



Jolly, Becky <becky.jolly@dnr.iowa.gov>

Fwd: Document correction - Marshalltown East and West Closed Landfills - Permits #64-SDP-05-91C & #64-SDP-03-90C

1 message

Rath, Brian <brian.rath@dnr.iowa.gov>
To: Becky Jolly <becky.jolly@dnr.iowa.gov>

Mon, Sep 29, 2025 at 3:51 PM

Becky,

Please file both the attached and this email. Thanks.

Brian L. Rath
Iowa DNR Solid Waste
Sent from mobile device

----- Forwarded message -----

From: **Blodgett, Meghan** <mblodgett@scsengineers.com>

Date: Mon, Sep 29, 2025 at 3:33 PM

Subject: RE: Document correction - Marshalltown East and West Closed Landfills - Permits #64-SDP-05-91C & #64-SDP-03-90C

To: Rath, Brian <brian.rath@dnr.iowa.gov>

CC: Coughlin, Jenny <jennycoughlin@alliantenergy.com>, Matzuk, Ryan <RMatzuk@scsengineers.com>

Brian,

See attached. As stated below, this is the correct Appendix E for the 2024 Marshalltown East and West Closed Landfills AWQR.

Thank you,

Meghan Blodgett

SCS Engineers

Madison, WI

608-216-7362 (O)

608-345-9221 (C)

mblodgett@scsengineers.com

www.scsengineers.com

From: Rath, Brian <brian.rath@dnr.iowa.gov>

Sent: Monday, September 29, 2025 2:58 PM

To: Blodgett, Meghan <mblodgett@scsengineers.com>

Cc: Coughlin, Jenny <jennycoughlin@alliantenergy.com>; Matzuk, Ryan <RMatzuk@scsengineers.com>

Subject: Re: Document correction - Marshalltown East and West Closed Landfills - Permits #64-SDP-05-91C & #64-SDP-03-90C

This email originated from outside of SCS Engineers. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Meghan,

Just the attachment will be fine. Thanks.

Brian L. Rath
Iowa DNR Solid Waste
Sent from mobile device

On Mon, Sep 29, 2025 at 2:38 PM Blodgett, Meghan <mblodgett@scsengineers.com> wrote:

Brian,

We have identified that an incorrect attachment was included with the 2024 AWQR for the Marshalltown East and West Closed Landfills. Appendix E of the 2024 AWQR should have included the November 30, 2023 Statistical Evaluation memo for Marshalltown, which was previously submitted with the 2023 AWQR. The equivalent statistical memo for the Big Bend Closed Landfill was mistakenly included instead. These memos were not updated in 2024 but were included with the 2024 AWQRs for reference.

Please let us know how you'd like us to correct this error. We can provide a full new AWQR PDF, provide just the correct attachment, or something else if you prefer.

Thank you,

Meghan Blodgett, PG*

Hydrogeologist

SCS Engineers

[2830 Dairy Drive](#)

[Madison, WI 53718-6751 USA](#)

608-216-7362 (O)

608-345-9221 (C)

mblodgett@scsengineers.com

*Licensed in Wisconsin

Driven by Client Success

www.scsengineers.com



Appendix E_Stats Memo_MT_2023.pdf

789K

November 30, 2023
File No. 25223064.00

TECHNICAL MEMORANDUM

SUBJECT: Statistical Evaluation of Groundwater Monitoring Results
Marshalltown East and West Closed CCR Landfills, September 2023 Sampling Event

PREPARED BY: Ryan Matzuk

CHECKED BY: Charles Hostetler

STATISTICAL METHOD

The statistical analysis uses a prediction interval approach, as recommended for detection monitoring in the March 2009 U.S. Environmental Protection Agency (U.S. EPA) Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act (RCRA) Facilities. For the prediction interval evaluation, interwell testing was selected based on the considerations outlined in Chapter 6 of the Unified Guidance. The statistical program used to calculate the interwell prediction interval is Sanitas™ (Version 9.6.37).

The Marshalltown monitoring data are evaluated in two well groups, representing the East and West Landfills. For the East Landfill, monitoring wells MW-9 and MW-10 are used as the background wells. For the West Landfill, monitoring wells MW-8, MW-13, and MW-14 are used as the background wells. For each group, the background data are pooled for calculation of the prediction limits.

TIME SERIES PLOTS

Time series plots are prepared for the required monitoring parameters to show the concentration variations over time. Time series graphs are included in **Attachments E1** (West) and **E2** (East). For metals, the time series plots only show monitoring results since 2016, when the monitoring program transitioned from dissolved metals to total metals analysis. For chloride and sulfate, which are not typically affected by filtering, older historical results for the background wells are included in the time series plots and are used in the determination of background for the statistical evaluation.

OUTLIER ANALYSIS

An outlier analysis is performed for background monitoring results at the upgradient wells. A statistical outlier is a value that is extremely different from the other values in the data set. The Sanitas outlier tests identify data points that do not appear to fit the distribution of the rest of the data set and determine if they differ significantly from the rest of the data. The outlier analysis was performed for each background well individually, rather than for the pooled background data.



The outlier analysis performed in Sanitas includes the following steps:

- 1) Run normality test (Shapiro Wilk/Francia).
- 2) If normally distributed, run U.S. EPA's 1989 Outlier Test to identify suspected outliers.
 - a) If number of background samples is less than or equal to 22, run Dixon's test for suspected outliers.
 - b) If number of background samples is more than 22, run Rosner's test for suspected outliers.
- 3) If not normally distributed, run Tukey's test for outliers.
- 4) Review data flagged as possible outliers to evaluate whether they should be removed from the background data set. Also review time series plots for possible outliers that were not picked up in the statistical evaluation (e.g., outlier test may not identify outliers when two values are similar to each other, but very different from all other data).

Results identified as statistical outliers are checked for possible lab instrument failure, field collection problems, or data entry errors; however, outliers may exist naturally in the data if there is an extremely wide inherent or temporal variability in the data. The Unified Guidance states that unless a likely error can be identified, the outlier should not be removed.

For the September 2023 sampling event, the following background values were identified as potential outliers and handled as described:

West Landfill

- **Barium (MW-14).** One high result from the September 2017 event was flagged by Sanitas as a statistical outlier. This result was kept in the dataset because there was no known explanation for the higher result, and it appeared to be within the range of potential natural variation relative to the other observed barium concentrations (approximately 2 times the typical values at MW-14, similar to levels at other background wells).
- **Iron (MW-14).** One high result from the September 2017 event was flagged by Sanitas as a statistical outlier. This result was kept in the dataset because there was no known explanation for the higher result, and it appeared to be within the range of potential natural variation relative to the other observed iron concentrations.

East Landfill

- **Chloride (MW-9).** Four high results from the September 2013, September 2014, September 2015, and September 2022 events were flagged by Sanitas as statistical outliers. These results were kept in the dataset because there was no known explanation for the higher results, and the higher chloride levels persisted for at least 2 years, so it did not appear to reflect a sampling or laboratory error.

Outlier analysis results are included in **Attachments E3** (West) and **E4** (East).

INTERWELL PREDICTION LIMITS

Interwell upper prediction limits (UPLs) are calculated for the shallow and deep groundwater systems using data from the background wells for each monitored constituent, with outliers removed as noted above. The prediction limit analysis performed in Sanitas includes the following steps:

- 1) If 50 percent or more of results are non-detect, apply a non-parametric UPL. For small background sample sizes, the non-parametric UPL is the highest background value. For a parameter with 100 percent non-detects in the background values, the Double Quantification rule applies, which says that a statistically significant increase (SSI) occurs when two results exceeding the quantification limit are reported for a compliance well.
- 2) If fewer than 50 percent of the results are non-detect, run normality test (Shapiro Wilk/Francia) to assess whether the data fit a normal distribution or can be transformed to fit a normal distribution (e.g., lognormal).
- 3) If normal or transformed normal, calculate parametric UPL.
- 4) If not normal or transformed normal, calculate non-parametric UPL.

For evaluation of parameters with less than 100 percent non-detects in the background sampling, the non-detects were replaced with the detection limit, unless the non-detects represented less than 15 percent of the total samples, in which case one-half of the detection limit was used.

Consistent with the Unified Guidance, parametric prediction limits are calculated based on a 1-of-2 retesting protocol and a target 10 percent annual site-wide false positive rate. Sanitas establishes the per-test significance level based on user inputs of the number of events per year, number of constituents being evaluated, and number of compliance wells. For the 2023 event, the following values were used:

Parameter	Value	Comments
Evaluations per year	1	September event
Constituents analyzed	12	Total of 18 constituents analyzed. Calcium, fluoride, lithium, molybdenum, total dissolved solids (TDS), and total suspended solids (TSS) not included because they were added to the program in 2023 and do not meet the minimum sample number requirements needed to produce prediction limits.
Compliance wells	13	6 West, 7 East

Non-parametric prediction limits are also based on a 1-of-2 retesting protocol. The non-parametric limit is the highest value in the background dataset. Due to the small sample size, the false positive rate for the non-parametric tests is higher than for the parametric tests, but will go down as more background data are obtained.

Although the limits are based on a 1-of-2 retesting approach, retesting is not required. Because the site is closed and has been monitored for many years, retesting will typically not be performed unless

TECHNICAL MEMORANDUM

November 30, 2023

Page 4

a new potential SSI is identified. If retesting is not performed, a result above the UPL is presumed to represent an SSI above the interwell background level. Only results that exceed the laboratory's limit of quantitation or reporting limit are compared to the UPL; therefore, a J-flagged value above the UPL is not an SSI.

Interwell prediction limit analysis results for 2023 are included in **Attachments E5** (West) and **E6** (East).

RM/lmh/CJH

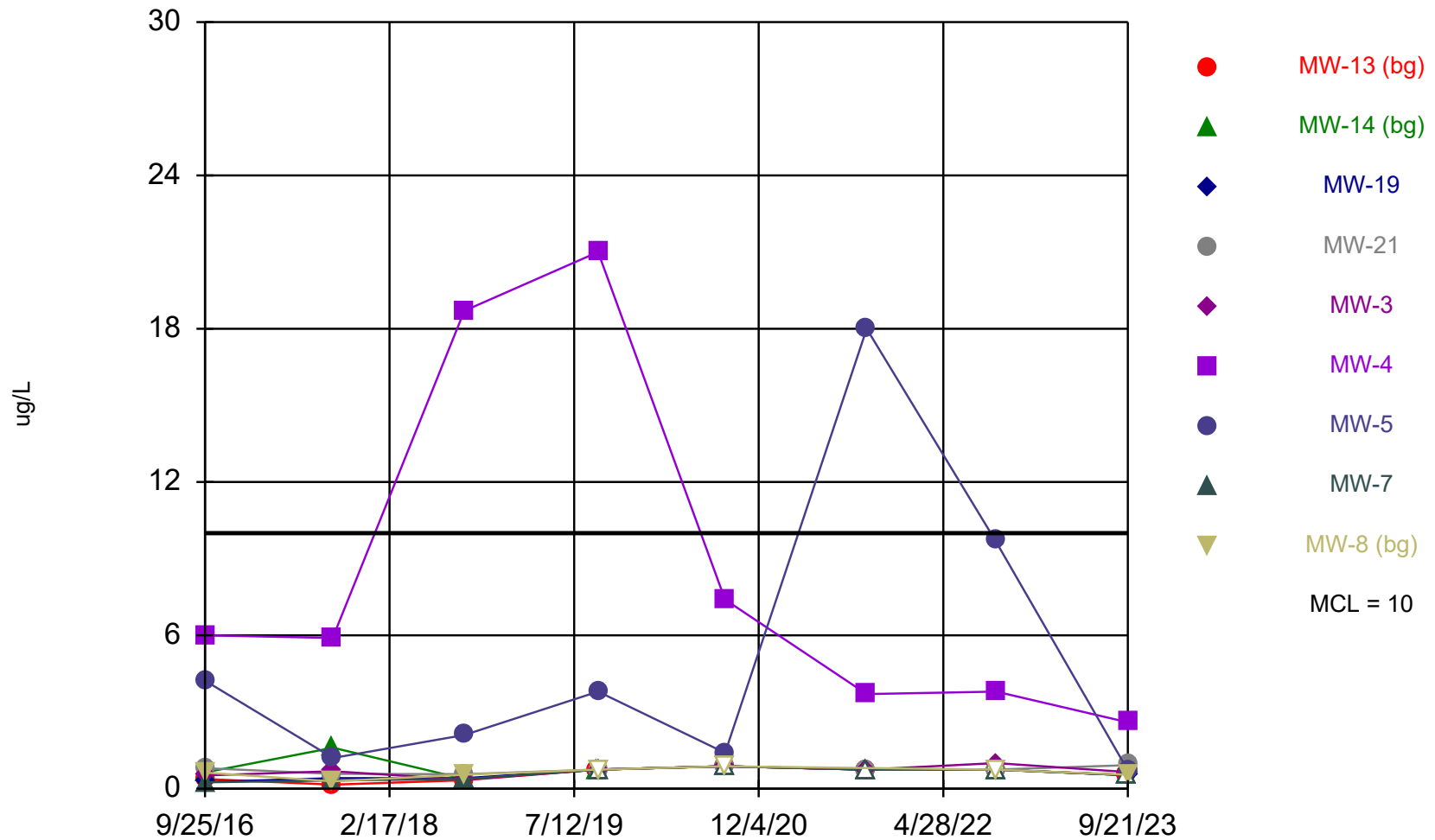
I:\25223064.00\Deliverables\2023 AWQR\Appendix E - Stats\Appendix E_Stats Memo_MT_2023.docx



Attachment E1

Times Series Graphs – West

Arsenic



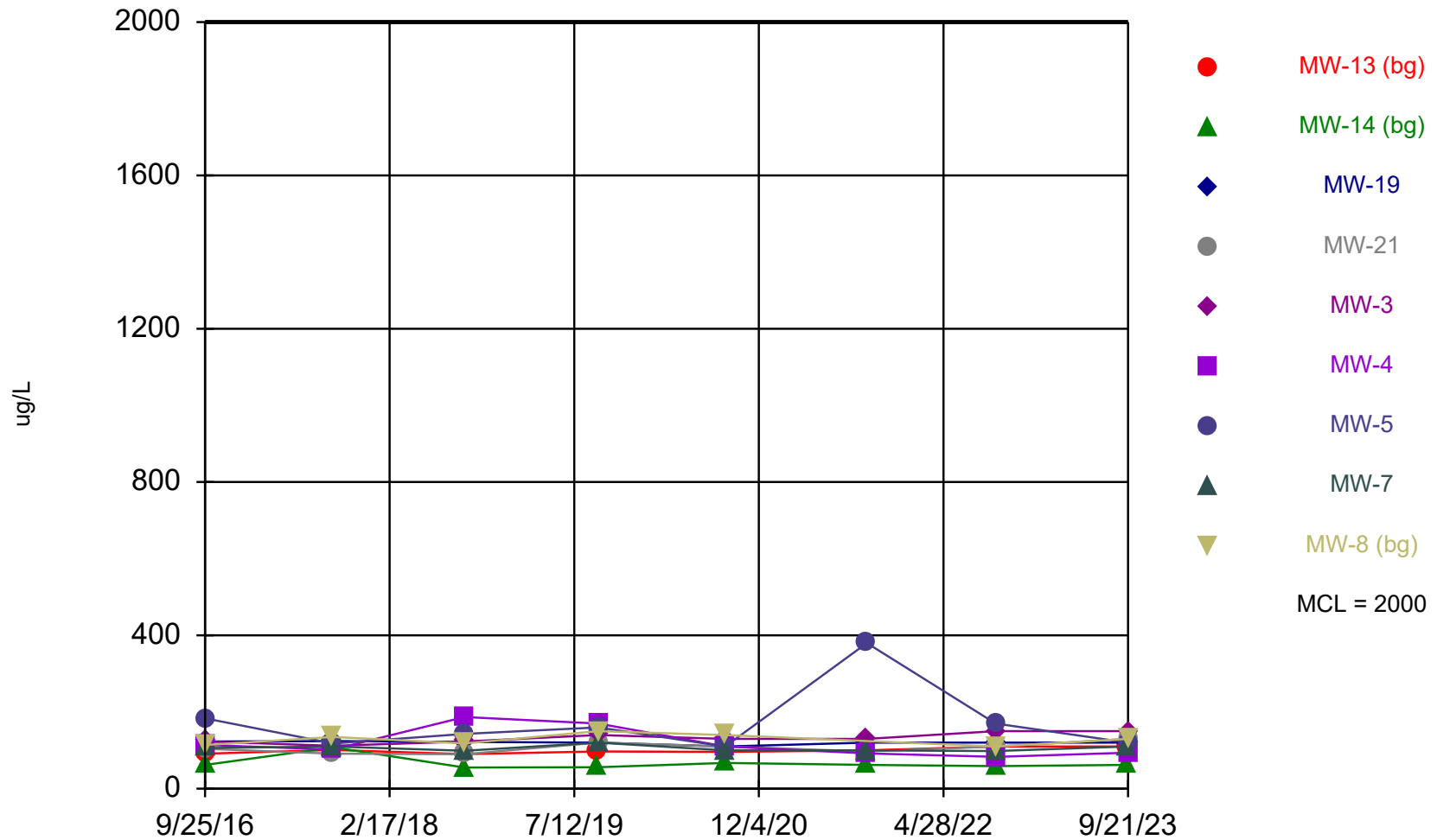
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	0.38 (J)								
9/26/2016		0.64 (J)							0.63 (J)
9/27/2016			0.26 (J)			6		0.25 (J)	
9/28/2016				0.8 (J)	0.52 (J)		4.2		
9/13/2017	0.16 (J)					5.9		0.32 (J)	0.29 (J)
9/14/2017		1.6	0.41 (J)	0.58 (J)	0.68 (J)		1.2		
9/11/2018	0.33 (J)			0.57 (J)					
9/12/2018		0.38 (J)	0.41 (J)			18.7	2.1		0.55 (J)
9/13/2018					0.35 (J)			0.38 (J)	
9/16/2019	<0.75	<0.75							
9/17/2019			<0.75	0.75 (J)	<0.75	21	3.8	<0.75	<0.75
9/1/2020		<0.88						<0.88	<0.88
9/2/2020	<0.88		<0.88	<0.88	<0.88	7.4	1.4 (J)		
9/27/2021	<0.75	<0.75							
9/28/2021								<0.75	
9/29/2021			<0.75	<0.75	<0.75	3.7	18		
9/20/2022		<0.75	<0.75				9.7	<0.75	<0.75
9/21/2022	<0.75				1 (J)				
9/22/2022				<0.75		3.8			
9/20/2023	<0.53 (U)	<0.53 (U)						<0.53 (U)	
9/21/2023			<0.53 (U)	0.92 (J)	0.65 (J)	2.6	0.72 (J)		0.55 (J)

Barium



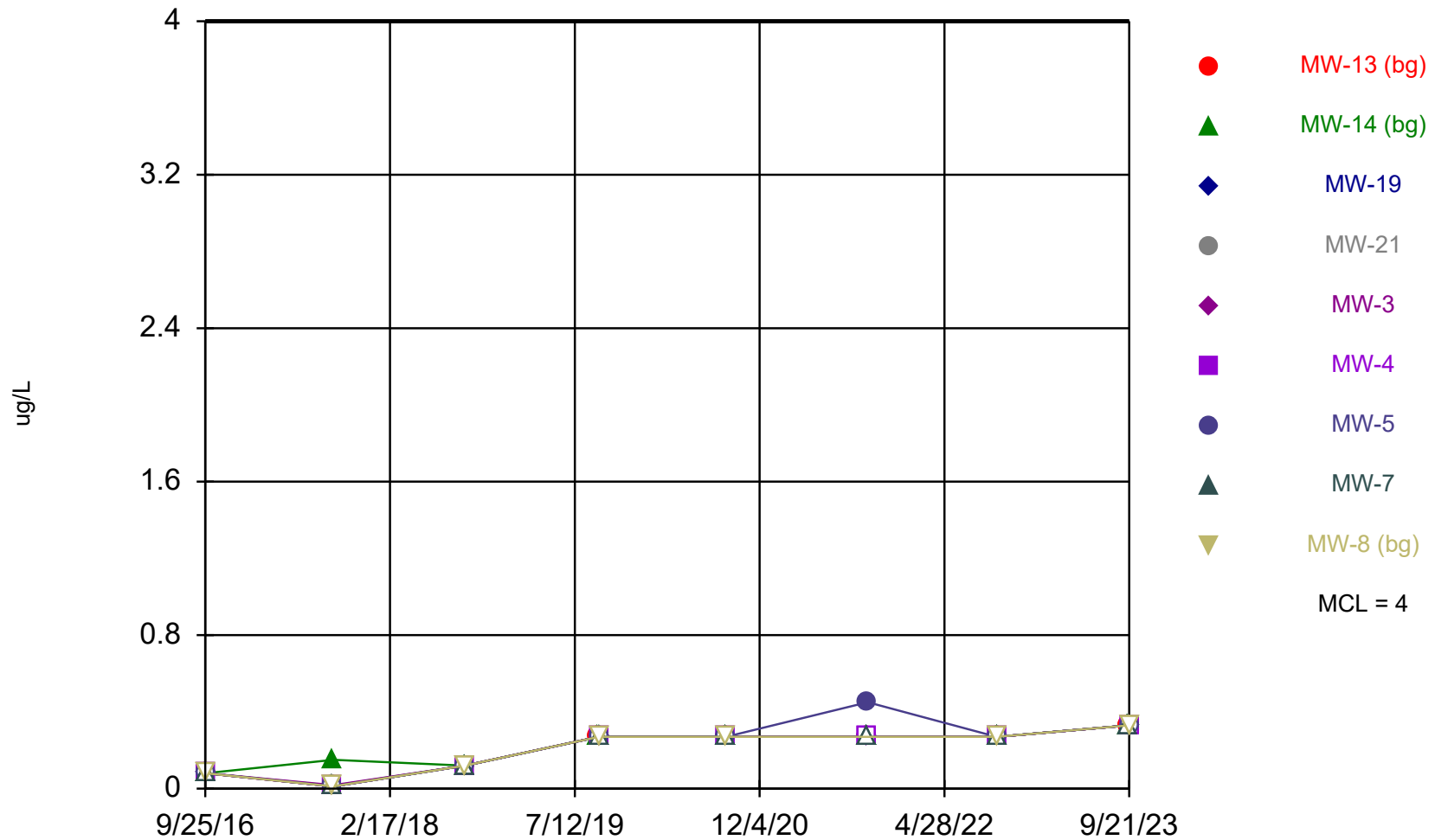
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Barium (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	91.2								
9/26/2016		62.1							114
9/27/2016			123			114		106	
9/28/2016				104	123		183		
9/13/2017	101					102		110	135
9/14/2017		108	124	91.3	112		118		
9/11/2018	90.4			89.8					
9/12/2018		55.1	122			187	143		118
9/13/2018					123			98.9	
9/16/2019	97	56							
9/17/2019			120	120	140	170	160	120	150
9/1/2020		67						100	140
9/2/2020	96		110	110	130	110	110		
9/27/2021	100	62							
9/28/2021								100	
9/29/2021			120	97	130	92	380		
9/20/2022		59	120				170	98	110
9/21/2022	110				150				
9/22/2022				110		83			
9/20/2023	110	62						110	
9/21/2023			120	130	150	94	120		130

Beryllium



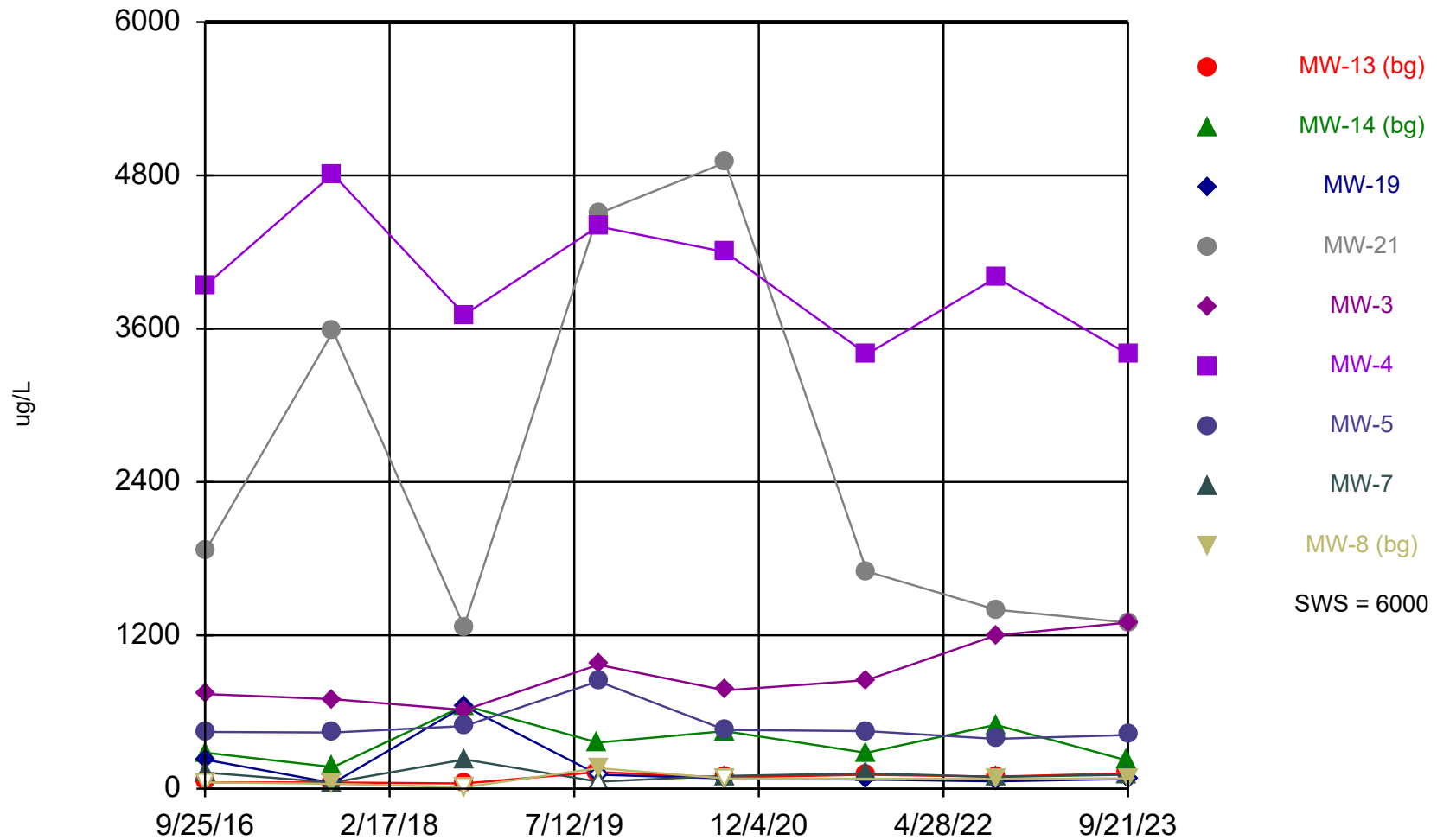
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	<0.08								
9/26/2016		<0.08							<0.08
9/27/2016			<0.08			<0.08		<0.08	
9/28/2016				<0.08	<0.08		<0.08		
9/13/2017	<0.012					0.012 (J)		<0.012	<0.012
9/14/2017		0.15 (J)	<0.012	0.015 (J)	0.018 (J)		<0.012		
9/11/2018	<0.12			<0.12					
9/12/2018		<0.12	<0.12			<0.12	<0.12		<0.12
9/13/2018					<0.12			<0.12	
9/16/2019	<0.27	<0.27							
9/17/2019			<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
9/1/2020		<0.27						<0.27	<0.27
9/2/2020	<0.27		<0.27	<0.27	<0.27	<0.27	<0.27		
9/27/2021	<0.27	<0.27							
9/28/2021								<0.27	
9/29/2021			<0.27	<0.27	<0.27	<0.27	0.45 (J)		
9/20/2022		<0.27	<0.27				<0.27	<0.27	<0.27
9/21/2022	<0.27				<0.27				
9/22/2022				<0.27		<0.27			
9/20/2023	<0.33 (U)	<0.33 (U)						<0.33 (U)	
9/21/2023			<0.33 (U)	<0.33 (U)	<0.33 (U)	<0.33 (U)	<0.33 (U)		<0.33 (U)

Boron



Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

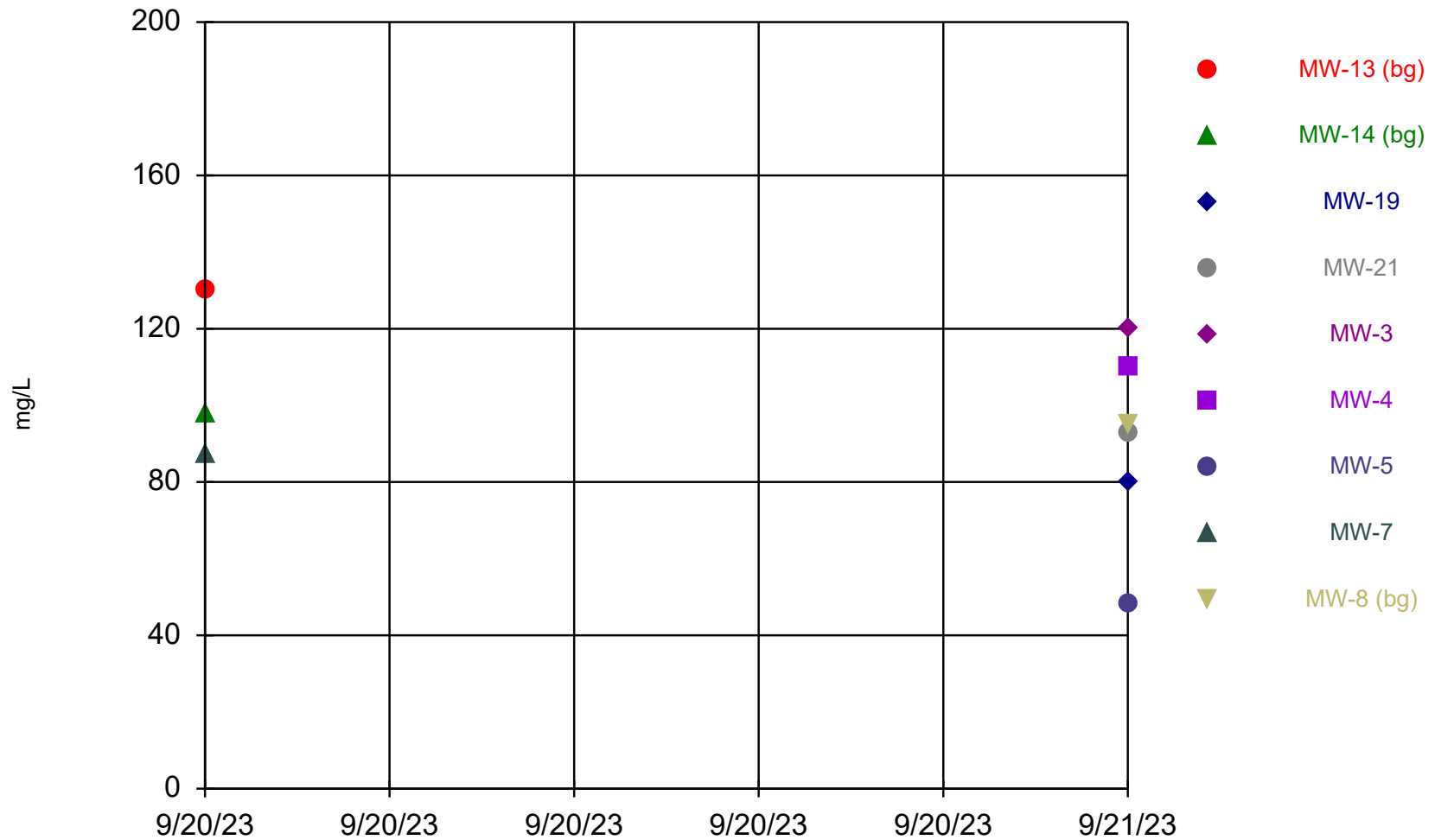
Time Series

Constituent: Boron (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	50.2 (J)								
9/26/2016		282							<50
9/27/2016			226			3940		126	
9/28/2016				1870	740		444		
9/13/2017	48.6 (J)					4810		49 (J)	37.6 (J)
9/14/2017		169	44.7 (J)	3580	700		440		
9/11/2018	41.4 (J)			1270					
9/12/2018		651	645			3710	490		<12.5
9/13/2018					616			228	
9/16/2019	130 (J)	360							
9/17/2019			<110	4500	970	4400	840	<110	160 (J)
9/1/2020		450						100	<80
9/2/2020	88 (J)		<80	4900	770	4200	460		
9/27/2021	110	280							
9/28/2021								120	
9/29/2021			72 (J)	1700	850	3400	450		
9/20/2022		500	<58				390	92 (J)	76 (J)
9/21/2022	94 (J)				1200				
9/22/2022				1400		4000			
9/20/2023	120	220						110	
9/21/2023			<76 (U)	1300	1300	3400	420		81 (J)

ND substitution: RL or RL/2 if <15% NDs.

Calcium



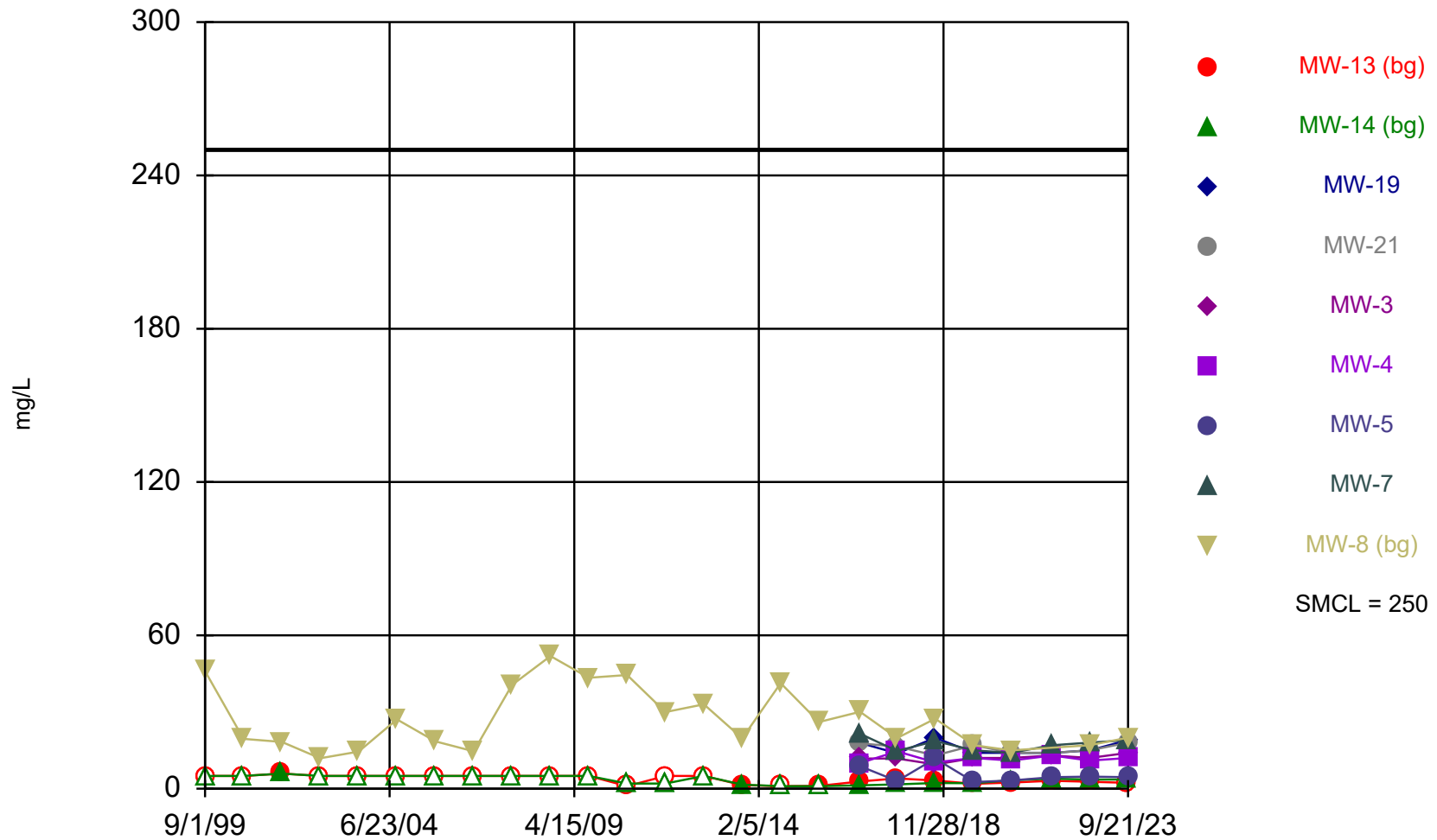
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Calcium (mg/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/20/2023	130	98						87	
9/21/2023			80	93	120	110	48		95

Chloride



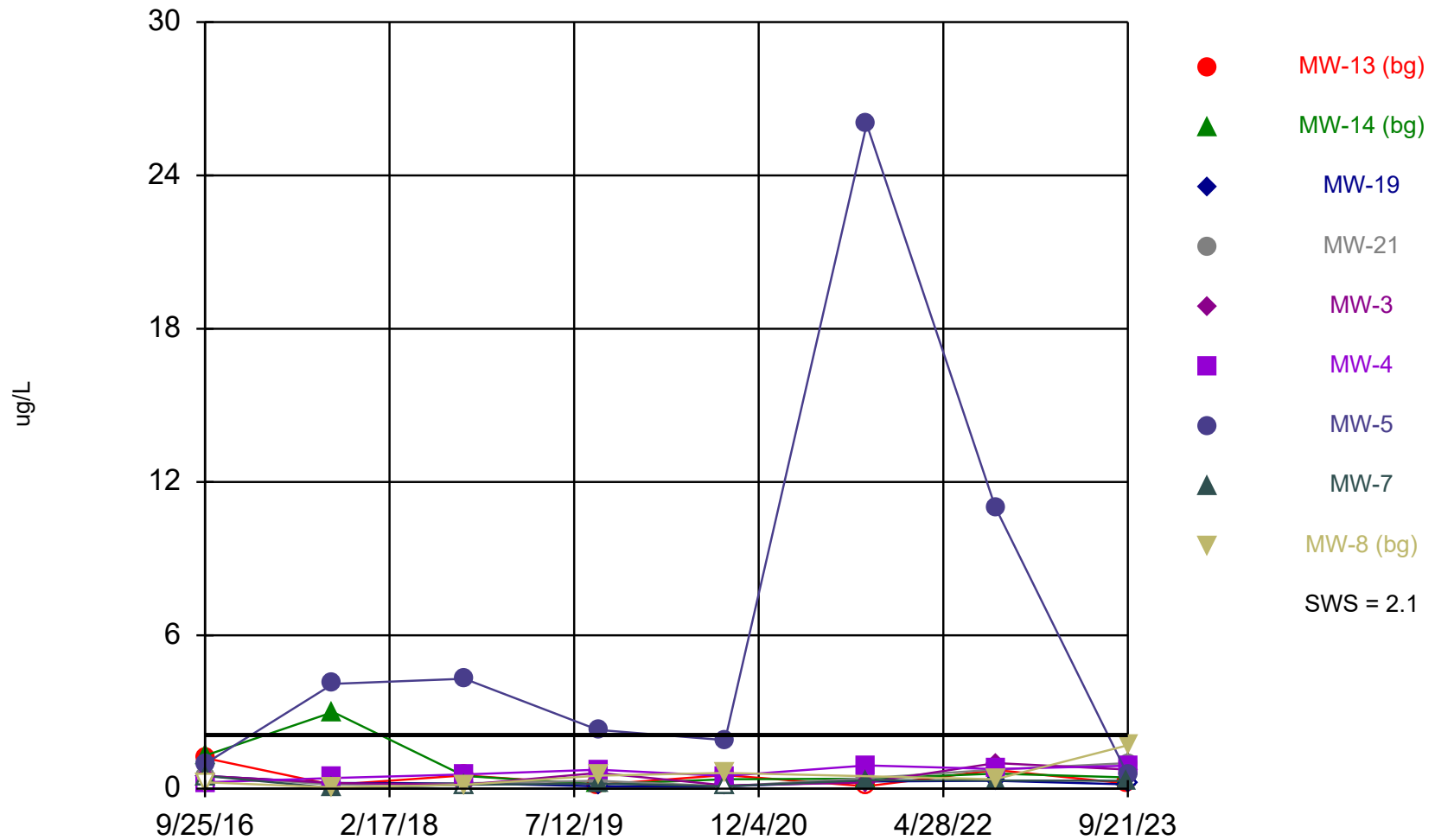
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/1/1999	<5	<5							46
9/1/2000	<5	<5							19.5
9/1/2001	5.9	5.9							18.3
9/1/2002	<5	<5							11.9
9/1/2003	<5	<5							14.5
9/1/2004	<5	<5							27.1
9/1/2005	<5	<5							18.5
9/1/2006	<5	<5							14.6
9/1/2007	<5	<5							40.6
9/1/2008	<5	<5							51.9
9/1/2009	<5	<5							43.4
9/1/2010	<1	<2							44.5
9/1/2011	<5	<2							30
9/1/2012	<5	<5							33
9/1/2013	1.4	1.6							19.7
9/1/2014	<1	<1							41.3
9/1/2015	1.1	<1							26.1
9/25/2016	2.8								
9/26/2016		1.3							30.1
9/27/2016			17.9			10		21.5	
9/28/2016				17.7	11.8		8.8		
9/13/2017	4					14.6		14.8	19.8
9/14/2017		1.7	13.8	16.5	11.8		3		
9/11/2018	3.2			13					
9/12/2018		2.2	19.9			10.3	11.8		27.4
9/13/2018					9.5			18.6	
9/16/2019	1.9 (J,B)	2.1 (J,B)							
9/17/2019			14 (B)	17 (B)	12 (B)	12 (B)	2.6 (J,B)	15 (B)	17 (B)
9/1/2020		3.3 (J,B)						14 (B)	15 (B)
9/2/2020	2.4 (J,B)		14 (B)	14 (B)	12 (B)	11 (B)	3.2 (J,B)		
9/27/2021	3.1 (J)	3.9 (J)							
9/28/2021								17	
9/29/2021			14	14	13	13	4.5 (J)		
9/20/2022		3.6 (J)	15				4.7 (J)	18	17
9/21/2022	2.7 (J)				12				
9/22/2022				15		11			
9/20/2023	<2.3 (U)	3.6 (J)						19	
9/21/2023			19	18	14	12	4.5 (J)		20

Cobalt



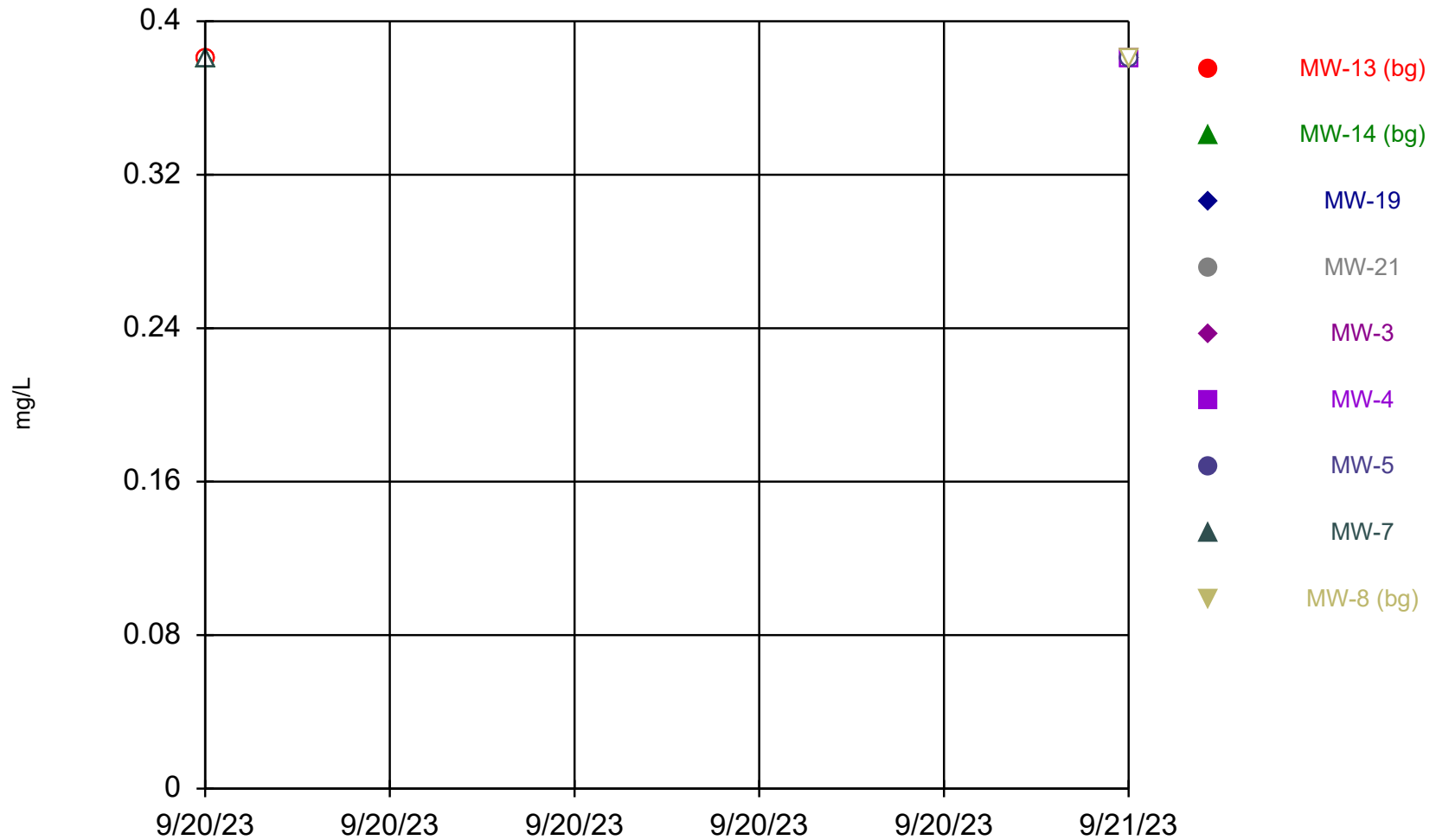
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	1.2								
9/26/2016		1.3							<0.5
9/27/2016			<0.5			<0.5		<0.5	
9/28/2016				<0.5	<0.5		1		
9/13/2017	0.15 (J)					0.42 (J)		0.027 (J)	0.051 (J)
9/14/2017		3	0.22 (J)	0.16 (J)	0.22 (J)		4.1		
9/11/2018	0.52 (J)			0.21 (J)					
9/12/2018		0.5 (J)	0.21 (J)			0.56 (J)	4.3		0.15 (J)
9/13/2018					<0.15			<0.15	
9/16/2019	0.16 (J)	0.17 (J)							
9/17/2019			<0.091	0.31 (J)	0.62	0.74	2.3	0.2 (J)	0.51
9/1/2020		0.37 (J)						<0.091	0.62
9/2/2020	0.53		0.094 (J)	<0.091	0.13 (J)	0.5	1.9		
9/27/2021	<0.19	0.39 (J)							
9/28/2021								0.33 (J)	
9/29/2021			0.28 (J)	0.41 (J)	0.24 (J)	0.91	26		
9/20/2022		0.59	0.31 (J)				11	0.32 (J)	0.37 (J)
9/21/2022	0.73				1				
9/22/2022				0.75		0.77			
9/20/2023	0.2 (J)	0.44 (J)						0.31 (J)	
9/21/2023			<0.17 (U)	1	0.75	0.9	0.53		1.7

Fluoride



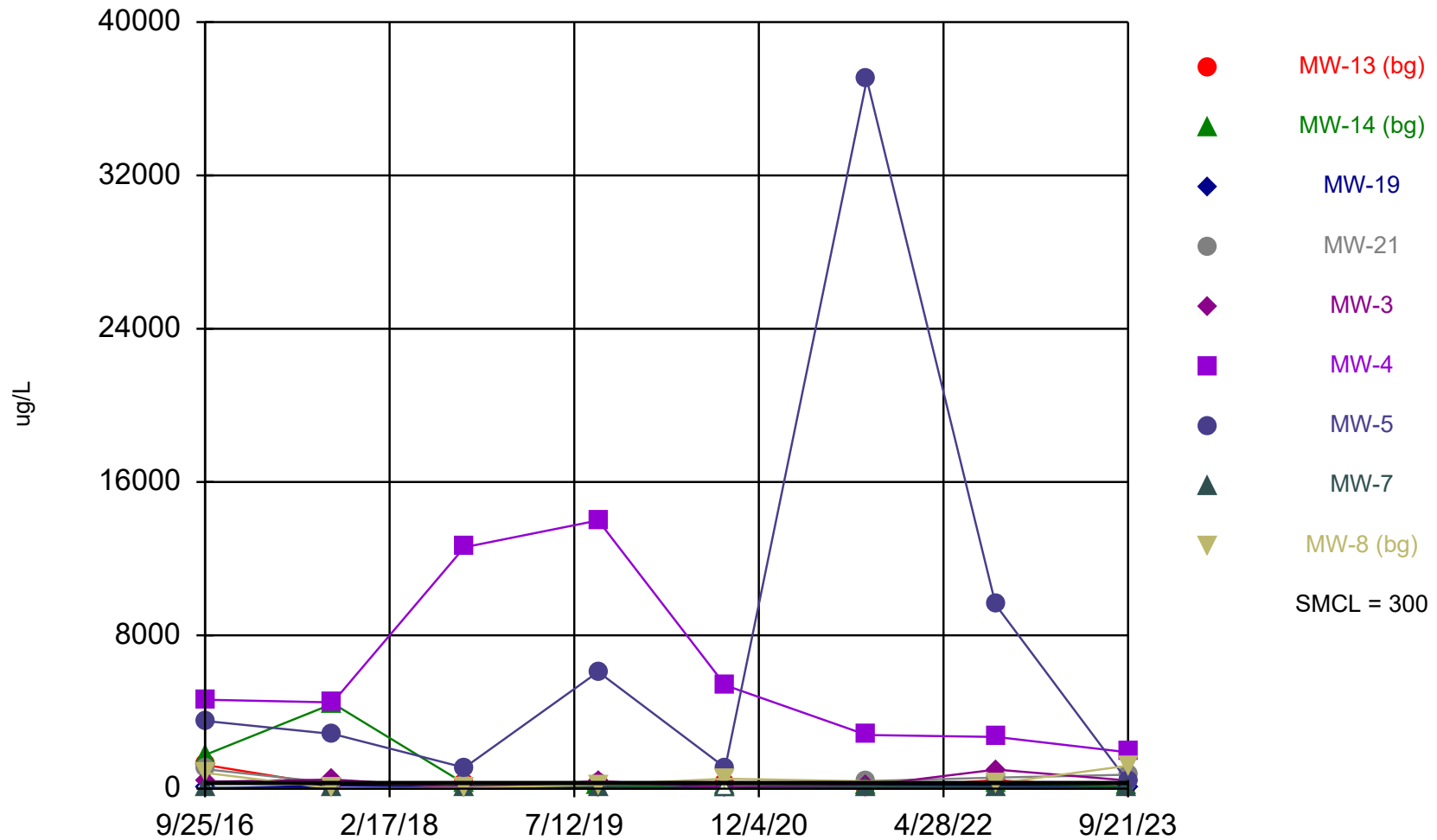
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Fluoride (mg/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/20/2023	<0.38 (U)	<0.38 (U)						<0.38 (U)	
9/21/2023			<0.38 (U)	<0.38 (U)	<0.38 (U)	<0.38 (U)	<0.38 (U)		<0.38 (U)

Iron



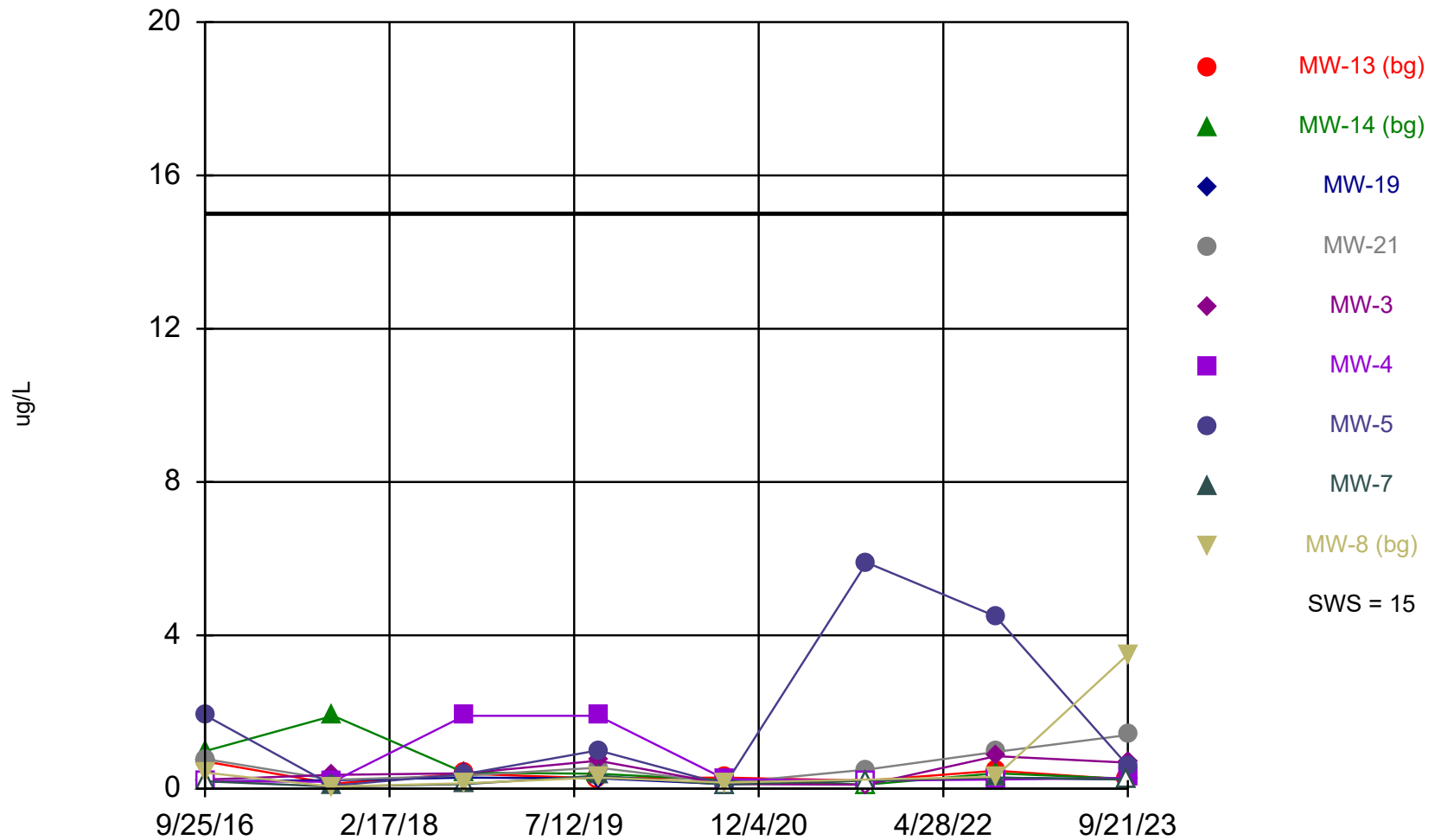
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Iron (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	1240								
9/26/2016		1770							820
9/27/2016			<12.8			4640		51.9	
9/28/2016				1010	362		3530		
9/13/2017	162					4500		11.9 (J)	18.7 (J)
9/14/2017		4440	162	297	475		2850		
9/11/2018	289			195					
9/12/2018		267	101			12600	1100		45.2 (J)
9/13/2018					42.2 (J)			41.7 (J)	
9/16/2019	76 (J)	130							
9/17/2019			<66	320	390	14000	6100	95 (J)	200
9/1/2020		130						<50	520
9/2/2020	230		<50	110	72 (J)	5400	1100		
9/27/2021	<36	140							
9/28/2021								110	
9/29/2021			130	400	170	2800	37000		
9/20/2022		240	170				9600	90 (J)	270
9/21/2022	440				1000				
9/22/2022				580		2700			
9/20/2023	78 (J)	120						54 (J)	
9/21/2023			<36 (U)	730	430	1900	360		1200

Lead



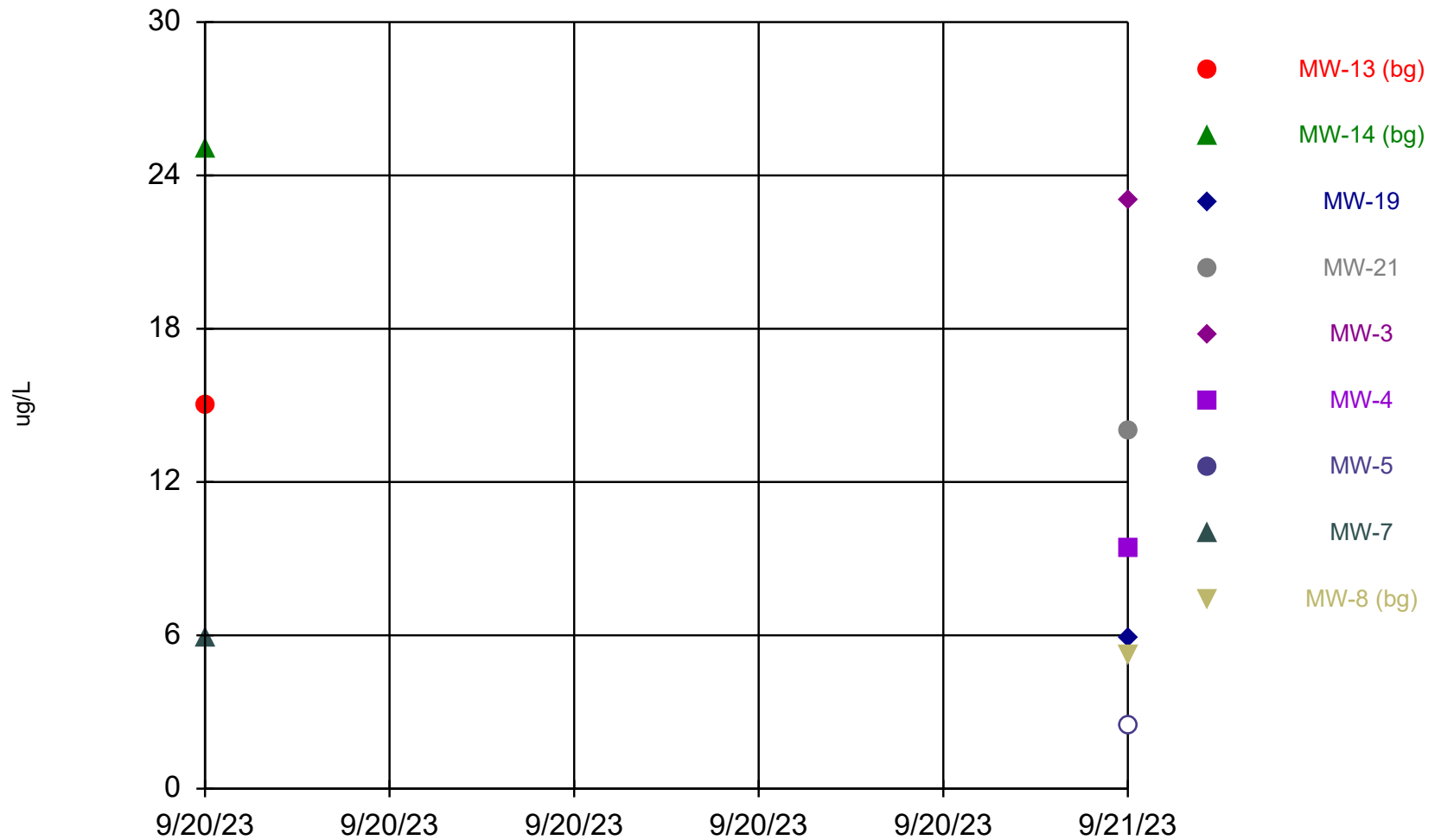
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Lead (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	0.71 (J)								
9/26/2016		0.98 (J)							0.42 (J)
9/27/2016			<0.19			<0.19		<0.19	
9/28/2016				0.77 (J)	0.24 (J)		1.9		
9/13/2017	0.13 (J)					0.18 (J)		0.056 (J)	0.053 (J)
9/14/2017		1.9	0.22 (J)	0.23 (J)	0.36 (J)		0.08 (J)		
9/11/2018	0.39 (J)			0.34 (J)					
9/12/2018		0.42 (J)	0.29 (J)			1.9	0.38 (J)		0.14 (J)
9/13/2018					0.4 (J)			<0.12	
9/16/2019	<0.27	0.39 (J)							
9/17/2019			<0.27	0.55	0.73	1.9	1	0.34 (J)	0.29 (J)
9/1/2020		0.22 (J)						<0.11	0.16 (J)
9/2/2020	0.29 (J)		0.12 (J)	0.15 (J)	0.12 (J)	0.25 (J)	0.11 (J)		
9/27/2021	<0.21	<0.21							
9/28/2021								<0.21	
9/29/2021			<0.21	0.5	<0.21	<0.21	5.9		
9/20/2022		0.4 (J)	0.29 (J)				4.5	0.29 (J)	0.31 (J)
9/21/2022	0.47 (J)				0.85				
9/22/2022				0.96		<0.24			
9/20/2023	<0.24 (U)	0.26 (J)						<0.24 (U)	
9/21/2023			<0.24 (U)	1.4	0.68	0.28 (J)	0.6		3.5

Lithium



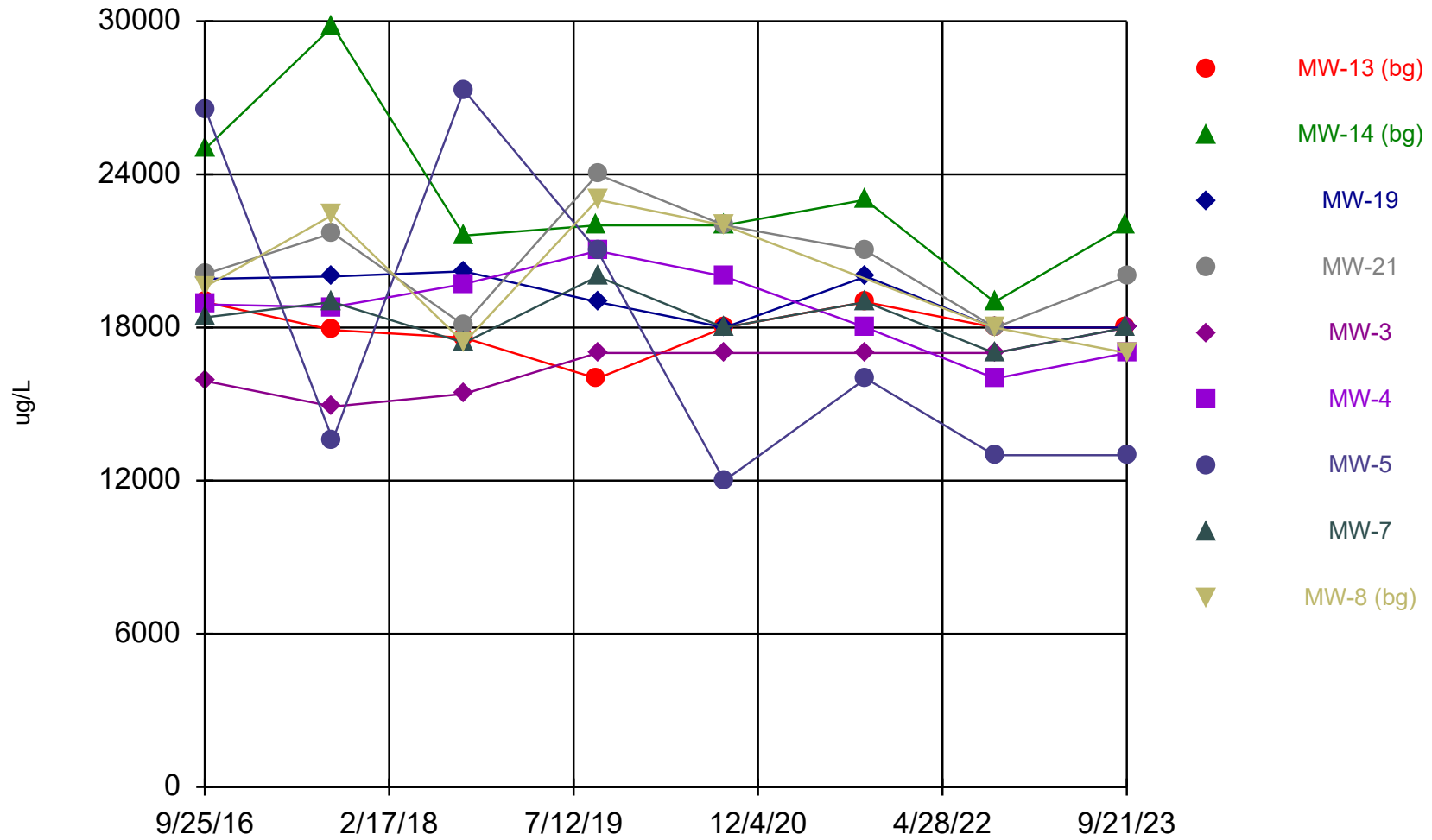
Time Series Analysis Run 10/30/2023 11:16 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Lithium (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/20/2023	15	25						5.9 (J)	
9/21/2023			5.9 (J)	14	23	9.4 (J)	<2.5 (U)		5.2 (J)

Magnesium



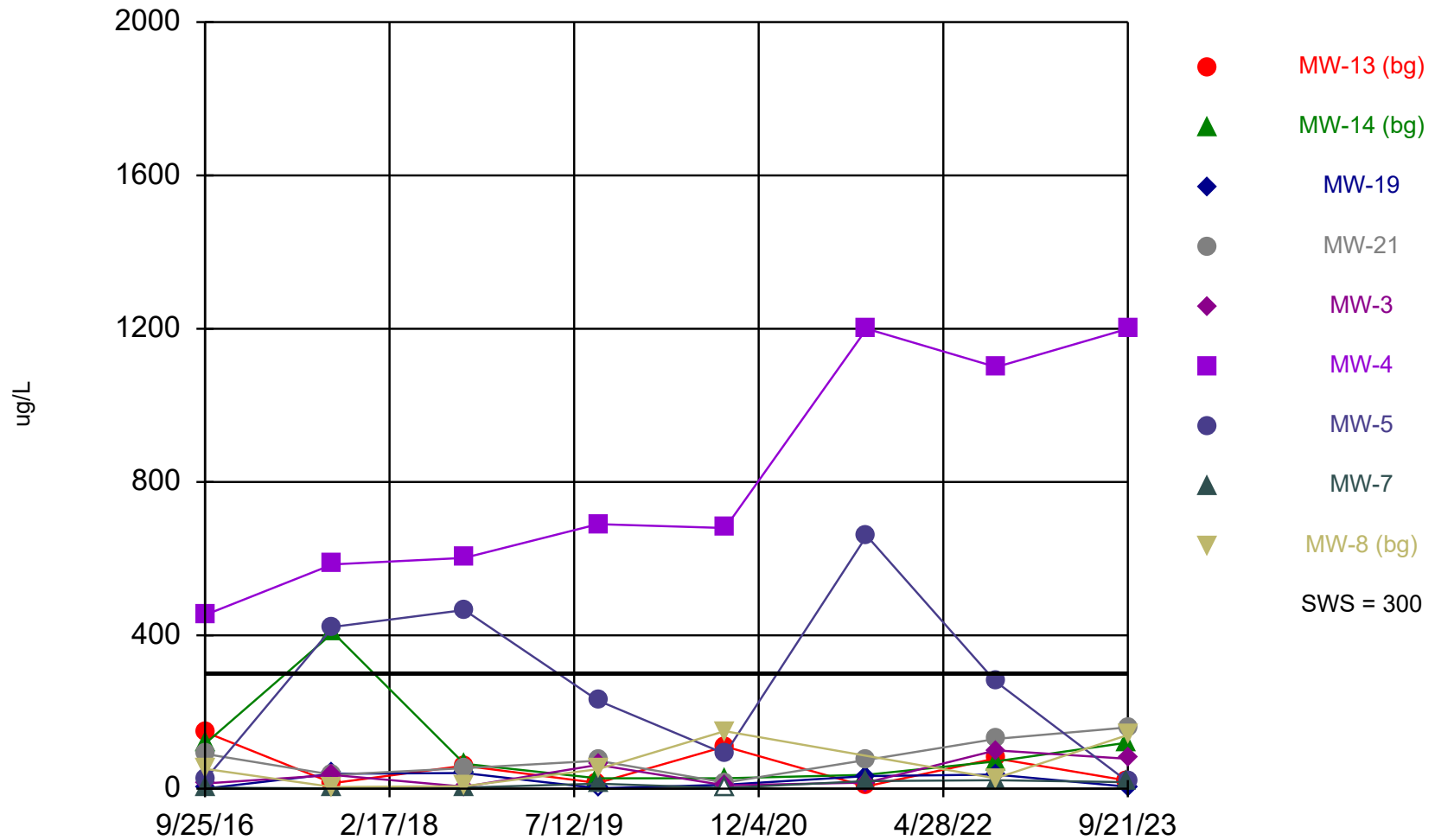
Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	19000								
9/26/2016		25000							19600
9/27/2016			19900			18900		18400	
9/28/2016				20100	15900		26500		
9/13/2017	17900					18800		19000	22400
9/14/2017		29800	20000	21700	14900		13600		
9/11/2018	17600			18100					
9/12/2018		21600	20200			19700	27300		17400
9/13/2018					15400			17400	
9/16/2019	16000	22000							
9/17/2019			19000	24000	17000	21000	21000	20000	23000
9/1/2020		22000						18000	22000
9/2/2020	18000		18000	22000	17000	20000	12000		
9/27/2021	19000	23000							
9/28/2021								19000	
9/29/2021			20000	21000	17000	18000	16000		
9/20/2022		19000	18000				13000	17000	18000
9/21/2022	18000				17000				
9/22/2022				18000		16000			
9/20/2023	18000	22000						18000	
9/21/2023			18000	20000	18000	17000	13000		17000

Manganese



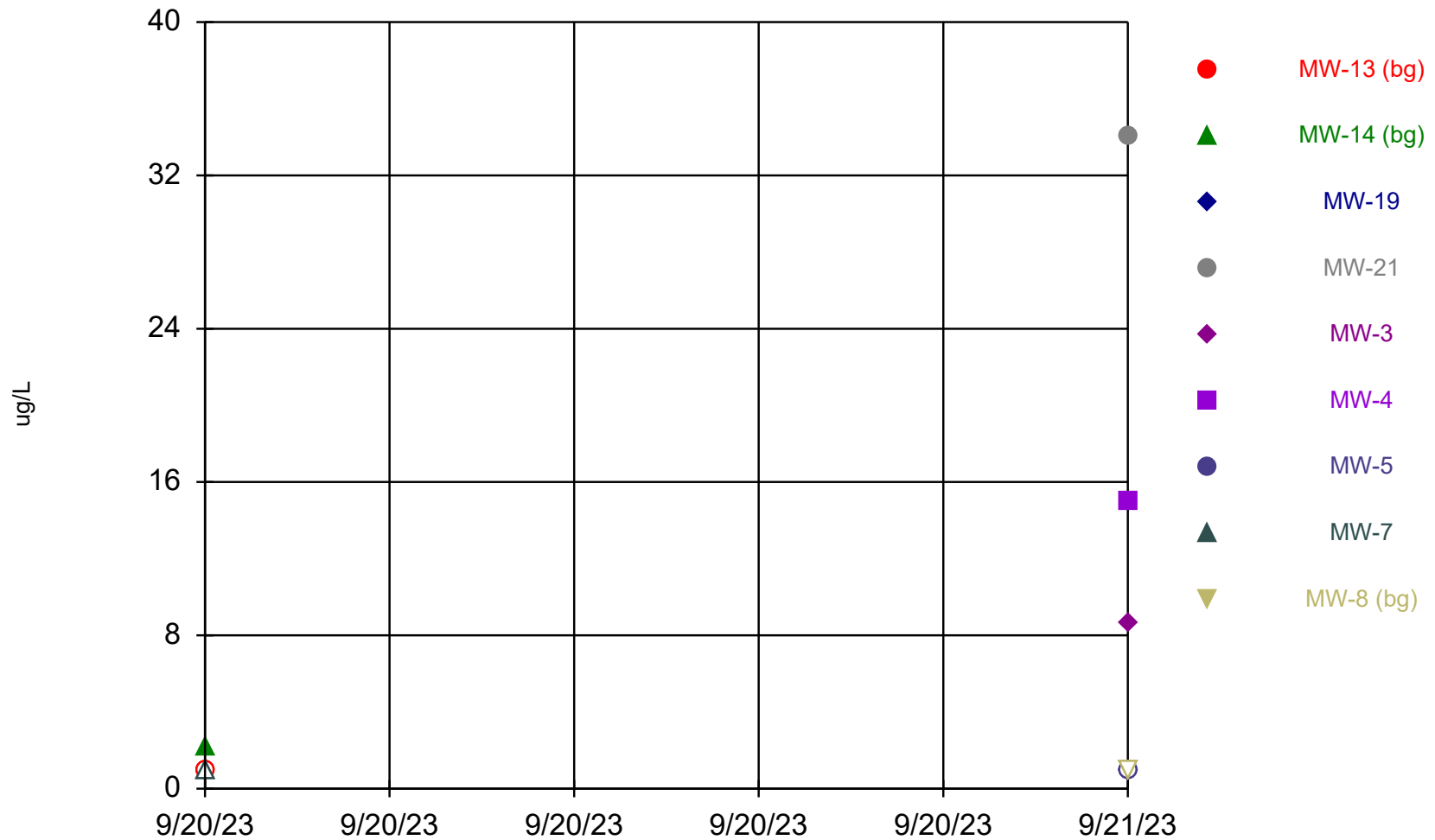
Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	148								
9/26/2016		118							51.6
9/27/2016			0.3 (J)			454		2.6	
9/28/2016				90.3	13.7		26.6		
9/13/2017	14.6					585		0.78 (J)	4.3
9/14/2017		407	39.1	36.1	35.8		422		
9/11/2018	59.8			53.6					
9/12/2018		64.9	40.9			602	466		6.6
9/13/2018					5.2			2.9	
9/16/2019	15	27							
9/17/2019			<2.5	73	62	690	230	13	51
9/1/2020		27						<4	150
9/2/2020	110		10	16	8.6 (J)	680	91		
9/27/2021	5.7 (J)	36							
9/28/2021								20	
9/29/2021			33	75	16	1200	660		
9/20/2022		71	37				280	22	27
9/21/2022	79				100				
9/22/2022				130		1100			
9/20/2023	21	120						17	
9/21/2023			5 (J)	160	78	1200	18		140

Molybdenum



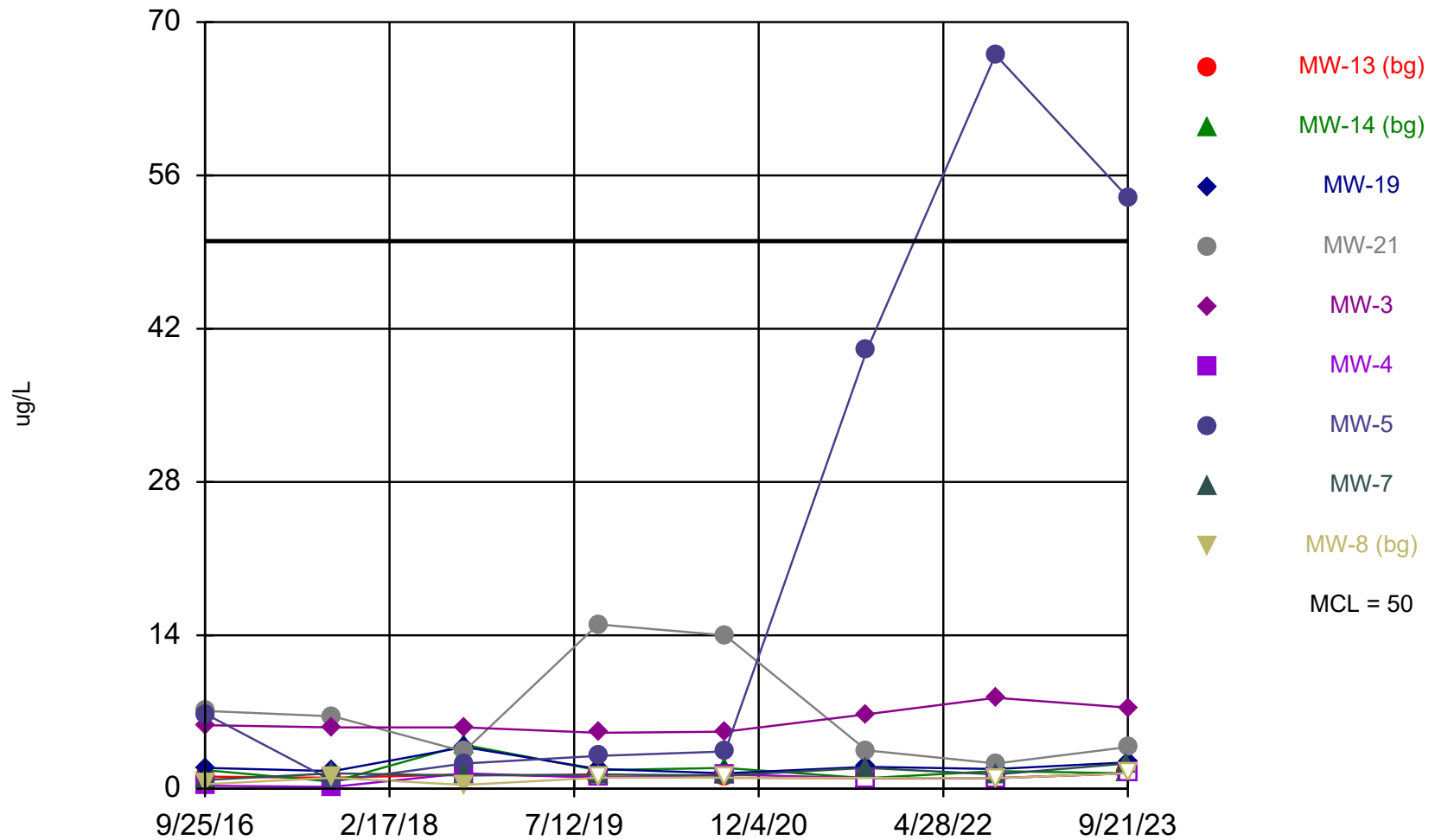
Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Molybdenum (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/20/2023	<0.91 (U)	2.2						<0.91 (U)	
9/21/2023			<0.91 (U)	34	8.6	15	<0.91 (U)		<0.91 (U)

Selenium



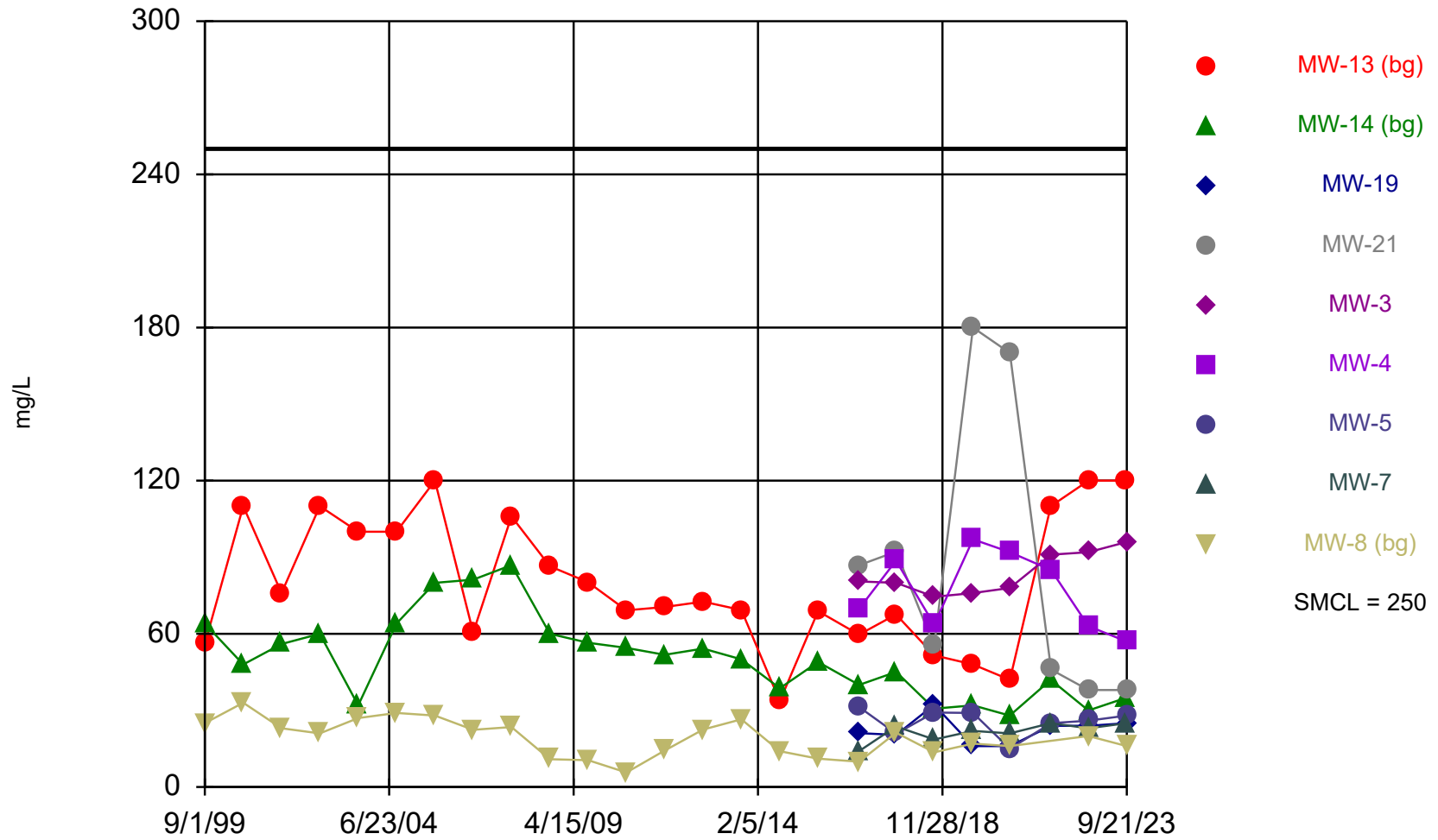
Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	1.1								
9/26/2016		1.7							0.41 (J)
9/27/2016			1.9			0.27 (J)		0.8 (J)	
9/28/2016				7.1	5.8		6.8		
9/13/2017	1					0.17 (J)		1.4	1
9/14/2017		0.63 (J)	1.6	6.6	5.6		0.69 (J)		
9/11/2018	1.3			3.4					
9/12/2018		4	3.8			1.4	2.3		0.34 (J)
9/13/2018					5.6			1.2	
9/16/2019	1.1 (J)	1.7 (J)							
9/17/2019			1.8 (J)	15	5.1	<1	3 (J)	1.3 (J)	<1
9/1/2020		1.9 (J)						1.2 (J)	<1
9/2/2020	<1		1.4 (J)	14	5.2	1.3 (J)	3.4 (J)		
9/27/2021	<0.96	<0.96							
9/28/2021								1.9 (J)	
9/29/2021			2 (J)	3.5 (J)	6.8	<0.96	40		
9/20/2022		1.6 (J)	1.8 (J)				67	1.3 (J)	<0.96
9/21/2022	<0.96				8.3				
9/22/2022				2.3 (J)		<0.96			
9/20/2023	<1.4 (U)	<1.4 (U)						2.3 (J)	
9/21/2023			2.4 (J)	3.8 (J)	7.4	<1.4 (U)	54		<1.4 (U)

Sulfate

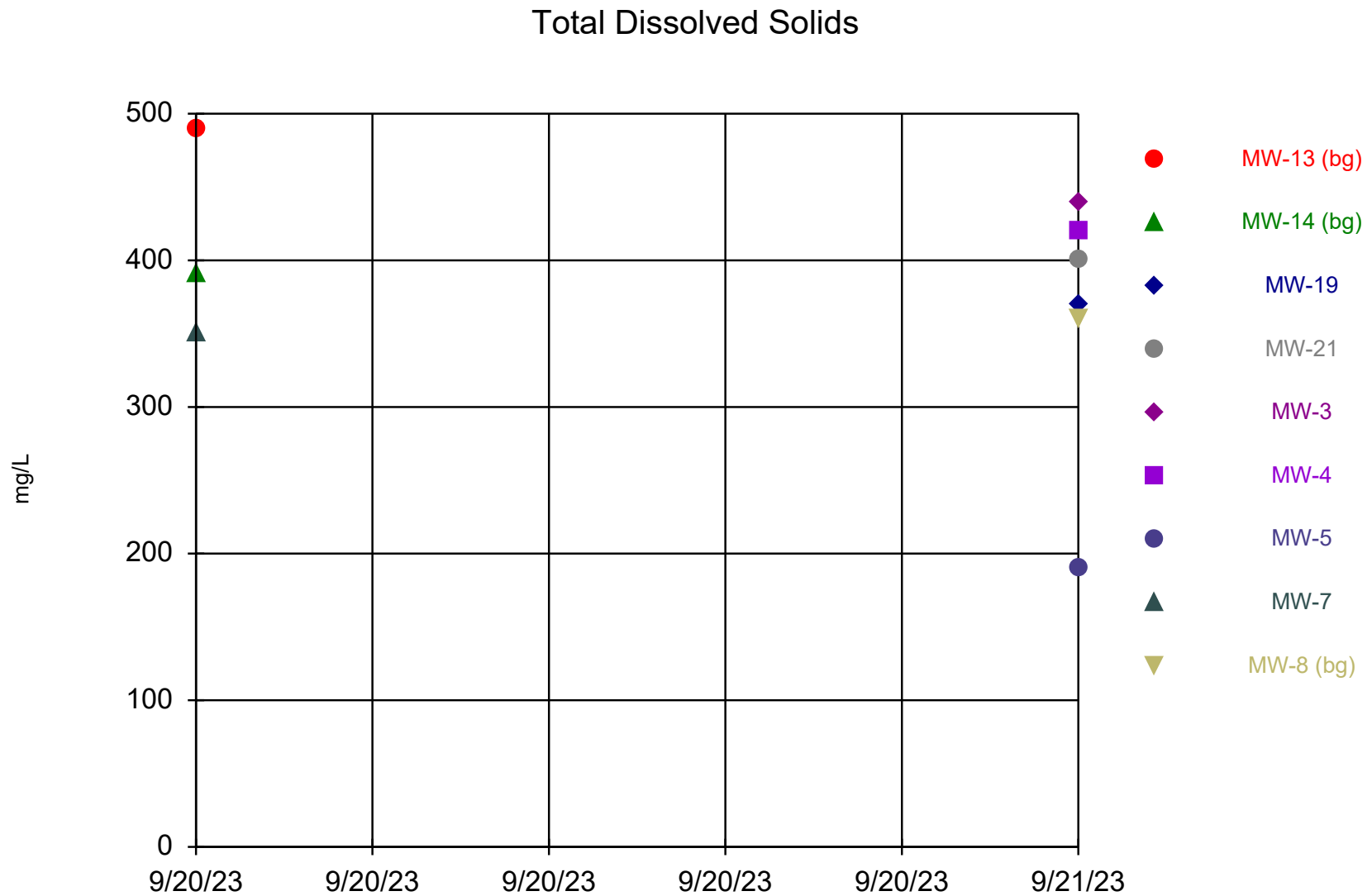


Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/1/1999	56	64							25
9/1/2000	110	48							33
9/1/2001	76	56							23
9/1/2002	110	60							21
9/1/2003	100	32							27
9/1/2004	100	64							29
9/1/2005	120	80							28
9/1/2006	60.5	81.2							22.4
9/1/2007	106	86.9							23.5
9/1/2008	86.5	60							10.9
9/1/2009	80.2	56.5							10.5
9/1/2010	69.2	54.5							5.7
9/1/2011	70.5	51.8							14.3
9/1/2012	72.6	54.2							22.5
9/1/2013	69.3	50							26.5
9/1/2014	33.6	38.7							14
9/1/2015	68.9	49							11.1
9/25/2016	59.7								
9/26/2016		40							9.9
9/27/2016			21.1			69.8		14.1	
9/28/2016				86.9	80.5		31.3		
9/13/2017	67.6					88.7		23.7	21.3
9/14/2017		45.1	20.4	92.2	80		20.9		
9/11/2018	51.6			55.2					
9/12/2018		30.7	32.2			63.6	29.2		13.6
9/13/2018					74.5			18.6	
9/16/2019	48	32							
9/17/2019			16	180	76	97	29	22	17
9/1/2020		28						21	16
9/2/2020	42		16	170	78	92	15		
9/27/2021	110	42							
9/28/2021								25	
9/29/2021			24	46	91	85	25		
9/20/2022		30	24				26	23	20
9/21/2022	120				92				
9/22/2022				38		63			
9/20/2023	120	35						25	
9/21/2023			25	38	96	57	28		16



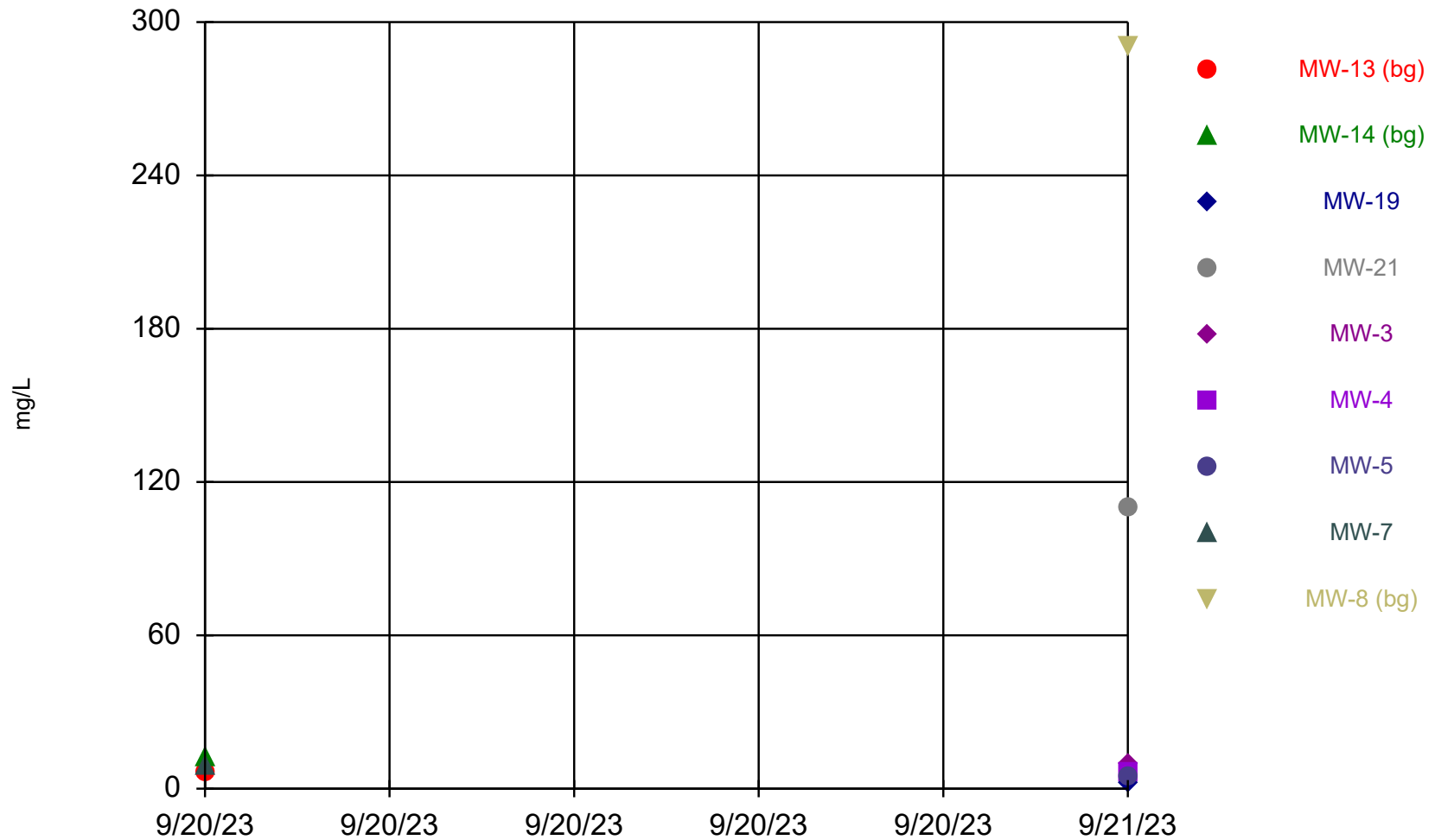
Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/20/2023	490	390						350	
9/21/2023			370	400	440	420	190		360

Total Suspended Solids



Time Series Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

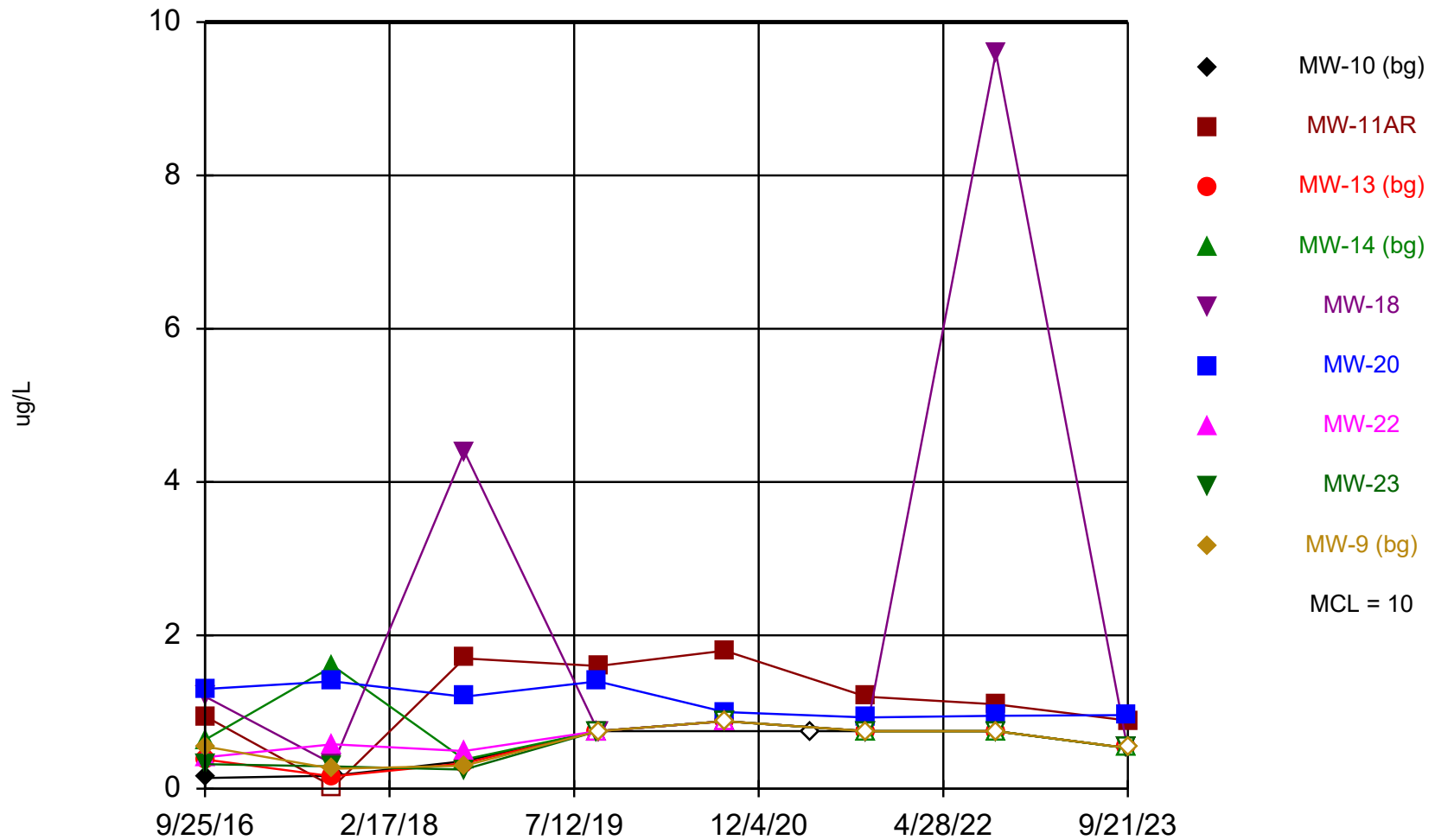
Constituent: Total Suspended Solids (mg/L) Analysis Run 10/30/2023 11:17 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/20/2023	6.4	12						8.4	
9/21/2023			2.1	110	10	6	4.5		290

Attachment E2

Times Series Graphs – East

Arsenic



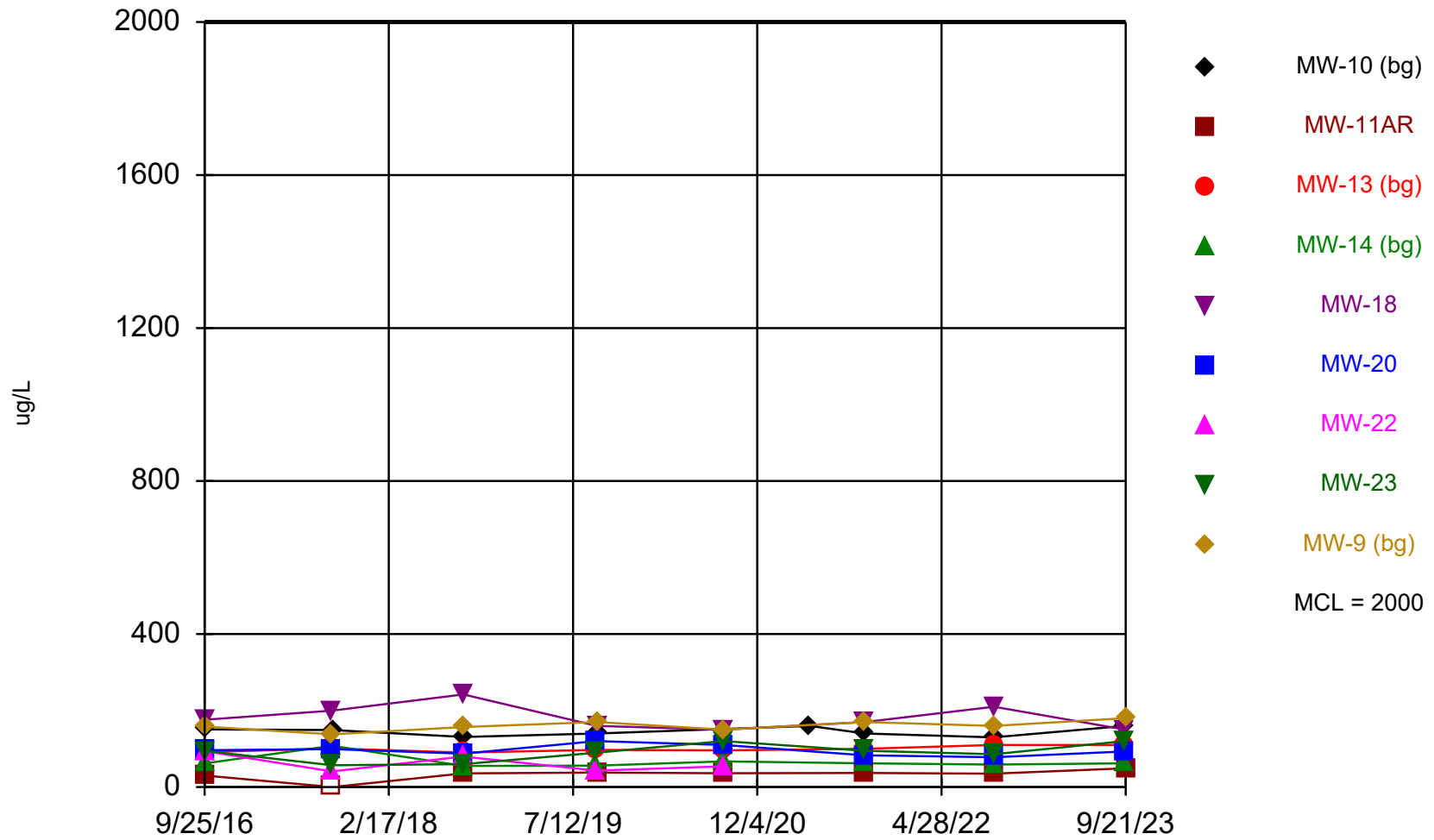
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			0.38 (J)						0.55 (J)
9/26/2016				0.64 (J)	1.2	1.3	0.41 (J)		
9/27/2016	0.14 (J)	0.94 (J)							
9/28/2016								0.32 (J)	
9/13/2017			0.16 (J)			1.4	0.58 (J)	0.29 (J)	
9/14/2017		<0.052		1.6	0.32 (J)				0.26 (J)
9/15/2017	0.17 (J)								
9/11/2018			0.33 (J)			1.2	0.49 (J)	0.25 (J)	
9/12/2018	0.36 (J)	1.7		0.38 (J)	4.4				0.3 (J)
9/16/2019			<0.75	<0.75		1.4 (J)	<0.75	<0.75	
9/17/2019	<0.75	1.6 (J)			<0.75				<0.75
9/1/2020		1.8 (J)		<0.88	<0.88			<0.88	<0.88
9/2/2020			<0.88			1 (J)	<0.88		
4/29/2021	<0.75								
9/27/2021			<0.75	<0.75		0.93 (J)		<0.75	
9/28/2021	<0.75	1.2 (J)			<0.75				<0.75
9/20/2022	<0.75			<0.75					<0.75
9/21/2022		1.1 (J)	<0.75		9.6	0.95 (J)		<0.75	
9/18/2023	<0.53 (U)							<0.53 (U)	
9/20/2023			<0.53 (U)	<0.53 (U)	<0.53 (U)	0.96 (J)			
9/21/2023		0.89 (J)							<0.53 (U)

Barium



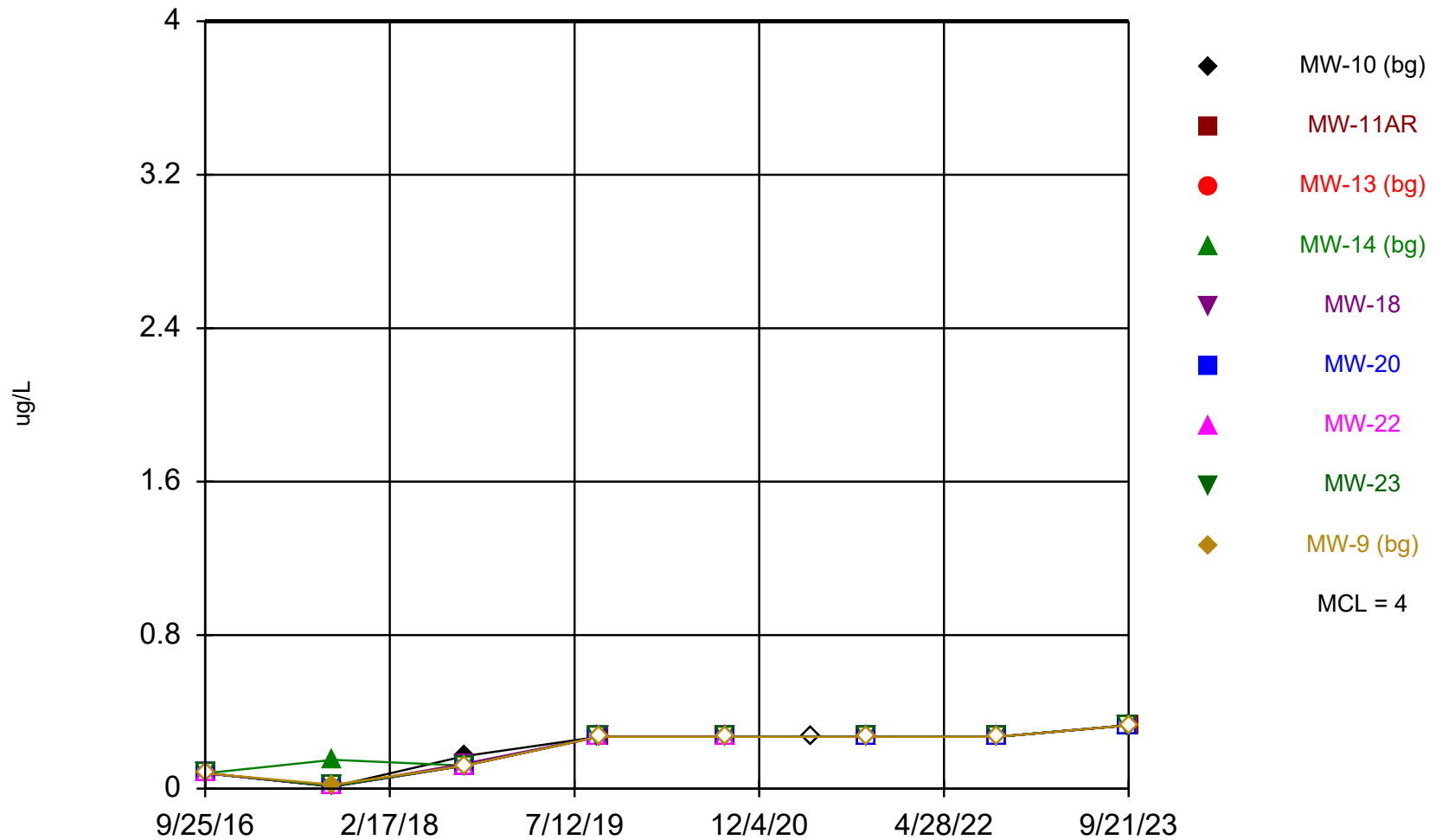
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Barium (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			91.2						158
9/26/2016				62.1	176	96.5	93.8		
9/27/2016	151	30.1							
9/28/2016								94.2	
9/13/2017			101			99.1	40.9	57	
9/14/2017		<0.095		108	200				138
9/15/2017	149								
9/11/2018			90.4			87.3	79.6	60	
9/12/2018	131	35.6		55.1	242				157
9/16/2019			97	56		120	43	90	
9/17/2019	140	38			160				170
9/1/2020		36		67	150			120	150
9/2/2020			96			110	54		
4/29/2021	160								
9/27/2021			100	62		83		95	
9/28/2021	140	37			170				170
9/20/2022	130			59					160
9/21/2022		35	110		210	78		86	
9/18/2023	160							120	
9/20/2023			110	62	150	93			
9/21/2023		49							180

Beryllium



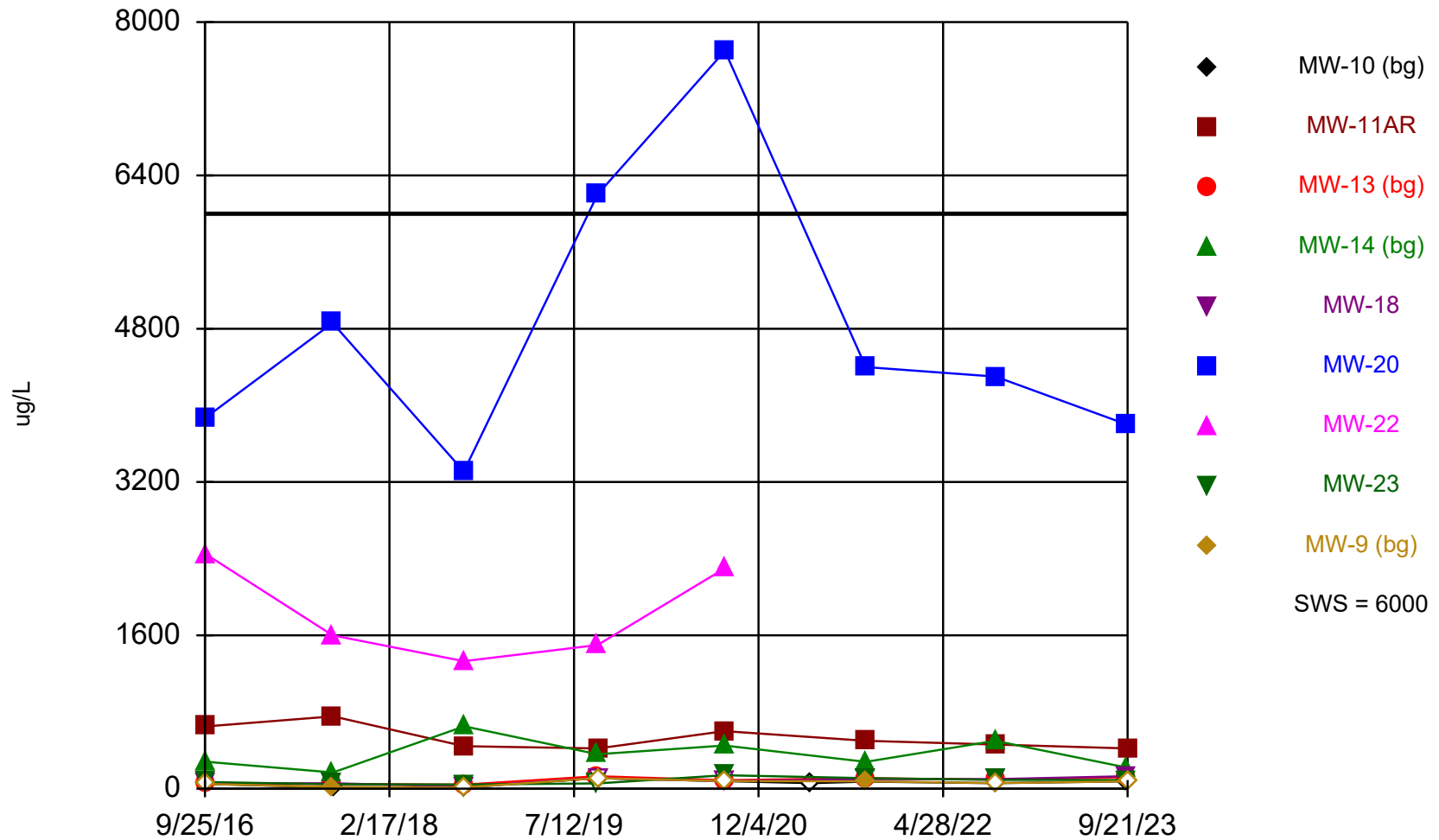
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			<0.08						<0.08
9/26/2016				<0.08	<0.08	<0.08	<0.08		
9/27/2016	<0.08	<0.08							
9/28/2016								<0.08	
9/13/2017			<0.012			<0.012	<0.012	<0.012	
9/14/2017		<0.012		0.15 (J)	<0.012				0.02 (J)
9/15/2017	<0.012								
9/11/2018			<0.12			<0.12	<0.12	<0.12	
9/12/2018	0.17 (J)	<0.12		<0.12	0.13 (J)				<0.12
9/16/2019			<0.27	<0.27		<0.27	<0.27	<0.27	
9/17/2019	<0.27	<0.27			<0.27				<0.27
9/1/2020		<0.27		<0.27	<0.27			<0.27	<0.27
9/2/2020			<0.27			<0.27	<0.27		
4/29/2021	<0.27								
9/27/2021			<0.27	<0.27		<0.27		<0.27	
9/28/2021	<0.27	<0.27			<0.27				<0.27
9/20/2022	<0.27			<0.27					<0.27
9/21/2022		<0.27	<0.27		<0.27	<0.27		<0.27	
9/18/2023	<0.33 (U)							<0.33 (U)	
9/20/2023			<0.33 (U)	<0.33 (U)	<0.33 (U)	<0.33 (U)			
9/21/2023		<0.33 (U)							<0.33 (U)

Boron



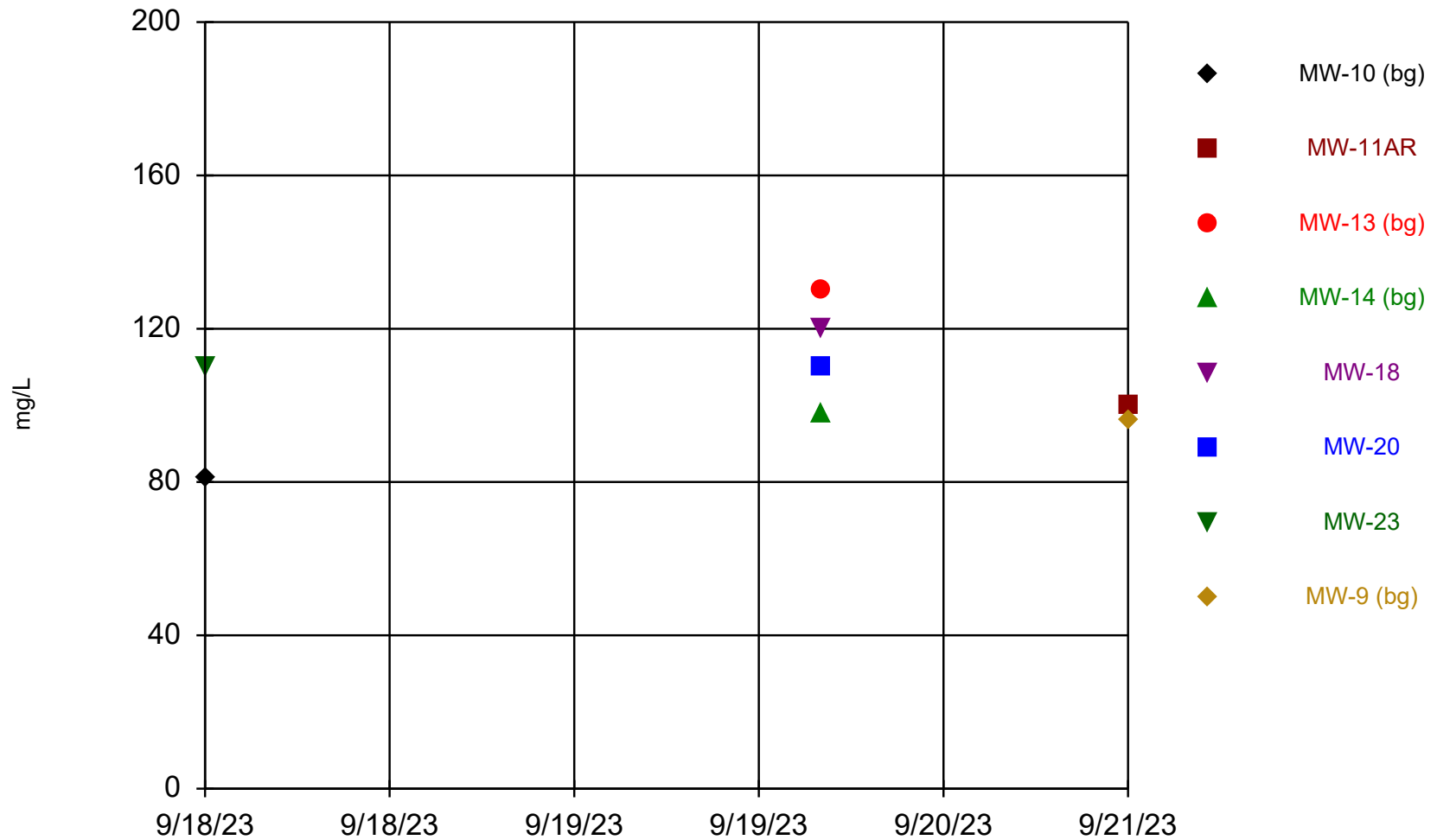
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Boron (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			50.2 (J)						<50
9/26/2016				282	53.8 (J)	3870	2450		
9/27/2016	<50	650							
9/28/2016								70.1 (J)	
9/13/2017			48.6 (J)			4860	1600	47 (J)	
9/14/2017		755		169	57 (J)				17.2 (J)
9/15/2017	14.1 (J)								
9/11/2018			41.4 (J)			3310	1330	42.9 (J)	
9/12/2018	<12.5	443		651	21.6 (J)				<12.5
9/16/2019			130 (J)	360		6200	1500	<110	
9/17/2019	<110	420			<110				<110
9/1/2020		600		450	<80			140	<80
9/2/2020			88 (J)			7700	2300		
4/29/2021	<58								
9/27/2021			110	280		4400		110	
9/28/2021	74 (J)	500			100				77 (J)
9/20/2022	<58			500					<58
9/21/2022		460	94 (J)		100	4300		92 (J)	
9/18/2023	<76 (U)							89 (J)	
9/20/2023			120	220	130	3800			
9/21/2023		420							<76 (U)

Calcium



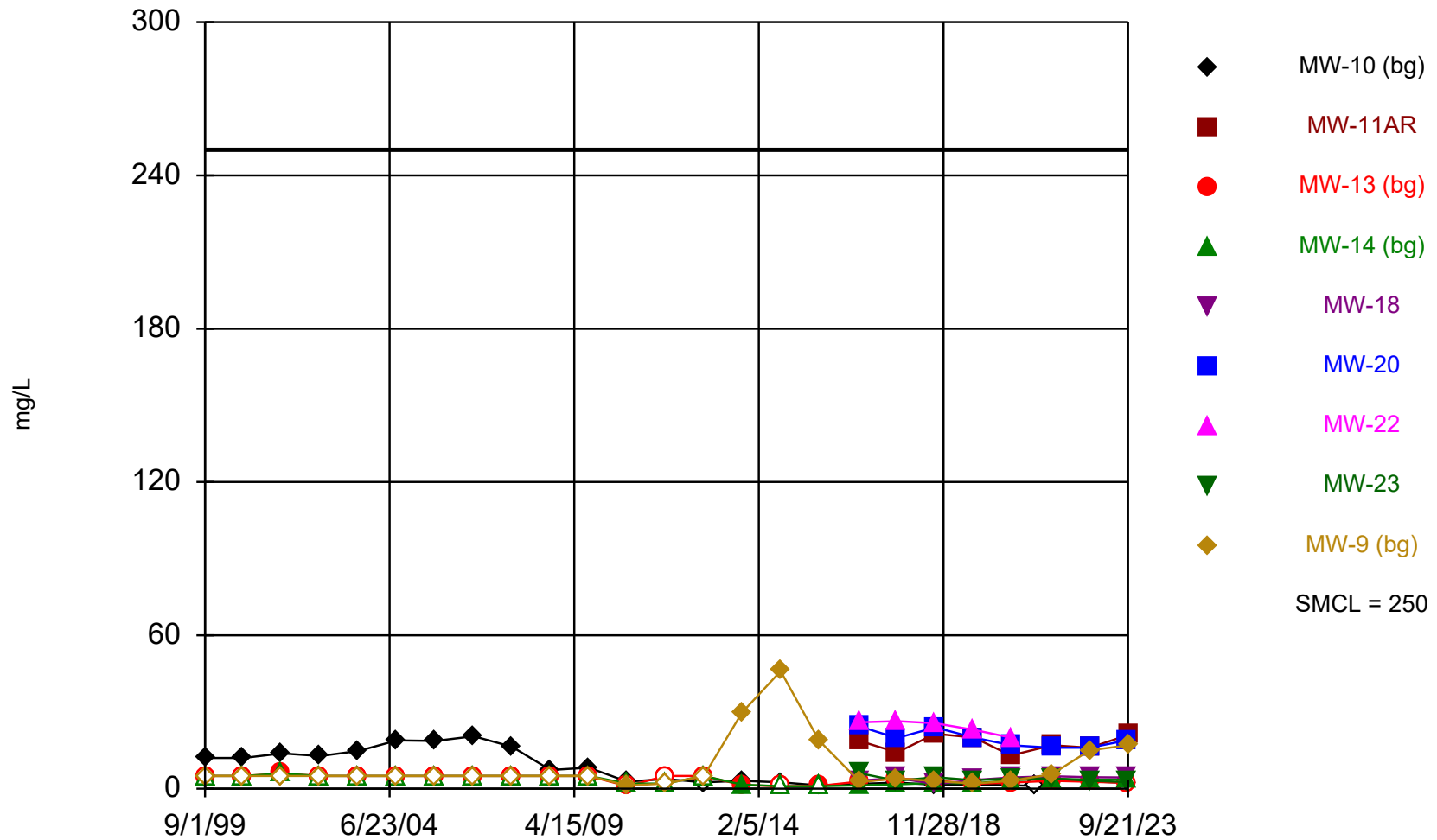
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Calcium (mg/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-23	MW-9 (bg)
9/18/2023	81						110	
9/20/2023			130	98	120	110		
9/21/2023		100						96

Chloride



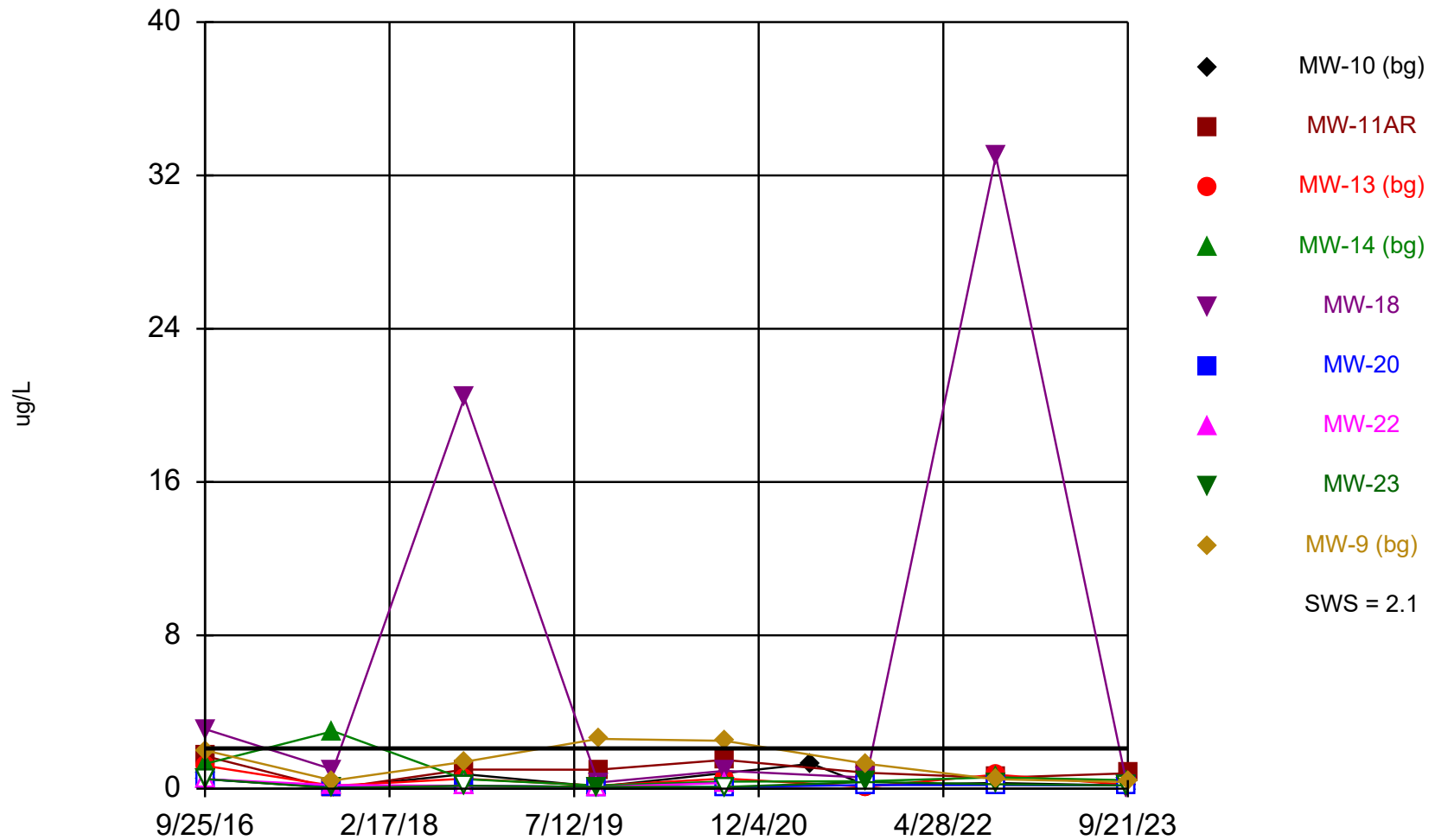
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/1/1999	12		<5	<5					<5
9/1/2000	12		<5	<5					<5
9/1/2001	13.8		5.9	5.9					<5
9/1/2002	12.8		<5	<5					<5
9/1/2003	14.8		<5	<5					<5
9/1/2004	18.9		<5	<5					<5
9/1/2005	18.7		<5	<5					<5
9/1/2006	20.5		<5	<5					<5
9/1/2007	16.4		<5	<5					<5
9/1/2008	7.31		<5	<5					<5
9/1/2009	8.21		<5	<5					<5
9/1/2010	2.76		<1	<2					1.25
9/1/2011	3.81		<5	<2					<2
9/1/2012	<5		<5	<5					<5
9/1/2013	3.1		1.4	1.6					29.9
9/1/2014	2.5		<1	<1					46
9/1/2015	1.3		1.1	<1					18.9
9/25/2016			2.8						2.6
9/26/2016				1.3	3.2	24.3	26		
9/27/2016	1.9	18.6							
9/28/2016								6	
9/13/2017			4			19.8	26.4	3.1	
9/14/2017		14.2		1.7	4.2				4
9/15/2017	2.4								
9/11/2018			3.2			24	25.6	4.5	
9/12/2018	1.5	21.5		2.2	1.8				3
9/16/2019			1.9 (J,B)	2.1 (J,B)		20 (B)	23 (B)	3.3 (J,B)	
9/17/2019	1.7 (J,B)	20 (B)			3.4 (J,B)				2 (J,B)
9/1/2020		13 (B)		3.3 (J,B)	4.4 (J,B)			4 (J,B)	3.1 (J,B)
9/2/2020			2.4 (J,B)			17 (B)	20 (B)		
4/29/2021	<2.2								
9/27/2021			3.1 (J)	3.9 (J)		16		4 (J)	
9/28/2021	4 (J)	17			4.9 (J)				5.7
9/20/2022	2.9 (J)			3.6 (J)					15
9/21/2022		16	2.7 (J)		4.5 (J)	16		3.1 (J)	
9/18/2023	2.3 (J)							2.6 (J)	
9/20/2023			<2.3 (U)	3.6 (J)	4.4 (J)	19			
9/21/2023		21							17

Cobalt



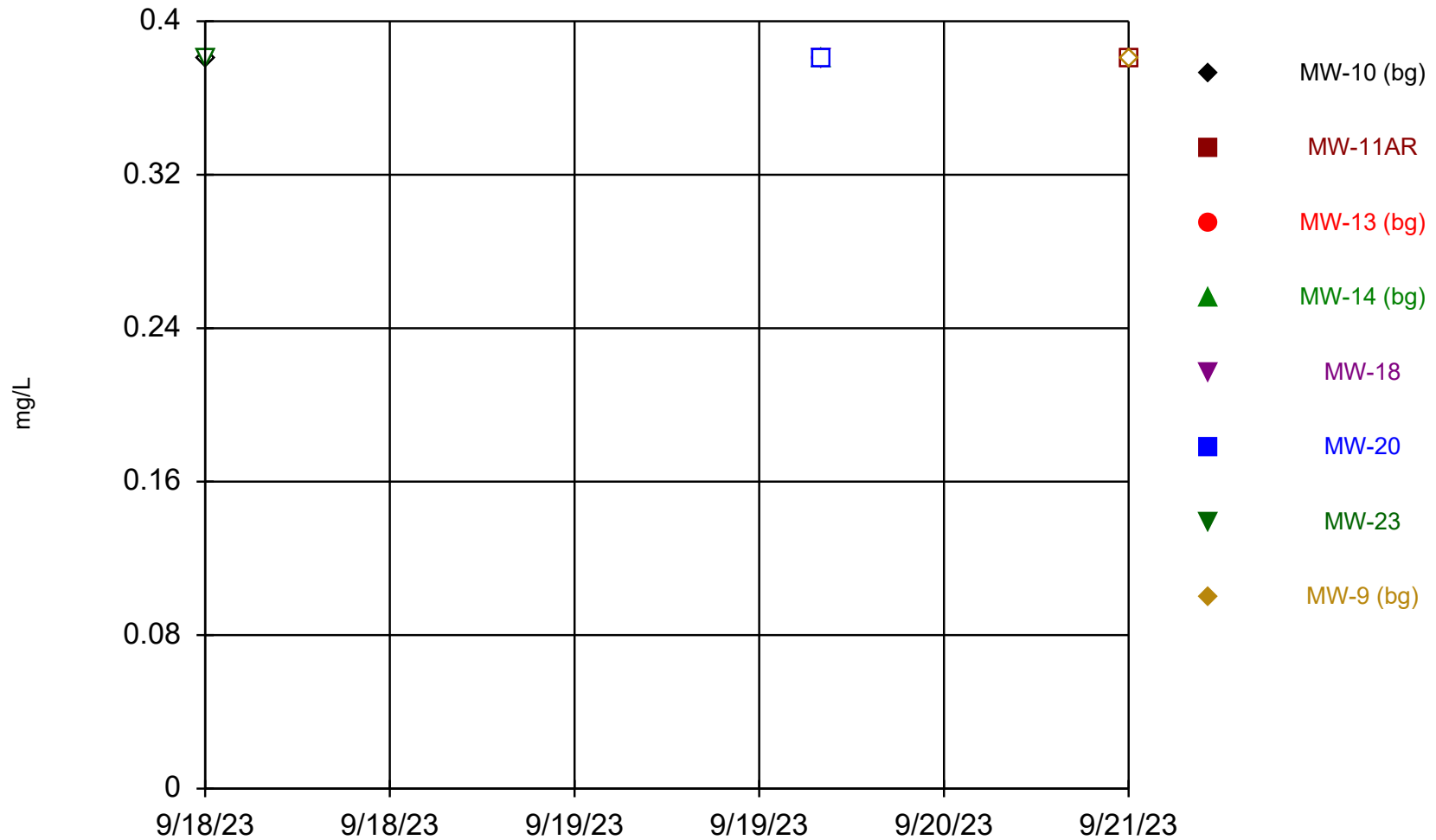
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			1.2						2
9/26/2016				1.3	3.1	<0.5	<0.5		
9/27/2016	<0.5	1.7							
9/28/2016								<0.5	
9/13/2017			0.15 (J)			0.09 (J)	0.19 (J)	0.036 (J)	
9/14/2017		<0.014		3	1				0.43 (J)
9/15/2017	0.05 (J)								
9/11/2018			0.52 (J)			0.16 (J)	<0.15	<0.15	
9/12/2018	0.76 (J)	1		0.5 (J)	20.4				1.4
9/16/2019			0.16 (J)	0.17 (J)		<0.091	<0.091	0.094 (J)	
9/17/2019	0.11 (J)	0.99			0.32 (J)				2.6
9/1/2020		1.5		0.37 (J)	0.93			<0.091	2.5
9/2/2020			0.53			<0.091	0.3 (J)		
4/29/2021	1.3								
9/27/2021			<0.19	0.39 (J)		<0.19		0.35 (J)	
9/28/2021	<0.19	0.83			0.58				1.3
9/20/2022	0.3 (J)			0.59					0.49 (J)
9/21/2022		0.57	0.73		33	<0.19		0.23 (J)	
9/18/2023	<0.17 (U)							<0.17 (U)	
9/20/2023			0.2 (J)	0.44 (J)	<0.17 (U)	<0.17 (U)			
9/21/2023		0.8							0.35 (J)

Fluoride



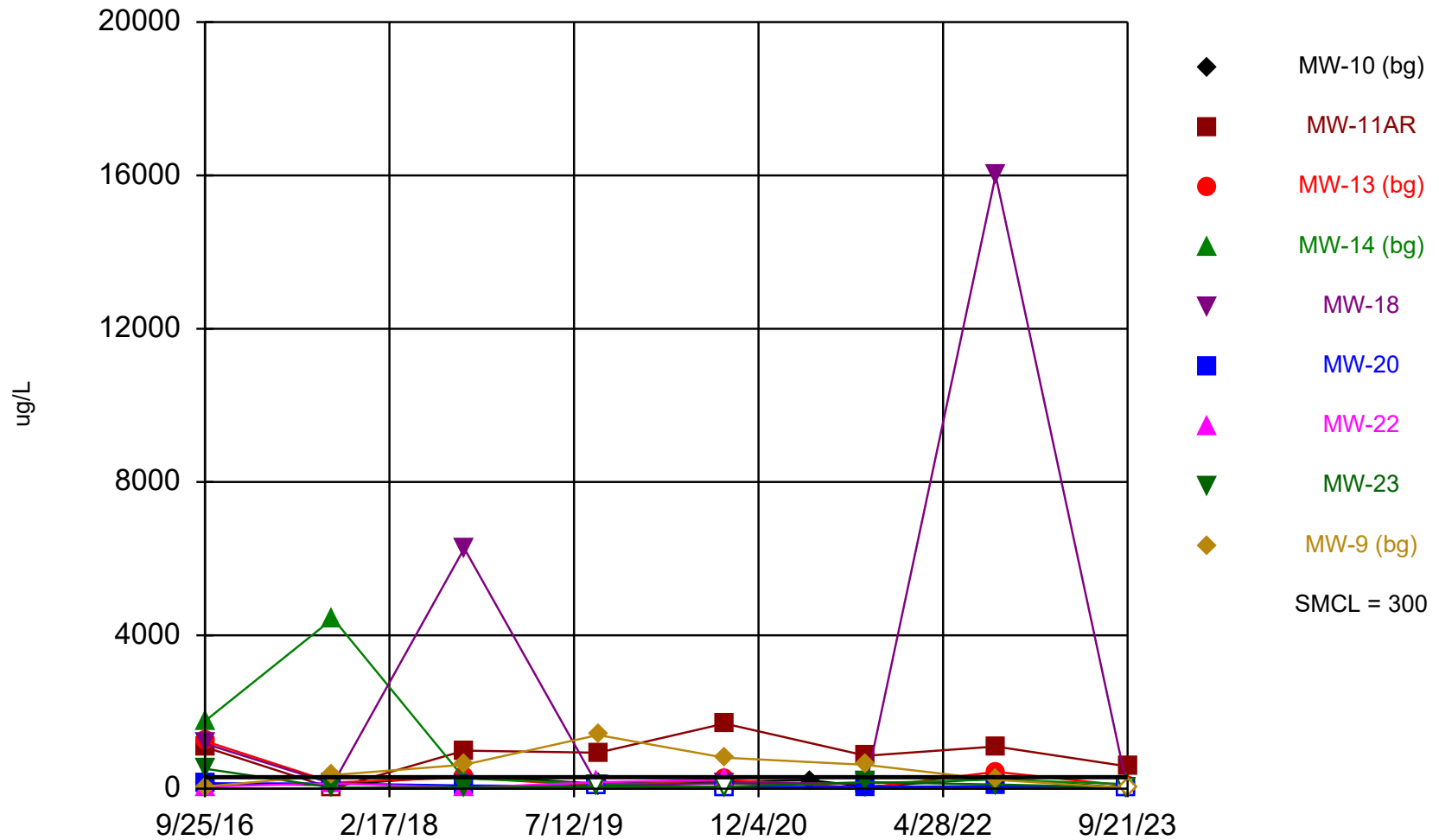
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Fluoride (mg/L) Analysis Run 10/30/2023 12:17 PM View: East Closed L
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-23	MW-9 (bg)
9/18/2023	<0.38 (U)						<0.38 (U)	
9/20/2023			<0.38 (U)	<0.38 (U)	<0.38 (U)	<0.38 (U)		
9/21/2023		<0.38 (U)						<0.38 (U)

Iron



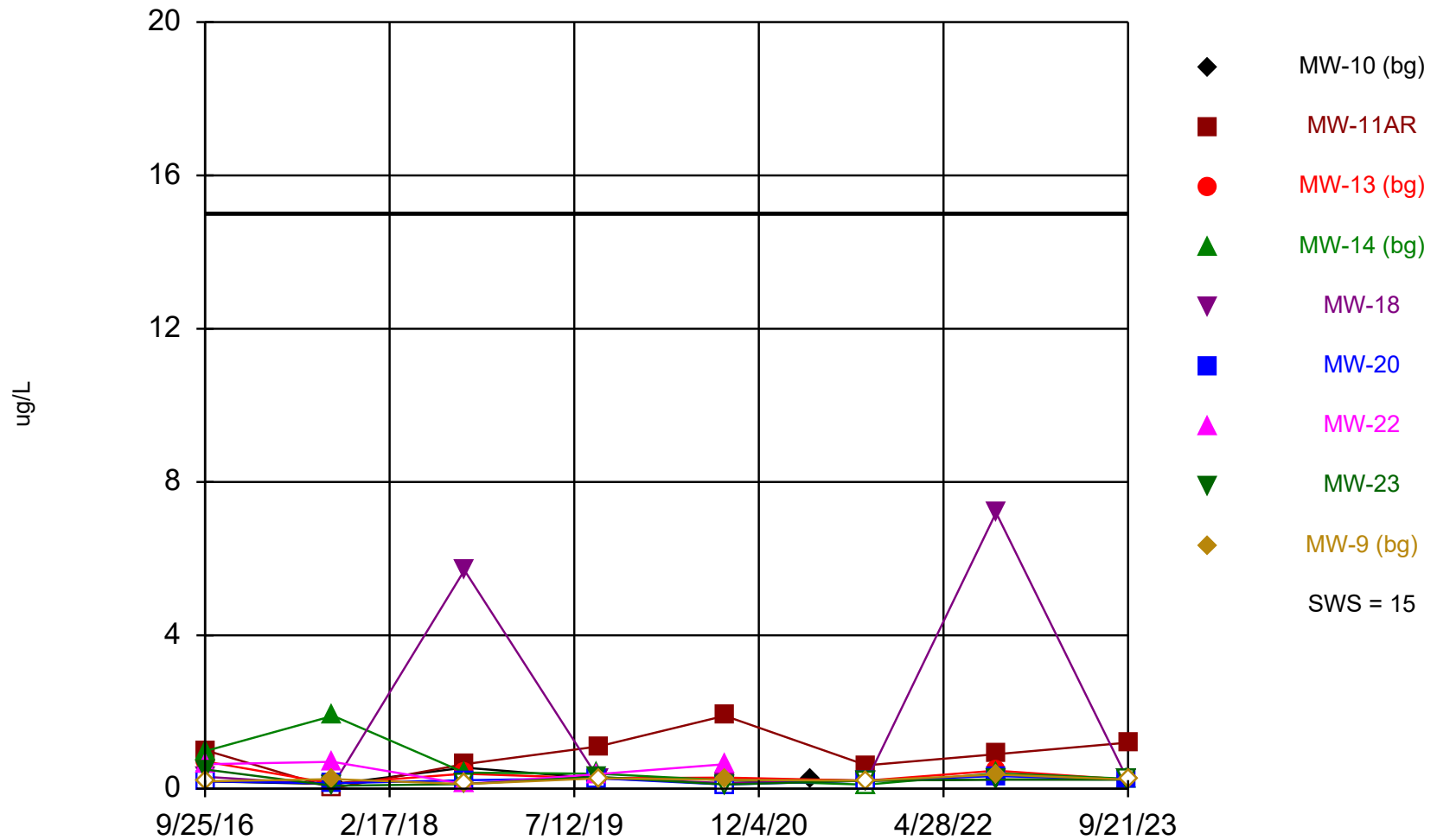
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Iron (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			1240						55.7
9/26/2016				1770	1170	140	54.6		
9/27/2016	126	1080							
9/28/2016								518	
9/13/2017			162			135	139	30.3 (J)	
9/14/2017		<9.6		4440	128				357
9/15/2017	93.1								
9/11/2018			289			82.8	23.9 (J)	34.3 (J)	
9/12/2018	344	993		267	6270				624
9/16/2019			76 (J)	130		<66	170	<66	
9/17/2019	130	940			<66				1400
9/1/2020		1700		130	140			<50	810
9/2/2020			230			<50	240		
4/29/2021	220								
9/27/2021			<36	140		49 (J)		170	
9/28/2021	52 (J)	860			140				620
9/20/2022	270			240					230
9/21/2022		1100	440		16000	67 (J)		110	
9/18/2023	<36 (U)							<36 (U)	
9/20/2023			78 (J)	120	<36 (U)	<36 (U)			
9/21/2023		580							<36 (U)

Lead



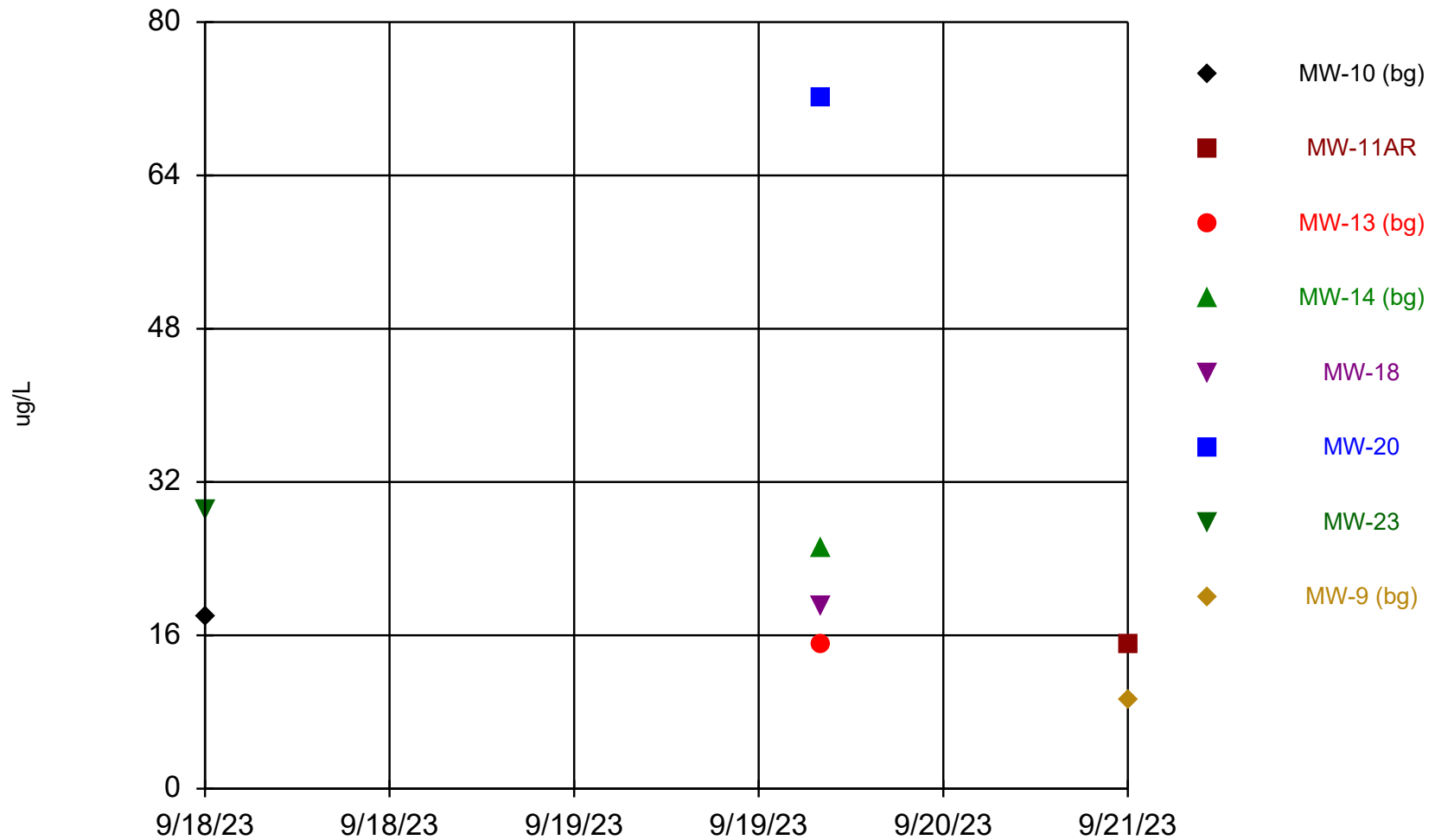
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Lead (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			0.71 (J)						<0.19
9/26/2016				0.98 (J)	0.31 (J)	<0.19	0.64 (J)		
9/27/2016	<0.19	1							
9/28/2016								0.5 (J)	
9/13/2017			0.13 (J)			0.14 (J)	0.7 (J)	0.076 (J)	
9/14/2017		<0.033		1.9	0.1 (J)				0.25 (J)
9/15/2017	0.12 (J)								
9/11/2018			0.39 (J)			0.22 (J)	<0.12	<0.12	
9/12/2018	0.55 (J)	0.64 (J)		0.42 (J)	5.7				<0.12
9/16/2019			<0.27	0.39 (J)		<0.27	0.38 (J)	0.31 (J)	
9/17/2019	<0.27	1.1			<0.27				<0.27
9/1/2020		1.9		0.22 (J)	0.15 (J)			<0.11	0.23 (J)
9/2/2020			0.29 (J)			<0.11	0.64		
4/29/2021	0.23 (J)								
9/27/2021			<0.21	<0.21		<0.21		<0.21	
9/28/2021	<0.21	0.61			<0.21				<0.21
9/20/2022	<0.24			0.4 (J)					0.37 (J)
9/21/2022		0.9	0.47 (J)		7.2	0.33 (J)		<0.24	
9/18/2023	<0.24 (U)							<0.24 (U)	
9/20/2023			<0.24 (U)	0.26 (J)	<0.24 (U)	0.24 (J)			
9/21/2023		1.2							<0.24 (U)

Lithium



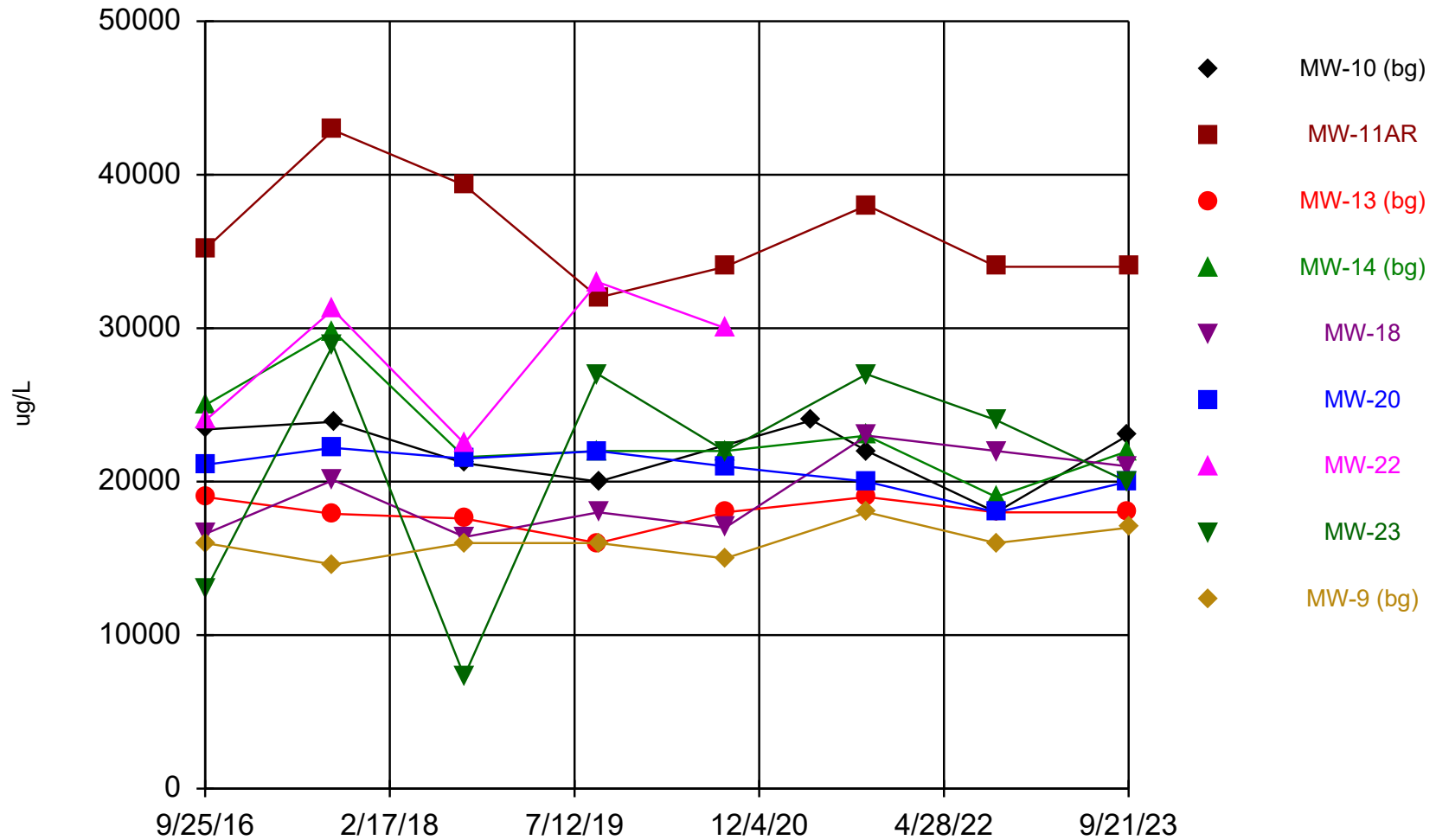
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Lithium (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-23	MW-9 (bg)
9/18/2023	18						29	
9/20/2023			15	25	19	72		
9/21/2023		15						9.3 (J)

Magnesium



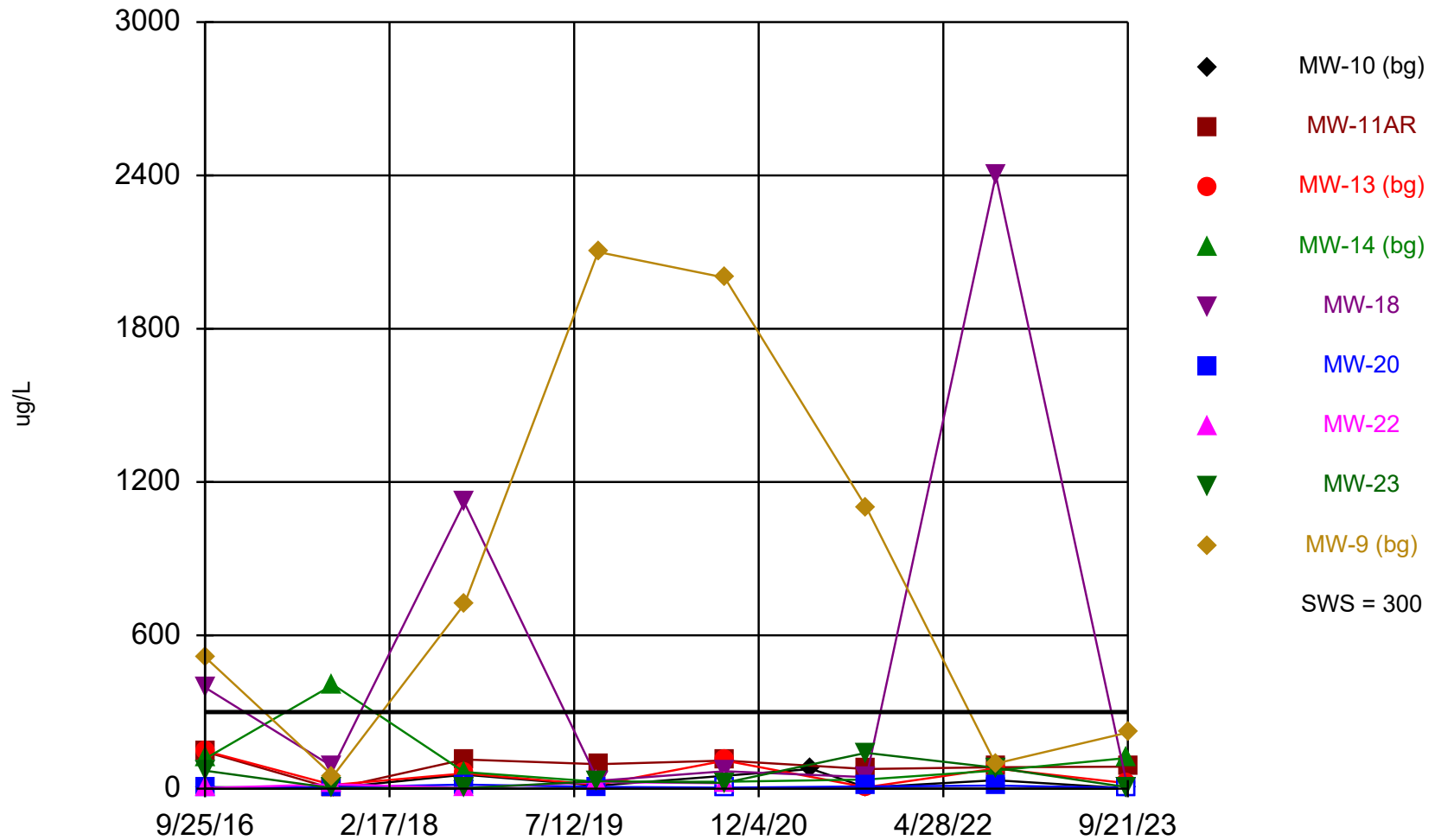
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			19000						16000
9/26/2016				25000	16600	21100	24000		
9/27/2016	23400	35200							
9/28/2016								13000	
9/13/2017			17900			22200	31200	28900	
9/14/2017		42900		29800	20100				14600
9/15/2017	23900								
9/11/2018			17600			21500	22500	7320	
9/12/2018	21200	39300		21600	16400				16000
9/16/2019			16000	22000		22000	33000	27000	
9/17/2019	20000	32000			18000				16000
9/1/2020		34000		22000	17000			22000	15000
9/2/2020			18000			21000	30000		
4/29/2021	24000								
9/27/2021			19000	23000		20000		27000	
9/28/2021	22000	38000			23000				18000
9/20/2022	18000			19000					16000
9/21/2022		34000	18000		22000	18000		24000	
9/18/2023	23000							20000	
9/20/2023			18000	22000	21000	20000			
9/21/2023		34000							17000

Manganese



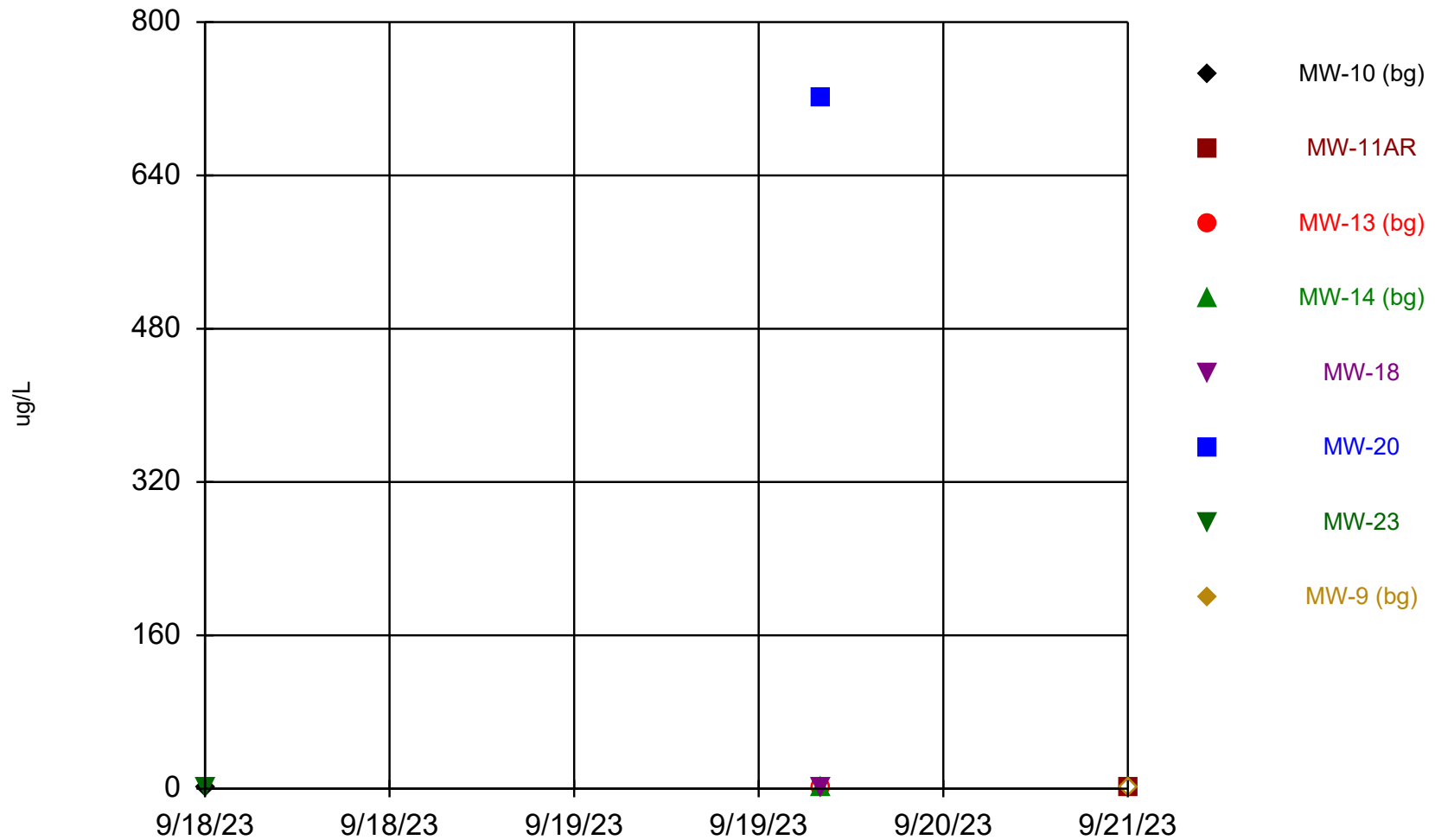
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			148						515
9/26/2016				118	395	4.2	2.5		
9/27/2016	6.1	144							
9/28/2016								70	
9/13/2017			14.6			6.3	17.2	2.2	
9/14/2017		<0.07		407	85.3				49.8
9/15/2017	3.2								
9/11/2018			59.8			15.7	2.9	2	
9/12/2018	54.9	114		64.9	1120				722
9/16/2019			15	27		7.3 (J)	26	29	
9/17/2019	12	96			31				2100
9/1/2020		110		27	68			23	2000
9/2/2020			110			<4	21		
4/29/2021	77								
9/27/2021			5.7 (J)	36		8.8 (J)		140	
9/28/2021	4.9 (J)	77			45				1100
9/20/2022	33			71					98
9/21/2022		84	79		2400	12		82	
9/18/2023	<3.6 (U)							5.8 (J)	
9/20/2023			21	120	7.5 (J)	<3.6 (U)			
9/21/2023		86							220

Molybdenum



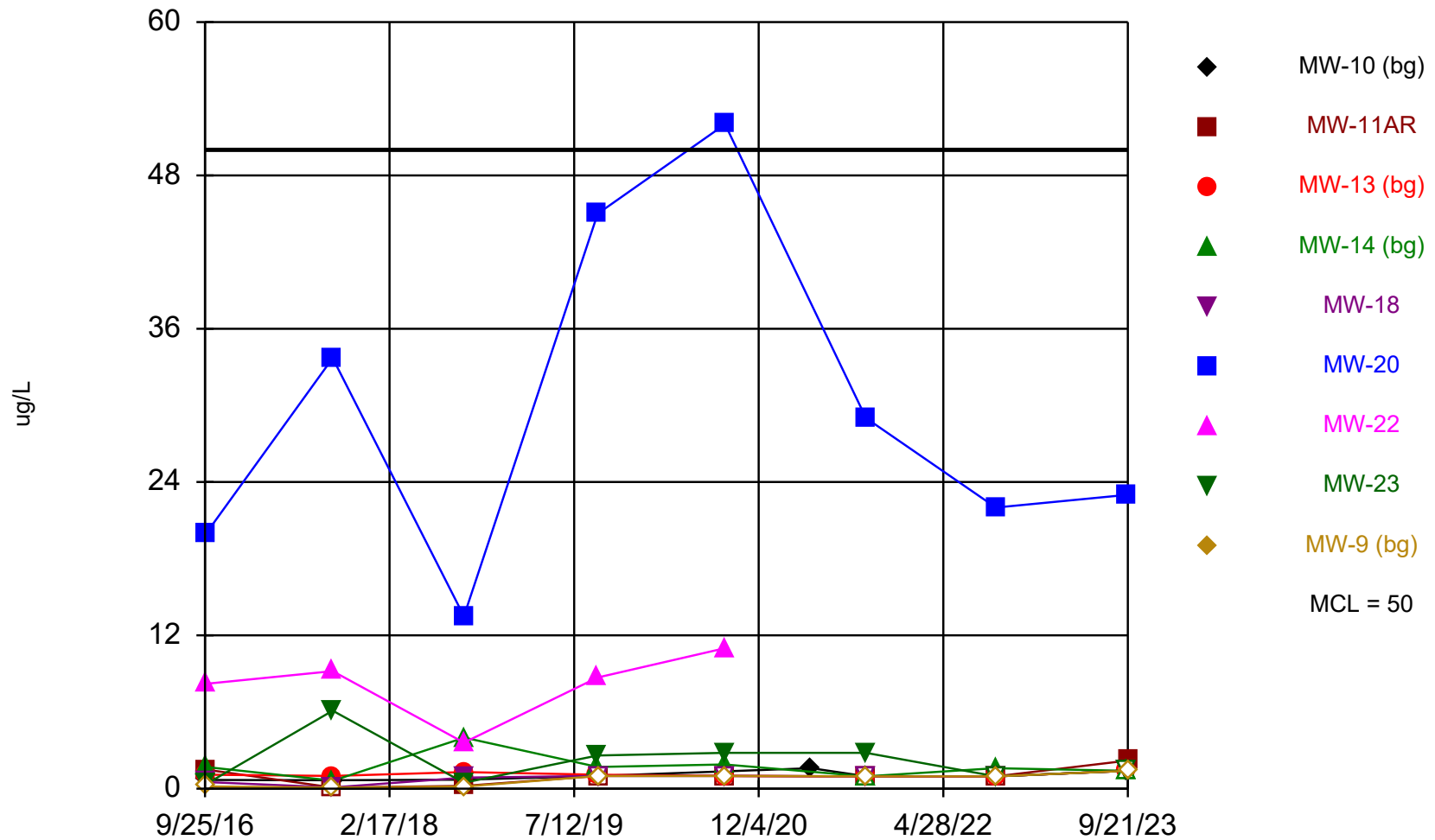
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Molybdenum (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-23	MW-9 (bg)
9/18/2023	1 (J)						1.5 (J)	
9/20/2023			<0.91 (U)	2.2	0.99 (J)	720		
9/21/2023		2.2						<0.91 (U)

Selenium



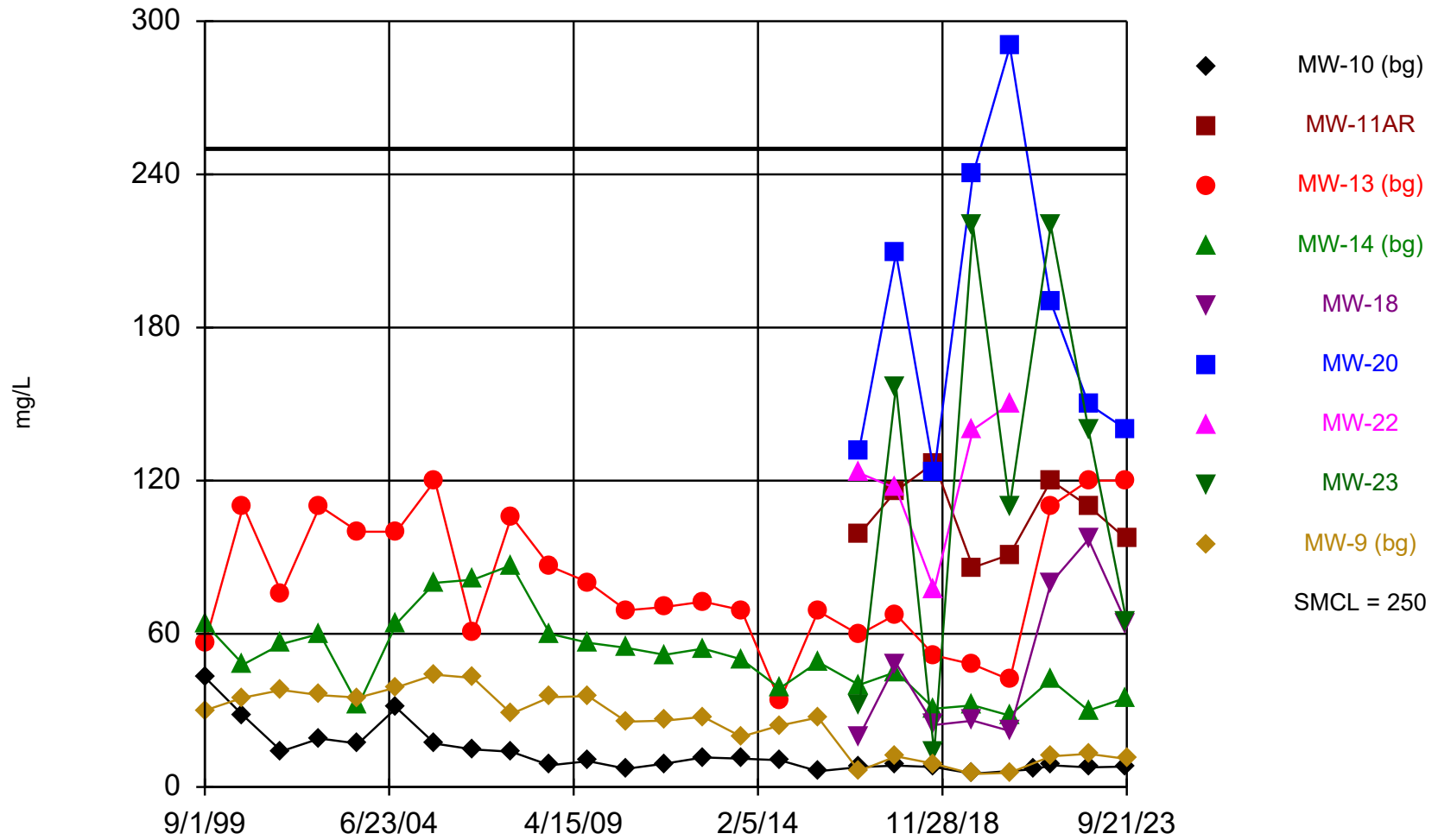
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			1.1						<0.18
9/26/2016				1.7	0.52 (J)	19.9	8.2		
9/27/2016	0.68 (J)	1.5							
9/28/2016								0.36 (J)	
9/13/2017			1			33.7	9.2	6.1	
9/14/2017		<0.086		0.63 (J)	0.094 (J)				<0.086
9/15/2017	0.66 (J)								
9/11/2018			1.3			13.5	3.6	0.47 (J)	
9/12/2018	0.71 (J)	0.22 (J)		4	0.87 (J)				<0.16
9/16/2019			1.1 (J)	1.7 (J)		45	8.7	2.6 (J)	
9/17/2019	<1	<1			<1				<1
9/1/2020		<1		1.9 (J)	<1			2.8 (J)	<1
9/2/2020			<1			52	11		
4/29/2021	1.6 (J)								
9/27/2021			<0.96	<0.96		29		2.8 (J)	
9/28/2021	<0.96	<0.96			<0.96				<0.96
9/20/2022	<0.96			1.6 (J)					<0.96
9/21/2022		<0.96	<0.96		<0.96	22		<0.96	
9/18/2023	<1.4 (U)							<1.4 (U)	
9/20/2023			<1.4 (U)	<1.4 (U)	<1.4 (U)	23			
9/21/2023		2.2 (J)							<1.4 (U)

Sulfate



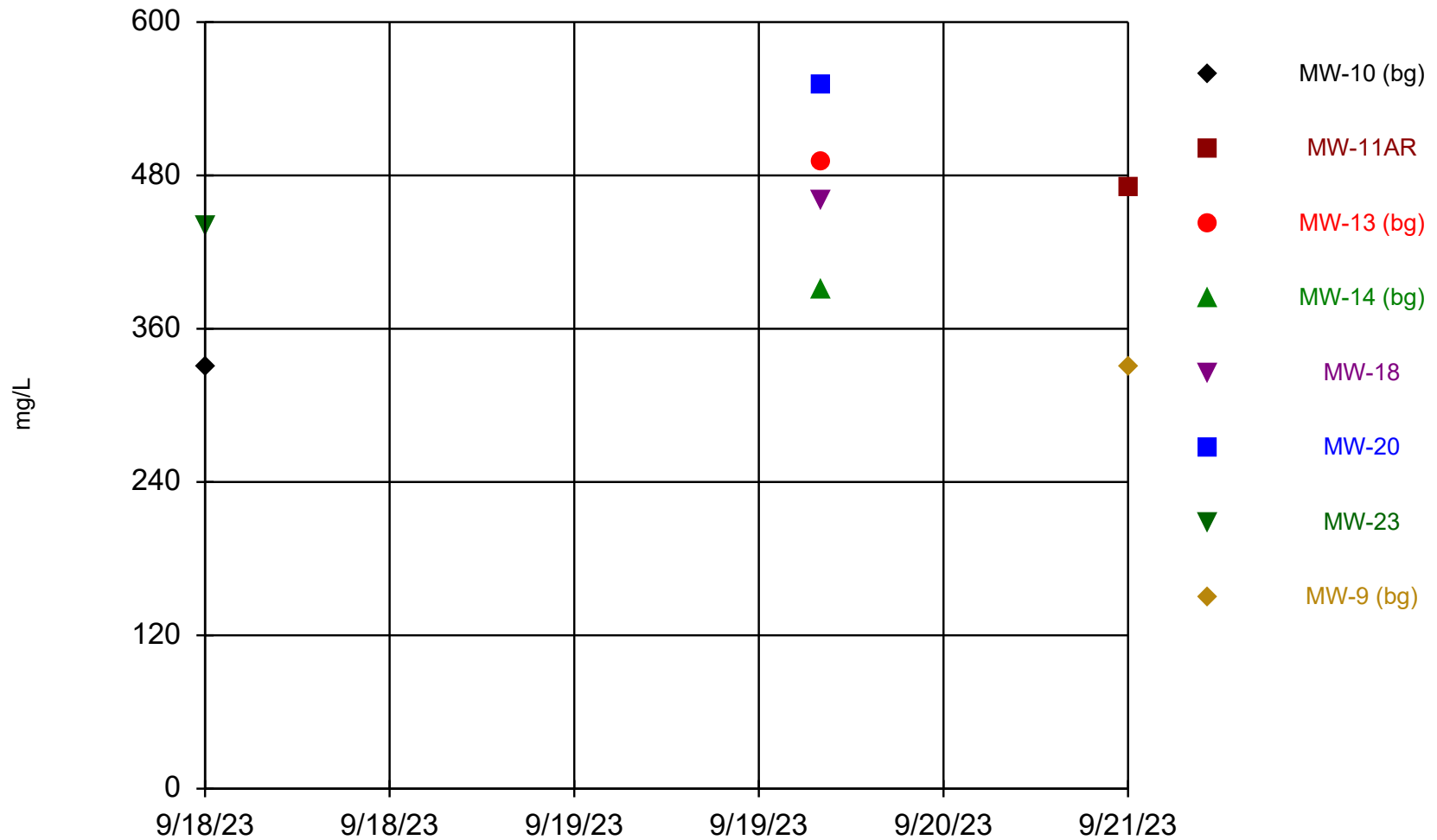
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/1/1999	43		56	64					30
9/1/2000	28		110	48					35
9/1/2001	14		76	56					38
9/1/2002	19		110	60					36
9/1/2003	17		100	32					35
9/1/2004	31		100	64					39
9/1/2005	17		120	80					44
9/1/2006	14.7		60.5	81.2					42.7
9/1/2007	13.8		106	86.9					28.7
9/1/2008	8.48		86.5	60					35.2
9/1/2009	10.1		80.2	56.5					35.6
9/1/2010	7.17		69.2	54.5					25.6
9/1/2011	9.16		70.5	51.8					26
9/1/2012	11.6		72.6	54.2					27.5
9/1/2013	11.1		69.3	50					19.7
9/1/2014	10.5		33.6	38.7					24.1
9/1/2015	6.2		68.9	49					27.2
9/25/2016			59.7						6.3
9/26/2016				40	19.8	132	123		
9/27/2016	7.8	99							
9/28/2016								31.8	
9/13/2017			67.6			209	117	157	
9/14/2017		116		45.1	48.4				12
9/15/2017	8.4								
9/11/2018			51.6			123	77.4	13.5	
9/12/2018	7.8	127		30.7	24.3				9.1
9/16/2019			48	32		240	140	220	
9/17/2019	5.2	86			26				5.1
9/1/2020		91		28	22			110	5.6
9/2/2020			42			290	150		
4/29/2021	7								
9/27/2021			110	42		190		220	
9/28/2021	8.5	120			80				12
9/20/2022	7.7			30					13
9/21/2022		110	120		97	150		140	
9/18/2023	8							65	
9/20/2023			120	35	64	140			
9/21/2023		97							11

Total Dissolved Solids



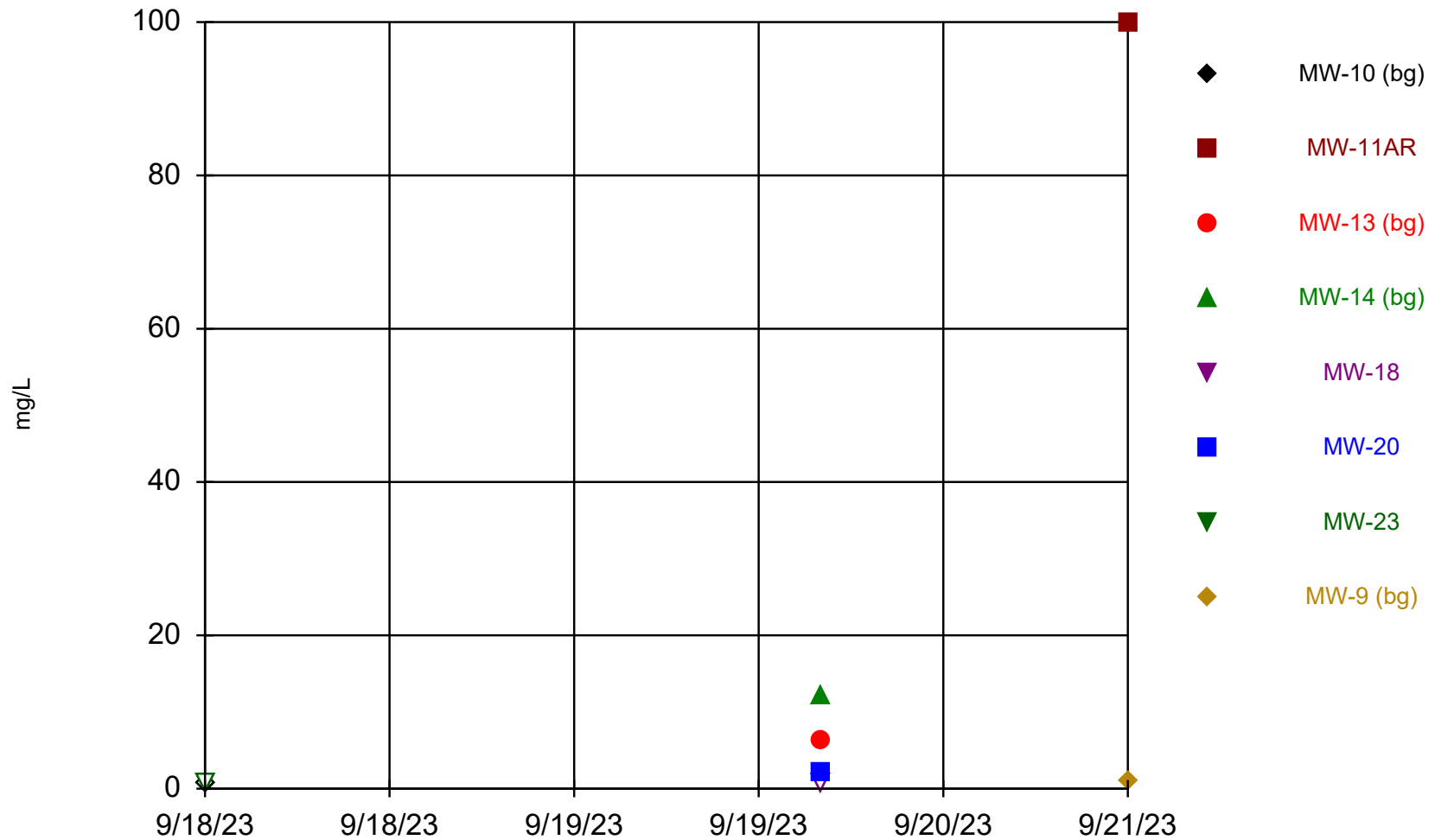
Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-23	MW-9 (bg)
9/18/2023	330						440	
9/20/2023			490	390	460	550		
9/21/2023		470						330

Total Suspended Solids



Time Series Analysis Run 10/30/2023 12:12 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Time Series

Constituent: Total Suspended Solids (mg/L) Analysis Run 10/30/2023 12:17 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-23	MW-9 (bg)
9/18/2023	<0.64 (U)						<0.64 (U)	
9/20/2023			6.4	12	<0.64 (U)	2		
9/21/2023		100						1.1 (J)



Attachment E3

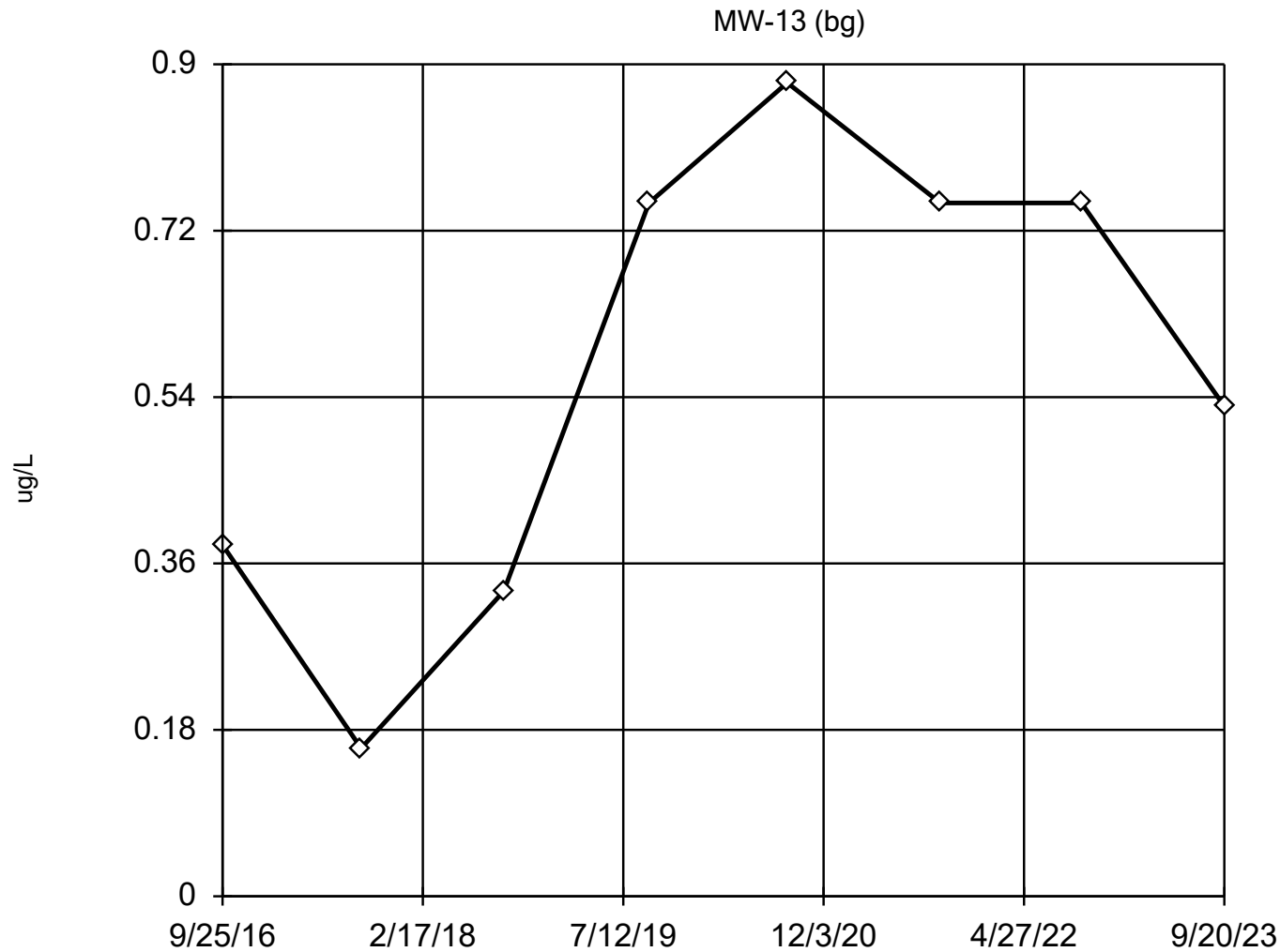
Outlier Analysis Results – West

Outlier Analysis

Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input Printed 10/30/2023, 11:24 AM

<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Date(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Arsenic (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.5662	0.2554	normal	ShapiroWilk
Arsenic (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.785	0.3639	ln(x)	ShapiroWilk
Arsenic (ug/L)	MW-8 (bg)	No	n/a	n/a	Dixon`s	0.05	7	0.6286	0.1913	normal	ShapiroWilk
Barium (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	99.45	7.495	normal	ShapiroWilk
Barium (ug/L)	MW-14 (bg)	Yes	108	9/14/2017	Dixon`s	0.05	8	66.4	17.23	normal	ShapiroWilk
Barium (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	128.1	14.72	normal	ShapiroWilk
Beryllium (ug/L)	MW-13 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.2028	0.115	unknown	ShapiroWilk
Beryllium (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.22	0.08992	normal	ShapiroWilk
Beryllium (ug/L)	MW-8 (bg)	No	n/a	n/a	Dixon`s	0.05	7	0.1931	0.1207	normal	ShapiroWilk
Boron (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	85.28	34.64	normal	ShapiroWilk
Boron (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	364	160.7	normal	ShapiroWilk
Boron (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	71.01	46.74	normal	ShapiroWilk
Chloride (mg/L)	MW-13 (bg)	No	n/a	n/a	NP (nrm)	NaN	25	3.712	1.596	unknown	ShapiroWilk
Chloride (mg/L)	MW-14 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	25	3.608	1.617	unknown	ShapiroWilk
Chloride (mg/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	24	26.97	11.87	ln(x)	ShapiroWilk
Cobalt (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.4481	0.3808	normal	ShapiroWilk
Cobalt (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.845	0.9325	ln(x)	ShapiroWilk
Cobalt (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.5216	0.556	ln(x)	ShapiroWilk
Iron (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	316.6	397.1	ln(x)	ShapiroWilk
Iron (ug/L)	MW-14 (bg)	Yes	4440	9/14/2017	NP (nrm)	NaN	8	904.6	1535	unknown	ShapiroWilk
Iron (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	439.1	437.5	normal	ShapiroWilk
Lead (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.3387	0.1831	normal	ShapiroWilk
Lead (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.5844	0.5921	ln(x)	ShapiroWilk
Lead (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.6961	1.242	ln(x)	ShapiroWilk
Magnesium (ug/L)	MW-13 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	17938	936.5	unknown	ShapiroWilk
Magnesium (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	23050	3189	normal	ShapiroWilk
Magnesium (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	19914	2537	normal	ShapiroWilk
Manganese (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	56.64	52.2	normal	ShapiroWilk
Manganese (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	108.9	126	ln(x)	ShapiroWilk
Manganese (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	61.5	60.11	normal	ShapiroWilk
Selenium (ug/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1.102	0.1644	normal	ShapiroWilk
Selenium (ug/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1.736	1.008	ln(x)	ShapiroWilk
Selenium (ug/L)	MW-8 (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.8729	0.3724	normal	ShapiroWilk
Sulfate (mg/L)	MW-13 (bg)	No	n/a	n/a	EPA 1989	0.05	25	80.33	26.2	normal	ShapiroWilk
Sulfate (mg/L)	MW-14 (bg)	No	n/a	n/a	EPA 1989	0.05	25	50.78	16.31	normal	ShapiroWilk
Sulfate (mg/L)	MW-8 (bg)	No	n/a	n/a	Rosner`s	0.01	24	19.22	7.104	normal	ShapiroWilk

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.5662, std. dev. 0.2554, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9125
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Arsenic Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

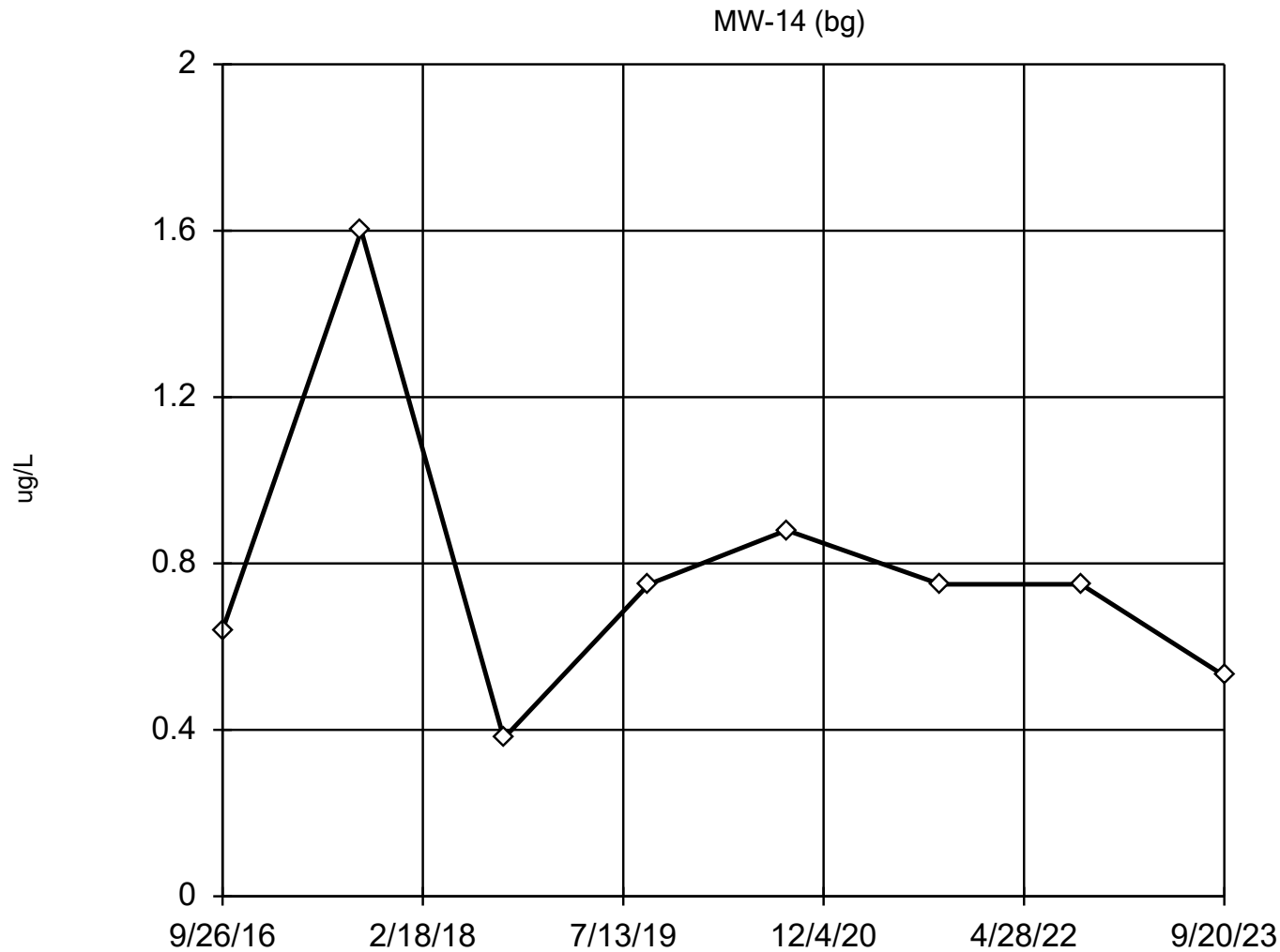
EPA 1989 Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	0.38 (J)
9/13/2017	0.16 (J)
9/11/2018	0.33 (J)
9/16/2019	<0.75
9/2/2020	<0.88
9/27/2021	<0.75
9/21/2022	<0.75
9/20/2023	<0.53 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.785, std. dev. 0.3639, critical Tn 2.032

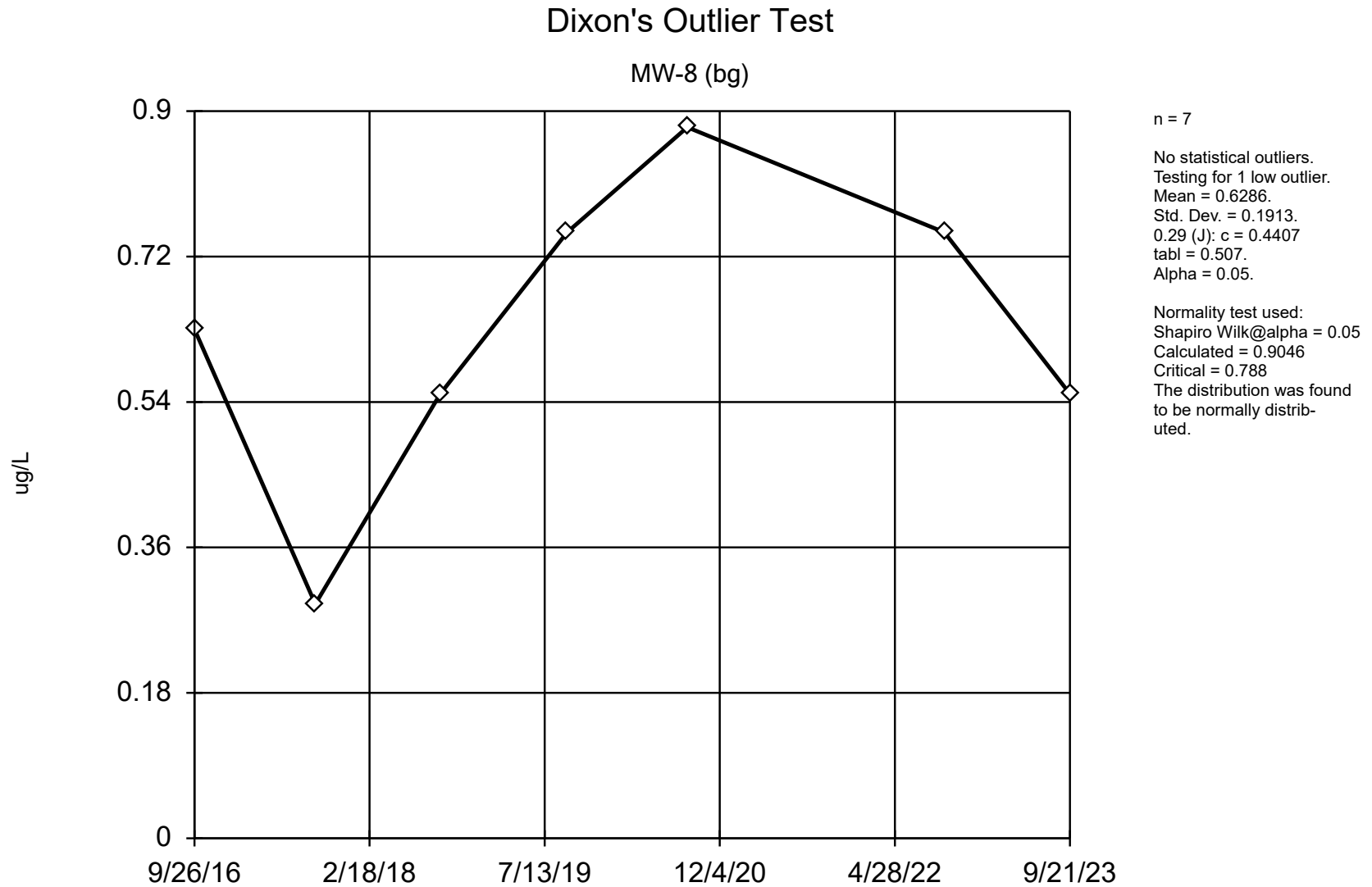
Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9341
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Arsenic Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-14 (bg)
9/26/2016	0.64 (J)
9/14/2017	1.6
9/12/2018	0.38 (J)
9/16/2019	<0.75
9/1/2020	<0.88
9/27/2021	<0.75
9/20/2022	<0.75
9/20/2023	<0.53 (U)



Constituent: Arsenic Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

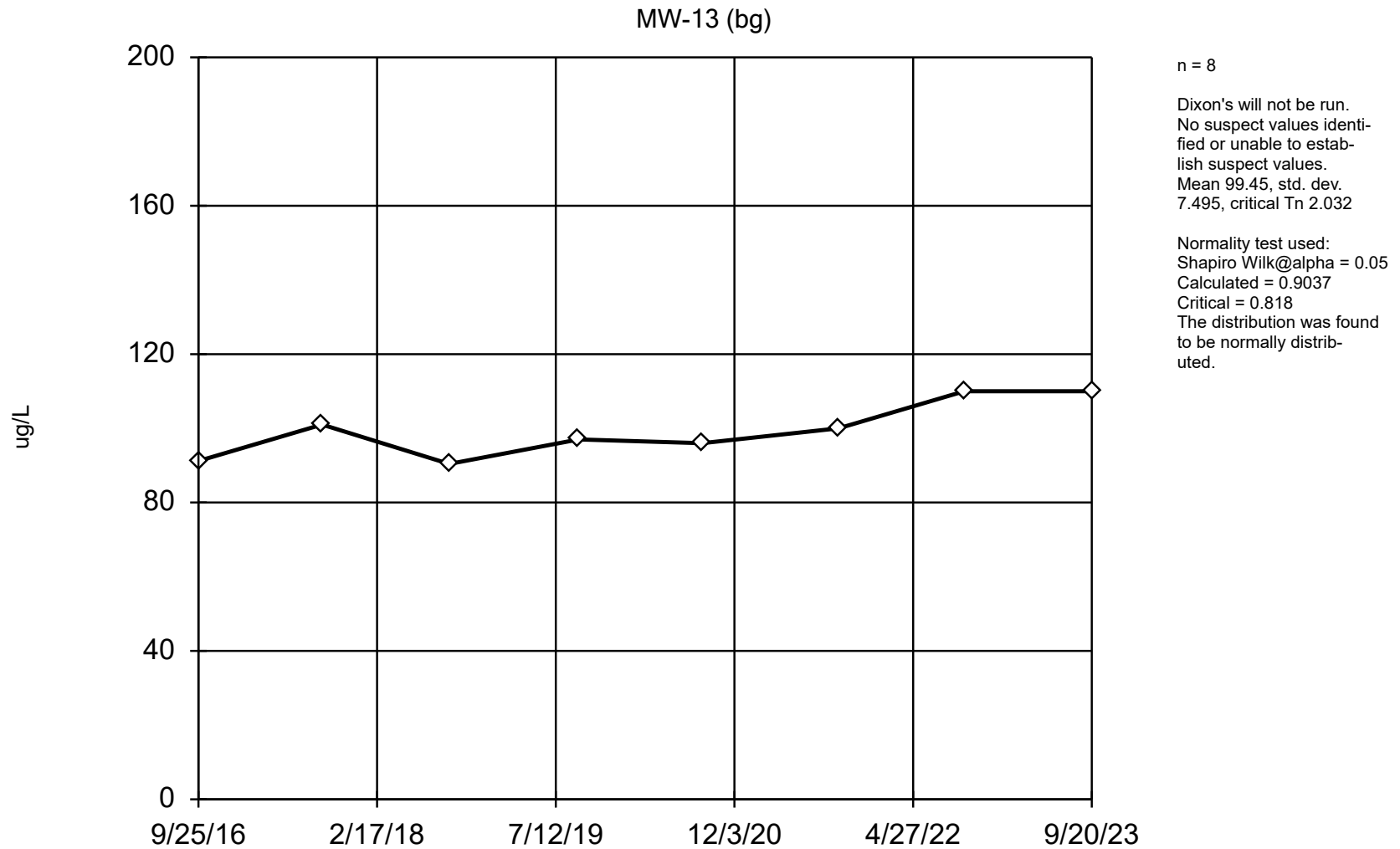
Dixon's Outlier Test

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	0.63 (J)
9/13/2017	0.29 (J)
9/12/2018	0.55 (J)
9/17/2019	<0.75
9/1/2020	<0.88
9/20/2022	<0.75
9/21/2023	0.55 (J)

EPA Screening (suspected outliers for Dixon's Test)



Constituent: Barium Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

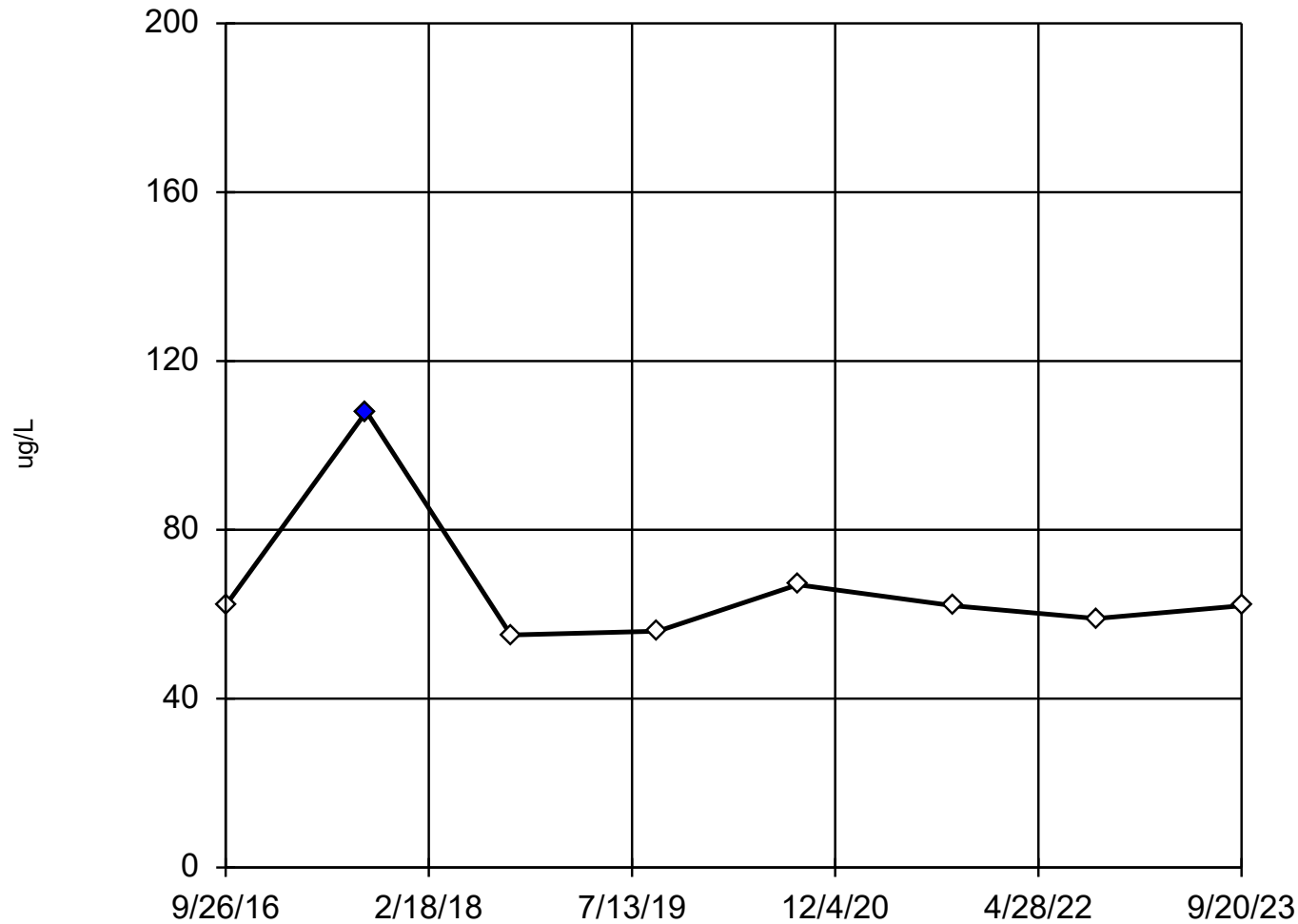
Constituent: Barium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	91.2
9/13/2017	101
9/11/2018	90.4
9/16/2019	97
9/2/2020	96
9/27/2021	100
9/21/2022	110
9/20/2023	110

Dixon's Outlier Test

MW-14 (bg)



n = 8

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 66.4.
Std. Dev. = 17.23.
108: c = 0.7885
tab1 = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9294
Critical = 0.803
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Barium Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

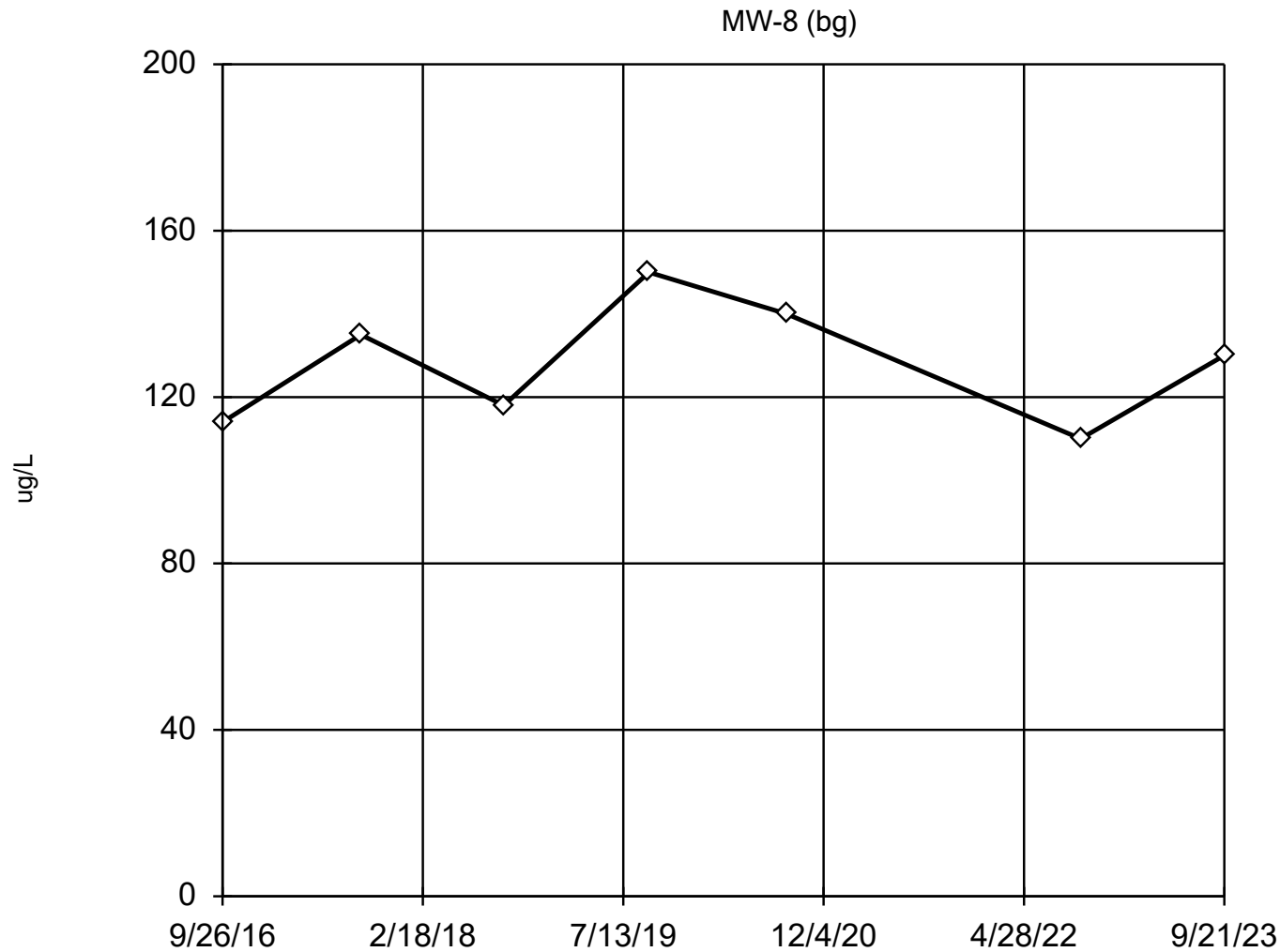
Dixon's Outlier Test

Constituent: Barium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	62.1
9/14/2017	108 (O)
9/12/2018	55.1
9/16/2019	56
9/1/2020	67
9/27/2021	62
9/20/2022	59
9/20/2023	62

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 128.1, std. dev. 14.72, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9522
Critical = 0.803
The distribution was found to be normally distributed.

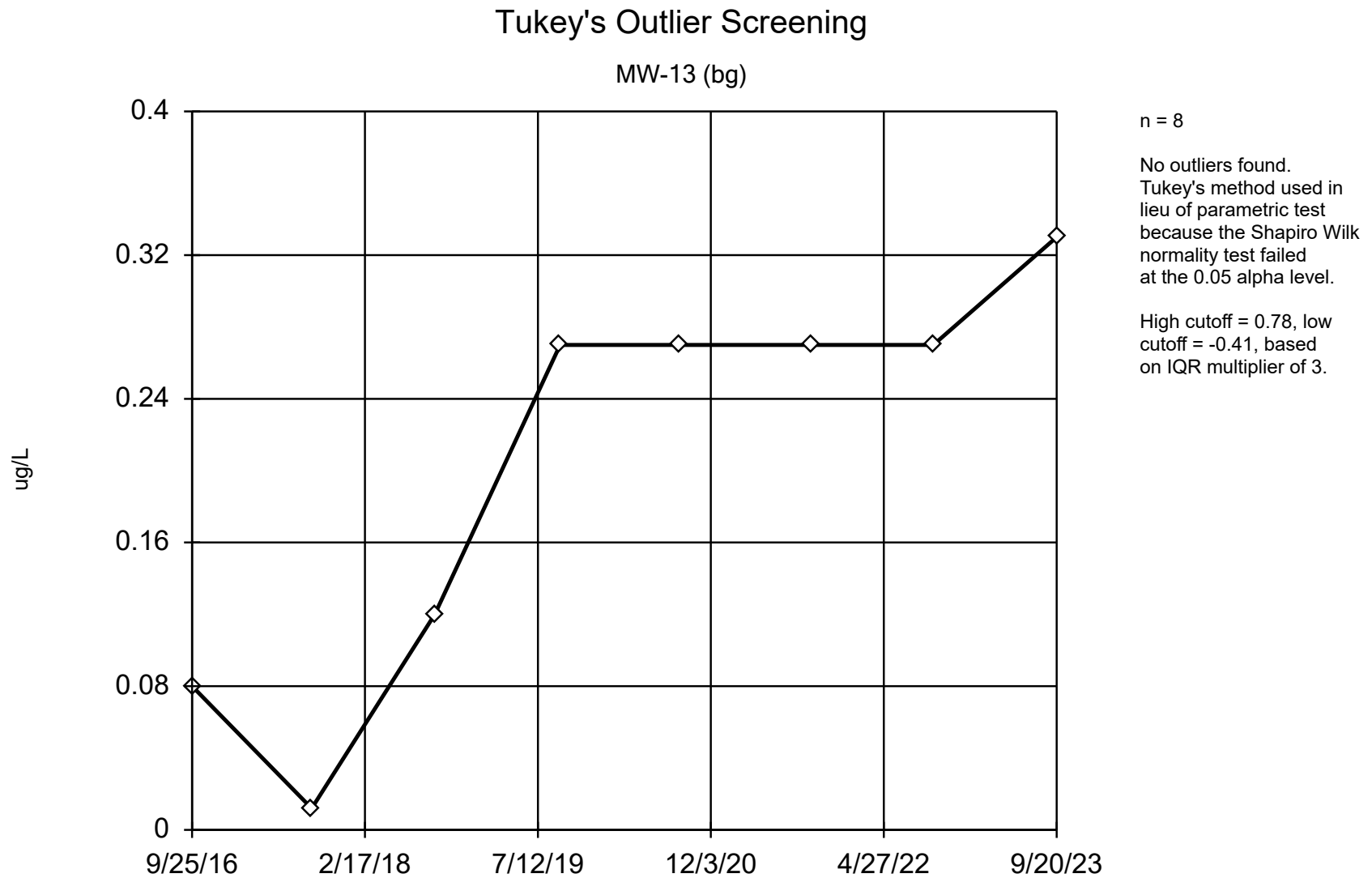
Constituent: Barium Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Barium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	114
9/13/2017	135
9/12/2018	118
9/17/2019	150
9/1/2020	140
9/20/2022	110
9/21/2023	130



Constituent: Beryllium Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

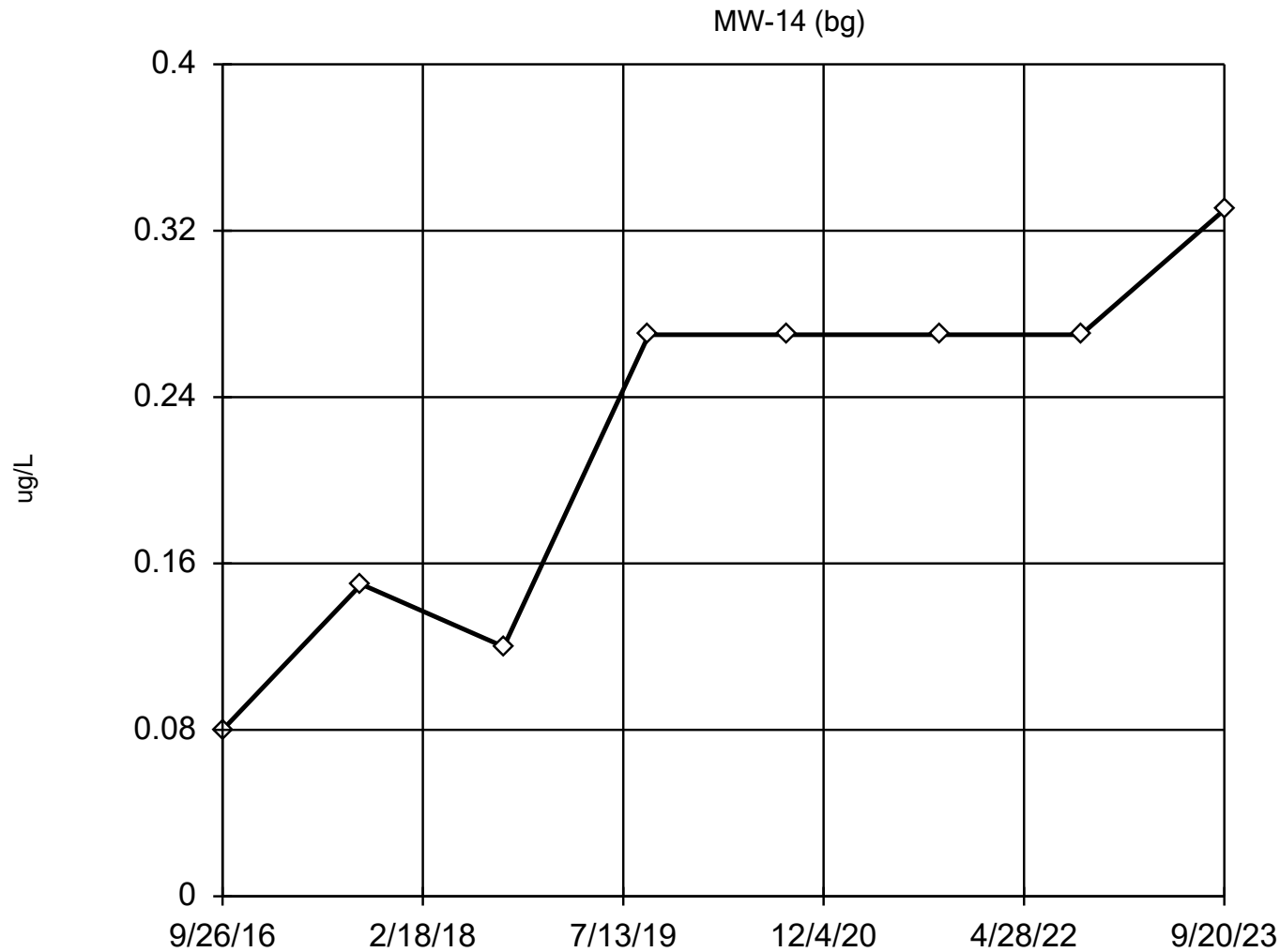
Tukey's Outlier Screening

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	<0.08
9/13/2017	<0.012
9/11/2018	<0.12
9/16/2019	<0.27
9/2/2020	<0.27
9/27/2021	<0.27
9/21/2022	<0.27
9/20/2023	<0.33 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.22, std. dev. 0.08992, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8526
Critical = 0.818
The distribution was found to be normally distributed.

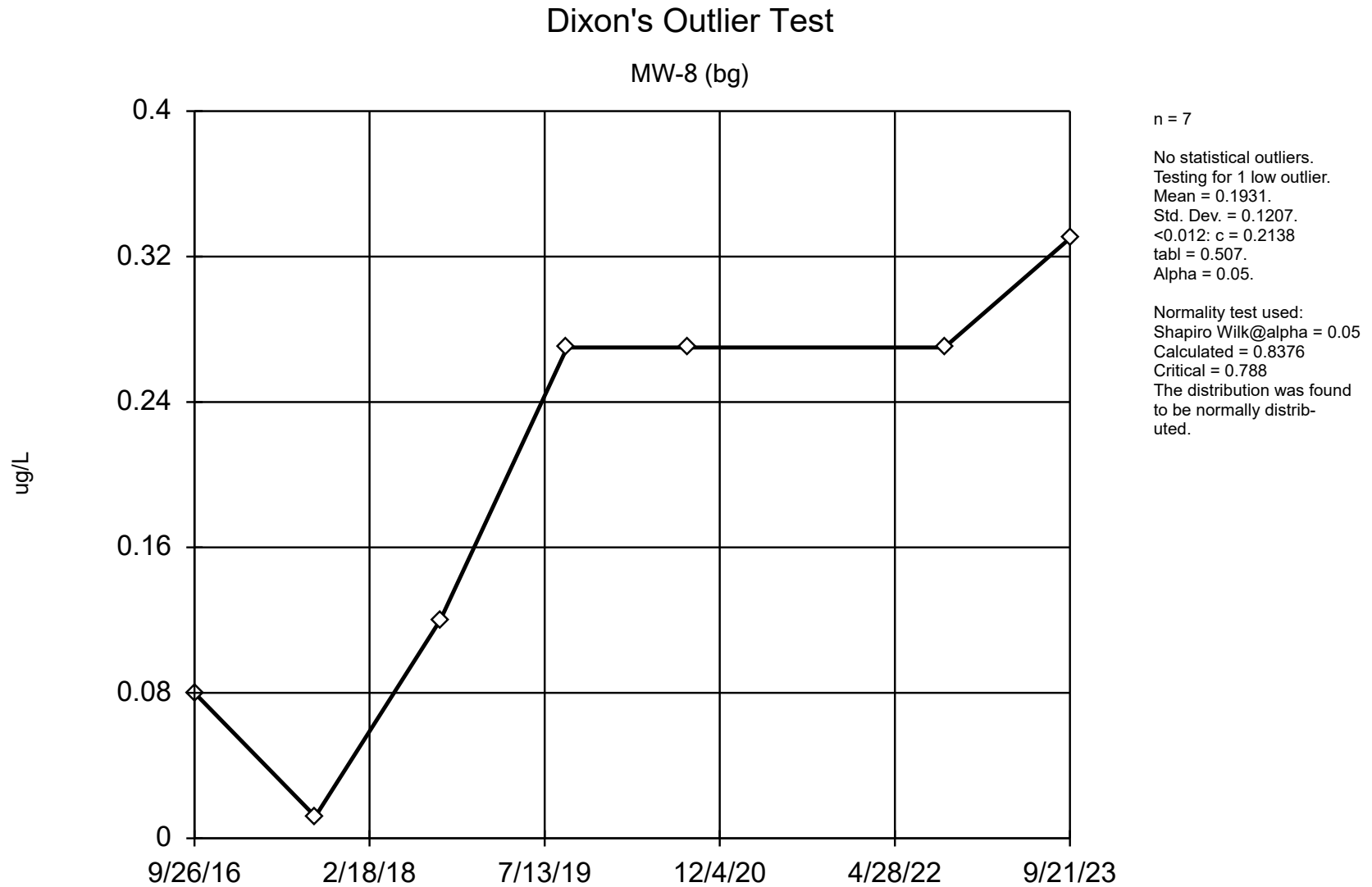
Constituent: Beryllium Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	<0.08
9/14/2017	0.15 (J)
9/12/2018	<0.12
9/16/2019	<0.27
9/1/2020	<0.27
9/27/2021	<0.27
9/20/2022	<0.27
9/20/2023	<0.33 (U)



Constituent: Beryllium Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

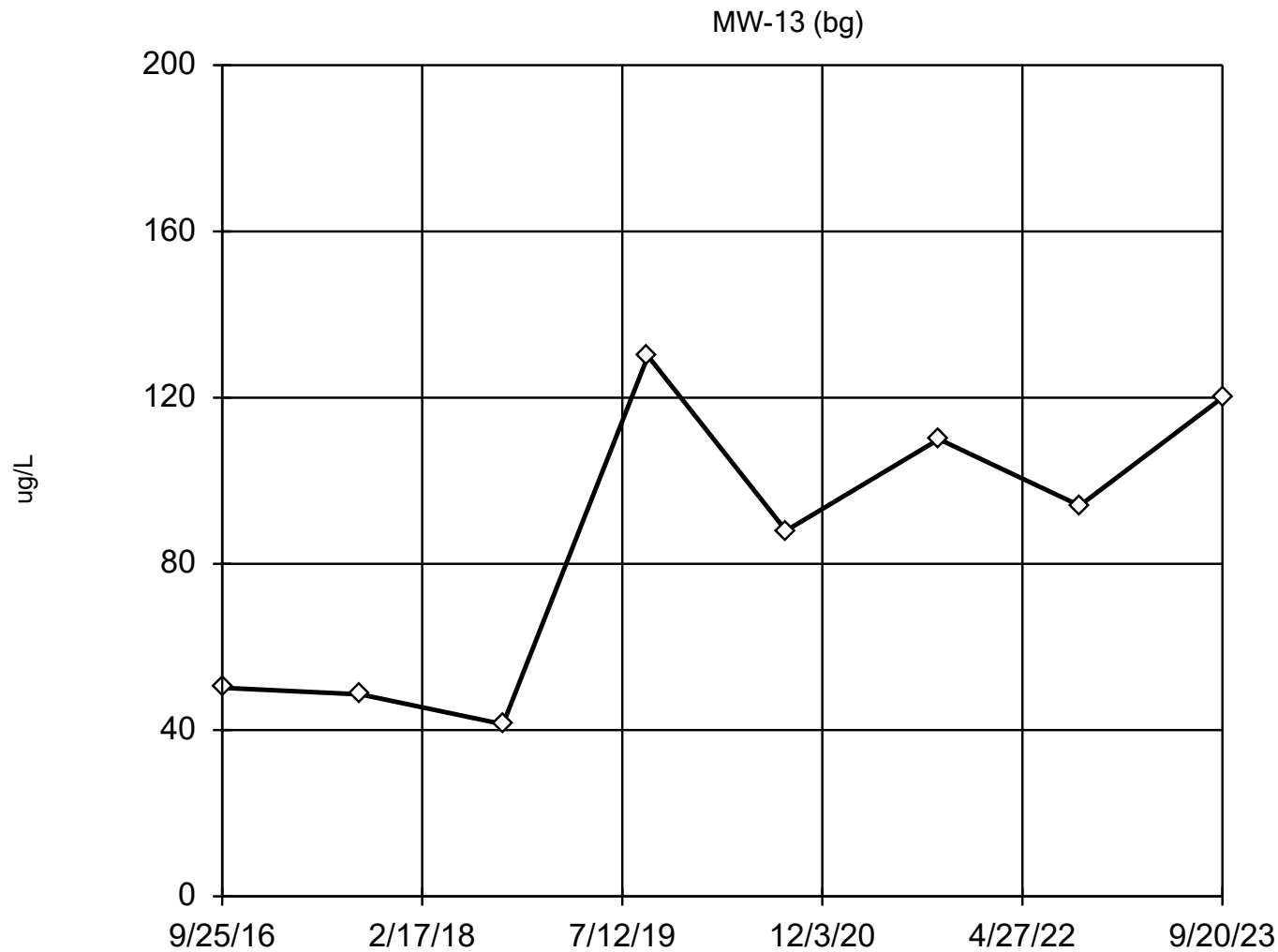
Dixon's Outlier Test

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	<0.08
9/13/2017	<0.012
9/12/2018	<0.12
9/17/2019	<0.27
9/1/2020	<0.27
9/20/2022	<0.27
9/21/2023	<0.33 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 85.28, std. dev. 34.64, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9003
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Boron Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

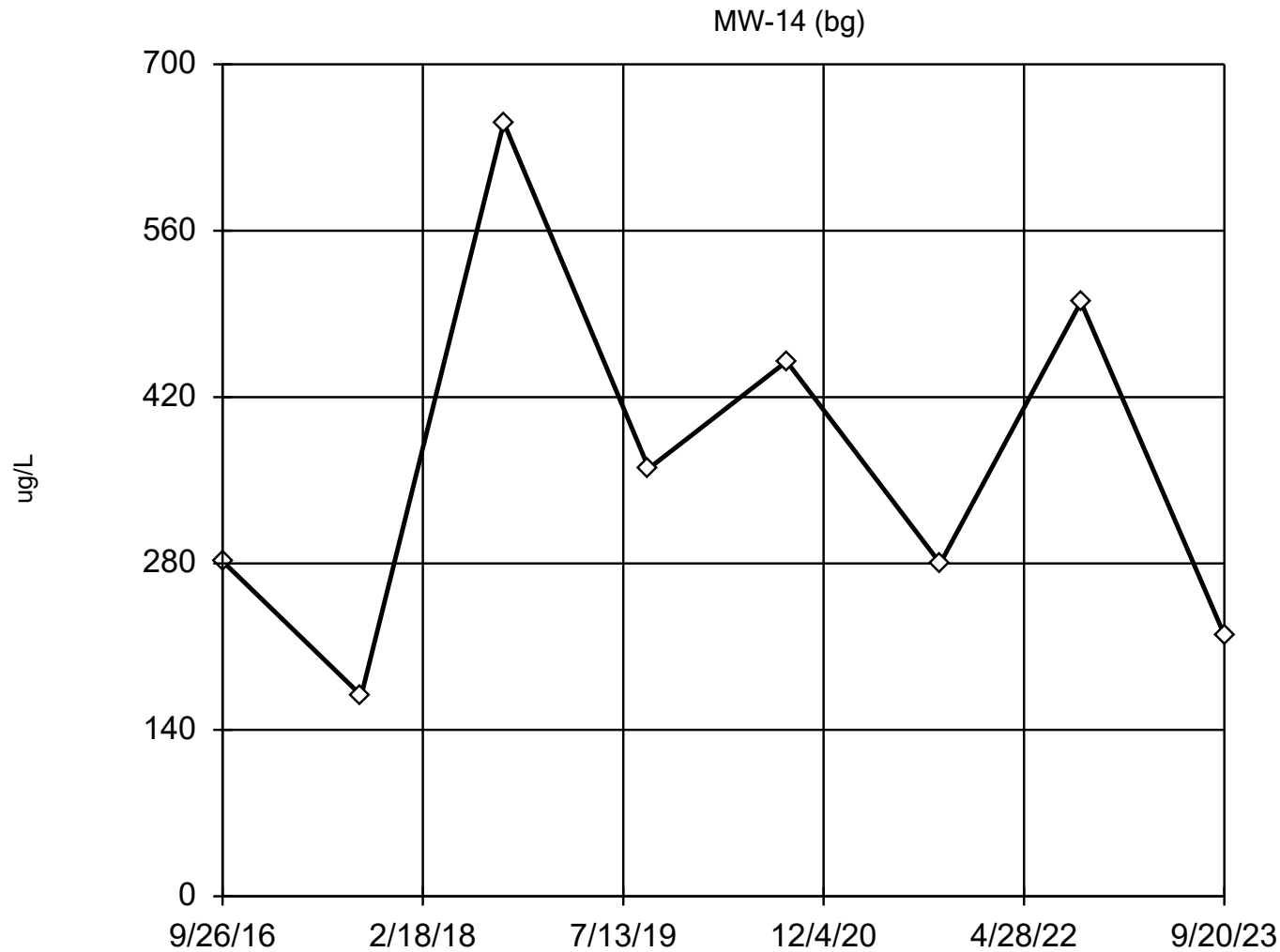
EPA 1989 Outlier Screening

Constituent: Boron (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	50.2 (J)
9/13/2017	48.6 (J)
9/11/2018	41.4 (J)
9/16/2019	130 (J)
9/2/2020	88 (J)
9/27/2021	110
9/21/2022	94 (J)
9/20/2023	120

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 364, std. dev. 160.7, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9493
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Boron Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

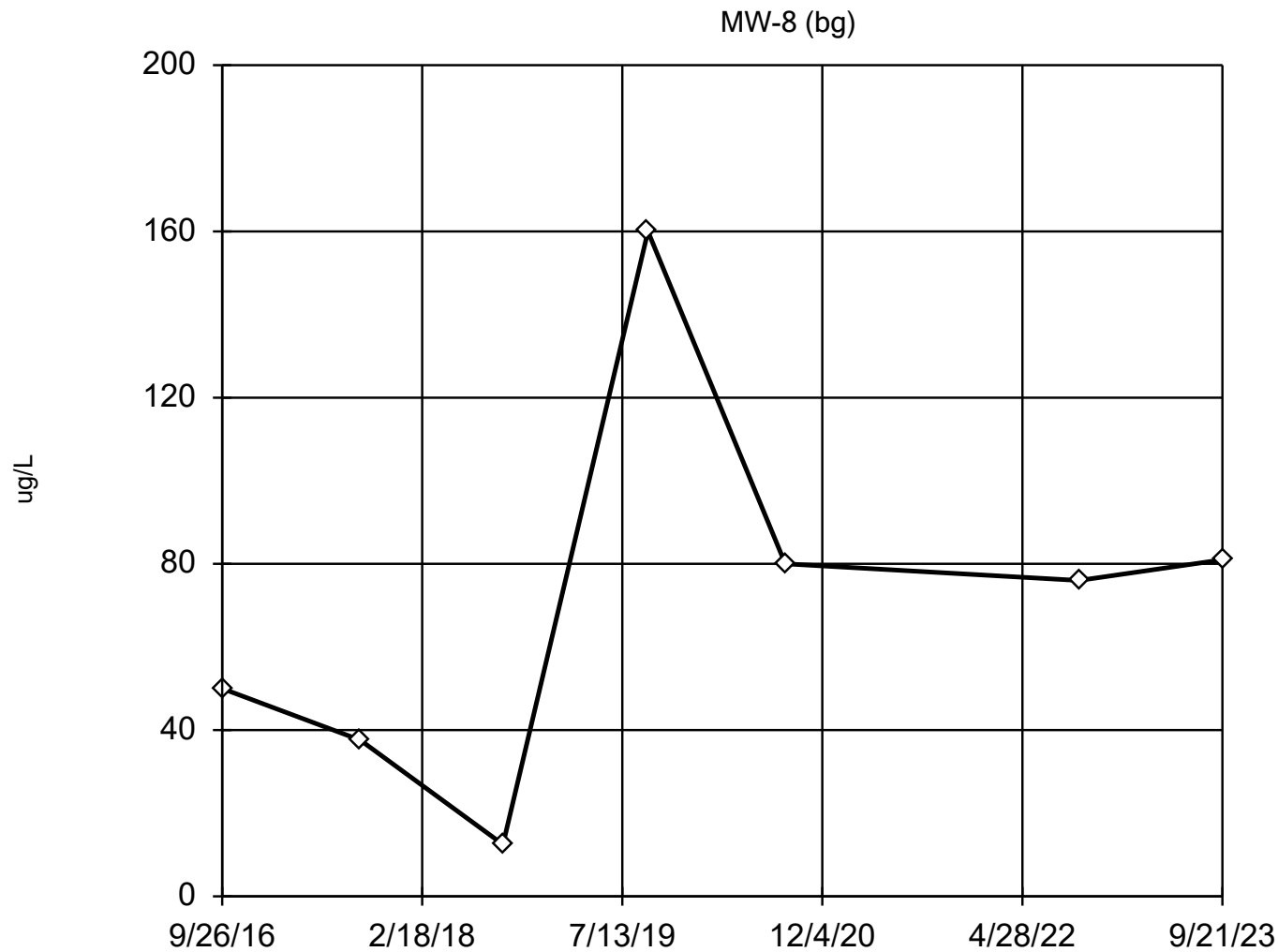
EPA 1989 Outlier Screening

Constituent: Boron (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	282
9/14/2017	169
9/12/2018	651
9/16/2019	360
9/1/2020	450
9/27/2021	280
9/20/2022	500
9/20/2023	220

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 71.01, std. dev. 46.74, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9114
Critical = 0.803
The distribution was found to be normally distributed.

Constituent: Boron Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

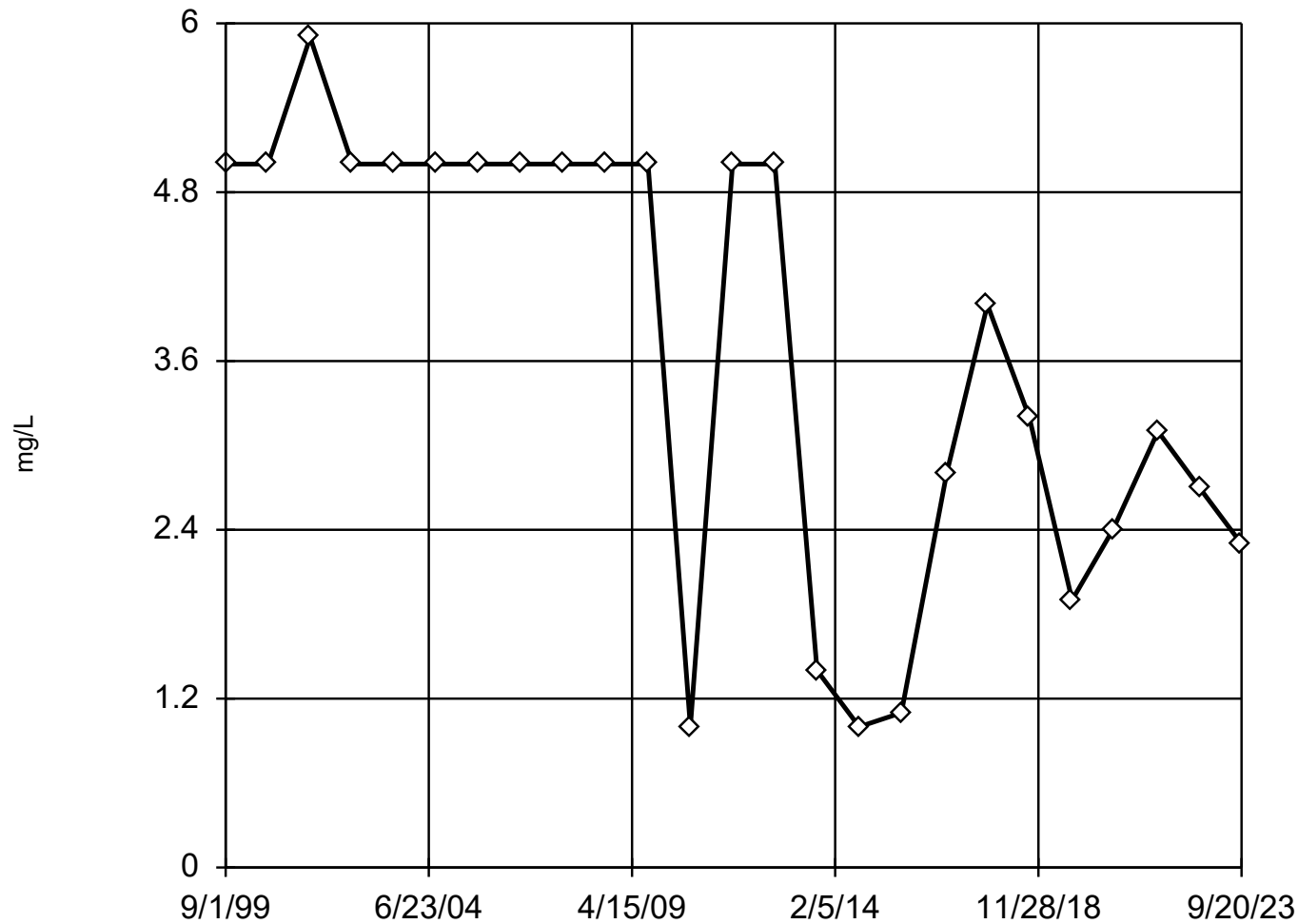
Constituent: Boron (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	<50
9/13/2017	37.6 (J)
9/12/2018	<12.5
9/17/2019	160 (J)
9/1/2020	<80
9/20/2022	76 (J)
9/21/2023	81 (J)

Tukey's Outlier Screening

MW-13 (bg)



n = 25

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

High cutoff = 12.95, low cutoff = -5.6, based on IQR multiplier of 3.

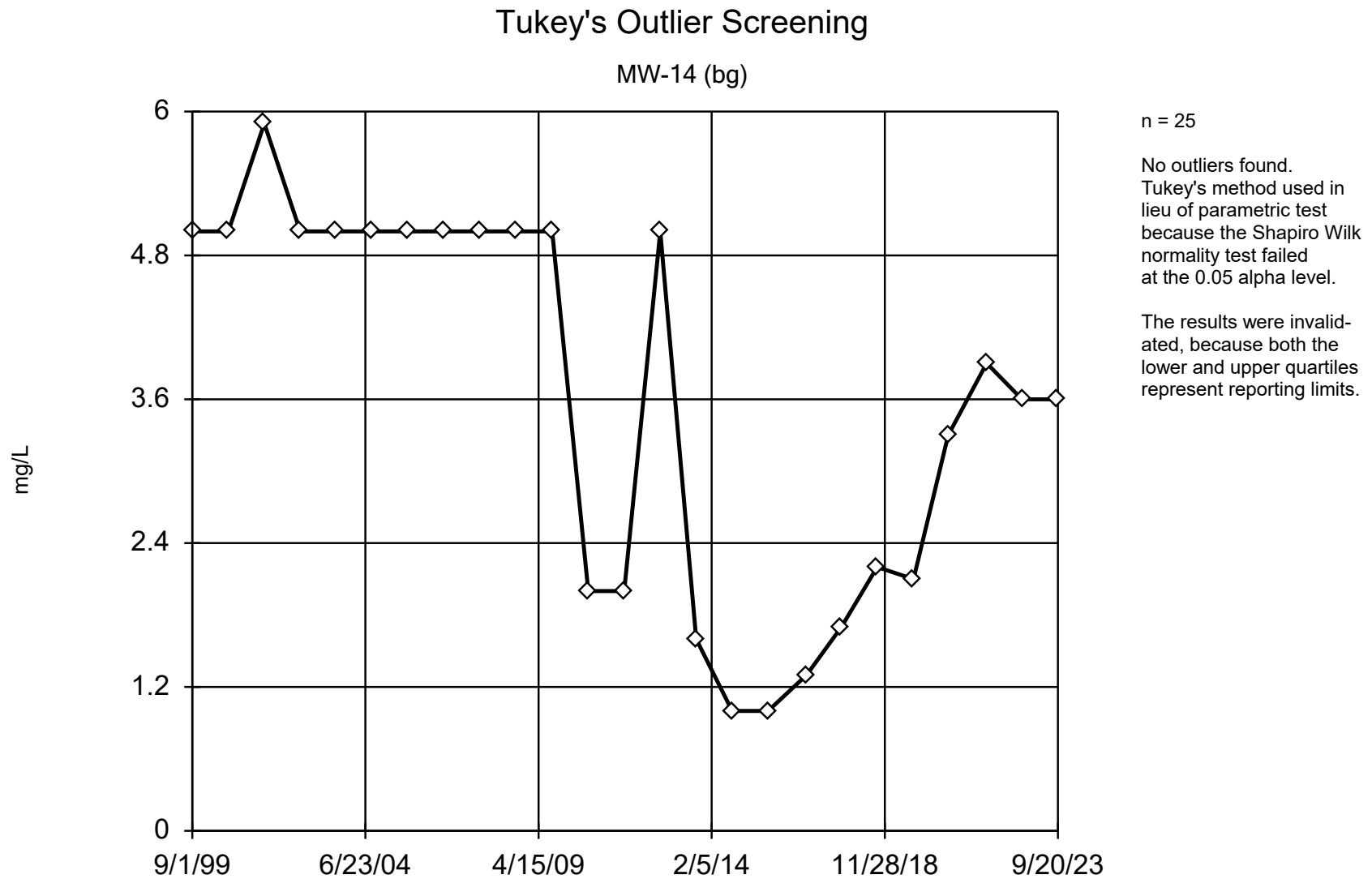
Constituent: Chloride Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Tukey's Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/1/1999	<5
9/1/2000	<5
9/1/2001	5.9
9/1/2002	<5
9/1/2003	<5
9/1/2004	<5
9/1/2005	<5
9/1/2006	<5
9/1/2007	<5
9/1/2008	<5
9/1/2009	<5
9/1/2010	<1
9/1/2011	<5
9/1/2012	<5
9/1/2013	1.4
9/1/2014	<1
9/1/2015	1.1
9/25/2016	2.8
9/13/2017	4
9/11/2018	3.2
9/16/2019	1.9 (J,B)
9/2/2020	2.4 (J,B)
9/27/2021	3.1 (J)
9/21/2022	2.7 (J)
9/20/2023	<2.3 (U)



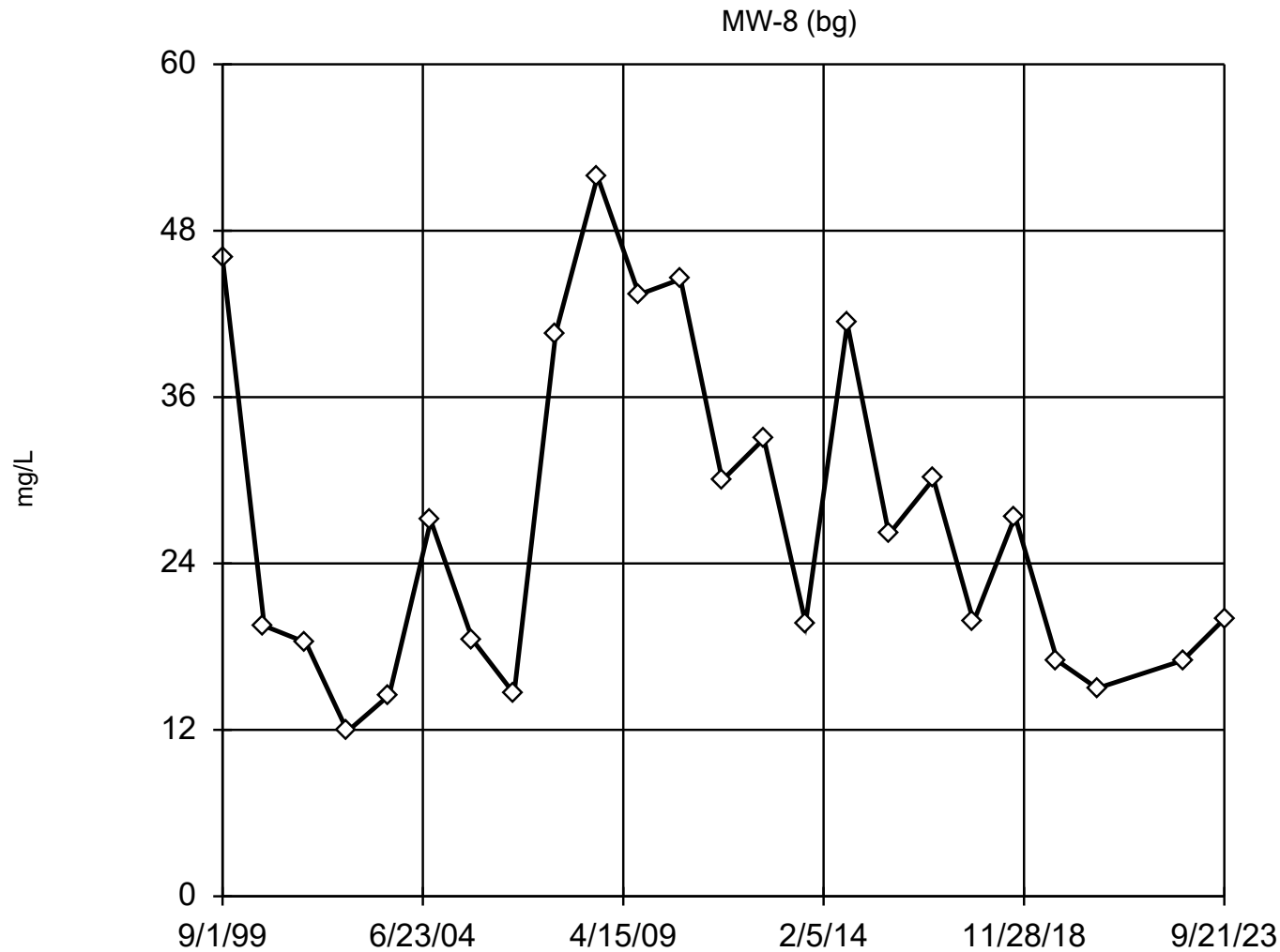
Tukey's Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/1/1999	<5
9/1/2000	<5
9/1/2001	5.9
9/1/2002	<5
9/1/2003	<5
9/1/2004	<5
9/1/2005	<5
9/1/2006	<5
9/1/2007	<5
9/1/2008	<5
9/1/2009	<5
9/1/2010	<2
9/1/2011	<2
9/1/2012	<5
9/1/2013	1.6
9/1/2014	<1
9/1/2015	<1
9/26/2016	1.3
9/14/2017	1.7
9/12/2018	2.2
9/16/2019	2.1 (J,B)
9/1/2020	3.3 (J,B)
9/27/2021	3.9 (J)
9/20/2022	3.6 (J)
9/20/2023	3.6 (J)

EPA Screening (suspected outliers for Rosner's Test)



n = 24

Rosner's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 26.97, std. dev. 11.87, critical Tn 2.644

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9408
Critical = 0.916 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Chloride Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

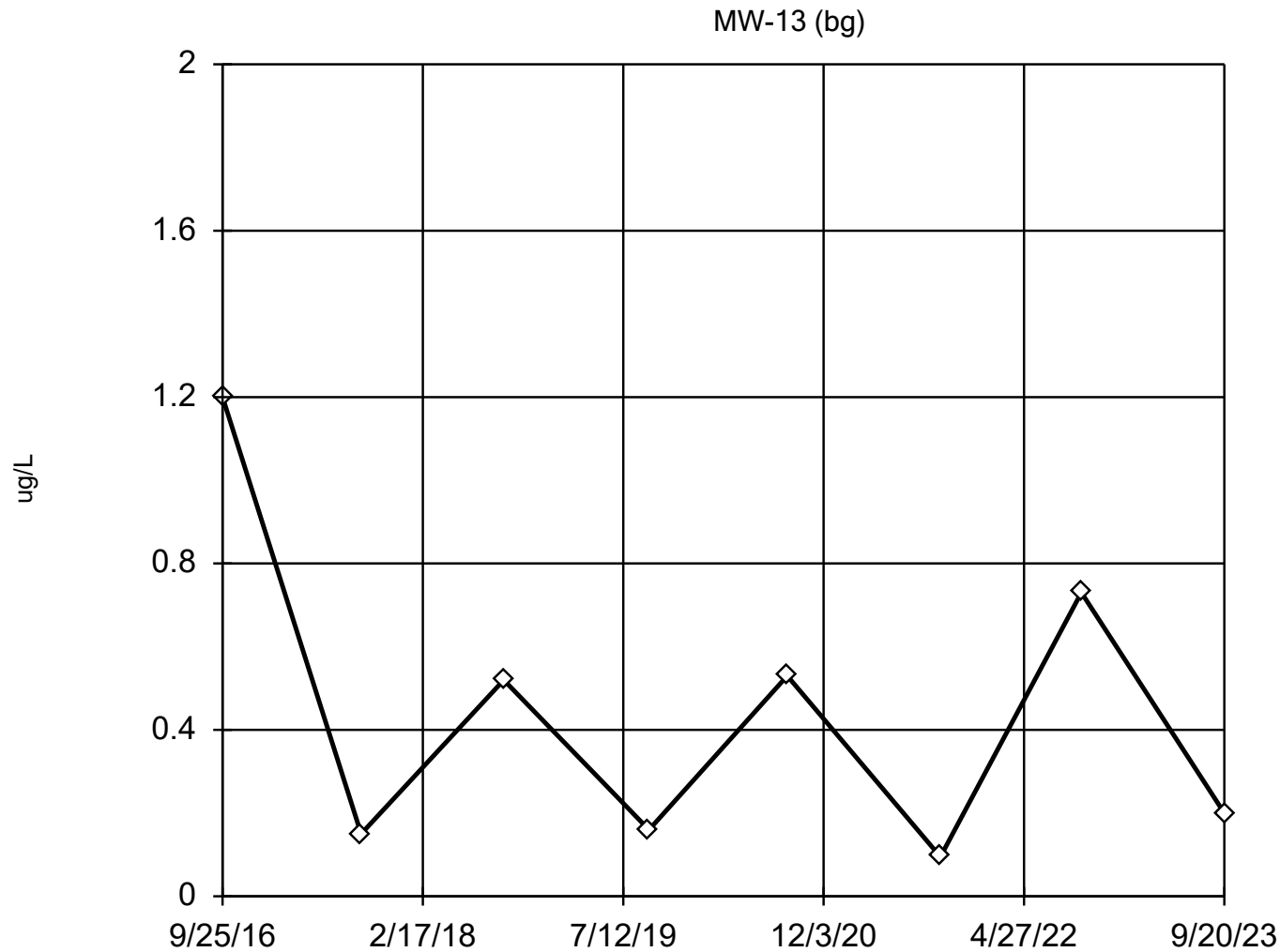
EPA 1989 Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/1/1999	46
9/1/2000	19.5
9/1/2001	18.3
9/1/2002	11.9
9/1/2003	14.5
9/1/2004	27.1
9/1/2005	18.5
9/1/2006	14.6
9/1/2007	40.6
9/1/2008	51.9
9/1/2009	43.4
9/1/2010	44.5
9/1/2011	30
9/1/2012	33
9/1/2013	19.7
9/1/2014	41.3
9/1/2015	26.1
9/26/2016	30.1
9/13/2017	19.8
9/12/2018	27.4
9/17/2019	17 (B)
9/1/2020	15 (B)
9/20/2022	17
9/21/2023	20

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.4481, std. dev. 0.3808, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8609
Critical = 0.818
The distribution was found to be normally distributed.

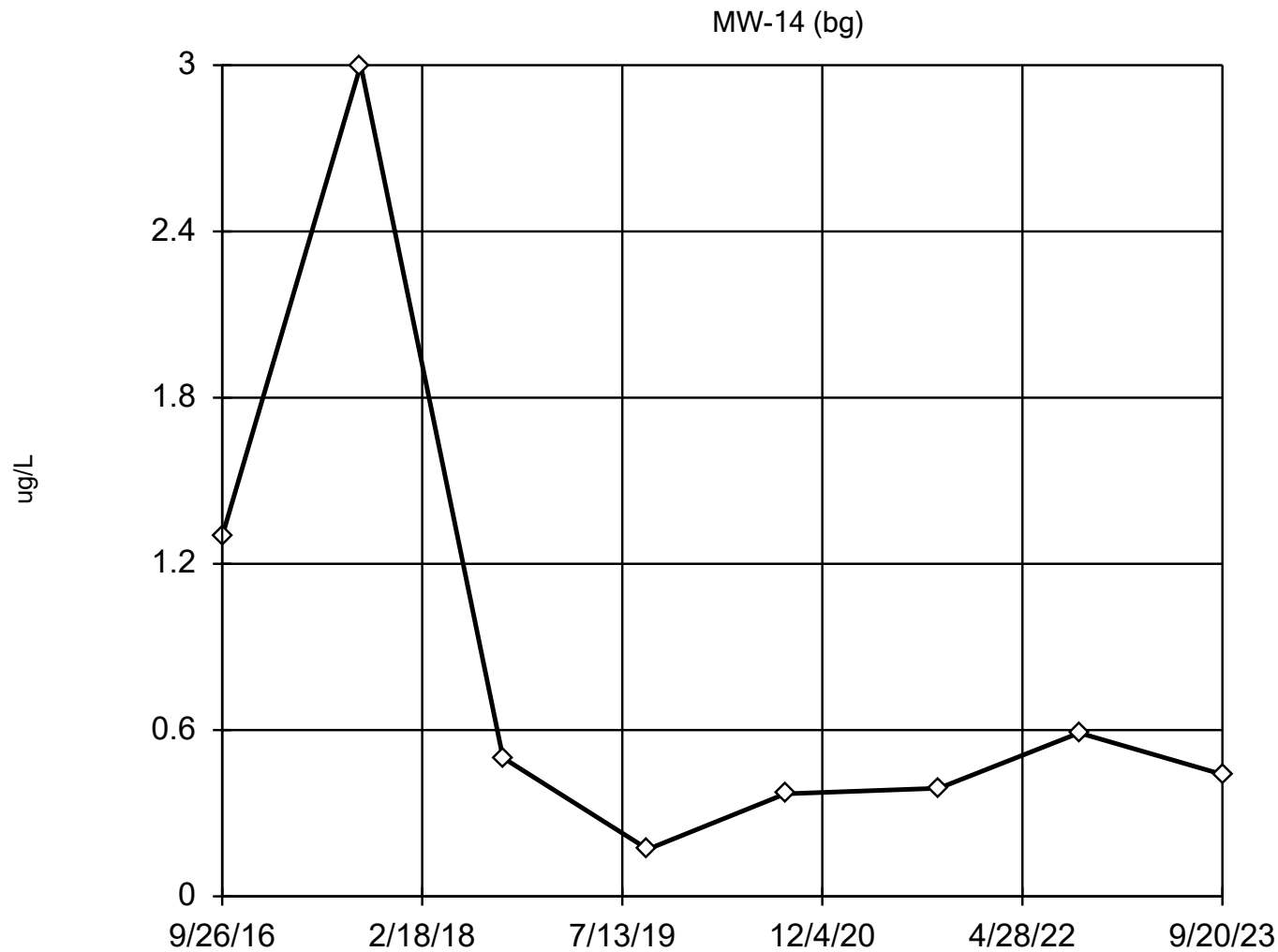
Constituent: Cobalt Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)	
9/25/2016	1.2
9/13/2017	0.15 (J)
9/11/2018	0.52 (J)
9/16/2019	0.16 (J)
9/2/2020	0.53
9/27/2021	<0.19
9/21/2022	0.73
9/20/2023	0.2 (J)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.845, std. dev. 0.9325, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9222
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Cobalt Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

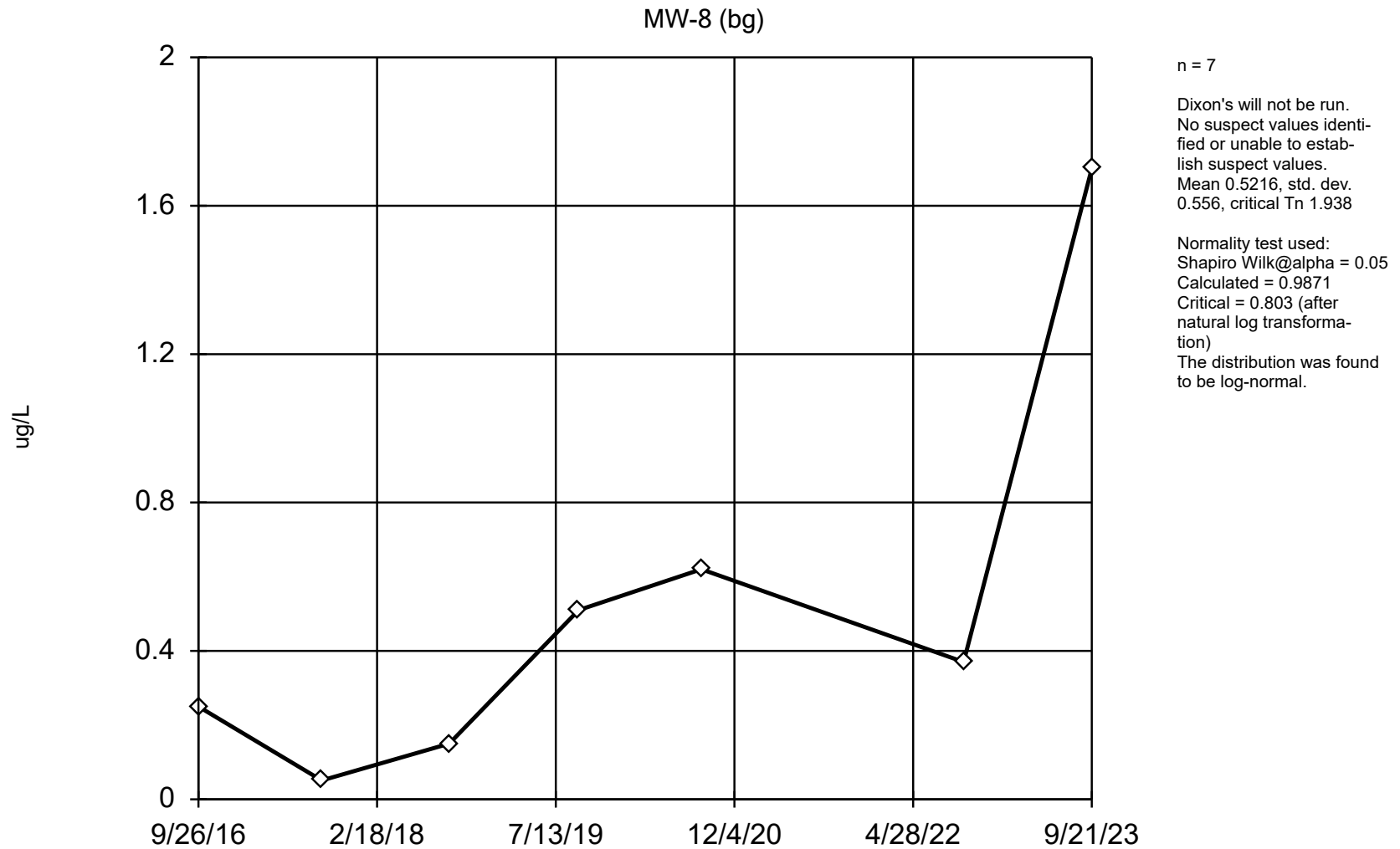
EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	1.3
9/14/2017	3
9/12/2018	0.5 (J)
9/16/2019	0.17 (J)
9/1/2020	0.37 (J)
9/27/2021	0.39 (J)
9/20/2022	0.59
9/20/2023	0.44 (J)

EPA Screening (suspected outliers for Dixon's Test)



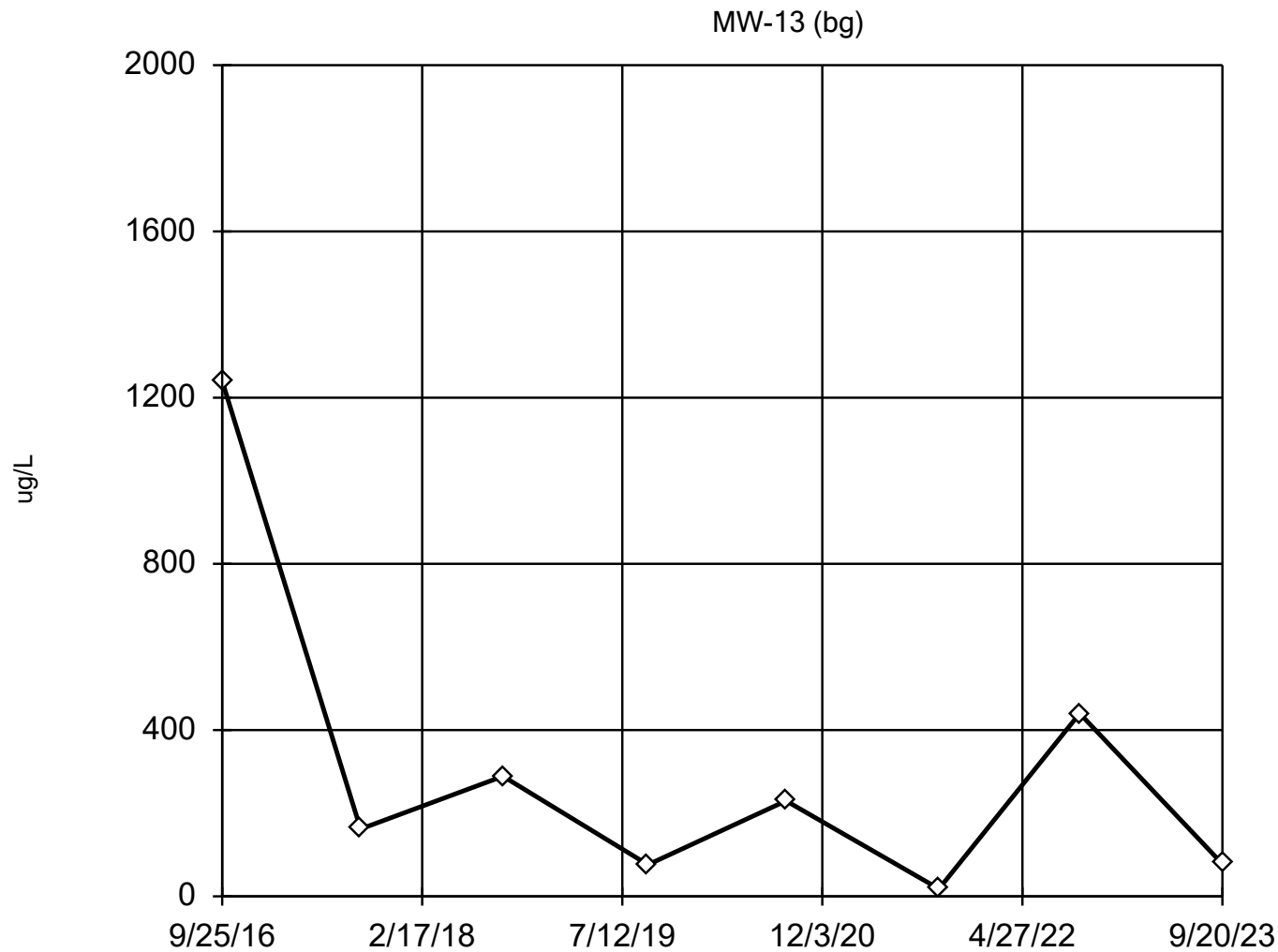
Constituent: Cobalt Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)	
9/26/2016	<0.5
9/13/2017	0.051 (J)
9/12/2018	0.15 (J)
9/17/2019	0.51
9/1/2020	0.62
9/20/2022	0.37 (J)
9/21/2023	1.7

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 316.6, std. dev. 397.1, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9826
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Iron Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

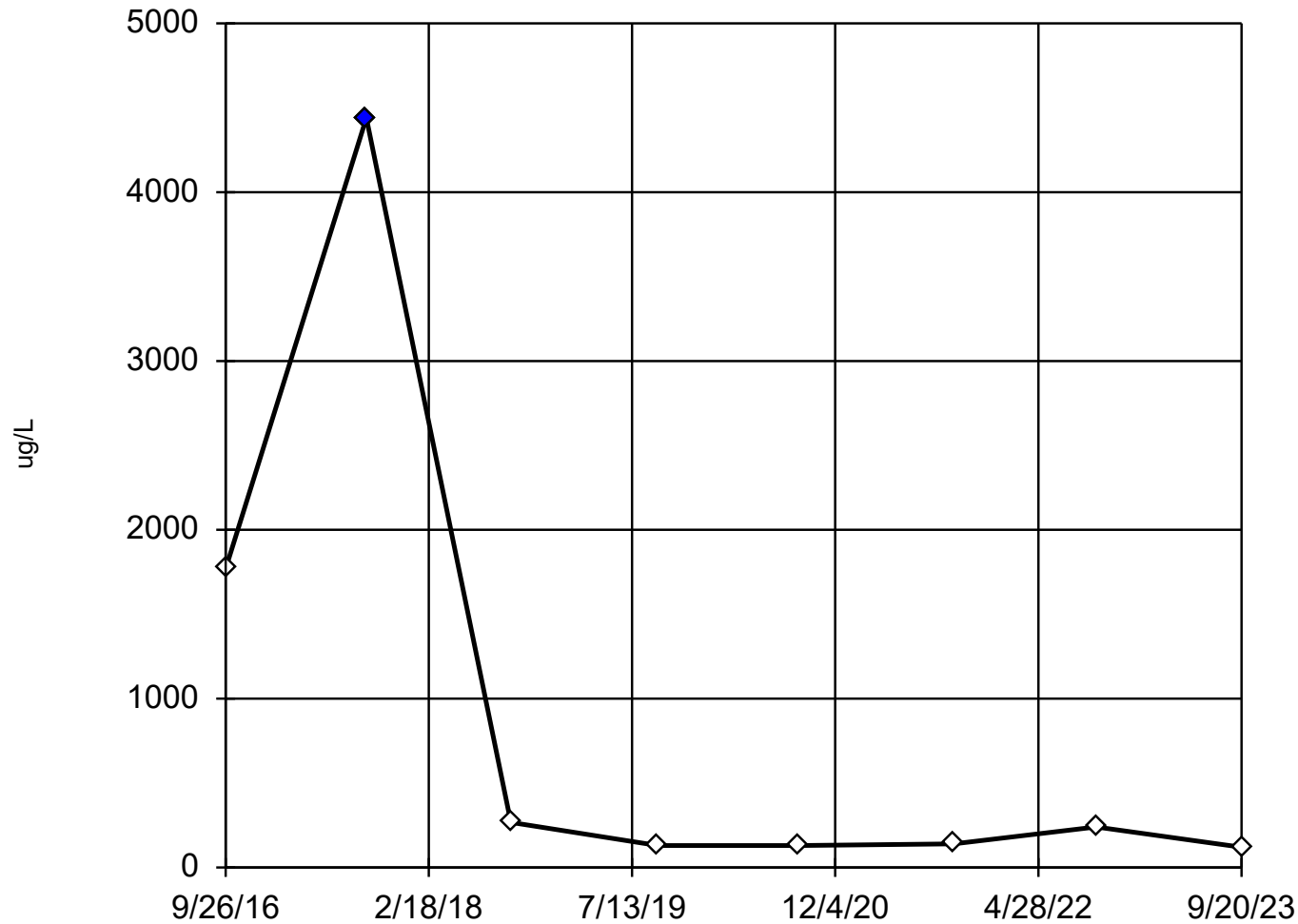
EPA 1989 Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)	
9/25/2016	1240
9/13/2017	162
9/11/2018	289
9/16/2019	76 (J)
9/2/2020	230
9/27/2021	<36
9/21/2022	440
9/20/2023	78 (J)

Tukey's Outlier Screening

MW-14 (bg)



n = 8

Outlier is drawn as solid.
Tukey's method used in
lieu of parametric test
because the Shapiro Wilk
normality test failed
at the 0.05 alpha level.

High cutoff = 3684, low
cutoff = -2536, based
on IQR multiplier of 3.

Constituent: Iron Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

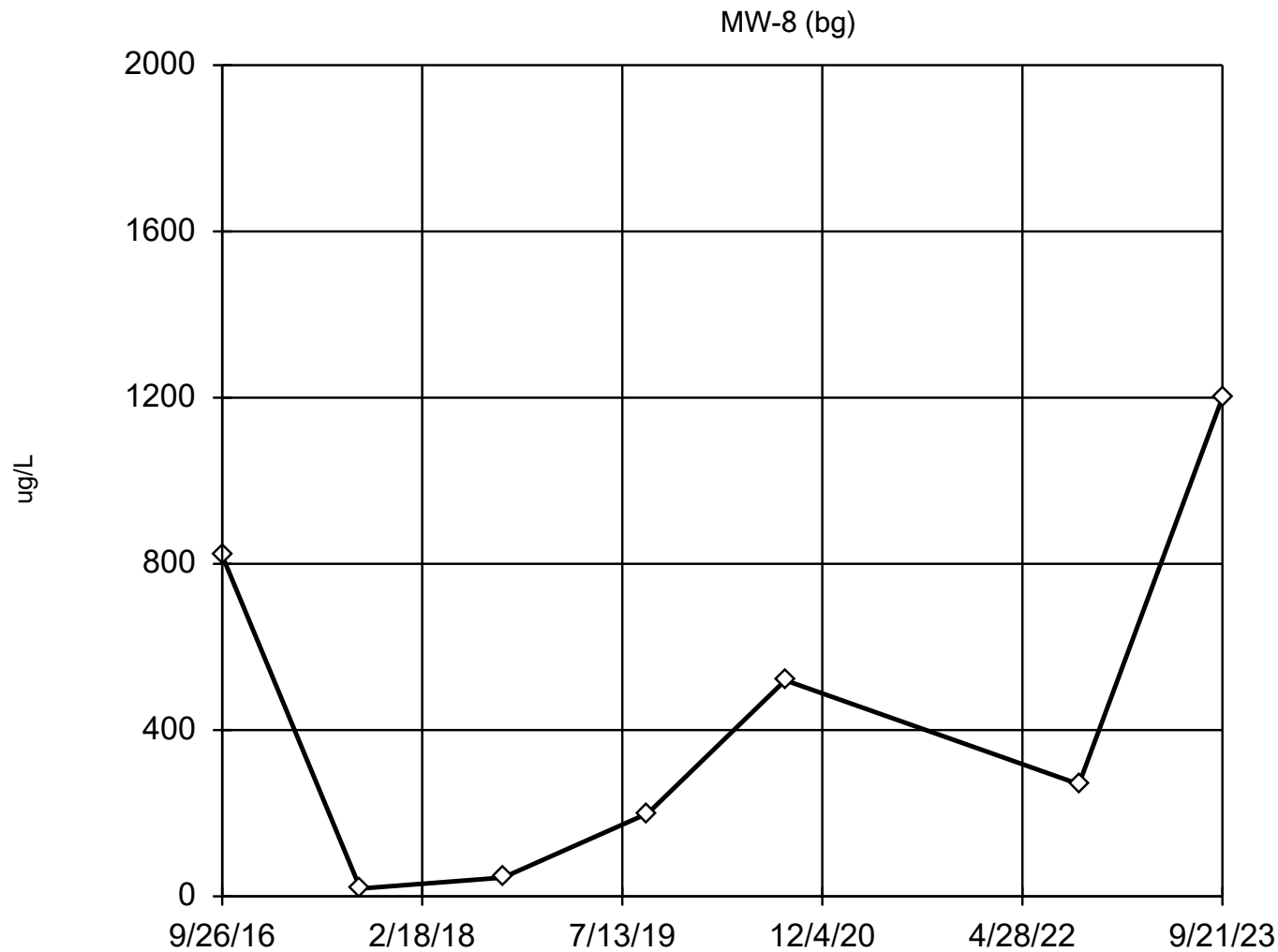
Tukey's Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	1770
9/14/2017	4440 (O)
9/12/2018	267
9/16/2019	130
9/1/2020	130
9/27/2021	140
9/20/2022	240
9/20/2023	120

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 439.1, std. dev. 437.5, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8989
Critical = 0.803
The distribution was found to be normally distributed.

Constituent: Iron Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

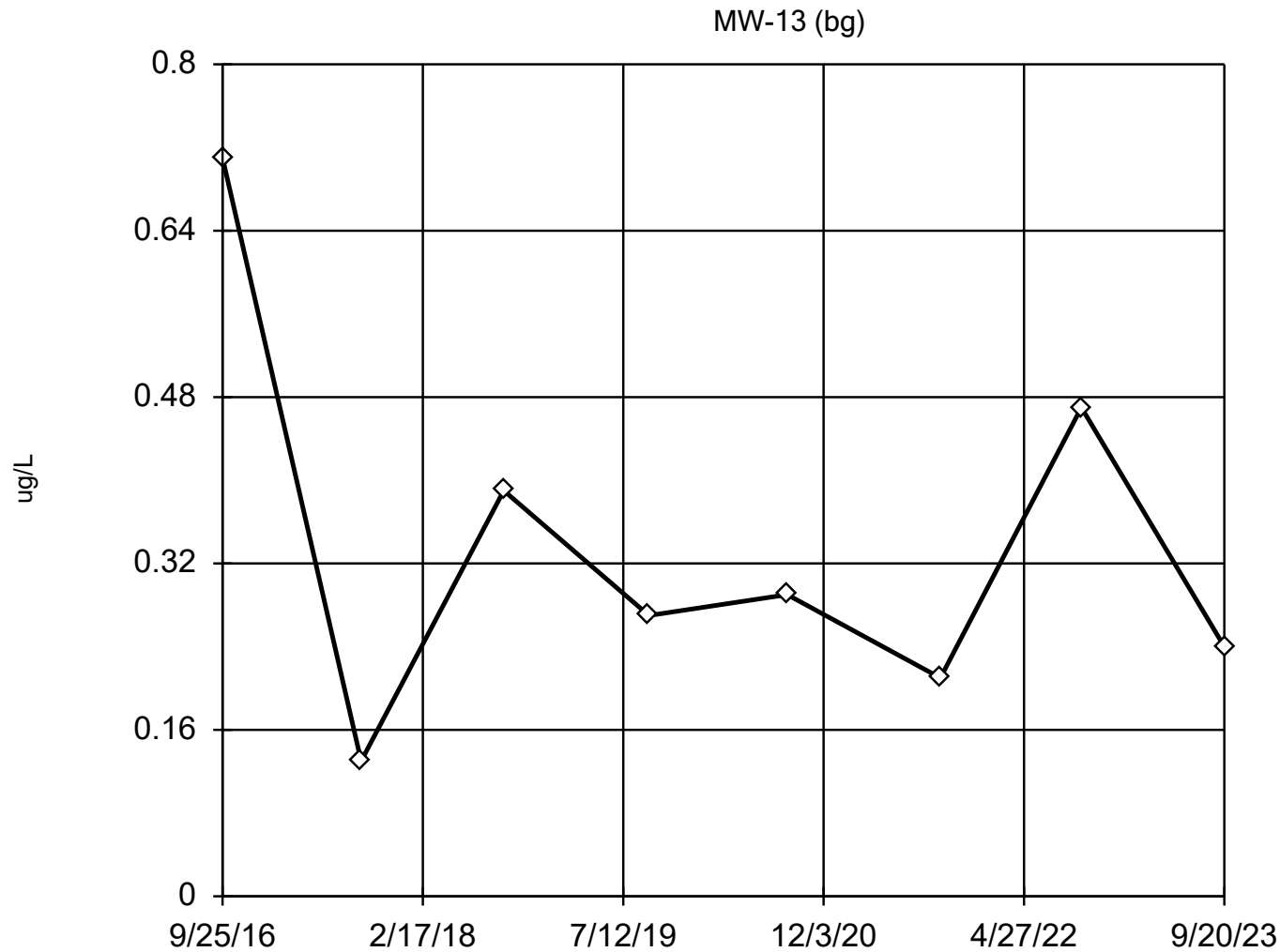
EPA 1989 Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	820
9/13/2017	18.7 (J)
9/12/2018	45.2 (J)
9/17/2019	200
9/1/2020	520
9/20/2022	270
9/21/2023	1200

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.3387, std. dev. 0.1831, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9038
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Lead Analysis Run 10/30/2023 11:22 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

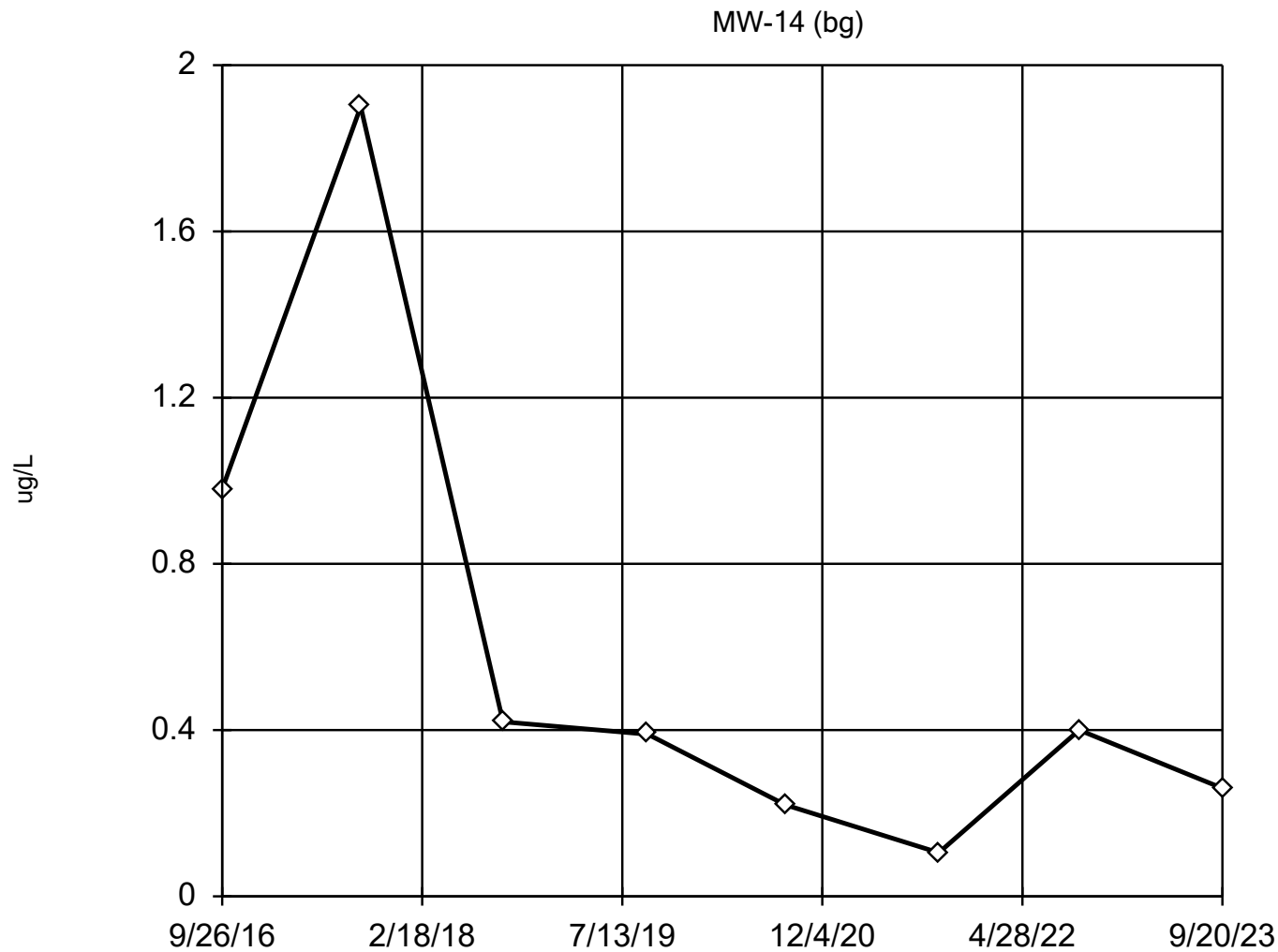
EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	0.71 (J)
9/13/2017	0.13 (J)
9/11/2018	0.39 (J)
9/16/2019	<0.27
9/2/2020	0.29 (J)
9/27/2021	<0.21
9/21/2022	0.47 (J)
9/20/2023	<0.24 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.5844, std. dev. 0.5921, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9591
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

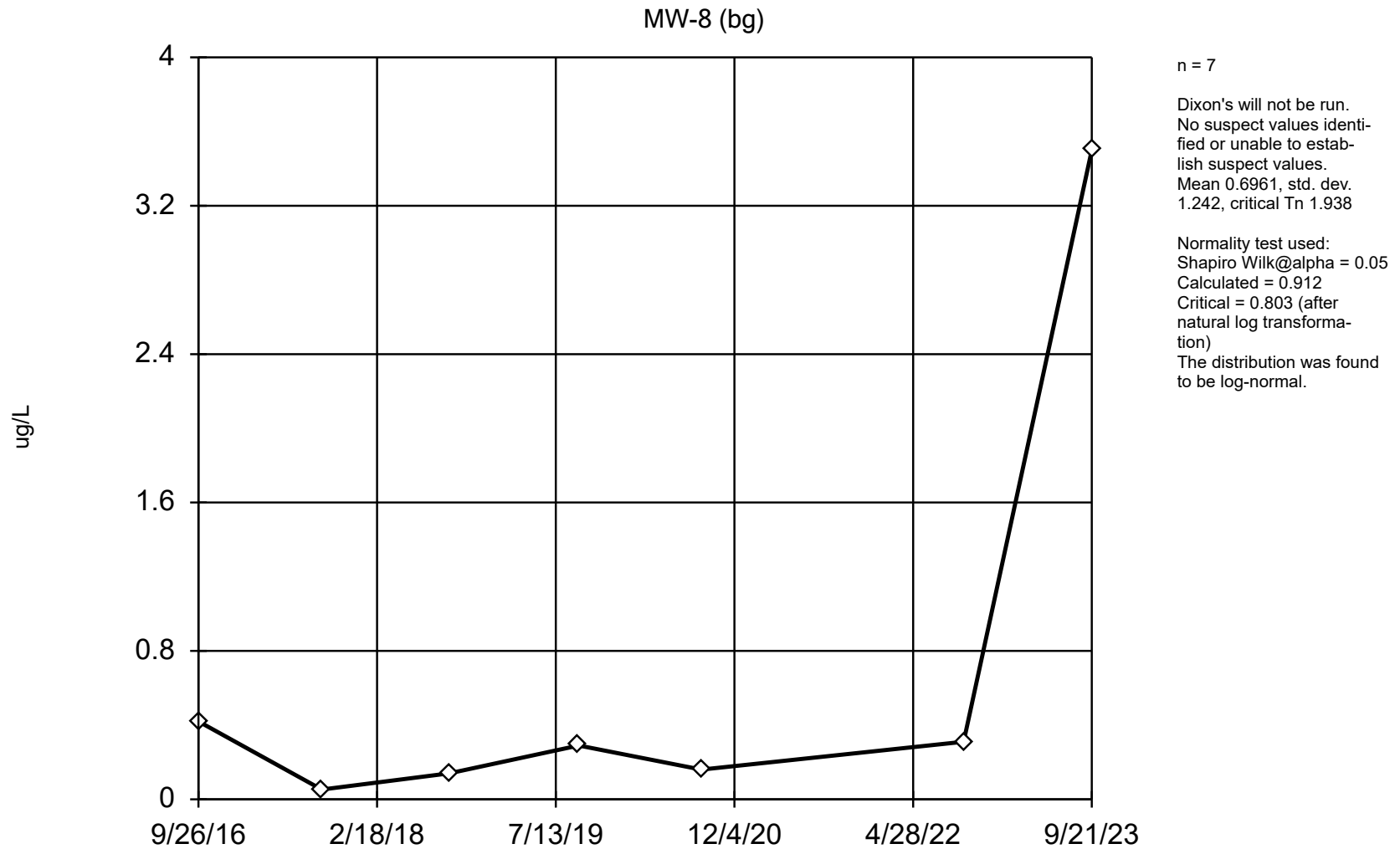
Constituent: Lead Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)	
9/26/2016	0.98 (J)
9/14/2017	1.9
9/12/2018	0.42 (J)
9/16/2019	0.39 (J)
9/1/2020	0.22 (J)
9/27/2021	<0.21
9/20/2022	0.4 (J)
9/20/2023	0.26 (J)

EPA Screening (suspected outliers for Dixon's Test)



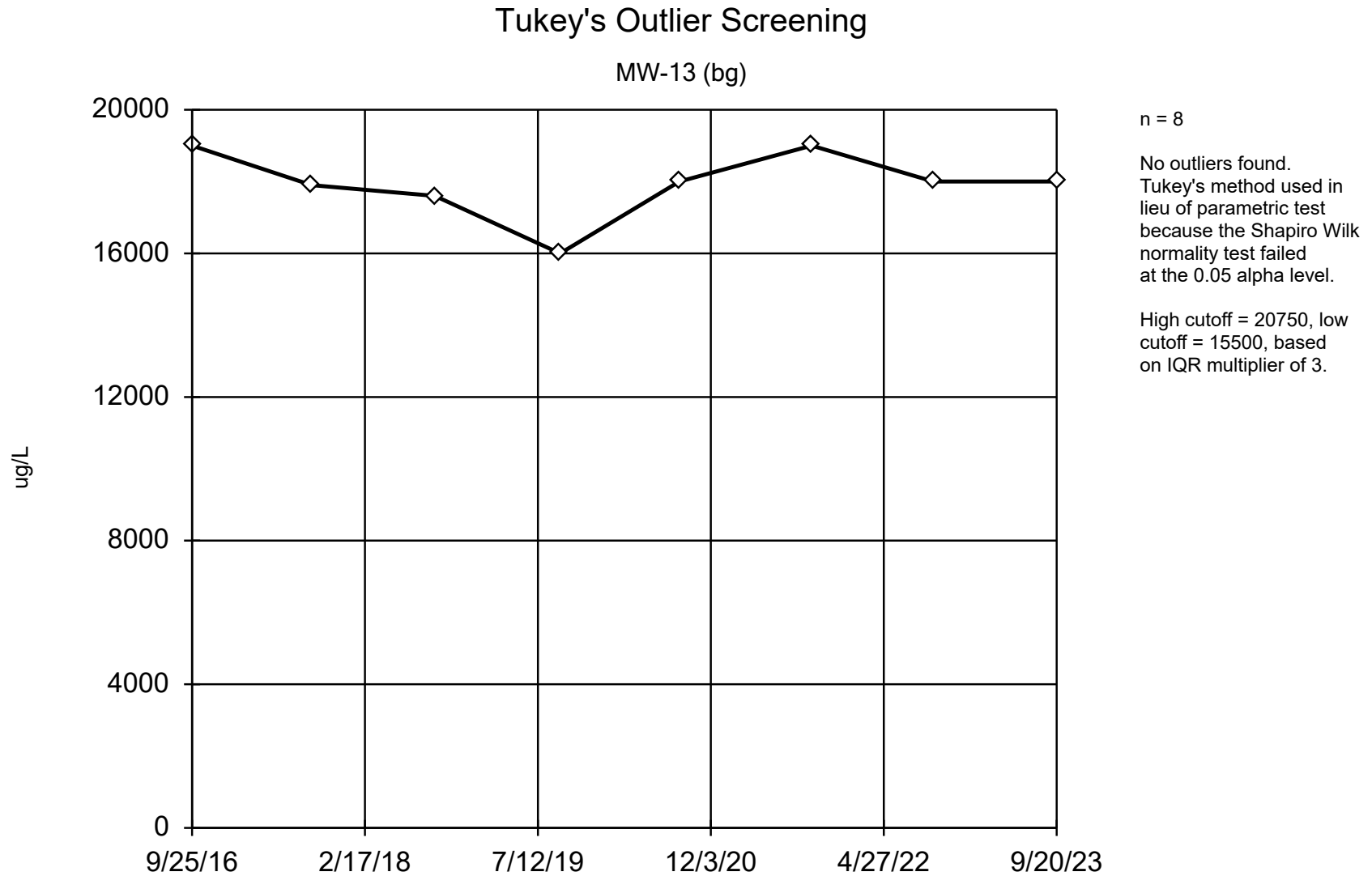
Constituent: Lead Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	0.42 (J)
9/13/2017	0.053 (J)
9/12/2018	0.14 (J)
9/17/2019	0.29 (J)
9/1/2020	0.16 (J)
9/20/2022	0.31 (J)
9/21/2023	3.5



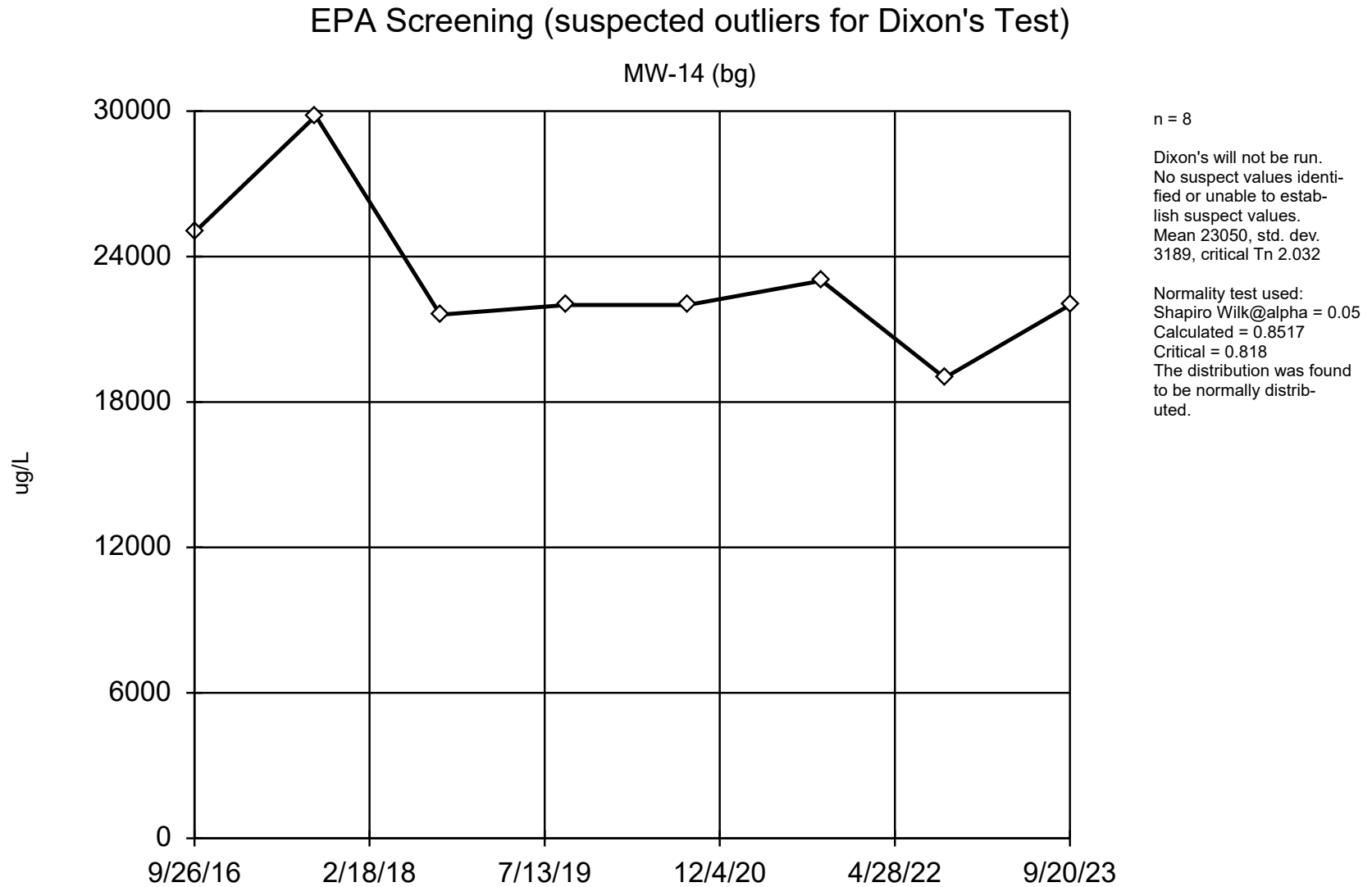
Constituent: Magnesium Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Tukey's Outlier Screening

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	19000
9/13/2017	17900
9/11/2018	17600
9/16/2019	16000
9/2/2020	18000
9/27/2021	19000
9/21/2022	18000
9/20/2023	18000



Constituent: Magnesium Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

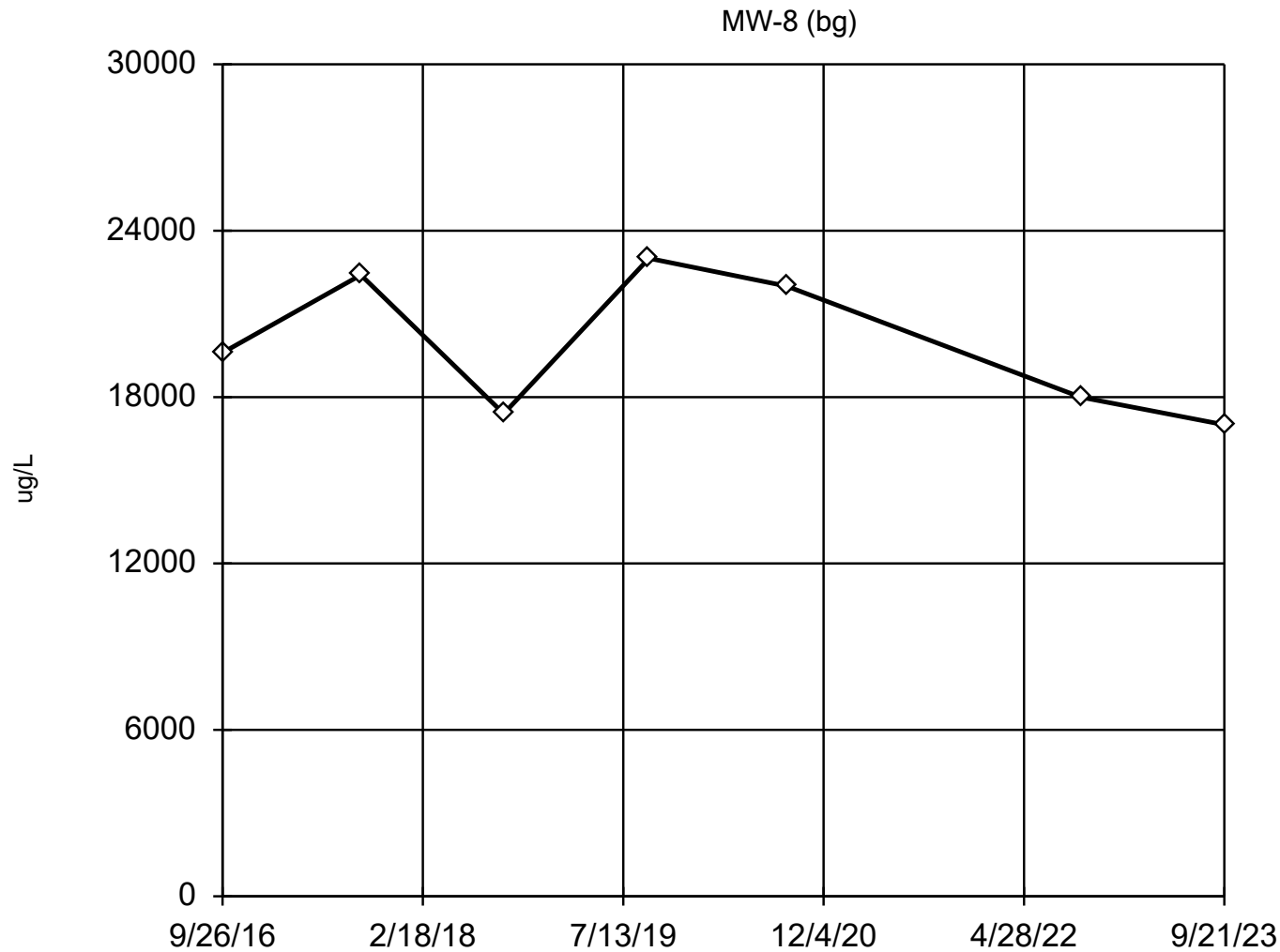
EPA 1989 Outlier Screening

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	25000
9/14/2017	29800
9/12/2018	21600
9/16/2019	22000
9/1/2020	22000
9/27/2021	23000
9/20/2022	19000
9/20/2023	22000

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 19914, std. dev. 2537, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8756
Critical = 0.803
The distribution was found to be normally distributed.

Constituent: Magnesium Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

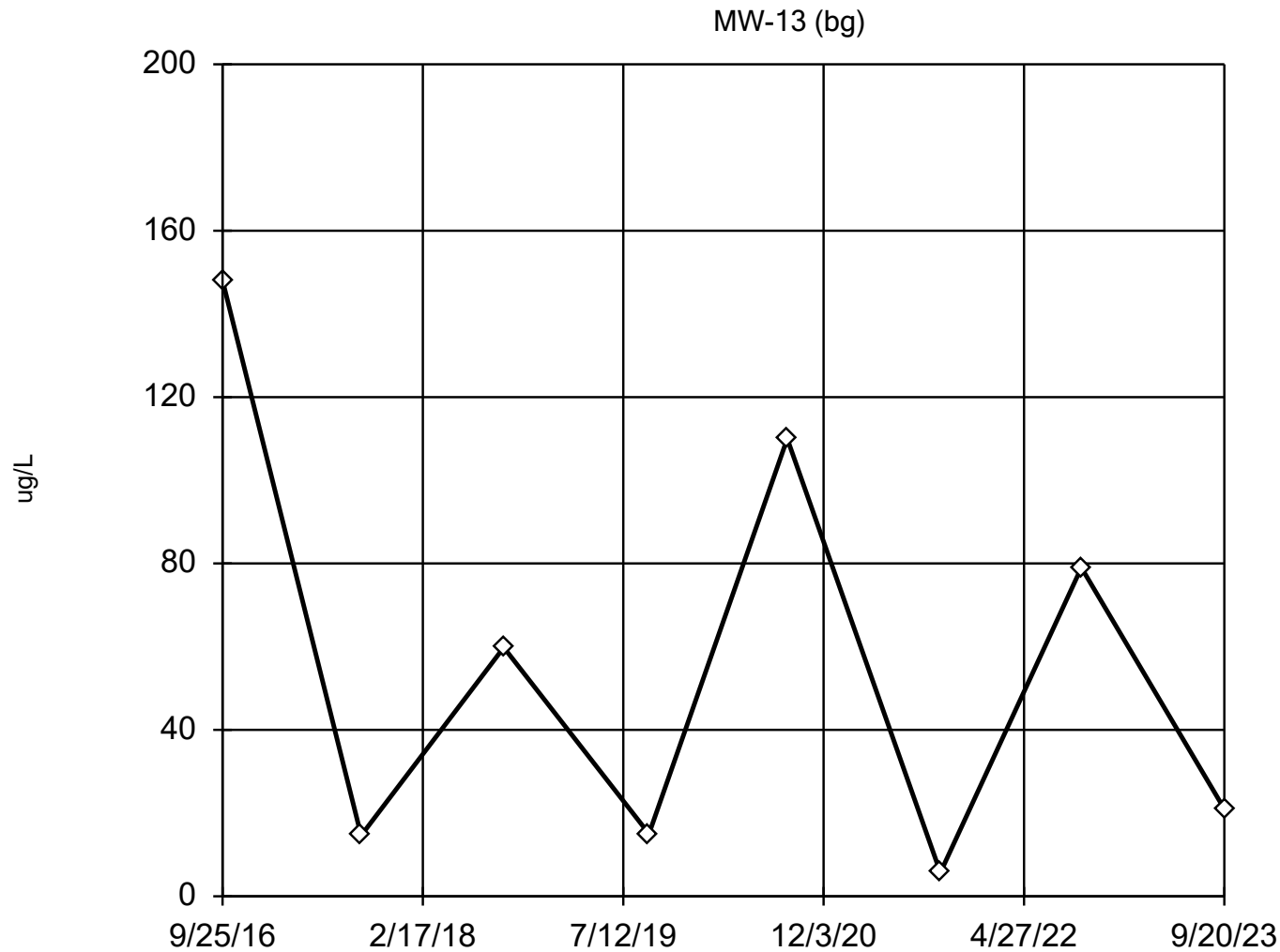
EPA 1989 Outlier Screening

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	19600
9/13/2017	22400
9/12/2018	17400
9/17/2019	23000
9/1/2020	22000
9/20/2022	18000
9/21/2023	17000

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 56.64, std. dev. 52.2, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8812
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Manganese Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

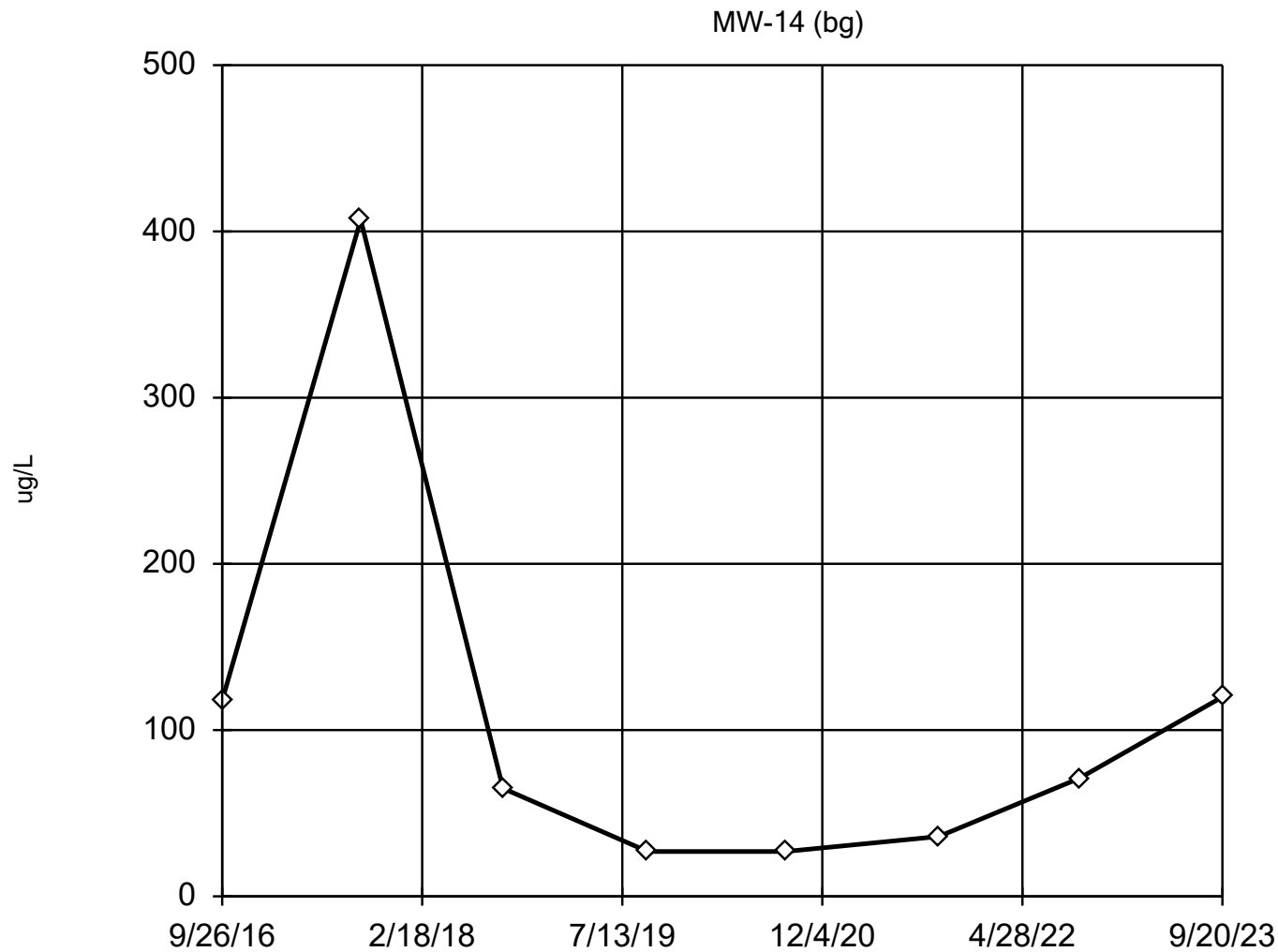
EPA 1989 Outlier Screening

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/25/2016	148
9/13/2017	14.6
9/11/2018	59.8
9/16/2019	15
9/2/2020	110
9/27/2021	5.7 (J)
9/21/2022	79
9/20/2023	21

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 108.9, std. dev. 126, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9137
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Manganese Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

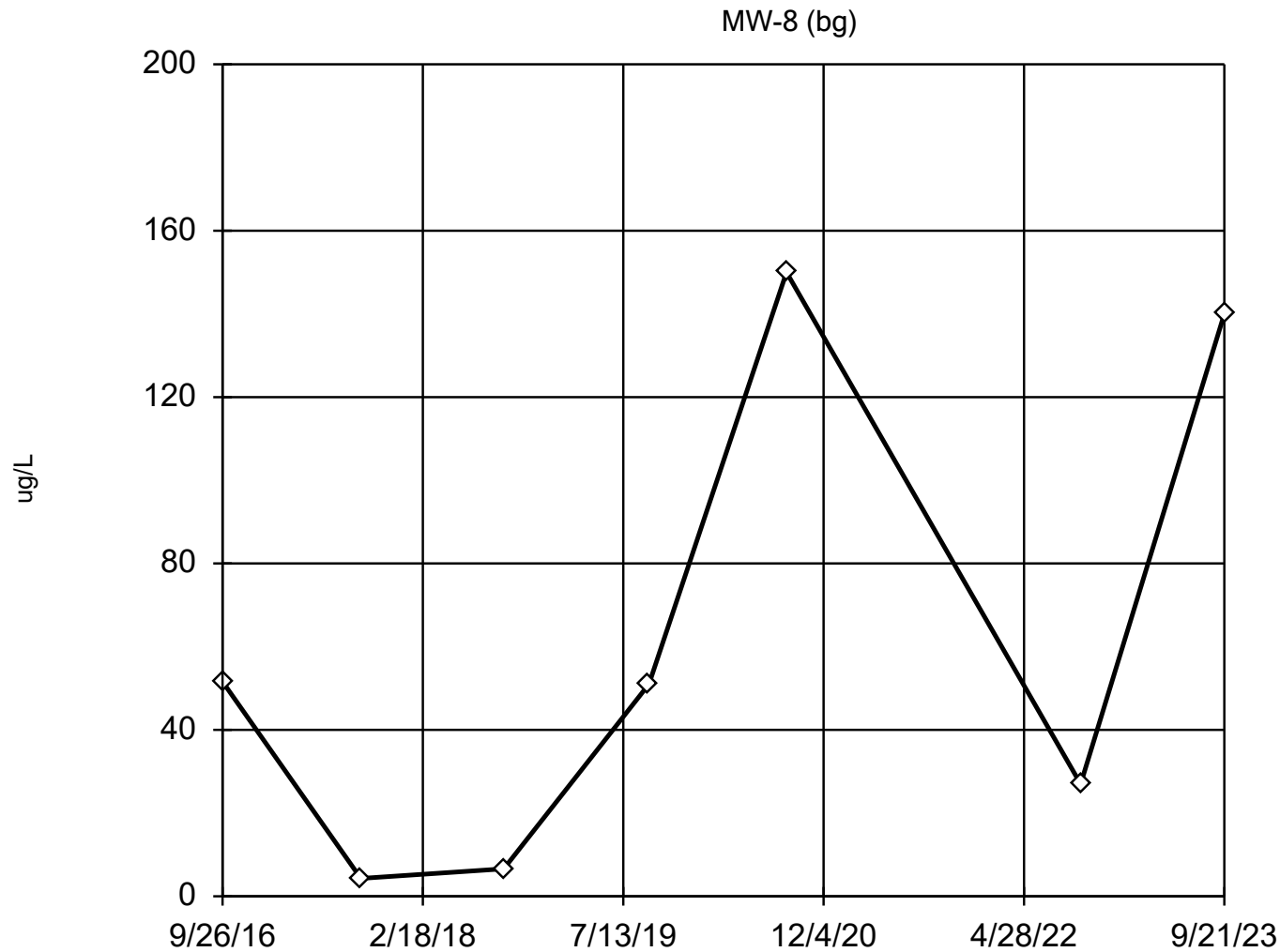
EPA 1989 Outlier Screening

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/26/2016	118
9/14/2017	407
9/12/2018	64.9
9/16/2019	27
9/1/2020	27
9/27/2021	36
9/20/2022	71
9/20/2023	120

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 61.5, std. dev. 60.11, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8369
Critical = 0.803
The distribution was found to be normally distributed.

Constituent: Manganese Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

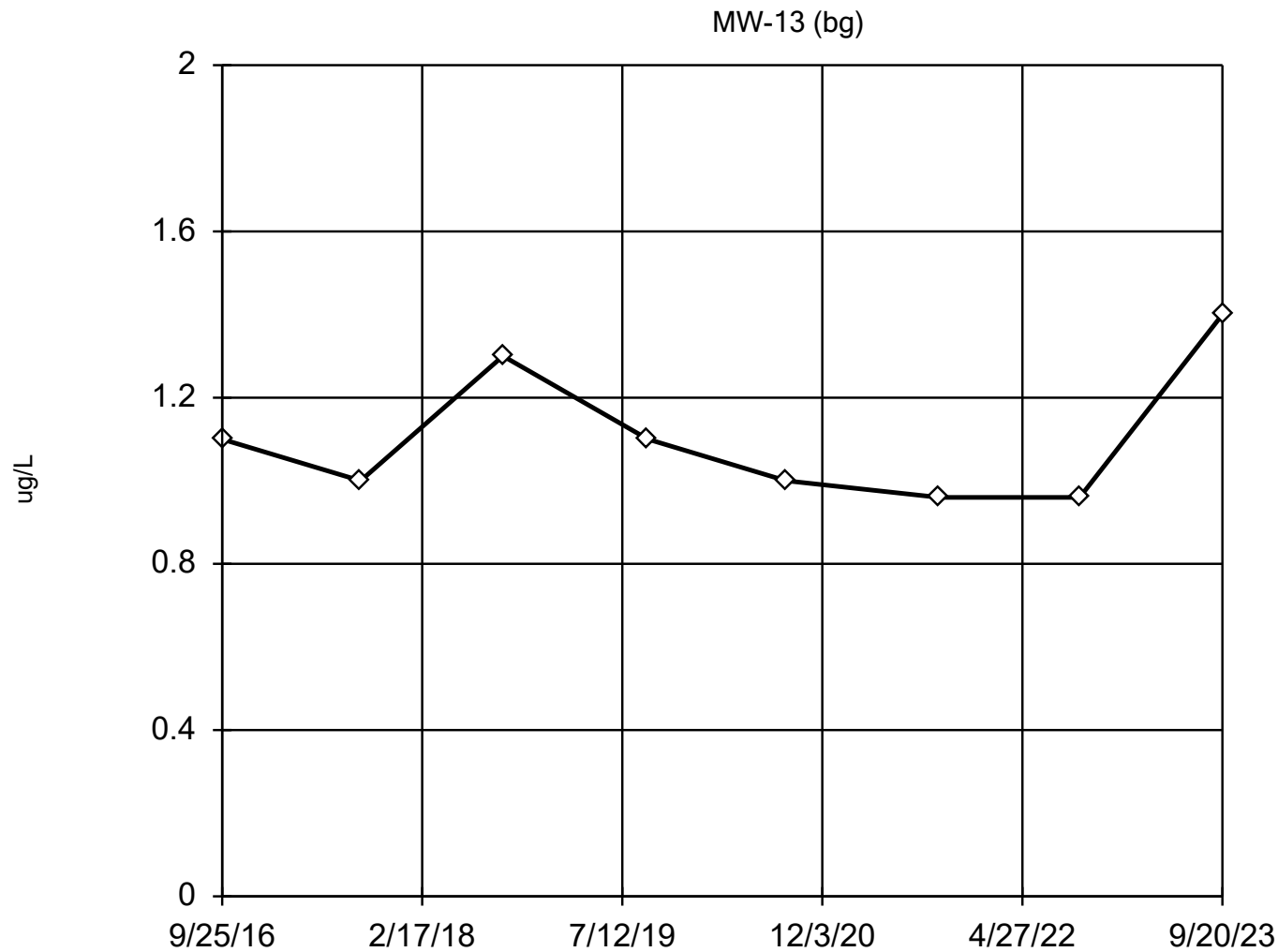
EPA 1989 Outlier Screening

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/26/2016	51.6
9/13/2017	4.3
9/12/2018	6.6
9/17/2019	51
9/1/2020	150
9/20/2022	27
9/21/2023	140

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1.102, std. dev. 0.1644, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8328
Critical = 0.818
The distribution was found to be normally distributed.

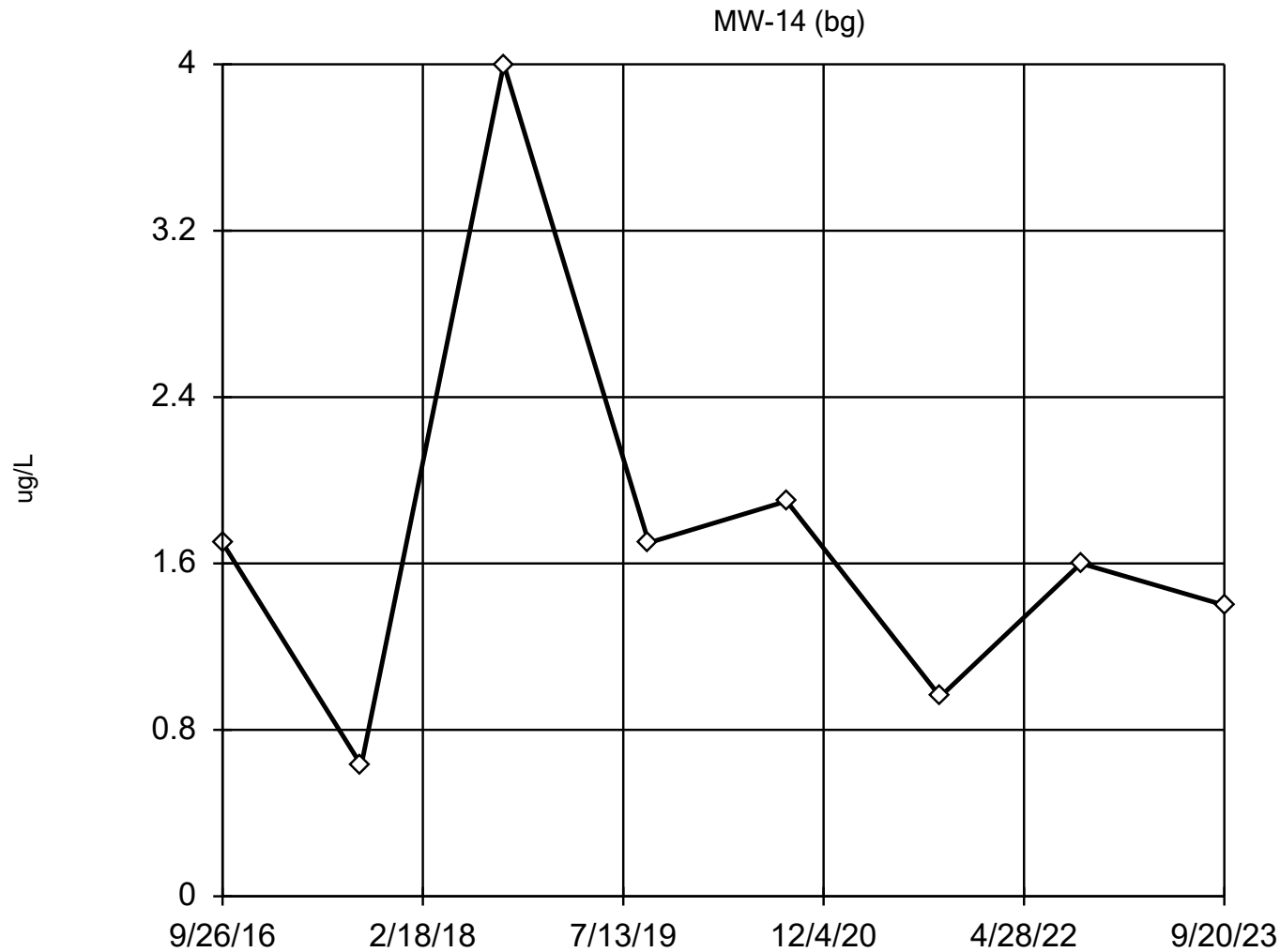
Constituent: Selenium Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)	
9/25/2016	1.1
9/13/2017	1
9/11/2018	1.3
9/16/2019	1.1 (J)
9/2/2020	<1
9/27/2021	<0.96
9/21/2022	<0.96
9/20/2023	<1.4 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1.736, std. dev. 1.008, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9377
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

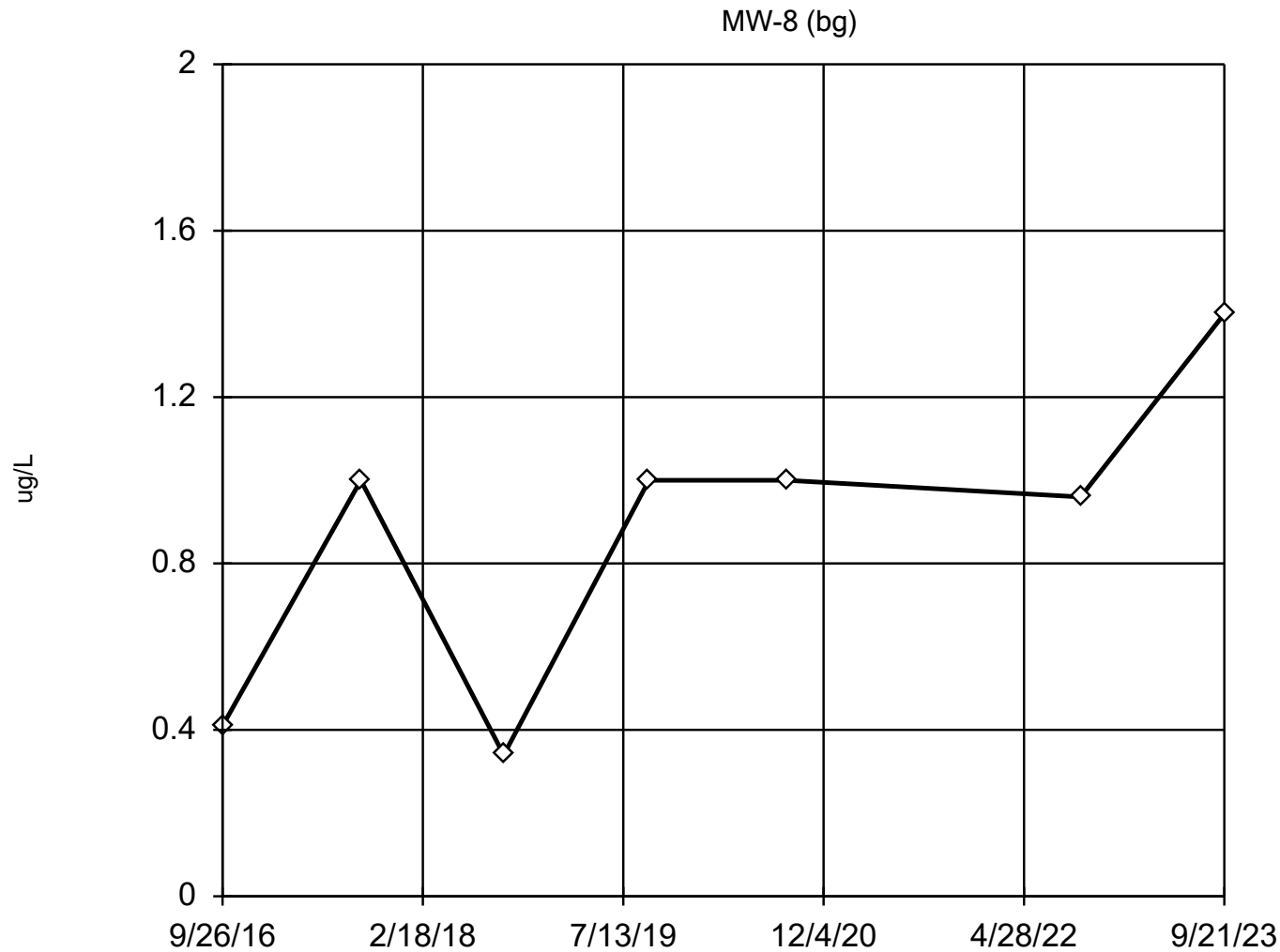
Constituent: Selenium Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)	
9/26/2016	1.7
9/14/2017	0.63 (J)
9/12/2018	4
9/16/2019	1.7 (J)
9/1/2020	1.9 (J)
9/27/2021	<0.96
9/20/2022	1.6 (J)
9/20/2023	<1.4 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.8729, std. dev. 0.3724, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8583
Critical = 0.803
The distribution was found to be normally distributed.

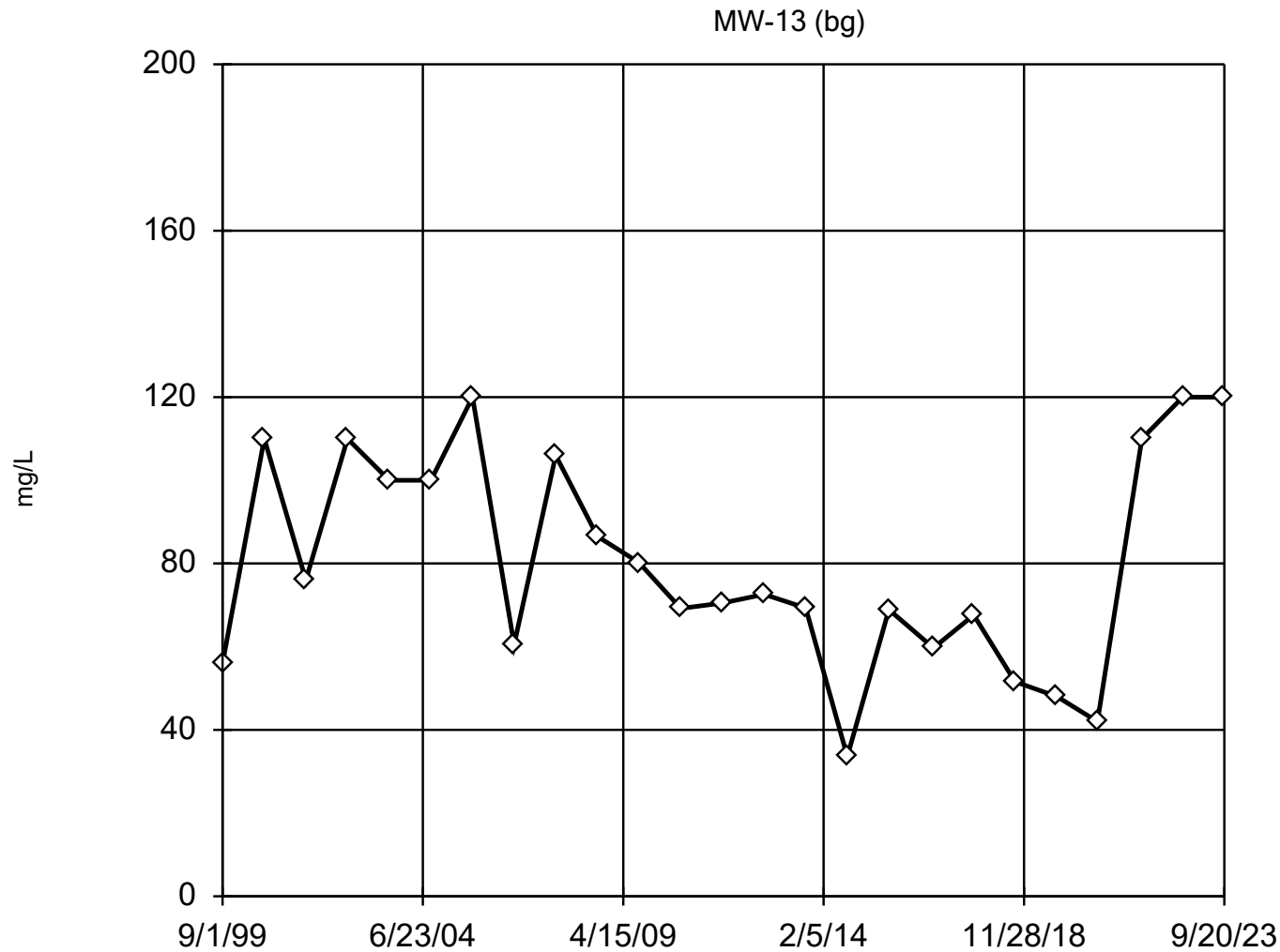
Constituent: Selenium Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-8 (bg)
9/26/2016	0.41 (J)
9/13/2017	1
9/12/2018	0.34 (J)
9/17/2019	<1
9/1/2020	<1
9/20/2022	<0.96
9/21/2023	<1.4 (U)

EPA Screening (suspected outliers for Rosner's Test)



n = 25

Rosner's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 80.33, std. dev. 26.2, critical Tn 2.663

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9362
Critical = 0.918
The distribution was found to be normally distributed.

Constituent: Sulfate Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

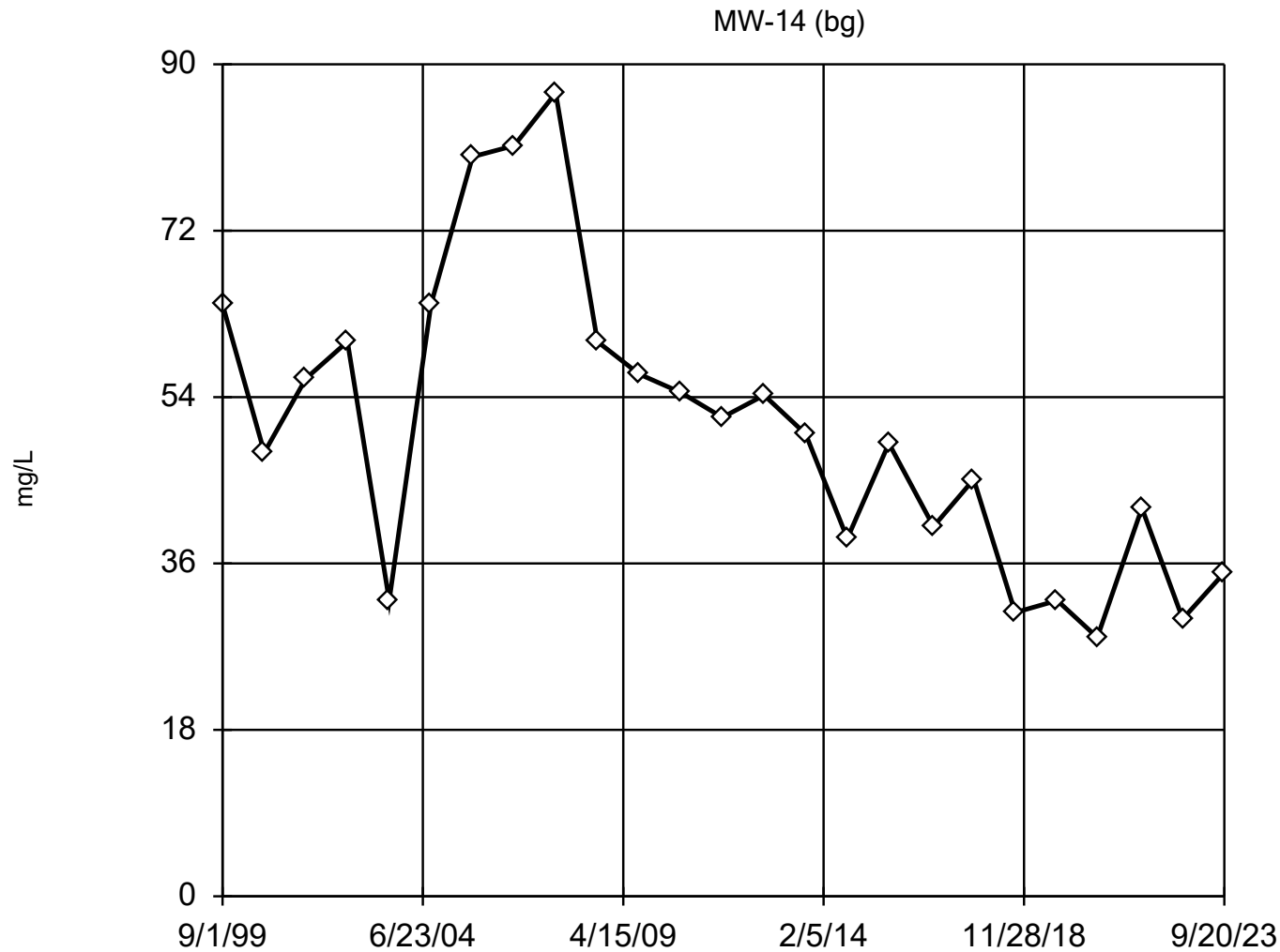
EPA 1989 Outlier Screening

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-13 (bg)

9/1/1999	56
9/1/2000	110
9/1/2001	76
9/1/2002	110
9/1/2003	100
9/1/2004	100
9/1/2005	120
9/1/2006	60.5
9/1/2007	106
9/1/2008	86.5
9/1/2009	80.2
9/1/2010	69.2
9/1/2011	70.5
9/1/2012	72.6
9/1/2013	69.3
9/1/2014	33.6
9/1/2015	68.9
9/25/2016	59.7
9/13/2017	67.6
9/11/2018	51.6
9/16/2019	48
9/2/2020	42
9/27/2021	110
9/21/2022	120
9/20/2023	120

EPA Screening (suspected outliers for Rosner's Test)



EPA 1989 Outlier Screening

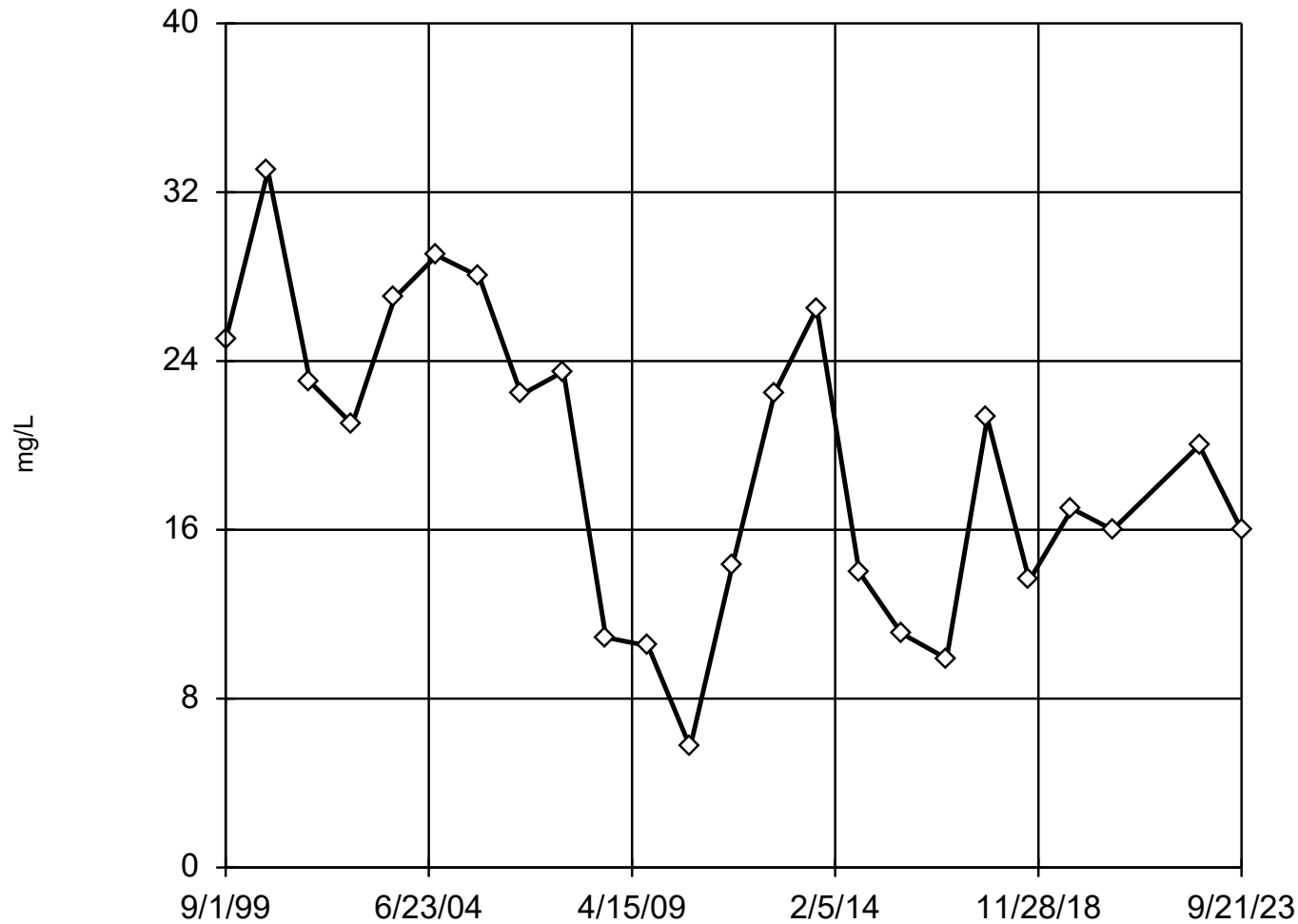
Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-14 (bg)

9/1/1999	64
9/1/2000	48
9/1/2001	56
9/1/2002	60
9/1/2003	32
9/1/2004	64
9/1/2005	80
9/1/2006	81.2
9/1/2007	86.9
9/1/2008	60
9/1/2009	56.5
9/1/2010	54.5
9/1/2011	51.8
9/1/2012	54.2
9/1/2013	50
9/1/2014	38.7
9/1/2015	49
9/26/2016	40
9/14/2017	45.1
9/12/2018	30.7
9/16/2019	32
9/1/2020	28
9/27/2021	42
9/20/2022	30
9/20/2023	35

Rosner's Outlier Test

MW-8 (bg)



n = 24

No statistical outliers.

k = 1

r = 1.94

Tabulated value = 2.824

Alpha = 0.01

Normality test used:

Shapiro Wilk@alpha = 0.05

Calculated = 0.9595

Critical = 0.914

The distribution was found to be normally distributed.

Constituent: Sulfate Analysis Run 10/30/2023 11:23 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Rosner's Outlier Test

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 11:24 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-8 (bg)

9/1/1999	25
9/1/2000	33
9/1/2001	23
9/1/2002	21
9/1/2003	27
9/1/2004	29
9/1/2005	28
9/1/2006	22.4
9/1/2007	23.5
9/1/2008	10.9
9/1/2009	10.5
9/1/2010	5.7
9/1/2011	14.3
9/1/2012	22.5
9/1/2013	26.5
9/1/2014	14
9/1/2015	11.1
9/26/2016	9.9
9/13/2017	21.3
9/12/2018	13.6
9/17/2019	17
9/1/2020	16
9/20/2022	20
9/21/2023	16



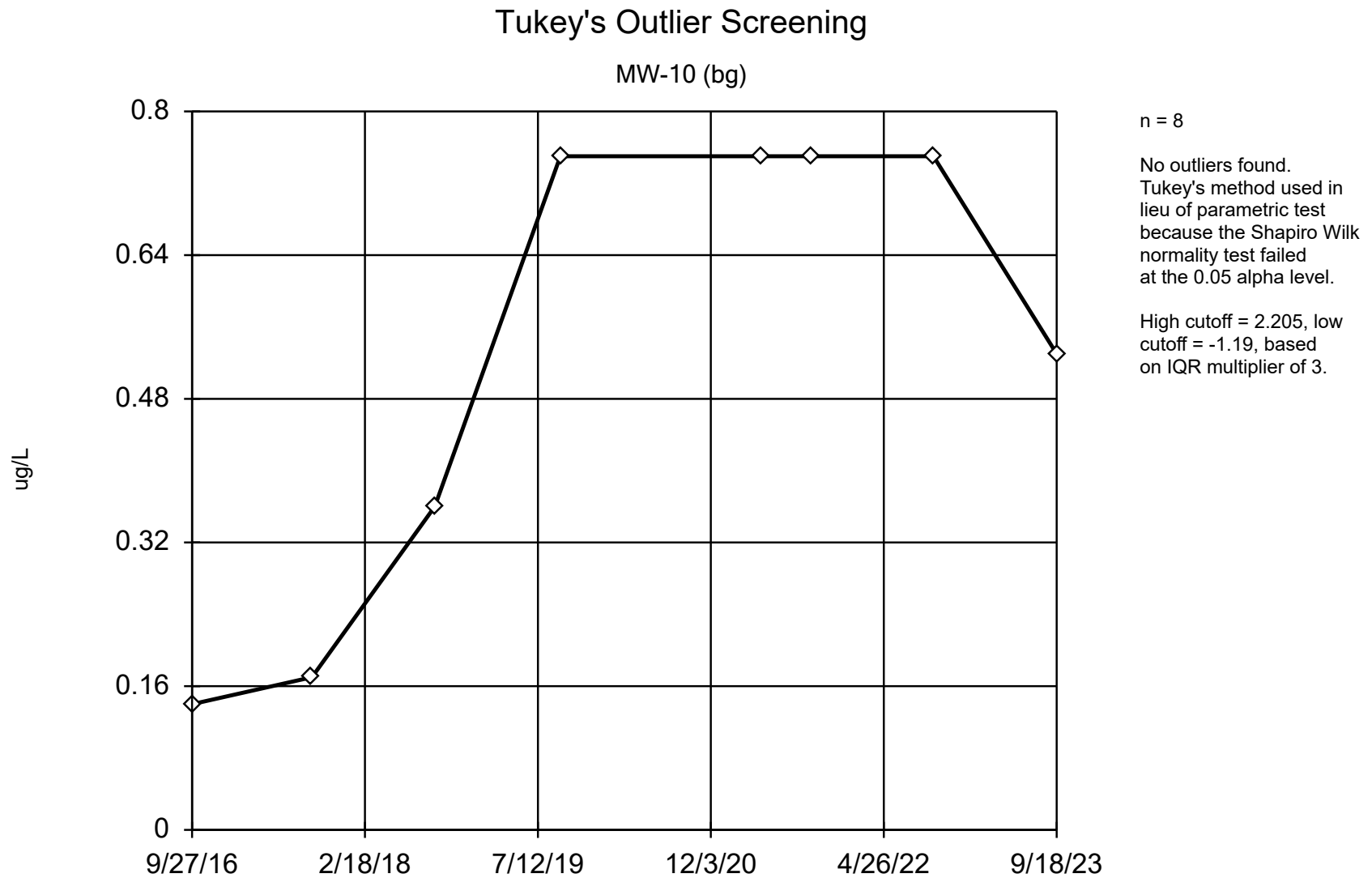
Attachment E4

Outlier Analysis Results - East

Outlier Analysis

Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input Printed 10/30/2023, 12:20 PM

<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Date(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Arsenic (ug/L)	MW-10 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.525	0.2683	unknown	ShapiroWilk
Arsenic (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.5962	0.2264	normal	ShapiroWilk
Barium (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	145.1	11.79	normal	ShapiroWilk
Barium (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	160.4	13.07	normal	ShapiroWilk
Beryllium (ug/L)	MW-10 (bg)	n/a	n/a	n/a	EPA 1989	0.05	8	0.209	0.1112	unknown	ShapiroWilk
Beryllium (ug/L)	MW-9 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.2038	0.1131	unknown	ShapiroWilk
Boron (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	56.58	32.36	normal	ShapiroWilk
Boron (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	60.09	33.03	normal	ShapiroWilk
Chloride (mg/L)	MW-10 (bg)	No	n/a	n/a	NP (nrm)	NaN	25	7.568	6.576	unknown	ShapiroWilk
Chloride (mg/L)	MW-9 (bg)	Yes	29.9,46,1...	9/1/2013,...	NP (nrm)	NaN	25	8.418	10.19	unknown	ShapiroWilk
Cobalt (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.4225	0.4241	normal	ShapiroWilk
Cobalt (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1.384	0.9172	normal	ShapiroWilk
Iron (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	156.6	112	normal	ShapiroWilk
Iron (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	514.3	456.3	normal	ShapiroWilk
Lead (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.2562	0.1269	ln(x)	ShapiroWilk
Lead (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.235	0.07131	normal	ShapiroWilk
Magnesium (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	21938	2110	normal	ShapiroWilk
Magnesium (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	16075	1063	normal	ShapiroWilk
Manganese (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	24.11	28.28	ln(x)	ShapiroWilk
Manganese (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	850.6	817.6	normal	ShapiroWilk
Selenium (ug/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.9962	0.3433	normal	ShapiroWilk
Selenium (ug/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.7182	0.4988	normal	ShapiroWilk
Sulfate (mg/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	25	13.29	8.899	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-9 (bg)	No	n/a	n/a	EPA 1989	0.05	25	24.94	12.43	normal	ShapiroWilk



Constituent: Arsenic Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

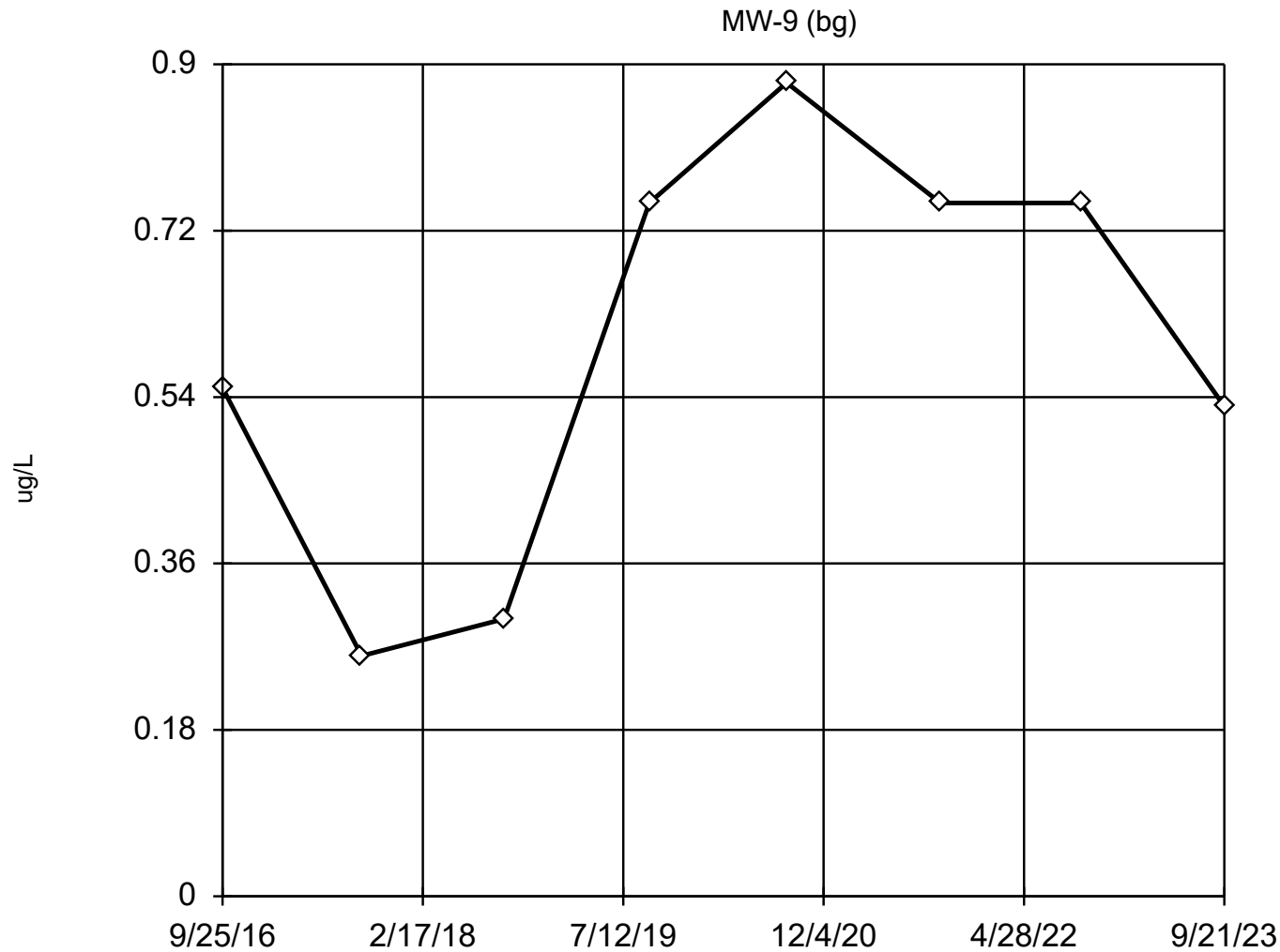
Tukey's Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	0.14 (J)
9/15/2017	0.17 (J)
9/12/2018	0.36 (J)
9/17/2019	<0.75
4/29/2021	<0.75
9/28/2021	<0.75
9/20/2022	<0.75
9/18/2023	<0.53 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.5962, std. dev. 0.2264, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8966
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Arsenic Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

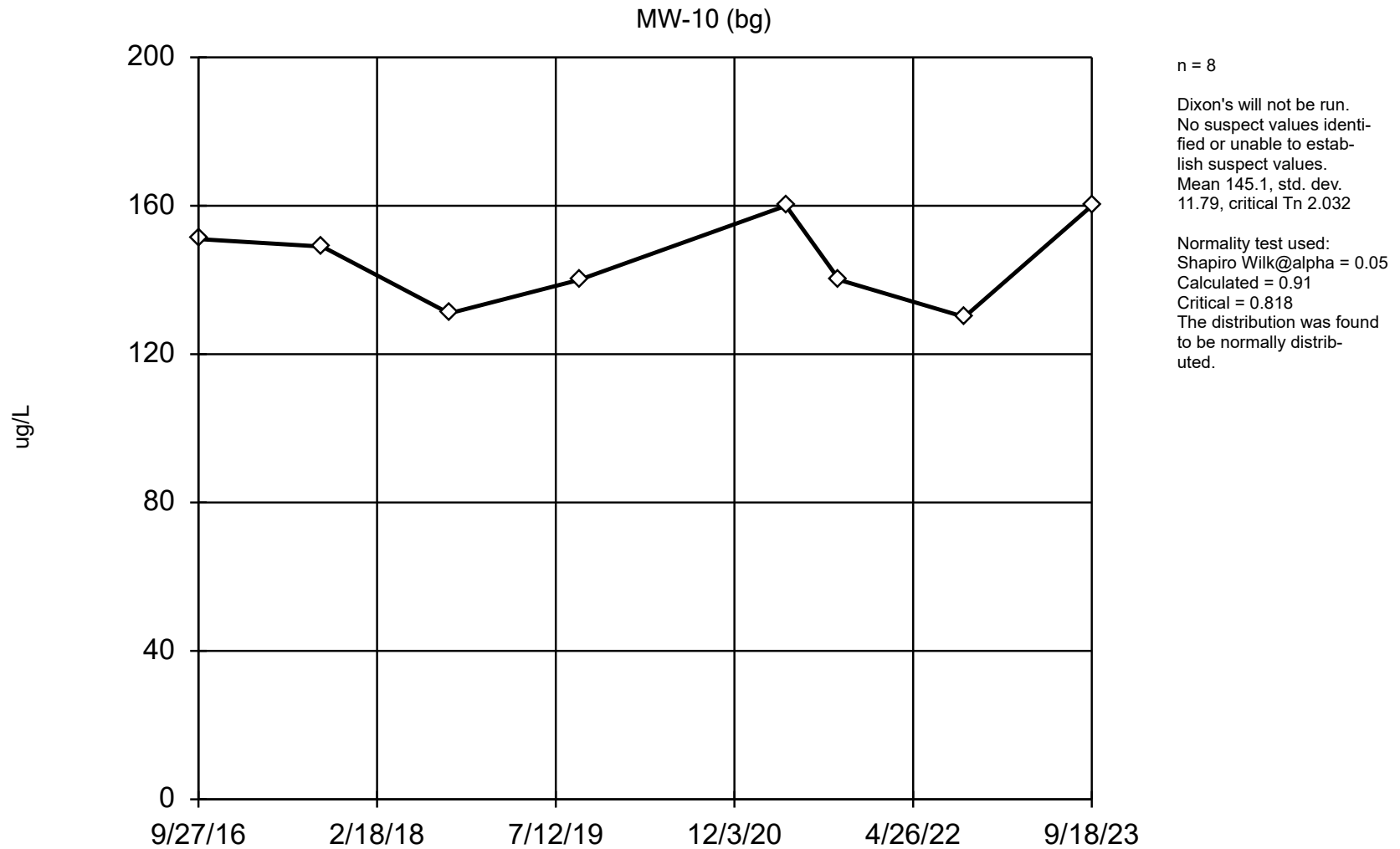
EPA 1989 Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	0.55 (J)
9/14/2017	0.26 (J)
9/12/2018	0.3 (J)
9/17/2019	<0.75
9/1/2020	<0.88
9/28/2021	<0.75
9/20/2022	<0.75
9/21/2023	<0.53 (U)

EPA Screening (suspected outliers for Dixon's Test)



Constituent: Barium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

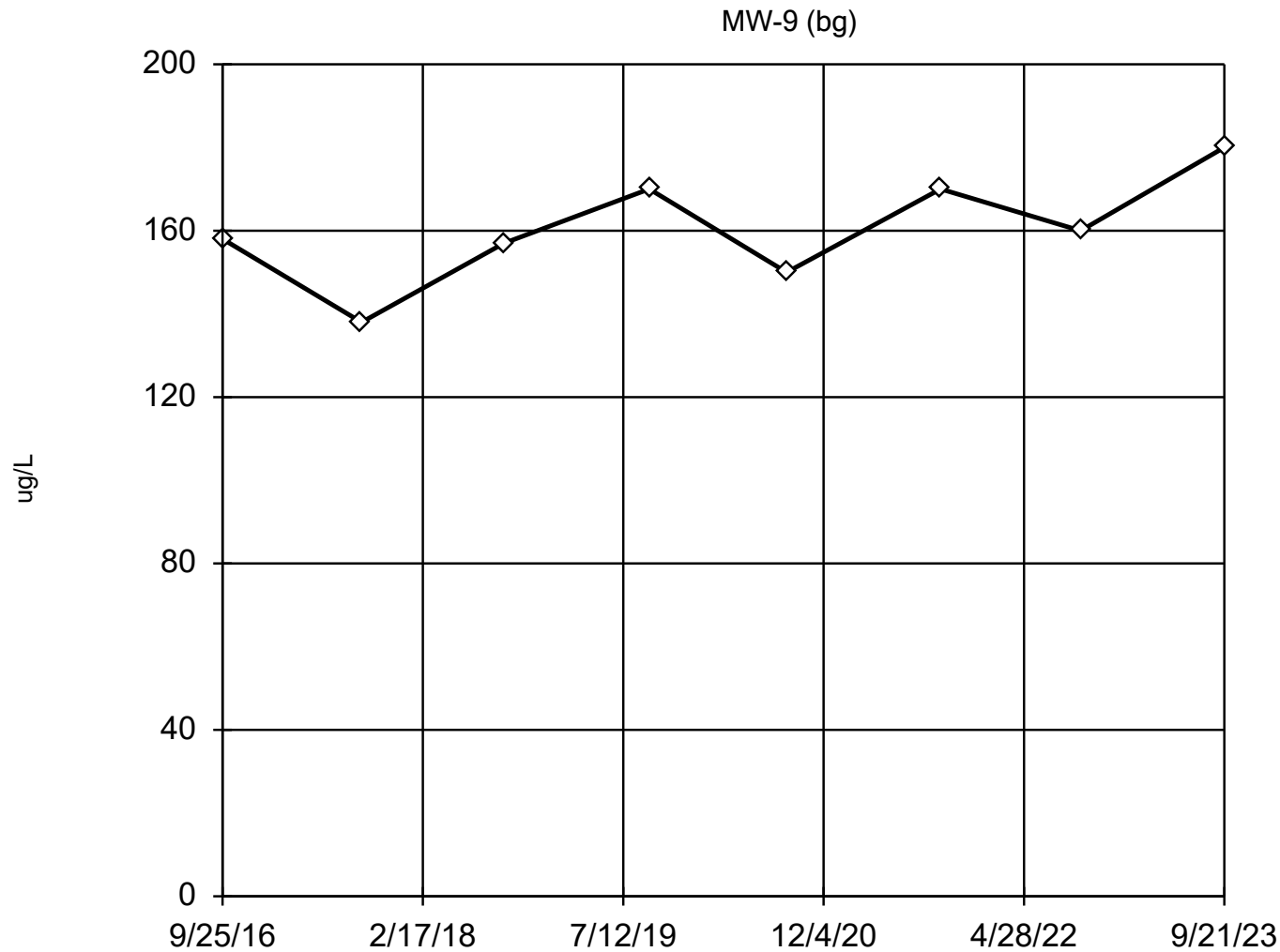
EPA 1989 Outlier Screening

Constituent: Barium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	151
9/15/2017	149
9/12/2018	131
9/17/2019	140
4/29/2021	160
9/28/2021	140
9/20/2022	130
9/18/2023	160

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 160.4, std. dev. 13.07, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9737
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Barium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

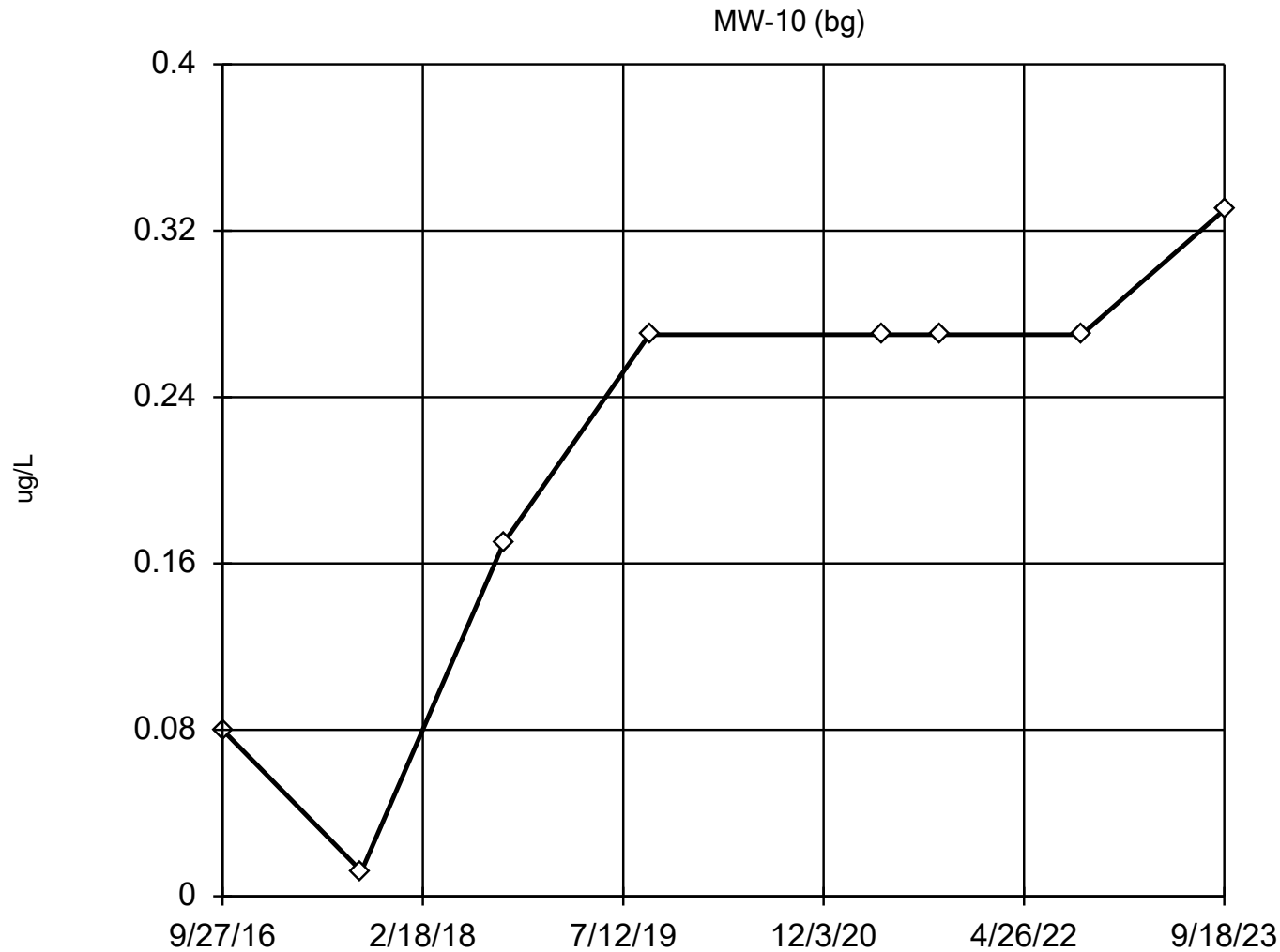
EPA 1989 Outlier Screening

Constituent: Barium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	158
9/14/2017	138
9/12/2018	157
9/17/2019	170
9/1/2020	150
9/28/2021	170
9/20/2022	160
9/21/2023	180

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.

Mean 0.209, std. dev. 0.1112, critical Tn 2.032.

After removing suspect data: mean 0.2371, std. dev. 0.08381, Tn 1.938; mean 0.2633, std. dev. 0.05164, Tn 1.822; mean 0.282, std. dev. 0.02683, Tn 1.672.

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8428
Critical = 0.818
The distribution was found to be normally distributed.

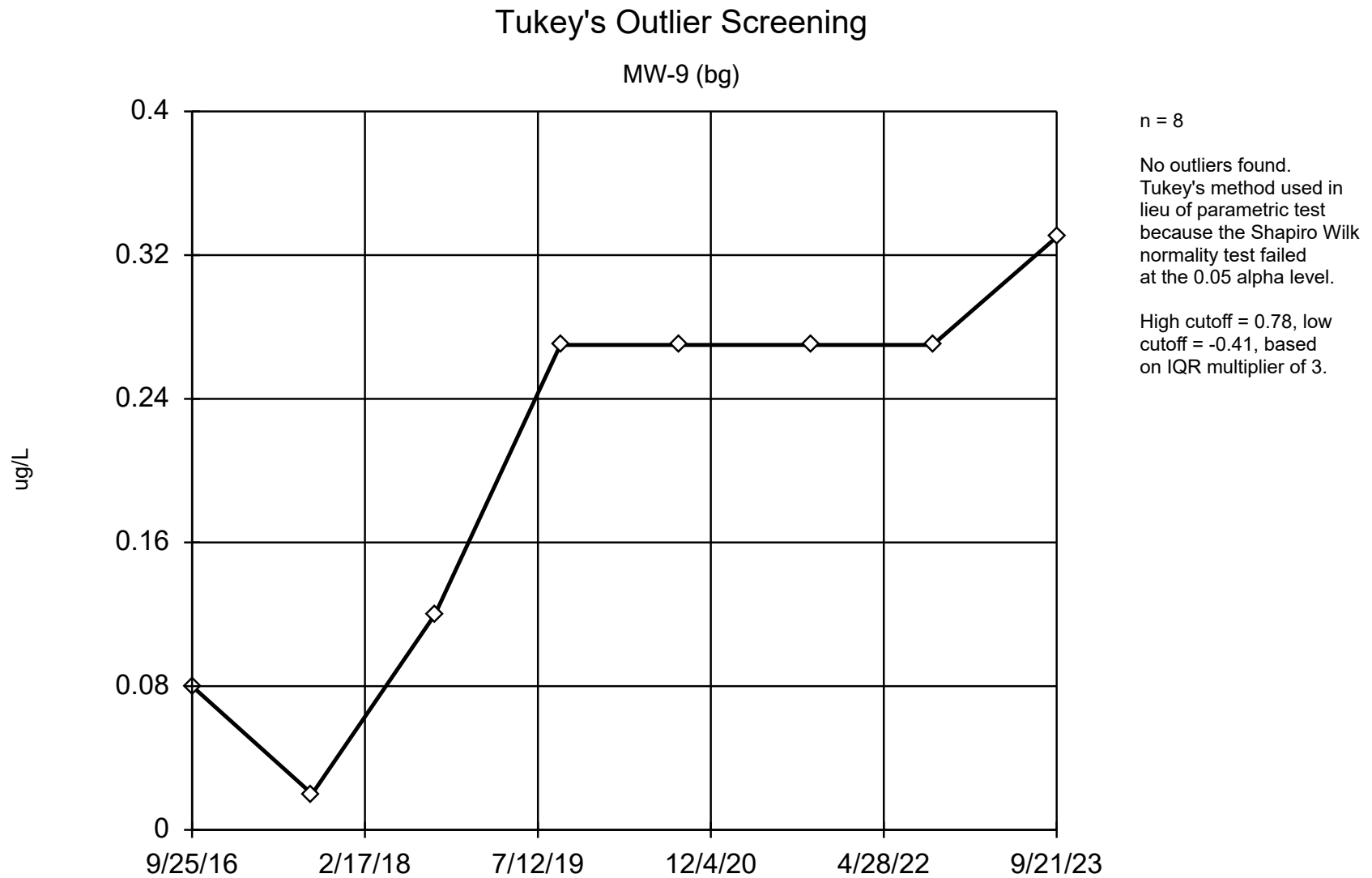
Constituent: Beryllium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	<0.08
9/15/2017	<0.012
9/12/2018	0.17 (J)
9/17/2019	<0.27
4/29/2021	<0.27
9/28/2021	<0.27
9/20/2022	<0.27
9/18/2023	<0.33 (U)



Constituent: Beryllium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

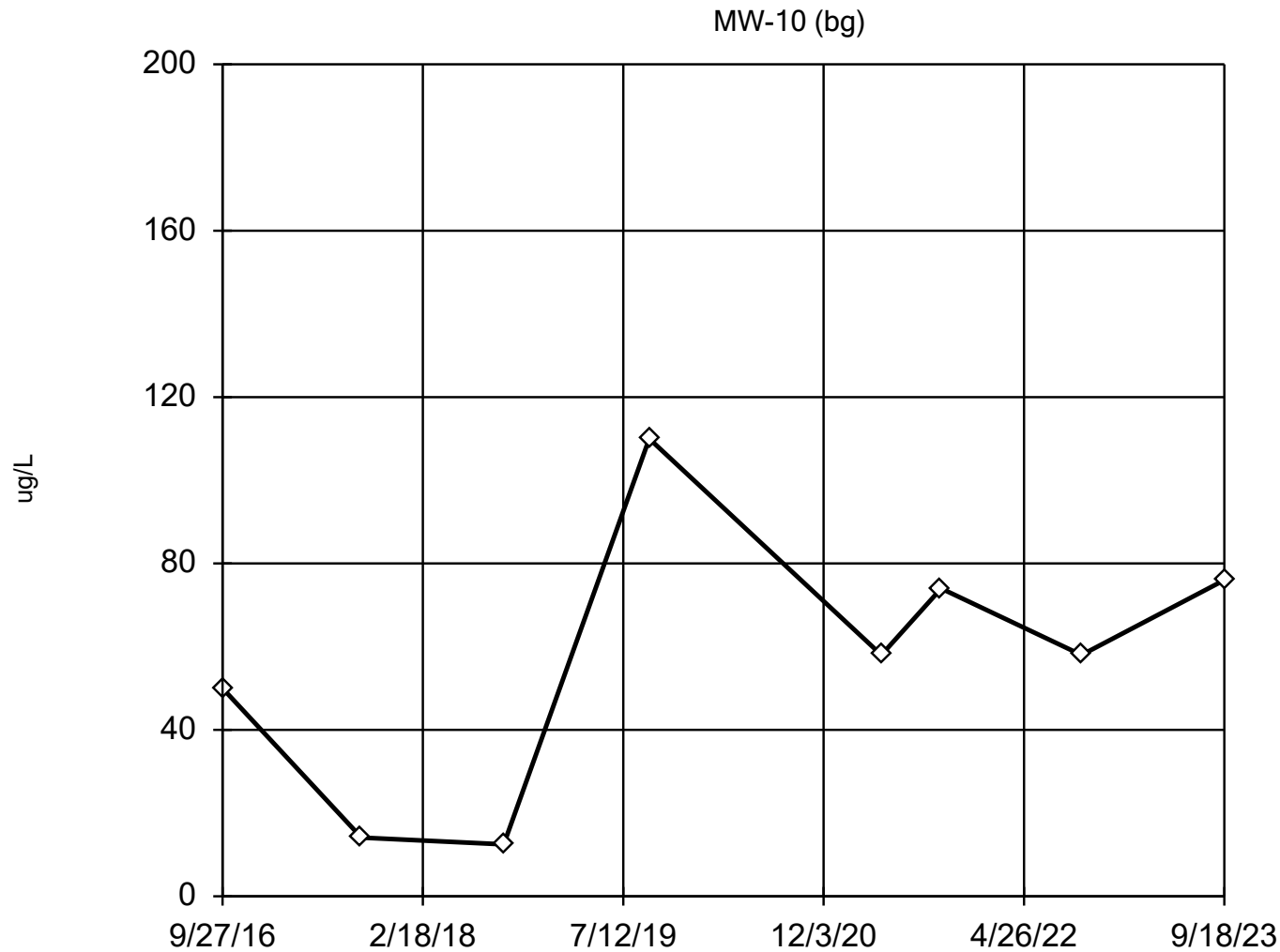
Tukey's Outlier Screening

Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	<0.08
9/14/2017	0.02 (J)
9/12/2018	<0.12
9/17/2019	<0.27
9/1/2020	<0.27
9/28/2021	<0.27
9/20/2022	<0.27
9/21/2023	<0.33 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 56.58, std. dev. 32.36, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9349
Critical = 0.818
The distribution was found to be normally distributed.

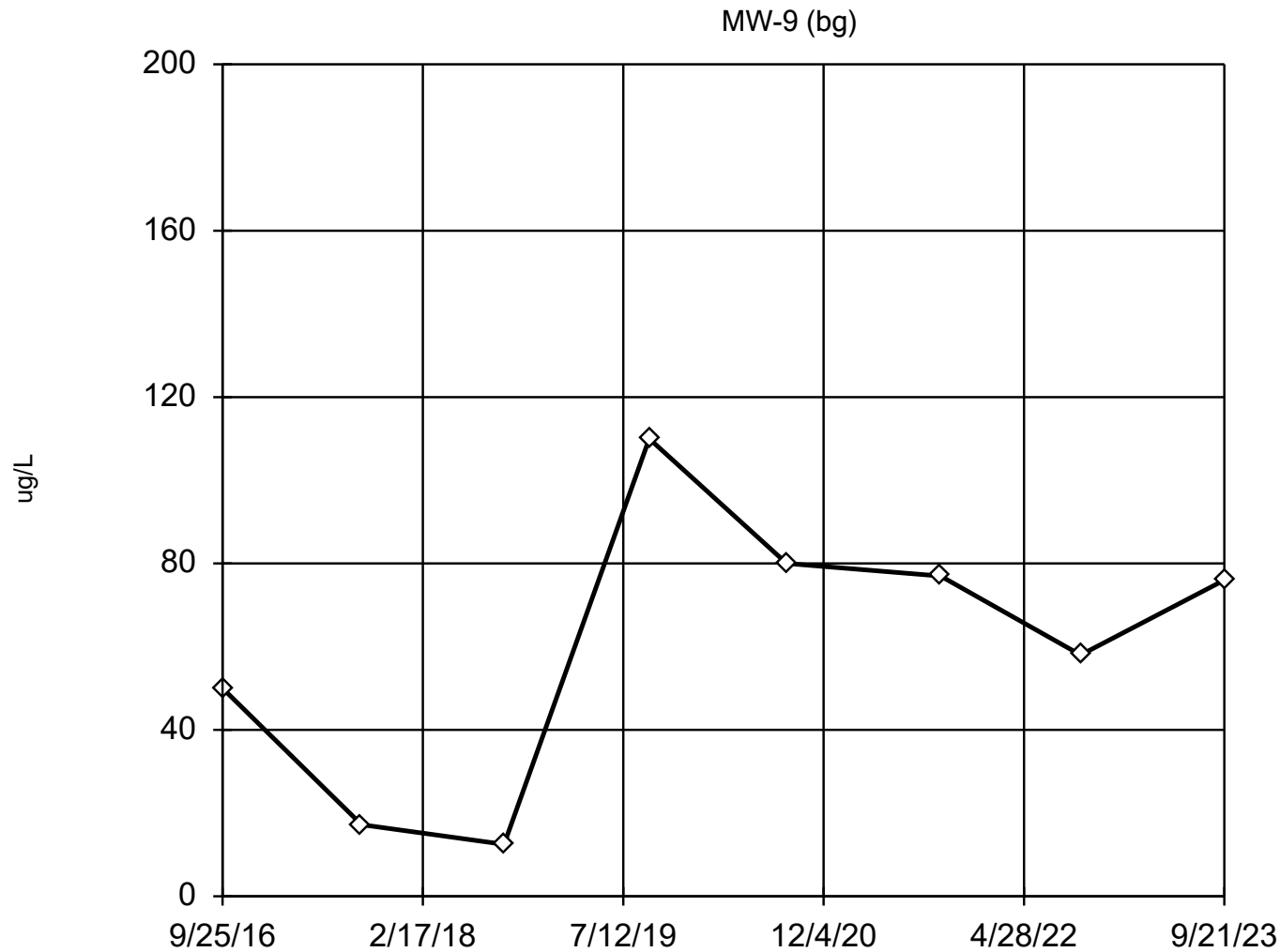
Constituent: Boron Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Boron (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)	
9/27/2016	<50
9/15/2017	14.1 (J)
9/12/2018	<12.5
9/17/2019	<110
4/29/2021	<58
9/28/2021	74 (J)
9/20/2022	<58
9/18/2023	<76 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 60.09, std. dev. 33.03, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.937
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Boron Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

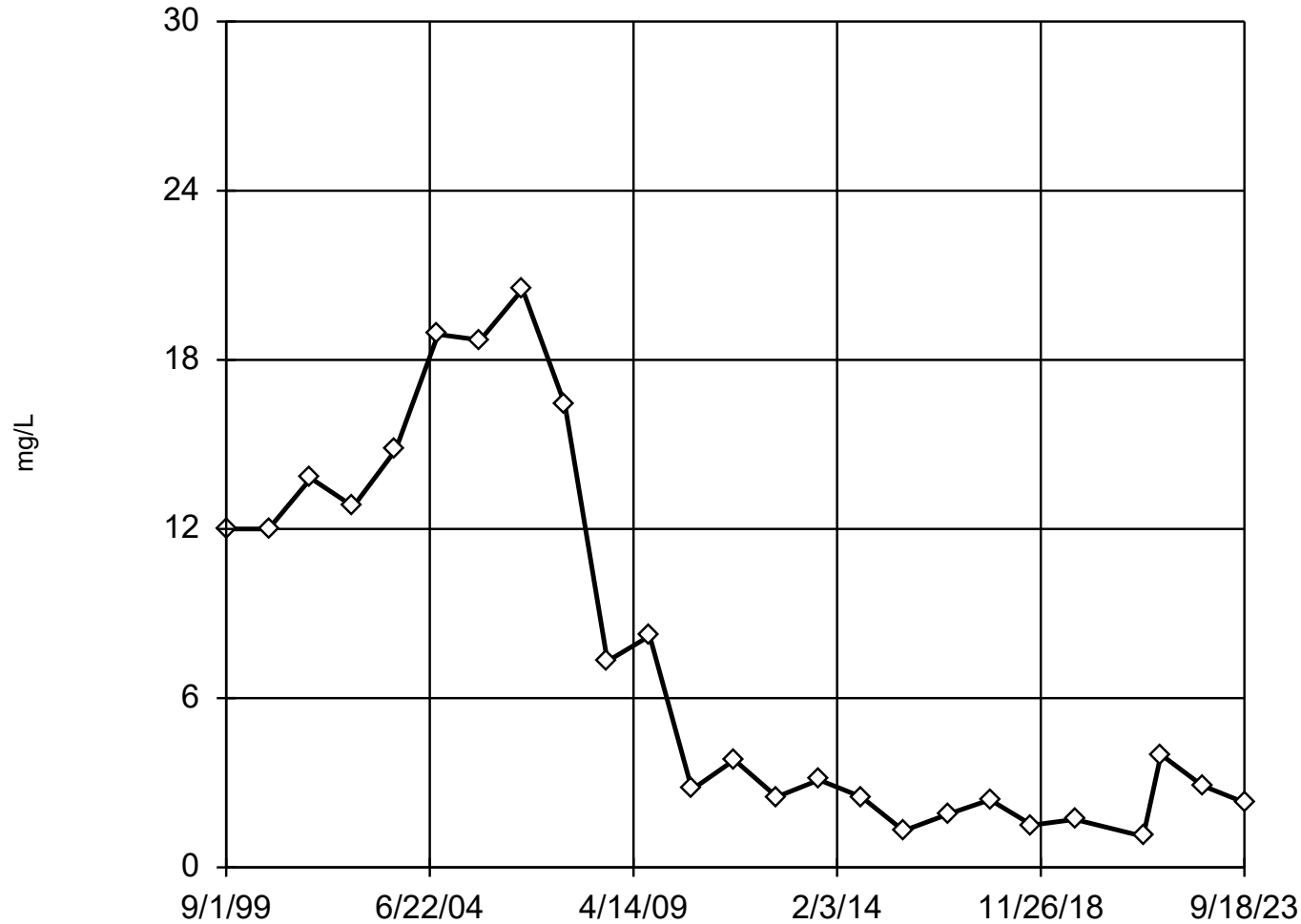
Constituent: Boron (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	<50
9/14/2017	17.2 (J)
9/12/2018	<12.5
9/17/2019	<110
9/1/2020	<80
9/28/2021	77 (J)
9/20/2022	<58
9/21/2023	<76 (U)

Tukey's Outlier Screening

MW-10 (bg)



n = 25

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

High cutoff = 46.15, low cutoff = -30.5, based on IQR multiplier of 3.

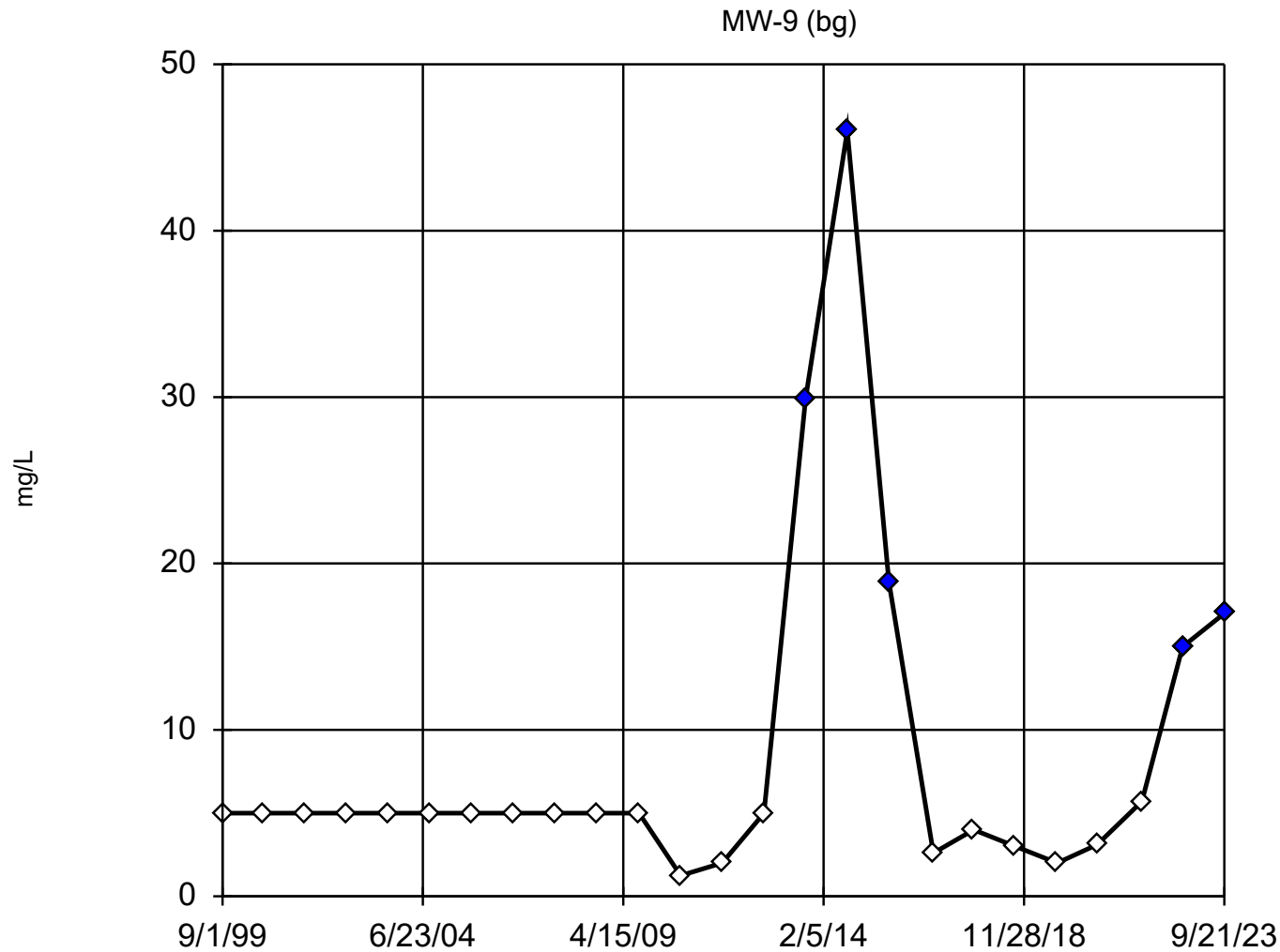
Constituent: Chloride Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Tukey's Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)
9/1/1999	12
9/1/2000	12
9/1/2001	13.8
9/1/2002	12.8
9/1/2003	14.8
9/1/2004	18.9
9/1/2005	18.7
9/1/2006	20.5
9/1/2007	16.4
9/1/2008	7.31
9/1/2009	8.21
9/1/2010	2.76
9/1/2011	3.81
9/1/2012	<5
9/1/2013	3.1
9/1/2014	2.5
9/1/2015	1.3
9/27/2016	1.9
9/15/2017	2.4
9/12/2018	1.5
9/17/2019	1.7 (J,B)
4/29/2021	<2.2
9/28/2021	4 (J)
9/20/2022	2.9 (J)
9/18/2023	2.3 (J)

Tukey's Outlier Screening



n = 25

Outliers are drawn as solid.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

High cutoff = 10.75, low cutoff = -1.85, based on IQR multiplier of 3.

Constituent: Chloride Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

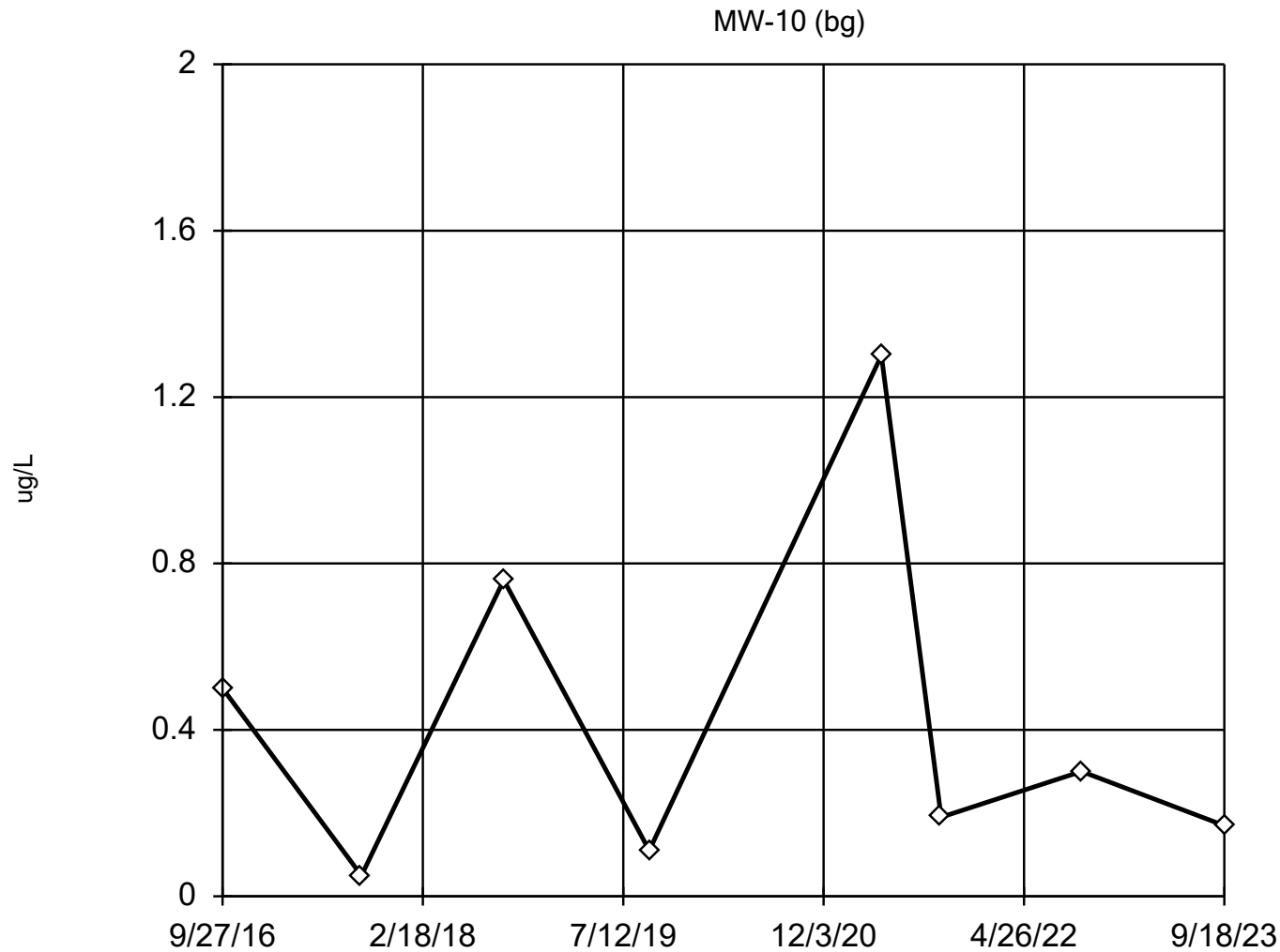
Tukey's Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/1/1999	<5
9/1/2000	<5
9/1/2001	<5
9/1/2002	<5
9/1/2003	<5
9/1/2004	<5
9/1/2005	<5
9/1/2006	<5
9/1/2007	<5
9/1/2008	<5
9/1/2009	<5
9/1/2010	1.25
9/1/2011	<2
9/1/2012	<5
9/1/2013	29.9 (O)
9/1/2014	46 (O)
9/1/2015	18.9 (O)
9/25/2016	2.6
9/14/2017	4
9/12/2018	3
9/17/2019	2 (J,B)
9/1/2020	3.1 (J,B)
9/28/2021	5.7
9/20/2022	15 (O)
9/21/2023	17 (O)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.4225, std. dev. 0.4241, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8358
Critical = 0.818
The distribution was found to be normally distributed.

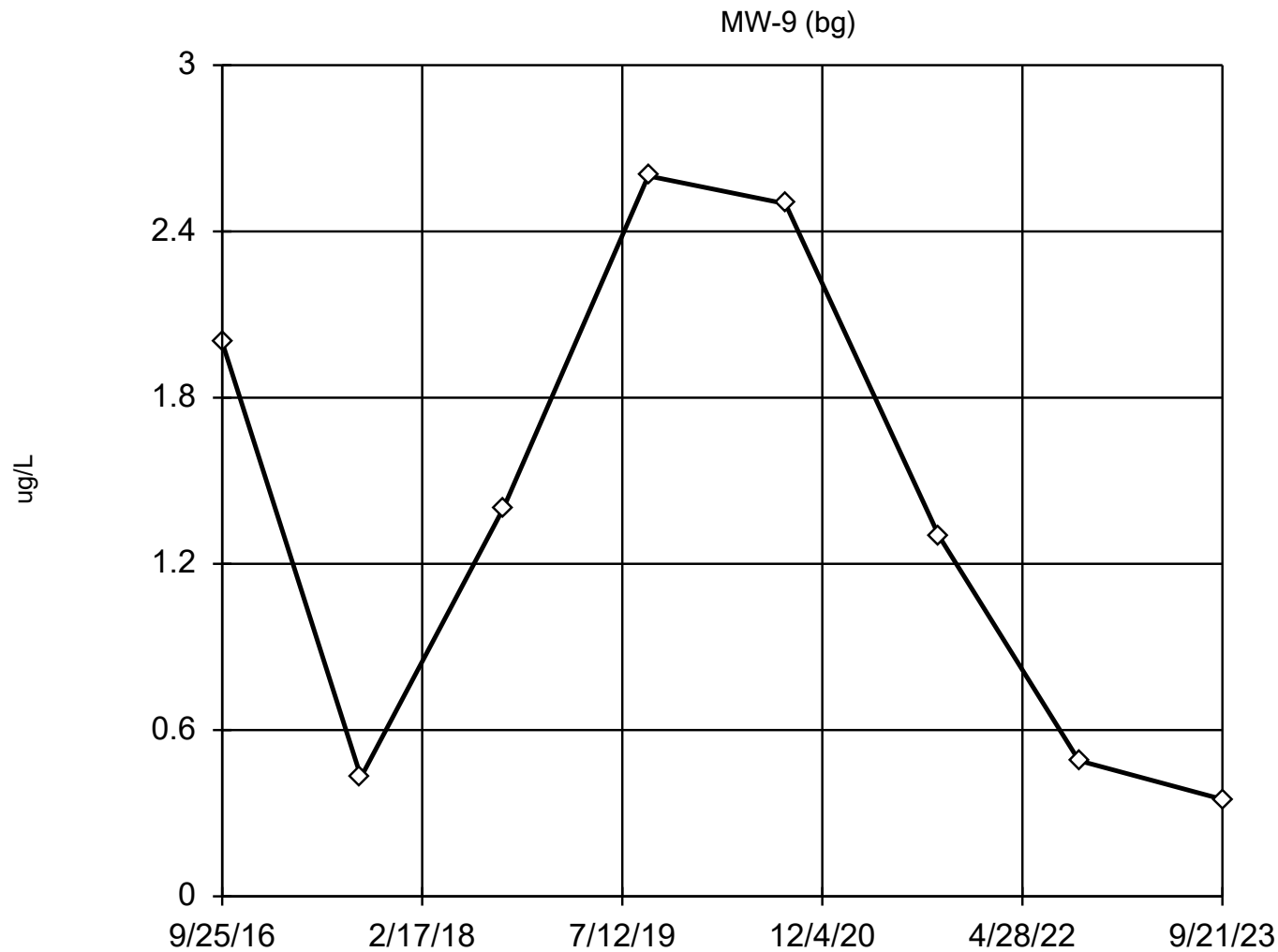
Constituent: Cobalt Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)
9/27/2016	<0.5
9/15/2017	0.05 (J)
9/12/2018	0.76 (J)
9/17/2019	0.11 (J)
4/29/2021	1.3
9/28/2021	<0.19
9/20/2022	0.3 (J)
9/18/2023	<0.17 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1.384, std. dev. 0.9172, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8869
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Cobalt Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

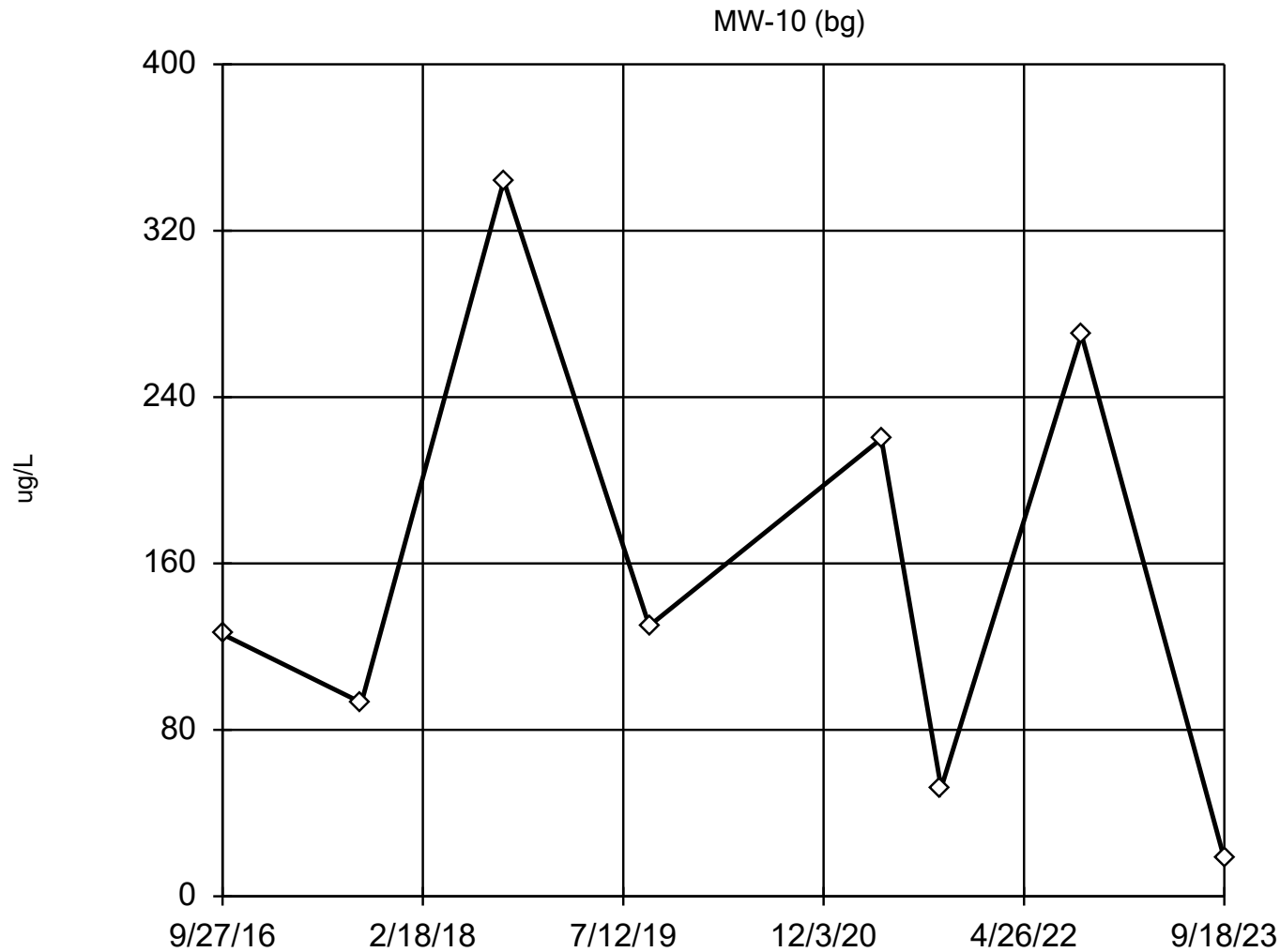
EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	2
9/14/2017	0.43 (J)
9/12/2018	1.4
9/17/2019	2.6
9/1/2020	2.5
9/28/2021	1.3
9/20/2022	0.49 (J)
9/21/2023	0.35 (J)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 156.6, std. dev. 112, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9484
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Iron Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

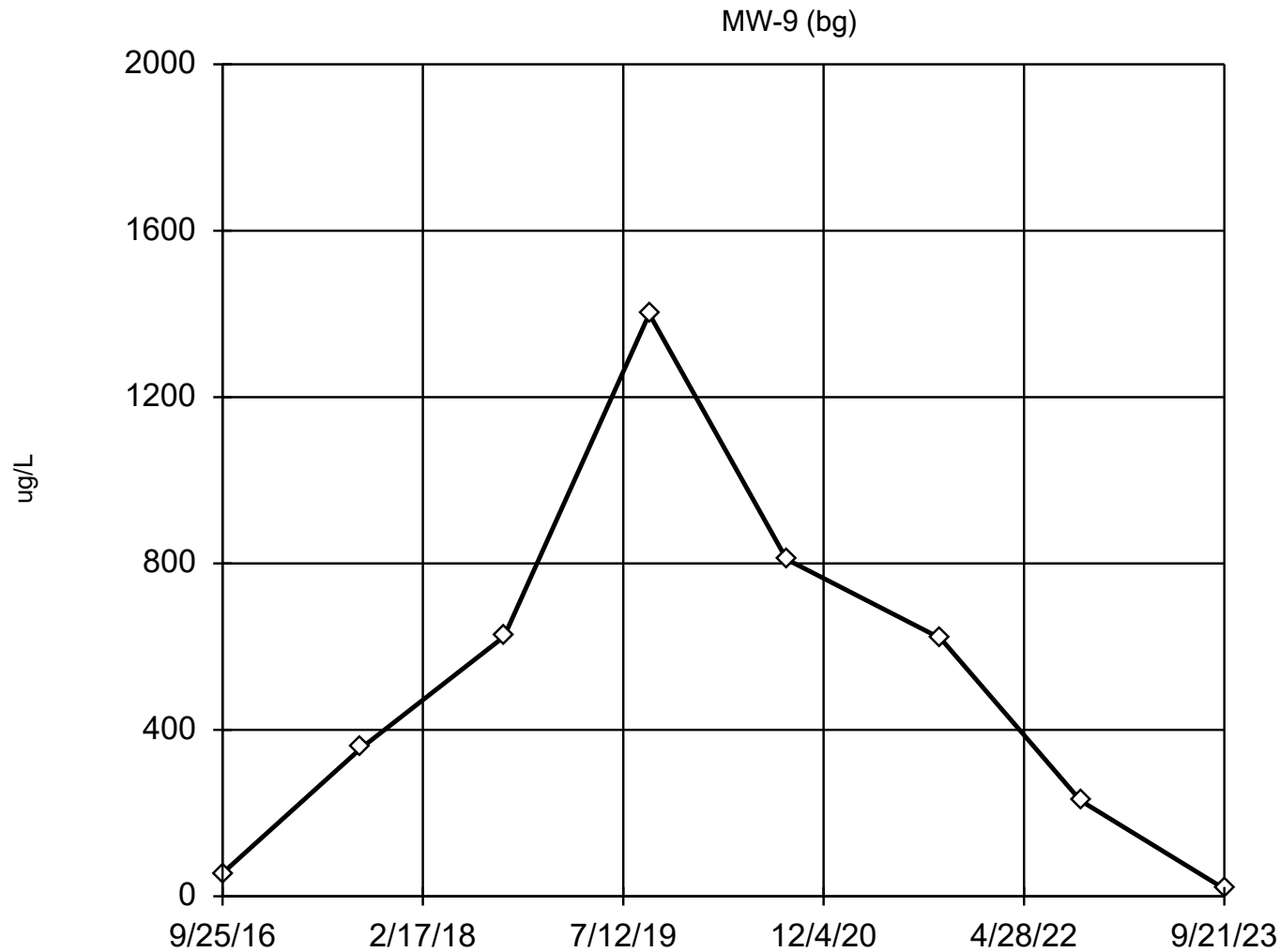
EPA 1989 Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	126
9/15/2017	93.1
9/12/2018	344
9/17/2019	130
4/29/2021	220
9/28/2021	52 (J)
9/20/2022	270
9/18/2023	<36 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 514.3, std. dev. 456.3, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9209
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Iron Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

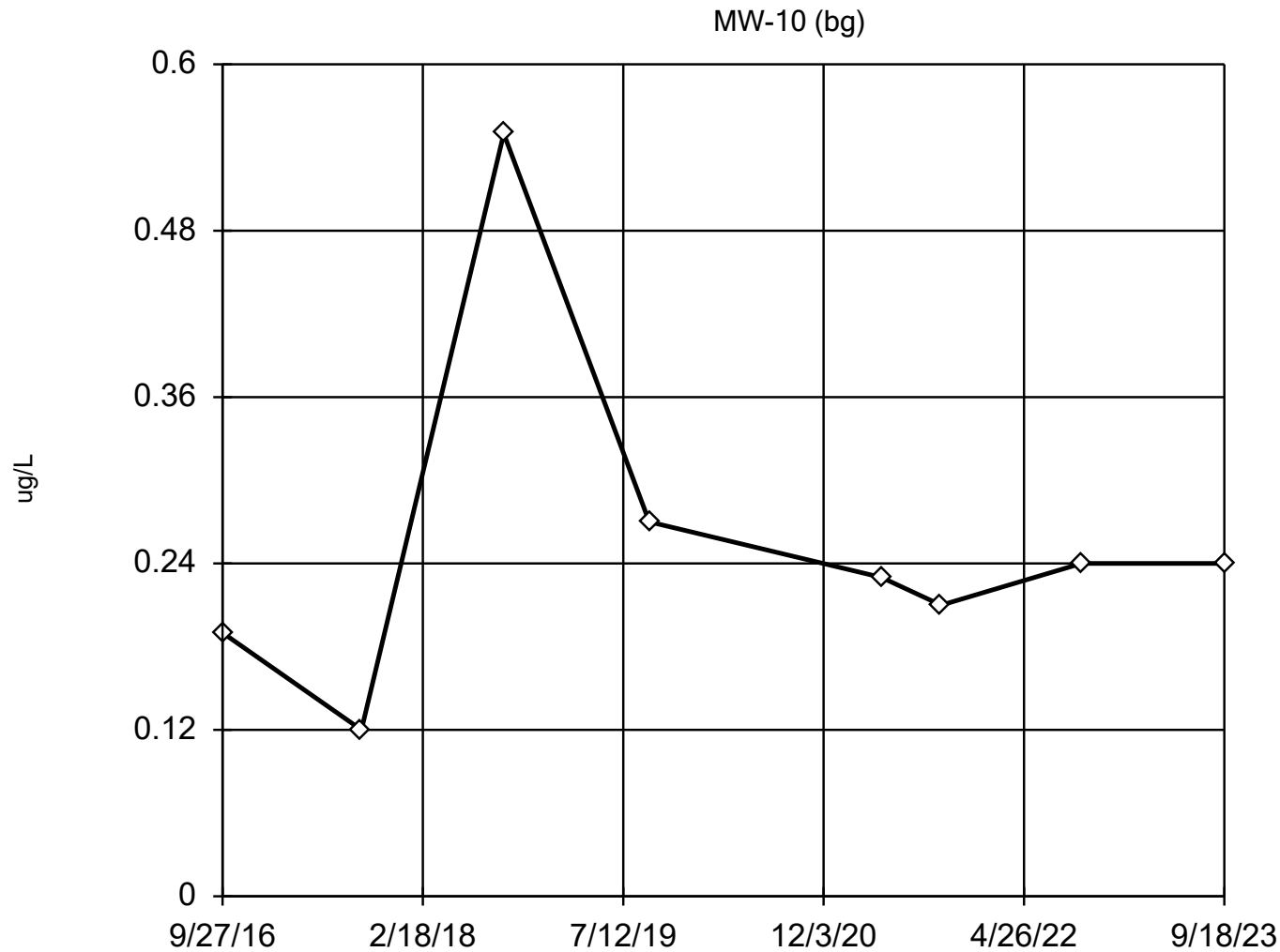
EPA 1989 Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	55.7
9/14/2017	357
9/12/2018	624
9/17/2019	1400
9/1/2020	810
9/28/2021	620
9/20/2022	230
9/21/2023	<36 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.2562, std. dev. 0.1269, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8936
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Lead Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

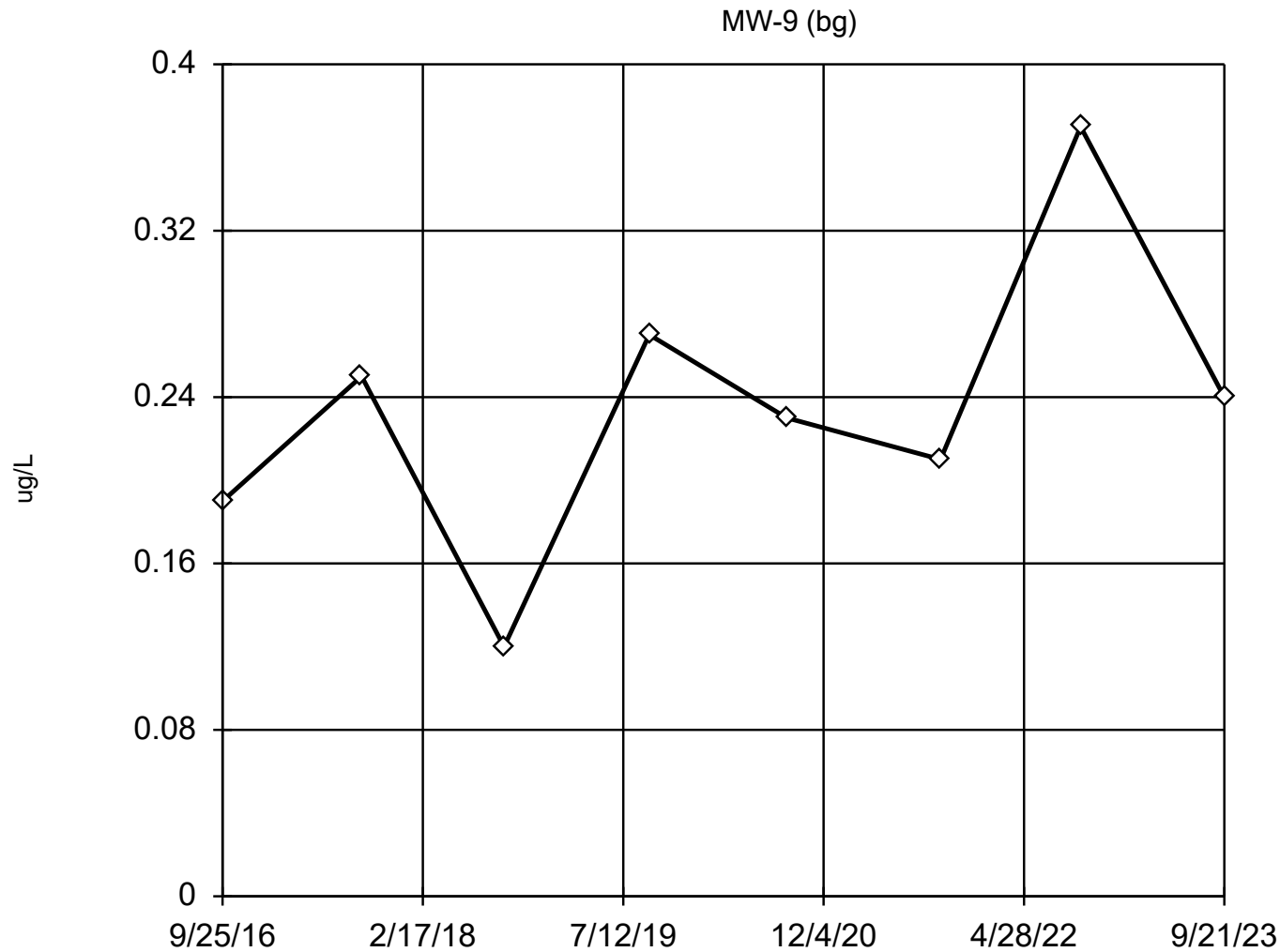
EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	<0.19
9/15/2017	0.12 (J)
9/12/2018	0.55 (J)
9/17/2019	<0.27
4/29/2021	0.23 (J)
9/28/2021	<0.21
9/20/2022	<0.24
9/18/2023	<0.24 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.235, std. dev. 0.07131, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9525
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Lead Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

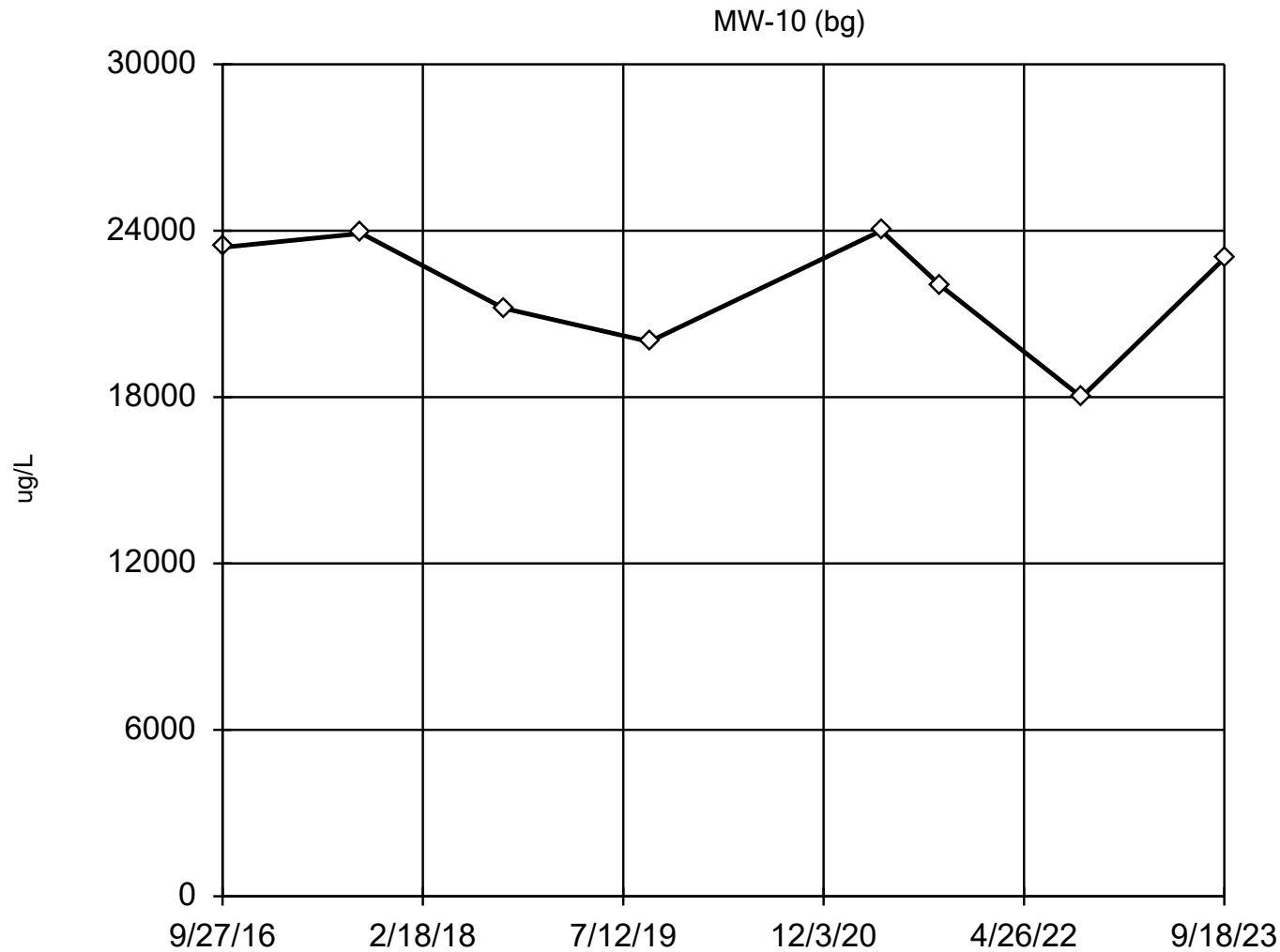
EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	<0.19
9/14/2017	0.25 (J)
9/12/2018	<0.12
9/17/2019	<0.27
9/1/2020	0.23 (J)
9/28/2021	<0.21
9/20/2022	0.37 (J)
9/21/2023	<0.24 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 21938, std. dev. 2110, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9025
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Magnesium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

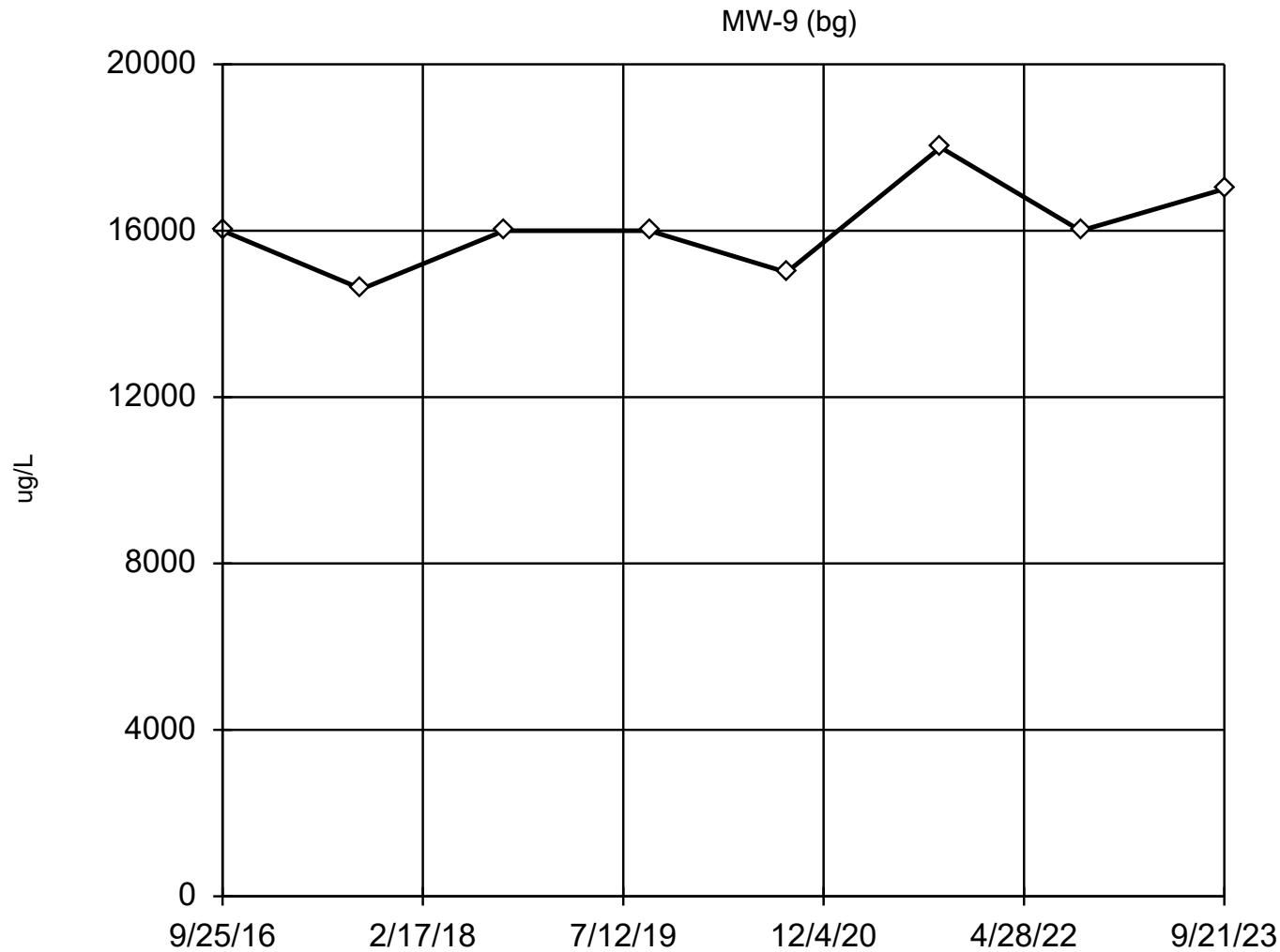
EPA 1989 Outlier Screening

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	23400
9/15/2017	23900
9/12/2018	21200
9/17/2019	20000
4/29/2021	24000
9/28/2021	22000
9/20/2022	18000
9/18/2023	23000

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 16075, std. dev. 1063, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9146
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Magnesium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

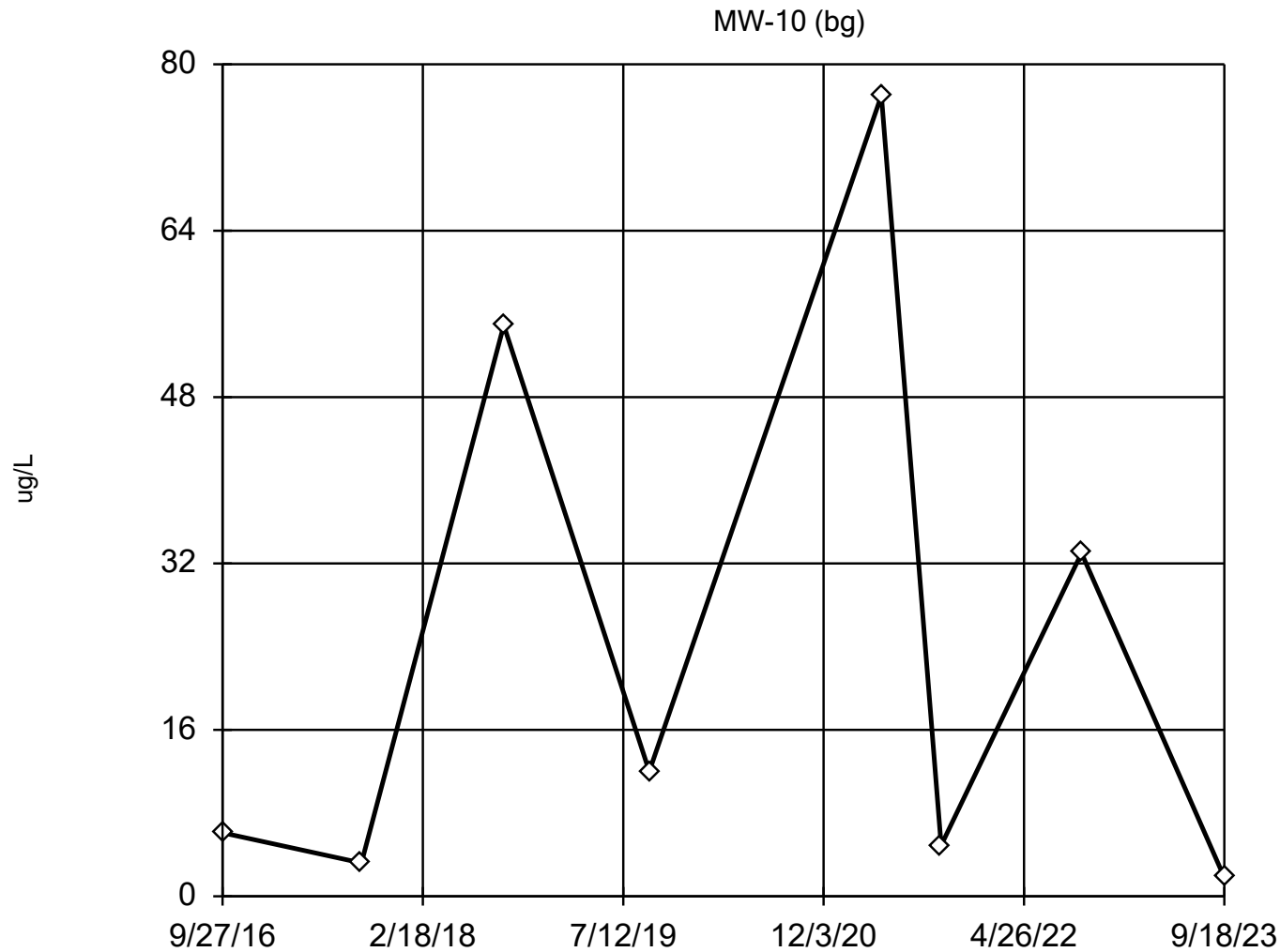
EPA 1989 Outlier Screening

Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	16000
9/14/2017	14600
9/12/2018	16000
9/17/2019	16000
9/1/2020	15000
9/28/2021	18000
9/20/2022	16000
9/21/2023	17000

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 24.11, std. dev. 28.28, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9383
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

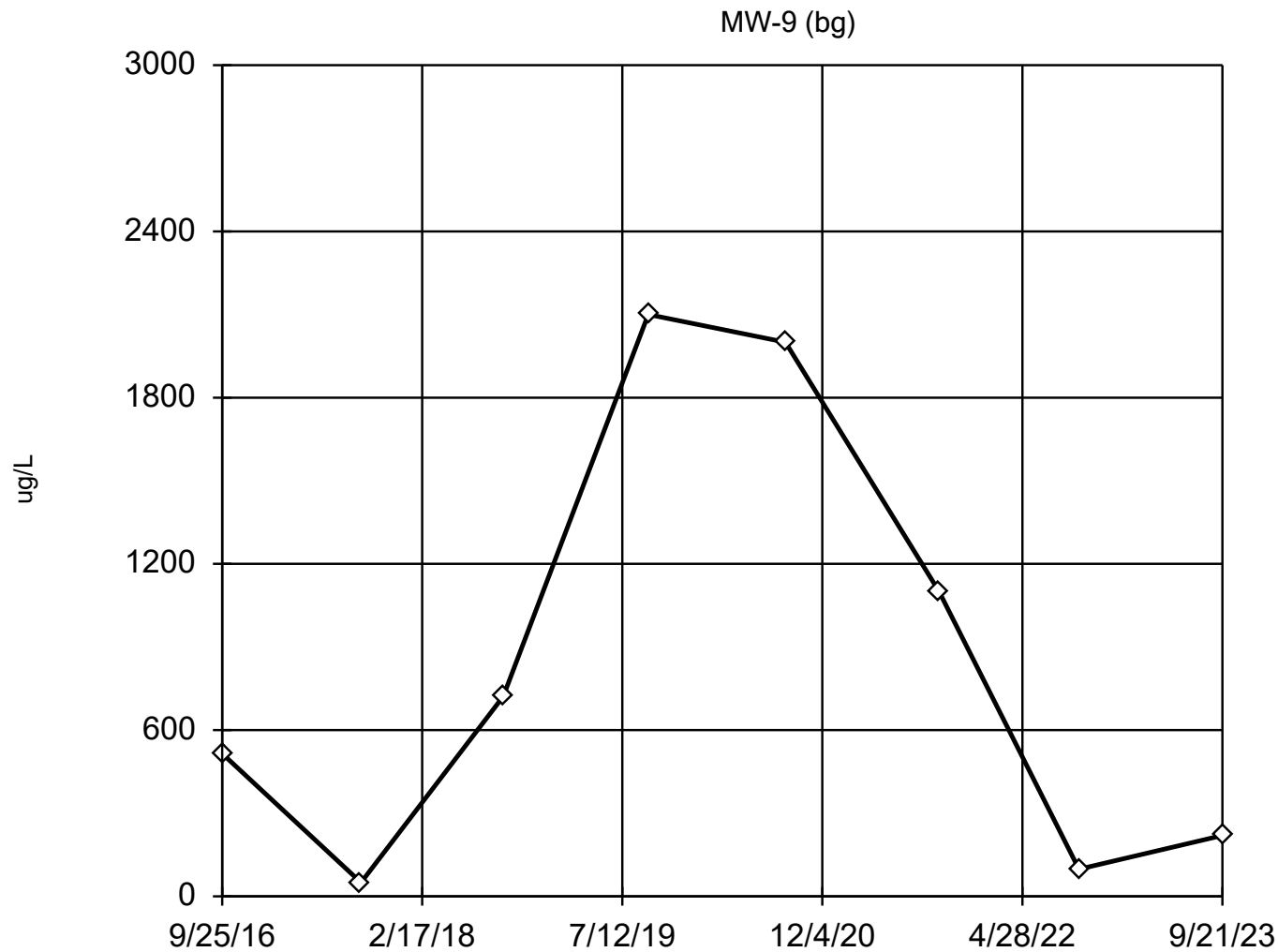
Constituent: Manganese Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)
9/27/2016	6.1
9/15/2017	3.2
9/12/2018	54.9
9/17/2019	12
4/29/2021	77
9/28/2021	4.9 (J)
9/20/2022	33
9/18/2023	<3.6 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 850.6, std. dev. 817.6, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8614
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Manganese Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

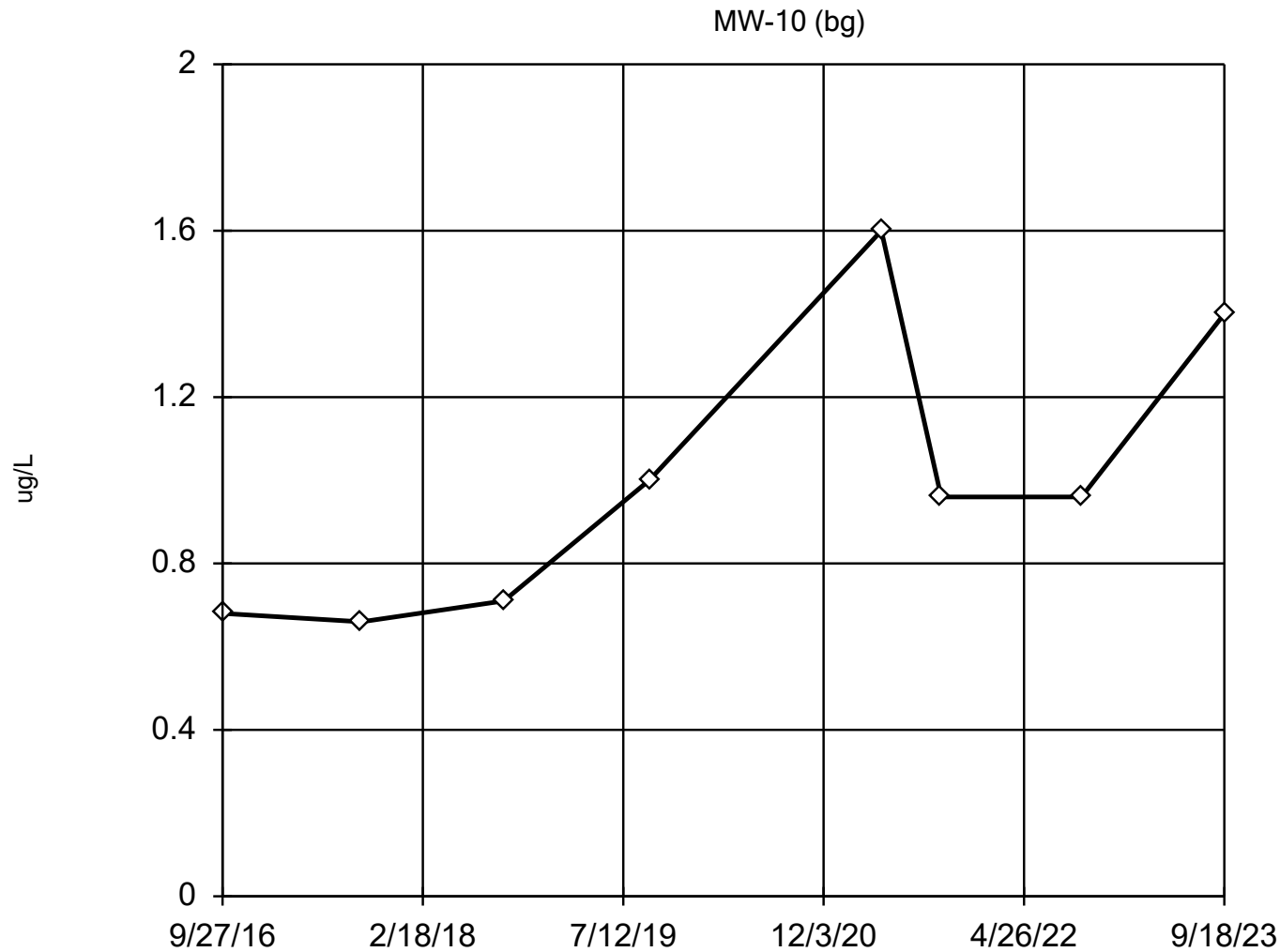
EPA 1989 Outlier Screening

Constituent: Manganese (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	515
9/14/2017	49.8
9/12/2018	722
9/17/2019	2100
9/1/2020	2000
9/28/2021	1100
9/20/2022	98
9/21/2023	220

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.9962, std. dev. 0.3433, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8699
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Selenium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

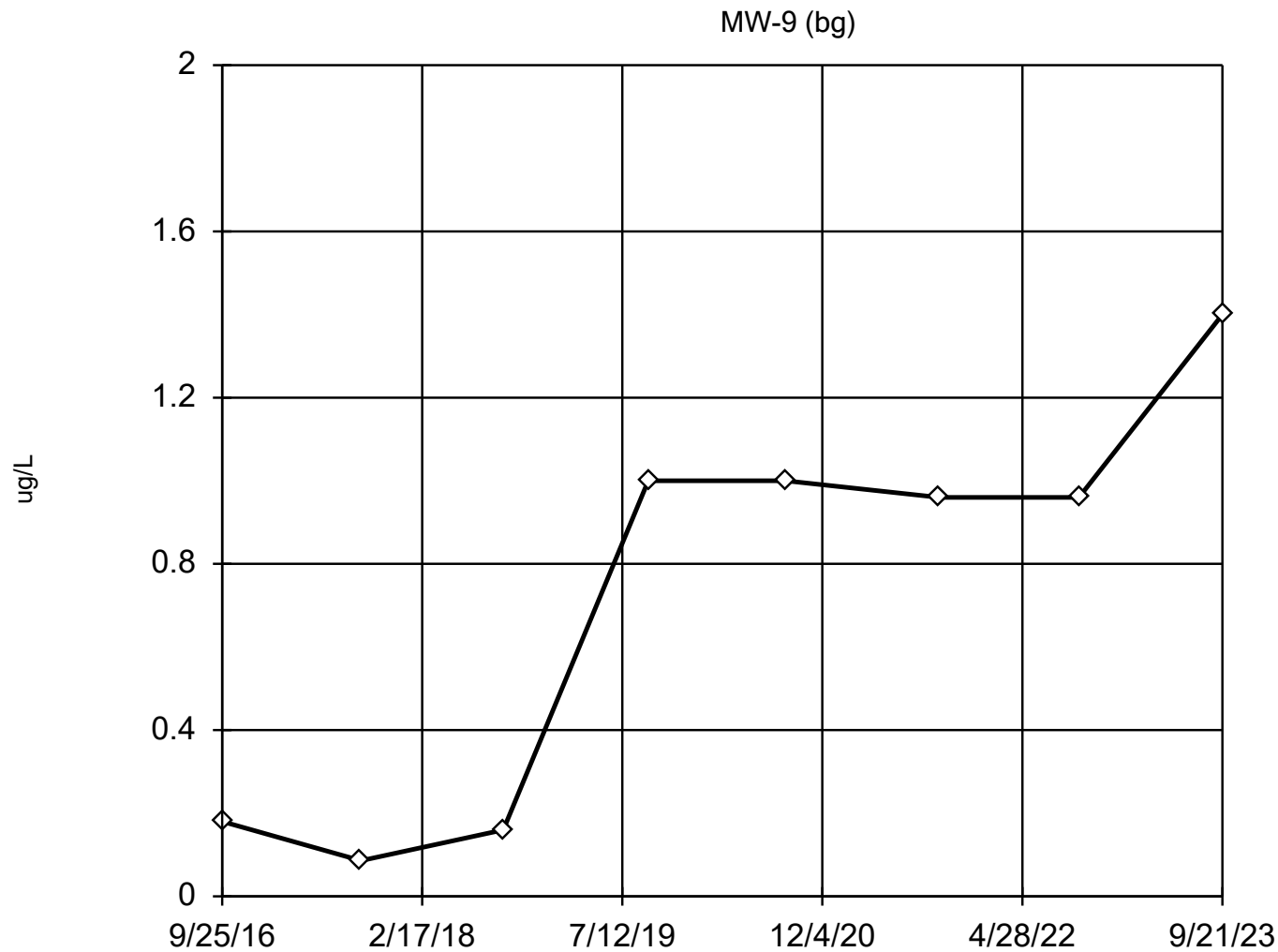
EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/27/2016	0.68 (J)
9/15/2017	0.66 (J)
9/12/2018	0.71 (J)
9/17/2019	<1
4/29/2021	1.6 (J)
9/28/2021	<0.96
9/20/2022	<0.96
9/18/2023	<1.4 (U)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.7182, std. dev. 0.4988, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8323
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Selenium Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

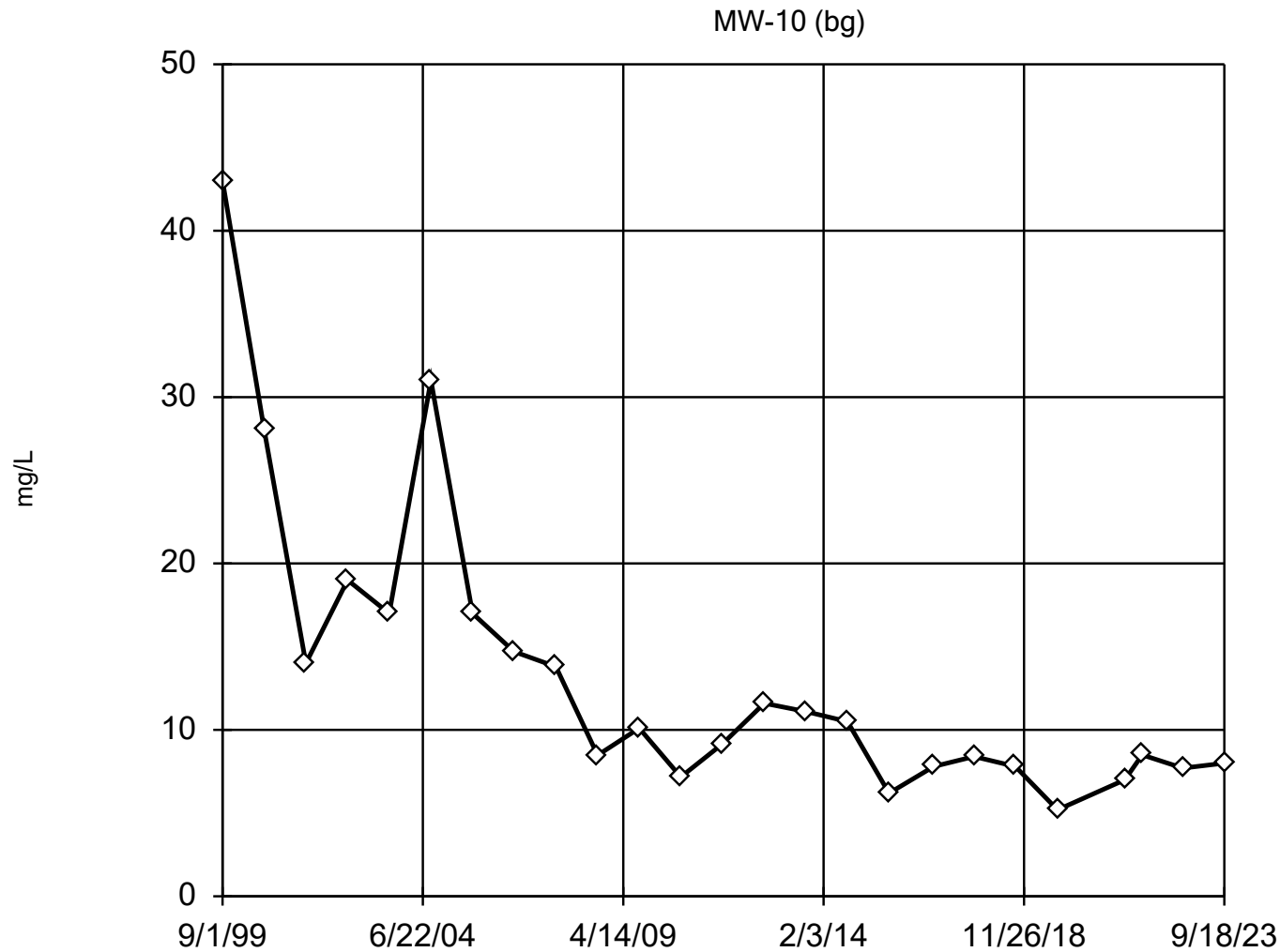
EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/25/2016	<0.18
9/14/2017	<0.086
9/12/2018	<0.16
9/17/2019	<1
9/1/2020	<1
9/28/2021	<0.96
9/20/2022	<0.96
9/21/2023	<1.4 (U)

EPA Screening (suspected outliers for Rosner's Test)



n = 25

Rosner's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 13.29, std. dev. 8.899, critical Tn 2.663

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9215
Critical = 0.918 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Sulfate Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

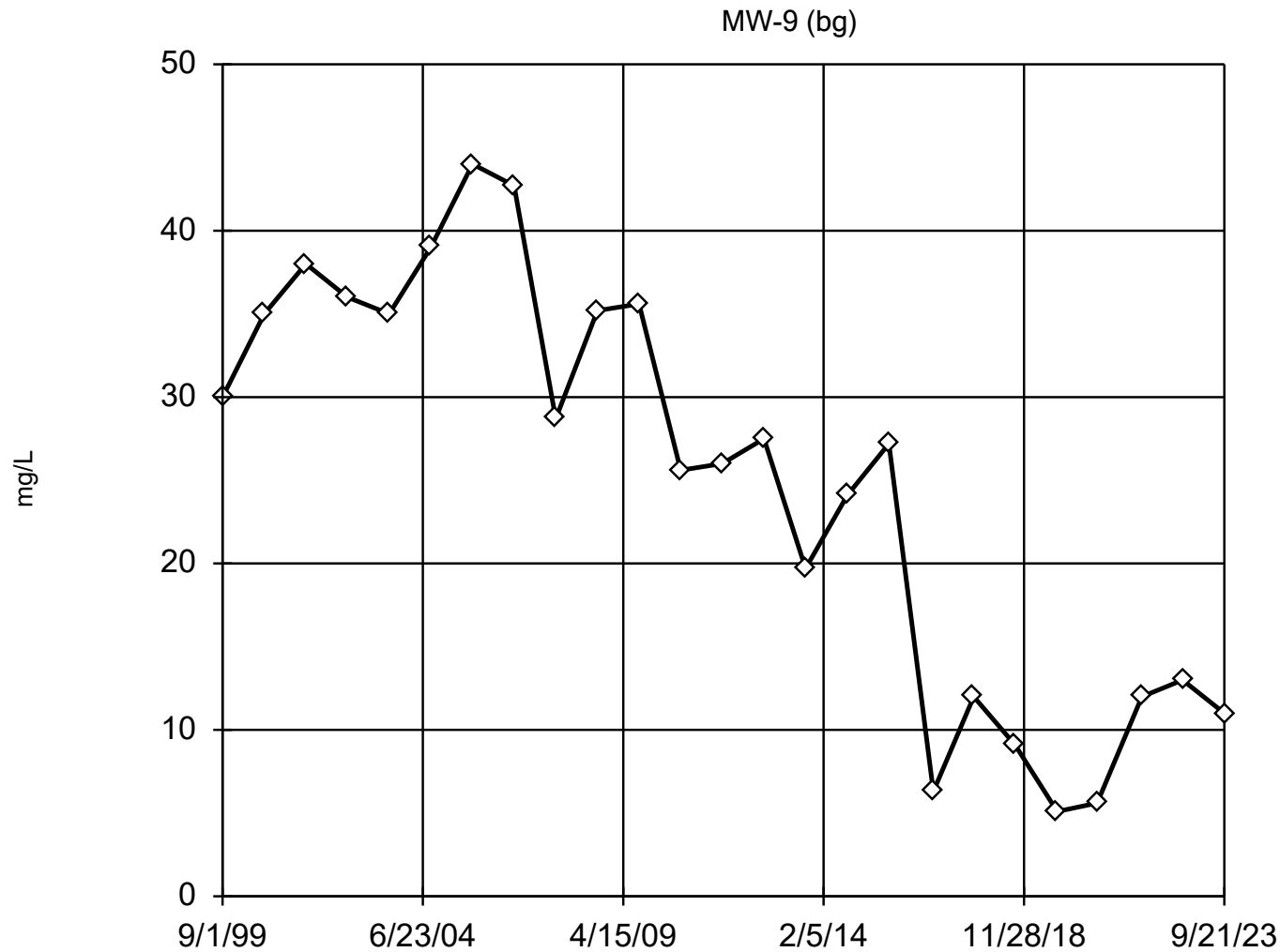
EPA 1989 Outlier Screening

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-10 (bg)

9/1/1999	43
9/1/2000	28
9/1/2001	14
9/1/2002	19
9/1/2003	17
9/1/2004	31
9/1/2005	17
9/1/2006	14.7
9/1/2007	13.8
9/1/2008	8.48
9/1/2009	10.1
9/1/2010	7.17
9/1/2011	9.16
9/1/2012	11.6
9/1/2013	11.1
9/1/2014	10.5
9/1/2015	6.2
9/27/2016	7.8
9/15/2017	8.4
9/12/2018	7.8
9/17/2019	5.2
4/29/2021	7
9/28/2021	8.5
9/20/2022	7.7
9/18/2023	8

EPA Screening (suspected outliers for Rosner's Test)



n = 25

Rosner's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 24.94, std. dev. 12.43, critical Tn 2.663

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9213
Critical = 0.918
The distribution was found to be normally distributed.

Constituent: Sulfate Analysis Run 10/30/2023 12:19 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

EPA 1989 Outlier Screening

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 12:20 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

MW-9 (bg)

9/1/1999	30
9/1/2000	35
9/1/2001	38
9/1/2002	36
9/1/2003	35
9/1/2004	39
9/1/2005	44
9/1/2006	42.7
9/1/2007	28.7
9/1/2008	35.2
9/1/2009	35.6
9/1/2010	25.6
9/1/2011	26
9/1/2012	27.5
9/1/2013	19.7
9/1/2014	24.1
9/1/2015	27.2
9/25/2016	6.3
9/14/2017	12
9/12/2018	9.1
9/17/2019	5.1
9/1/2020	5.6
9/28/2021	12
9/20/2022	13
9/21/2023	11

Attachment E5

Interwell Prediction Limit Analysis Results – West

Prediction Limit

Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input Printed 10/30/2023, 11:49 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Arsenic (ug/L)	MW-19	1.60	n/a	9/21/2023	0.53ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	56.52	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-21	1.60	n/a	9/21/2023	0.92J	No	23	MW-13,MW-8,MW-14	n/a	n/a	56.52	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-3	1.60	n/a	9/21/2023	0.65J	No	23	MW-13,MW-8,MW-14	n/a	n/a	56.52	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-4	1.60	n/a	9/21/2023	2.6	Yes	23	MW-13,MW-8,MW-14	n/a	n/a	56.52	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-5	1.60	n/a	9/21/2023	0.72J	No	23	MW-13,MW-8,MW-14	n/a	n/a	56.52	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-7	1.60	n/a	9/20/2023	0.53ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	56.52	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Barium (ug/L)	MW-19	163	n/a	9/21/2023	120	No	23	MW-13,MW-14,MW-8	96.69	28.68	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-21	163	n/a	9/21/2023	130	No	23	MW-13,MW-14,MW-8	96.69	28.68	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-3	163	n/a	9/21/2023	150	No	23	MW-13,MW-14,MW-8	96.69	28.68	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-4	163	n/a	9/21/2023	94	No	23	MW-13,MW-14,MW-8	96.69	28.68	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-5	163	n/a	9/21/2023	120	No	23	MW-13,MW-14,MW-8	96.69	28.68	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-7	163	n/a	9/20/2023	110	No	23	MW-13,MW-14,MW-8	96.69	28.68	0	None	No	0.0005787	Param Inter 1 of 2
Beryllium (ug/L)	MW-19	0.330	n/a	9/21/2023	0.33ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	95.65	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-21	0.330	n/a	9/21/2023	0.33ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	95.65	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-3	0.330	n/a	9/21/2023	0.33ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	95.65	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-4	0.330	n/a	9/21/2023	0.33ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	95.65	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-5	0.330	n/a	9/21/2023	0.33ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	95.65	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-7	0.330	n/a	9/20/2023	0.33ND	No	23	MW-13,MW-8,MW-14	n/a	n/a	95.65	n/a	n/a	0.003168	NP Inter (NDs) 1 of 2
Boron (ug/L)	MW-19	1340	n/a	9/21/2023	38ND	No	23	MW-13,MW-14,MW-8	4.676	1.099	13.04	None	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-21	1340	n/a	9/21/2023	1300	No	23	MW-13,MW-14,MW-8	4.676	1.099	13.04	None	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-3	1340	n/a	9/21/2023	1300	No	23	MW-13,MW-14,MW-8	4.676	1.099	13.04	None	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-4	1340	n/a	9/21/2023	3400	Yes	23	MW-13,MW-14,MW-8	4.676	1.099	13.04	None	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-5	1340	n/a	9/21/2023	420	No	23	MW-13,MW-14,MW-8	4.676	1.099	13.04	None	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-7	1340	n/a	9/20/2023	110	No	23	MW-13,MW-14,MW-8	4.676	1.099	13.04	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-19	51.9	n/a	9/21/2023	19	No	74	MW-13,MW-14,MW-8	n/a	n/a	40.54	n/a	n/a	0.0003516	NP Inter (normality) ...
Chloride (mg/L)	MW-21	51.9	n/a	9/21/2023	18	No	74	MW-13,MW-14,MW-8	n/a	n/a	40.54	n/a	n/a	0.0003516	NP Inter (normality) ...
Chloride (mg/L)	MW-3	51.9	n/a	9/21/2023	14	No	74	MW-13,MW-14,MW-8	n/a	n/a	40.54	n/a	n/a	0.0003516	NP Inter (normality) ...
Chloride (mg/L)	MW-4	51.9	n/a	9/21/2023	12	No	74	MW-13,MW-14,MW-8	n/a	n/a	40.54	n/a	n/a	0.0003516	NP Inter (normality) ...
Chloride (mg/L)	MW-5	51.9	n/a	9/21/2023	4.5J	No	74	MW-13,MW-14,MW-8	n/a	n/a	40.54	n/a	n/a	0.0003516	NP Inter (normality) ...
Chloride (mg/L)	MW-7	51.9	n/a	9/20/2023	19	No	74	MW-13,MW-14,MW-8	n/a	n/a	40.54	n/a	n/a	0.0003516	NP Inter (normality) ...
Cobalt (ug/L)	MW-19	3.58	n/a	9/21/2023	0.085ND	No	23	MW-13,MW-14,MW-8	-0.9294	0.9591	8.696	None	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-21	3.58	n/a	9/21/2023	1	No	23	MW-13,MW-14,MW-8	-0.9294	0.9591	8.696	None	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-3	3.58	n/a	9/21/2023	0.75	No	23	MW-13,MW-14,MW-8	-0.9294	0.9591	8.696	None	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-4	3.58	n/a	9/21/2023	0.9	No	23	MW-13,MW-14,MW-8	-0.9294	0.9591	8.696	None	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-5	3.58	n/a	9/21/2023	0.53	No	23	MW-13,MW-14,MW-8	-0.9294	0.9591	8.696	None	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-7	3.58	n/a	9/20/2023	0.31J	No	23	MW-13,MW-14,MW-8	-0.9294	0.9591	8.696	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-19	5220	n/a	9/21/2023	18ND	No	23	MW-13,MW-14,MW-8	5.438	1.358	4.348	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-21	5220	n/a	9/21/2023	730	No	23	MW-13,MW-14,MW-8	5.438	1.358	4.348	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-3	5220	n/a	9/21/2023	430	No	23	MW-13,MW-14,MW-8	5.438	1.358	4.348	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-4	5220	n/a	9/21/2023	1900	No	23	MW-13,MW-14,MW-8	5.438	1.358	4.348	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-5	5220	n/a	9/21/2023	360	No	23	MW-13,MW-14,MW-8	5.438	1.358	4.348	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-7	5220	n/a	9/20/2023	54J	No	23	MW-13,MW-14,MW-8	5.438	1.358	4.348	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-19	2.55	n/a	9/21/2023	0.24ND	No	23	MW-13,MW-14,MW-8	-1.083	0.8793	17.39	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-21	2.55	n/a	9/21/2023	1.4	No	23	MW-13,MW-14,MW-8	-1.083	0.8793	17.39	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-3	2.55	n/a	9/21/2023	0.68	No	23	MW-13,MW-14,MW-8	-1.083	0.8793	17.39	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-4	2.55	n/a	9/21/2023	0.28J	No	23	MW-13,MW-14,MW-8	-1.083	0.8793	17.39	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-5	2.55	n/a	9/21/2023	0.6	No	23	MW-13,MW-14,MW-8	-1.083	0.8793	17.39	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-7	2.55	n/a	9/20/2023	0.24ND	No	23	MW-13,MW-14,MW-8	-1.083	0.8793	17.39	None	ln(x)	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-19	27600	n/a	9/21/2023	18000	No	23	MW-13,MW-14,MW-8	20317	3178	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-21	27600	n/a	9/21/2023	20000	No	23	MW-13,MW-14,MW-8	20317	3178	0	None	No	0.0005787	Param Inter 1 of 2

Prediction Limit

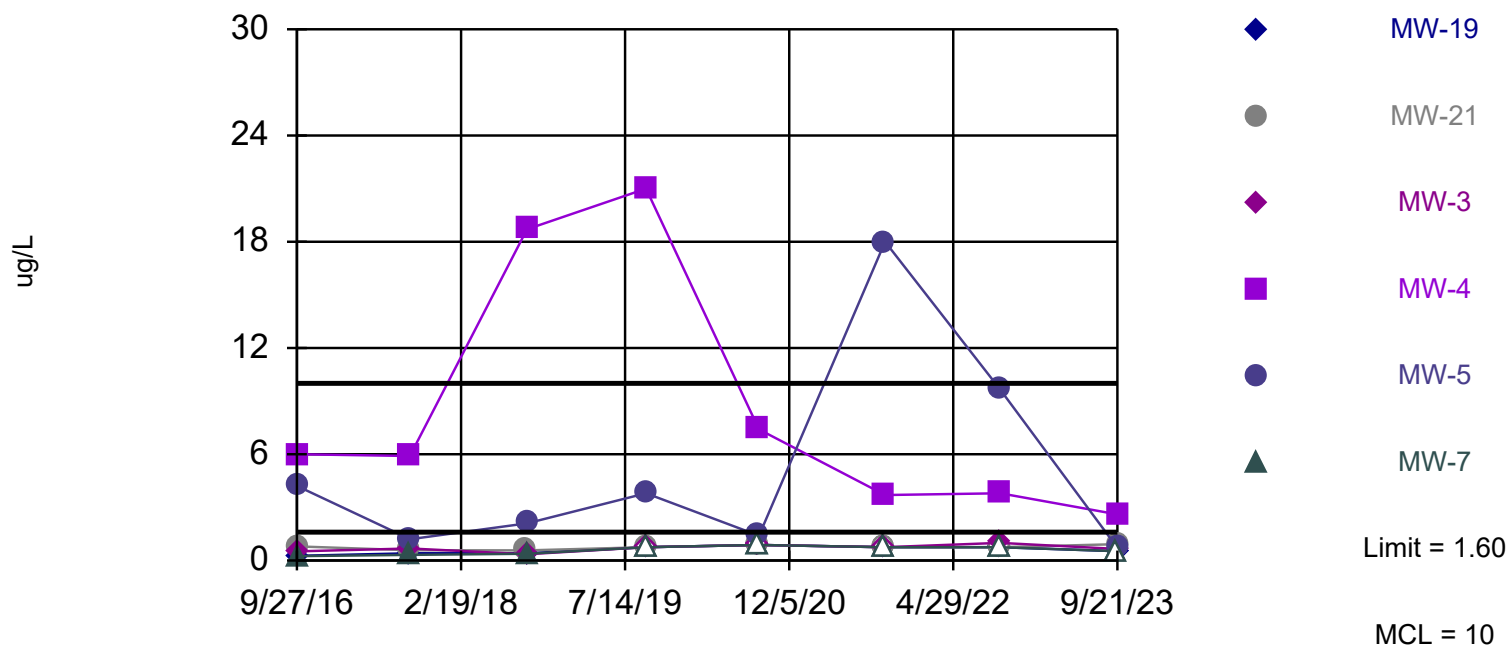
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input Printed 10/30/2023, 11:49 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Magnesium (ug/L)	MW-3	27600	n/a	9/21/2023	18000	No	23	MW-13,MW-14,MW-8 20317	3178	0	None	No		0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-4	27600	n/a	9/21/2023	17000	No	23	MW-13,MW-14,MW-8 20317	3178	0	None	No		0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-5	27600	n/a	9/21/2023	13000	No	23	MW-13,MW-14,MW-8 20317	3178	0	None	No		0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-7	27600	n/a	9/20/2023	18000	No	23	MW-13,MW-14,MW-8 20317	3178	0	None	No		0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-19	637	n/a	9/21/2023	5J	No	23	MW-13,MW-14,MW-8 3.782	1.164	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-21	637	n/a	9/21/2023	160	No	23	MW-13,MW-14,MW-8 3.782	1.164	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-3	637	n/a	9/21/2023	78	No	23	MW-13,MW-14,MW-8 3.782	1.164	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-4	637	n/a	9/21/2023	1200	Yes	23	MW-13,MW-14,MW-8 3.782	1.164	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-5	637	n/a	9/21/2023	18	No	23	MW-13,MW-14,MW-8 3.782	1.164	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-7	637	n/a	9/20/2023	17	No	23	MW-13,MW-14,MW-8 3.782	1.164	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Selenium (ug/L)	MW-19	3.49	n/a	9/21/2023	2.4J	No	23	MW-13,MW-14,MW-8 0.1055	0.4985	43.48	None	ln(x)		0.0005787	Param Inter 1 of 2
Selenium (ug/L)	MW-21	3.49	n/a	9/21/2023	3.8J	No	23	MW-13,MW-14,MW-8 0.1055	0.4985	43.48	None	ln(x)		0.0005787	Param Inter 1 of 2
Selenium (ug/L)	MW-3	3.49	n/a	9/21/2023	7.4	Yes	23	MW-13,MW-14,MW-8 0.1055	0.4985	43.48	None	ln(x)		0.0005787	Param Inter 1 of 2
Selenium (ug/L)	MW-4	3.49	n/a	9/21/2023	1.4ND	No	23	MW-13,MW-14,MW-8 0.1055	0.4985	43.48	None	ln(x)		0.0005787	Param Inter 1 of 2
Selenium (ug/L)	MW-5	3.49	n/a	9/21/2023	54	Yes	23	MW-13,MW-14,MW-8 0.1055	0.4985	43.48	None	ln(x)		0.0005787	Param Inter 1 of 2
Selenium (ug/L)	MW-7	3.49	n/a	9/20/2023	2.3J	No	23	MW-13,MW-14,MW-8 0.1055	0.4985	43.48	None	ln(x)		0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-19	175	n/a	9/21/2023	25	No	74	MW-13,MW-14,MW-8 3.707	0.7077	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-21	175	n/a	9/21/2023	38	No	74	MW-13,MW-14,MW-8 3.707	0.7077	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-3	175	n/a	9/21/2023	96	No	74	MW-13,MW-14,MW-8 3.707	0.7077	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-4	175	n/a	9/21/2023	57	No	74	MW-13,MW-14,MW-8 3.707	0.7077	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-5	175	n/a	9/21/2023	28	No	74	MW-13,MW-14,MW-8 3.707	0.7077	0	None	ln(x)		0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-7	175	n/a	9/20/2023	25	No	74	MW-13,MW-14,MW-8 3.707	0.7077	0	None	ln(x)		0.0005787	Param Inter 1 of 2

Exceeds Limit: MW-4

Arsenic

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 23 background values. 56.52% NDs. Annual per-constituent alpha = 0.04041. Individual comparison alpha = 0.003168 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit

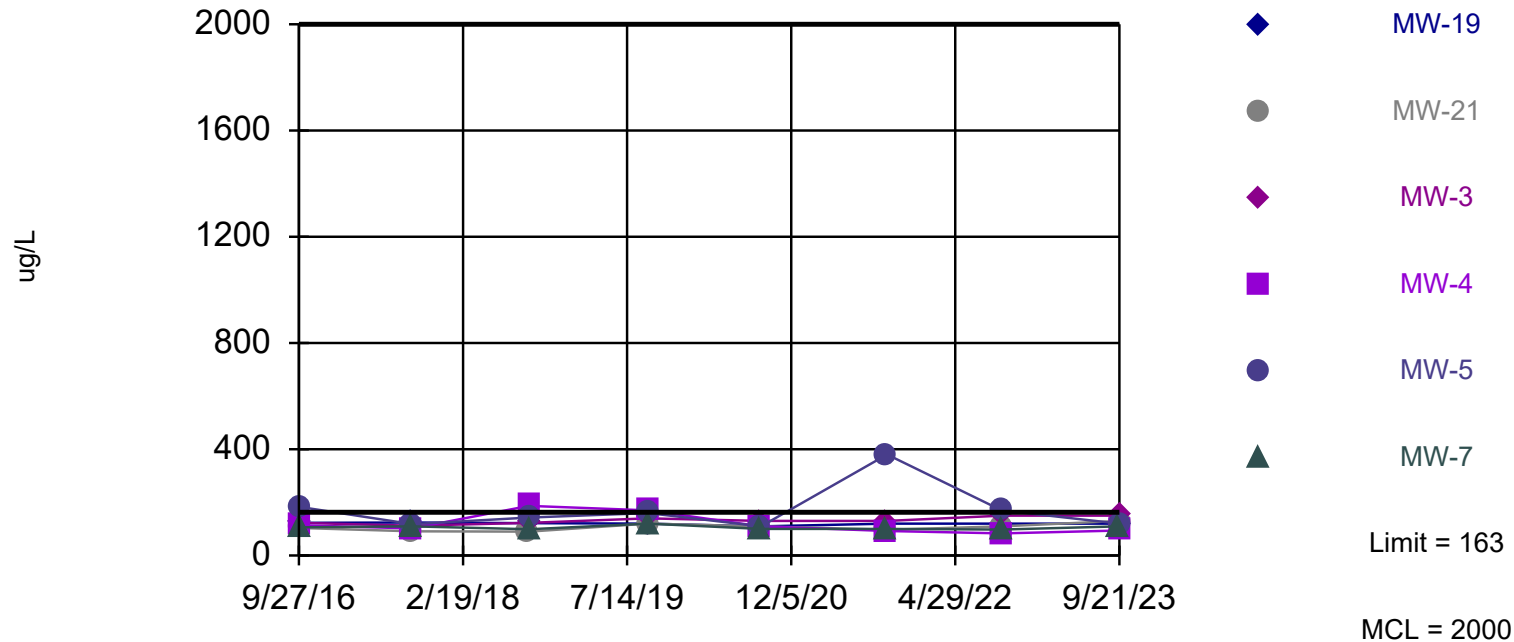
Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 11:49 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-8 (bg)	MW-4	MW-7	MW-19	MW-3	MW-21	MW-5
9/25/2016	0.38 (J)								
9/26/2016		0.64 (J)	0.63 (J)						
9/27/2016				6	0.25 (J)	0.26 (J)			
9/28/2016							0.52 (J)	0.8 (J)	4.2
9/13/2017	0.16 (J)		0.29 (J)	5.9	0.32 (J)				
9/14/2017		1.6				0.41 (J)	0.68 (J)	0.58 (J)	1.2
9/11/2018	0.33 (J)							0.57 (J)	
9/12/2018		0.38 (J)	0.55 (J)	18.7		0.41 (J)			2.1
9/13/2018					0.38 (J)		0.35 (J)		
9/16/2019	<0.75	<0.75							
9/17/2019			<0.75	21	<0.75	<0.75	<0.75	0.75 (J)	3.8
9/1/2020		<0.88	<0.88		<0.88				
9/2/2020	<0.88			7.4		<0.88	<0.88	<0.88	1.4 (J)
9/27/2021	<0.75	<0.75							
9/28/2021					<0.75				
9/29/2021				3.7		<0.75	<0.75	<0.75	18
9/20/2022		<0.75	<0.75		<0.75	<0.75			9.7
9/21/2022	<0.75						1 (J)		
9/22/2022				3.8				<0.75	
9/20/2023	<0.53 (U)	<0.53 (U)			<0.53 (U)				
9/21/2023			0.55 (J)	2.6		<0.53 (U)	0.65 (J)	0.92 (J)	0.72 (J)

Within Limit

Barium

Interwell Parametric



Background Data Summary: Mean=96.69, Std. Dev.=28.68, n=23. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9343, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

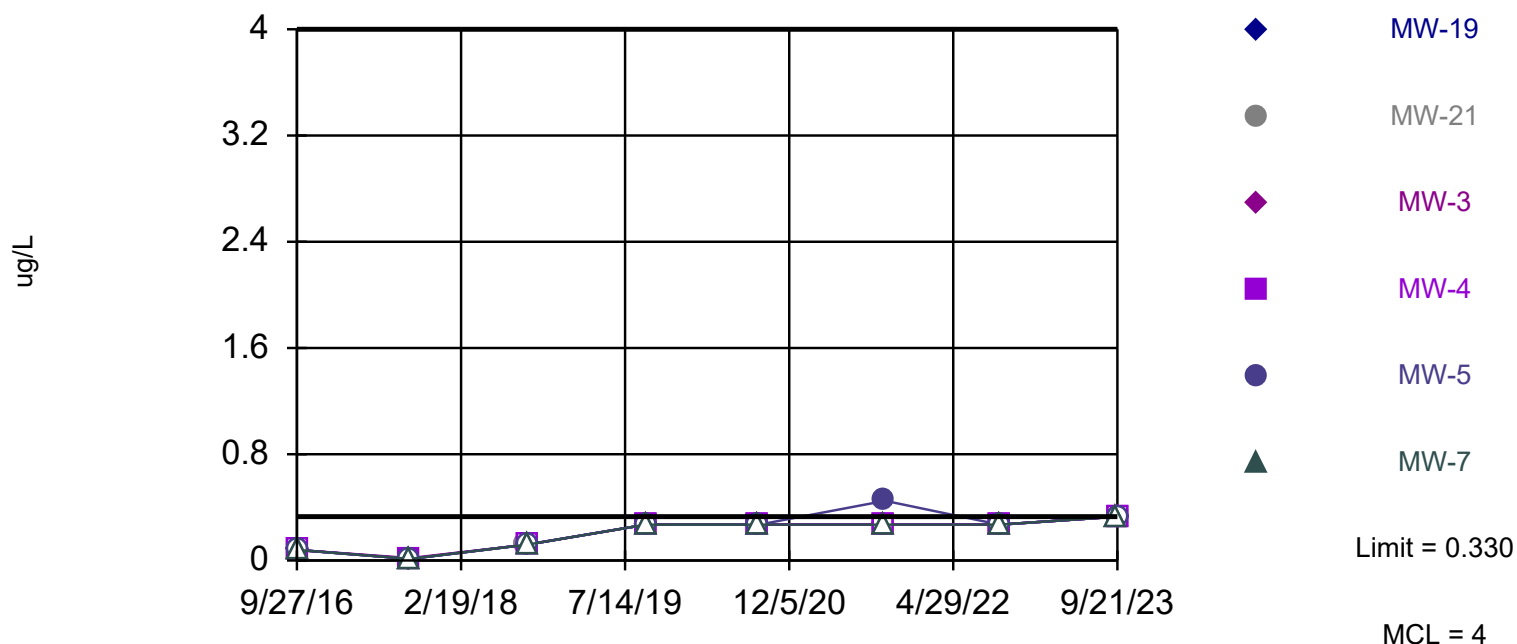
Constituent: Barium (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	91.2								
9/26/2016		62.1							114
9/27/2016			123			114		106	
9/28/2016				104	123		183		
9/13/2017	101					102		110	135
9/14/2017		108	124	91.3	112		118		
9/11/2018	90.4			89.8					
9/12/2018		55.1	122			187	143		118
9/13/2018					123			98.9	
9/16/2019	97	56							
9/17/2019			120	120	140	170	160	120	150
9/1/2020		67						100	140
9/2/2020	96		110	110	130	110	110		
9/27/2021	100	62							
9/28/2021								100	
9/29/2021			120	97	130	92	380		
9/20/2022		59	120				170	98	110
9/21/2022	110				150				
9/22/2022				110		83			
9/20/2023	110	62						110	
9/21/2023			120	130	150	94	120		130

Within Limit

Beryllium

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 23 background values. 95.65% NDs. Annual per-constituent alpha = 0.04041. Individual comparison alpha = 0.003168 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

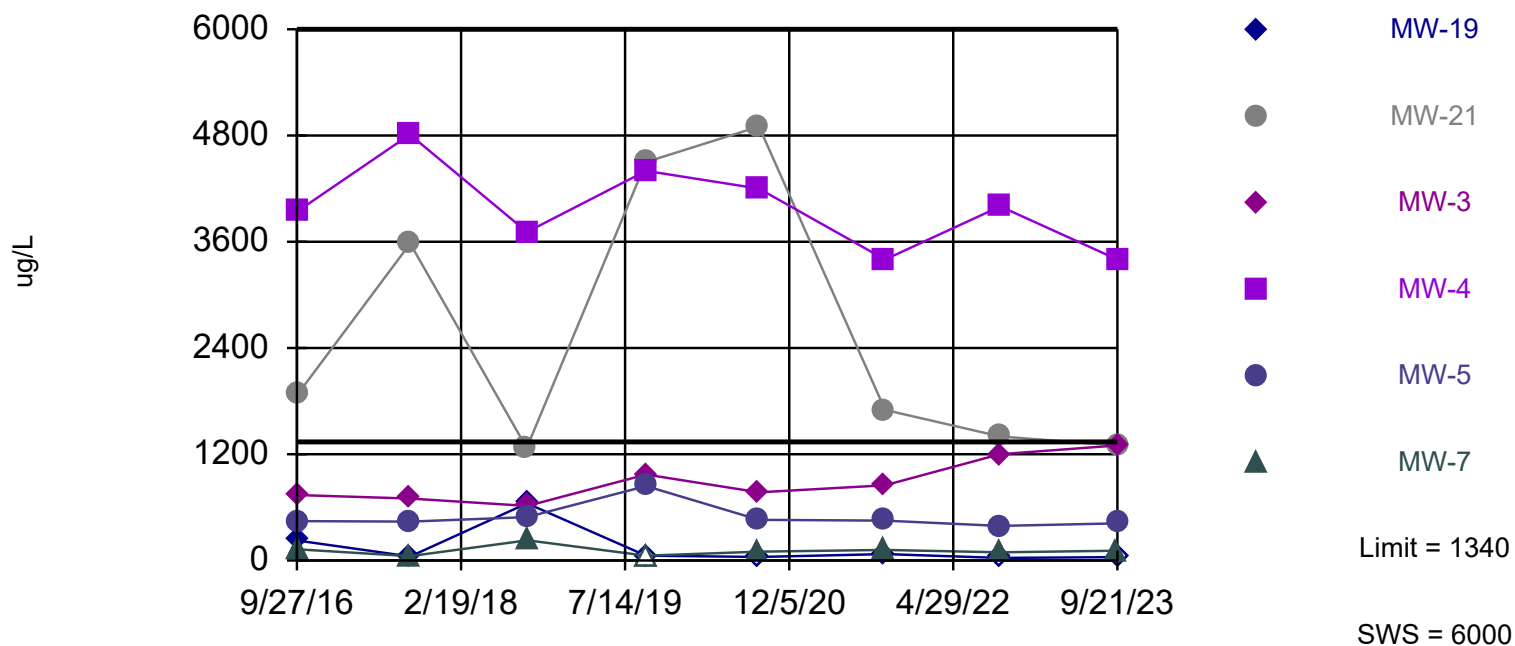
Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-8 (bg)	MW-4	MW-7	MW-19	MW-3	MW-21	MW-5
9/25/2016	<0.08								
9/26/2016		<0.08	<0.08						
9/27/2016				<0.08	<0.08	<0.08			
9/28/2016							<0.08	<0.08	<0.08
9/13/2017	<0.012		<0.012	0.012 (J)	<0.012				
9/14/2017		0.15 (J)				<0.012	0.018 (J)	0.015 (J)	<0.012
9/11/2018	<0.12							<0.12	
9/12/2018		<0.12	<0.12	<0.12		<0.12			<0.12
9/13/2018					<0.12		<0.12		
9/16/2019	<0.27	<0.27							
9/17/2019			<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
9/1/2020		<0.27	<0.27		<0.27				
9/2/2020	<0.27			<0.27		<0.27	<0.27	<0.27	<0.27
9/27/2021	<0.27	<0.27							
9/28/2021					<0.27				
9/29/2021				<0.27		<0.27	<0.27	<0.27	0.45 (J)
9/20/2022		<0.27	<0.27		<0.27	<0.27			<0.27
9/21/2022	<0.27						<0.27		
9/22/2022				<0.27				<0.27	
9/20/2023	<0.33 (U)	<0.33 (U)			<0.33 (U)				
9/21/2023			<0.33 (U)	<0.33 (U)		<0.33 (U)	<0.33 (U)	<0.33 (U)	<0.33 (U)

Exceeds Limit: MW-4

Boron

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=4.676, Std. Dev.=1.099, n=23, 13.04% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9707, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

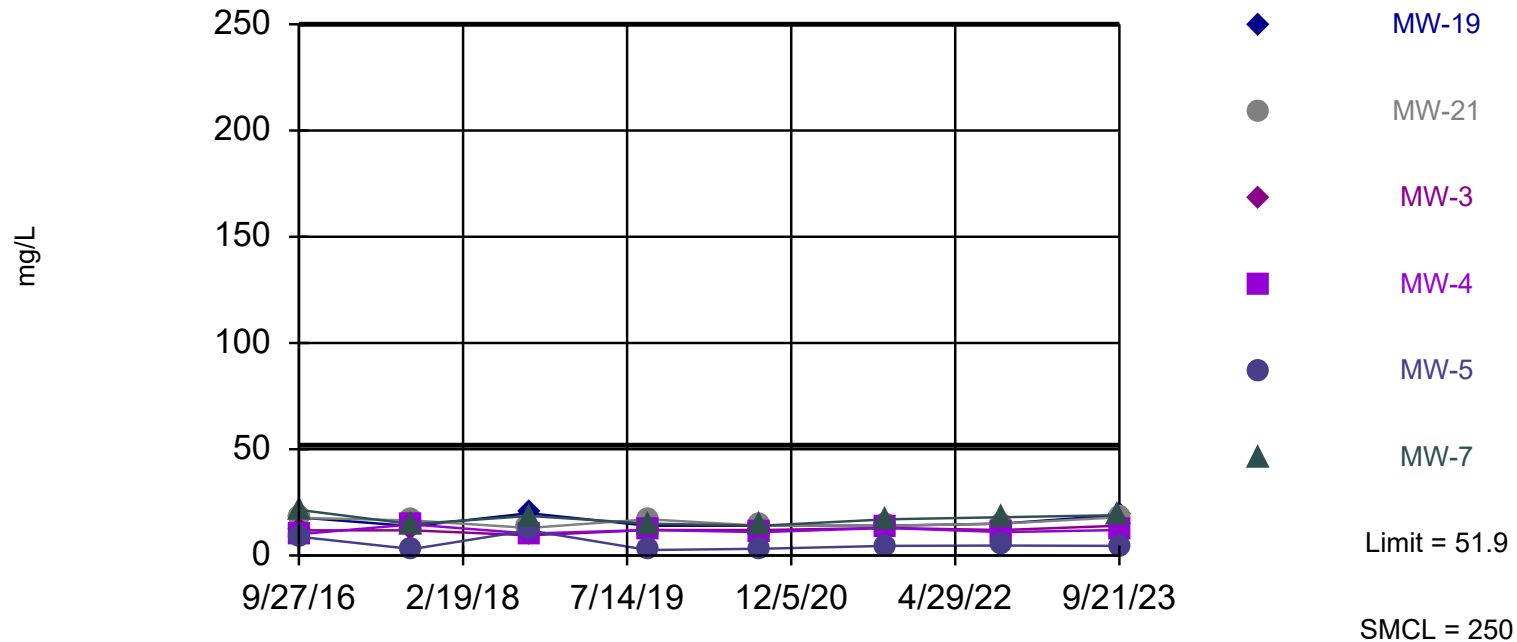
Constituent: Boron (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	50.2 (J)								
9/26/2016		282							<50
9/27/2016			226			3940		126	
9/28/2016				1870	740		444		
9/13/2017	48.6 (J)					4810		49 (J)	37.6 (J)
9/14/2017		169	44.7 (J)	3580	700		440		
9/11/2018	41.4 (J)			1270					
9/12/2018		651	645			3710	490		<12.5
9/13/2018					616			228	
9/16/2019	130 (J)	360							
9/17/2019			<110	4500	970	4400	840	<110	160 (J)
9/1/2020		450						100	<80
9/2/2020	88 (J)		<80	4900	770	4200	460		
9/27/2021	110	280							
9/28/2021								120	
9/29/2021			72 (J)	1700	850	3400	450		
9/20/2022		500	<58				390	92 (J)	76 (J)
9/21/2022	94 (J)				1200				
9/22/2022				1400		4000			
9/20/2023	120	220						110	
9/21/2023			<76 (U)	1300	1300	3400	420		81 (J)

Within Limit

Chloride

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 74 background values. 40.54% NDs. Annual per-constituent alpha = 0.004561. Individual comparison alpha = 0.0003516 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

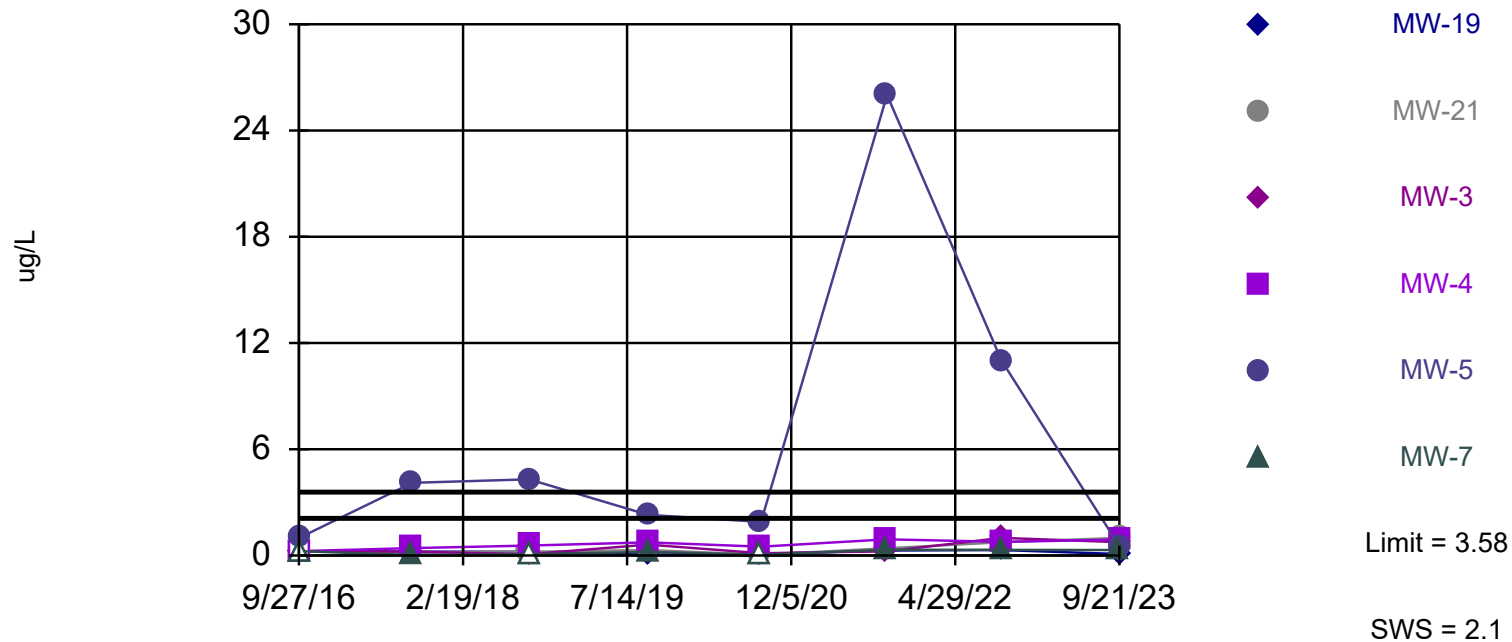
Constituent: Chloride (mg/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-8 (bg)	MW-7	MW-19	MW-4	MW-21	MW-5	MW-3
9/1/1999	<5	<5	46						
9/1/2000	<5	<5	19.5						
9/1/2001	5.9	5.9	18.3						
9/1/2002	<5	<5	11.9						
9/1/2003	<5	<5	14.5						
9/1/2004	<5	<5	27.1						
9/1/2005	<5	<5	18.5						
9/1/2006	<5	<5	14.6						
9/1/2007	<5	<5	40.6						
9/1/2008	<5	<5	51.9						
9/1/2009	<5	<5	43.4						
9/1/2010	<1	<2	44.5						
9/1/2011	<5	<2	30						
9/1/2012	<5	<5	33						
9/1/2013	1.4	1.6	19.7						
9/1/2014	<1	<1	41.3						
9/1/2015	1.1	<1	26.1						
9/25/2016	2.8								
9/26/2016		1.3	30.1						
9/27/2016				21.5	17.9	10			
9/28/2016							17.7	8.8	11.8
9/13/2017	4		19.8	14.8		14.6			
9/14/2017		1.7			13.8		16.5	3	11.8
9/11/2018	3.2						13		
9/12/2018		2.2	27.4		19.9	10.3		11.8	
9/13/2018				18.6					9.5
9/16/2019	1.9 (J,B)	2.1 (J,B)							
9/17/2019			17 (B)	15 (B)	14 (B)	12 (B)	17 (B)	2.6 (J,B)	12 (B)
9/1/2020		3.3 (J,B)	15 (B)	14 (B)					
9/2/2020	2.4 (J,B)				14 (B)	11 (B)	14 (B)	3.2 (J,B)	12 (B)
9/27/2021	3.1 (J)	3.9 (J)							
9/28/2021				17					
9/29/2021					14	13	14	4.5 (J)	13
9/20/2022		3.6 (J)	17	18	15			4.7 (J)	
9/21/2022	2.7 (J)								12
9/22/2022						11	15		
9/20/2023	<2.3 (U)	3.6 (J)		19					
9/21/2023			20		19	12	18	4.5 (J)	14

Within Limit

Cobalt

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=-0.9294, Std. Dev.=0.9591, n=23, 8.696% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9822, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

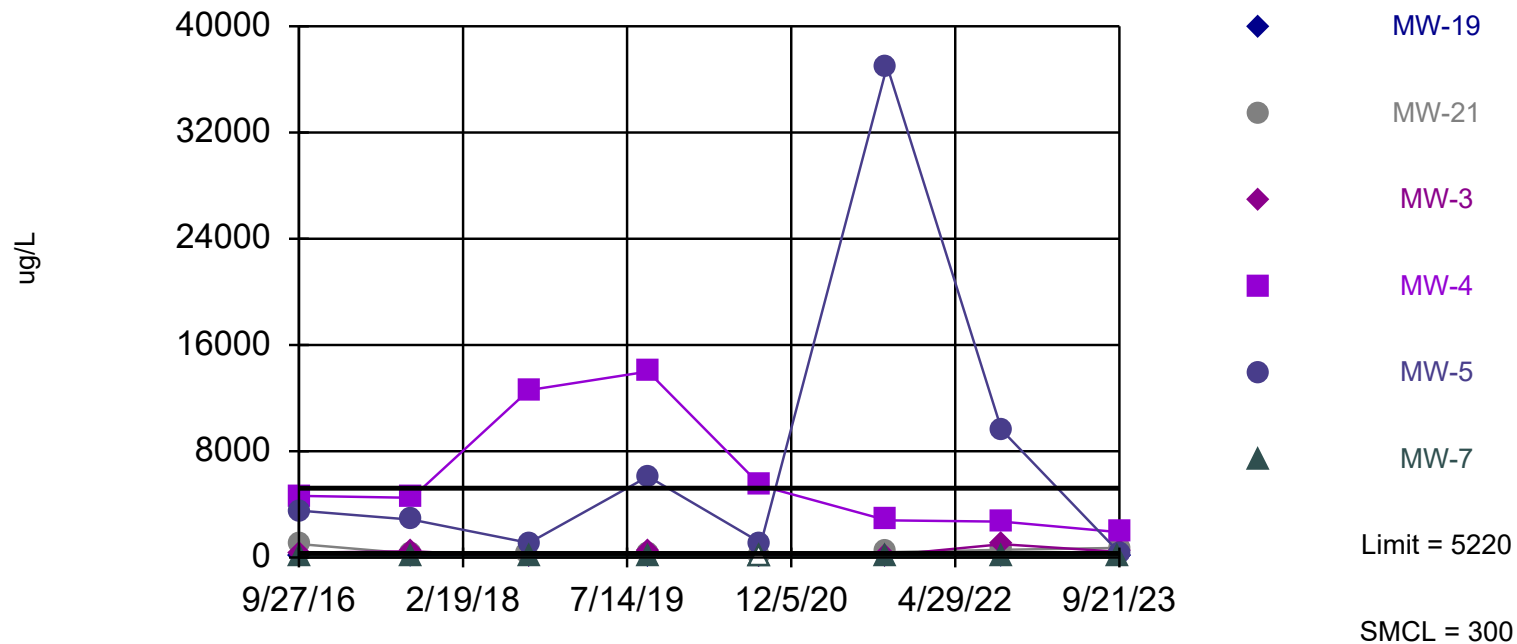
Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	1.2								
9/26/2016		1.3							<0.5
9/27/2016			<0.5			<0.5		<0.5	
9/28/2016				<0.5	<0.5		1		
9/13/2017	0.15 (J)					0.42 (J)		0.027 (J)	0.051 (J)
9/14/2017		3	0.22 (J)	0.16 (J)	0.22 (J)		4.1		
9/11/2018	0.52 (J)			0.21 (J)					
9/12/2018		0.5 (J)	0.21 (J)			0.56 (J)	4.3		0.15 (J)
9/13/2018					<0.15			<0.15	
9/16/2019	0.16 (J)	0.17 (J)							
9/17/2019			<0.091	0.31 (J)	0.62	0.74	2.3	0.2 (J)	0.51
9/1/2020		0.37 (J)						<0.091	0.62
9/2/2020	0.53		0.094 (J)	<0.091	0.13 (J)	0.5	1.9		
9/27/2021	<0.19	0.39 (J)							
9/28/2021								0.33 (J)	
9/29/2021			0.28 (J)	0.41 (J)	0.24 (J)	0.91	26		
9/20/2022		0.59	0.31 (J)				11	0.32 (J)	0.37 (J)
9/21/2022	0.73				1				
9/22/2022				0.75		0.77			
9/20/2023	0.2 (J)	0.44 (J)						0.31 (J)	
9/21/2023			<0.17 (U)	1	0.75	0.9	0.53		1.7

Within Limit

Iron

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=5.438, Std. Dev.=1.358, n=23, 4.348% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9762, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit

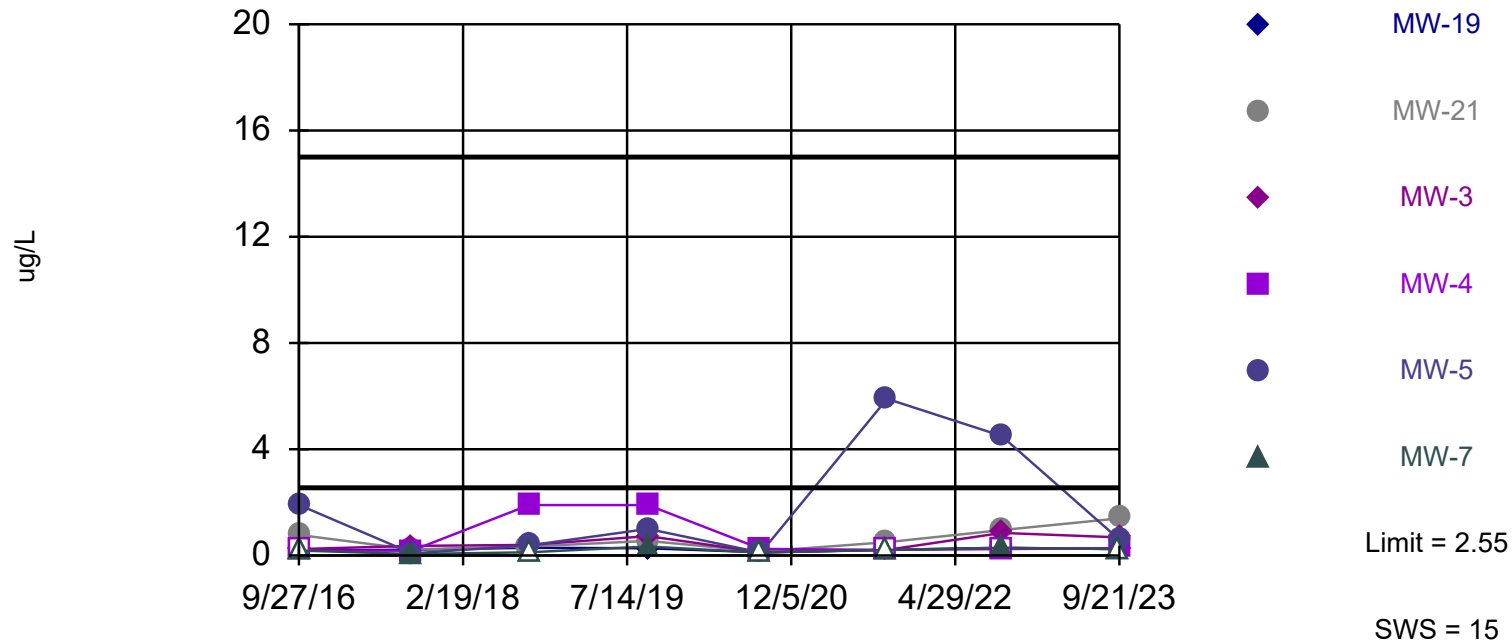
Constituent: Iron (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	1240								
9/26/2016		1770							820
9/27/2016			<12.8			4640		51.9	
9/28/2016				1010	362		3530		
9/13/2017	162					4500		11.9 (J)	18.7 (J)
9/14/2017		4440	162	297	475		2850		
9/11/2018	289			195					
9/12/2018		267	101			12600	1100		45.2 (J)
9/13/2018					42.2 (J)			41.7 (J)	
9/16/2019	76 (J)	130							
9/17/2019			<66	320	390	14000	6100	95 (J)	200
9/1/2020		130						<50	520
9/2/2020	230		<50	110	72 (J)	5400	1100		
9/27/2021	<36	140							
9/28/2021								110	
9/29/2021			130	400	170	2800	37000		
9/20/2022		240	170				9600	90 (J)	270
9/21/2022	440				1000				
9/22/2022				580		2700			
9/20/2023	78 (J)	120						54 (J)	
9/21/2023			<36 (U)	730	430	1900	360		1200

Within Limit

Lead

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=-1.083, Std. Dev.=0.8793, n=23, 17.39% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9302, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

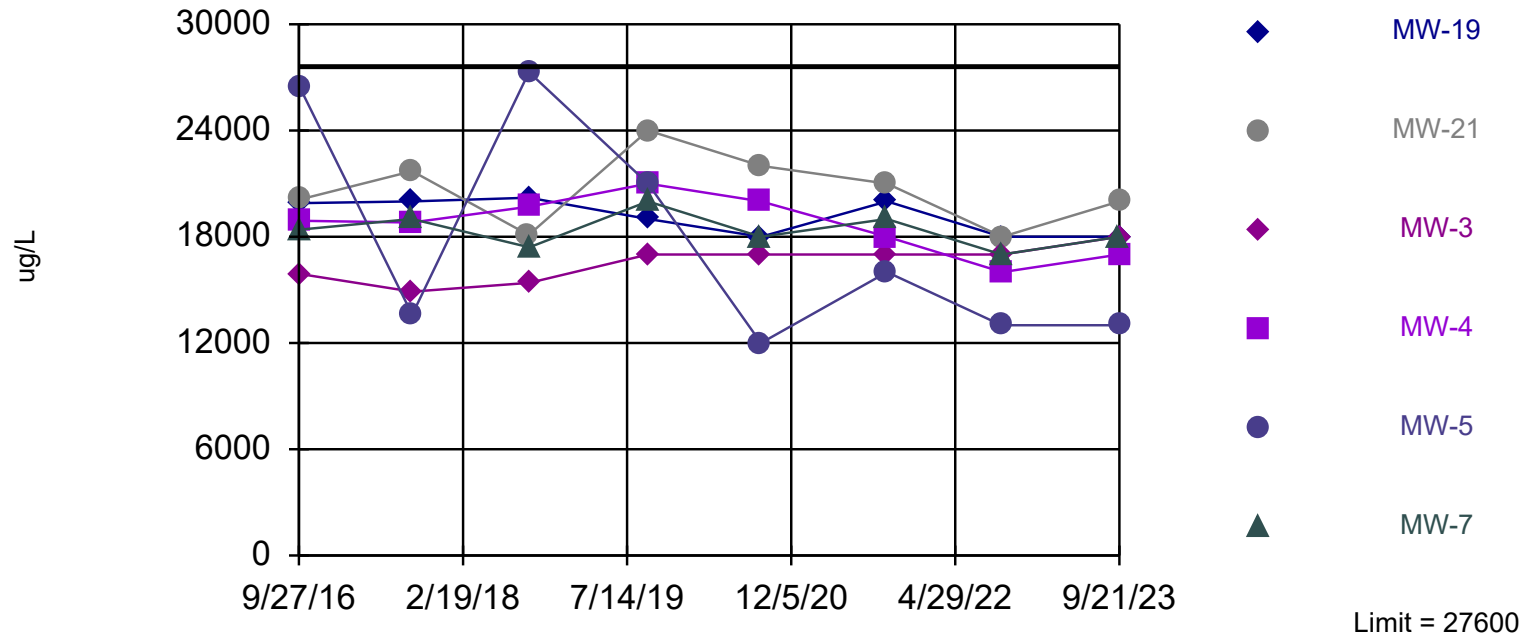
Constituent: Lead (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	0.71 (J)								
9/26/2016		0.98 (J)							0.42 (J)
9/27/2016			<0.19			<0.19		<0.19	
9/28/2016				0.77 (J)	0.24 (J)		1.9		
9/13/2017	0.13 (J)					0.18 (J)		0.056 (J)	0.053 (J)
9/14/2017		1.9	0.22 (J)	0.23 (J)	0.36 (J)		0.08 (J)		
9/11/2018	0.39 (J)			0.34 (J)					
9/12/2018		0.42 (J)	0.29 (J)			1.9	0.38 (J)		0.14 (J)
9/13/2018					0.4 (J)			<0.12	
9/16/2019	<0.27	0.39 (J)							
9/17/2019			<0.27	0.55	0.73	1.9	1	0.34 (J)	0.29 (J)
9/1/2020		0.22 (J)						<0.11	0.16 (J)
9/2/2020	0.29 (J)		0.12 (J)	0.15 (J)	0.12 (J)	0.25 (J)	0.11 (J)		
9/27/2021	<0.21	<0.21							
9/28/2021								<0.21	
9/29/2021			<0.21	0.5	<0.21	<0.21	5.9		
9/20/2022		0.4 (J)	0.29 (J)				4.5	0.29 (J)	0.31 (J)
9/21/2022	0.47 (J)				0.85				
9/22/2022				0.96		<0.24			
9/20/2023	<0.24 (U)	0.26 (J)						<0.24 (U)	
9/21/2023			<0.24 (U)	1.4	0.68	0.28 (J)	0.6		3.5

Within Limit

Magnesium

Interwell Parametric



Background Data Summary: Mean=20317, Std. Dev.=3178, n=23. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8853, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

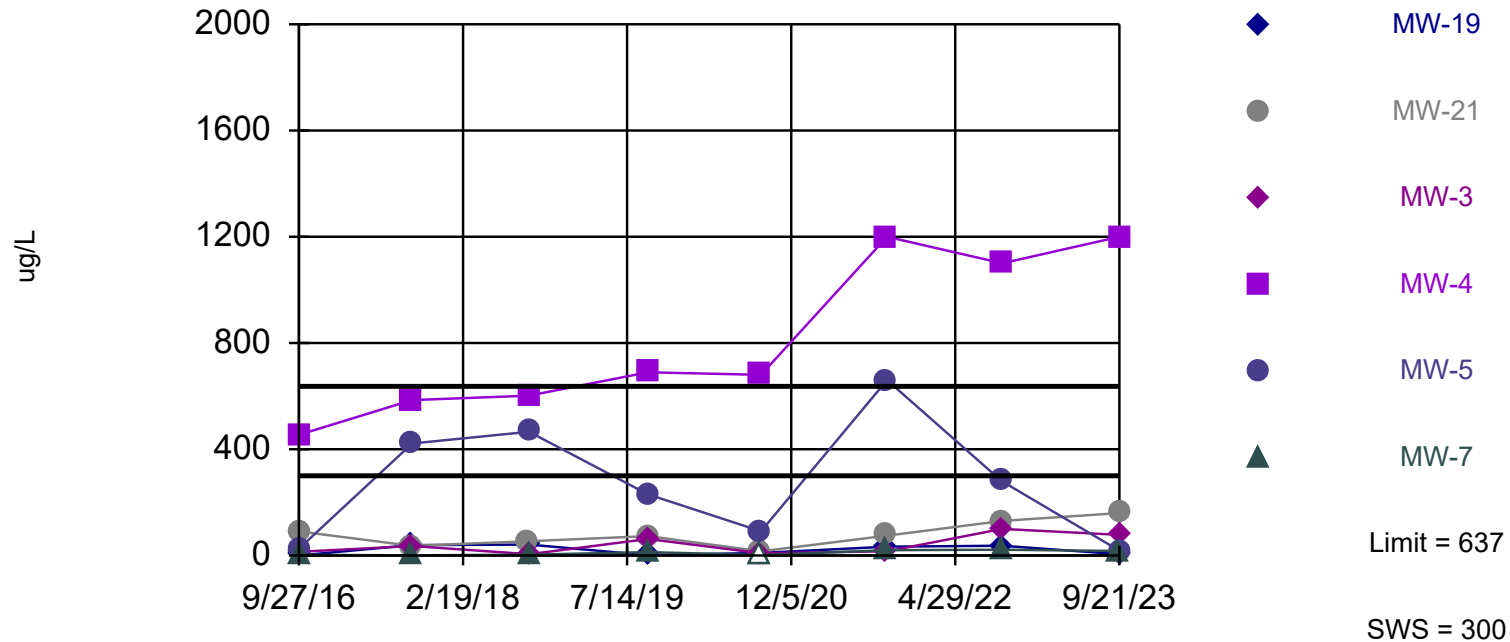
Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	19000								
9/26/2016		25000							19600
9/27/2016			19900			18900		18400	
9/28/2016				20100	15900		26500		
9/13/2017	17900					18800		19000	22400
9/14/2017		29800	20000	21700	14900		13600		
9/11/2018	17600			18100					
9/12/2018		21600	20200			19700	27300		17400
9/13/2018					15400			17400	
9/16/2019	16000	22000							
9/17/2019			19000	24000	17000	21000	21000	20000	23000
9/1/2020		22000						18000	22000
9/2/2020	18000		18000	22000	17000	20000	12000		
9/27/2021	19000	23000							
9/28/2021								19000	
9/29/2021			20000	21000	17000	18000	16000		
9/20/2022		19000	18000				13000	17000	18000
9/21/2022	18000				17000				
9/22/2022				18000		16000			
9/20/2023	18000	22000						18000	
9/21/2023			18000	20000	18000	17000	13000		17000

Exceeds Limit: MW-4

Manganese

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=3.782, Std. Dev.=1.164, n=23. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9654, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

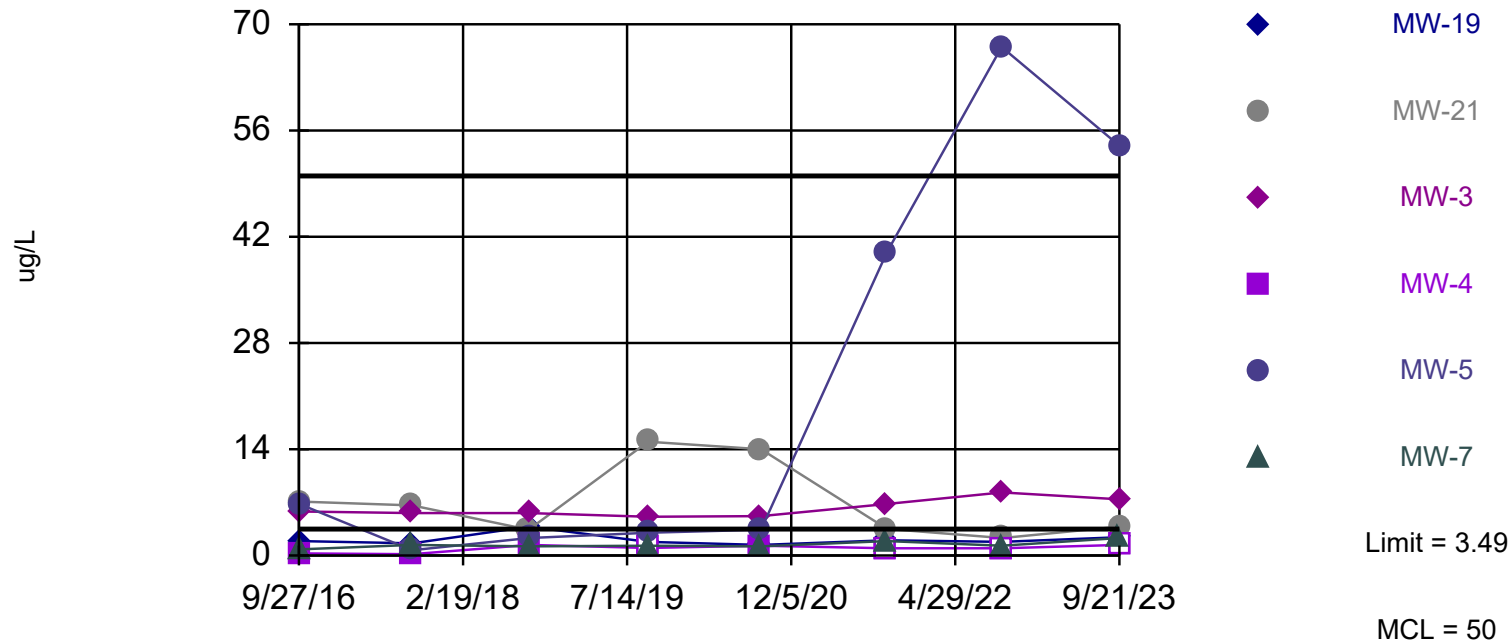
Constituent: Manganese (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	148								
9/26/2016		118							51.6
9/27/2016			0.3 (J)			454		2.6	
9/28/2016				90.3	13.7		26.6		
9/13/2017	14.6					585		0.78 (J)	4.3
9/14/2017		407	39.1	36.1	35.8		422		
9/11/2018	59.8			53.6					
9/12/2018		64.9	40.9			602	466		6.6
9/13/2018					5.2			2.9	
9/16/2019	15	27							
9/17/2019			<2.5	73	62	690	230	13	51
9/1/2020		27						<4	150
9/2/2020	110		10	16	8.6 (J)	680	91		
9/27/2021	5.7 (J)	36							
9/28/2021								20	
9/29/2021			33	75	16	1200	660		
9/20/2022		71	37				280	22	27
9/21/2022	79				100				
9/22/2022				130		1100			
9/20/2023	21	120						17	
9/21/2023			5 (J)	160	78	1200	18		140

Exceeds Limit: MW-3, MW-5

Selenium

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=0.1055, Std. Dev.=0.4985, n=23, 43.48% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9051, critical = 0.881. Kappa = 2.298 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

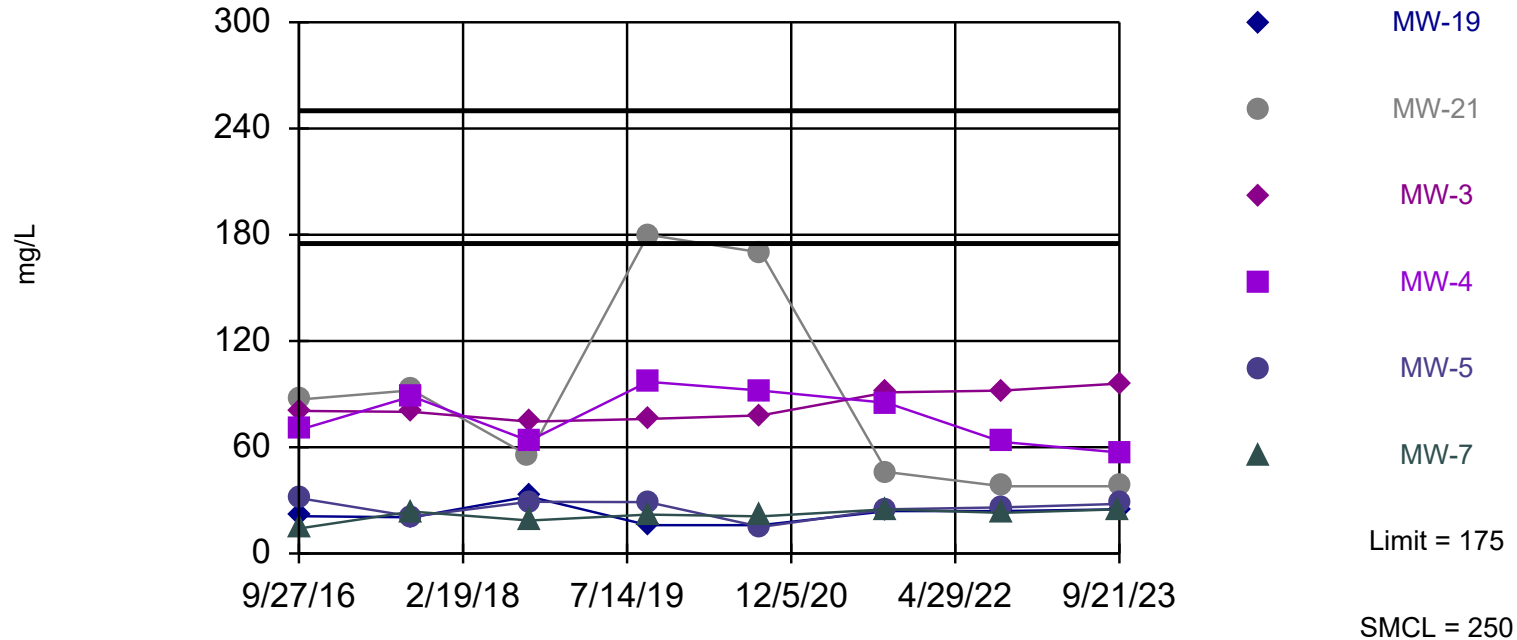
Constituent: Selenium (ug/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/25/2016	1.1								
9/26/2016		1.7							0.41 (J)
9/27/2016			1.9			0.27 (J)		0.8 (J)	
9/28/2016				7.1	5.8		6.8		
9/13/2017	1					0.17 (J)		1.4	1
9/14/2017		0.63 (J)	1.6	6.6	5.6		0.69 (J)		
9/11/2018	1.3			3.4					
9/12/2018		4	3.8			1.4	2.3		0.34 (J)
9/13/2018					5.6			1.2	
9/16/2019	1.1 (J)	1.7 (J)							
9/17/2019			1.8 (J)	15	5.1	<1	3 (J)	1.3 (J)	<1
9/1/2020		1.9 (J)						1.2 (J)	<1
9/2/2020	<1		1.4 (J)	14	5.2	1.3 (J)	3.4 (J)		
9/27/2021	<0.96	<0.96							
9/28/2021								1.9 (J)	
9/29/2021			2 (J)	3.5 (J)	6.8	<0.96	40		
9/20/2022		1.6 (J)	1.8 (J)				67	1.3 (J)	<0.96
9/21/2022	<0.96				8.3				
9/22/2022				2.3 (J)		<0.96			
9/20/2023	<1.4 (U)	<1.4 (U)						2.3 (J)	
9/21/2023			2.4 (J)	3.8 (J)	7.4	<1.4 (U)	54		<1.4 (U)

Within Limit

Sulfate

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=3.707, Std. Dev.=0.7077, n=74. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9703, critical = 0.956. Kappa = 2.057 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/30/2023 11:36 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 11:50 AM View: West Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-14 (bg)	MW-19	MW-21	MW-3	MW-4	MW-5	MW-7	MW-8 (bg)
9/1/1999	56	64							25
9/1/2000	110	48							33
9/1/2001	76	56							23
9/1/2002	110	60							21
9/1/2003	100	32							27
9/1/2004	100	64							29
9/1/2005	120	80							28
9/1/2006	60.5	81.2							22.4
9/1/2007	106	86.9							23.5
9/1/2008	86.5	60							10.9
9/1/2009	80.2	56.5							10.5
9/1/2010	69.2	54.5							5.7
9/1/2011	70.5	51.8							14.3
9/1/2012	72.6	54.2							22.5
9/1/2013	69.3	50							26.5
9/1/2014	33.6	38.7							14
9/1/2015	68.9	49							11.1
9/25/2016	59.7								
9/26/2016		40							9.9
9/27/2016			21.1			69.8		14.1	
9/28/2016				86.9	80.5		31.3		
9/13/2017	67.6					88.7		23.7	21.3
9/14/2017		45.1	20.4	92.2	80		20.9		
9/11/2018	51.6			55.2					
9/12/2018		30.7	32.2			63.6	29.2		13.6
9/13/2018					74.5			18.6	
9/16/2019	48	32							
9/17/2019			16	180	76	97	29	22	17
9/1/2020		28						21	16
9/2/2020	42		16	170	78	92	15		
9/27/2021	110	42							
9/28/2021								25	
9/29/2021			24	46	91	85	25		
9/20/2022		30	24				26	23	20
9/21/2022	120				92				
9/22/2022				38		63			
9/20/2023	120	35						25	
9/21/2023			25	38	96	57	28		16



Attachment E6

Interwell Prediction Limit Analysis Results - East

Prediction Limit

Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input Printed 10/30/2023, 2:58 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Arsenic (ug/L)	MW-11AR	1.60	n/a	9/21/2023	0.89J	No	32	MW-10,MW-13,MW-9,n/a	n/a	62.5	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-18	1.60	n/a	9/20/2023	0.53ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	62.5	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-20	1.60	n/a	9/20/2023	0.96J	No	32	MW-10,MW-13,MW-9,n/a	n/a	62.5	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-22	1.60	n/a	9/2/2020	0.88ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	62.5	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-23	1.60	n/a	9/18/2023	0.53ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	62.5	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Barium (ug/L)	MW-11AR	205	n/a	9/21/2023	49	No	32	MW-10,MW-13,MW-14,17.8	39.73	0	None	No	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-18	205	n/a	9/20/2023	150	No	32	MW-10,MW-13,MW-14,17.8	39.73	0	None	No	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-20	205	n/a	9/20/2023	93	No	32	MW-10,MW-13,MW-14,17.8	39.73	0	None	No	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-22	205	n/a	9/2/2020	54	No	32	MW-10,MW-13,MW-14,17.8	39.73	0	None	No	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-23	205	n/a	9/18/2023	120	No	32	MW-10,MW-13,MW-14,17.8	39.73	0	None	No	No	0.0005787	Param Inter 1 of 2
Beryllium (ug/L)	MW-11AR	0.330	n/a	9/21/2023	0.33ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	90.63	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-18	0.330	n/a	9/20/2023	0.33ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	90.63	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-20	0.330	n/a	9/20/2023	0.33ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	90.63	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-22	0.330	n/a	9/2/2020	0.27ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	90.63	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-23	0.330	n/a	9/18/2023	0.33ND	No	32	MW-10,MW-13,MW-9,n/a	n/a	90.63	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Boron (ug/L)	MW-11AR	815	n/a	9/21/2023	420	No	32	MW-10,MW-13,MW-14,47	1.019	37.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-18	815	n/a	9/20/2023	130	No	32	MW-10,MW-13,MW-14,47	1.019	37.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-20	815	n/a	9/20/2023	3800	Yes	32	MW-10,MW-13,MW-14,47	1.019	37.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-22	815	n/a	9/2/2020	2300	Yes	32	MW-10,MW-13,MW-14,47	1.019	37.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Boron (ug/L)	MW-23	815	n/a	9/18/2023	89J	No	32	MW-10,MW-13,MW-14,47	1.019	37.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-11AR	46.0	n/a	9/21/2023	21	No	100	MW-13,MW-14,MW-9,n/a	n/a	45	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Chloride (mg/L)	MW-18	46.0	n/a	9/20/2023	4.4J	No	100	MW-13,MW-14,MW-9,n/a	n/a	45	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Chloride (mg/L)	MW-20	46.0	n/a	9/20/2023	19	No	100	MW-13,MW-14,MW-9,n/a	n/a	45	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Chloride (mg/L)	MW-22	46.0	n/a	9/2/2020	20	No	100	MW-13,MW-14,MW-9,n/a	n/a	45	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Chloride (mg/L)	MW-23	46.0	n/a	9/18/2023	2.6J	No	100	MW-13,MW-14,MW-9,n/a	n/a	45	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Cobalt (ug/L)	MW-11AR	4.95	n/a	9/21/2023	0.8	No	32	MW-10,MW-13,MW-140.7991	1.093	12.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-18	4.95	n/a	9/20/2023	0.085ND	No	32	MW-10,MW-13,MW-140.7991	1.093	12.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-20	4.95	n/a	9/20/2023	0.085ND	No	32	MW-10,MW-13,MW-140.7991	1.093	12.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-22	4.95	n/a	9/2/2020	0.3J	No	32	MW-10,MW-13,MW-140.7991	1.093	12.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-23	4.95	n/a	9/18/2023	0.085ND	No	32	MW-10,MW-13,MW-140.7991	1.093	12.5	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-11AR	3520	n/a	9/21/2023	580	No	32	MW-10,MW-13,MW-14,323	1.296	9.375	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-18	3520	n/a	9/20/2023	18ND	No	32	MW-10,MW-13,MW-14,323	1.296	9.375	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-20	3520	n/a	9/20/2023	18ND	No	32	MW-10,MW-13,MW-14,323	1.296	9.375	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-22	3520	n/a	9/2/2020	240	No	32	MW-10,MW-13,MW-14,323	1.296	9.375	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-23	3520	n/a	9/18/2023	18ND	No	32	MW-10,MW-13,MW-14,323	1.296	9.375	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-11AR	1.90	n/a	9/21/2023	1.2	No	32	MW-9,MW-10,MW-13,n/a	n/a	43.75	n/a	n/a	n/a	0.001728	NP Inter (normality) ...
Lead (ug/L)	MW-18	1.90	n/a	9/20/2023	0.24ND	No	32	MW-9,MW-10,MW-13,n/a	n/a	43.75	n/a	n/a	n/a	0.001728	NP Inter (normality) ...
Lead (ug/L)	MW-20	1.90	n/a	9/20/2023	0.24J	No	32	MW-9,MW-10,MW-13,n/a	n/a	43.75	n/a	n/a	n/a	0.001728	NP Inter (normality) ...
Lead (ug/L)	MW-22	1.90	n/a	9/2/2020	0.64	No	32	MW-9,MW-10,MW-13,n/a	n/a	43.75	n/a	n/a	n/a	0.001728	NP Inter (normality) ...
Lead (ug/L)	MW-23	1.90	n/a	9/18/2023	0.24ND	No	32	MW-9,MW-10,MW-13,n/a	n/a	43.75	n/a	n/a	n/a	0.001728	NP Inter (normality) ...
Magnesium (ug/L)	MW-11AR	27400	n/a	9/21/2023	34000	Yes	32	MW-10,MW-13,MW-14,9750	3483	0	None	No	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-18	27400	n/a	9/20/2023	21000	No	32	MW-10,MW-13,MW-14,9750	3483	0	None	No	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-20	27400	n/a	9/20/2023	20000	No	32	MW-10,MW-13,MW-14,9750	3483	0	None	No	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-22	27400	n/a	9/2/2020	30000	Yes	32	MW-10,MW-13,MW-14,9750	3483	0	None	No	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-23	27400	n/a	9/18/2023	20000	No	32	MW-10,MW-13,MW-14,9750	3483	0	None	No	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-11AR	3050	n/a	9/21/2023	86	No	32	MW-10,MW-13,MW-14,092	1.792	3.125	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-18	3050	n/a	9/20/2023	7.5J	No	32	MW-10,MW-13,MW-14,092	1.792	3.125	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-20	3050	n/a	9/20/2023	1.8ND	No	32	MW-10,MW-13,MW-14,092	1.792	3.125	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-22	3050	n/a	9/2/2020	21	No	32	MW-10,MW-13,MW-14,092	1.792	3.125	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-23	3050	n/a	9/18/2023	5.8J	No	32	MW-10,MW-13,MW-14,092	1.792	3.125	None	ln(x)	ln(x)	0.0005787	Param Inter 1 of 2

Prediction Limit

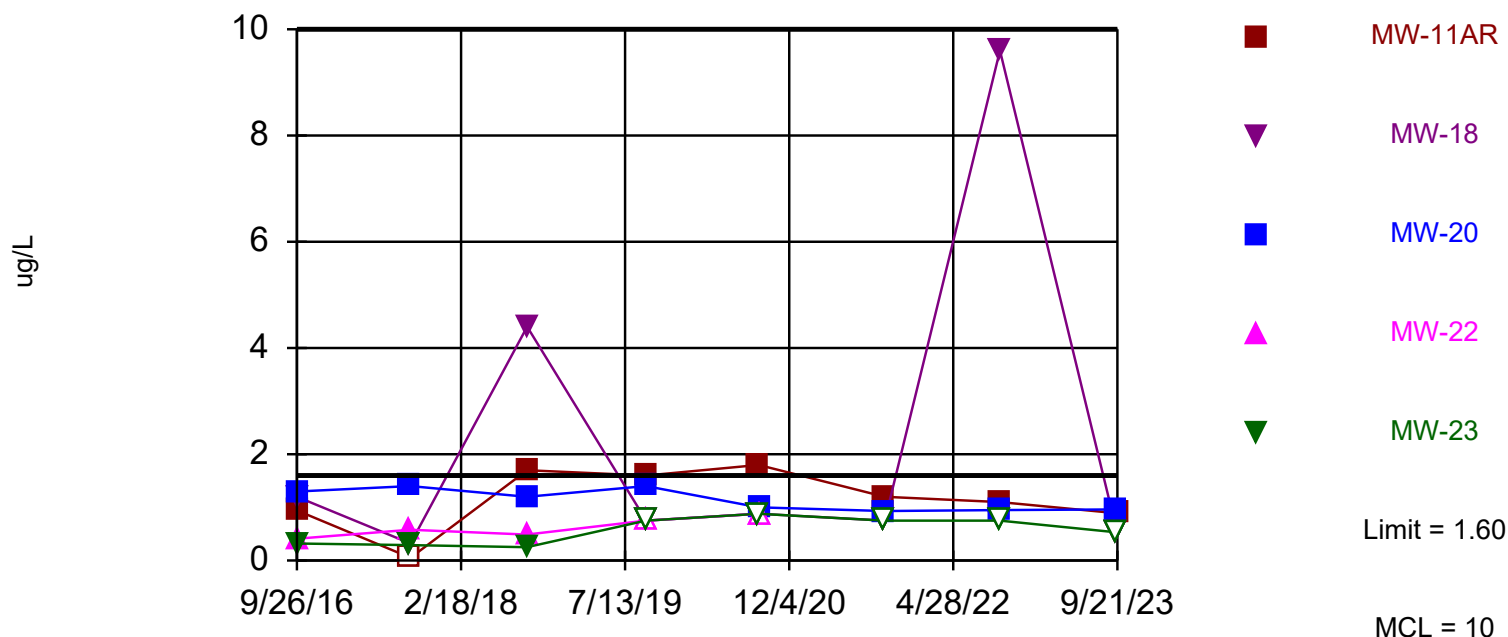
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input Printed 10/30/2023, 2:58 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>Bg Wells</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Selenium (ug/L)	MW-11AR	4.00	n/a	9/21/2023	2.2J	No	32	MW-9,MW-14,MW-10,n/a	n/a	56.25	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Selenium (ug/L)	MW-18	4.00	n/a	9/20/2023	1.4ND	No	32	MW-9,MW-14,MW-10,n/a	n/a	56.25	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Selenium (ug/L)	MW-20	4.00	n/a	9/20/2023	23	Yes	32	MW-9,MW-14,MW-10,n/a	n/a	56.25	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Selenium (ug/L)	MW-22	4.00	n/a	9/2/2020	11	Yes	32	MW-9,MW-14,MW-10,n/a	n/a	56.25	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Selenium (ug/L)	MW-23	4.00	n/a	9/18/2023	1.4ND	No	32	MW-9,MW-14,MW-10,n/a	n/a	56.25	n/a	n/a	n/a	0.001728	NP Inter (NDs) 1 of 2
Sulfate (mg/L)	MW-11AR	120	n/a	9/21/2023	97	No	100	MW-9,MW-10,MW-14,n/a	n/a	0	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Sulfate (mg/L)	MW-18	120	n/a	9/20/2023	64	No	100	MW-9,MW-10,MW-14,n/a	n/a	0	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Sulfate (mg/L)	MW-20	120	n/a	9/20/2023	140	Yes	100	MW-9,MW-10,MW-14,n/a	n/a	0	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Sulfate (mg/L)	MW-22	120	n/a	9/2/2020	150	Yes	100	MW-9,MW-10,MW-14,n/a	n/a	0	n/a	n/a	n/a	0.000193	NP Inter (normality) ...
Sulfate (mg/L)	MW-23	120	n/a	9/18/2023	65	No	100	MW-9,MW-10,MW-14,n/a	n/a	0	n/a	n/a	n/a	0.000193	NP Inter (normality) ...

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 32 background values. 62.5% NDs. Annual per-constituent alpha = 0.02223. Individual comparison alpha = 0.001728 (1 of 2). Comparing 5 points to limit. Assumes 8 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Arsenic Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

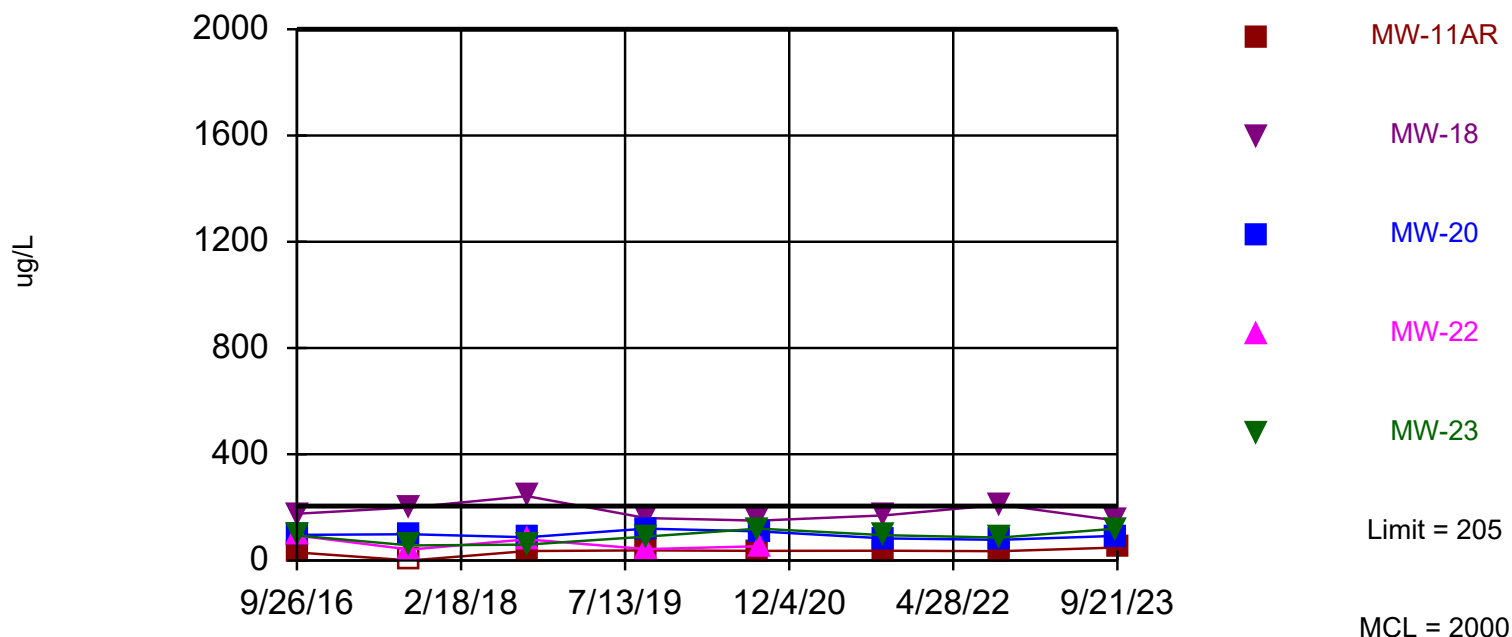
Constituent: Arsenic (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-9 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-11AR	MW-10 (bg)	MW-23
9/25/2016	0.38 (J)	0.55 (J)							
9/26/2016			0.64 (J)	1.2	1.3	0.41 (J)			
9/27/2016							0.94 (J)	0.14 (J)	
9/28/2016									0.32 (J)
9/13/2017	0.16 (J)				1.4	0.58 (J)			0.29 (J)
9/14/2017		0.26 (J)	1.6	0.32 (J)			<0.052		
9/15/2017								0.17 (J)	
9/11/2018	0.33 (J)				1.2	0.49 (J)			0.25 (J)
9/12/2018		0.3 (J)	0.38 (J)	4.4			1.7	0.36 (J)	
9/16/2019	<0.75		<0.75		1.4 (J)	<0.75			<0.75
9/17/2019		<0.75		<0.75			1.6 (J)	<0.75	
9/1/2020		<0.88	<0.88	<0.88			1.8 (J)		<0.88
9/2/2020	<0.88				1 (J)	<0.88			
4/29/2021								<0.75	
9/27/2021	<0.75		<0.75		0.93 (J)				<0.75
9/28/2021		<0.75		<0.75			1.2 (J)	<0.75	
9/20/2022		<0.75	<0.75					<0.75	
9/21/2022	<0.75			9.6	0.95 (J)		1.1 (J)		<0.75
9/18/2023								<0.53 (U)	<0.53 (U)
9/20/2023	<0.53 (U)		<0.53 (U)	<0.53 (U)	0.96 (J)				
9/21/2023		<0.53 (U)					0.89 (J)		

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=117.8, Std. Dev.=39.73, n=32. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9135, critical = 0.904. Kappa = 2.193 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 5 points to limit. Assumes 8 future values.

Constituent: Barium Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

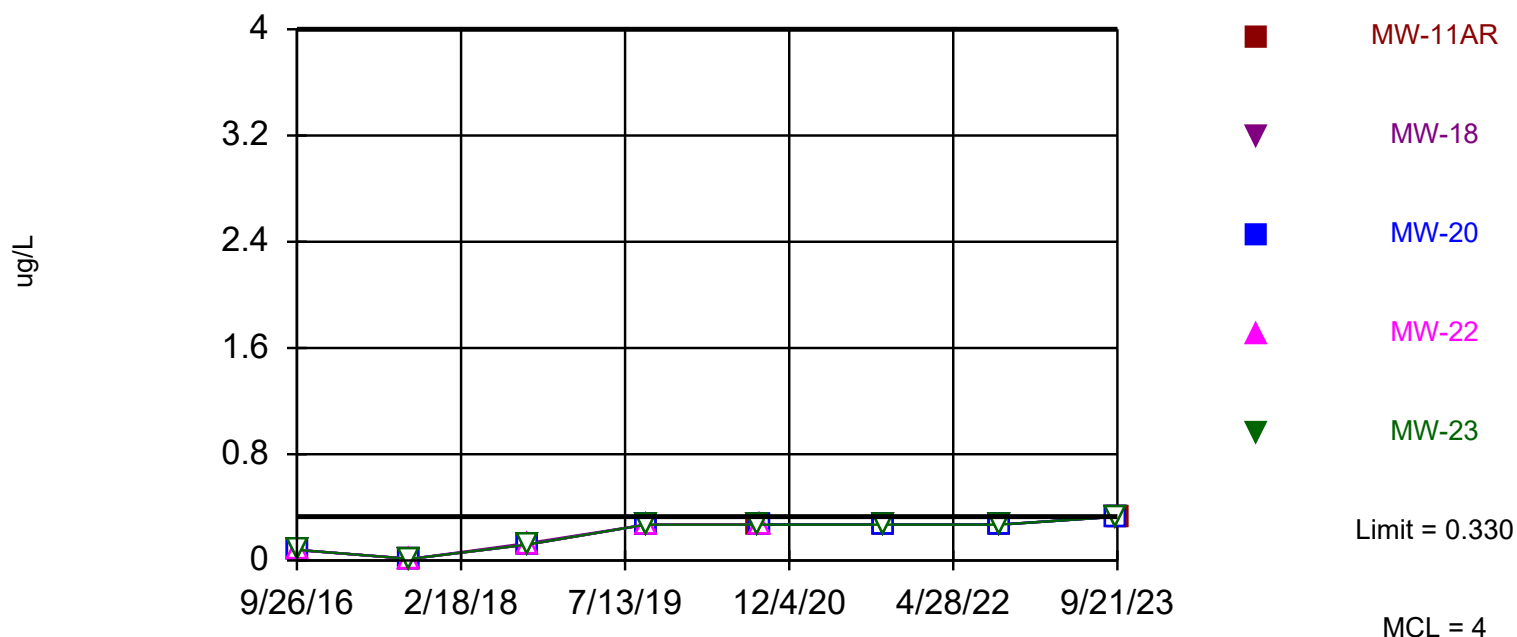
Constituent: Barium (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			91.2						158
9/26/2016				62.1	176	96.5	93.8		
9/27/2016	151	30.1							
9/28/2016								94.2	
9/13/2017			101			99.1	40.9	57	
9/14/2017		<0.095		108	200				138
9/15/2017	149								
9/11/2018			90.4			87.3	79.6	60	
9/12/2018	131	35.6		55.1	242				157
9/16/2019			97	56		120	43	90	
9/17/2019	140	38			160				170
9/1/2020		36		67	150			120	150
9/2/2020			96			110	54		
4/29/2021	160								
9/27/2021			100	62		83		95	
9/28/2021	140	37			170				170
9/20/2022	130			59					160
9/21/2022		35	110		210	78		86	
9/18/2023	160							120	
9/20/2023			110	62	150	93			
9/21/2023		49							180

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 32 background values. 90.63% NDs. Annual per-constituent alpha = 0.02223. Individual comparison alpha = 0.001728 (1 of 2). Comparing 5 points to limit. Assumes 8 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Beryllium Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

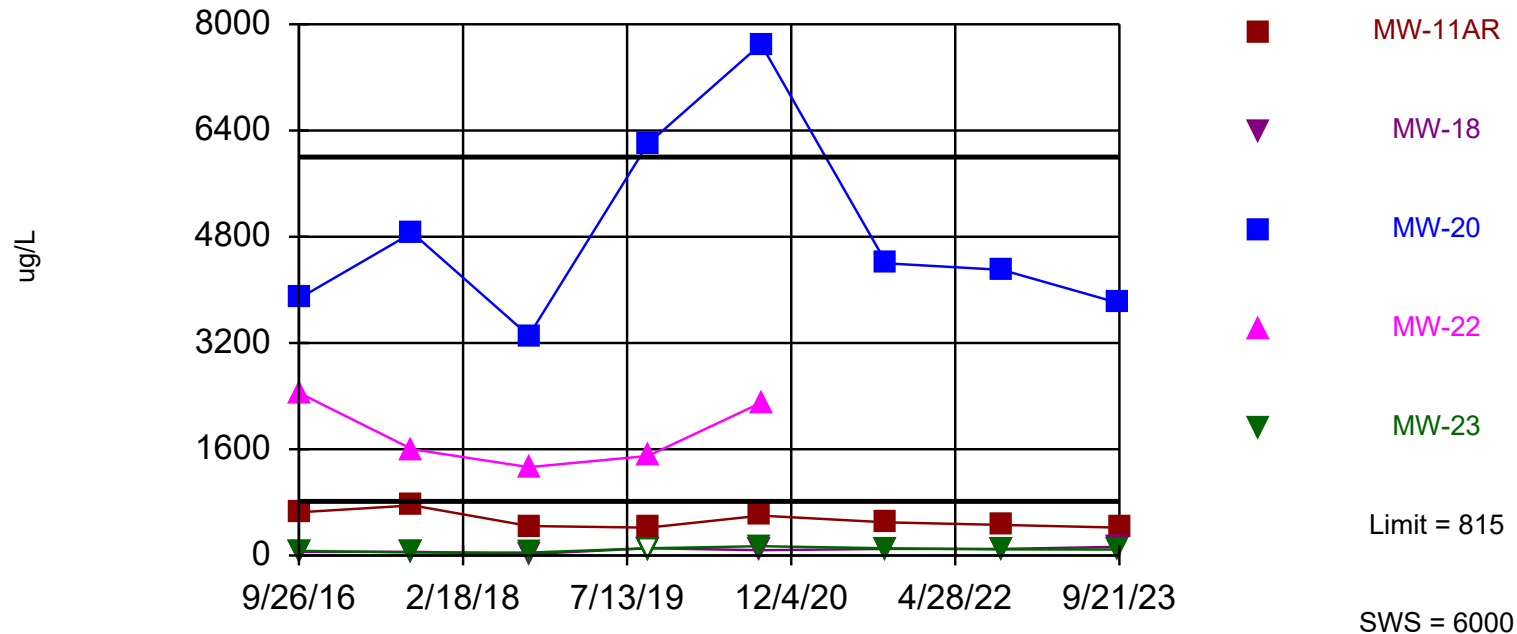
Constituent: Beryllium (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-9 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-11AR	MW-10 (bg)	MW-23
9/25/2016	<0.08	<0.08							
9/26/2016			<0.08	<0.08	<0.08	<0.08			
9/27/2016							<0.08	<0.08	
9/28/2016									<0.08
9/13/2017	<0.012				<0.012	<0.012			<0.012
9/14/2017		0.02 (J)	0.15 (J)	<0.012			<0.012		
9/15/2017								<0.012	
9/11/2018	<0.12				<0.12	<0.12			<0.12
9/12/2018		<0.12	<0.12	0.13 (J)			<0.12	0.17 (J)	
9/16/2019	<0.27		<0.27		<0.27	<0.27			<0.27
9/17/2019		<0.27		<0.27			<0.27	<0.27	
9/1/2020		<0.27	<0.27	<0.27			<0.27		<0.27
9/2/2020	<0.27				<0.27	<0.27			
4/29/2021								<0.27	
9/27/2021	<0.27		<0.27		<0.27				<0.27
9/28/2021		<0.27		<0.27			<0.27	<0.27	
9/20/2022		<0.27	<0.27					<0.27	
9/21/2022	<0.27			<0.27	<0.27		<0.27		<0.27
9/18/2023								<0.33 (U)	<0.33 (U)
9/20/2023	<0.33 (U)		<0.33 (U)	<0.33 (U)	<0.33 (U)				
9/21/2023		<0.33 (U)					<0.33 (U)		

Exceeds Limit: MW-20, MW-22

Prediction Limit

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=4.47, Std. Dev.=1.019, n=32, 37.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9535, critical = 0.904. Kappa = 2.193 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 5 points to limit. Assumes 8 future values.

Constituent: Boron Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

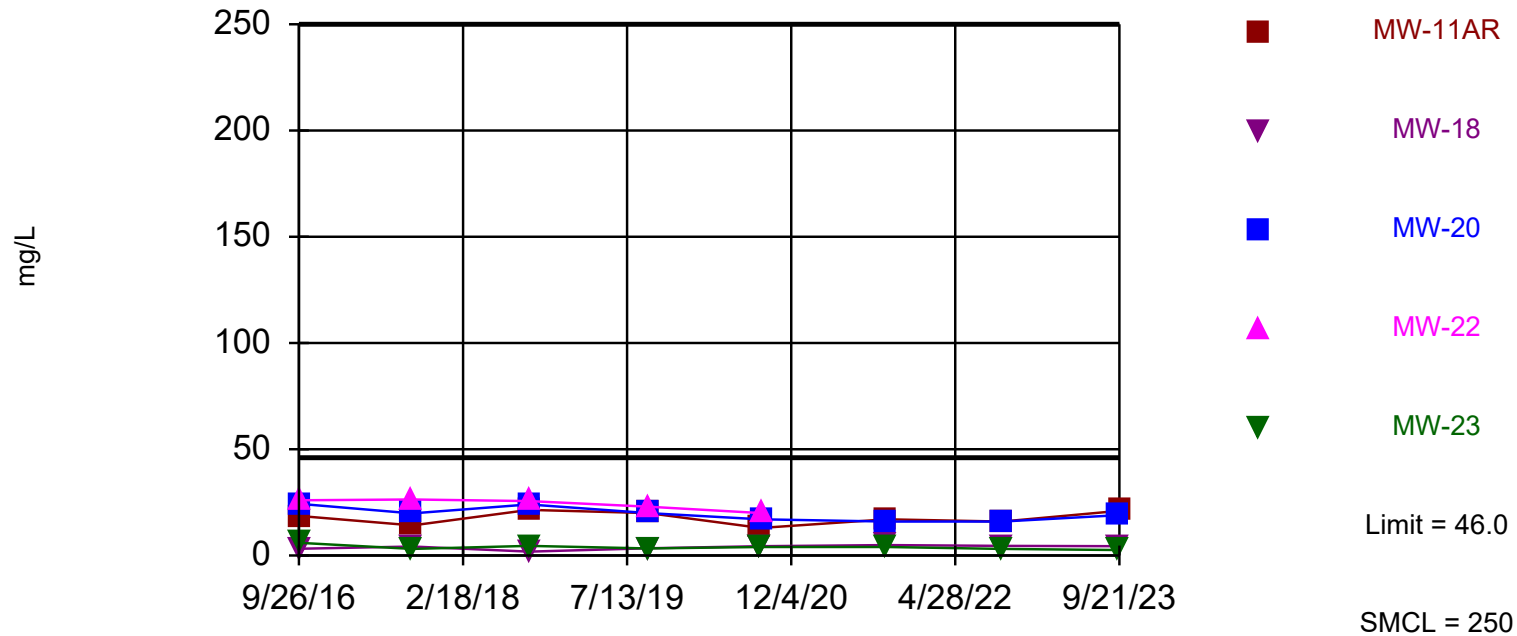
Constituent: Boron (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			50.2 (J)						<50
9/26/2016				282	53.8 (J)	3870	2450		
9/27/2016	<50	650							
9/28/2016								70.1 (J)	
9/13/2017			48.6 (J)			4860	1600	47 (J)	
9/14/2017		755		169	57 (J)				17.2 (J)
9/15/2017	14.1 (J)								
9/11/2018			41.4 (J)			3310	1330	42.9 (J)	
9/12/2018	<12.5	443		651	21.6 (J)				<12.5
9/16/2019			130 (J)	360		6200	1500	<110	
9/17/2019	<110	420			<110				<110
9/1/2020		600		450	<80			140	<80
9/2/2020			88 (J)			7700	2300		
4/29/2021	<58								
9/27/2021			110	280		4400		110	
9/28/2021	74 (J)	500			100				77 (J)
9/20/2022	<58			500					<58
9/21/2022		460	94 (J)		100	4300		92 (J)	
9/18/2023	<76 (U)							89 (J)	
9/20/2023			120	220	130	3800			
9/21/2023		420							<76 (U)

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 100 background values. 45% NDs. Annual per-constituent alpha = 0.002506. Individual comparison alpha = 0.000193 (1 of 2). Comparing 5 points to limit. Assumes 8 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Chloride Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

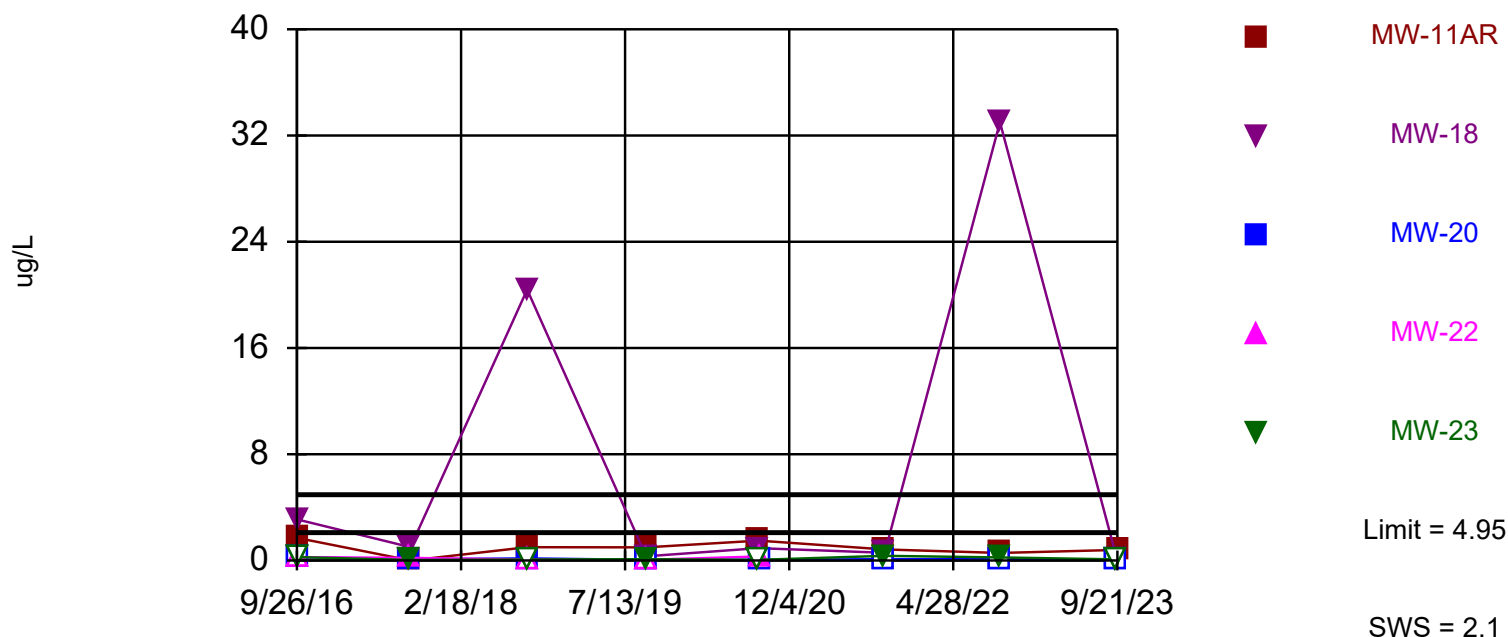
Constituent: Chloride (mg/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-13 (bg)	MW-14 (bg)	MW-9 (bg)	MW-22	MW-20	MW-18	MW-11AR	MW-23
9/1/1999	12	<5	<5	<5					
9/1/2000	12	<5	<5	<5					
9/1/2001	13.8	5.9	5.9	<5					
9/1/2002	12.8	<5	<5	<5					
9/1/2003	14.8	<5	<5	<5					
9/1/2004	18.9	<5	<5	<5					
9/1/2005	18.7	<5	<5	<5					
9/1/2006	20.5	<5	<5	<5					
9/1/2007	16.4	<5	<5	<5					
9/1/2008	7.31	<5	<5	<5					
9/1/2009	8.21	<5	<5	<5					
9/1/2010	2.76	<1	<2	1.25					
9/1/2011	3.81	<5	<2	<2					
9/1/2012	<5	<5	<5	<5					
9/1/2013	3.1	1.4	1.6	29.9					
9/1/2014	2.5	<1	<1	46					
9/1/2015	1.3	1.1	<1	18.9					
9/25/2016		2.8		2.6					
9/26/2016			1.3		26	24.3	3.2		
9/27/2016	1.9							18.6	
9/28/2016									6
9/13/2017		4			26.4	19.8			3.1
9/14/2017			1.7	4			4.2	14.2	
9/15/2017	2.4								
9/11/2018		3.2			25.6	24			4.5
9/12/2018	1.5		2.2	3			1.8	21.5	
9/16/2019		1.9 (J,B)	2.1 (J,B)		23 (B)	20 (B)			3.3 (J,B)
9/17/2019	1.7 (J,B)			2 (J,B)			3.4 (J,B)	20 (B)	
9/1/2020			3.3 (J,B)	3.1 (J,B)			4.4 (J,B)	13 (B)	4 (J,B)
9/2/2020		2.4 (J,B)			20 (B)	17 (B)			
4/29/2021	<2.2								
9/27/2021		3.1 (J)	3.9 (J)			16			4 (J)
9/28/2021	4 (J)			5.7			4.9 (J)	17	
9/20/2022	2.9 (J)		3.6 (J)	15					
9/21/2022		2.7 (J)				16	4.5 (J)	16	3.1 (J)
9/18/2023	2.3 (J)								2.6 (J)
9/20/2023		<2.3 (U)	3.6 (J)			19	4.4 (J)		
9/21/2023				17				21	

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=-0.7991, Std. Dev.=1.093, n=32, 12.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9685, critical = 0.904. Kappa = 2.193 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 5 points to limit. Assumes 8 future values.

Constituent: Cobalt Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

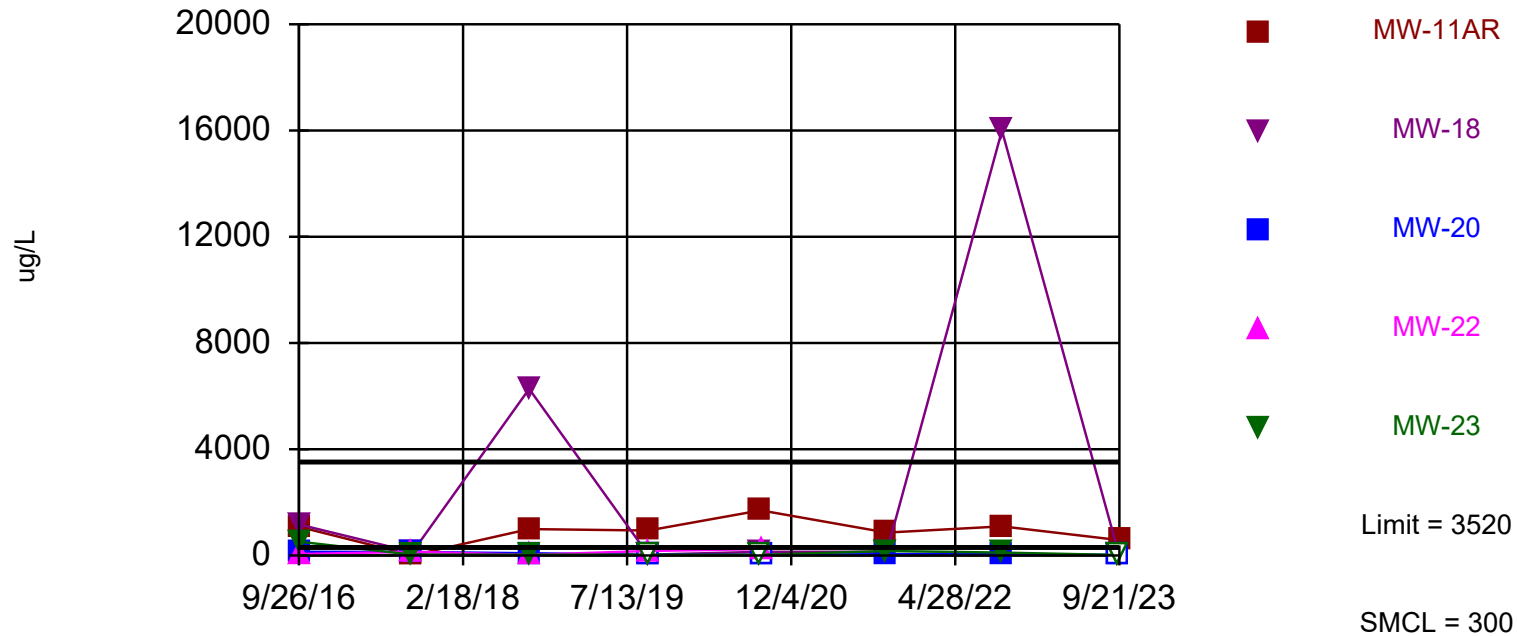
Constituent: Cobalt (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			1.2						2
9/26/2016				1.3	3.1	<0.5	<0.5		
9/27/2016	<0.5	1.7							
9/28/2016								<0.5	
9/13/2017			0.15 (J)			0.09 (J)	0.19 (J)	0.036 (J)	
9/14/2017		<0.014		3	1				0.43 (J)
9/15/2017	0.05 (J)								
9/11/2018			0.52 (J)			0.16 (J)	<0.15	<0.15	
9/12/2018	0.76 (J)	1		0.5 (J)	20.4				1.4
9/16/2019			0.16 (J)	0.17 (J)		<0.091	<0.091	0.094 (J)	
9/17/2019	0.11 (J)	0.99			0.32 (J)				2.6
9/1/2020		1.5		0.37 (J)	0.93			<0.091	2.5
9/2/2020			0.53			<0.091	0.3 (J)		
4/29/2021	1.3								
9/27/2021			<0.19	0.39 (J)		<0.19		0.35 (J)	
9/28/2021	<0.19	0.83			0.58				1.3
9/20/2022	0.3 (J)			0.59					0.49 (J)
9/21/2022		0.57	0.73		33	<0.19		0.23 (J)	
9/18/2023	<0.17 (U)							<0.17 (U)	
9/20/2023			0.2 (J)	0.44 (J)	<0.17 (U)	<0.17 (U)			
9/21/2023		0.8							0.35 (J)

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=5.323, Std. Dev.=1.296, n=32, 9.375% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9722, critical = 0.904. Kappa = 2.193 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 5 points to limit. Assumes 8 future values.

Constituent: Iron Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

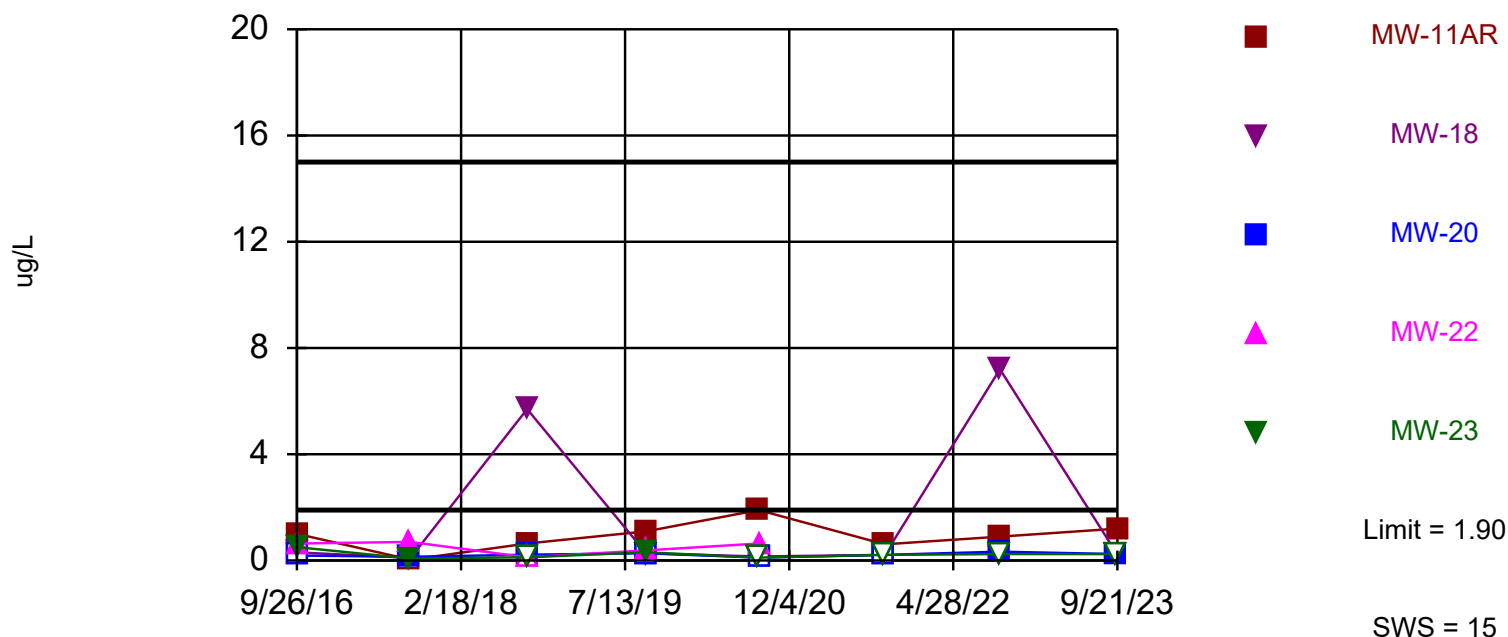
Constituent: Iron (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			1240						55.7
9/26/2016				1770	1170	140	54.6		
9/27/2016	126	1080							
9/28/2016								518	
9/13/2017			162			135	139	30.3 (J)	
9/14/2017		<9.6		4440	128				357
9/15/2017	93.1								
9/11/2018			289			82.8	23.9 (J)	34.3 (J)	
9/12/2018	344	993		267	6270				624
9/16/2019			76 (J)	130		<66	170	<66	
9/17/2019	130	940			<66				1400
9/1/2020		1700		130	140			<50	810
9/2/2020			230			<50	240		
4/29/2021	220								
9/27/2021			<36	140		49 (J)		170	
9/28/2021	52 (J)	860			140				620
9/20/2022	270			240					230
9/21/2022		1100	440		16000	67 (J)		110	
9/18/2023	<36 (U)							<36 (U)	
9/20/2023			78 (J)	120	<36 (U)	<36 (U)			
9/21/2023		580							<36 (U)

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 32 background values. 43.75% NDs. Annual per-constituent alpha = 0.02223. Individual comparison alpha = 0.001728 (1 of 2). Comparing 5 points to limit. Assumes 8 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Lead Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

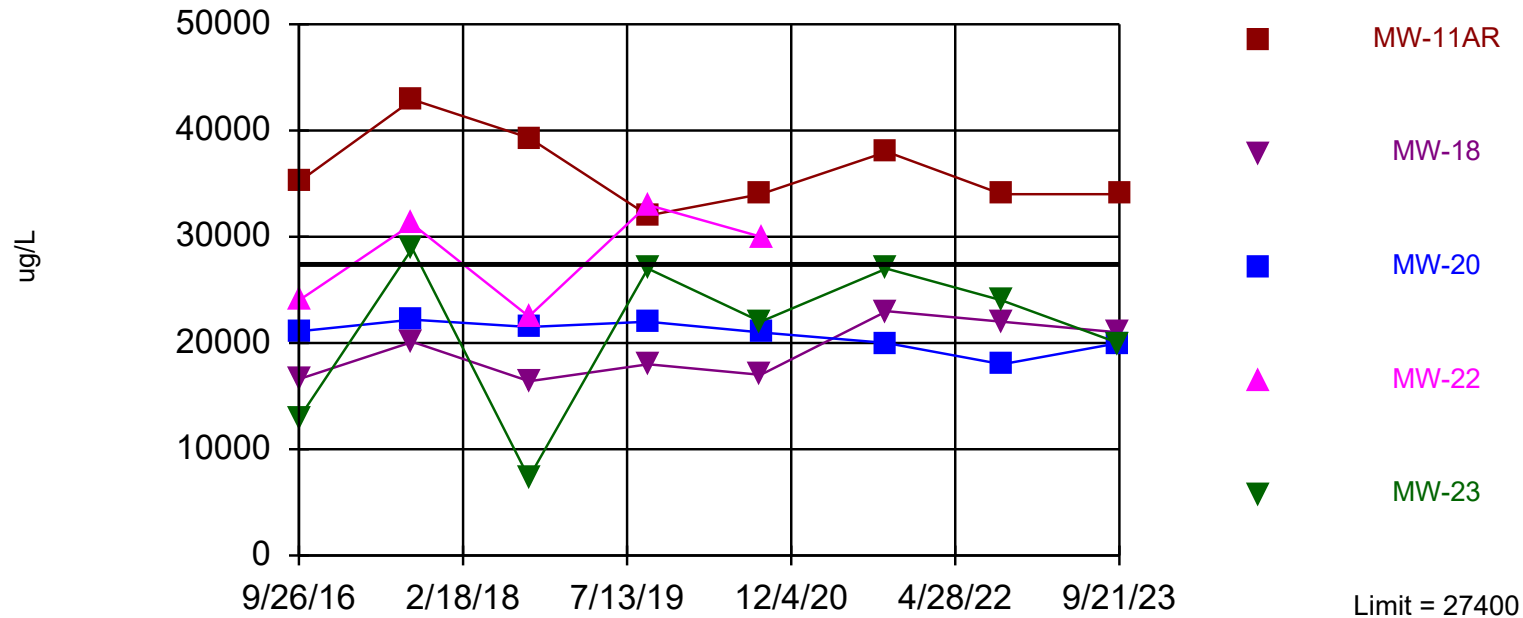
Constituent: Lead (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-9 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-11AR	MW-10 (bg)	MW-23
9/25/2016	0.71 (J)	<0.19							
9/26/2016			0.98 (J)	0.31 (J)	<0.19	0.64 (J)			
9/27/2016							1	<0.19	
9/28/2016									0.5 (J)
9/13/2017	0.13 (J)				0.14 (J)	0.7 (J)			0.076 (J)
9/14/2017		0.25 (J)	1.9	0.1 (J)			<0.033		
9/15/2017								0.12 (J)	
9/11/2018	0.39 (J)				0.22 (J)	<0.12			<0.12
9/12/2018		<0.12	0.42 (J)	5.7			0.64 (J)	0.55 (J)	
9/16/2019	<0.27		0.39 (J)		<0.27	0.38 (J)			0.31 (J)
9/17/2019		<0.27		<0.27			1.1	<0.27	
9/1/2020		0.23 (J)	0.22 (J)	0.15 (J)			1.9		<0.11
9/2/2020	0.29 (J)				<0.11	0.64			
4/29/2021								0.23 (J)	
9/27/2021	<0.21		<0.21		<0.21				<0.21
9/28/2021		<0.21		<0.21			0.61	<0.21	
9/20/2022		0.37 (J)	0.4 (J)					<0.24	
9/21/2022	0.47 (J)			7.2	0.33 (J)		0.9		<0.24
9/18/2023								<0.24 (U)	<0.24 (U)
9/20/2023	<0.24 (U)		0.26 (J)	<0.24 (U)	0.24 (J)				
9/21/2023		<0.24 (U)					1.2		

Exceeds Limit: MW-11AR, MW-22

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=19750, Std. Dev.=3483, n=32. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9358, critical = 0.904. Kappa = 2.193 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 5 points to limit. Assumes 8 future values.

Constituent: Magnesium Analysis Run 10/30/2023 2:57 PM View: East Closed LF
 Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

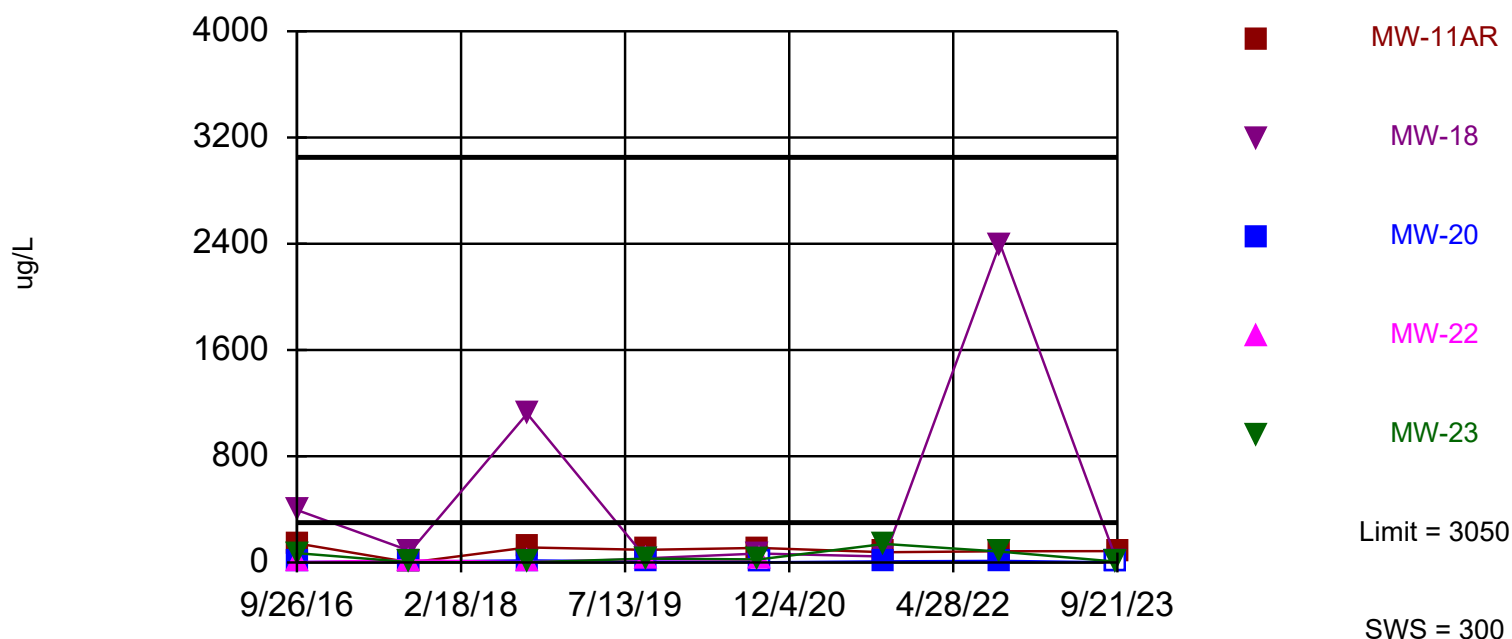
Constituent: Magnesium (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			19000						16000
9/26/2016				25000	16600	21100	24000		
9/27/2016	23400	35200							
9/28/2016								13000	
9/13/2017			17900			22200	31200	28900	
9/14/2017		42900		29800	20100				14600
9/15/2017	23900								
9/11/2018			17600			21500	22500	7320	
9/12/2018	21200	39300		21600	16400				16000
9/16/2019			16000	22000		22000	33000	27000	
9/17/2019	20000	32000			18000				16000
9/1/2020		34000		22000	17000			22000	15000
9/2/2020			18000			21000	30000		
4/29/2021	24000								
9/27/2021			19000	23000		20000		27000	
9/28/2021	22000	38000			23000				18000
9/20/2022	18000			19000					16000
9/21/2022		34000	18000		22000	18000		24000	
9/18/2023	23000							20000	
9/20/2023			18000	22000	21000	20000			
9/21/2023		34000							17000

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=4.092, Std. Dev.=1.792, n=32, 3.125% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9753, critical = 0.904. Kappa = 2.193 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 5 points to limit. Assumes 8 future values.

Constituent: Manganese Analysis Run 10/30/2023 2:57 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

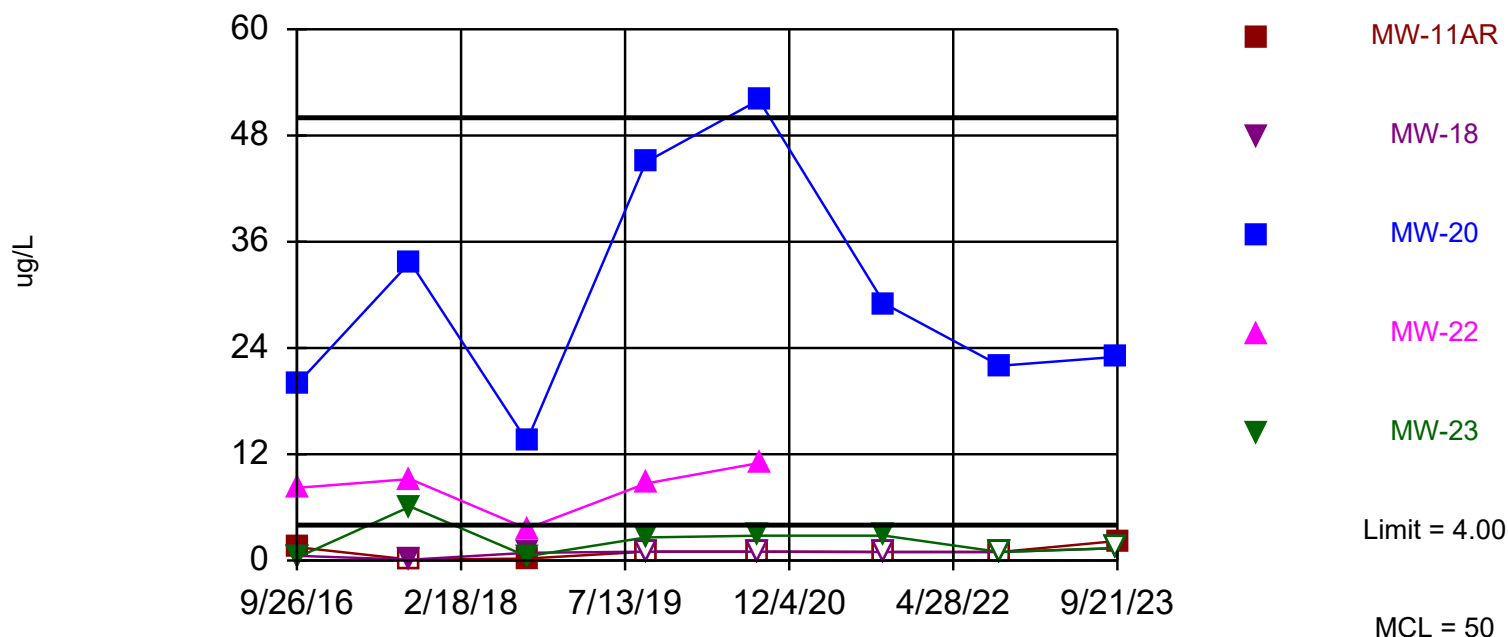
Constituent: Manganese (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
 Marshelltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-11AR	MW-13 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-23	MW-9 (bg)
9/25/2016			148						515
9/26/2016				118	395	4.2	2.5		
9/27/2016	6.1	144							
9/28/2016								70	
9/13/2017			14.6			6.3	17.2	2.2	
9/14/2017		<0.07		407	85.3				49.8
9/15/2017	3.2								
9/11/2018			59.8			15.7	2.9	2	
9/12/2018	54.9	114		64.9	1120				722
9/16/2019			15	27		7.3 (J)	26	29	
9/17/2019	12	96			31				2100
9/1/2020		110		27	68			23	2000
9/2/2020			110			<4	21		
4/29/2021	77								
9/27/2021			5.7 (J)	36		8.8 (J)		140	
9/28/2021	4.9 (J)	77			45				1100
9/20/2022	33			71					98
9/21/2022		84	79		2400	12		82	
9/18/2023	<3.6 (U)							5.8 (J)	
9/20/2023			21	120	7.5 (J)	<3.6 (U)			
9/21/2023		86							220

Exceeds Limit: MW-20, MW-22

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 32 background values. 56.25% NDs. Annual per-constituent alpha = 0.02223. Individual comparison alpha = 0.001728 (1 of 2). Comparing 5 points to limit. Assumes 8 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Selenium Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

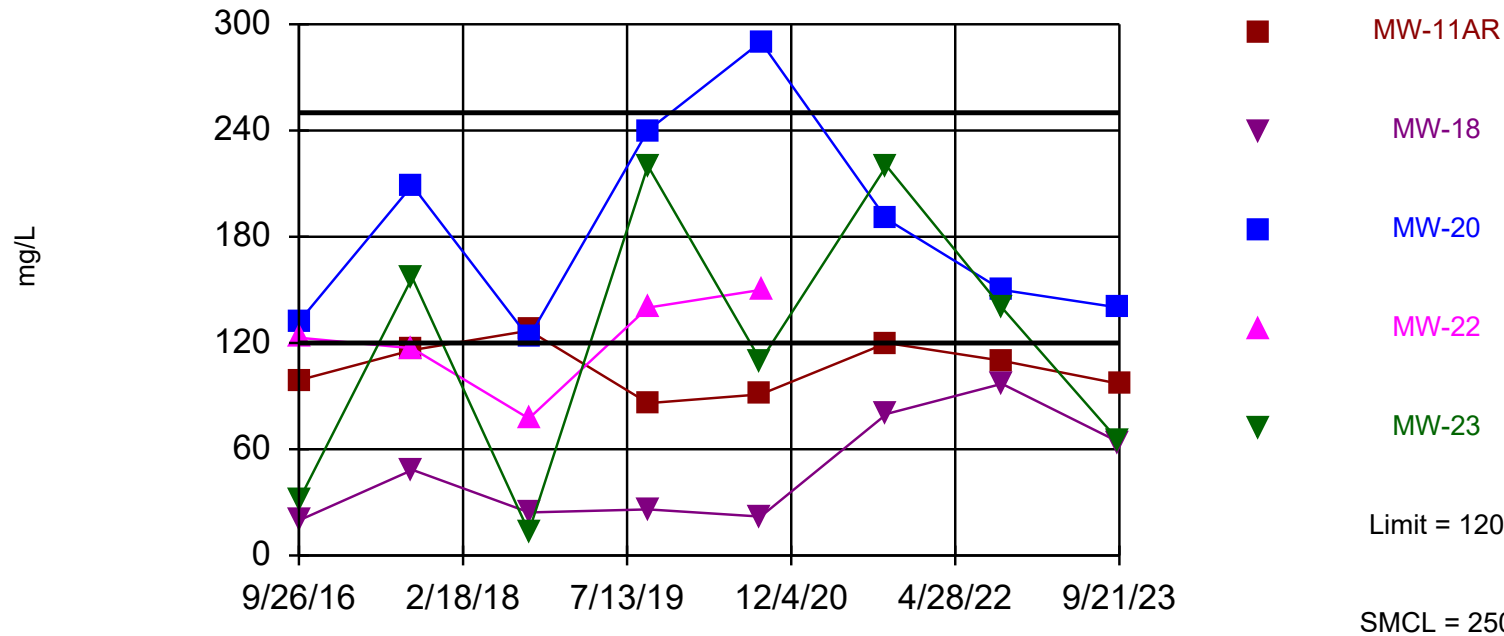
Constituent: Selenium (ug/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-13 (bg)	MW-9 (bg)	MW-14 (bg)	MW-18	MW-20	MW-22	MW-11AR	MW-10 (bg)	MW-23
9/25/2016	1.1	<0.18							
9/26/2016			1.7	0.52 (J)	19.9	8.2			
9/27/2016							1.5	0.68 (J)	
9/28/2016									0.36 (J)
9/13/2017	1				33.7	9.2			6.1
9/14/2017		<0.086	0.63 (J)	0.094 (J)			<0.086		
9/15/2017								0.66 (J)	
9/11/2018	1.3				13.5	3.6			0.47 (J)
9/12/2018		<0.16	4	0.87 (J)			0.22 (J)	0.71 (J)	
9/16/2019	1.1 (J)		1.7 (J)		45	8.7			2.6 (J)
9/17/2019		<1		<1			<1	<1	
9/1/2020		<1	1.9 (J)	<1			<1		2.8 (J)
9/2/2020	<1				52	11			
4/29/2021								1.6 (J)	
9/27/2021	<0.96		<0.96		29				2.8 (J)
9/28/2021		<0.96		<0.96			<0.96	<0.96	
9/20/2022		<0.96	1.6 (J)					<0.96	
9/21/2022	<0.96			<0.96	22		<0.96		<0.96
9/18/2023								<1.4 (U)	<1.4 (U)
9/20/2023	<1.4 (U)		<1.4 (U)	<1.4 (U)	23				
9/21/2023		<1.4 (U)					2.2 (J)		

Exceeds Limit: MW-20, MW-22

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 100 background values. Annual per-constituent alpha = 0.002506. Individual comparison alpha = 0.000193 (1 of 2). Comparing 5 points to limit. Assumes 8 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Sulfate Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 10/30/2023 2:58 PM View: East Closed LF
Marshalltown E and W Closed LFs Client: SCS Engineers Data: Marshal_input

	MW-10 (bg)	MW-13 (bg)	MW-14 (bg)	MW-9 (bg)	MW-22	MW-20	MW-18	MW-11AR	MW-23
9/1/1999	43	56	64	30					
9/1/2000	28	110	48	35					
9/1/2001	14	76	56	38					
9/1/2002	19	110	60	36					
9/1/2003	17	100	32	35					
9/1/2004	31	100	64	39					
9/1/2005	17	120	80	44					
9/1/2006	14.7	60.5	81.2	42.7					
9/1/2007	13.8	106	86.9	28.7					
9/1/2008	8.48	86.5	60	35.2					
9/1/2009	10.1	80.2	56.5	35.6					
9/1/2010	7.17	69.2	54.5	25.6					
9/1/2011	9.16	70.5	51.8	26					
9/1/2012	11.6	72.6	54.2	27.5					
9/1/2013	11.1	69.3	50	19.7					
9/1/2014	10.5	33.6	38.7	24.1					
9/1/2015	6.2	68.9	49	27.2					
9/25/2016		59.7		6.3					
9/26/2016			40		123	132	19.8		
9/27/2016	7.8							99	
9/28/2016									31.8
9/13/2017		67.6			117	209			157
9/14/2017			45.1	12			48.4	116	
9/15/2017	8.4								
9/11/2018		51.6			77.4	123			13.5
9/12/2018	7.8		30.7	9.1			24.3	127	
9/16/2019		48	32		140	240			220
9/17/2019	5.2			5.1			26	86	
9/1/2020			28	5.6			22	91	110
9/2/2020		42			150	290			
4/29/2021	7								
9/27/2021		110	42			190			220
9/28/2021	8.5			12			80	120	
9/20/2022	7.7		30	13					
9/21/2022		120				150	97	110	140
9/18/2023	8								65
9/20/2023		120	35			140	64		
9/21/2023				11				97	