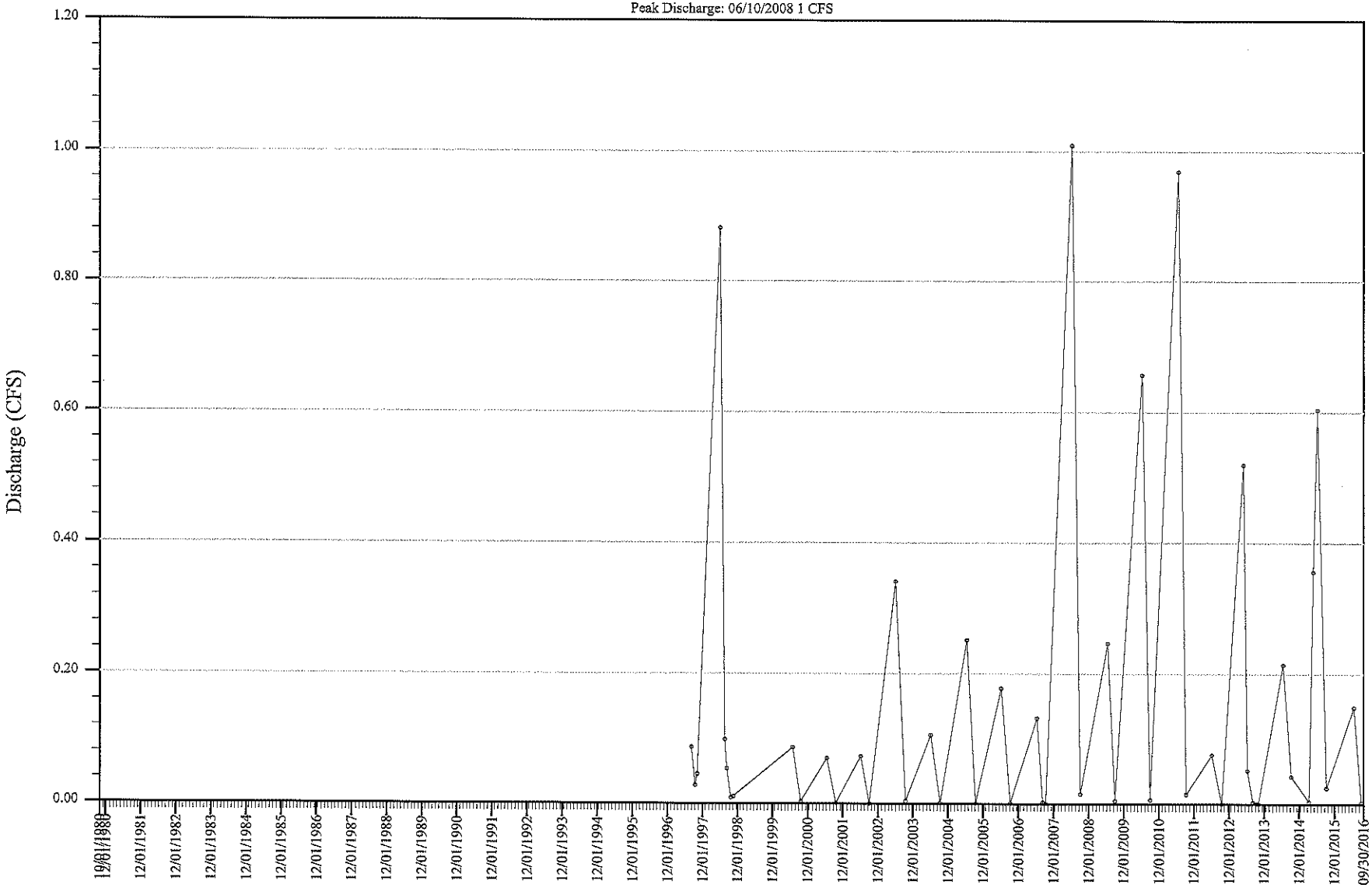
Table of Contents

On water quality reports: < indicates an analytical value below the Method Detection Limit

B indicates an analytical value between the Method Detection Limit and the Practical Quantitation Limit

Discharge Hydrograph

Peak Discharge: 06/10/2008 1 CFS



WSH9

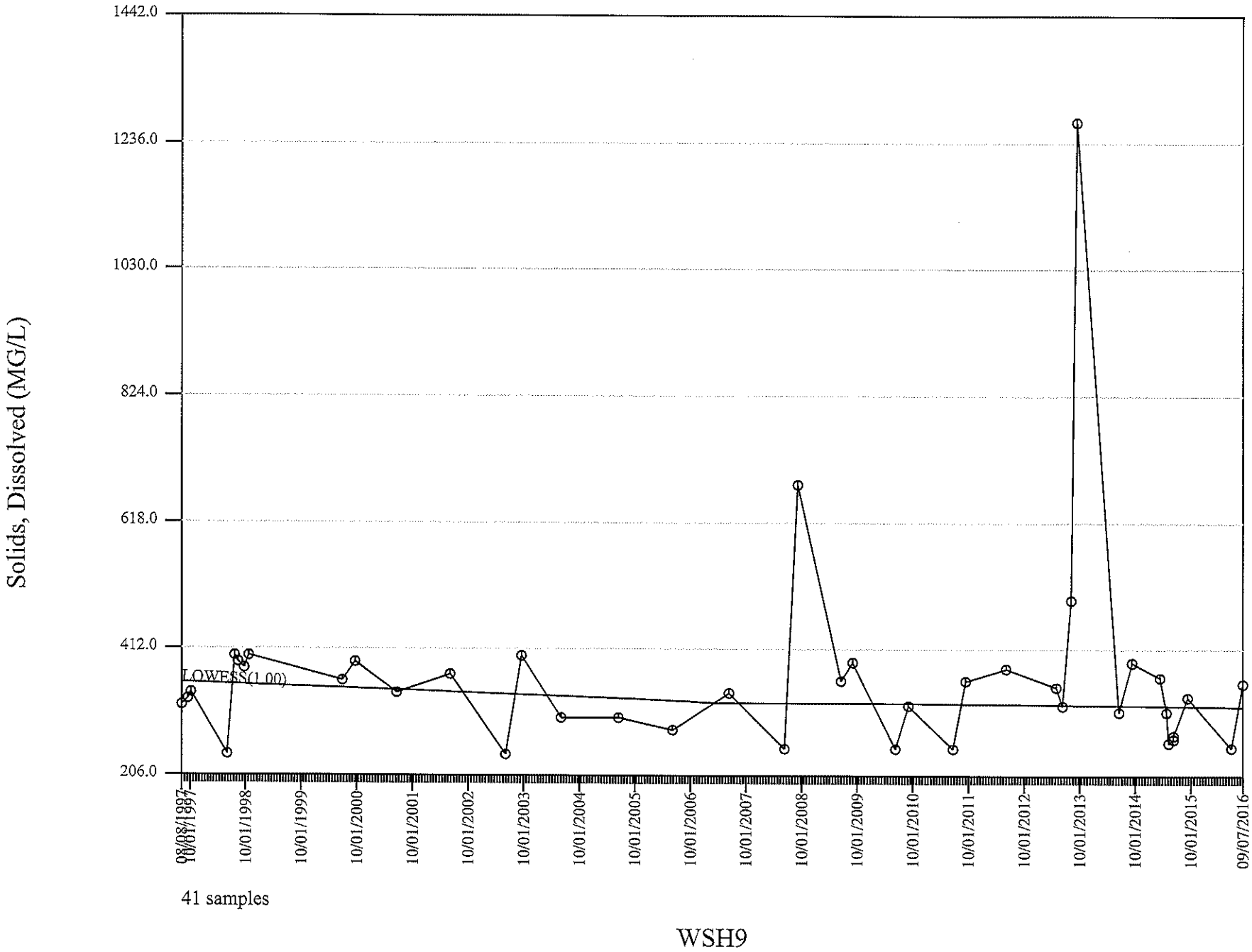
Extended Water Quality Report
WSH9 - SW-S2W-SG9
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	06/22/2016 13:15	09/07/2016 10:15
Field Parameters			
Field Ph	S.U.	7.3100	8.3500
Temperature	C	21.2000	10.5000
Field Conductivity	UMHOS/CM	470.0000	591.0000
Field Salinity	0/00	66.7000	
Flow	CFS	0.1486	0.0022
Laboratory Parameters			
Selenium, Dissolved	UG/L	B 0.2000	< 0.1000
Solids, Dissolved	MG/L	252.0000	356.0000
Solids, Suspended	MG/L	B 12.0000	B 7.0000
Iron, Total Rec.	MG/L	0.2800	0.4800
Selenium, Total Rec.	UG/L	B 0.3000	B 0.2000
Manganese, Pot. Diss.	MG/L	0.0081	0.0038
Selenium, Pot. Diss.	UG/L	B 0.3000	B 0.2000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

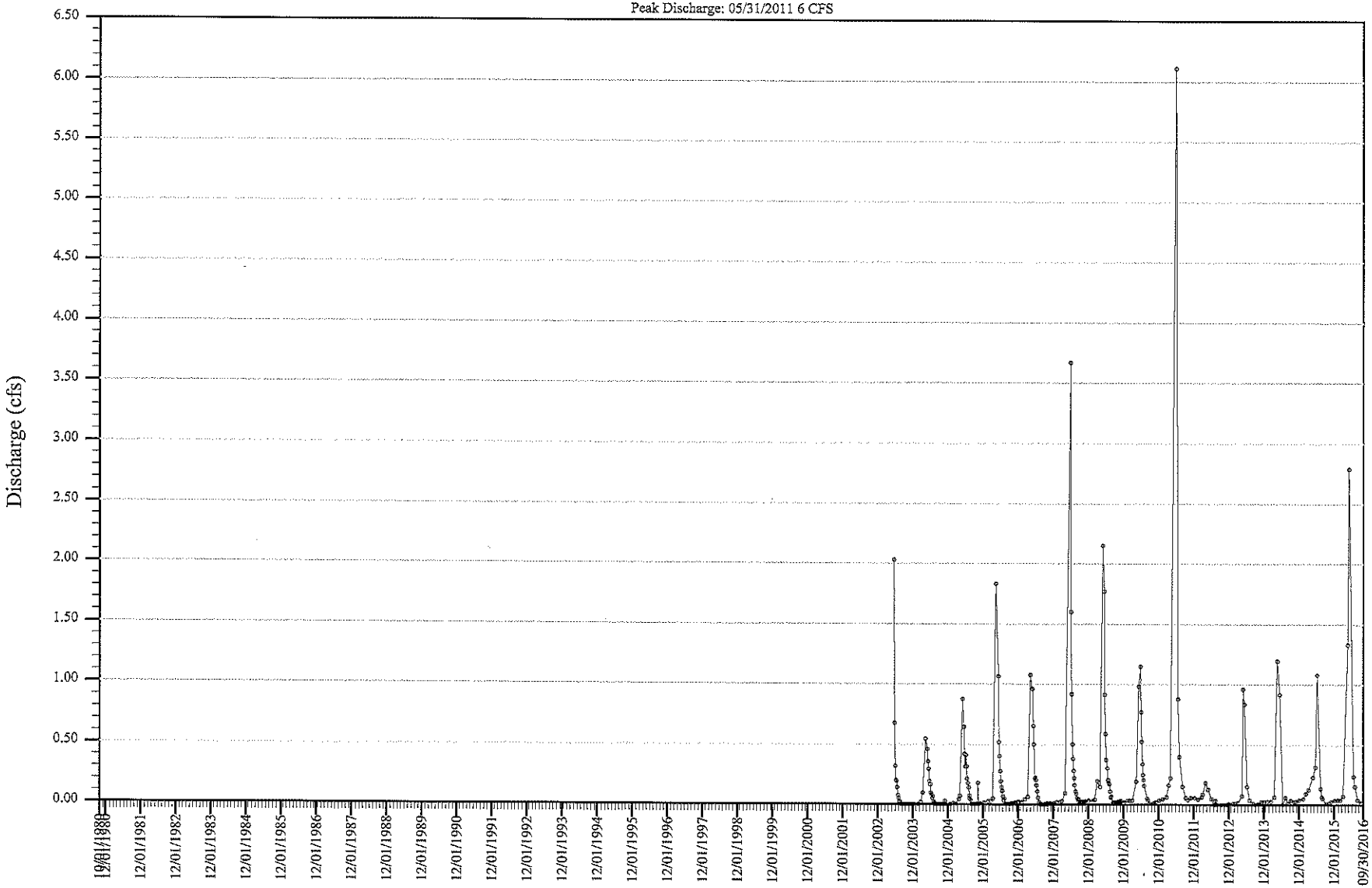
Instantaneous Flow Measurements Report
WSH9 - SW-S2W-SG9
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
06/22/2016	13:15:00	MANF	INS				0.15	66.70	0.10
09/07/2016	10:15:00	MANF	INS				0.00	1.00	0.00


Solids, Dissolved (MG/L)
1442.0
1236.0
1030.0
824.0
618.0
412.0
206.0
LOWESS(1.00)
08/08/1997
10/01/1997
10/01/1998
10/01/1999
10/01/2000
10/01/2001
10/01/2002
10/01/2003
10/01/2004
10/01/2005
10/01/2006
10/01/2007
10/01/2008
10/01/2009
10/01/2010
10/01/2011
10/01/2012
10/01/2013
10/01/2014
10/01/2015
09/07/2016
41 samples
WSH9

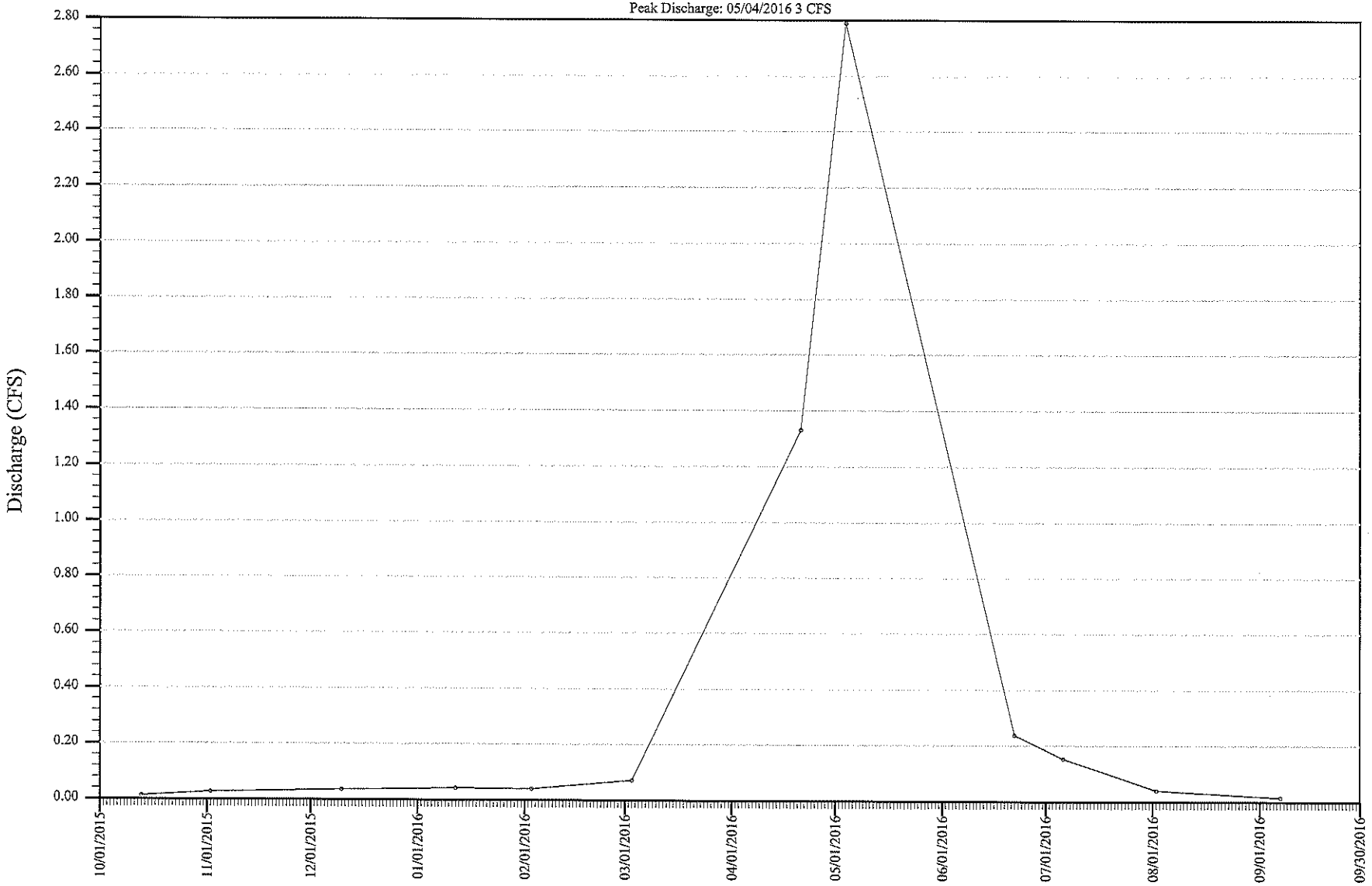
Discharge Hydrograph

Peak Discharge: 05/31/2011 6 CFS



Discharge Hydrograph

Peak Discharge: 05/04/2016 3 CFS



NPDES17

Extended Water Quality Report
NPDES17 - NPDES 017 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	10/13/2015 08:10	11/02/2015 15:40	12/10/2015 10:45	01/12/2016 12:30	02/03/2016 12:45	03/03/2016 11:55	04/21/2016 13:20	05/04/2016 11:50	06/22/2016 12:50
Field Parameters										
Field Ph	S.U.	8.3900	8.5800	8.1400	8.0800	8.2000	8.1700	7.7800	8.1100	7.9000
Temperature	C	9.3000	10.5000	4.3000	2.9000	0.3000	4.0000	14.1000	10.1000	23.2000
Field Conductivity	UMHOS/CM	2650.0000	2370.0000	1830.0000	1550.0000	1590.0000	1320.0000	710.0000	570.0000	970.0000
Flow	CFS	0.0127	0.0267	0.0356	0.0420	0.0397	0.0713	1.3301	2.7895	0.2379
Laboratory Parameters										
Solids, Dissolved	MG/L	2060.0000	1830.0000	1220.0000	1050.0000	1060.0000	2210.0000	446.0000	308.0000	630.0000
Iron, Total Rec.	MG/L	B 0.0800	0.1200	0.1100	0.1000	0.0700	B 0.0900	0.7600	0.2900	0.1100
Selenium, Total Rec.	UG/L	2.7000	2.0000	1.0000	0.9000	1.1000	1.1000	1.3000	1.2000	1.5000
Selenium, Pot. Diss.	UG/L	2.4000	1.9000	1.3000	0.9000	1.6000	1.3000	1.2000	1.2000	1.5000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

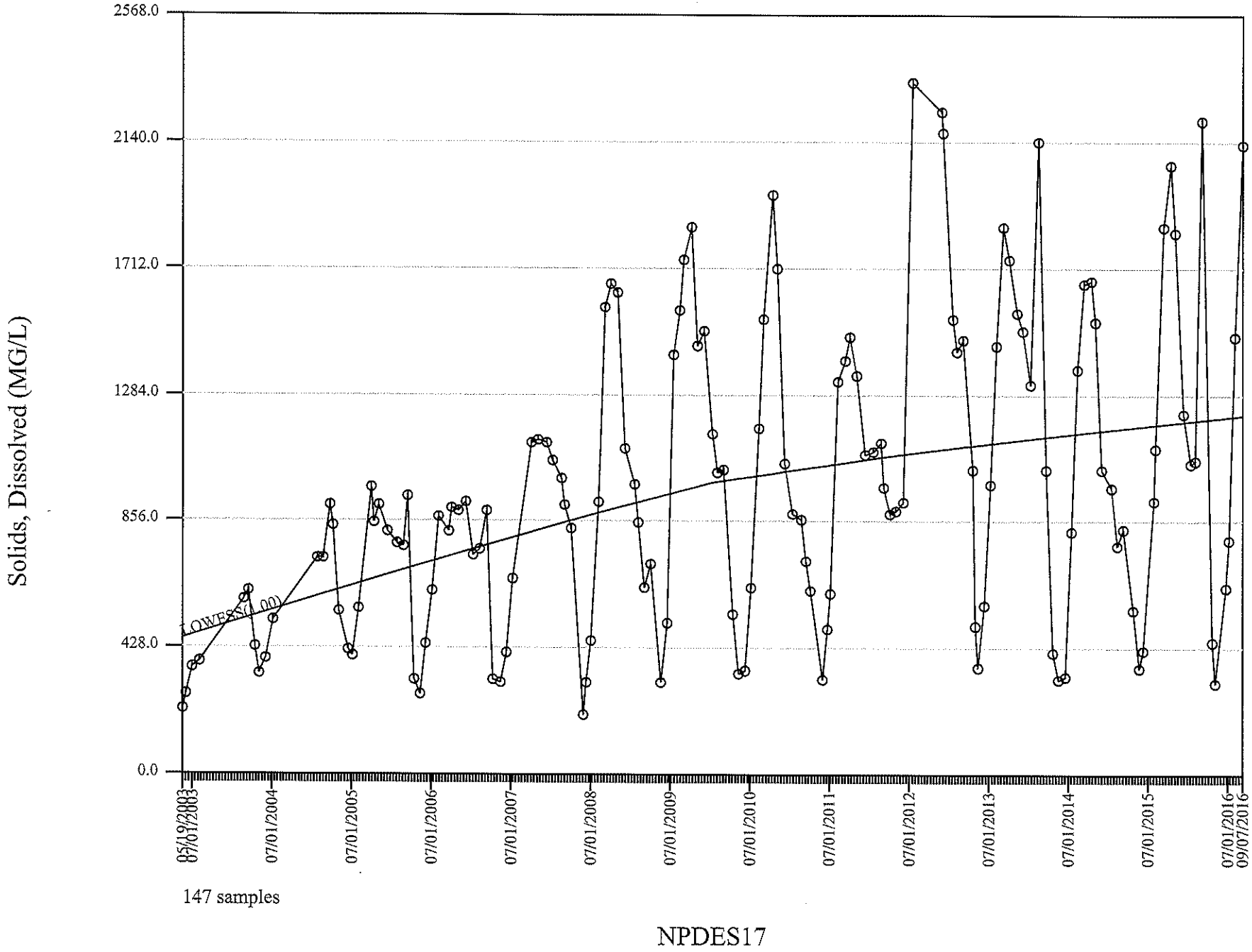
Extended Water Quality Report
NPDES17 - NPDES 017 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	07/06/2016 07:50	08/02/2016 08:15	09/07/2016 09:45
Field Parameters				
Field Ph	S.U.	8.1700	7.7900	8.3900
Temperature	C	17.4000	17.9000	15.5000
Field Conductivity	UMHOS/CM	1106.0000	1808.0000	2580.0000
Flow	CFS	0.1533	0.0397	0.0152
Laboratory Parameters				
Solids, Dissolved	MG/L	792.0000	1480.0000	2130.0000
Iron, Total Rec.	MG/L	0.1100	0.0800	0.1400
Selenium, Total Rec.	UG/L	1.6000	3.3000	4.2000
Selenium, Pot. Diss.	UG/L	1.8000	3.7000	3.6000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

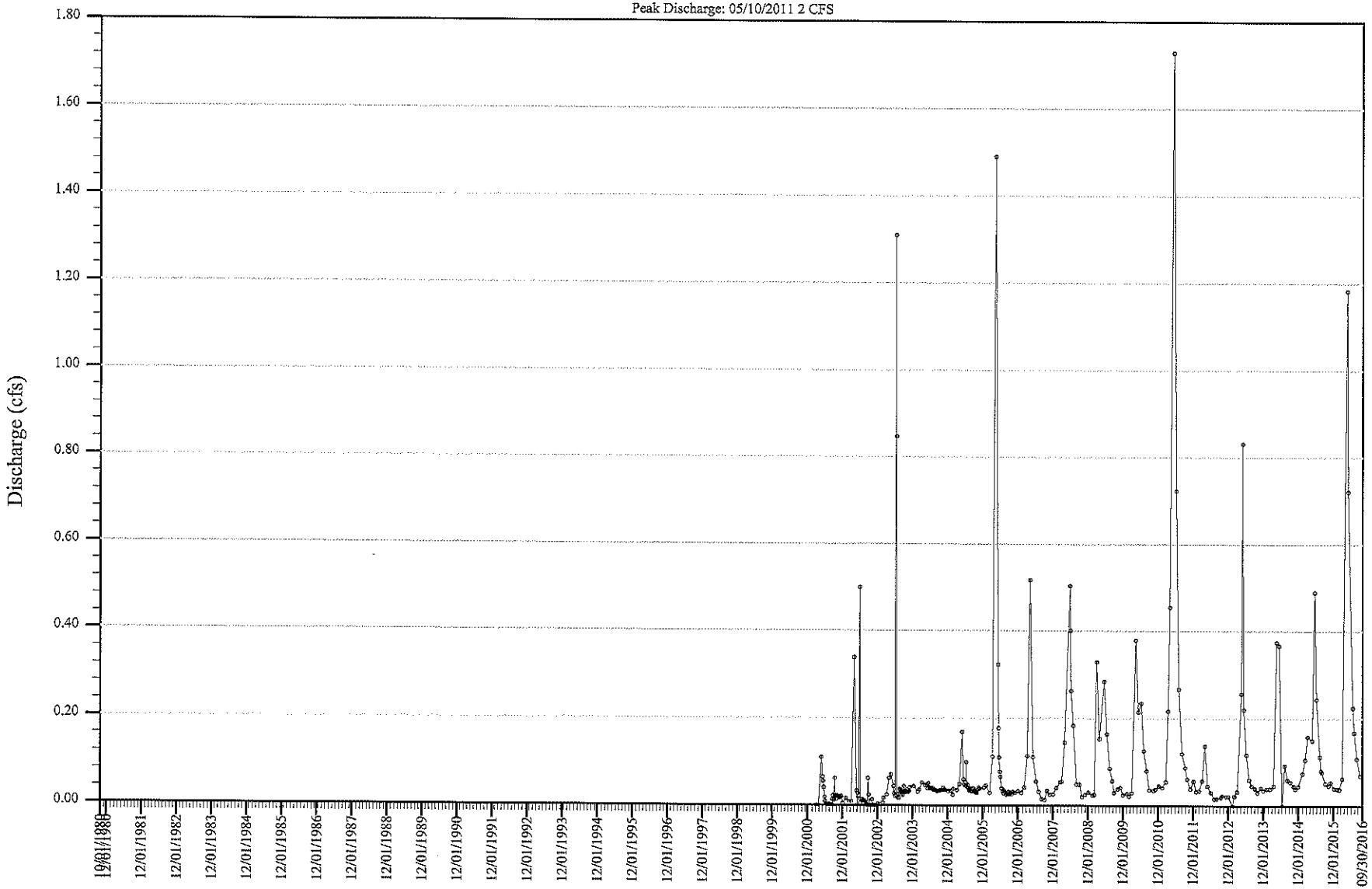
Instantaneous Flow Measurements Report
NPDES17 - NPDES 017 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
10/13/2015	08:10:00	MANF	INS				0.01	5.70	0.01
11/02/2015	15:40:00	MANF	INS				0.03	12.00	0.02
12/10/2015	10:45:00	MANF	INS				0.04	16.00	0.02
01/12/2016	12:30:00	MANF	INS				0.04	18.84	0.03
02/03/2016	12:45:00	MANF	INS				0.04	17.81	0.03
03/03/2016	11:55:00	MANF	INS				0.07	32.00	0.05
04/21/2016	13:20:00	MANF	INS				1.33	597.00	0.86
05/04/2016	11:50:00	MANF	INS				2.79	1252.00	1.80
06/22/2016	12:50:00	MANF	INS				0.24	106.76	0.15
07/06/2016	07:50:00	MANF	INS				0.15	68.80	0.10
08/02/2016	08:15:00	MANF	INS				0.04	17.80	0.03
09/07/2016	09:45:00	MANF	INS				0.02	6.80	0.01


Solids, Dissolved (MG/L)
2568.0
2140.0
1712.0
1284.0
856.0
428.0
0.0
LOWESS(1.00)
05/19/2003
07/01/2003
07/01/2004
07/01/2005
07/01/2006
07/01/2007
07/01/2008
07/01/2009
07/01/2010
07/01/2011
07/01/2012
07/01/2013
07/01/2014
07/01/2015
07/01/2016
09/07/2016
147 samples
NPDES17

Discharge Hydrograph

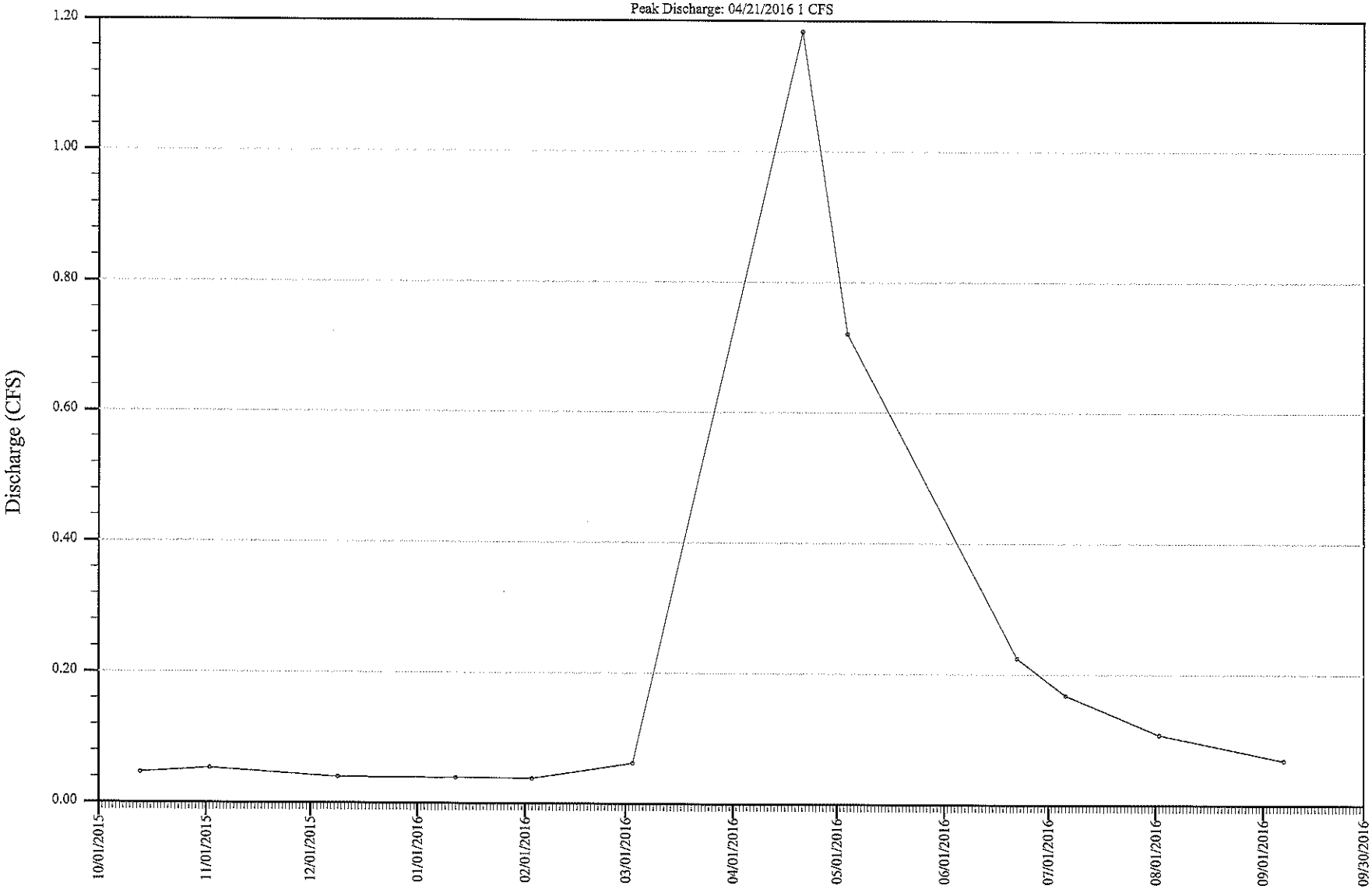
Peak Discharge: 05/10/2011 2 CFS



NPDES16

Discharge Hydrograph

Peak Discharge: 04/21/2016 1 CFS



NPDES16

Extended Water Quality Report
NPDES16 - NPDES 016 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	10/13/2015 08:55	11/02/2015 16:05	12/09/2015 10:10	01/12/2016 13:00	02/03/2016 13:00	03/03/2016 12:15	04/21/2016 13:00	05/04/2016 11:30	06/22/2016 12:20
Field Parameters										
Field Ph	S.U.	7.9100	8.3100	8.0200	7.9800	7.9900	7.8100	7.9100	7.9500	7.5900
Temperature	C	12.8000	8.9000	3.9000	2.3000	1.3000	4.2000	10.7000	11.5000	22.8000
Field Conductivity	UMHOS/CM	2650.0000	2580.0000	2770.0000	2780.0000	2740.0000	2730.0000	1490.0000	1850.0000	2560.0000
Flow	CFS	0.0468	0.0535	0.0401	0.0392	0.0383	0.0624	1.1831	0.7210	0.2245
Laboratory Parameters										
Solids, Dissolved	MG/L	2210.0000	2130.0000	2220.0000	2280.0000	2280.0000	882.0000	1120.0000	1370.0000	2170.0000
Iron, Total Rec.	MG/L	< 0.0400	< 0.0200	< 0.0400	B 0.0600	< 0.0400	B 0.0400	0.3800	0.3900	< 0.0400
Selenium, Total Rec.	UG/L	1.3000	1.3000	2.0000	2.8000	3.3000	3.4000	1.4000	1.7000	2.7000
Selenium, Pot. Diss.	UG/L	0.9000	1.2000	2.4000	2.9000	3.4000	3.7000	1.4000	1.8000	2.7000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

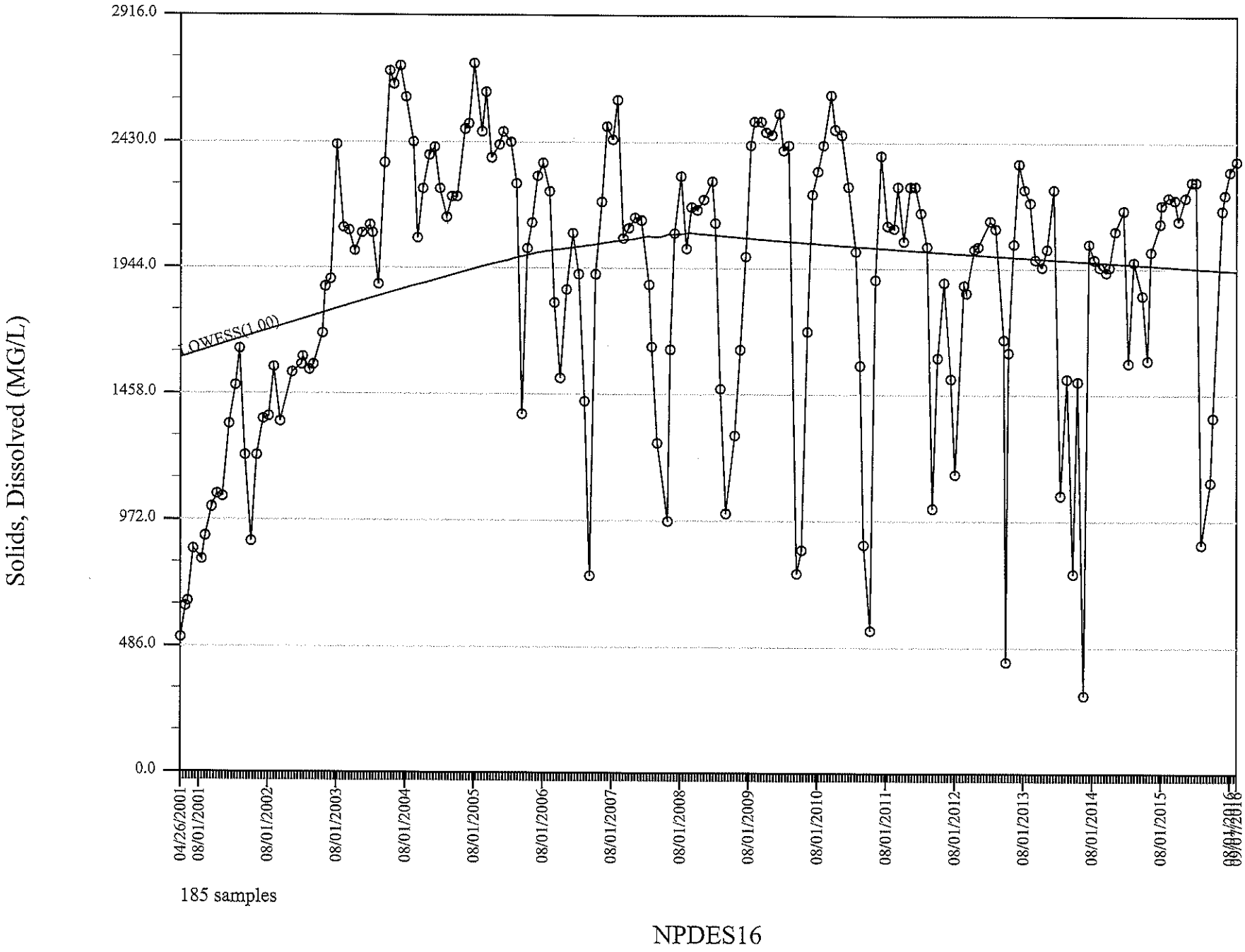
Extended Water Quality Report
NPDES16 - NPDES 016 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	07/06/2016 08:20	08/02/2016 09:00	09/07/2016 11:00
Field Parameters				
Field Ph	S.U.	7.7100	7.7600	7.9300
Temperature	C	18.8000	20.0000	17.1000
Field Conductivity	UMHOS/CM	2570.0000	2690.0000	2720.0000
Flow	CFS	0.1678	0.1078	0.0691
Laboratory Parameters				
Solids, Dissolved	MG/L	2230.0000	2320.0000	2360.0000
Iron, Total Rec.	MG/L	< 0.0400	B 0.0600	< 0.0400
Selenium, Total Rec.	UG/L	2.5000	1.8000	1.4000
Selenium, Pot. Diss.	UG/L	2.5000	1.9000	1.4000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

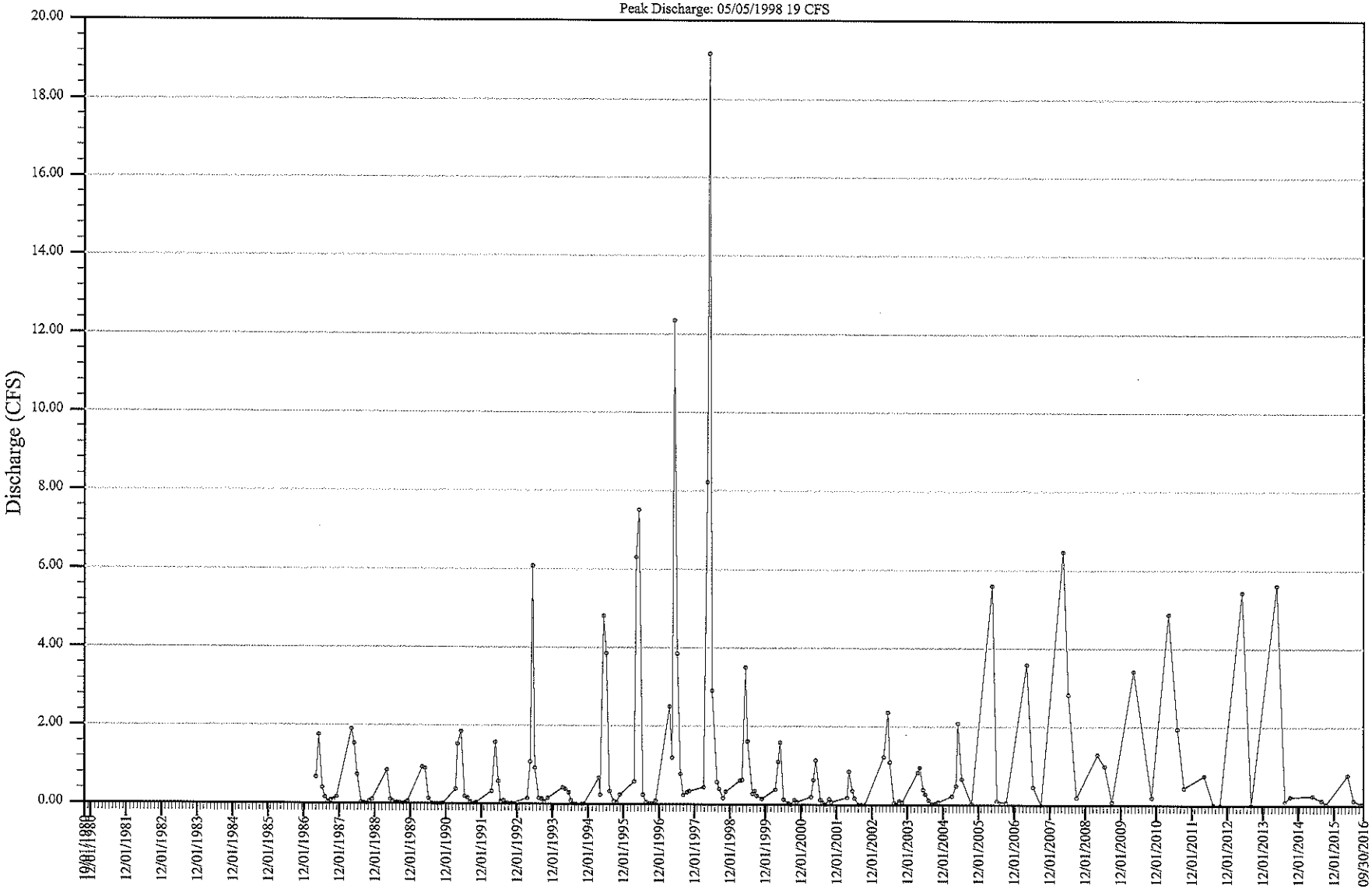
Instantaneous Flow Measurements Report
NPDES16 - NPDES 016 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
10/13/2015	08:55:00	MANF	INS				0.05	21.00	0.03
11/02/2015	16:05:00	MANF	INS				0.05	24.00	0.03
12/09/2015	10:10:00	MANF	INS				0.04	18.00	0.03
01/12/2016	13:00:00	MANF	INS				0.04	17.60	0.03
02/03/2016	13:00:00	MANF	INS				0.04	17.19	0.02
03/03/2016	12:15:00	MANF	INS				0.06	28.00	0.04
04/21/2016	13:00:00	MANF	INS				1.18	531.00	0.76
05/04/2016	11:30:00	MANF	INS				0.72	323.60	0.47
06/22/2016	12:20:00	MANF	INS				0.22	100.78	0.15
07/06/2016	08:20:00	MANF	INS				0.17	75.30	0.11
08/02/2016	09:00:00	MANF	INS				0.11	48.40	0.07
09/07/2016	11:00:00	MANF	INS				0.07	31.01	0.04


Solids, Dissolved (MG/L)
2916.0
2430.0
1944.0
1458.0
972.0
486.0
0.0
LOWESS(1.00)
04/26/2001
08/01/2001
08/01/2002
08/01/2003
08/01/2004
08/01/2005
08/01/2006
08/01/2007
08/01/2008
08/01/2009
08/01/2010
08/01/2011
08/01/2012
08/01/2013
08/01/2014
08/01/2015
185 samples
NPDES16

Discharge Hydrograph

Peak Discharge: 05/05/1998 19 CFS



WSH7

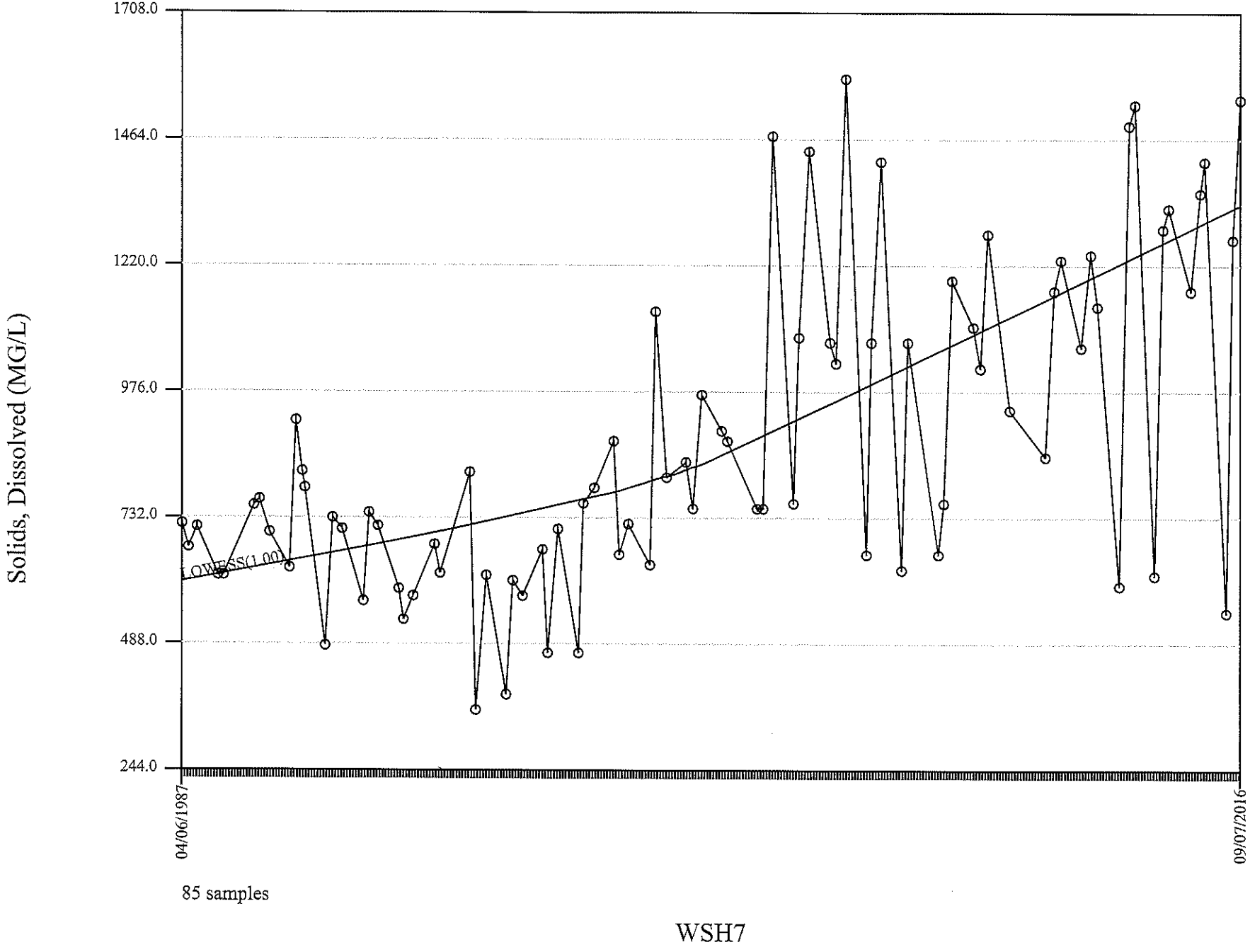
Extended Water Quality Report
WSH7 - SW-S2W-SG7
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	04/20/2016 16:50	06/22/2016 11:35	09/07/2016 08:50
Field Parameters				
Field Ph	S.U.	8.2000	7.7100	8.1900
Temperature	C	14.1000	19.4000	9.9000
Field Conductivity	UMHOS/CM	880.0000	1700.0000	1934.0000
Flow	CFS	0.7753	0.1225	0.0352
Laboratory Parameters				
Selenium, Dissolved	UG/L	1.0000	1.7000	0.8000
Solids, Dissolved	MG/L	548.0000	1270.0000	1540.0000
Solids, Suspended	MG/L	475.0000	130.0000	52.0000
Iron, Total Rec.	MG/L	20.3000	4.1800	2.2900
Selenium, Total Rec.	UG/L	1.2000	1.7000	0.8000
Manganese, Pot. Diss.	MG/L	0.0112	0.0183	0.0130
Selenium, Pot. Diss.	UG/L	1.0000	1.5000	1.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

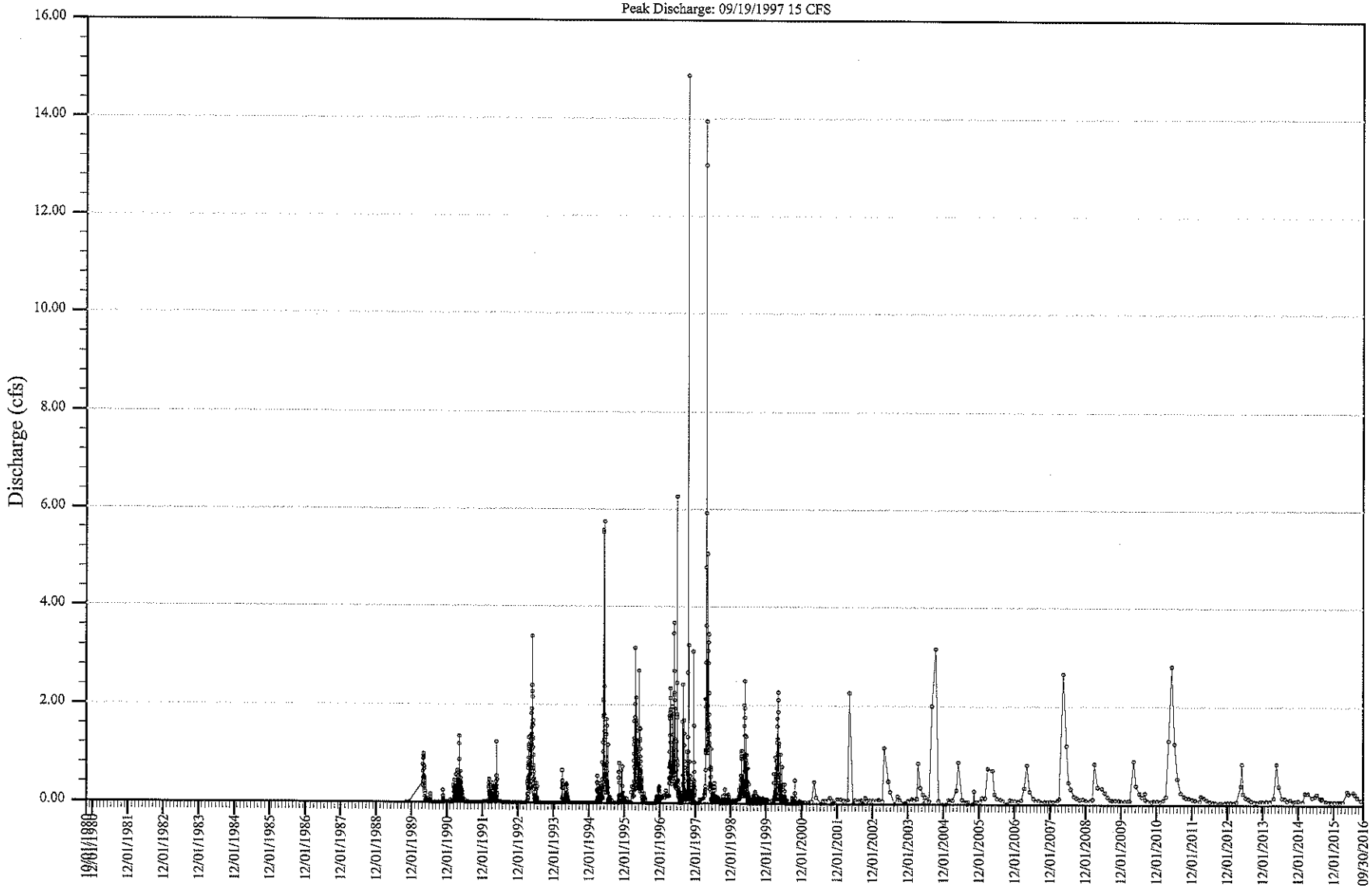
Instantaneous Flow Measurements Report
WSH7 - SW-S2W-SG7
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
04/20/2016	16:50:00	MANF	INS				0.78	348.00	0.50
06/22/2016	11:35:00	MANF	INS				0.12	55.00	0.08
09/07/2016	08:50:00	MANF	INS				0.04	15.82	0.02


1708.0
1464.0
1220.0
976.0
732.0
488.0
244.0
Solids, Dissolved (MG/L)
LOWESS(1.00)
04/06/1987
09/07/2016
85 samples
WSH7

Discharge Hydrograph

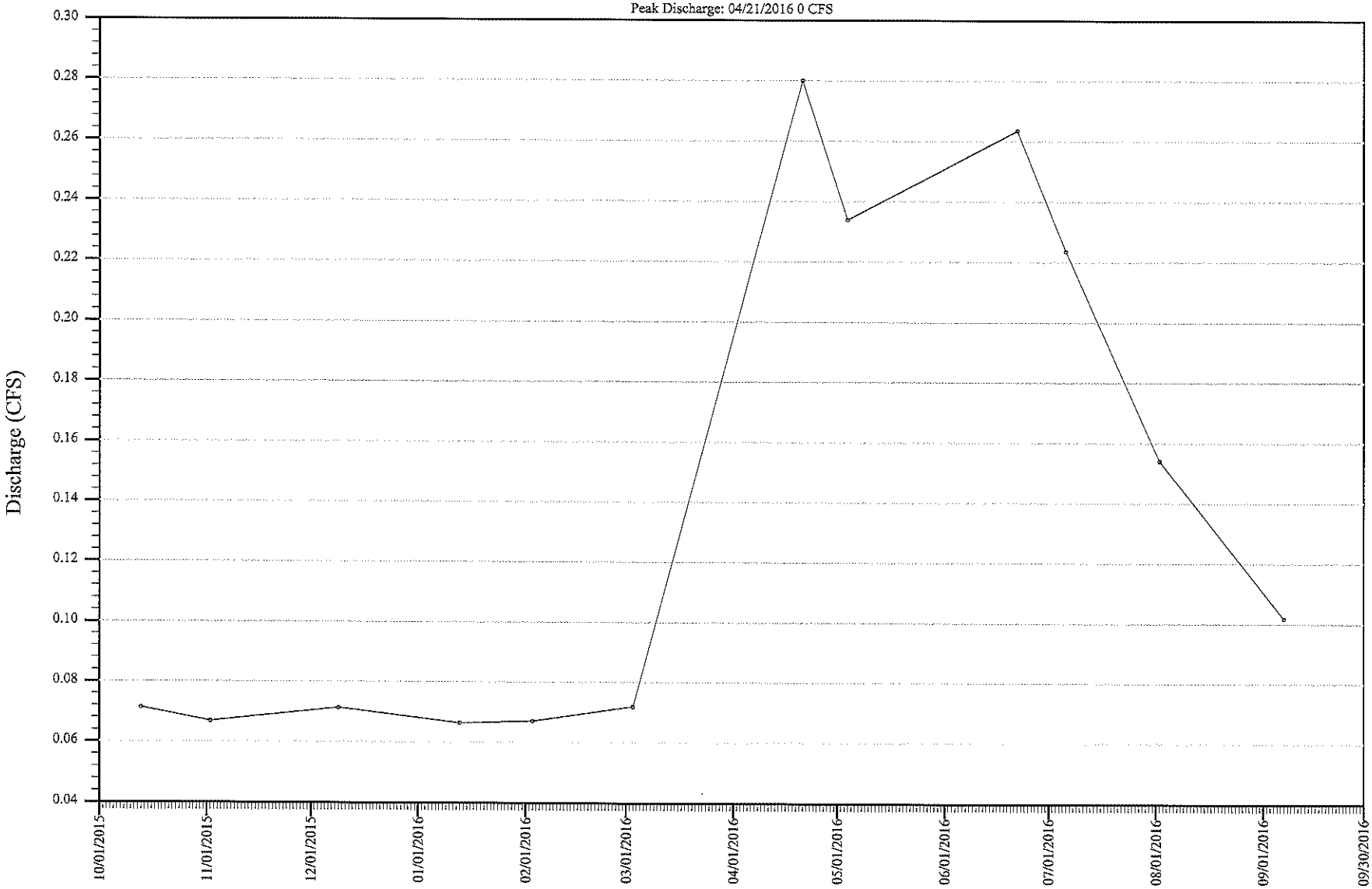
Peak Discharge: 09/19/1997 15 CFS



NPDES6

Discharge Hydrograph

Peak Discharge: 04/21/2016 0 CFS



NPDES6

Extended Water Quality Report
NPDES6 - NPDES 006 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	10/13/2015 09:35	11/02/2015 16:30	12/09/2015 10:45	01/13/2016 09:00	02/03/2016 12:15	03/03/2016 11:25	04/21/2016 12:25	05/04/2016 10:45	06/22/2016 12:00
Field Parameters										
Field Ph	S.U.	7.7300	8.1500	7.8900	7.3200	7.6800	7.4000	7.4300	7.8100	7.5600
Temperature	C	14.4000	8.9000	4.2000	4.3000	3.9000	4.9000	10.3000	11.9000	22.4000
Field Conductivity	UMHOS/CM	4020.0000	4010.0000	4180.0000	4440.0000	4190.0000	3310.0000	1680.0000	3510.0000	4300.0000
Flow	CFS	0.0713	0.0668	0.0713	0.0664	0.0670	0.0719	0.2801	0.2339	0.2635
Laboratory Parameters										
Solids, Dissolved	MG/L	3900.0000	4370.0000	3790.0000	3890.0000	3760.0000	2740.0000	1270.0000	3130.0000	4250.0000
Iron, Total Rec.	MG/L	0.1800	0.1200	B 0.0700	0.2000	B 0.0800	B 0.0900	0.7600	B 0.0700	< 0.1000
Selenium, Total Rec.	UG/L	< 0.2000	< 0.5000	B 0.2000	< 0.1000	< 0.2000	0.7000	1.9000	3.8000	0.7000
Manganese, Pot. Diss.	MG/L	< 0.0050			2.0500			0.1470		
Selenium, Pot. Diss.	UG/L	B 0.2000	< 0.5000	B 0.2000	B 0.2000	1.8000	1.2000	1.2000	4.0000	1.2000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

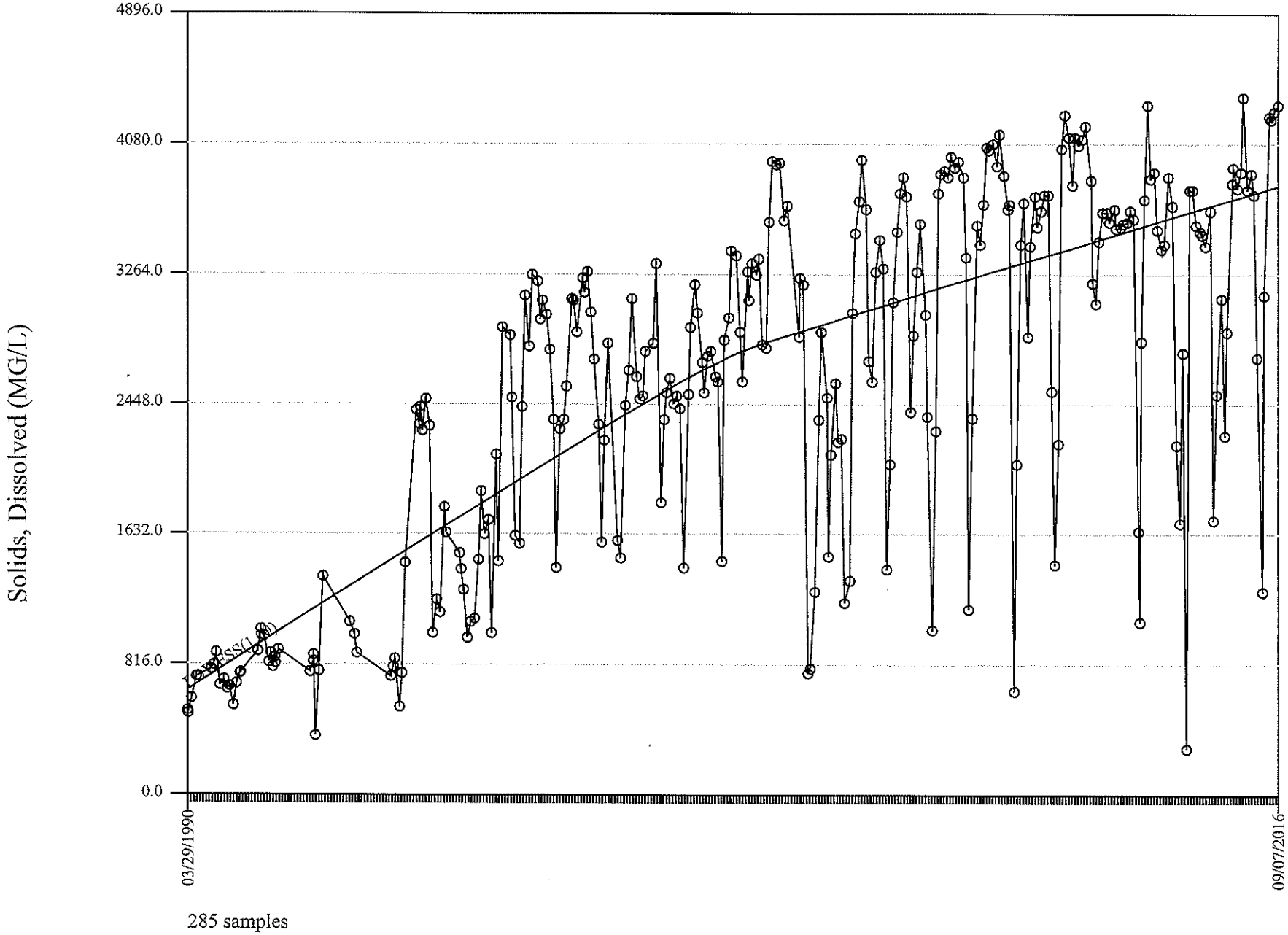
Extended Water Quality Report
NPDES6 - NPDES 006 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	07/06/2016 07:00	08/02/2016 07:30	09/07/2016 09:15
Field Parameters				
Field Ph	S.U.	7.6400	7.7500	7.8900
Temperature	C	18.3000	18.9000	15.4000
Field Conductivity	UMHOS/CM	4190.0000	4330.0000	4380.0000
Flow	CFS	0.2235	0.1542	0.1018
Laboratory Parameters				
Solids, Dissolved	MG/L	4230.0000	4280.0000	4320.0000
Iron, Total Rec.	MG/L	B 0.0500	B 0.0400	< 0.1000
Selenium, Total Rec.	UG/L	0.4000	0.4000	< 0.5000
Manganese, Pot. Diss.	MG/L	0.0620		
Selenium, Pot. Diss.	UG/L	0.6000	< 0.5000	< 0.5000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

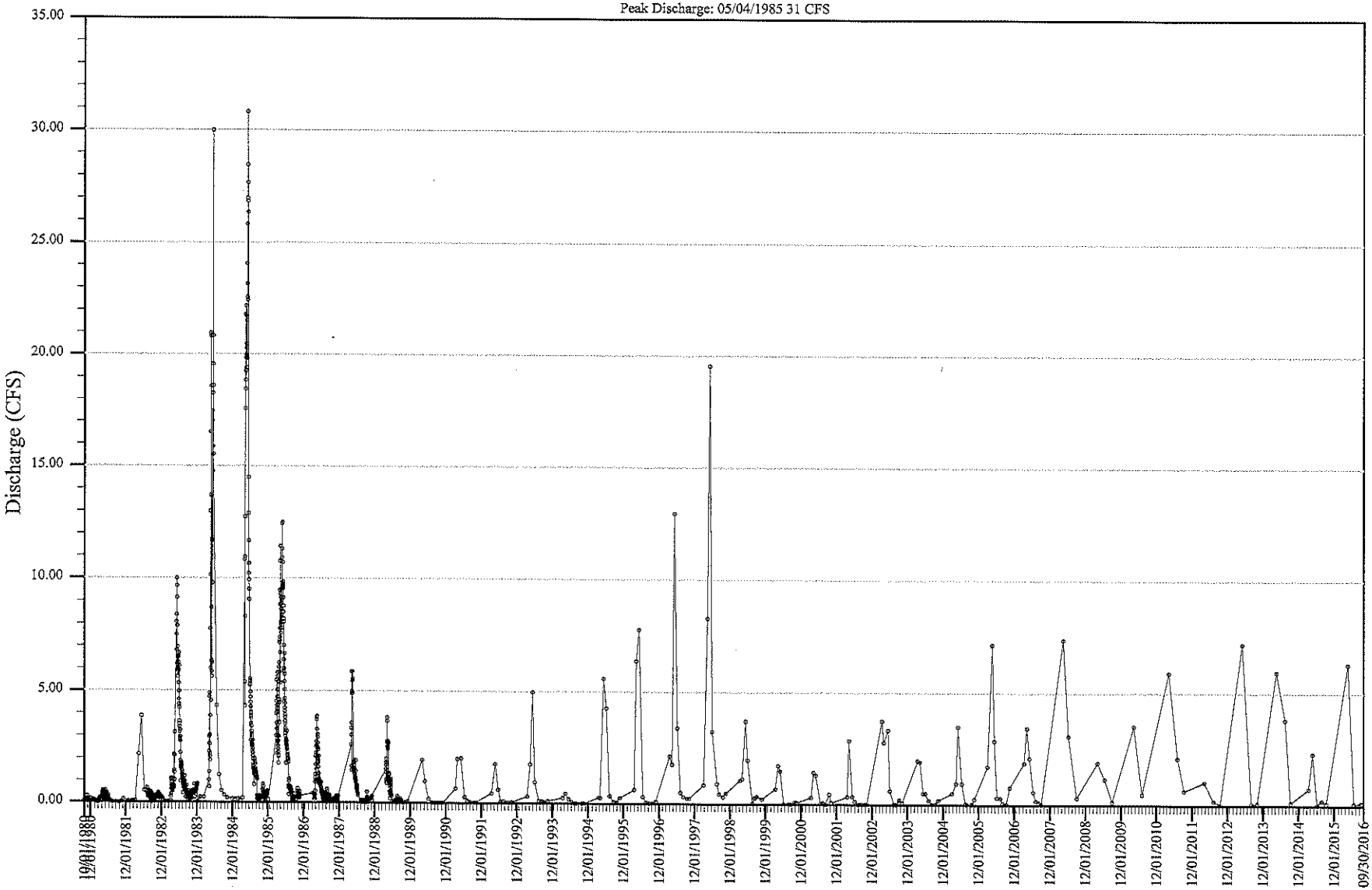
Instantaneous Flow Measurements Report
NPDES6 - NPDES 006 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
10/13/2015	09:35:00	MANF	INS				0.07	32.00	0.05
11/02/2015	16:30:00	MANF	INS				0.07	30.00	0.04
12/09/2015	10:45:00	MANF	INS				0.07	32.00	0.05
01/13/2016	09:00:00	MANF	INS				0.07	29.78	0.04
02/03/2016	12:15:00	MANF	INS				0.07	30.08	0.04
03/03/2016	11:25:00	MANF	INS				0.07	32.26	0.05
04/21/2016	12:25:00	MANF	INS				0.28	125.70	0.18
05/04/2016	10:45:00	MANF	INS				0.23	105.00	0.15
06/22/2016	12:00:00	MANF	INS				0.26	118.27	0.17
07/06/2016	07:00:00	MANF	INS				0.22	100.30	0.14
08/02/2016	07:30:00	MANF	INS				0.15	69.20	0.10
09/07/2016	09:15:00	MANF	INS				0.10	45.69	0.07


4896.0
4080.0
3264.0
2448.0
1632.0
816.0
0.0
Solids, Dissolved (MG/L)
03/29/1990
09/07/2016
285 samples
NPDES6

Discharge Hydrograph

Peak Discharge: 05/04/1985 31 CFS



WSHF1

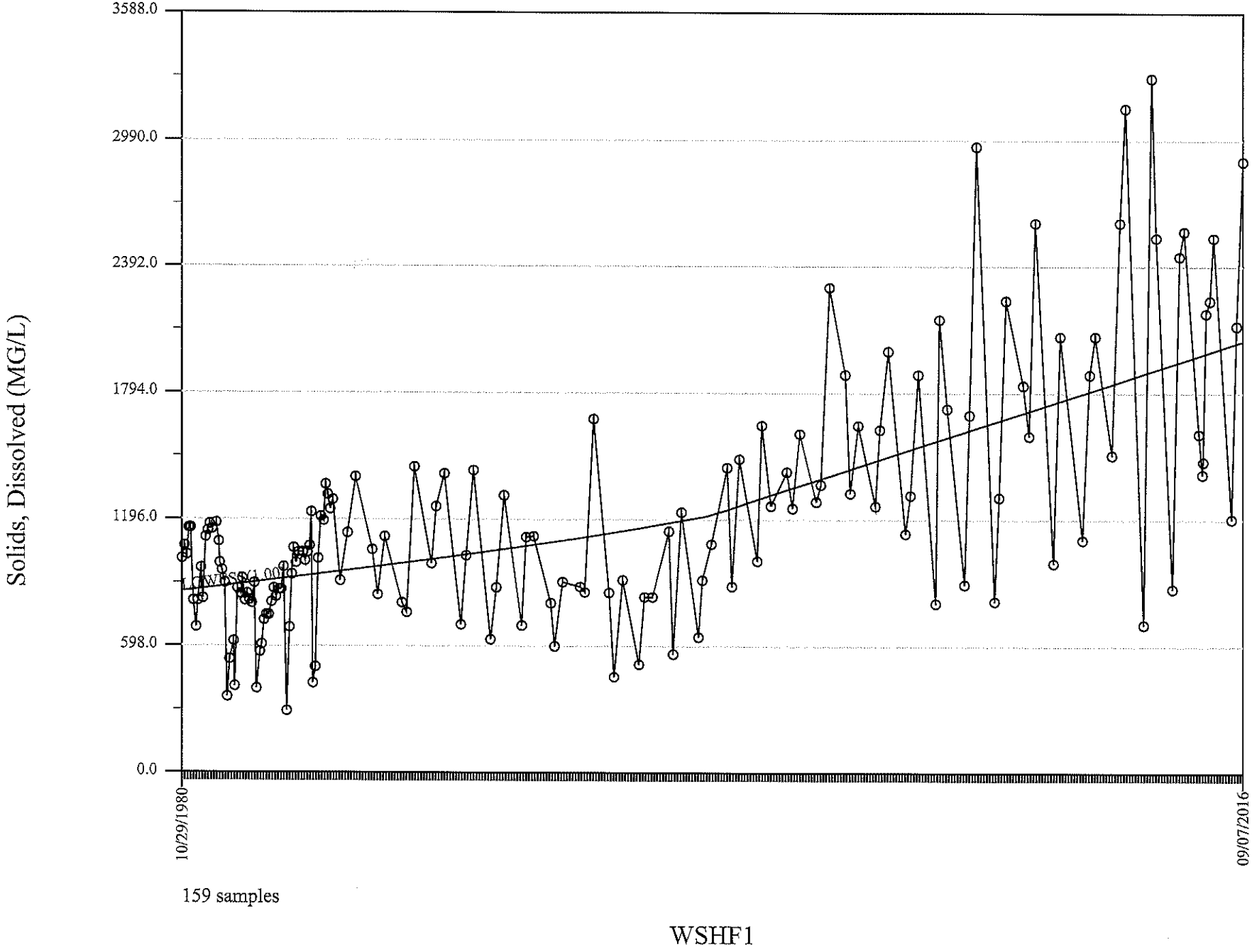
Extended Water Quality Report
WSHF1 - SW-S2W-FG1
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	04/20/2016 16:15	06/22/2016 11:15	09/07/2016 08:30
Field Parameters				
Field Ph	S.U.	8.1500	7.6800	7.9800
Temperature	C	14.8000	20.0000	9.3000
Field Conductivity	UMHOS/CM	1650.0000	2510.0000	3350.0000
Flow	CFS	6.3053	0.0758	0.1143
Laboratory Parameters				
Mercury, Total	UG/L	< 0.2000	< 0.2000	
Ammonia Nitrogen_N	MG/L	< 0.0500	< 0.0500	
Nitrate Nitrogen_N	MG/L	0.3100	0.2000	
Nitrite Nitrogen_N	MG/L	< 0.0100	< 0.0100	
Nitrate/Nitrite Nitrogen_N	MG/L	0.3200	0.2000	
Selenium, Dissolved	UG/L	1.2000	1.0000	B 0.3000
Solids, Dissolved	MG/L	1200.0000	2110.0000	2890.0000
Solids, Suspended	MG/L	334.0000	29.0000	66.0000
Sulfate	MG/L	650.0000	1210.0000	
Sulfide	MG/L	< 0.0200	< 0.0200	
Iron, Total Rec.	MG/L	11.5000	1.0800	2.7900
Selenium, Total Rec.	UG/L	1.4000	1.2000	B 0.4000
Manganese, Pot. Diss.	MG/L	0.0352	0.0440	0.2470
Selenium, Pot. Diss.	UG/L	1.1000	1.1000	B 0.5000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

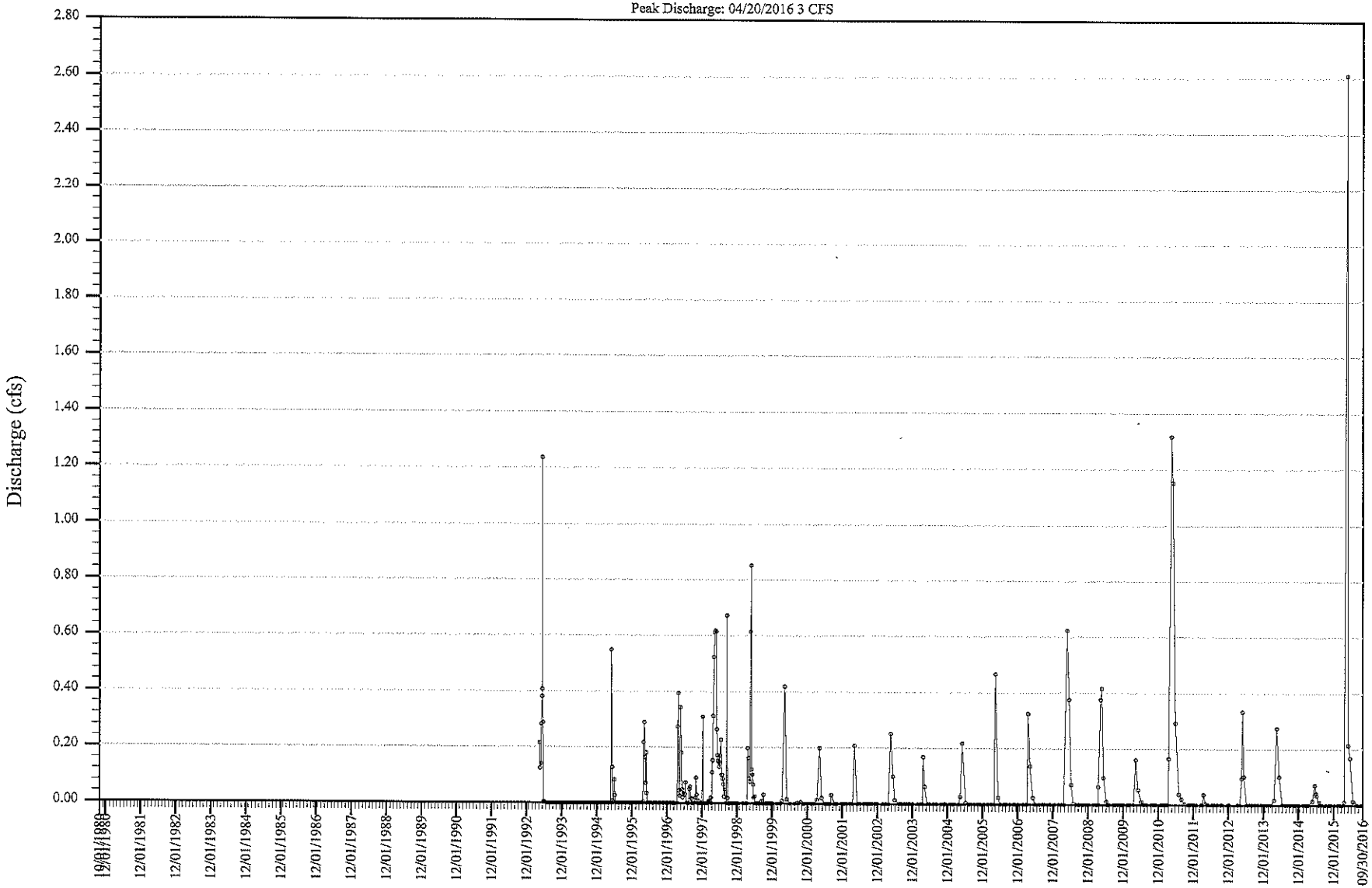
Instantaneous Flow Measurements Report
WSHF1 - SW-S2W-FG1
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
04/20/2016	16:15:00	MANF	INS				6.31	2830.00	4.08
06/22/2016	11:15:00	MANF	INS				0.08	34.00	0.05
09/07/2016	08:30:00	MANF	INS				0.11	51.30	0.07


Solids, Dissolved (MG/L)
3588.0
2990.0
2392.0
1794.0
1196.0
598.0
0.0
10/29/1980
09/07/2016
159 samples
WSHF1

Discharge Hydrograph

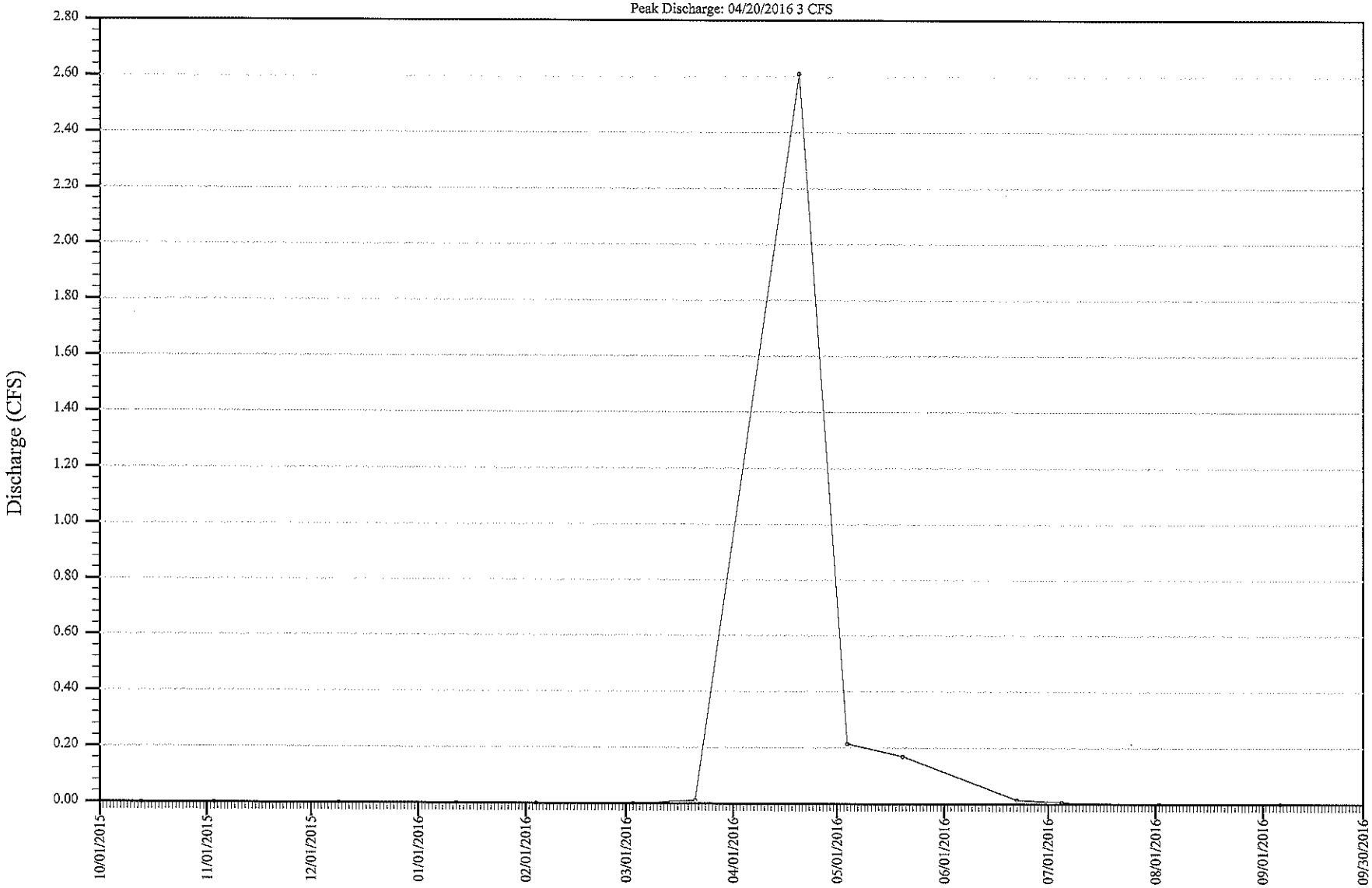
Peak Discharge: 04/20/2016 3 CFS



NPDES5

Discharge Hydrograph

Peak Discharge: 04/20/2016 3 CFS



NPDES5

Extended Water Quality Report
NPDES5 - NPDES 005 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	03/21/2016 08:15	03/21/2016 08:30	04/20/2016 15:55	05/04/2016 14:15	05/20/2016 06:30	06/22/2016 14:00	07/05/2016 16:45
Field Parameters								
Field Ph	S.U.	8.0100		8.3700	7.9400	7.7100	7.7900	8.0300
Temperature	C	2.9000		10.9000	16.2000	12.5000	23.7000	20.6000
Field Conductivity	UMHOS/CM	2790.0000		2780.0000	3700.0000	4050.0000	4460.0000	4550.0000
Flow	CFS	0.0116	0.0116	2.6090	0.2150	0.1693	0.0143	0.0062
Laboratory Parameters								
Alk As CaCO3, Ph 4.5	MG/L			298.0000				
Alk, Bicarb As CaCO3	MG/L			271.0000				
Alk, Carb As CaCO3	MG/L			26.6000				
Alk, Hydrox As CaCO3	MG/L			< 2.0000				
Boron, Dissolved	UG/L			270.0000				
Cadmium, Dissolved	UG/L			< 0.2000				
Calcium, Dissolved	MG/L			251.0000				
Chloride	MG/L			11.6000				
Chromium, Dissolved	UG/L			< 1.0000				
Conductivity	UMS/CM2			2460.0000				
Copper, Dissolved	UG/L			< 1.0000				
Hardness As CaCO3	MG/L			1680.0000				
Lead, Dissolved	UG/L			B 0.6000				
Magnesium, Dissolved	MG/L			255.0000				
Manganese, Dissolved	MG/L			0.1160				
Mercury, Total	UG/L			< 0.2000				0.0006
Nickel, Dissolved	UG/L			B 17.0000				
Ammonia Nitrogen_N	MG/L			< 0.0500				
Nitrate Nitrogen_N	MG/L			0.1700				
Nitrite Nitrogen_N	MG/L			< 0.0100				
Nitrate/Nitrite Nitrogen_N	MG/L			0.1800				
Ph At 25 Deg. Cent.	S.U.			8.5000				
Potassium, Dissolved	MG/L			7.8000				
Selenium, Dissolved	UG/L			1.2000				
Silver, Dissolved	UG/L			< 0.1000				
Sodium, Dissolved	MG/L			59.5000				
Solids, Dissolved	MG/L		2310.0000	2370.0000	3540.0000		4730.0000	4800.0000
Solids, Suspended	MG/L			75.0000				
Sulfate	MG/L			1640.0000				
Sulfide	MG/L			< 0.0200				
Zinc, Dissolved	MG/L			< 0.0100				
Bicarbonate As HCO3	MG/L			331.0000				
Carbonate As CO3	MG/L			B 15.9000				
Hydroxide As OH	MG/L			< 2.0000				
Cation_Anion Balance	PERCENT			< -6.5000				
Sar	RATIO			0.6400				
Solids, Diss. (Calc)	MG/L			2410.0000				

"B" -- Between MDL and PQL, "<" -- Less than detection limit

Extended Water Quality Report
NPDES5 - NPDES 005 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	03/21/2016 08:15	03/21/2016 08:30	04/20/2016 15:55	05/04/2016 14:15	05/20/2016 06:30	06/22/2016 14:00	07/05/2016 16:45
Laboratory Parameters								
Sum Of Anions	MEQ/L			41.0000				
Sum Of Cations	MEQ/L			36.0000				
Arsenic, Total Rec.	UG/L			B 1.0000				
Iron, Total Rec.	MG/L		< 0.0400	1.8200	B 0.0500		< 0.1000	< 0.0200
Selenium, Total Rec.	UG/L			1.2000				0.6000
Tds Ratio	ANAL/CALC			0.9800				
Cadmium, Pot. Diss.	UG/L							< 0.1000
Chromium, Pot. Diss.	UG/L							< 0.5000
Copper, Pot. Diss.	UG/L							< 0.5000
Lead, Pot. Diss.	UG/L							< 0.1000
Nickel, Pot. Diss.	UG/L							B 12.0000
Selenium, Pot. Diss.	UG/L							1.3000
Silver, Pot. Diss.	UG/L							< 0.0500
Zinc, Pot. Diss.	MG/L							< 0.0100

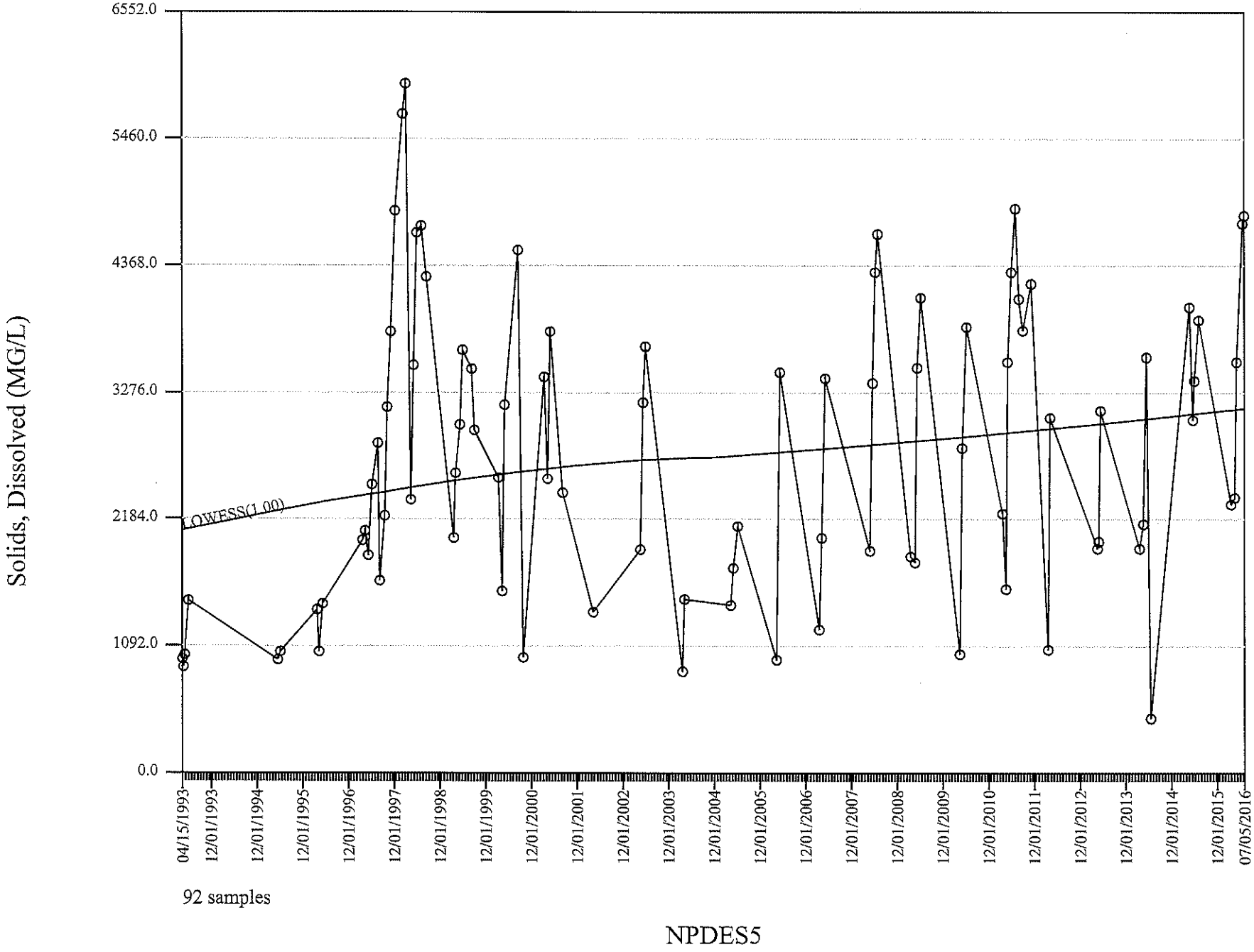
"B" -- Between MDL and PQL, "<" -- Less than detection limit

Instantaneous Flow Measurements Report
NPDES5 - NPDES 005 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
10/13/2015	10:10:00	MANF	INS				0.00	0.00	0.00
11/03/2015	07:30:00	MANF	INS				0.00	0.00	0.00
12/09/2015	11:15:00	MANF	INS				0.00	0.00	0.00
01/12/2016	16:30:00	MANF	INS				0.00	0.00	0.00
02/04/2016	09:20:00	MANF	INS				0.00	0.00	0.00
03/03/2016	11:15:00	MANF	INS				0.00	0.00	0.00
03/21/2016	08:15:00	MANF	INS				0.01	5.20	0.01
04/20/2016	15:55:00	MANF	INS				2.61	1171.00	1.69
05/04/2016	14:15:00	MANF	INS				0.21	96.49	0.14
05/20/2016	06:30:00	MANF	INS				0.17	75.97	0.11
06/22/2016	14:00:00	MANF	INS				0.01	6.40	0.01
07/05/2016	16:45:00	MANF	INS				0.01	2.80	0.00
08/02/2016	07:10:00	MANF	INS				0.00	0.00	0.00
09/06/2016	16:30:00	MANF	INS				0.00	0.00	0.00

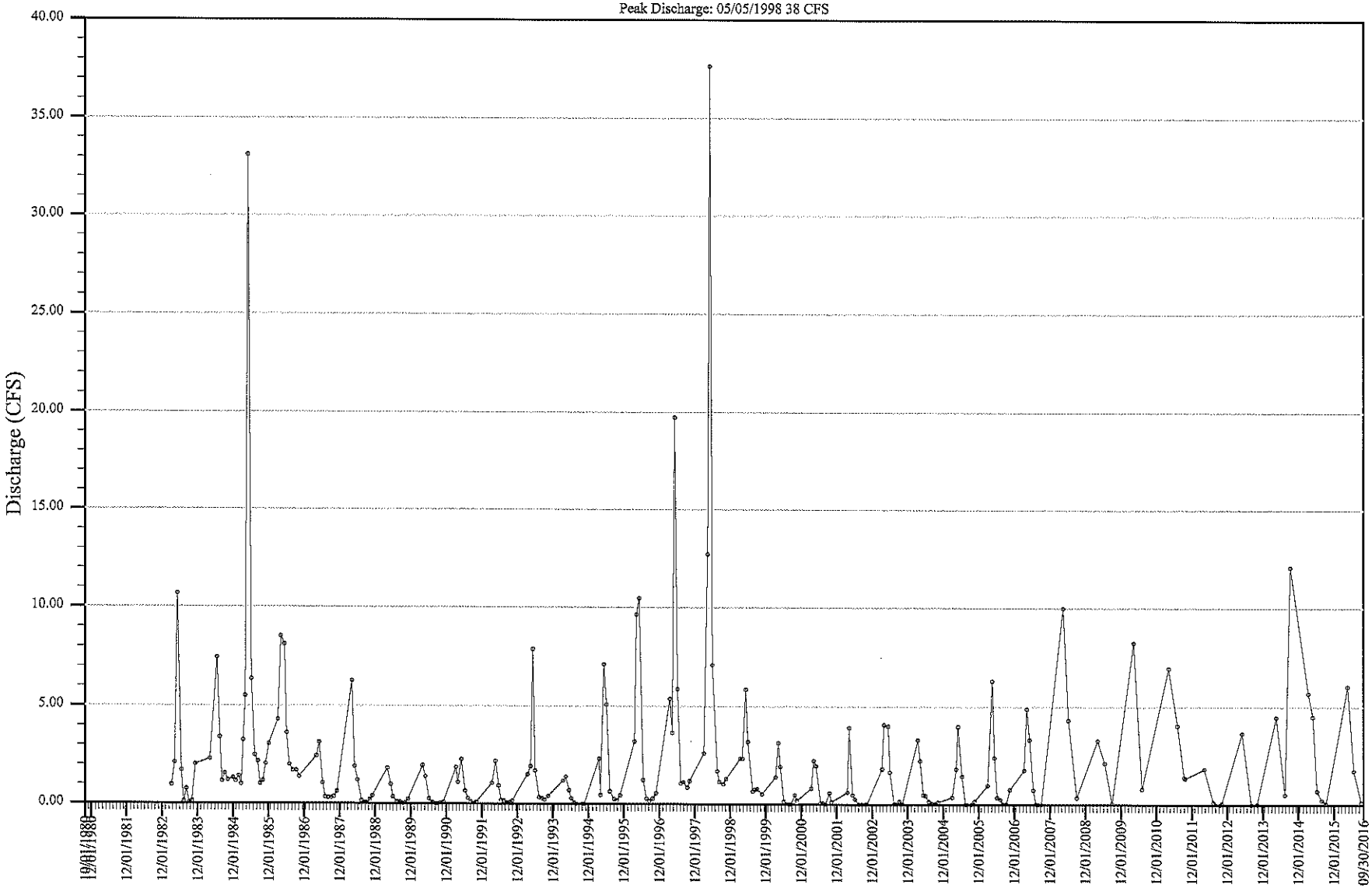
NPDES5 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
08/02/2016-07:10	NO FLOW
09/06/2016-16:30	NO FLOW


Solids, Dissolved (MG/L)
6552.0
5460.0
4368.0
3276.0
2184.0
1092.0
0.0
LOWESS(1.00)
04/15/1993
12/01/1993
12/01/1994
12/01/1995
12/01/1996
12/01/1997
12/01/1998
12/01/1999
12/01/2000
12/01/2001
12/01/2002
12/01/2003
12/01/2004
12/01/2005
12/01/2006
12/01/2007
12/01/2008
12/01/2009
12/01/2010
12/01/2011
12/01/2012
12/01/2013
12/01/2014
12/01/2015
07/05/2016
92 samples
NPDES5

Discharge Hydrograph

Peak Discharge: 05/05/1998 38 CFS



WSD5

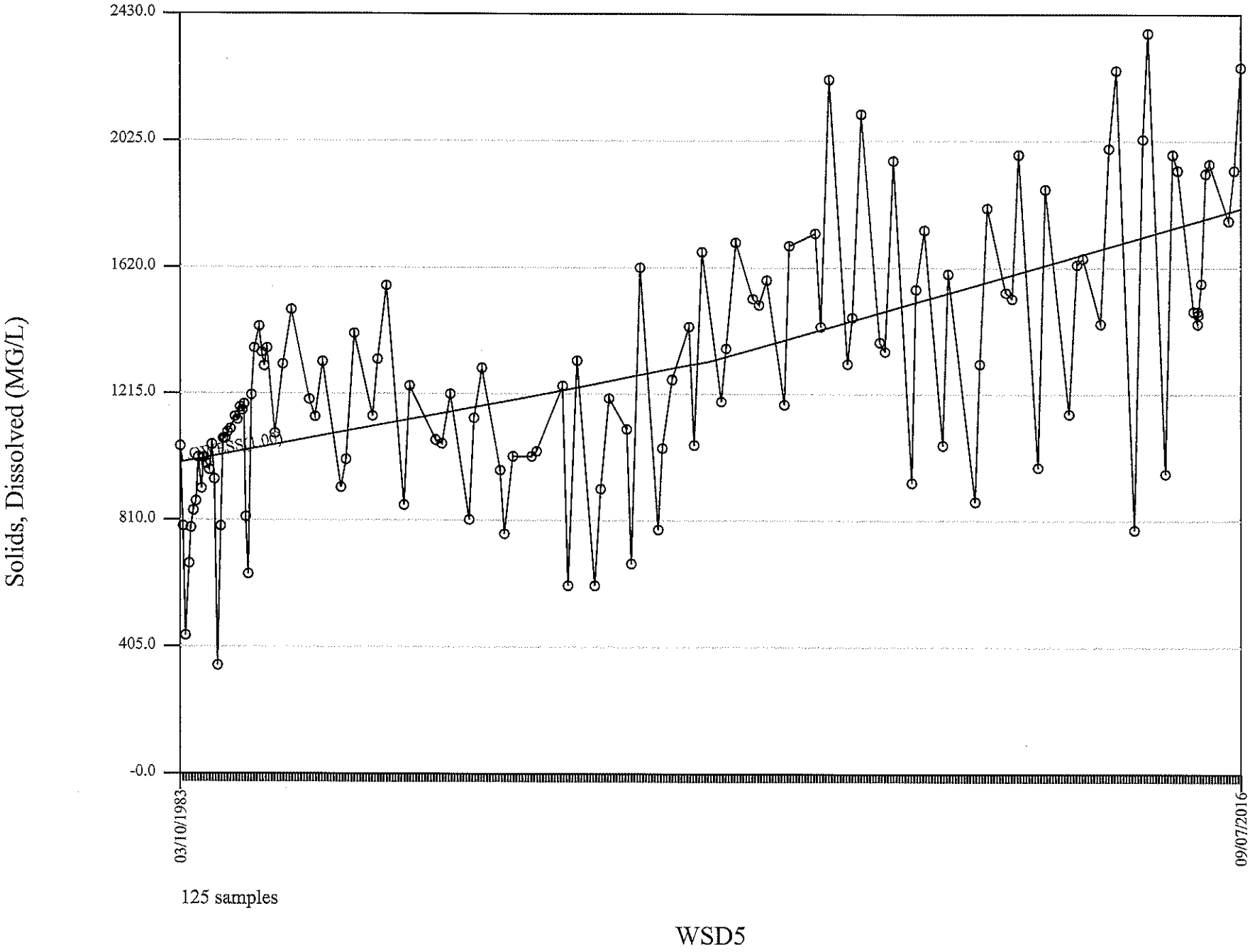
Extended Water Quality Report
WSD5 - SW-S2W-SG5
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	04/20/2016 15:25	06/22/2016 10:45	09/07/2016 08:00
Field Parameters				
Field Ph	S.U.	8.0200	7.5900	8.0300
Temperature	C	12.8000	20.9000	9.4000
Field Conductivity	UMHOS/CM	2350.0000	2360.0000	2820.0000
Flow	CFS	6.0379	1.7401	0.1243
Laboratory Parameters				
Mercury, Total	UG/L	< 0.2000	< 0.2000	
Ammonia Nitrogen_N	MG/L	< 0.0500	< 0.0500	
Nitrate Nitrogen_N	MG/L	1.7800	< 0.0200	
Nitrite Nitrogen_N	MG/L	B 0.0200	< 0.0100	
Nitrate/Nitrite Nitrogen_N	MG/L	1.8000	< 0.0200	
Selenium, Dissolved	UG/L	26.8000	0.5000	< 0.2000
Solids, Dissolved	MG/L	1770.0000	1930.0000	2260.0000
Solids, Suspended	MG/L	B 20.0000	B 10.0000	B 8.0000
Sulfate	MG/L	889.0000	1050.0000	
Sulfide	MG/L	< 0.0200	< 0.0200	
Iron, Total Rec.	MG/L	0.7900	0.4600	0.5100
Selenium, Total Rec.	UG/L	25.7000	0.5000	< 0.2000
Manganese, Pot. Diss.	MG/L	0.0299	0.0308	0.0930
Selenium, Pot. Diss.	UG/L	25.9000	0.5000	B 0.3000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

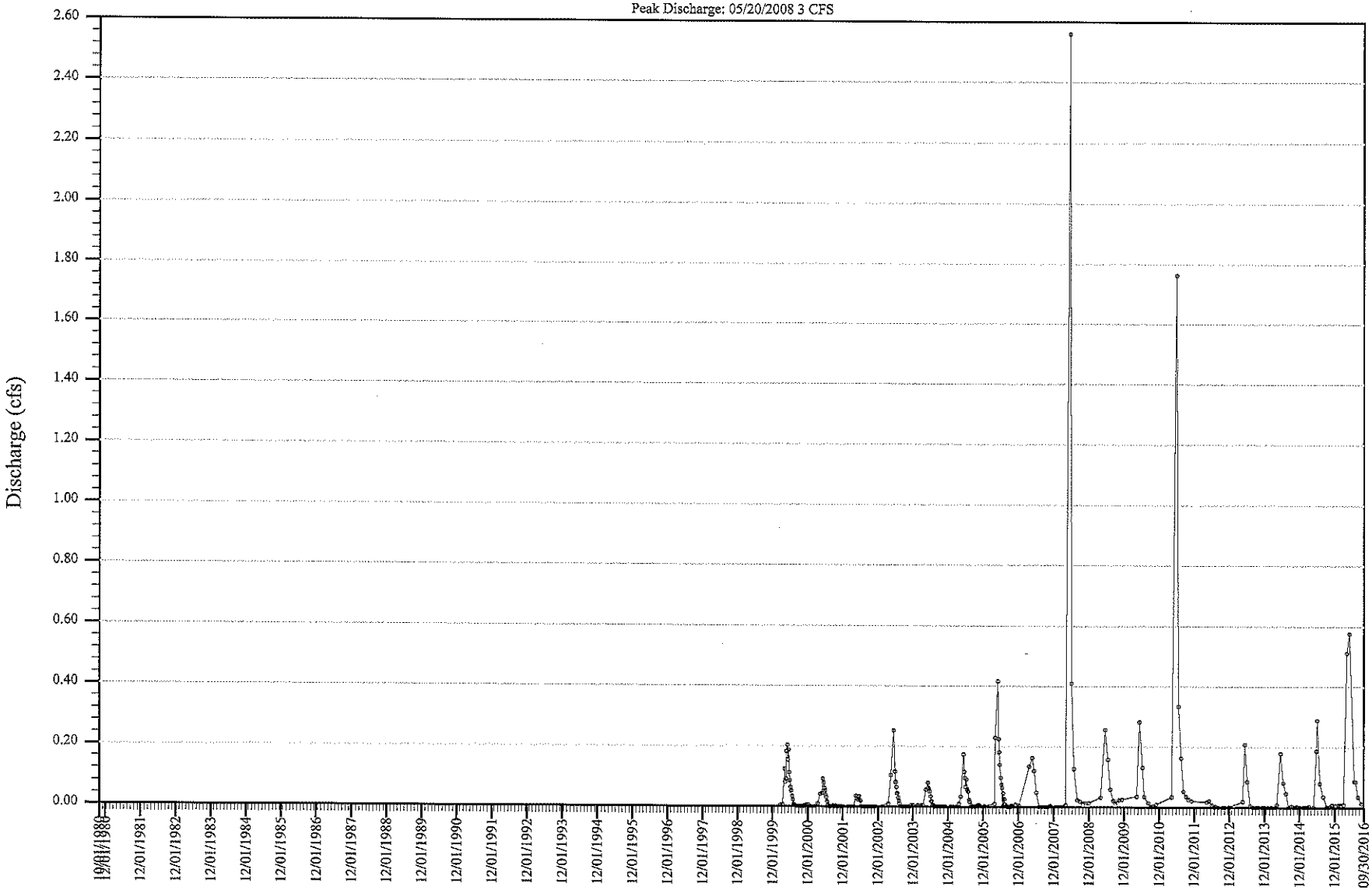
Instantaneous Flow Measurements Report
WSD5 - SW-S2W-SG5
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
04/20/2016	15:25:00	MANF	INS				6.04	2710.00	3.90
06/22/2016	10:45:00	MANF	INS				1.74	781.00	1.12
09/07/2016	08:00:00	MANF	INS				0.12	55.79	0.08


2430.0
2025.0
1620.0
1215.0
810.0
405.0
-0.0
Solids, Dissolved (MG/L)
03/10/1983
09/07/2016
125 samples
WSD5

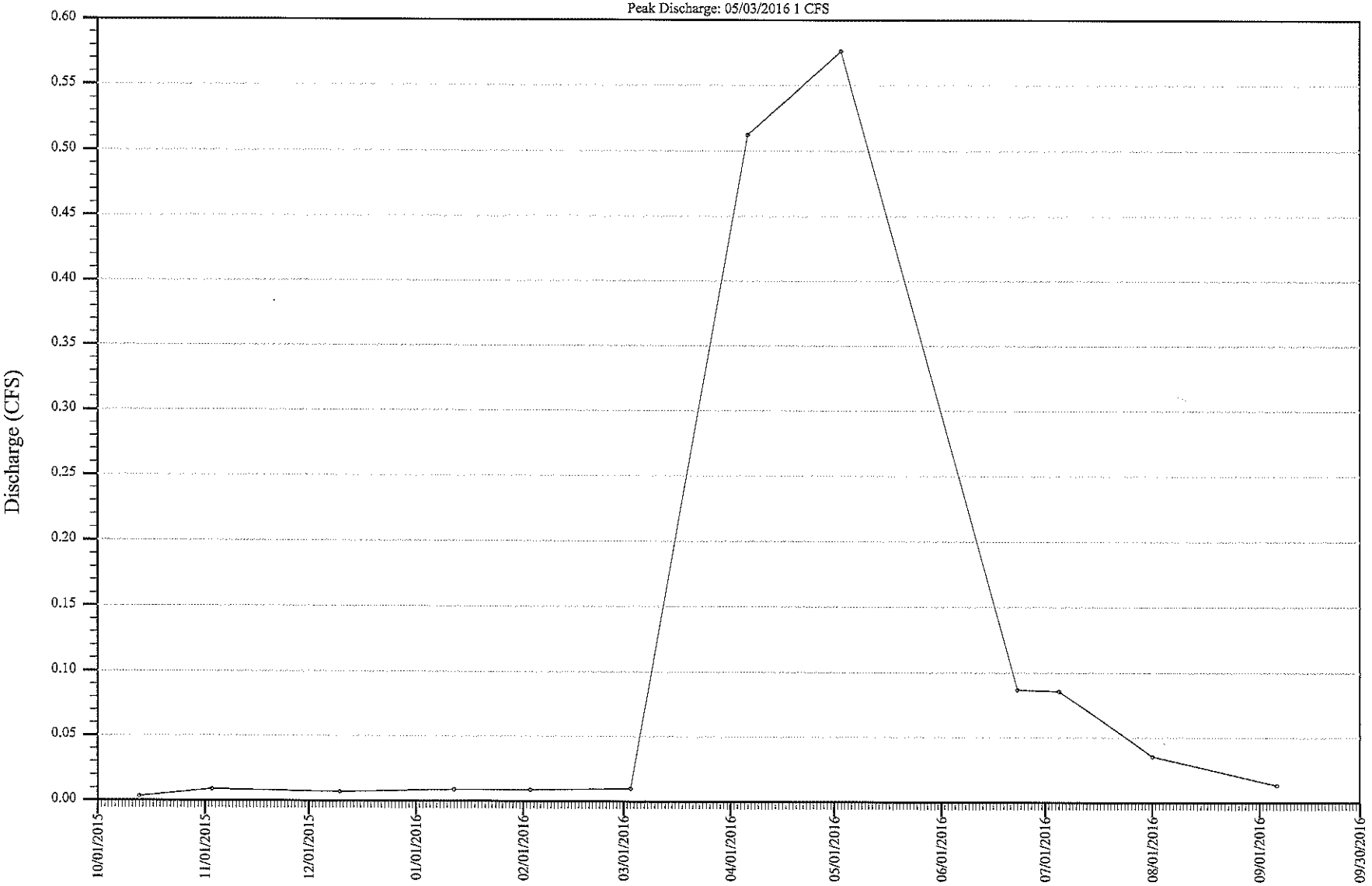
Discharge Hydrograph

Peak Discharge: 05/20/2008 3 CFS



Discharge Hydrograph

Peak Discharge: 05/03/2016 1 CFS



NPDES15

Extended Water Quality Report
NPDES15 - NPDES 015 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	10/13/2015 11:05	11/03/2015 08:20	12/10/2015 12:00	01/12/2016 13:30	02/03/2016 15:05	03/03/2016 14:30	04/06/2016 07:45	05/03/2016 15:50	06/23/2016 11:40
Field Parameters										
Field Ph	S.U.	7.7800	7.6700	8.0600	8.1700	7.8000	8.0800	8.1700	7.8300	6.8800
Temperature	C	12.4000	8.3000	4.3000	3.4000	1.5000	4.2000	4.6000	12.8000	19.2000
Field Conductivity	UMHOS/CM	810.0000	810.0000	790.0000	920.0000	930.0000	960.0000	860.0000	520.0000	630.0000
Flow	CFS	0.0033	0.0089	0.0069	0.0088	0.0088	0.0100	0.5120	0.5759	0.0869
Laboratory Parameters										
Solids, Dissolved	MG/L	420.0000	438.0000	442.0000	492.0000	522.0000	522.0000	450.0000	290.0000	358.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

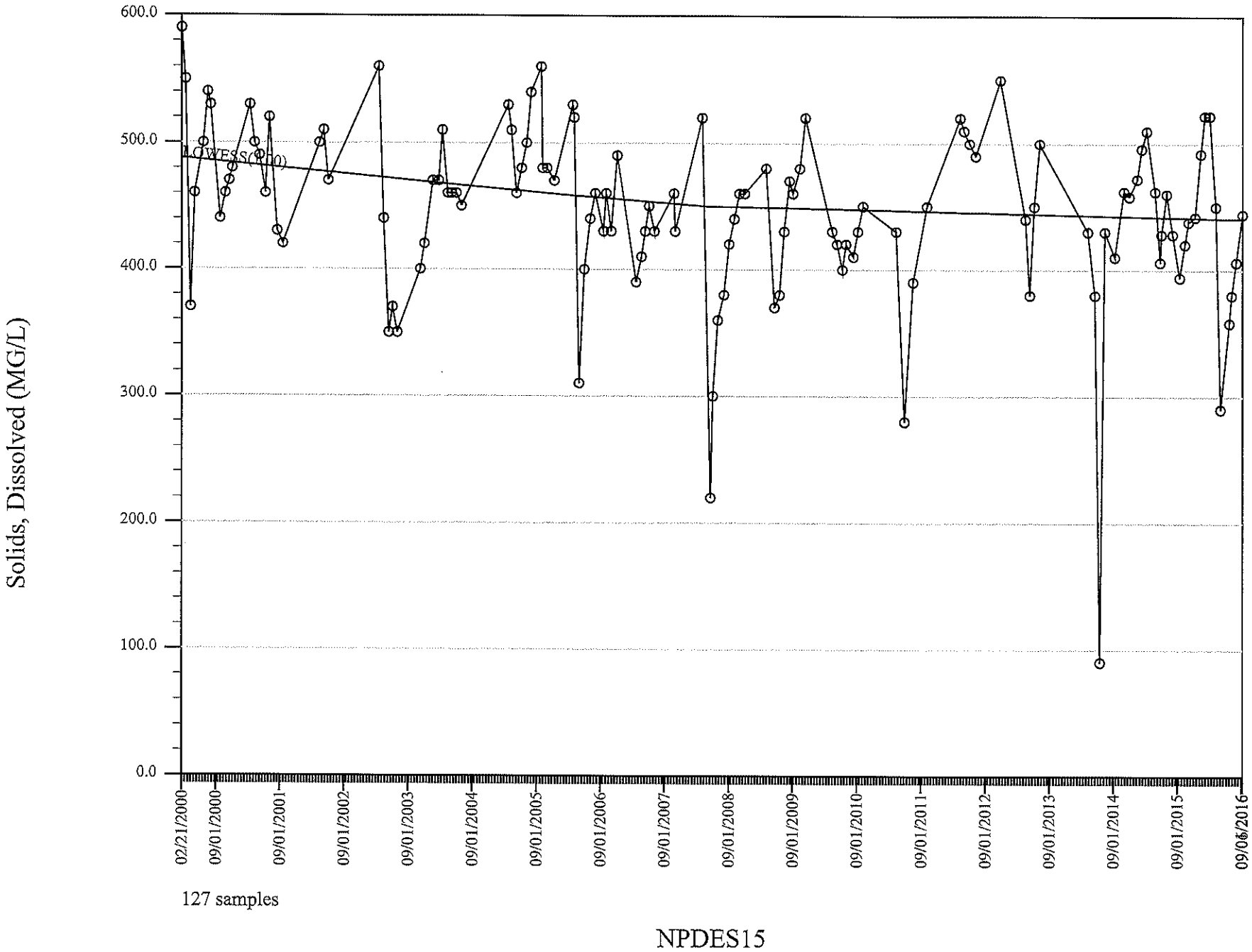
Extended Water Quality Report
NPDES15 - NPDES 015 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	07/05/2016 14:50	08/01/2016 13:30	09/06/2016 14:45
Field Parameters				
Field Ph	S.U.	7.4900	7.8100	8.1600
Temperature	C	21.6000	22.3000	17.8000
Field Conductivity	UMHOS/CM	604.0000	641.0000	665.0000
Flow	CFS	0.0858	0.0356	0.0133
Laboratory Parameters				
Solids, Dissolved	MG/L	380.0000	406.0000	444.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

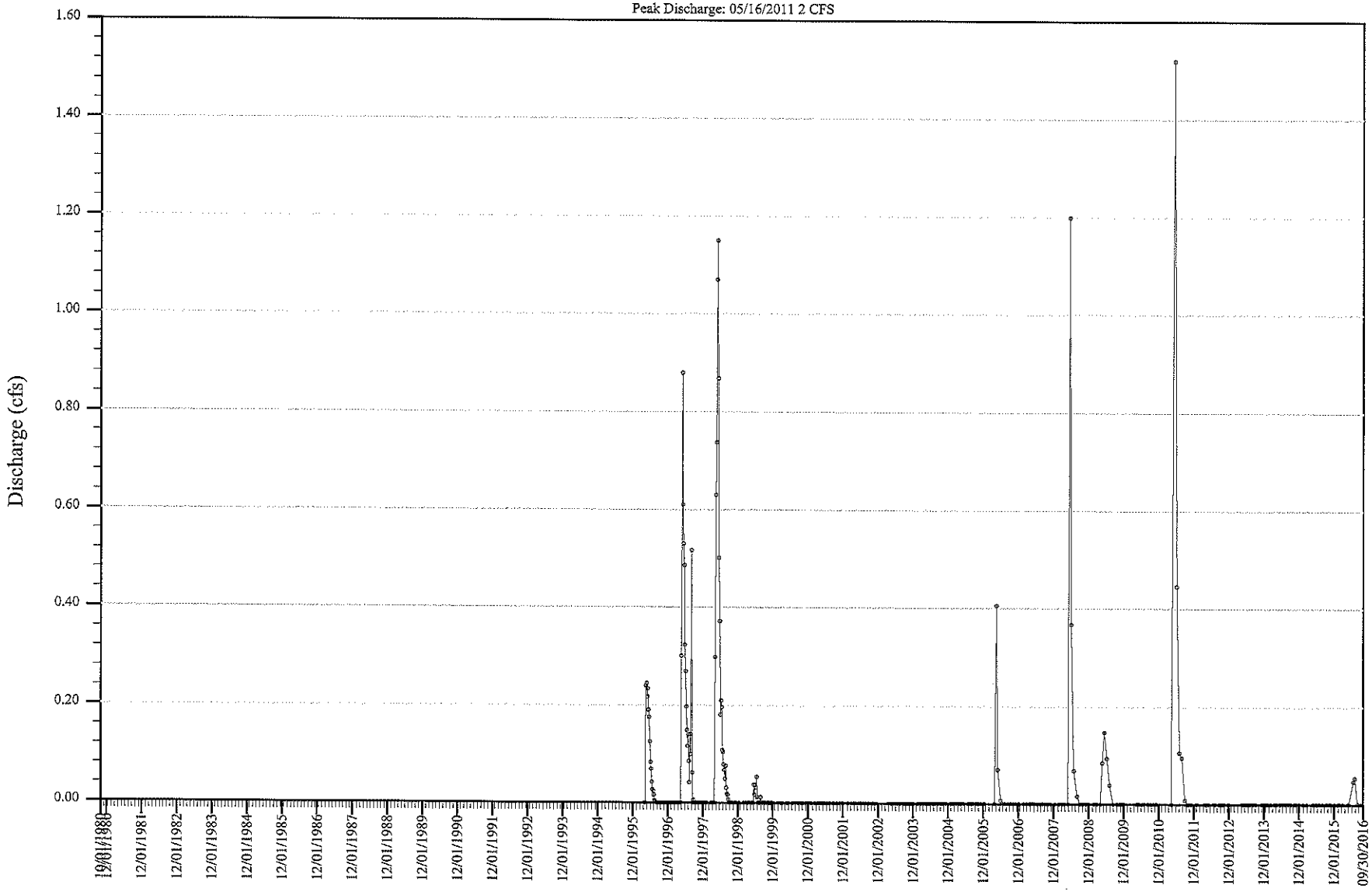
Instantaneous Flow Measurements Report
NPDES15 - NPDES 015 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
10/13/2015	11:05:00	MANF	INS				0.00	1.50	0.00
11/03/2015	08:20:00	MANF	INS				0.01	4.00	0.01
12/10/2015	12:00:00	MANF	INS				0.01	3.10	0.00
01/12/2016	13:30:00	MANF	INS				0.01	3.97	0.01
02/03/2016	15:05:00	MANF	INS				0.01	3.94	0.01
03/03/2016	14:30:00	MANF	INS				0.01	4.50	0.01
04/06/2016	07:45:00	MANF	INS				0.51	229.80	0.33
05/03/2016	15:50:00	MANF	INS				0.58	258.50	0.37
06/23/2016	11:40:00	MANF	INS				0.09	39.01	0.06
07/05/2016	14:50:00	MANF	INS				0.09	38.50	0.06
08/01/2016	13:30:00	MANF	INS				0.04	16.00	0.02
09/06/2016	14:45:00	MANF	INS				0.01	5.99	0.01


Solids, Dissolved (MG/L)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
LOWESS(0.10)
02/21/2000
09/01/2000
09/01/2001
09/01/2002
09/01/2003
09/01/2004
09/01/2005
09/01/2006
09/01/2007
09/01/2008
09/01/2009
09/01/2010
09/01/2011
09/01/2012
09/01/2013
09/01/2014
09/01/2015
09/06/2016
127 samples
NPDES15

Discharge Hydrograph

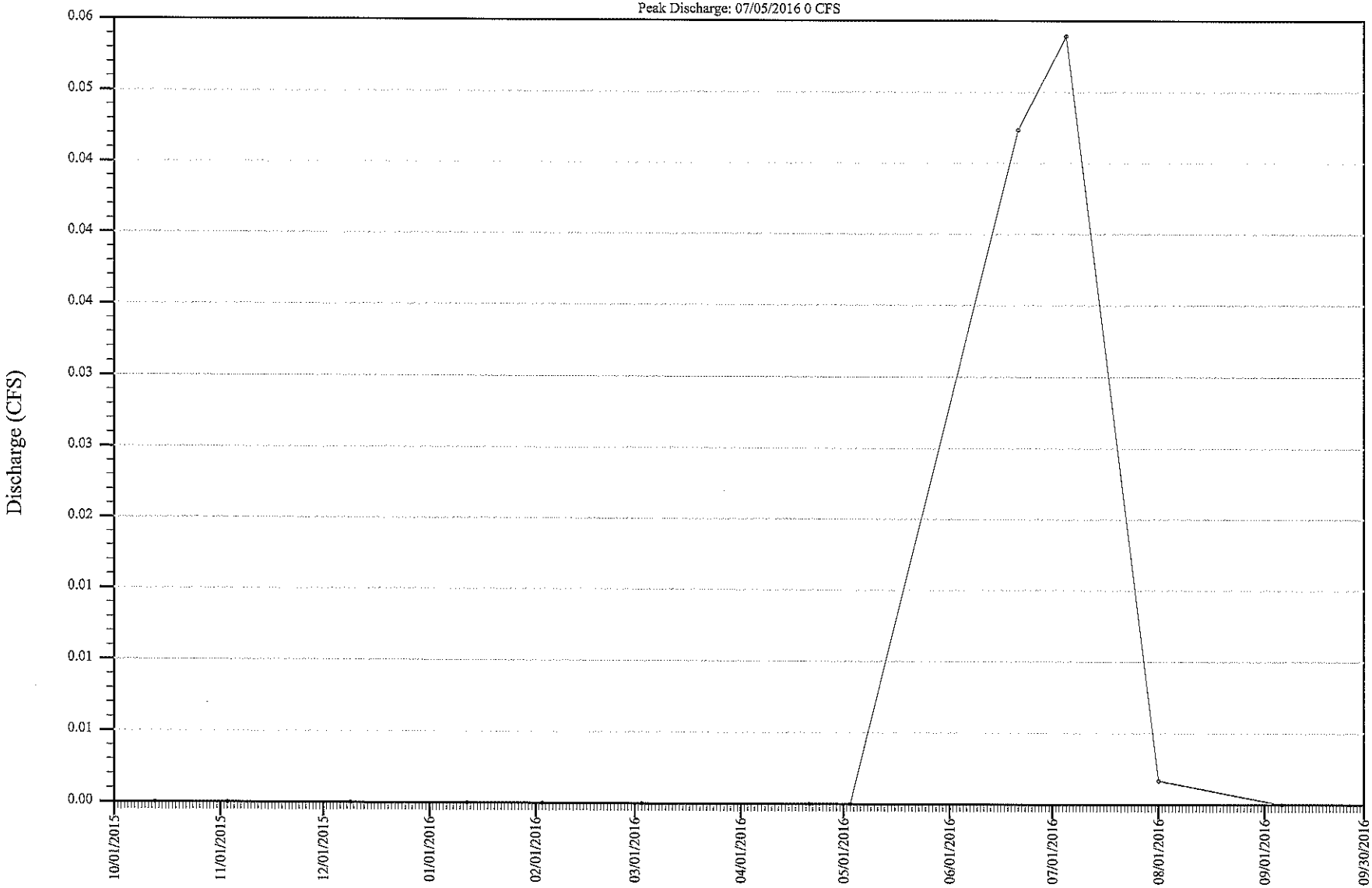
Peak Discharge: 05/16/2011 2 CFS



NPDES9

Discharge Hydrograph

Peak Discharge: 07/05/2016 0 CFS



NPDES9

Extended Water Quality Report
NPDES9 - NPDES 009 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	06/21/2016 12:00	07/05/2016 14:20	08/01/2016 13:00
Field Parameters				
Field Ph	S.U.	7.8900	8.1600	7.7900
Temperature	C	23.5000	22.0000	15.6000
Field Conductivity	UMHOS/CM	610.0000	667.0000	995.0000
Flow	CFS	0.0473	0.0539	0.0016
Laboratory Parameters				
Solids, Dissolved	MG/L	442.0000	428.0000	604.0000

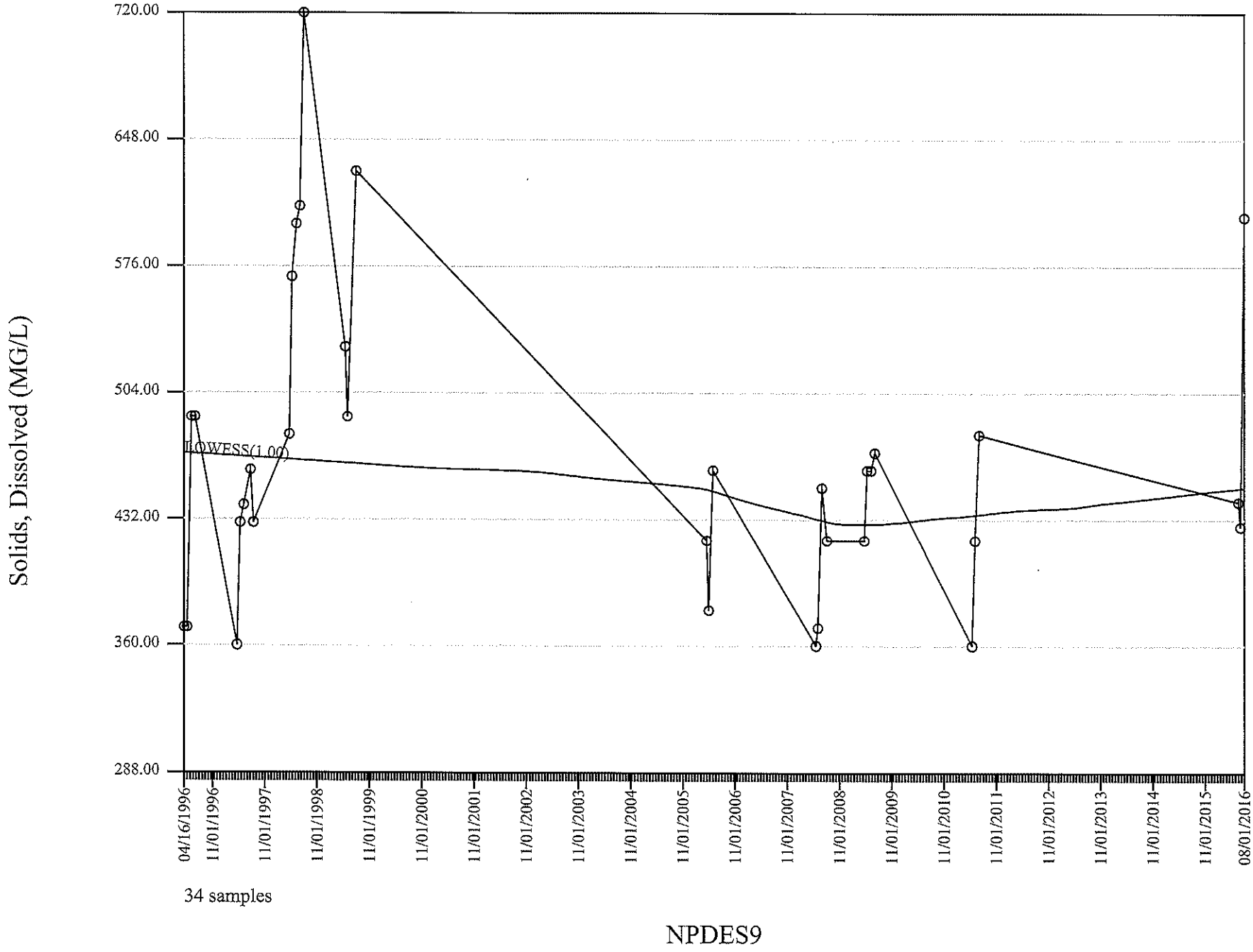
"B" -- Between MDL and PQL, "<" -- Less than detection limit

Instantaneous Flow Measurements Report
NPDES9 - NPDES 009 (SENECA IIW)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
10/13/2015	10:40:00	MANF	INS				0.00	0.00	0.00
11/03/2015	07:45:00	MANF	INS				0.00	0.00	0.00
12/09/2015	11:45:00	MANF	INS				0.00	0.00	0.00
01/12/2016	16:00:00	MANF	INS				0.00	0.00	0.00
02/03/2016	09:05:00	MANF	INS				0.00	0.00	0.00
02/03/2016	15:55:00	MANF	INS				0.00	0.00	0.00
03/03/2016	11:25:00	MANF	INS				0.00	0.00	0.00
04/21/2016	10:00:00	MANF	INS				0.00	0.00	0.00
05/03/2016	15:25:00	MANF	INS				0.00	0.00	0.00
06/21/2016	12:00:00	MANF	INS				0.05	21.25	0.03
07/05/2016	14:20:00	MANF	INS				0.05	24.20	0.03
08/01/2016	13:00:00	MANF	INS				0.00	0.74	0.00
09/06/2016	14:15:00	MANF	INS				0.00	0.00	0.00

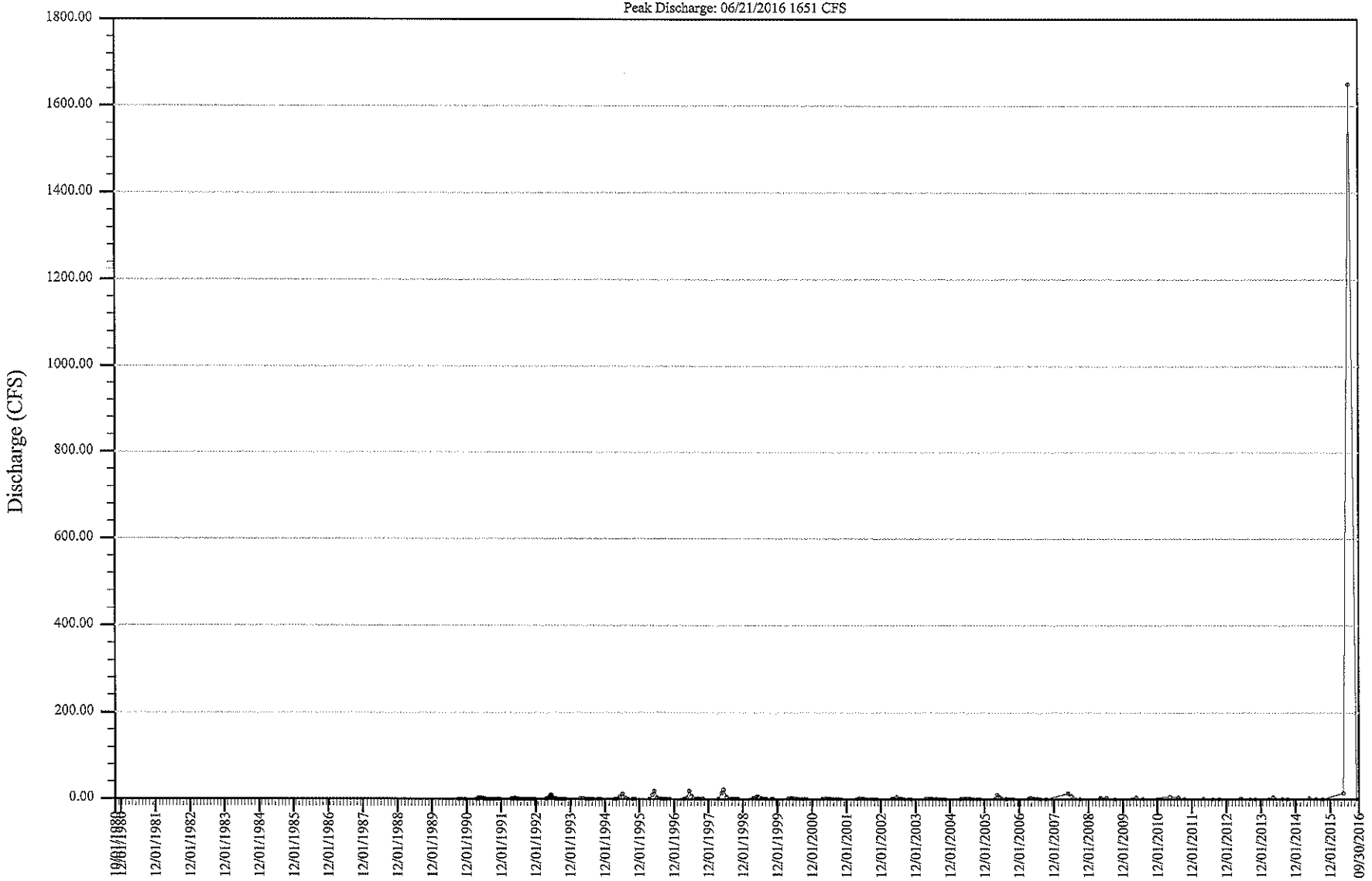
NPDES9 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/03/2016-15:25	NO FLOW
09/06/2016-14:15	NO FLOW


Solids, Dissolved (MG/L)
720.00
648.00
576.00
504.00
432.00
360.00
288.00
LOWESS(1.00)
04/16/1996
11/01/1996
11/01/1997
11/01/1998
11/01/1999
11/01/2000
11/01/2001
11/01/2002
11/01/2003
11/01/2004
11/01/2005
11/01/2006
11/01/2007
11/01/2008
11/01/2009
11/01/2010
11/01/2011
11/01/2012
11/01/2013
11/01/2014
11/01/2015
08/01/2016
34 samples
NPDES9

Discharge Hydrograph

Peak Discharge: 06/21/2016 1651 CFS



WSSF3

Extended Water Quality Report
WSSF3 - SW-S2W-FG4
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	04/21/2016 08:15	06/21/2016 11:30
Field Parameters			
Field Ph	S.U.	7.4300	7.6400
Temperature	C	7.3000	19.5000
Field Conductivity	UMHOS/CM	1250.0000	1090.0000
Flow	CFS	14.5088	1650.8930
Laboratory Parameters			
Mercury, Total	UG/L	< 0.2000	< 0.2000
Ammonia Nitrogen_N	MG/L	< 0.0500	< 0.0500
Nitrate Nitrogen_N	MG/L	B 0.0400	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	B 0.0400	< 0.0200
Selenium, Dissolved	UG/L	1.0000	0.4000
Solids, Dissolved	MG/L	778.0000	900.0000
Solids, Suspended	MG/L	B 15.0000	B 11.0000
Sulfate	MG/L	386.0000	405.0000
Sulfide	MG/L	< 0.0200	< 0.0200
Iron, Total Rec.	MG/L	0.7100	0.3300
Selenium, Total Rec.	UG/L	0.9000	0.4000
Manganese, Pot. Diss.	MG/L	0.0264	0.0164
Selenium, Pot. Diss.	UG/L	1.0000	0.4000

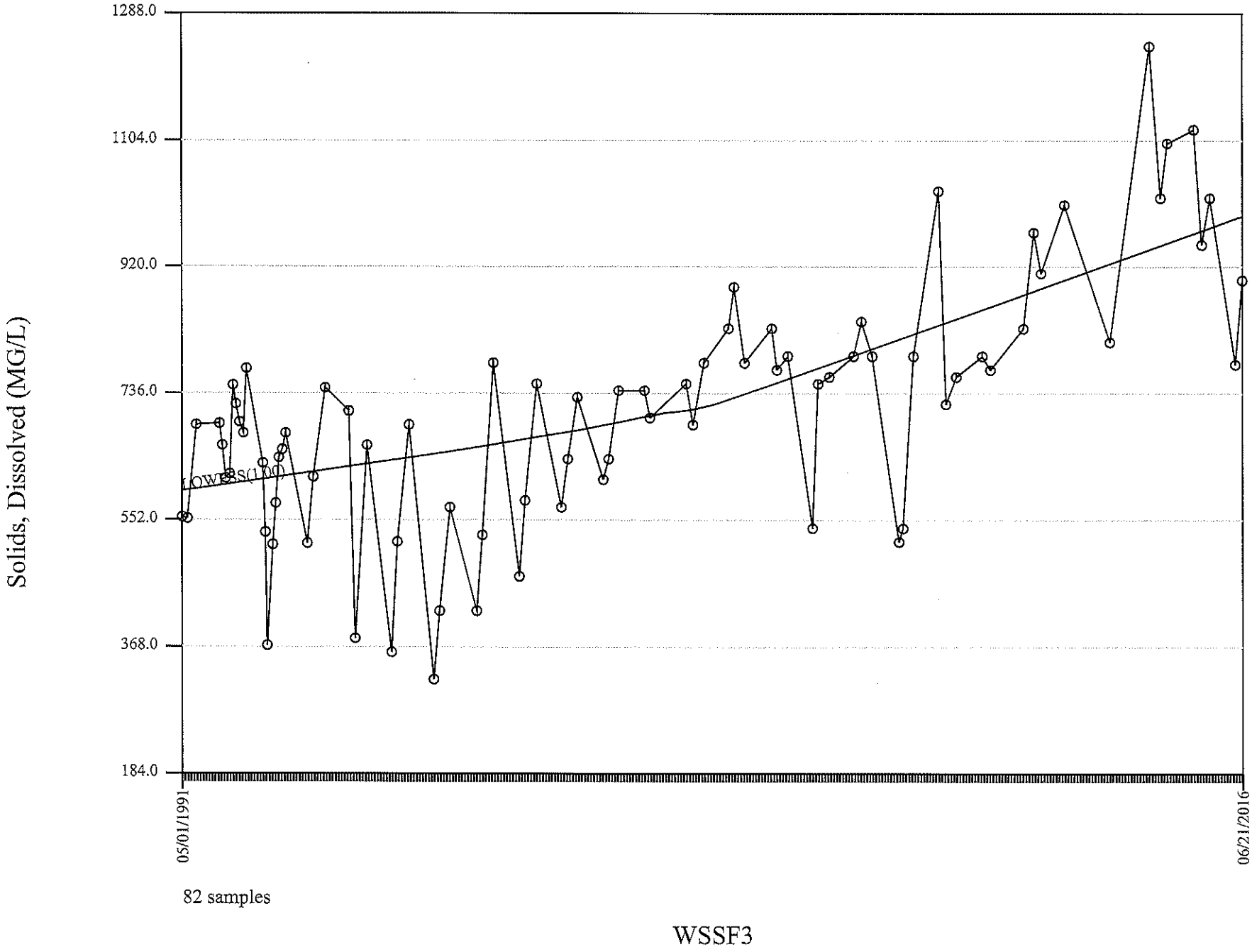
"B" -- Between MDL and PQL, "<" -- Less than detection limit

Instantaneous Flow Measurements Report
WSSF3 - SW-S2W-FG4
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
04/21/2016	08:15:00	MANF	INS				14.51	6512.00	9.38
06/21/2016	11:30:00	MANF	INS				1650.89	740972.22	1067.00
09/06/2016	14:00:00	MANF	INS				0.00	0.00	0.00

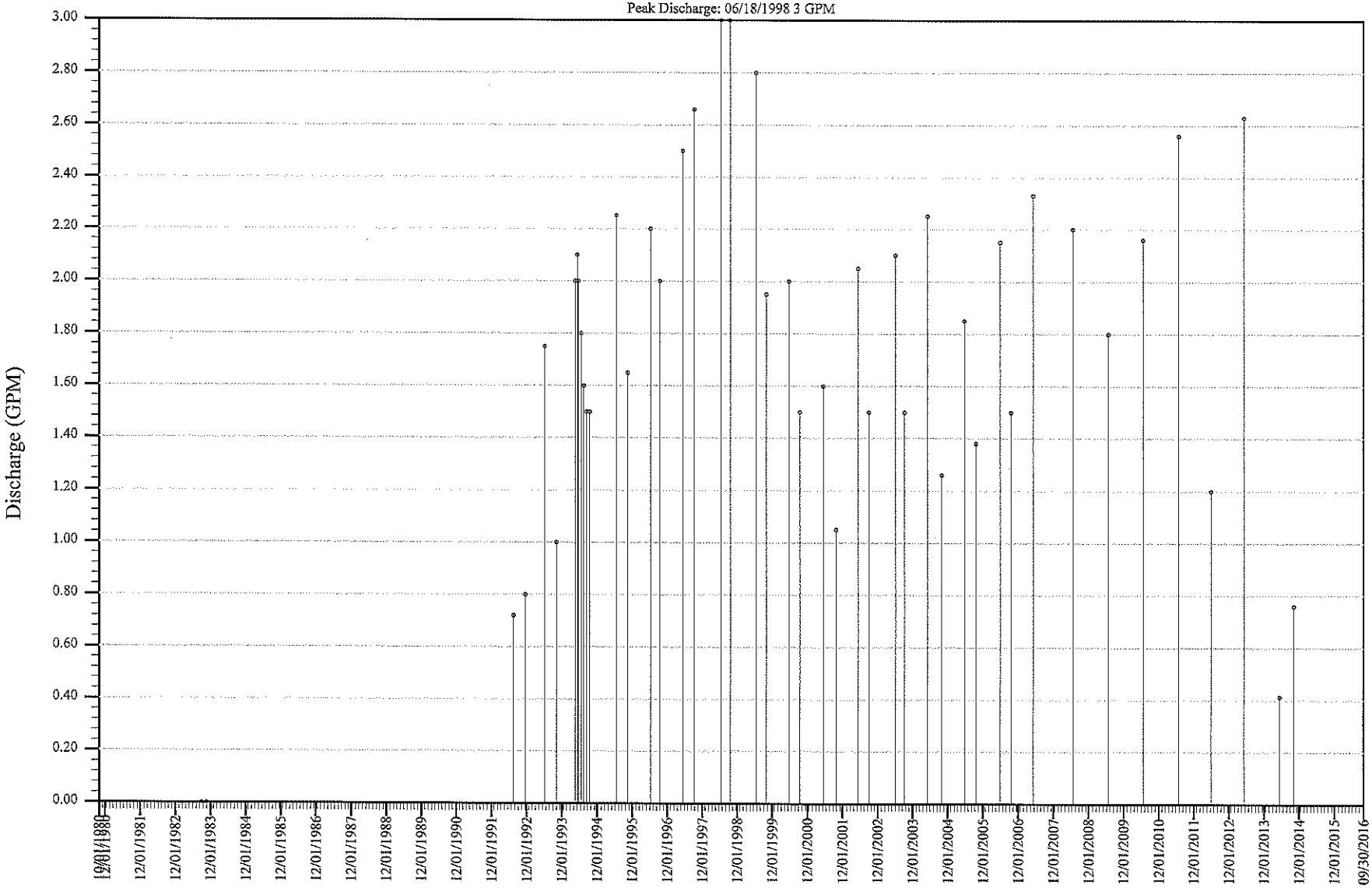
WSSF3 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
09/06/2016-14:00	NO FLOW


1288.0
1104.0
920.0
736.0
552.0
368.0
184.0
Solids, Dissolved (MG/L)
LOWESS(100)
05/01/1991
06/21/2016
82 samples
WSSF3

Discharge Hydrograph

Peak Discharge: 06/18/1998 3 GPM



WSPG46

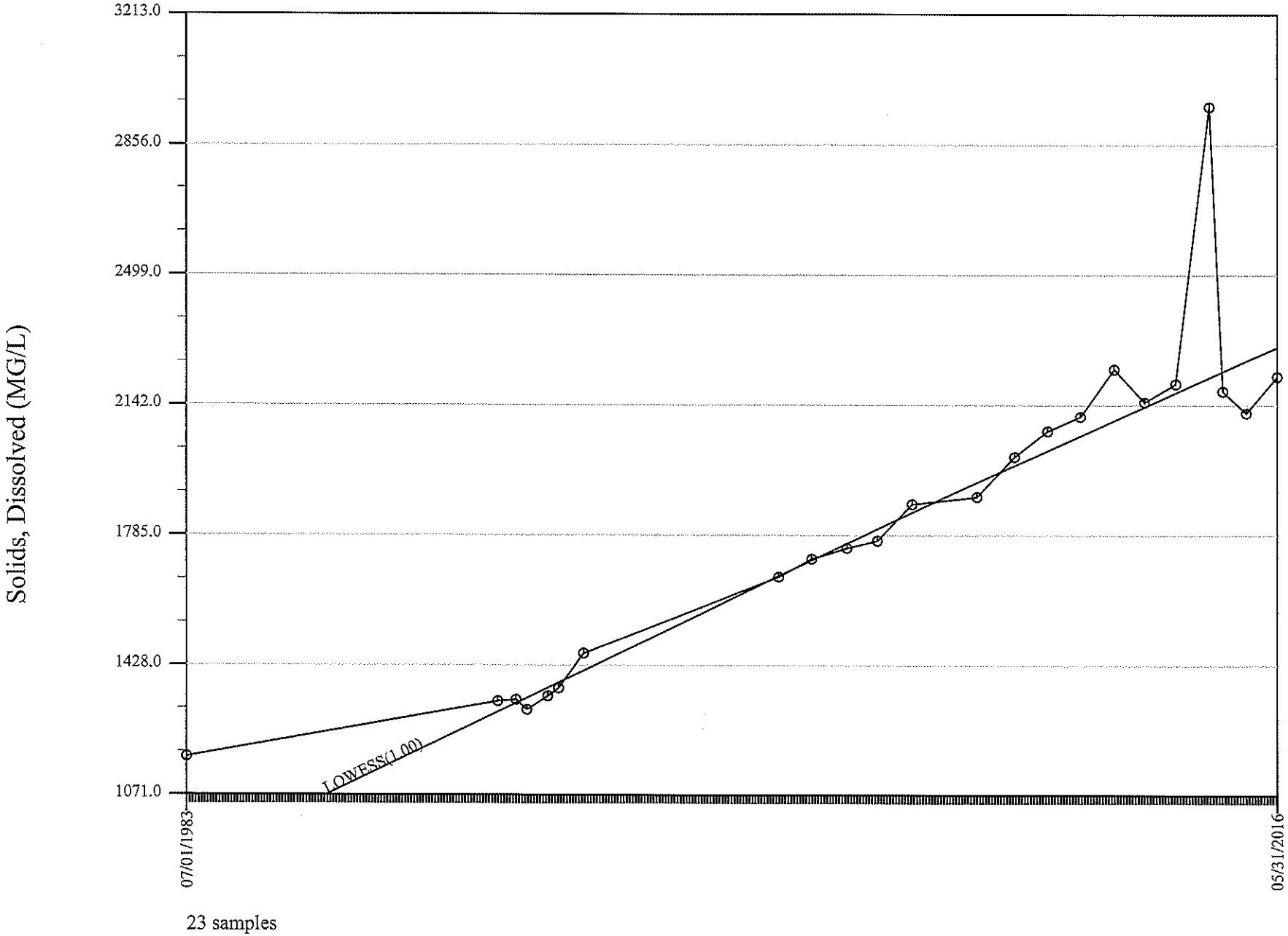
Extended Water Quality Report
WSPG46 - SPRING S-46 (005 DAM)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 13:50
Field Parameters		
Field Ph	S.U.	6.7600
Temperature	C	13.9000
Field Conductivity	UMHOS/CM	2580.0000
Flow	GPM	
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	0.5300
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	< 0.2000
Solids, Dissolved	MG/L	2220.0000
Solids, Suspended	MG/L	108.0000
Sulfate	MG/L	972.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	7.2600
Selenium, Total Rec.	UG/L	B 0.2000
Manganese, Pot. Diss.	MG/L	0.1870
Selenium, Pot. Diss.	UG/L	1.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

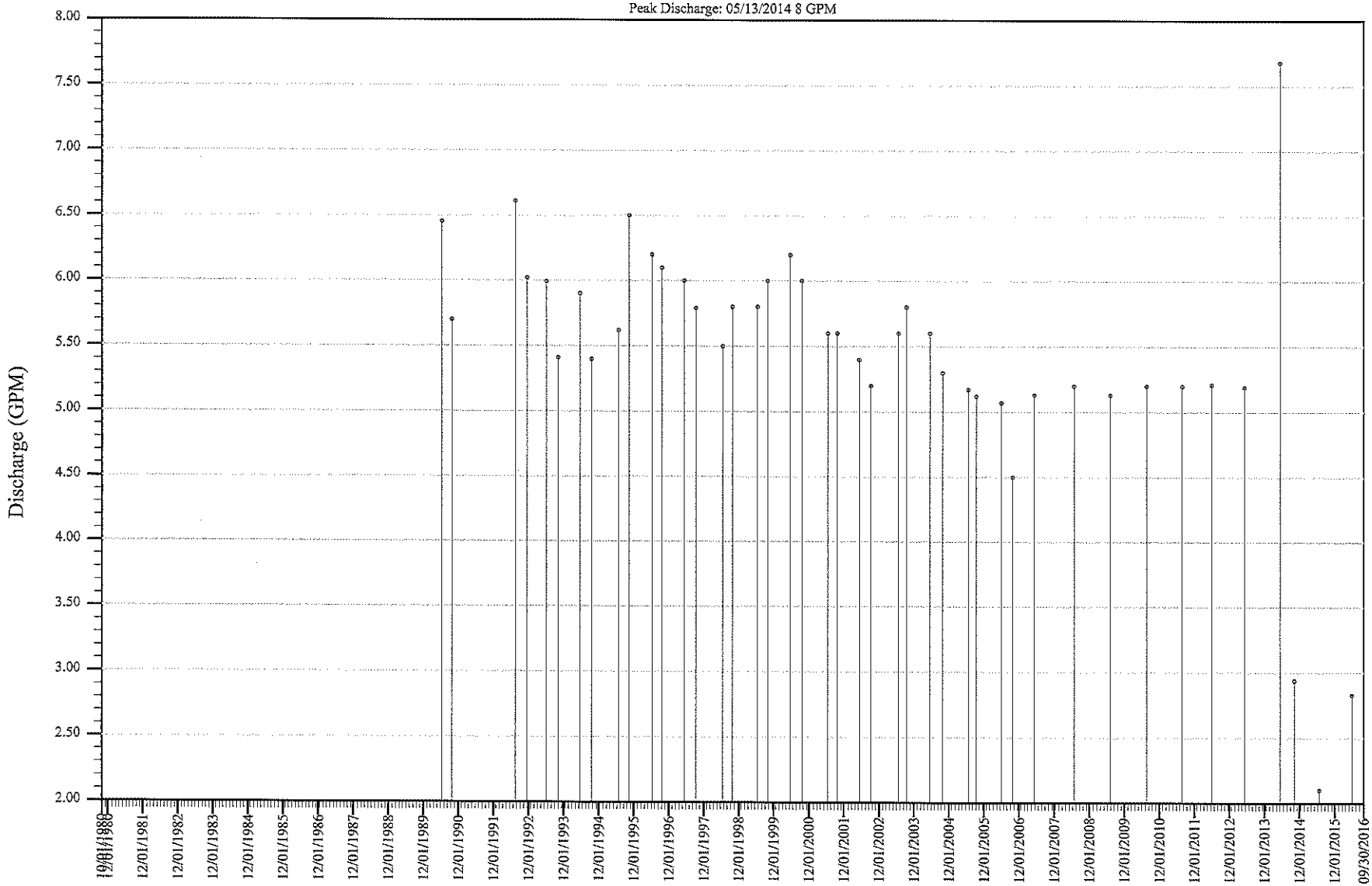
WSPG46 Sample Remarks
10/01/2015 to 09/30/2016

Remark Date-Time	Remark
05/31/2016-13:50	PIPE PLUGGED, COULDN'T GET FLOW


3213.0
2856.0
2499.0
2142.0
1785.0
1428.0
1071.0
Solids, Dissolved (MG/L)
LOWESS(1.00)
07/01/1983
05/31/2016
23 samples
WSPG46

Discharge Hydrograph

Peak Discharge: 05/13/2014 8 GPM



WSPG47

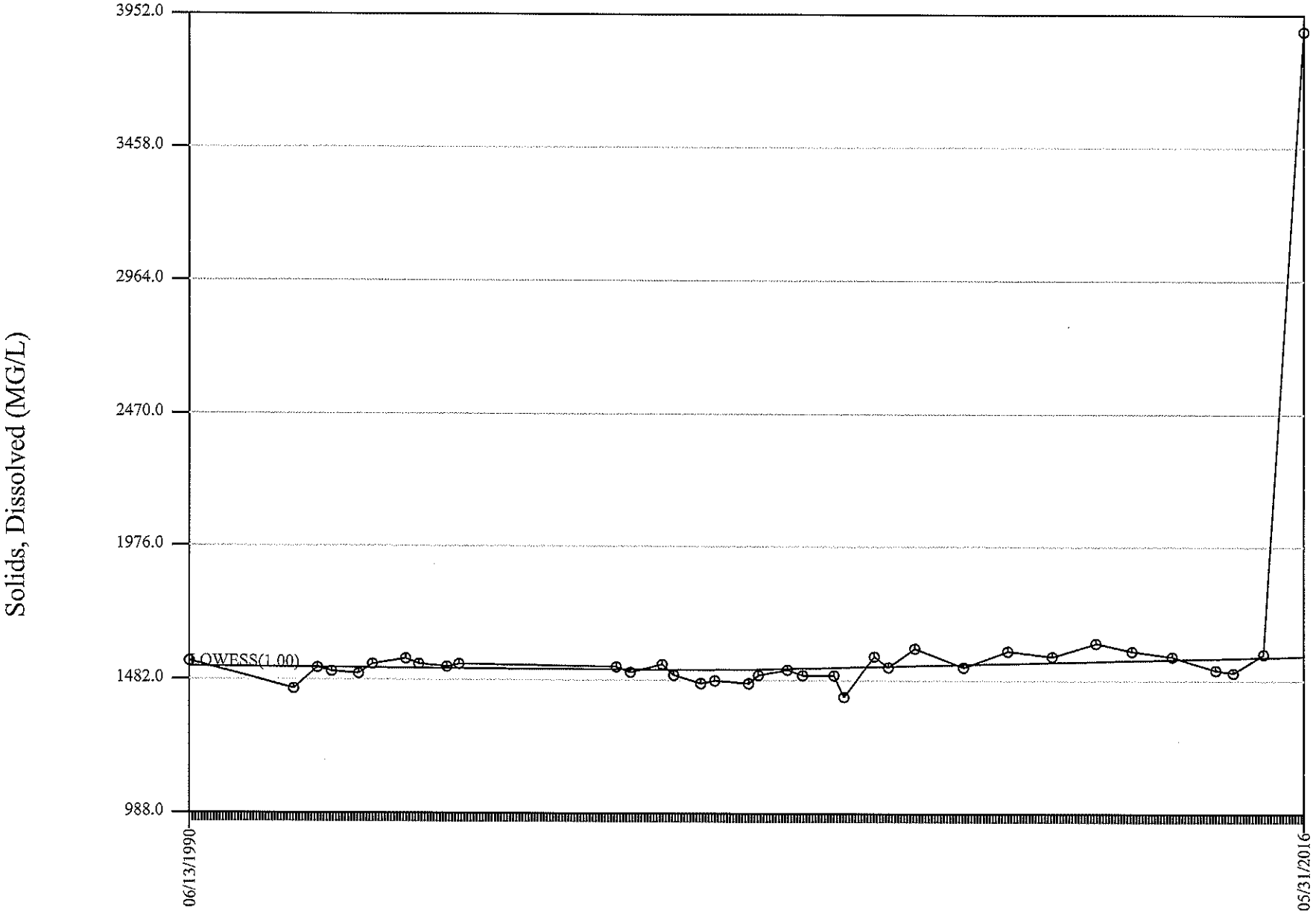
Extended Water Quality Report
WSPG47 - SPRING S-47 (WEATHER)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 17:30
Field Parameters		
Field Ph	S.U.	8.0000
Temperature	C	20.5000
Field Conductivity	UMHOS/CM	3880.0000
Flow	GPM	2.8300
Laboratory Parameters		
Selenium, Dissolved	UG/L	1.4000
Solids, Dissolved	MG/L	3890.0000
Solids, Suspended	MG/L	B 18.0000
Iron, Total Rec.	MG/L	0.9900
Selenium, Total Rec.	UG/L	1.6000
Manganese, Pot. Diss.	MG/L	0.0720
Selenium, Pot. Diss.	UG/L	1.7000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

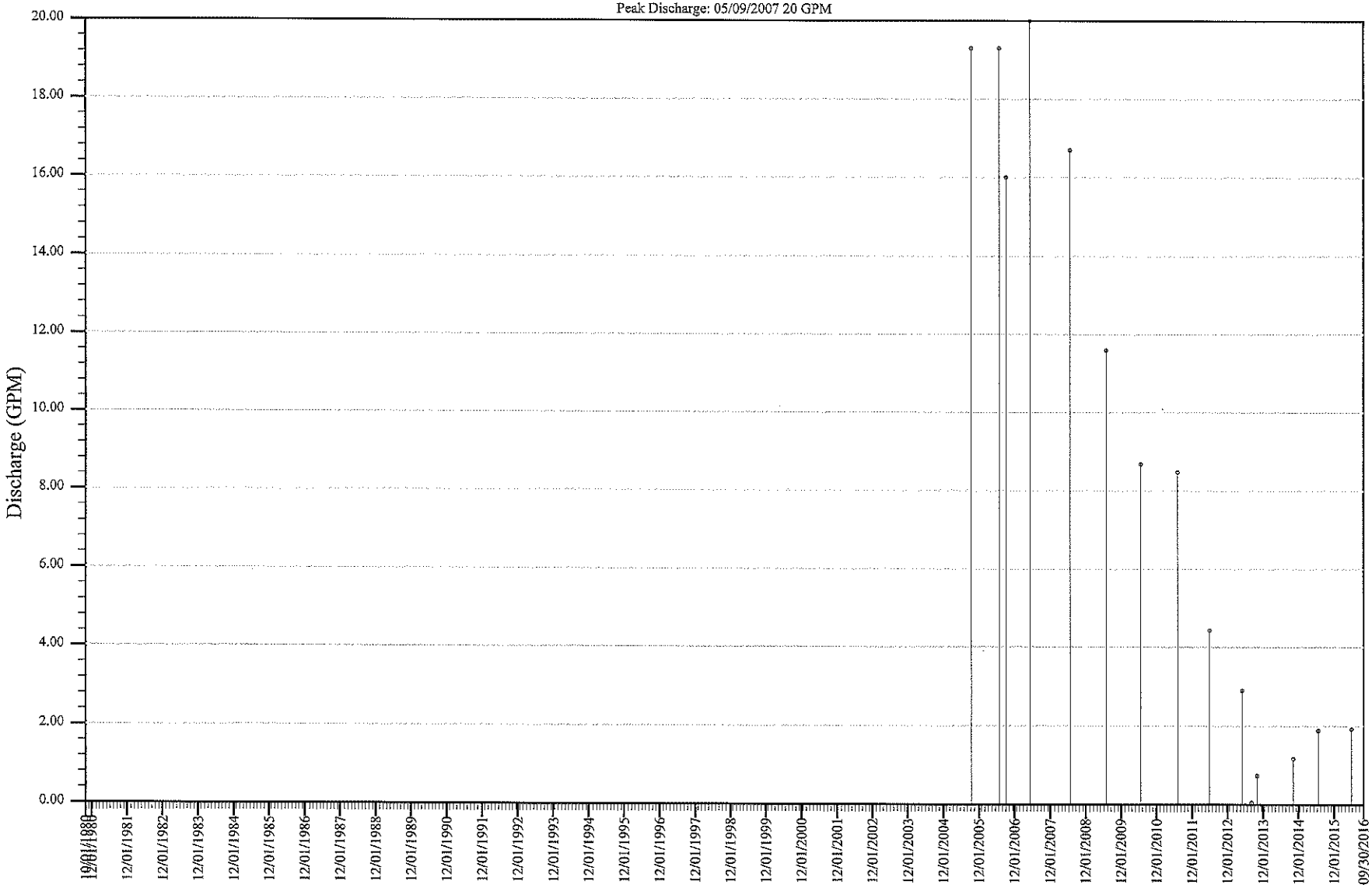
Instantaneous Flow Measurements Report
WSPG47 - SPRING S-47 (WEATHER)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	17:30:00	MANF	INS				0.01	2.83	0.00


Solids, Dissolved (MG/L)
3952.0
3458.0
2964.0
2470.0
1976.0
1482.0
988.0
LOWESS(1.00)
06/13/1990
05/31/2016
35 samples
WSPG47

Discharge Hydrograph

Peak Discharge: 05/09/2007 20 GPM



WSPG50

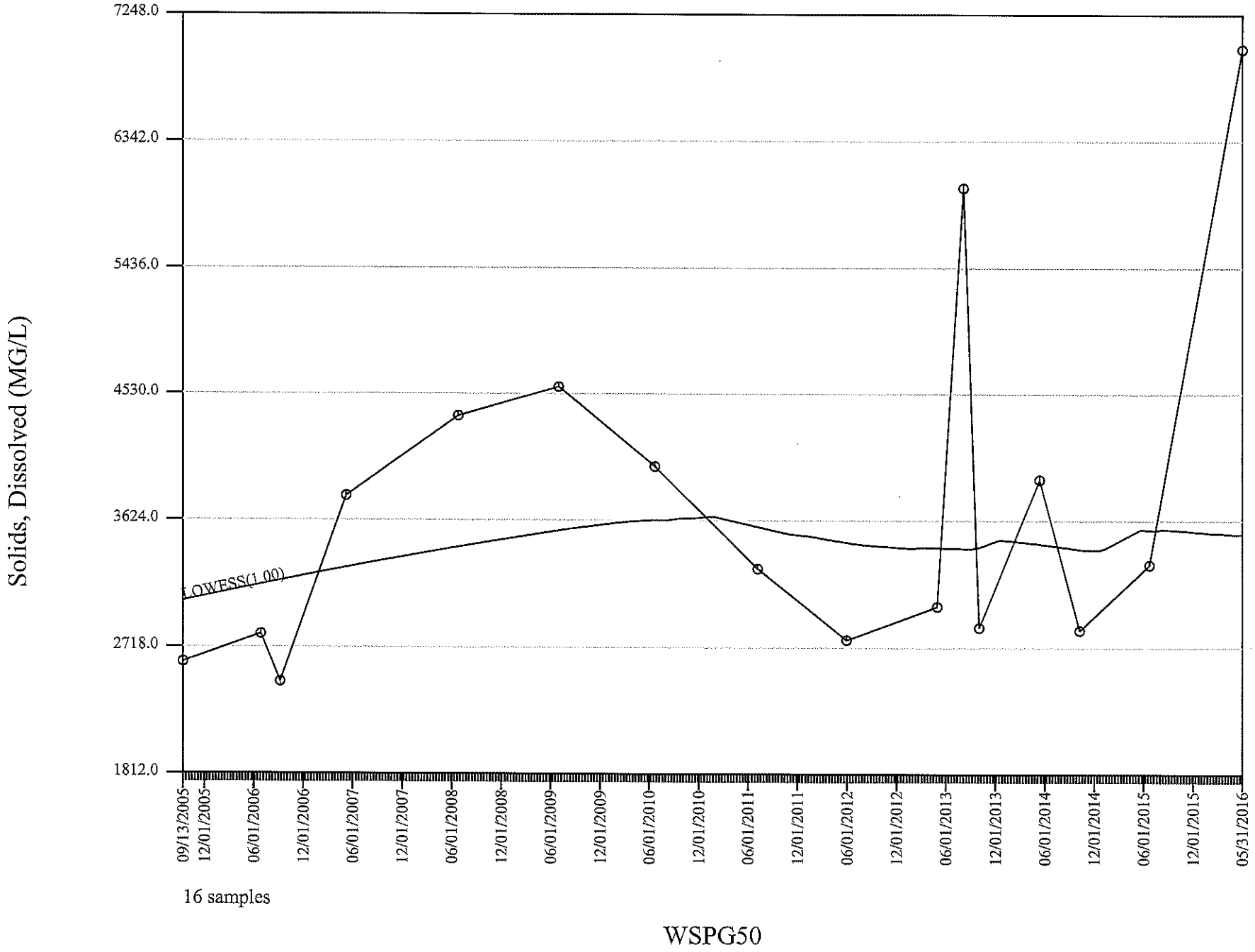
Extended Water Quality Report
WSPG50 - SPRING 50 (W24wells)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 15:15
Field Parameters		
Field Ph	S.U.	7.6800
Temperature	C	19.2000
Field Conductivity	UMHOS/CM	6500.0000
Flow	GPM	1.9200
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	< 0.0500
Nitrate Nitrogen_N	MG/L	6.5500
Nitrite Nitrogen_N	MG/L	B 0.0400
Nitrate/Nitrite Nitrogen_N	MG/L	6.5900
Selenium, Dissolved	UG/L	10.8000
Solids, Dissolved	MG/L	7000.0000
Solids, Suspended	MG/L	B 17.0000
Sulfate	MG/L	3770.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	0.5000
Selenium, Total Rec.	UG/L	13.0000
Manganese, Pot. Diss.	MG/L	0.0510
Selenium, Pot. Diss.	UG/L	13.0000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

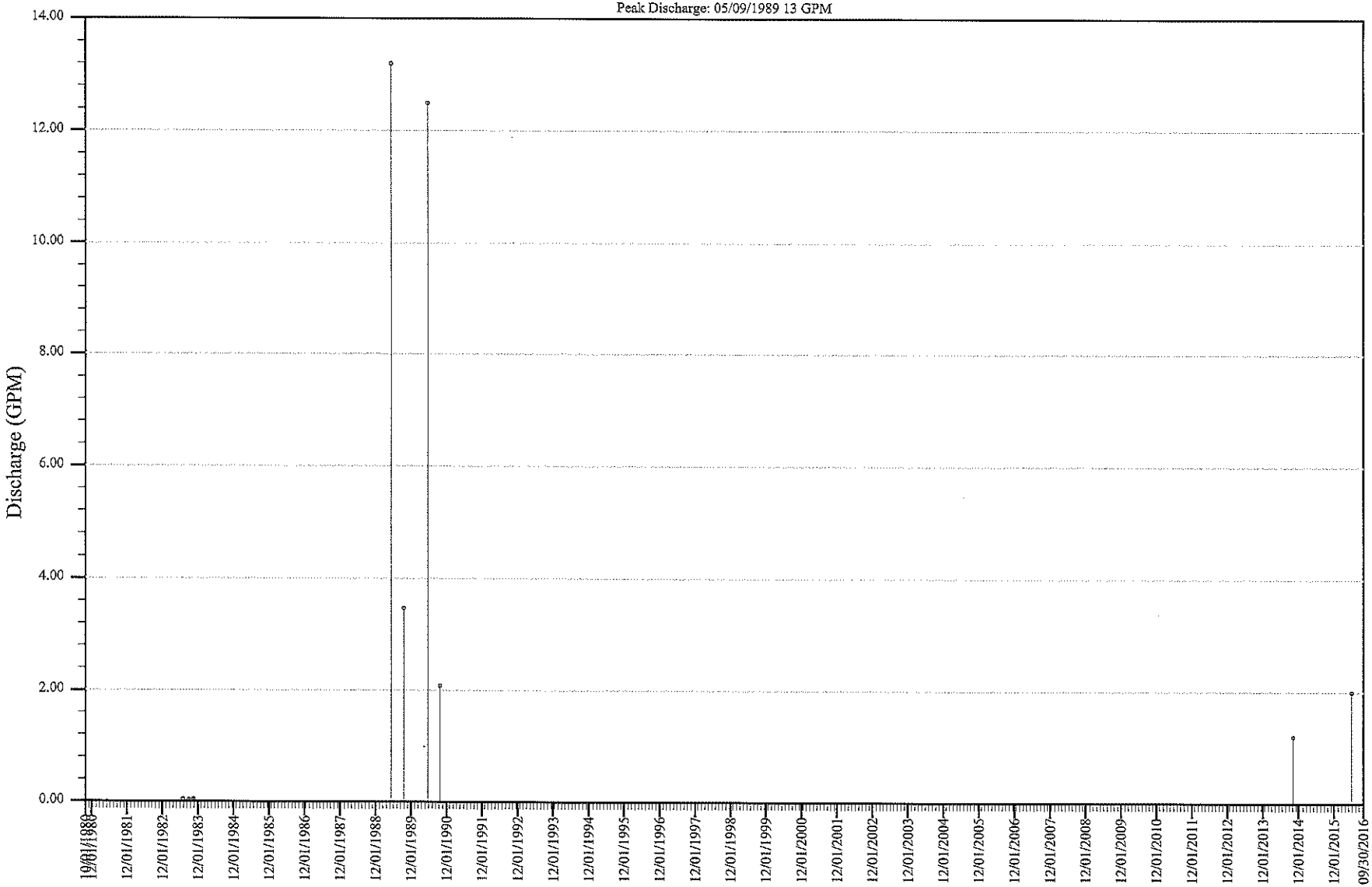
Instantaneous Flow Measurements Report
WSPG50 - SPRING 50 (W24wells)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	15:15:00	MANF	INS				0.00	1.92	0.00


Solids, Dissolved (MG/L)
7248.0
6342.0
5436.0
4530.0
3624.0
2718.0
1812.0
LOWESS(1.00)
09/13/2005
12/01/2005
06/01/2006
12/01/2006
06/01/2007
12/01/2007
06/01/2008
12/01/2008
06/01/2009
12/01/2009
06/01/2010
12/01/2010
06/01/2011
12/01/2011
06/01/2012
12/01/2012
06/01/2013
12/01/2013
06/01/2014
12/01/2014
06/01/2015
12/01/2015
05/31/2016
16 samples
WSPG50

Discharge Hydrograph

Peak Discharge: 05/09/1989 13 GPM



WSPG7

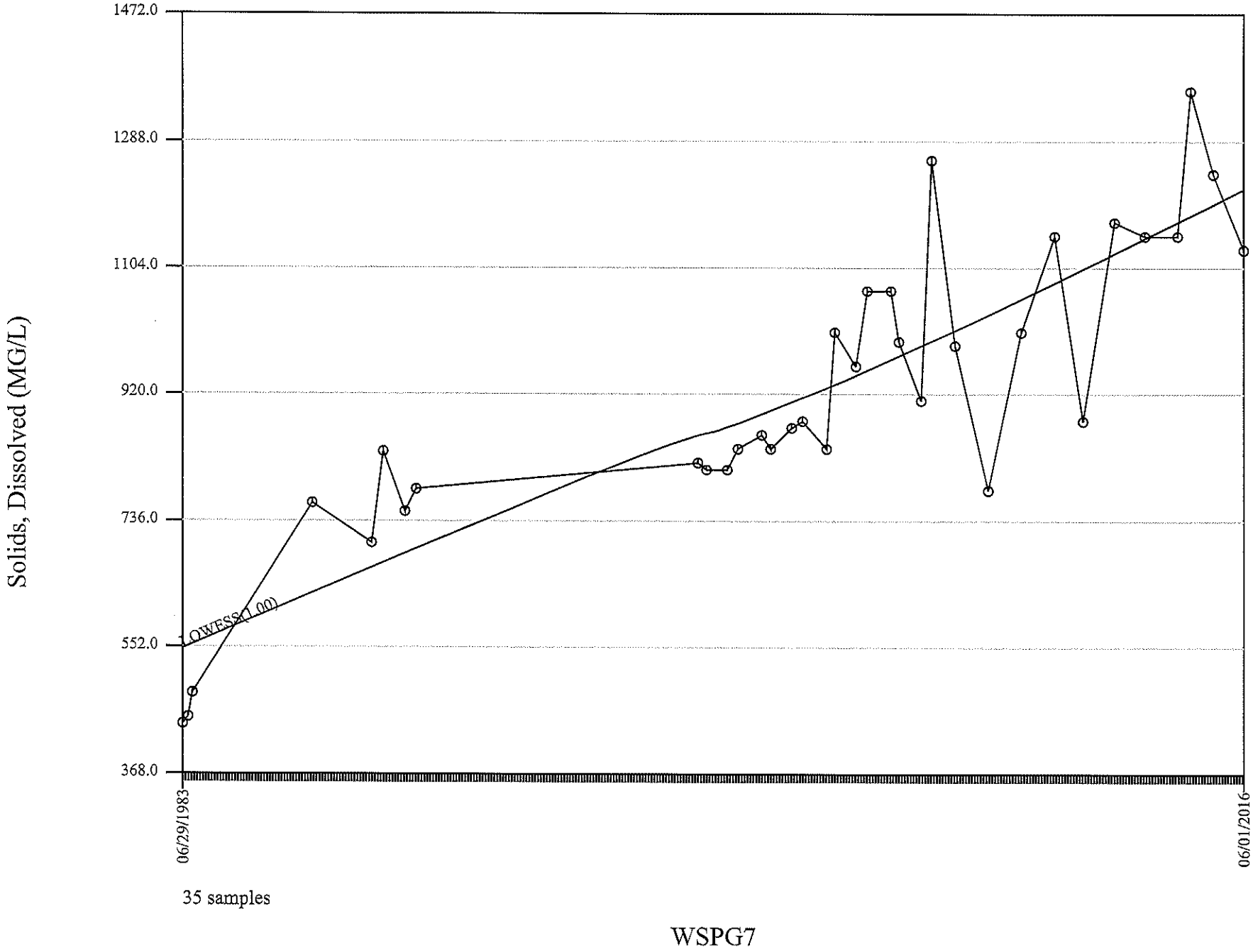
Extended Water Quality Report
WSPG7 - SPRING S-7 (HOMESTEAD)
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	06/01/2016 11:00
Field Parameters		
Field Ph	S.U.	7.2700
Temperature	C	12.3000
Field Conductivity	UMHOS/CM	1610.0000
Flow	GPM	2.0000
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	< 0.0500
Nitrate Nitrogen_N	MG/L	2.7400
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	2.7400
Selenium, Dissolved	UG/L	1.3000
Solids, Dissolved	MG/L	1130.0000
Solids, Suspended	MG/L	< 5.0000
Sulfate	MG/L	531.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	0.2500
Selenium, Total Rec.	UG/L	1.2000
Manganese, Pot. Diss.	MG/L	0.0364
Selenium, Pot. Diss.	UG/L	1.4000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

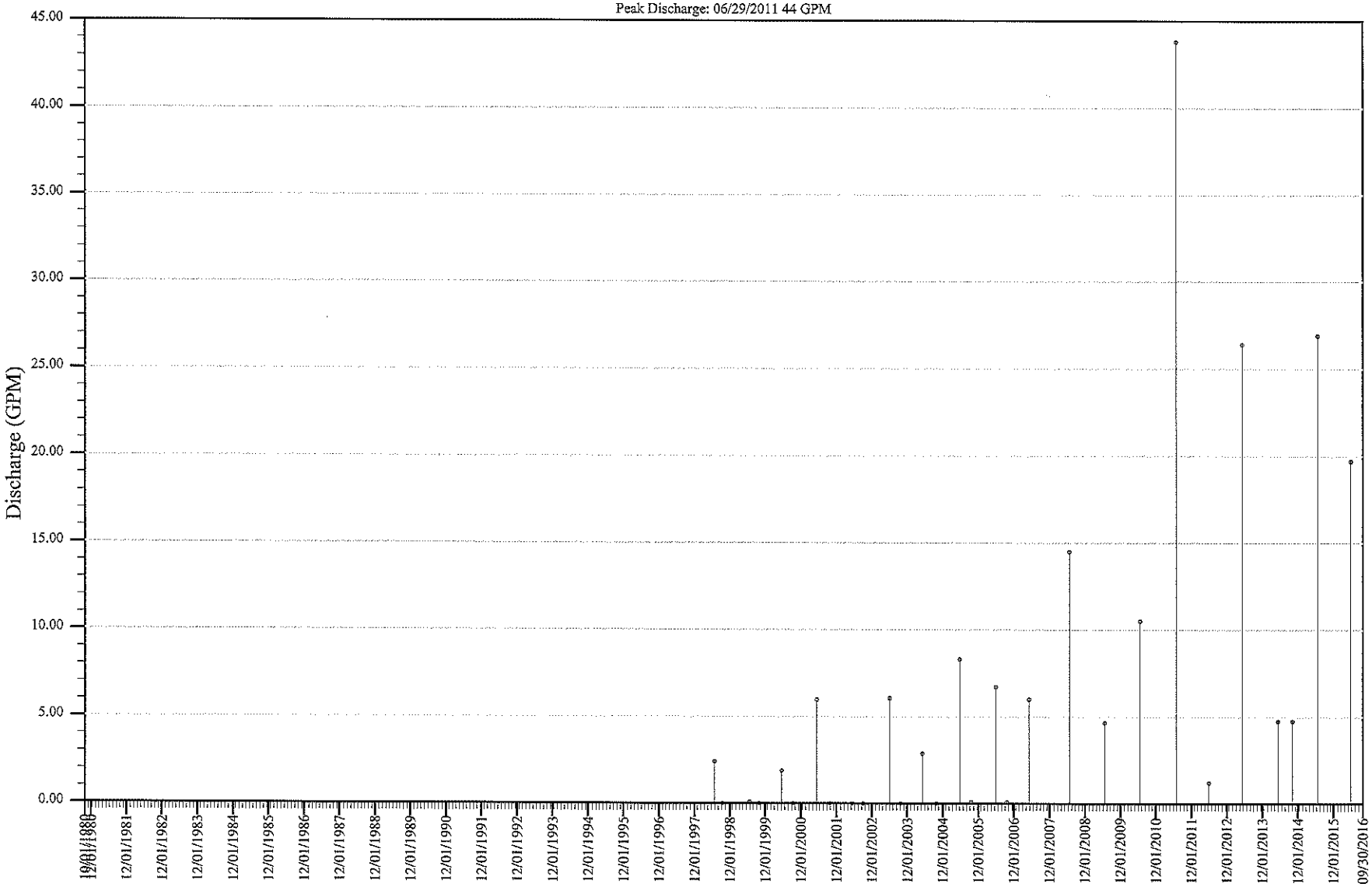
Instantaneous Flow Measurements Report
WSPG7 - SPRING S-7 (HOMESTEAD)
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
06/01/2016	11:00:00	MANF	INS				0.00	2.00	0.00


1472.0
1288.0
1104.0
920.0
736.0
552.0
368.0
Solids, Dissolved (MG/L)
LOWESS(1.00)
06/29/1983
06/01/2016
35 samples
WSPG7

Discharge Hydrograph

Peak Discharge: 06/29/2011 44 GPM



WSSPG1

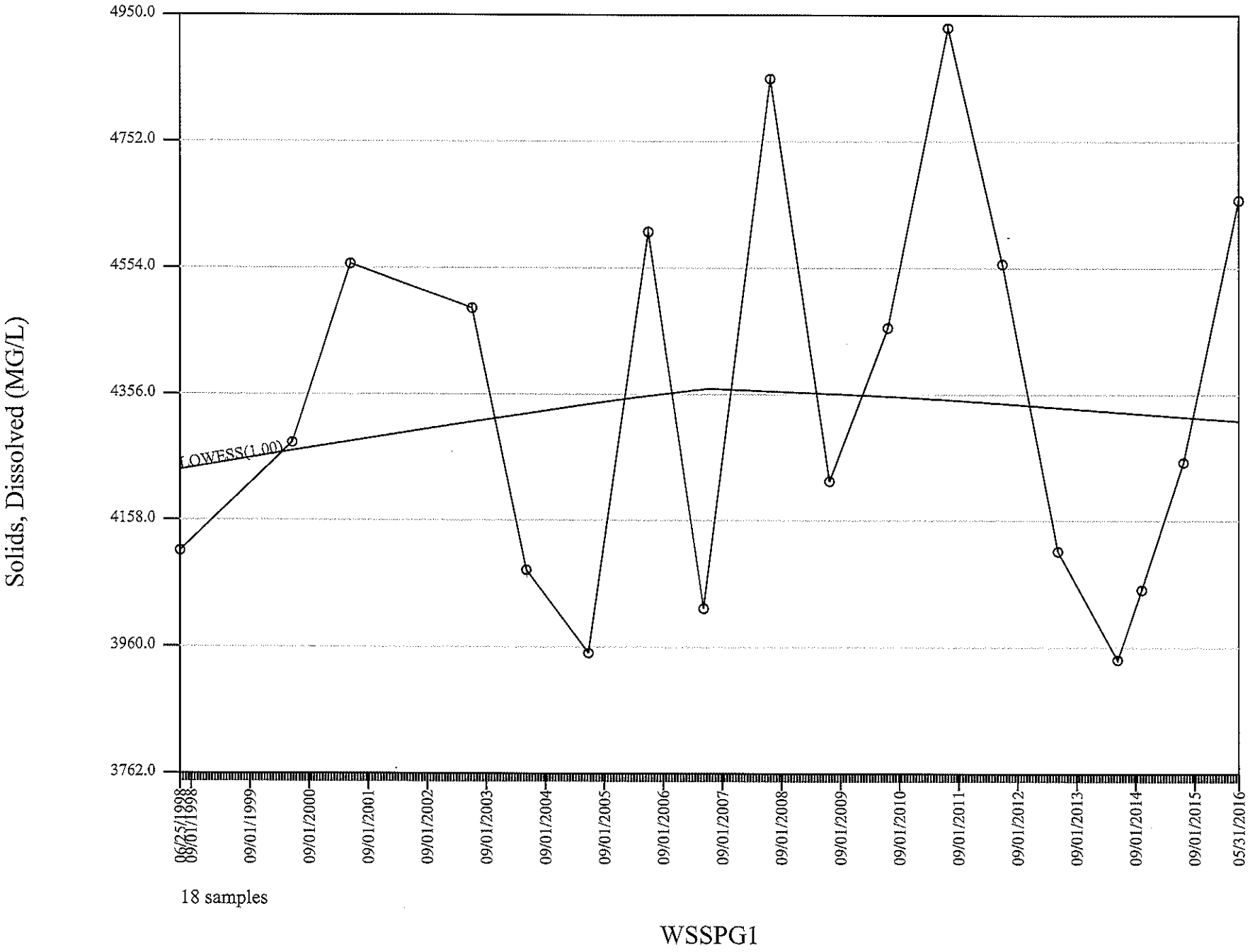
Extended Water Quality Report
WSSPG1 - SPOIL SPRING 1
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 14:15
Field Parameters		
Field Ph	S.U.	7.3900
Temperature	C	20.2000
Field Conductivity	UMHOS/CM	4330.0000
Flow	GPM	19.7000
Laboratory Parameters		
Selenium, Dissolved	UG/L	< 0.5000
Solids, Dissolved	MG/L	4660.0000
Solids, Suspended	MG/L	B 9.0000
Iron, Total Rec.	MG/L	B 0.2000
Selenium, Total Rec.	UG/L	B 0.3000
Manganese, Pot. Diss.	MG/L	1.7000
Selenium, Pot. Diss.	UG/L	1.5000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

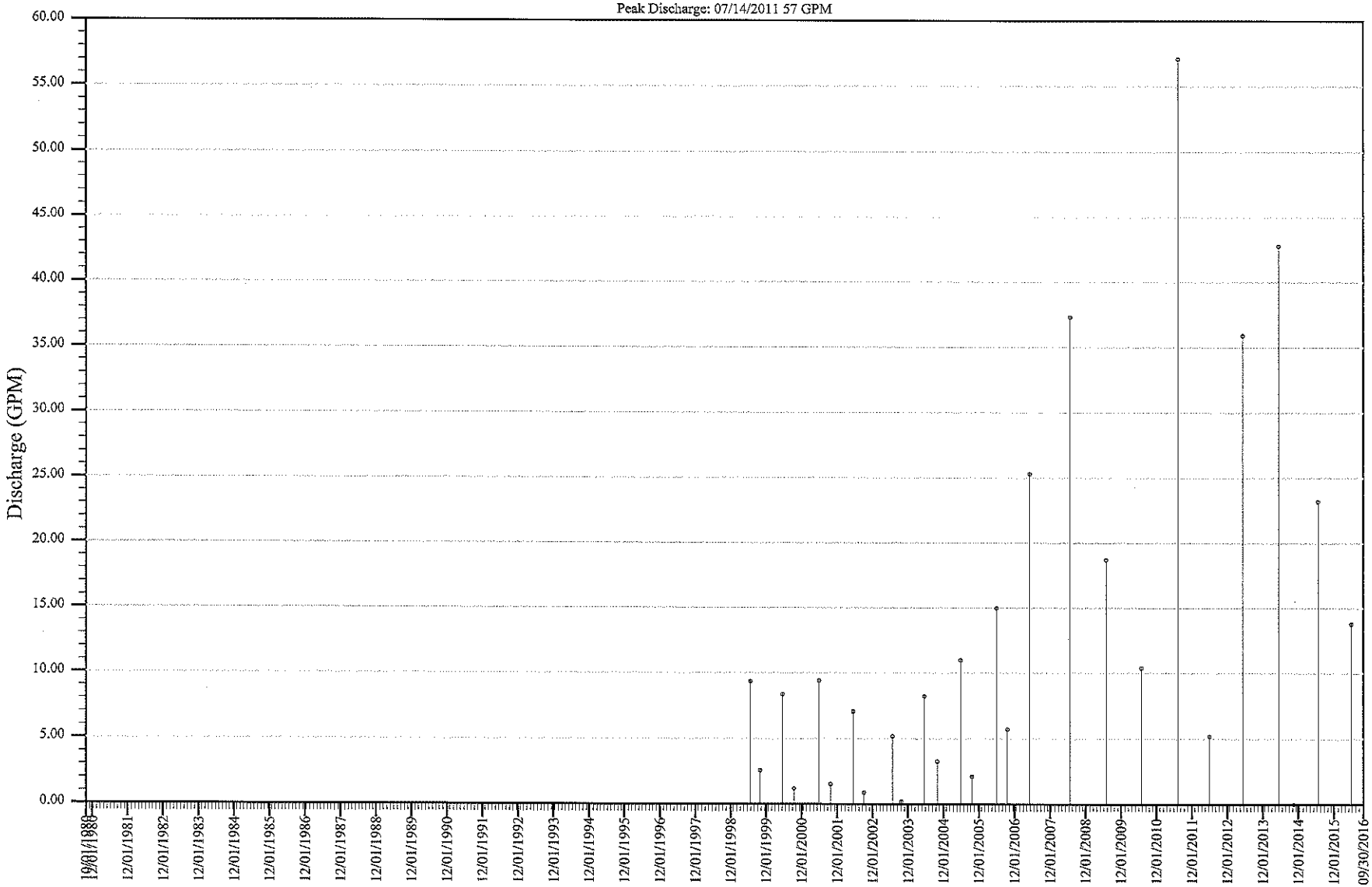
Instantaneous Flow Measurements Report
WSSPG1 - SPOIL SPRING 1
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	14:15:00	MANF	INS				0.04	19.70	0.03


Solids, Dissolved (MG/L)
4950.0
4752.0
4554.0
4356.0
4158.0
3960.0
3762.0
LOWESS(1.00)
06/25/1998
09/01/1998
09/01/1999
09/01/2000
09/01/2001
09/01/2002
09/01/2003
09/01/2004
09/01/2005
09/01/2006
09/01/2007
09/01/2008
09/01/2009
09/01/2010
09/01/2011
09/01/2012
09/01/2013
09/01/2014
09/01/2015
05/31/2016
18 samples
WSSPG1

Discharge Hydrograph

Peak Discharge: 07/14/2011 57 GPM



WSSPG2

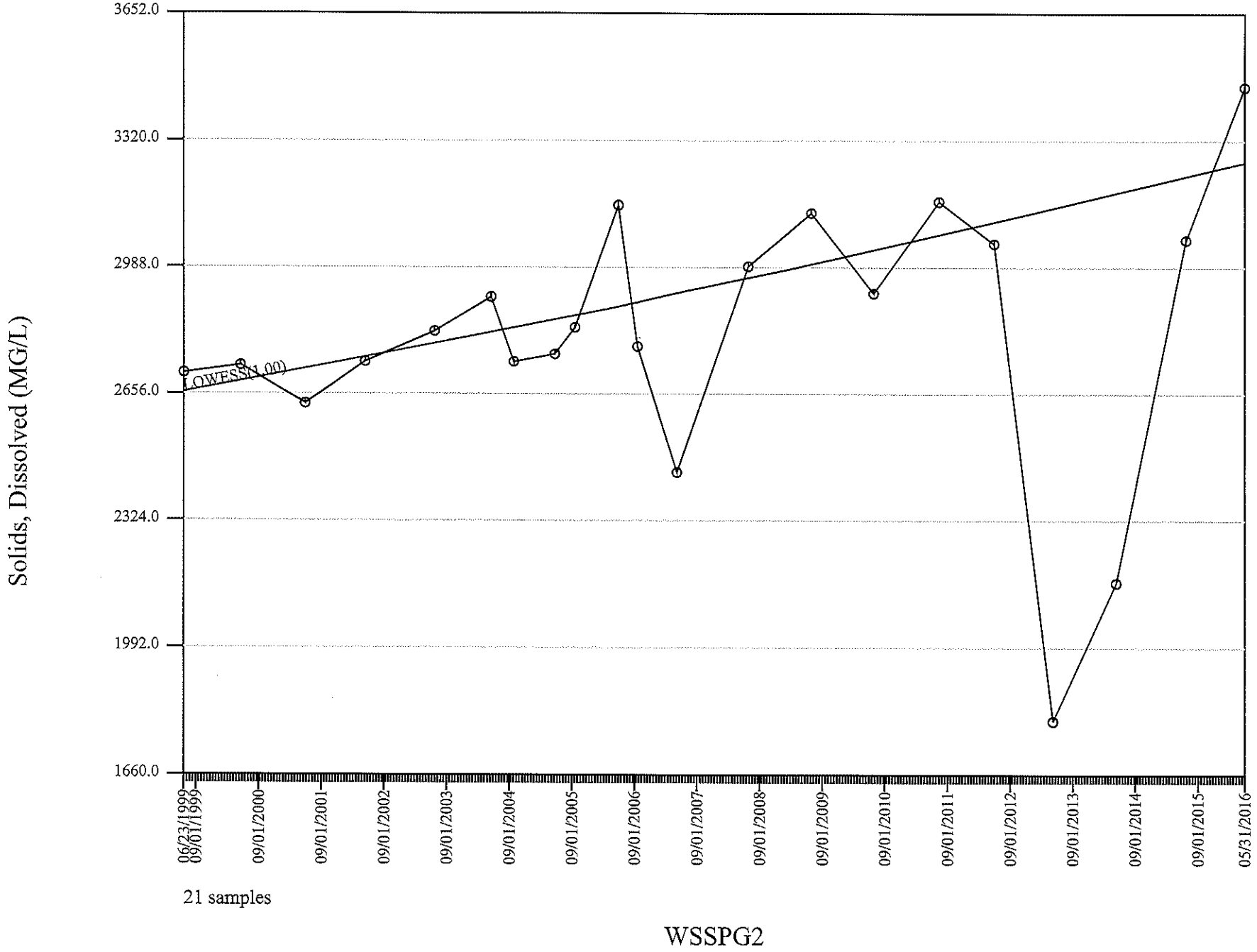
Extended Water Quality Report
WSSPG2 - SPOIL SPRING 2
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 16:00
Field Parameters		
Field Ph	S.U.	7.7900
Temperature	C	19.0000
Field Conductivity	UMHOS/CM	3620.0000
Flow	GPM	13.8000
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	< 0.0500
Nitrate Nitrogen_N	MG/L	7.4000
Nitrite Nitrogen_N	MG/L	B 0.0300
Nitrate/Nitrite Nitrogen_N	MG/L	7.4000
Selenium, Dissolved	UG/L	6.2000
Solids, Dissolved	MG/L	3460.0000
Solids, Suspended	MG/L	B 13.0000
Sulfate	MG/L	1530.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	0.2900
Selenium, Total Rec.	UG/L	6.6000
Manganese, Pot. Diss.	MG/L	0.0090
Selenium, Pot. Diss.	UG/L	6.6000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

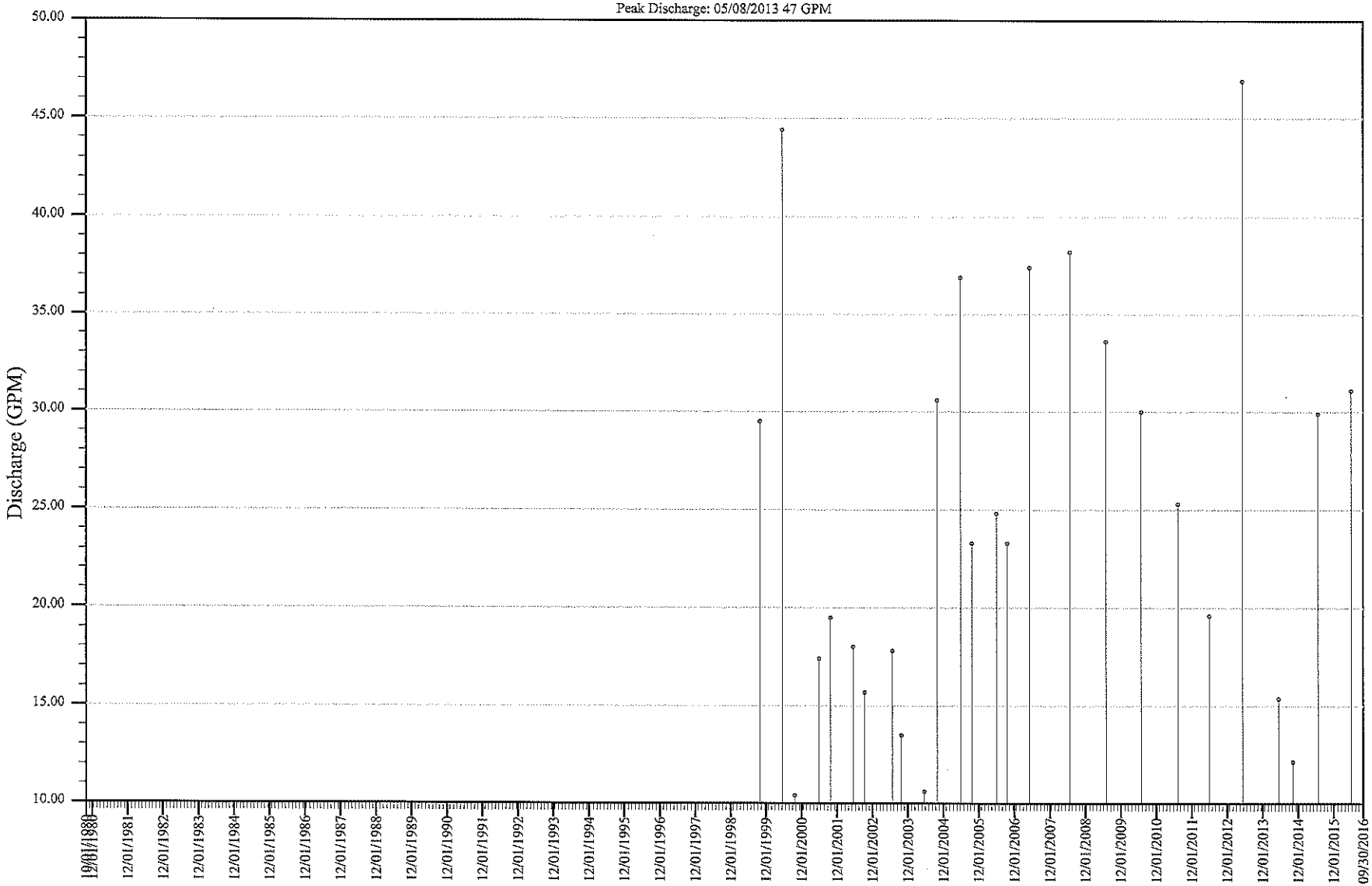
Instantaneous Flow Measurements Report
WSSPG2 - SPOIL SPRING 2
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	16:00:00	MANF	INS				0.03	13.80	0.02


Solids, Dissolved (MG/L)
3652.0
3320.0
2988.0
2656.0
2324.0
1992.0
1660.0
LOWESS(1.00)
06/23/1999
09/01/1999
09/01/2000
09/01/2001
09/01/2002
09/01/2003
09/01/2004
09/01/2005
09/01/2006
09/01/2007
09/01/2008
09/01/2009
09/01/2010
09/01/2011
09/01/2012
09/01/2013
09/01/2014
09/01/2015
05/31/2016
21 samples
WSSPG2

Discharge Hydrograph

Peak Discharge: 05/08/2013 47 GPM



WSSPG3

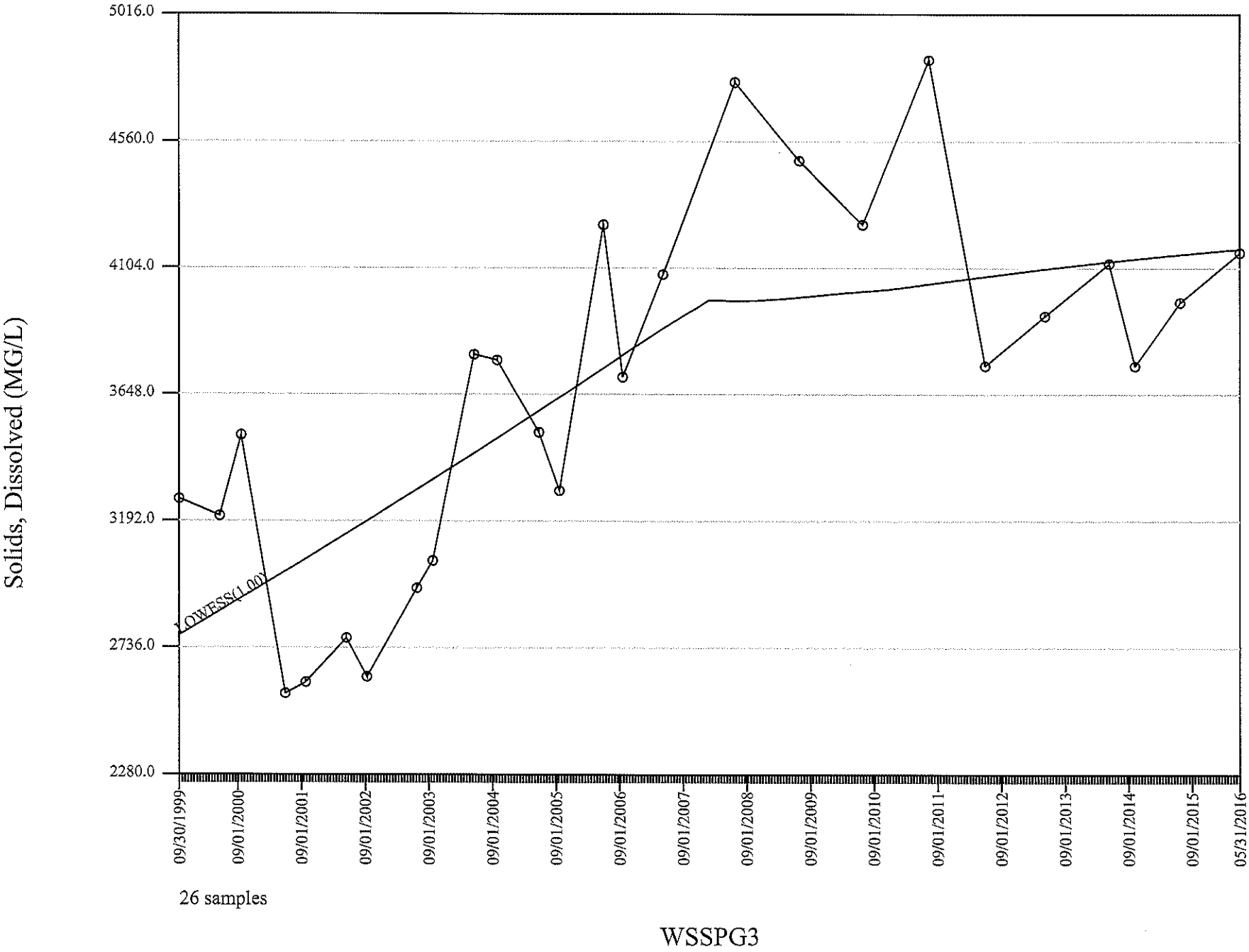
Extended Water Quality Report
WSSPG3 - SPOIL SPRING 3
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 16:30
Field Parameters		
Field Ph	S.U.	7.6600
Temperature	C	18.5000
Field Conductivity	UMHOS/CM	4140.0000
Flow	GPM	31.1000
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	< 0.0500
Nitrate Nitrogen_N	MG/L	1.4700
Nitrite Nitrogen_N	MG/L	B 0.0500
Nitrate/Nitrite Nitrogen_N	MG/L	1.5200
Selenium, Dissolved	UG/L	1.8000
Solids, Dissolved	MG/L	4160.0000
Solids, Suspended	MG/L	B 14.0000
Sulfate	MG/L	1980.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	0.1800
Selenium, Total Rec.	UG/L	1.7000
Manganese, Pot. Diss.	MG/L	0.4263
Selenium, Pot. Diss.	UG/L	1.6000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

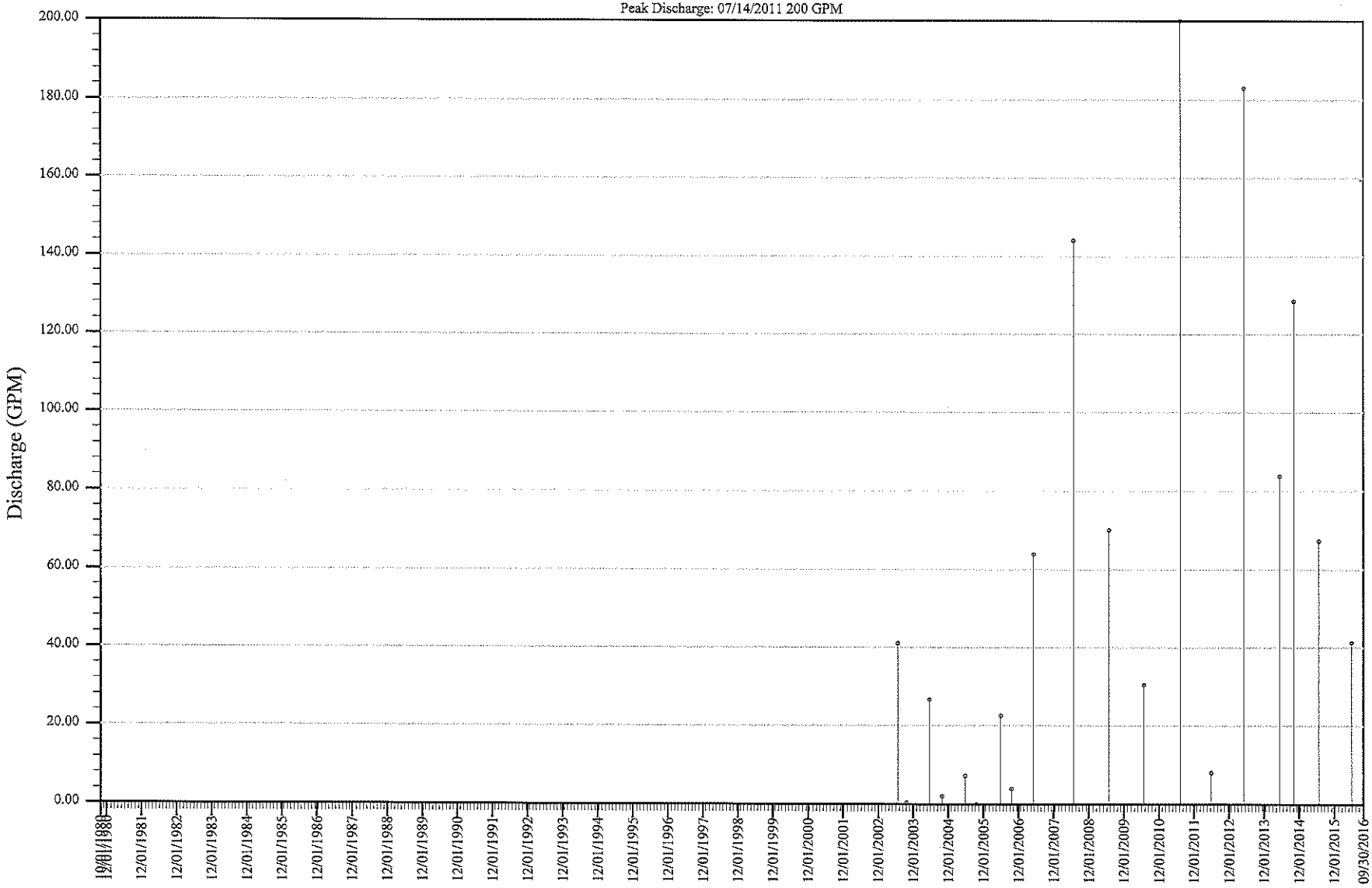
Instantaneous Flow Measurements Report
WSSPG3 - SPOIL SPRING 3
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	16:30:00	MANF	INS				0.07	31.10	0.04


Solids, Dissolved (MG/L)
5016.0
4560.0
4104.0
3648.0
3192.0
2736.0
2280.0
LOWESS(1.00)
09/30/1999
09/01/2000
09/01/2001
09/01/2002
09/01/2003
09/01/2004
09/01/2005
09/01/2006
09/01/2007
09/01/2008
09/01/2009
09/01/2010
09/01/2011
09/01/2012
09/01/2013
09/01/2014
09/01/2015
05/31/2016
26 samples
WSSPG3

Discharge Hydrograph

Peak Discharge: 07/14/2011 200 GPM



WSSPG4

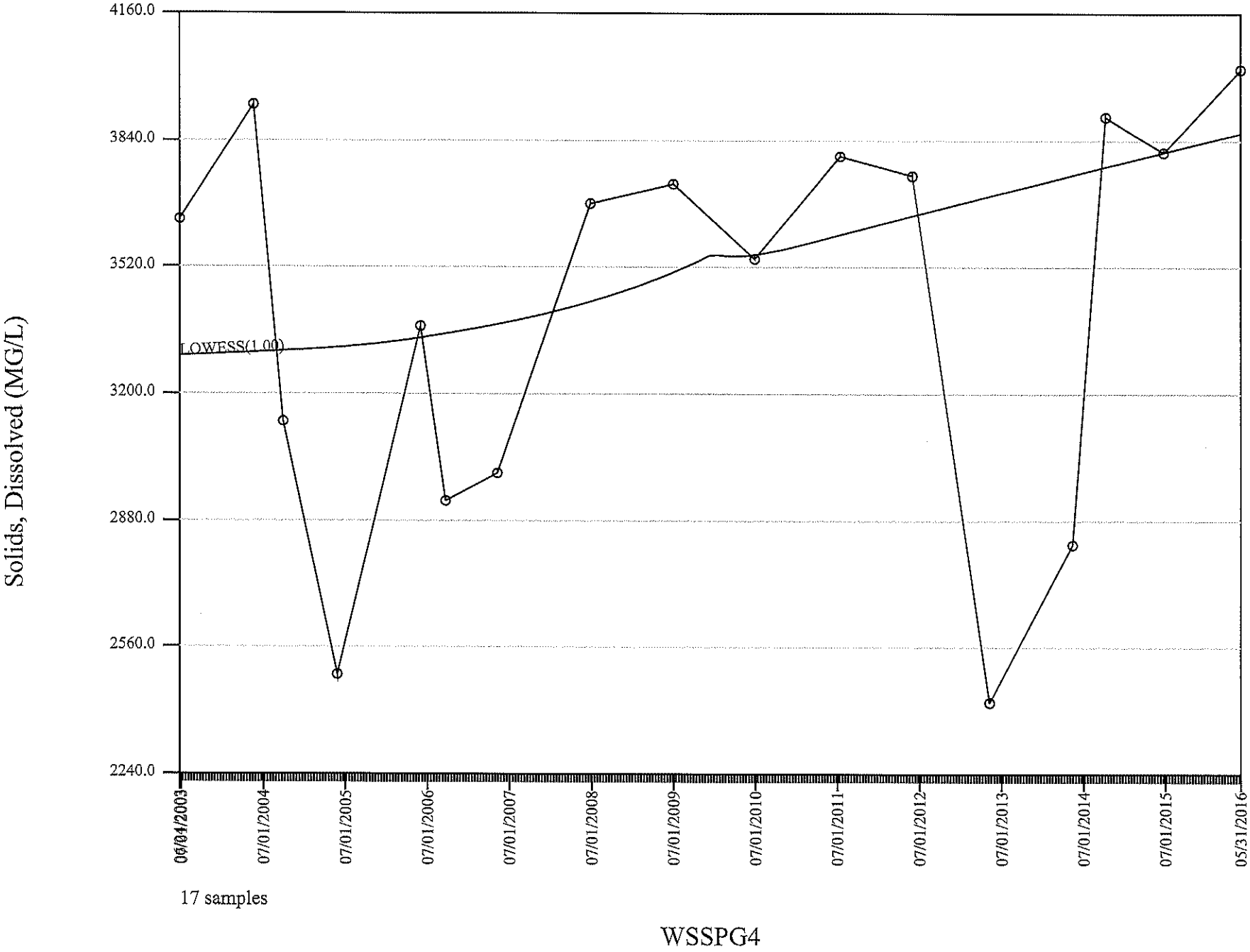
Extended Water Quality Report
WSSPG4 - SPOIL SPRING 4
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 15:45
Field Parameters		
Field Ph	S.U.	7.8300
Temperature	C	19.8000
Field Conductivity	UMHOS/CM	4100.0000
Flow	GPM	41.3000
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	B 0.0700
Nitrate Nitrogen_N	MG/L	1.6700
Nitrite Nitrogen_N	MG/L	0.1000
Nitrate/Nitrite Nitrogen_N	MG/L	1.7700
Selenium, Dissolved	UG/L	2.2000
Solids, Dissolved	MG/L	4020.0000
Solids, Suspended	MG/L	B 16.0000
Sulfate	MG/L	1880.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	0.3000
Selenium, Total Rec.	UG/L	2.0000
Manganese, Pot. Diss.	MG/L	0.7705
Selenium, Pot. Diss.	UG/L	2.1000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

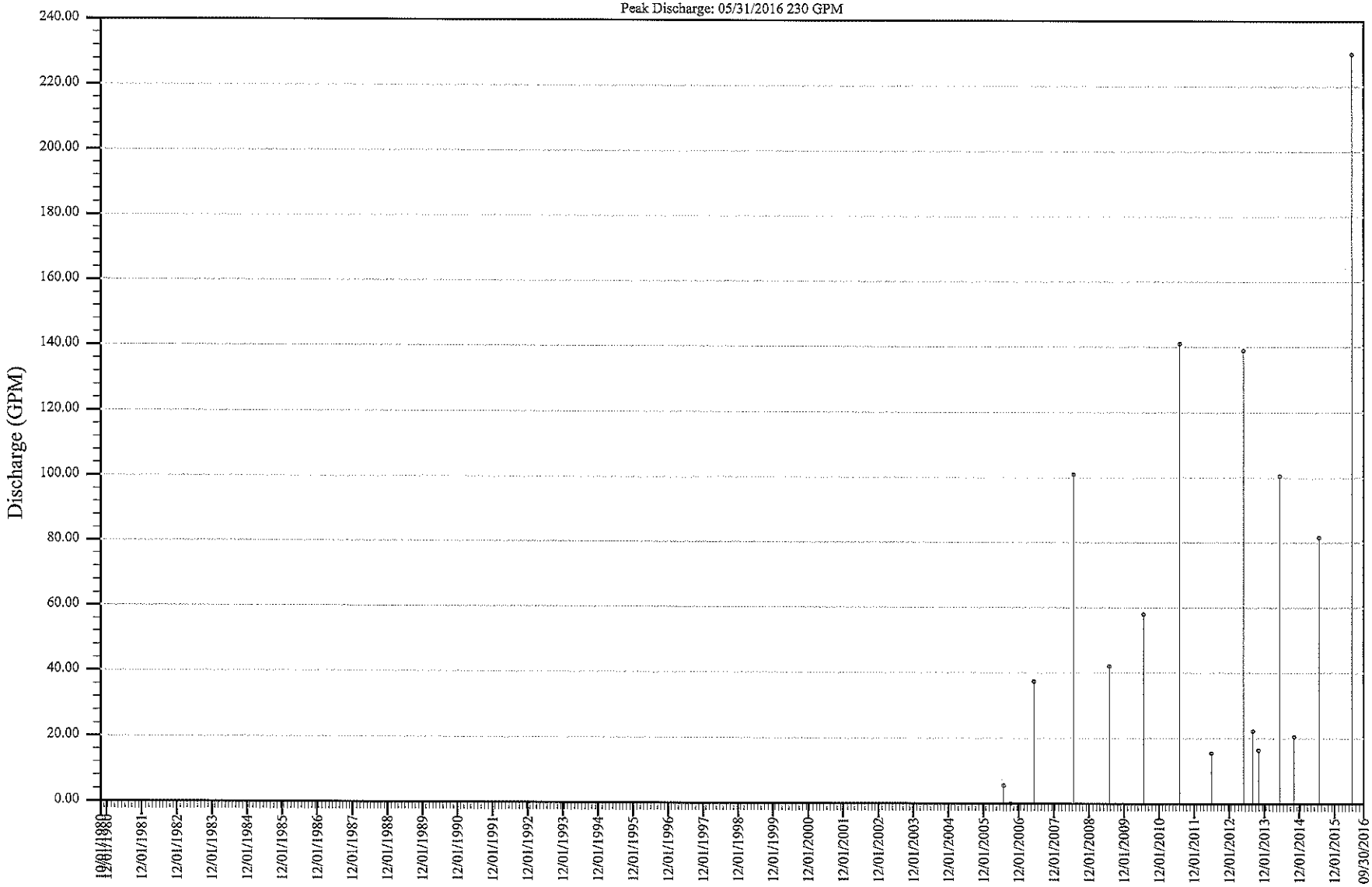
Instantaneous Flow Measurements Report
WSSPG4 - SPOIL SPRING 4
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	15:45:00	MANF	INS				0.09	41.30	0.06


Solids, Dissolved (MG/L)
4160.0
3840.0
3520.0
3200.0
2880.0
2560.0
2240.0
LOWESS(1.00)
06/04/2003
07/01/2004
07/01/2005
07/01/2006
07/01/2007
07/01/2008
07/01/2009
07/01/2010
07/01/2011
07/01/2012
07/01/2013
07/01/2014
07/01/2015
05/31/2016
17 samples
WSSPG4

Discharge Hydrograph

Peak Discharge: 05/31/2016 230 GPM



WSSPG5

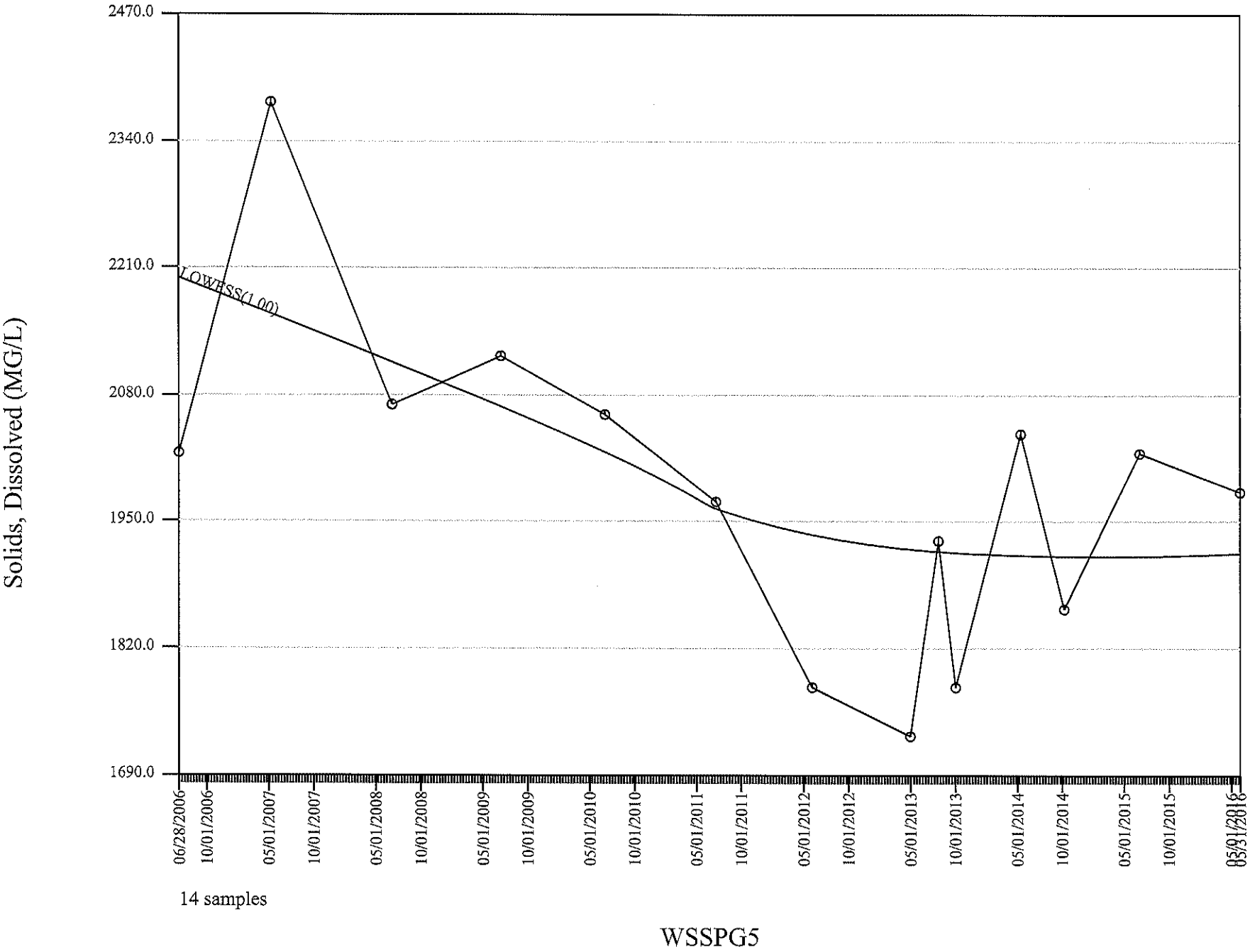
Extended Water Quality Report
WSSPG5 - SPOIL SPRING 5
10/01/2015-00:00 to 09/30/2016-23:59

Parameters	Units	05/31/2016 14:45
Field Parameters		
Field Ph	S.U.	7.1000
Temperature	C	14.5000
Field Conductivity	UMHOS/CM	2430.0000
Flow	GPM	229.9000
Laboratory Parameters		
Mercury, Total	UG/L	< 0.2000
Ammonia Nitrogen_N	MG/L	0.4100
Nitrate Nitrogen_N	MG/L	< 0.0200
Nitrite Nitrogen_N	MG/L	< 0.0100
Nitrate/Nitrite Nitrogen_N	MG/L	< 0.0200
Selenium, Dissolved	UG/L	B 0.2000
Solids, Dissolved	MG/L	1980.0000
Solids, Suspended	MG/L	< 5.0000
Sulfate	MG/L	789.0000
Sulfide	MG/L	< 0.0200
Iron, Total Rec.	MG/L	0.0700
Selenium, Total Rec.	UG/L	B 0.2000
Manganese, Pot. Diss.	MG/L	1.1300
Selenium, Pot. Diss.	UG/L	0.6000

"B" -- Between MDL and PQL, "<" -- Less than detection limit

Instantaneous Flow Measurements Report
WSSPG5 - SPOIL SPRING 5
10/01/2015-00:00 to 09/30/2016-23:59

Date	Time	Instrument	Type	Flag	Begin/End	Stage	CFS	GPM	MGD
05/31/2016	14:45:00	MANF	INS				0.51	229.90	0.33


Solids, Dissolved (MG/L)
2470.0
2340.0
2210.0
2080.0
1950.0
1820.0
1690.0
LOWESS(1.00)
06/28/2006
10/01/2006
05/01/2007
10/01/2007
05/01/2008
10/01/2008
05/01/2009
10/01/2009
05/01/2010
10/01/2010
05/01/2011
10/01/2011
05/01/2012
10/01/2012
05/01/2013
10/01/2013
05/01/2014
10/01/2014
05/01/2015
10/01/2015
14 samples
WSSPG5