

THE SILVER PRODUCER

FINANCIAL OVERVIEW

SILVER MARKET

HECLA PROPERTIES



2012 FWMP PRESENTATION

9 July 2013



Tailings Area Fresh Water Monitoring Program

- Comparison against AWQS
- Upgradient / Downgradient comparative graphs for SC, SO₄, Pb, & Zn
- Review of statistical tests for trends
- Continued collection of data from Tributary Creek (Site 9) and Lower Althea (Site 60)

Tailings Area: Shallow Wells (Peat)

- Site 58 “MW-T-00-01C”
 - Up-gradient reference site, located to the northeast of Tailings Area
- Site 27 “MW-2S”
 - Down-gradient groundwater site, located south of Tailings Area
- Site 29 “MW-3S”
 - Down-gradient groundwater site, located west of Tailings Area
- Site 32 “MW-5”
 - Down-gradient groundwater site, located west of Tailings Area

Tailings Area: Deep Wells (Glacial / Marine Till)

- Site 59 “MW-T-00-01A”
 - Up-gradient reference site, located to the northeast of Tailings Area, completed in glacial till
- Site 28 “MW-2D”
 - Down-gradient groundwater site, located south of Tailings Area, completed in marine silts/clays

Tailings Area: Surface Sites

- Site 9 “Tributary Creek”
 - Down-gradient surface site, located approximately 1 mile from the tailings pile

- Site 60 “Lower Althea Creek”
 - Down-gradient surface site, approximately $\frac{1}{4}$ mile west of Pond 7

TAILINGS AREA SHALLOW WELLS (PEAT)

- Site 58 “MW-T-00-01C”
- Site 27 “MW-2S”
- Site 29 “MW-3S”
- Site 32 “MW-5”

AWQS Exceedances

Site	Date	Parameter	Value	Limits		Hardness
				Lower	Upper	
58	7-May-12	pH Field	5.6 su	6.5	8.50	
58	9-Jul-12	pH Field	6.23 su	6.5	8.50	
58	18-Sep-12	pH Field	5.9 su	6.5	8.50	
27	15-Nov-11	pH Field	6.47 su	6.5	8.50	
27	7-May-12	pH Field	5.59 su	6.5	8.50	
27	18-Sep-12	pH Field	6.32 su	6.5	8.50	
29	15-Nov-11	Alkalinity	19.9 mg/L	20		
29	7-May-12	Alkalinity	0 mg/L	20		
29	9-Jul-12	Alkalinity	7.1 mg/L	20		
29	18-Sep-12	Alkalinity	18.3 mg/L	20		
29	15-Nov-11	Lead Dissolved	2.8 µg/L		0.54	20.30 mg/L
29	15-Nov-11	pH Field	5.67 su	6.5	8.50	
29	7-May-12	pH Field	4.49 su	6.5	8.50	
29	9-Jul-12	pH Field	5.03 su	6.5	8.50	
29	18-Sep-12	pH Field	5.01 su	6.5	8.50	

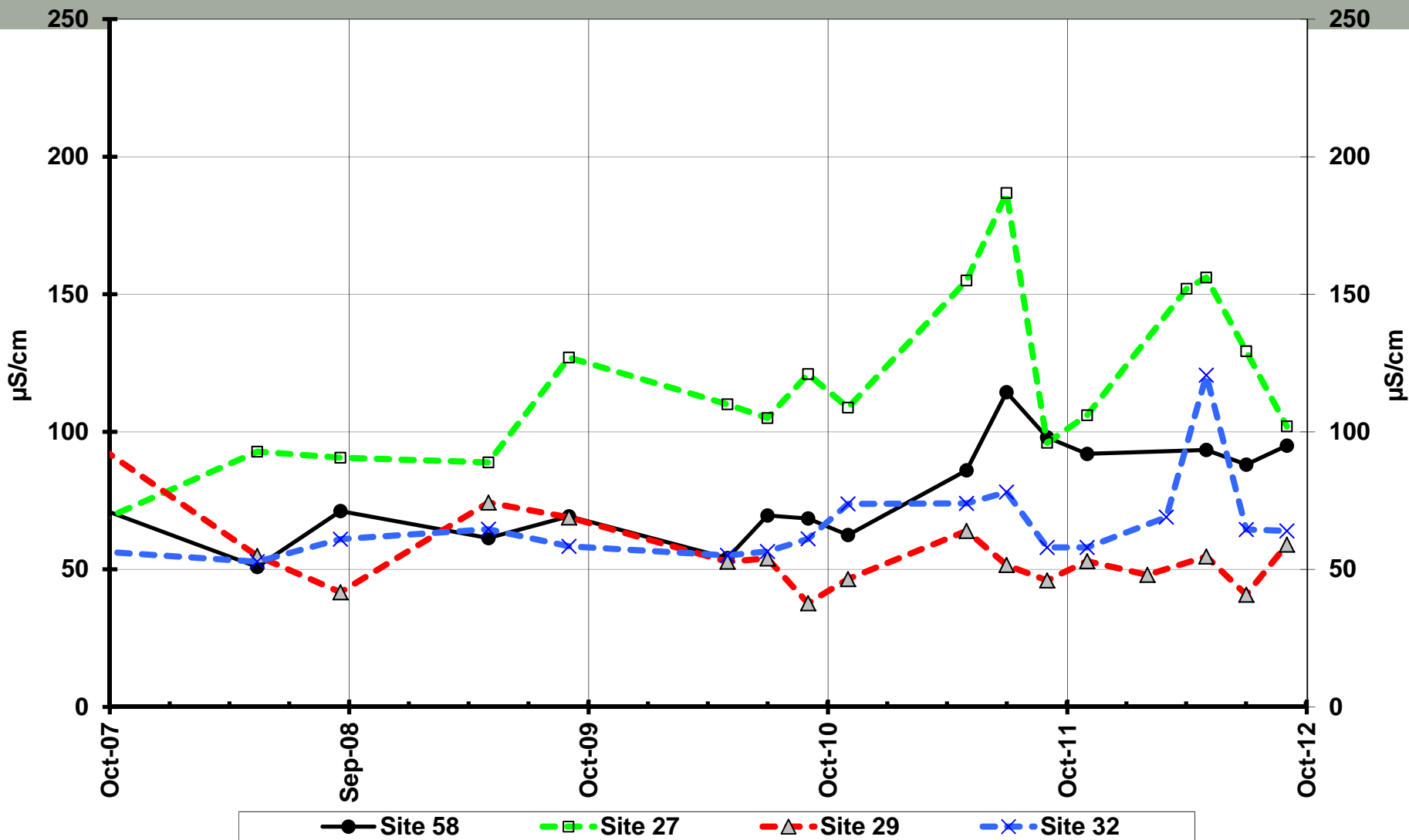
AWQS Exceedances (continued)

Site	Date	Parameter	Value	Limits		
				Lower	Upper	Hardness
32	15-Nov-11	Alkalinity	16.5 mg/L	20		
32	7-May-12	Alkalinity	8.5 mg/L	20		
32	9-Jul-12	Alkalinity	5.9 mg/L	20		
32	18-Sep-12	Alkalinity	15.5 mg/L	20		
32	15-Nov-11	Lead Dissolved	2.43 µg/L		0.54	9.02 mg/L
32	7-May-12	Lead Dissolved	1.06 µg/L		0.54	8.67 mg/L
32	9-Jul-12	Lead Dissolved	0.95 µg/L		0.54	8.51 mg/L
32	18-Sep-12	Lead Dissolved	1.69 µg/L		0.54	9.38 mg/L
32	15-Nov-11	pH Field	5.32 su	6.5	8.50	
32	7-May-12	pH Field	4.63 su	6.5	8.50	
32	9-Jul-12	pH Field	5.19 su	6.5	8.50	
32	18-Sep-12	pH Field	4.96 su	6.5	8.50	

AWQS Exceedances

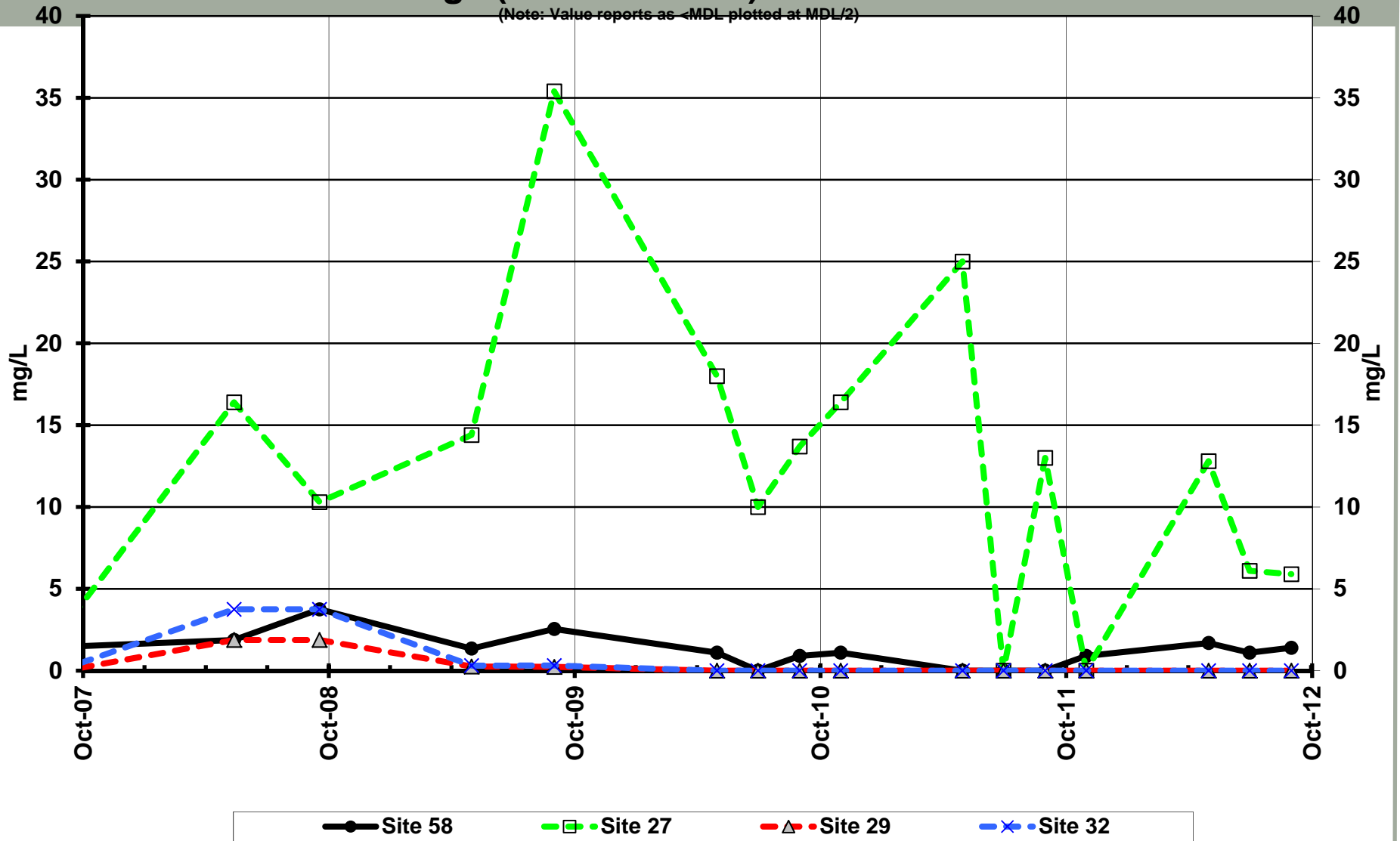
- Shallow wells continue historic trends in low pH, low alkalinity, and elevated lead.

Tailings (Shallow Wells) - Specific Conductance



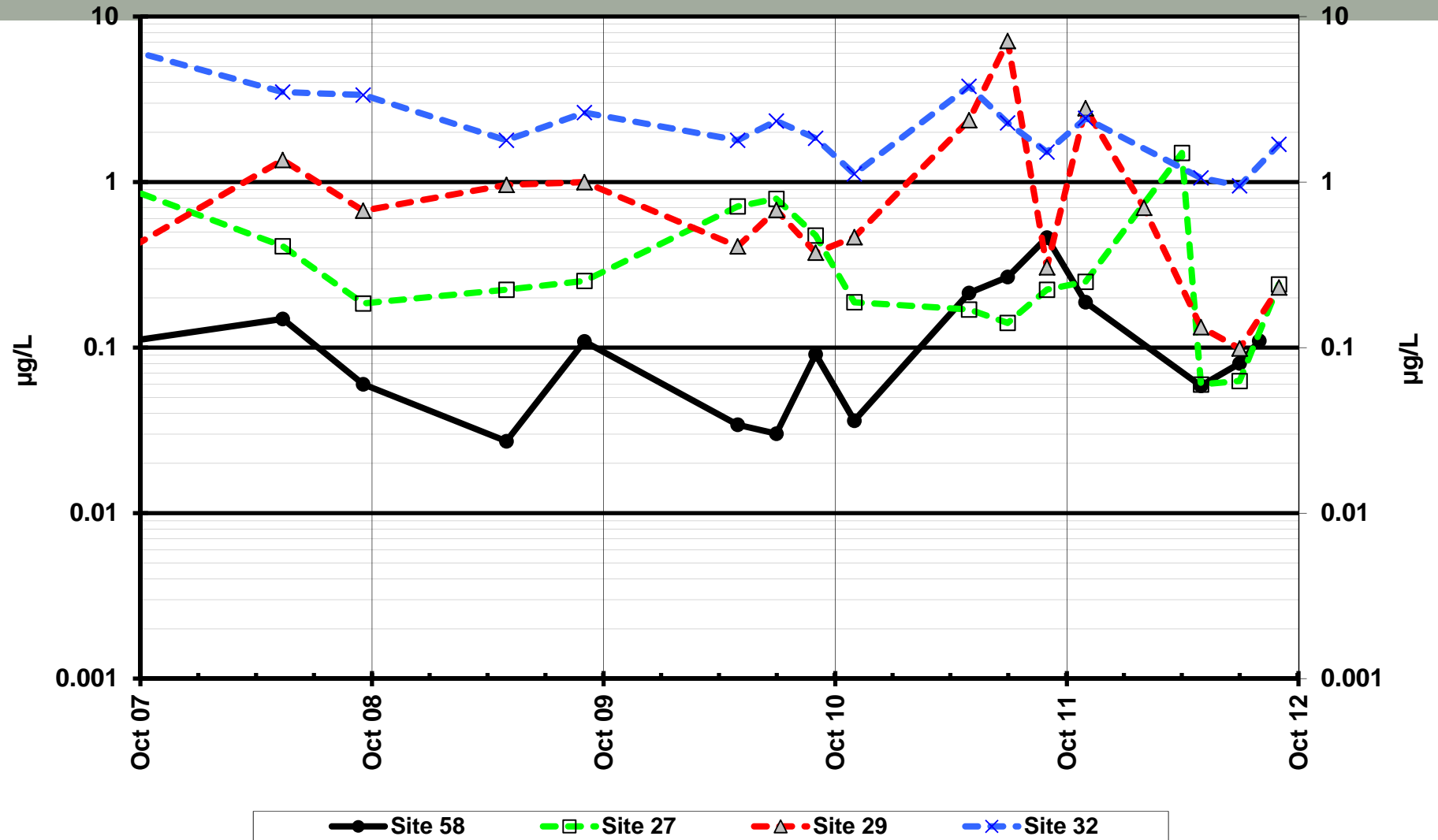
Tailings (Shallow Wells) - Total Sulfate

(Note: Value reports as <MDL plotted at MDL/2)



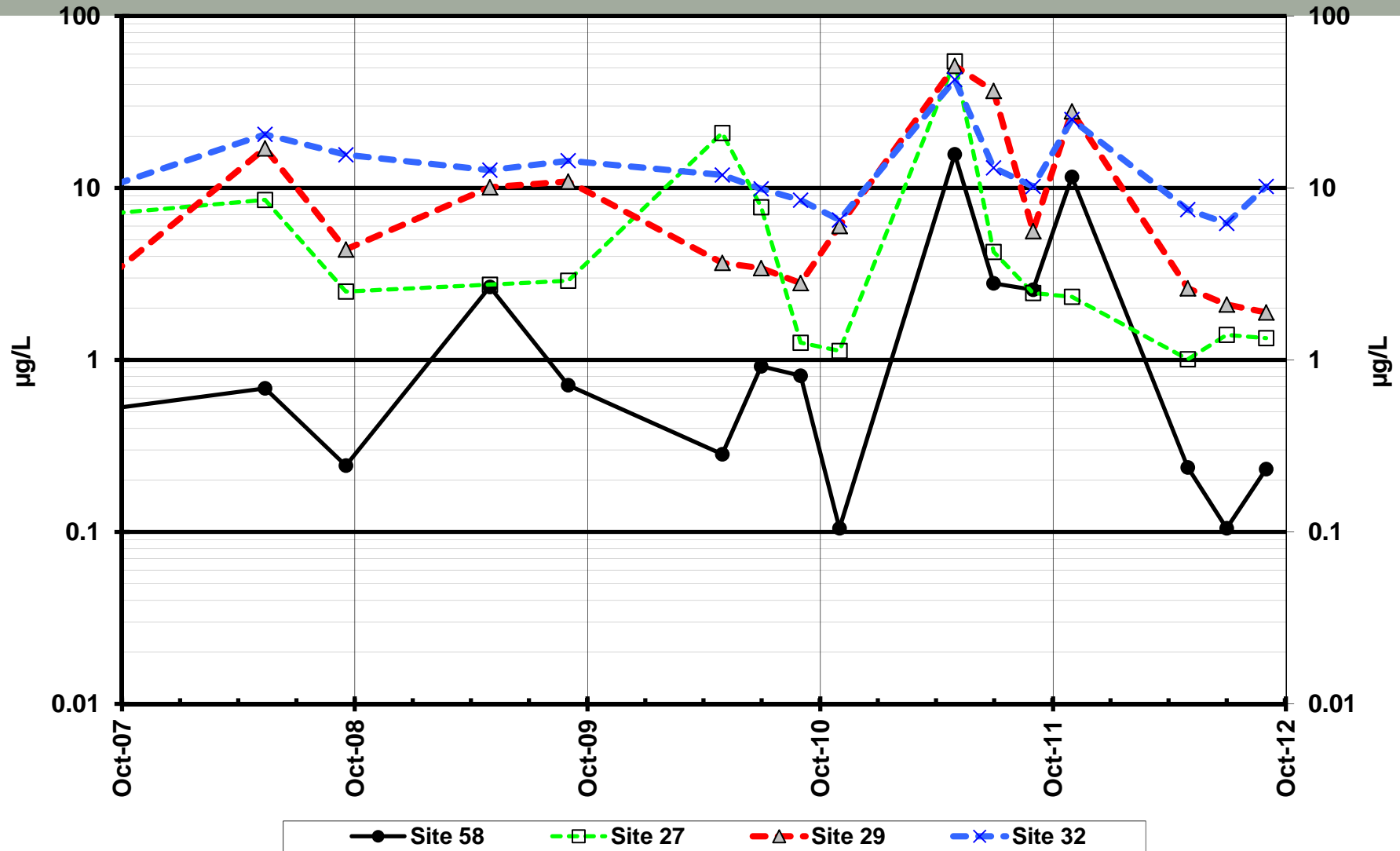
Tailings (Shallow Wells) - Dissolved Lead

(Note: Values reported as <MDL plotted at MDL/2)



Tailings (Shallow Wells) - Dissolved Zinc

(Note: Values reported as <MDL are plotted at 1/2MDL)



Tailings Shallow Wells-Statistical Trends

2012 Water Year

Mann-Kendall Seasonal Trend Test Probabilities

Site	Cond.	pH	Alkalinity	Sulfate	Diss.-Zinc
58	0.03	0.19	0.02	0.40	0.45
27	0.35	0.19	0.01	0.35	0.03
29	0.02	0.08	0.05	*	0.26
32	0.19	0.02	0.35	*	0.15

Sen's slope estimate

Site	$\mu\text{S/cm/yr}$	su/yr	mg/L/yr	$\mu\text{g/L/yr}$	$\mu\text{g/L/yr}$
58			+3.3		
27			+3.0		
29	-11.68				
32		-0.07			

TAILINGS AREA DEEP WELLS (GLACIAL / MARINE TILL)

- **Site 59 “MW-T-00-01A”**
- **Site 28 “ MW-2D”**

AWQS Exceedances Site 59 & 28

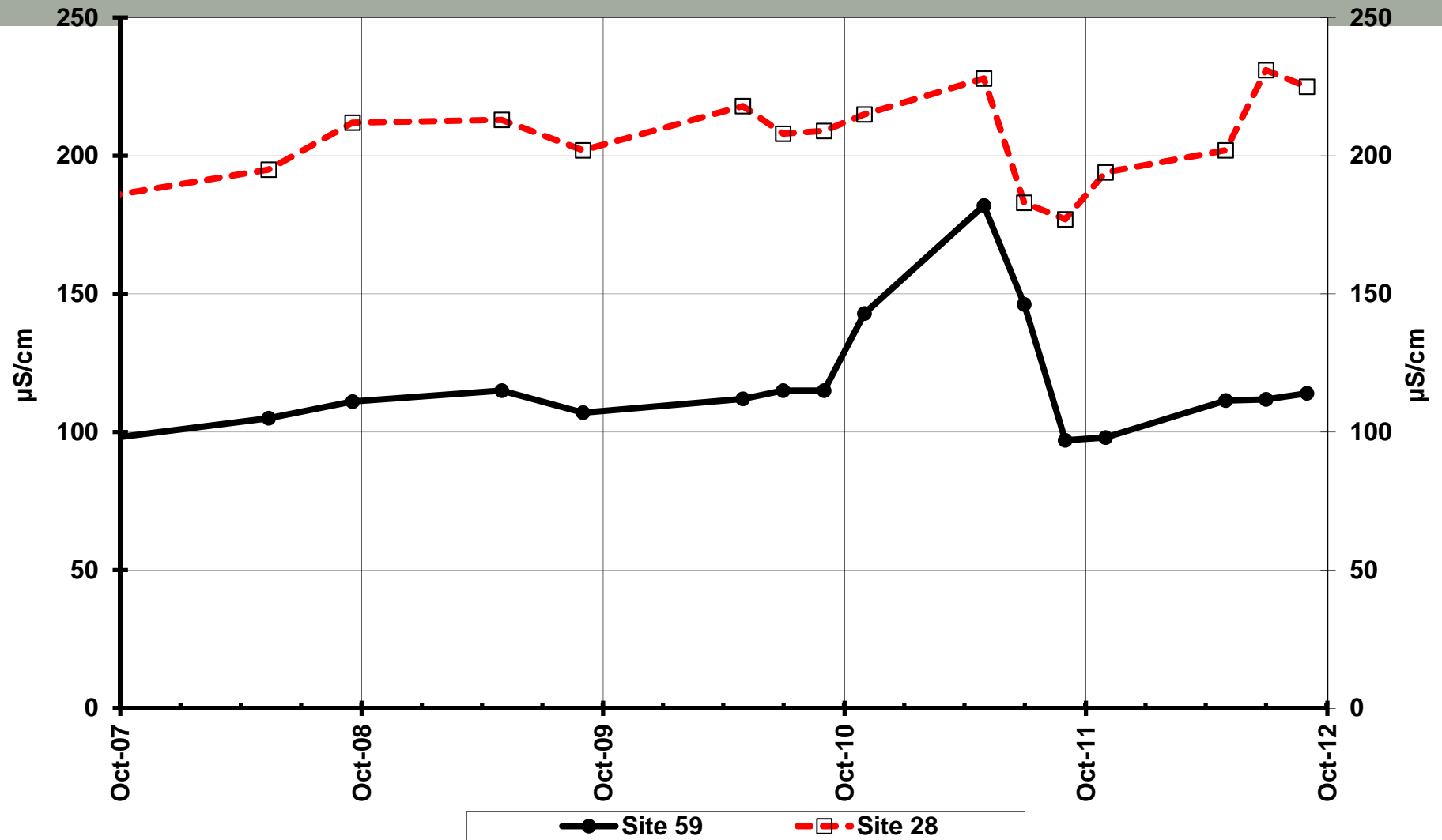
59	7-May-12	pH Field	6.16	su	6.5	8.50
59	18-Sep-12	pH Field	6.36	su	6.5	8.50
28	15-Nov-11	Arsenic Dissolved	80.2	µg/L		10.00
28	7-May-12	Arsenic Dissolved	78.4	µg/L		10.00
28	9-Jul-12	Arsenic Dissolved	80.6	µg/L		10.00
28	18-Sep-12	Arsenic Dissolved	77.9	µg/L		10.00

The downgradient deep well continues having arsenic levels in exceedance of the AWQS, however these values are similar to the historic measurements.

1988 – present

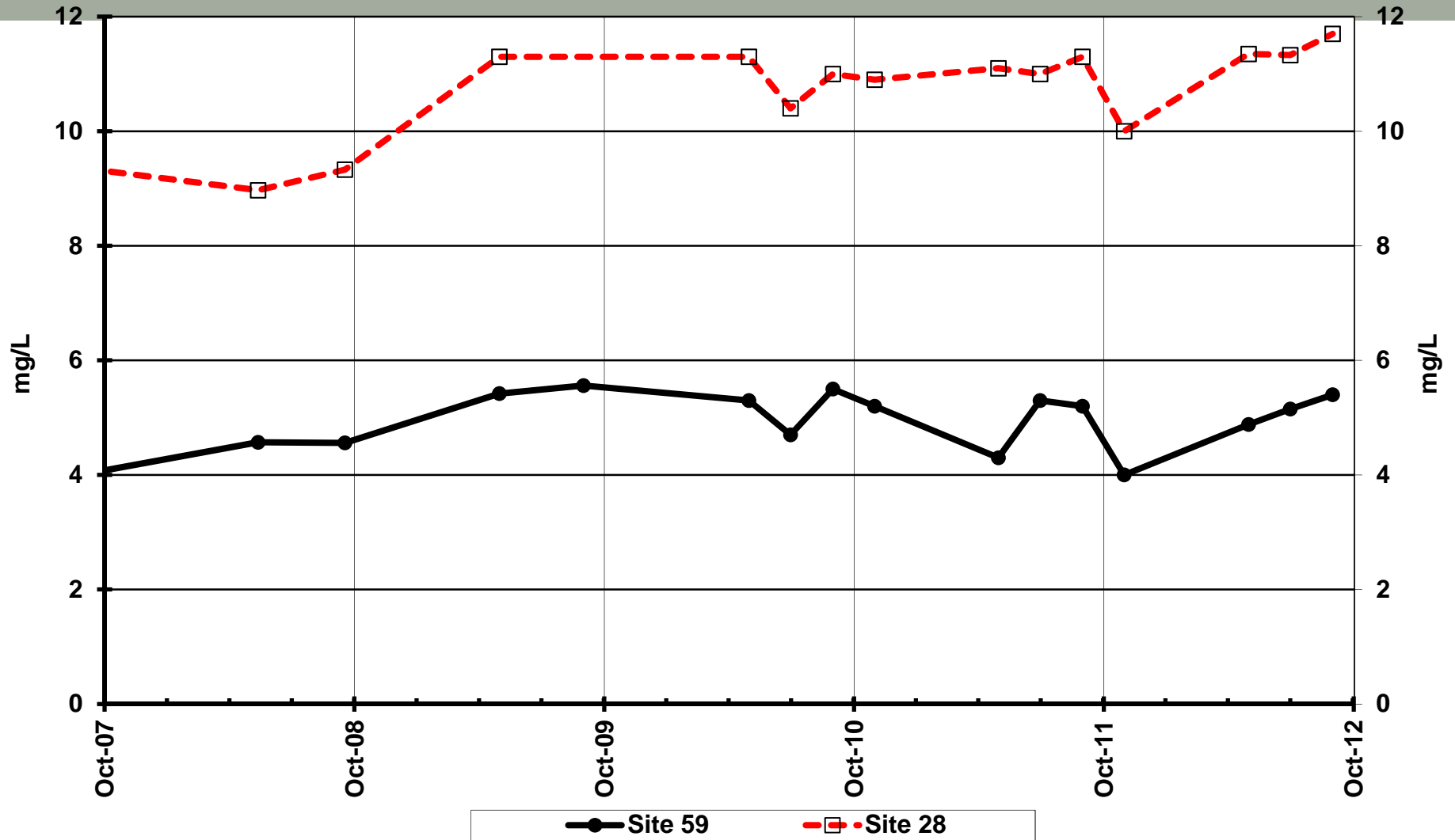
mean = 73.9 +/- 14.4 µg/L; n=119

Tailings (Deep Wells) - Specific Conductance



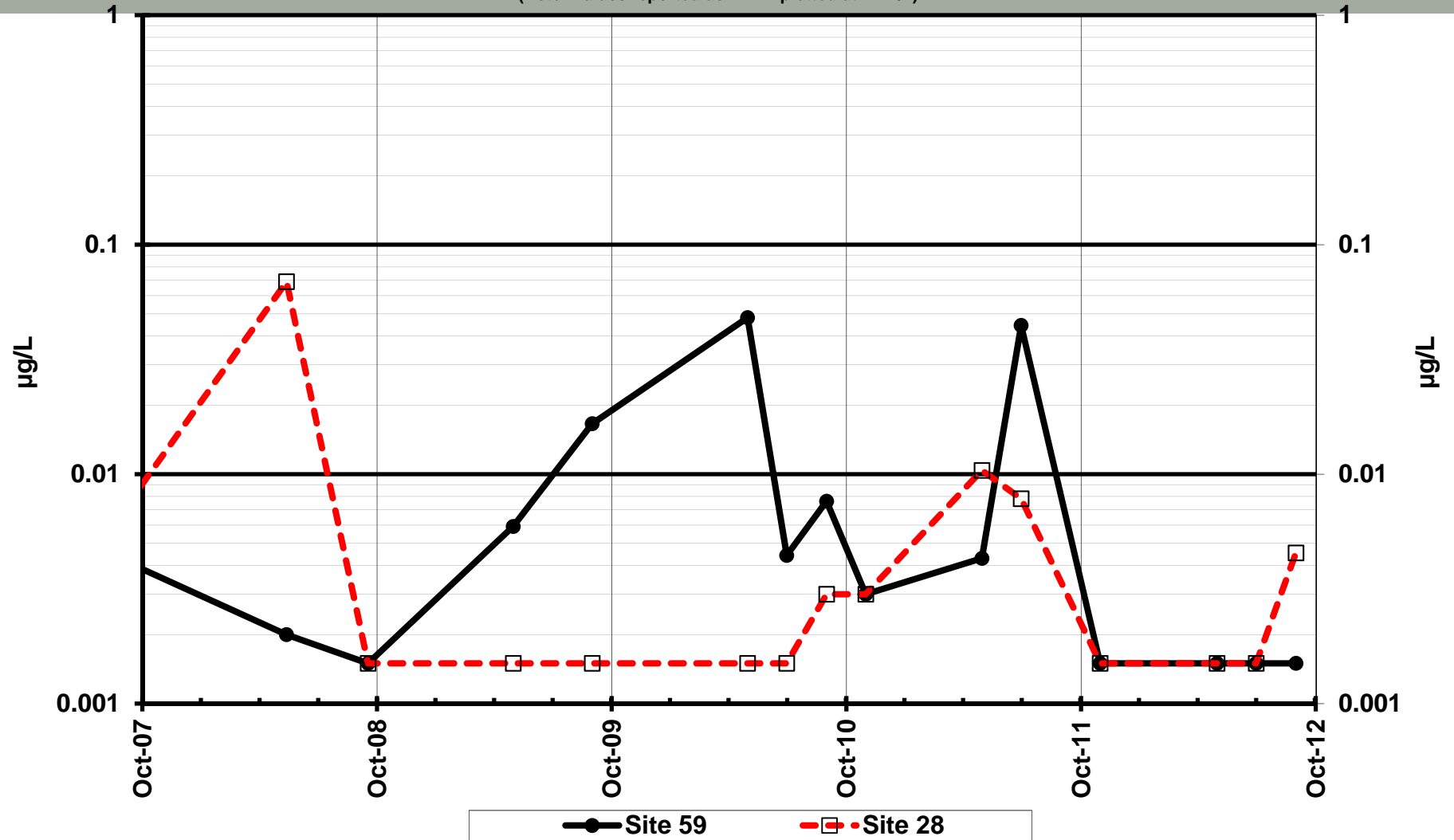
Tailings (Deep Wells) - Total Sulfate

(Note: Value reports as <MDL plotted at MDL/2)



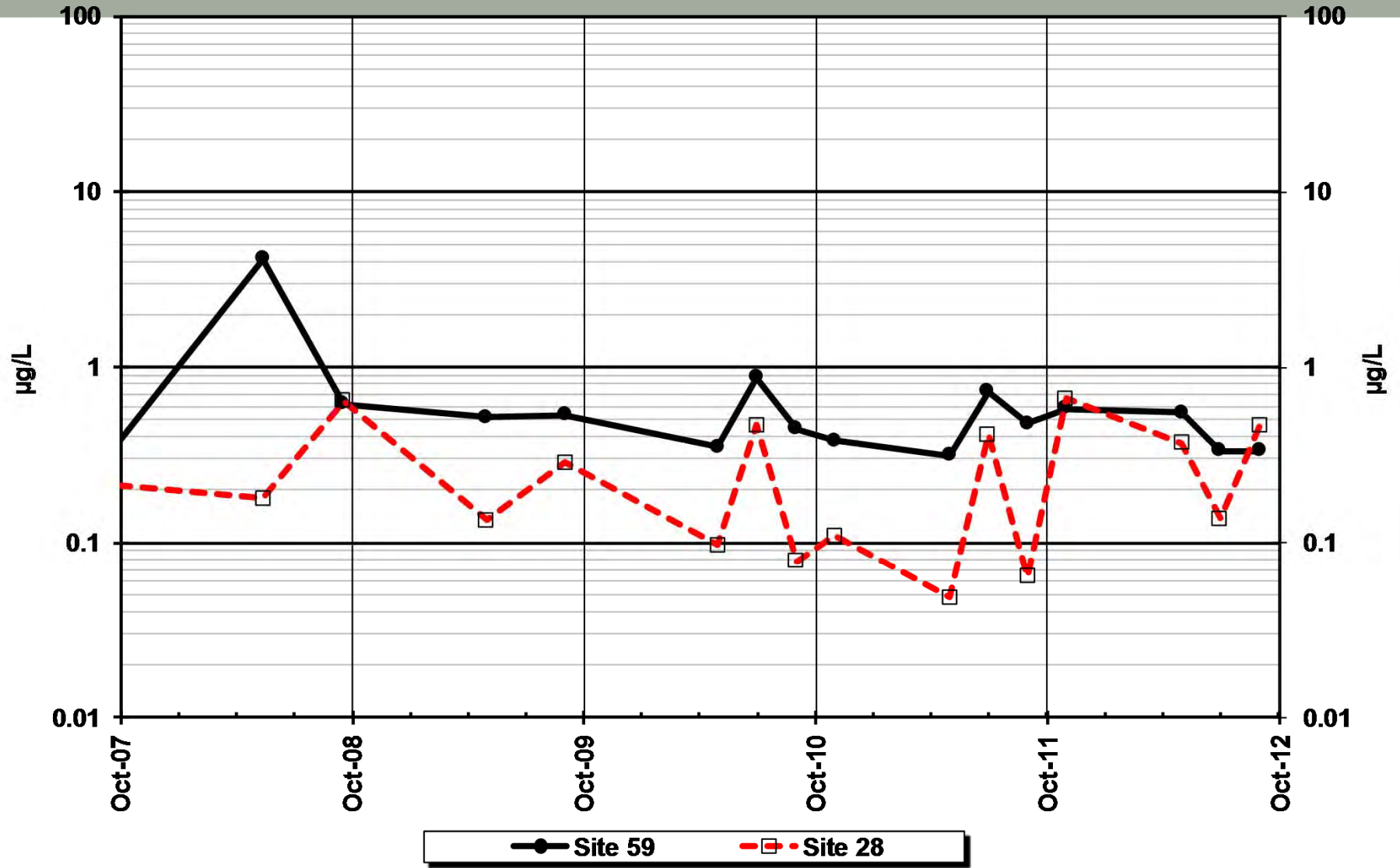
Tailings (Deep Wells) - Dissolved Lead

(Note: Values reported as <MDL plotted at MDL/2)



Tailings (Deep Wells) - Dissolved Zinc

(Note: Values reported as <MDL are plotted at 1/2MDL)



Tailings Deep Wells-Statistical Trends

Mann-Kendall Seasonal Trend Test Probabilities

Site	Cond.	pH	Alkalinity	Sulfate	Diss.-Zinc
59	0.35	0.08	0.35	0.19	0.19
28	0.35	0.13	0.03	<0.01	0.08

Sen's slope estimate

Site	$\mu\text{S/cm/yr}$	su/yr	mg/L/yr	$\mu\text{g/L/yr}$	$\mu\text{g/L/yr}$
59					
28				+0.47	

TAILINGS AREA SURFACE SITES

- Site 60 “Lower Althea Creek”
- Site 9 “Tributary Creek”

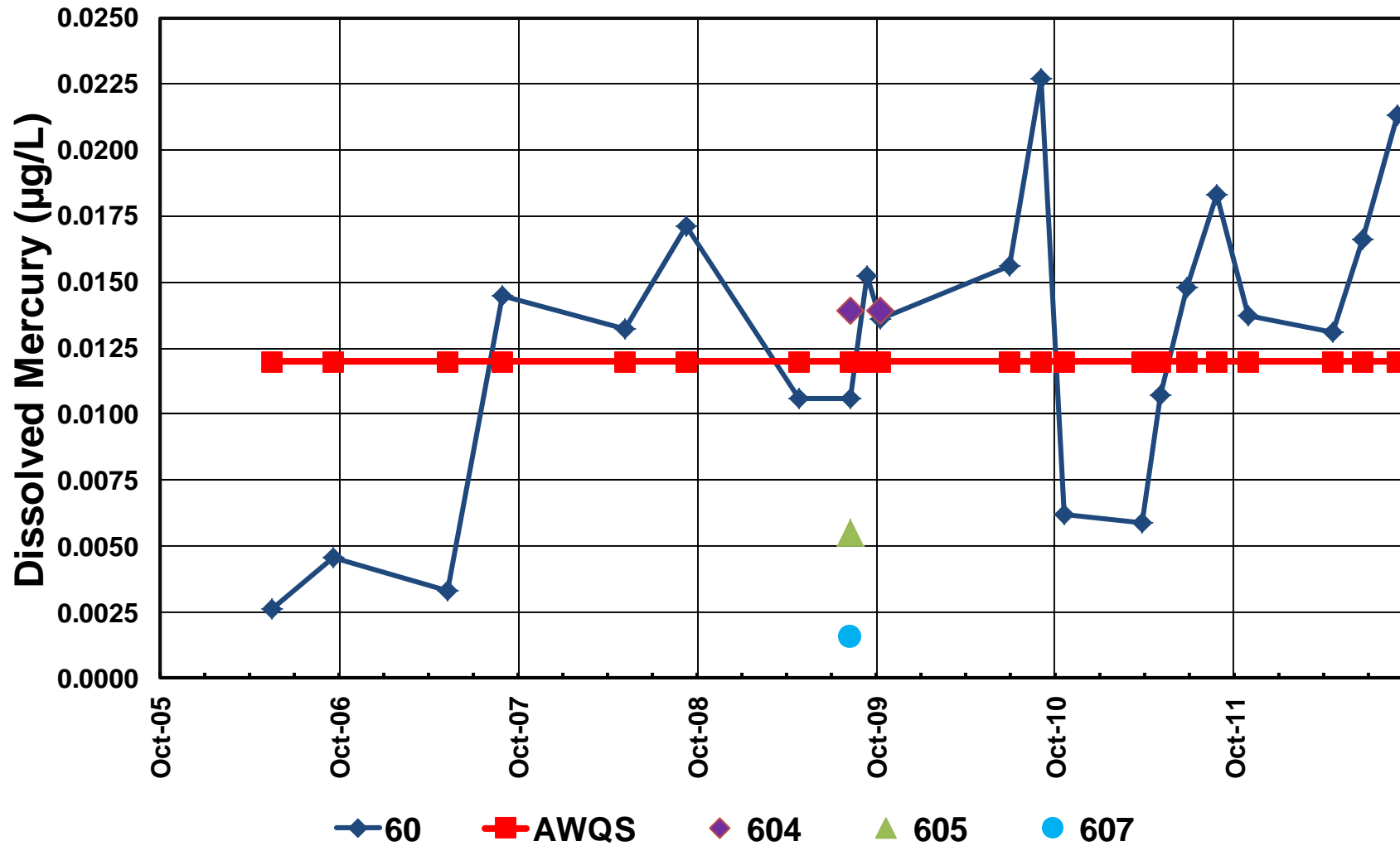
Site 60 Lower Althea

- Was added to the FWMP in WY 2006.
- Was added to monitor the impact of Pond 7 on the local watershed.
- Most analytes have returned to pre-disturbance levels.
- Mercury levels in exceedance of AWQS during the current water year.

AWQS Exceedances Sites 60

Site	Date	Parameter	Value	Limits		
				Lower	Upper	Hardness
60	15-Nov-11	Alkalinity	9.7 mg/L	20		
60	7-May-12	Alkalinity	7 mg/L	20		
60	9-Jul-12	Alkalinity	9 mg/L	20		
60	17-Sep-12	Alkalinity	8.9 mg/L	20		
60	17-Sep-12	Lead Dissolved	0.642 µg/L		0.54	21.60 mg/L
60	15-Nov-11	Mercury Dissolved	0.0137 µg/L		0.01	
60	7-May-12	Mercury Dissolved	0.0131 µg/L		0.01	
60	9-Jul-12	Mercury Dissolved	0.0166 µg/L		0.01	
60	17-Sep-12	Mercury Dissolved	0.0213 µg/L		0.01	
60	15-Nov-11	pH Field	6.38 su	6.5	8.50	
60	7-May-12	pH Field	5.83 su	6.5	8.50	
60	17-Sep-12	pH Field	6.14 su	6.5	8.50	

Site 60 and additional mercury samples



Site 9 Tributary

- Was added back into the monitoring plan in 2001 as a biomonitoring site.
- Additional sampling for Suite Q analytes during the months of May, July, September, and November.
- Was originally monitored between 1981 through 1993.

AWQS Exceedances Sites 9

Site	Date	Parameter	Value	Limits		
				Lower	Upper	Hardness
9	15-Nov-11	Alkalinity	15.3 mg/L	20		
9	7-May-12	Alkalinity	13.6 mg/L	20		
9	9-Jul-12	Alkalinity	15 mg/L	20		
9	17-Sep-12	Alkalinity	11.9 mg/L	20		
9	9-Jul-12	Lead Dissolved	1.09 µg/L		0.65	29.60 mg/L
9	17-Sep-12	Lead Dissolved	1.49 µg/L		0.54	23.00 mg/L
9	7-May-12	pH Field	6.23 su	6.5	8.50	



STOP

GREENS CREEK & 1350 FWMP SITES

Greens Creek & 1350 Sampling Sites

- Site 48 “Upper Greens Creek”
 - Up-gradient reference site
- Site 6 “ Middle Greens Creek”
 - Below the influence from the 1350, 960, 920 Mine Complex & Site C
- Site 54 “Lower Greens Creek”
 - Referenced to Site 6, below influence of Site 23/D

- Site 13 “1350 Mine Adit Discharge East”
 - Monitors the effect of contact water from the eastern portion of the 1350 Waste Rock site.

Bruin Creek & Site 23/D Sampling Sites

- Site 49 “Upper Bruin Creek”
 - Up-gradient reference site
- Site 46 “ Lower Bruin Creek”
 - Below influence from Site 23/D

- Site 57 “MW-23-00-03”
 - Up-gradient groundwater reference site, located above Site 23
- Site 56 “MW-D-00-01”
 - Down-gradient groundwater site, located below Site D

920 Area Fresh Water Monitoring Program

- Comparison against AWQS
- Upgradient / Downgradient comparative graphs for SC, SO₄, Pb, & Zn
- Review of statistical tests for trends and comparison of median values for selected analytes.

GREENS CREEK & 1350

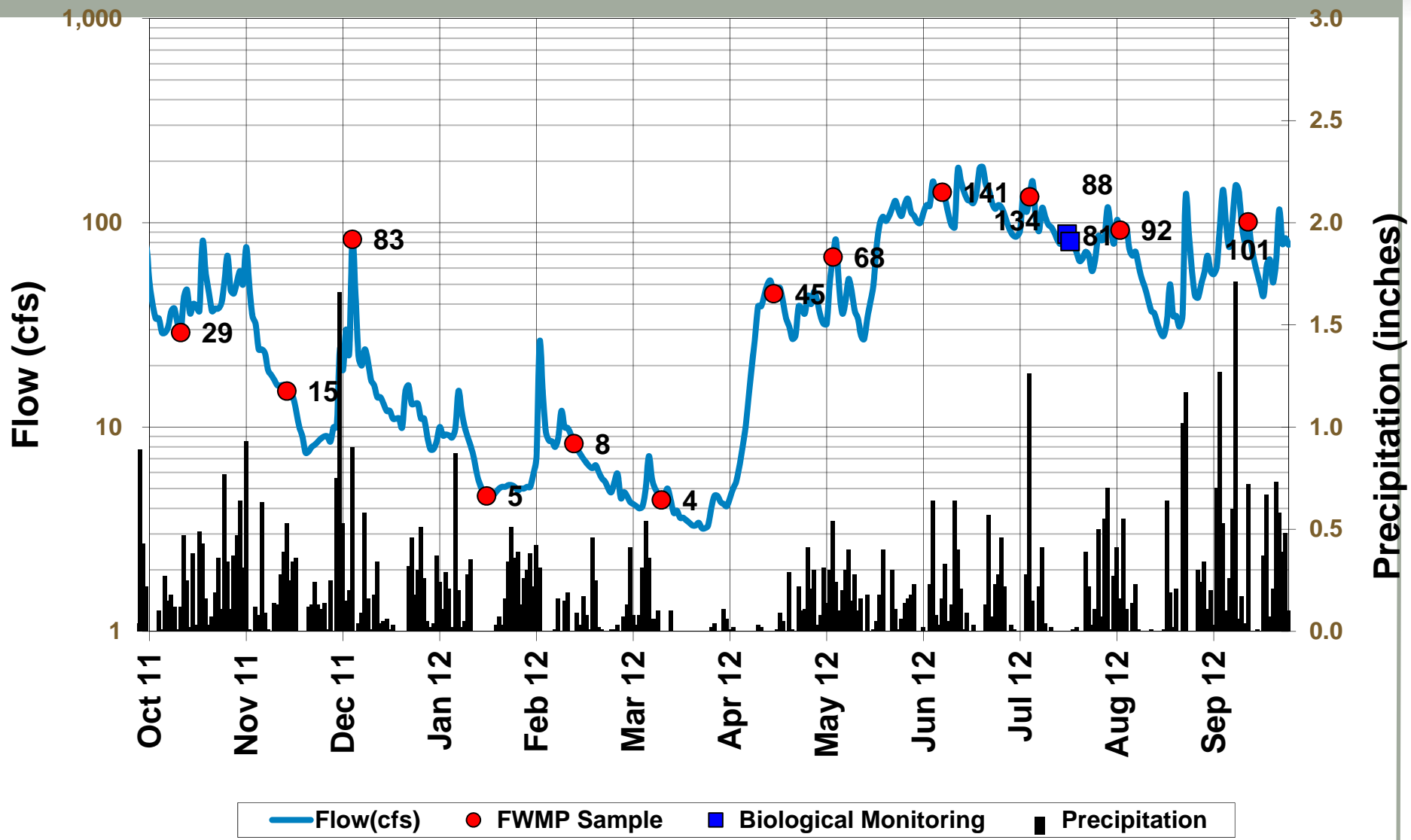
- Site 48 “Upper Greens Creek”
- Site 06 “Middle Greens Creek”
- Site 54 “Lower Greens Creek”
- Site 13 “1350 Mine Adit Discharge East”

AWQS Exceedances in Greens Creek

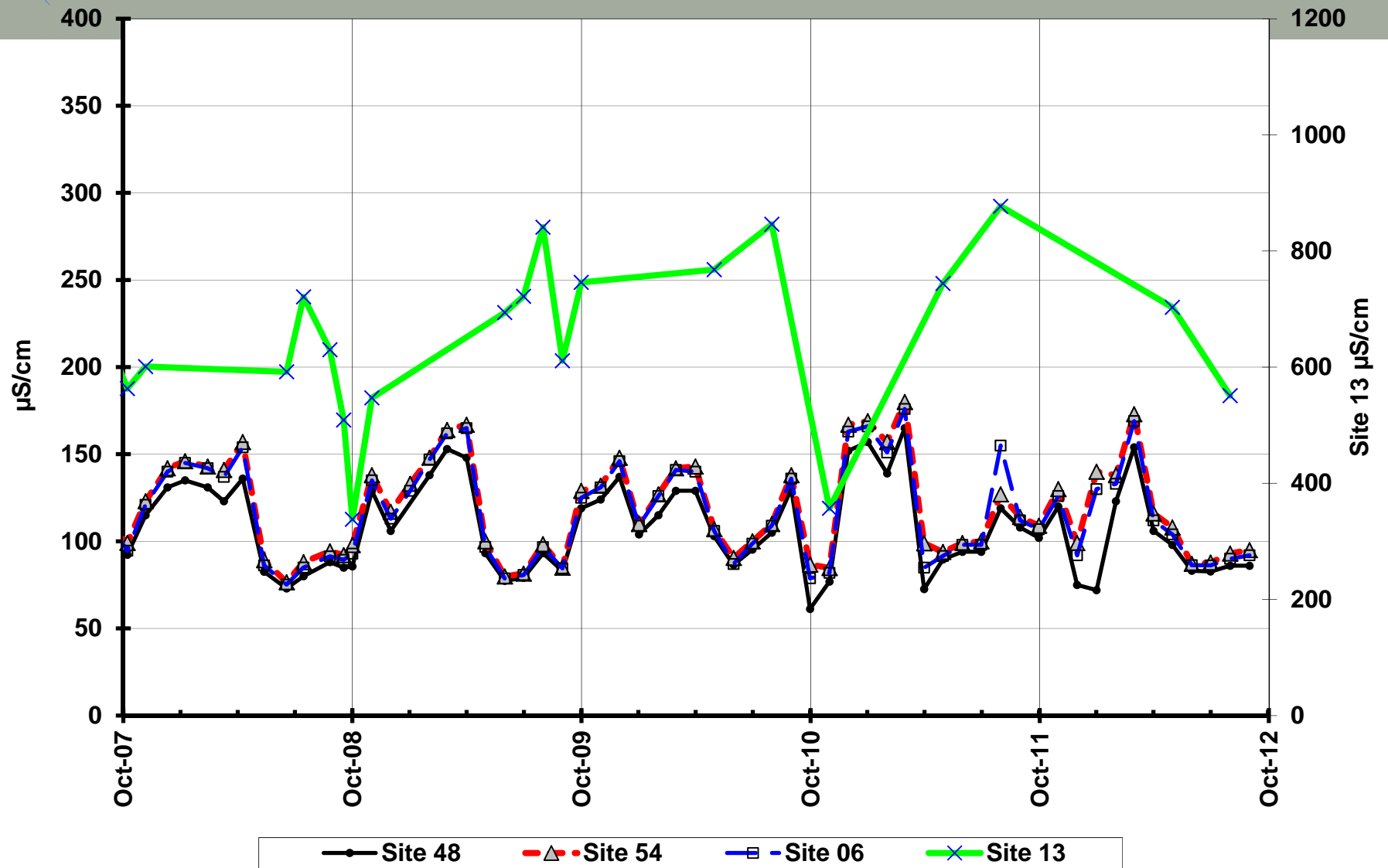
Site	Date	Parameter	Value	Limits		
				Lower	Upper	Hardness
48	17-Jan-12	pH Field	5.72 su	6.5	8.50	
6	17-Jan-12	pH Field	6.14 su	6.5	8.50	
54	17-Jan-12	pH Field	6.25 su	6.5	8.50	

- There were pH exceedances for Sites 48, 6, and 54.

Greens Creek Discharge

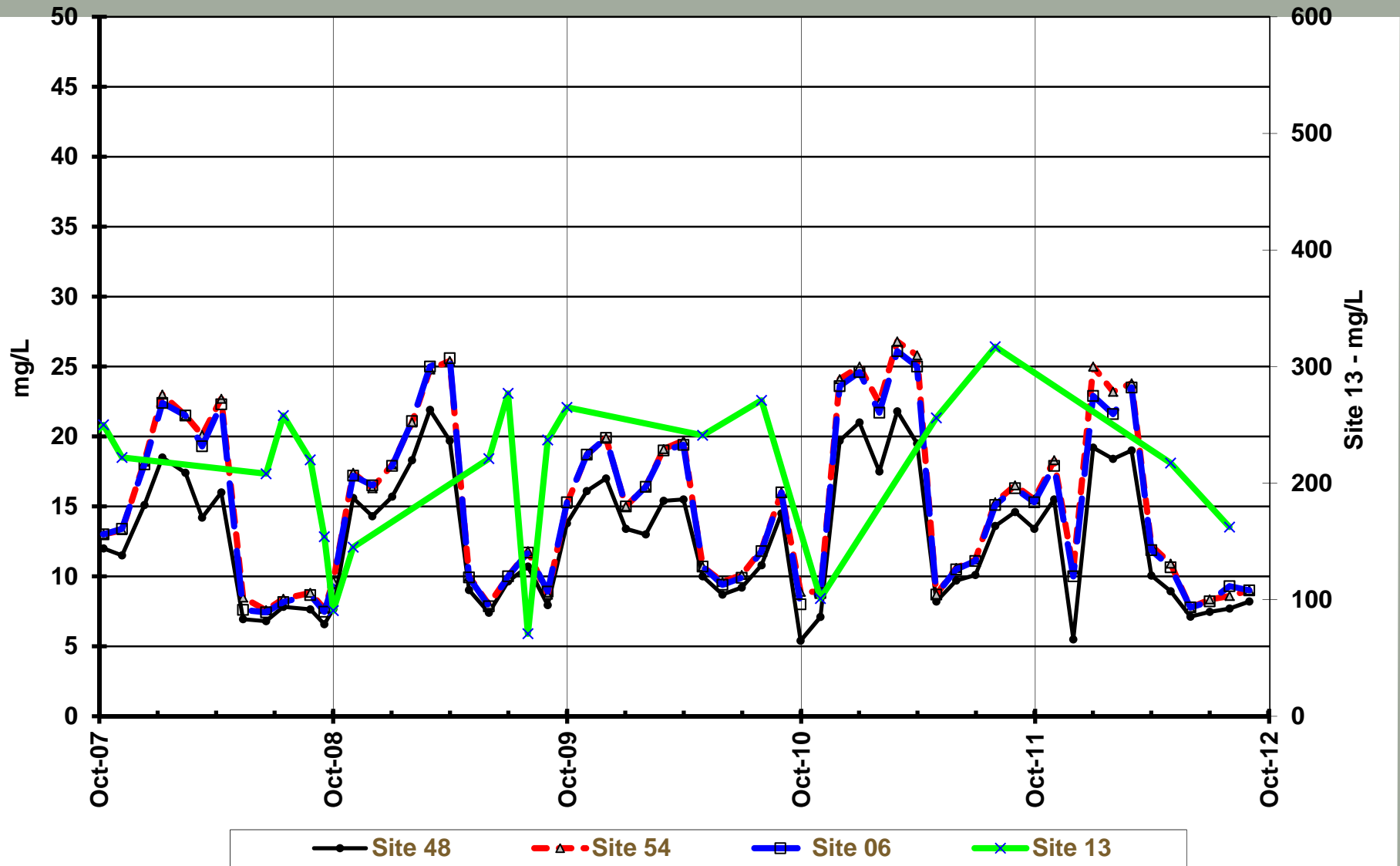


Greens Creek - Specific Conductance



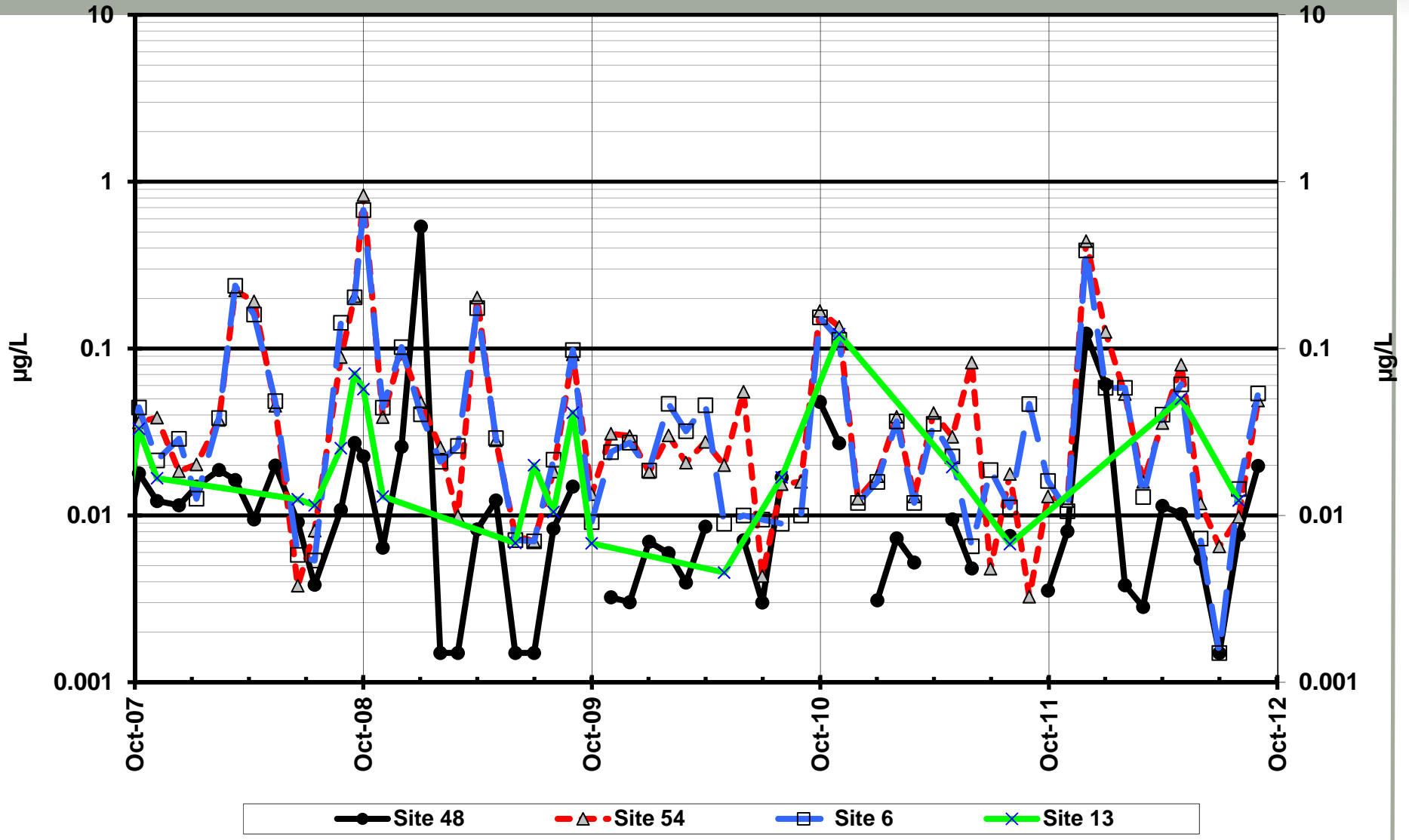
Greens Creek - Total Sulfate

(Note: Value reports as <MDL plotted at MDL/2)



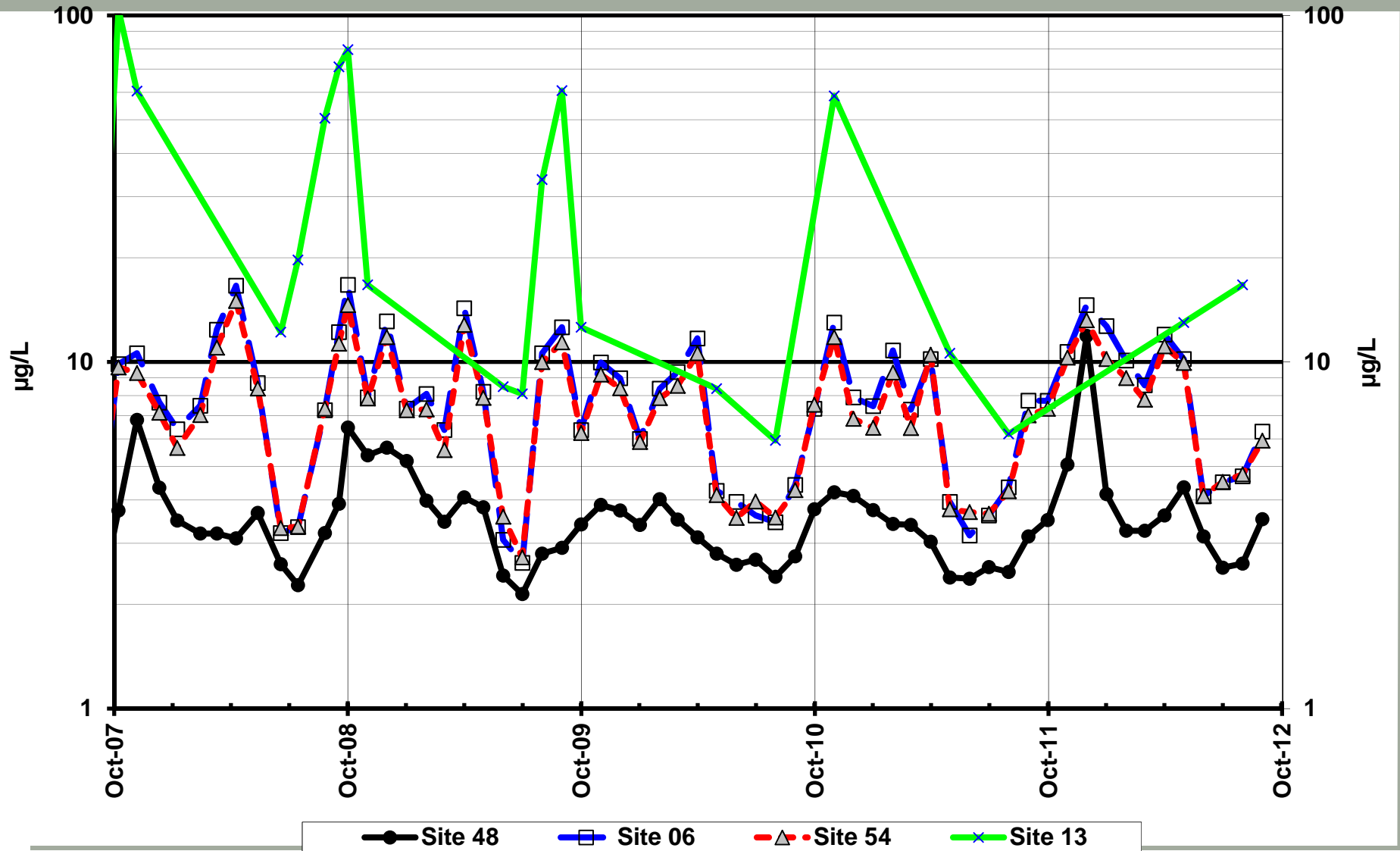
Greens Creek - Dissolved Lead

(Note: Values reported as <MDL plotted at MDL/2)



Greens Creek - Dissolved Zinc

(Note: Values reported as <MDL are plotted at 1/2MDL)



Greens Creek / 920 Area-Statistical Testing

2012 Water Year

Mann-Kendall Seasonal Trend Test Probabilities

Site	Cond.	pH	Alkalinity	Sulfate	Diss.-Zinc
48	0.16	<0.01	0.15	0.01	0.01
6	0.13	0.29	0.31	<0.01	<0.01
54	0.15	0.08	0.14	<0.01	<0.01
13	0.40	0.50	0.35	0.10	0.15

Sen's slope estimate

Site	$\mu\text{S/cm/yr}$	su/yr	mg/L/yr	$\mu\text{g/L/yr}$	$\mu\text{g/L/yr}$
48		-0.06		+0.45	+0.13
6				+0.36	+0.40
54				+0.46	+0.30
13					

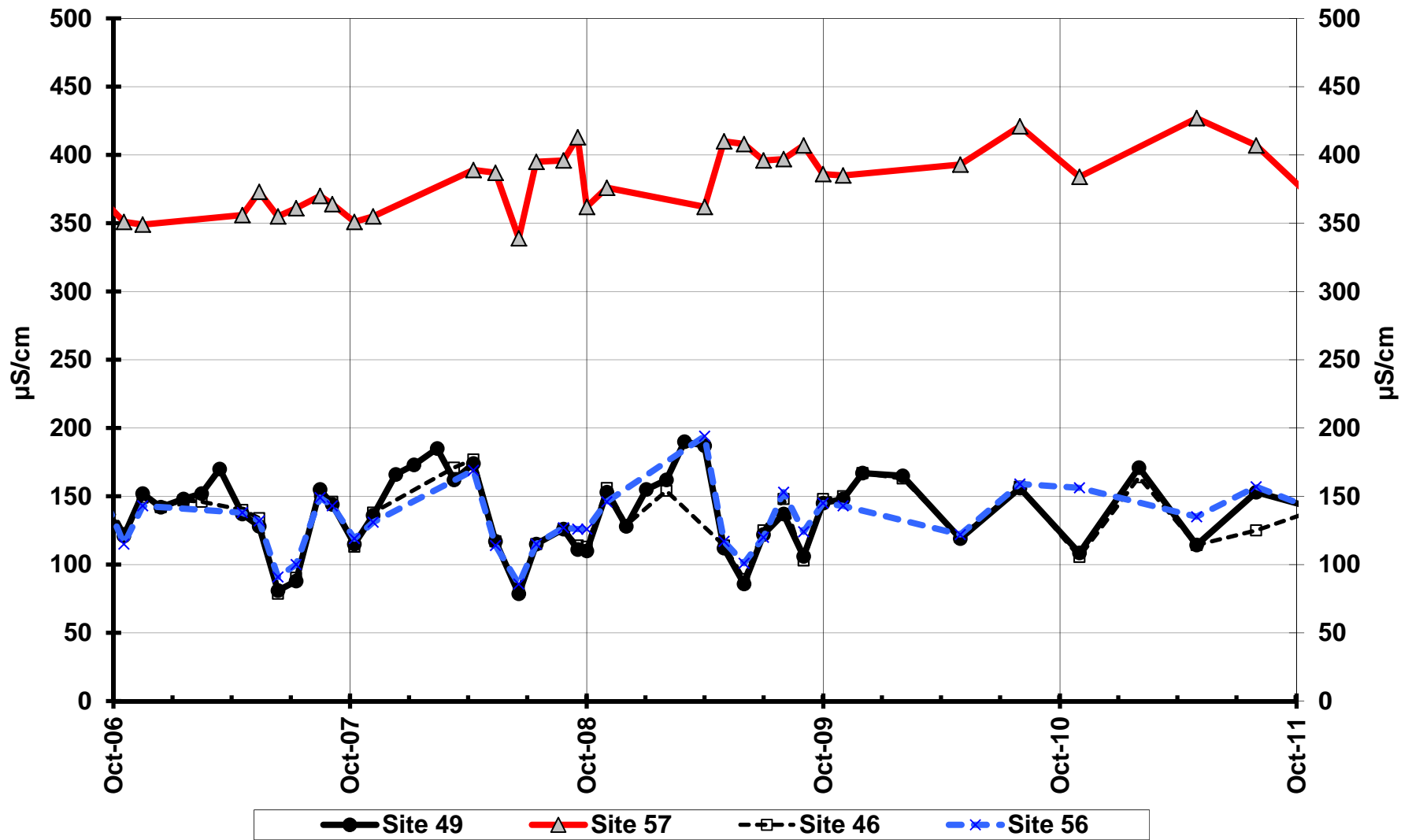
BRUIN CREEK & SITE 23/D MONITORING WELLS

- Site 49 “Upper Bruin Creek”
- Site 46 “Lower Bruin Creek”
- Site 57 “MW-23-00-03”
- Site 56 “MW-D-00-01”

AWQS Exceedances Bruin Creek & Site 23

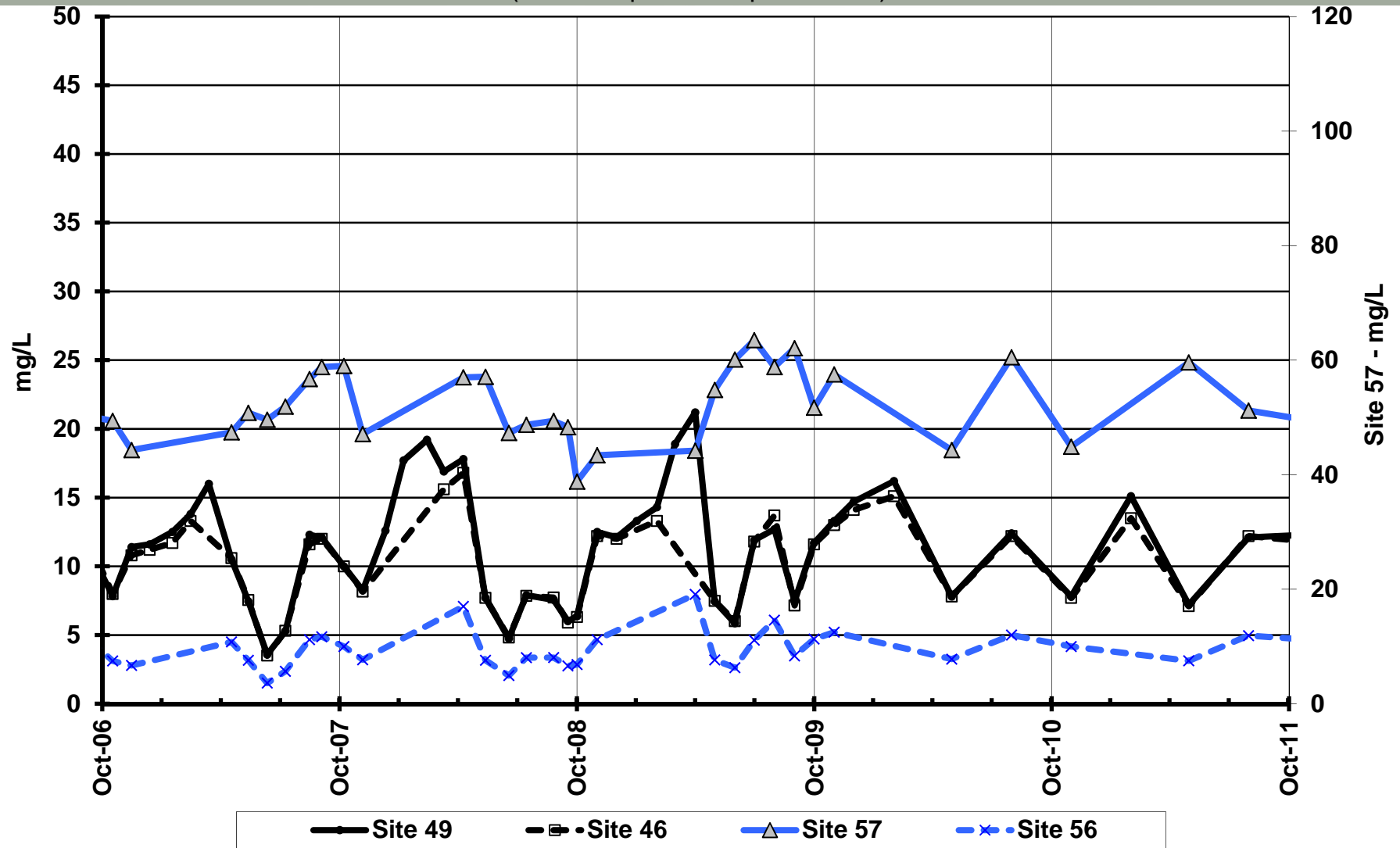
- No measured parameters exceeded AWQS for the Bruin Creek sites (49 & 46) or for the Site 23/D wells (57 & 56).

Site 23 Area - Specific Conductance



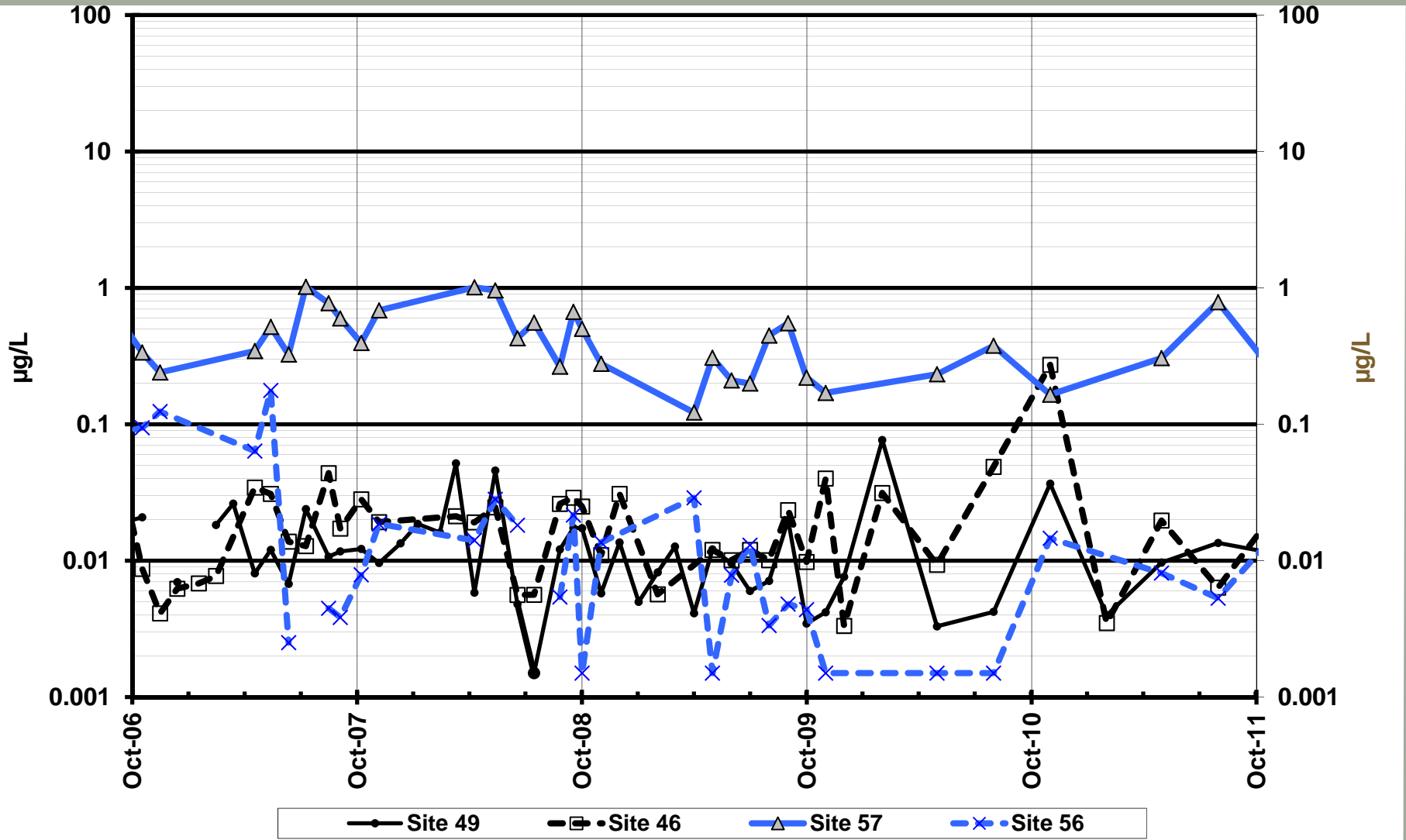
Site 23 Area - Total Sulfate

(Note: Value reports as <MDL plotted at MDL/2)



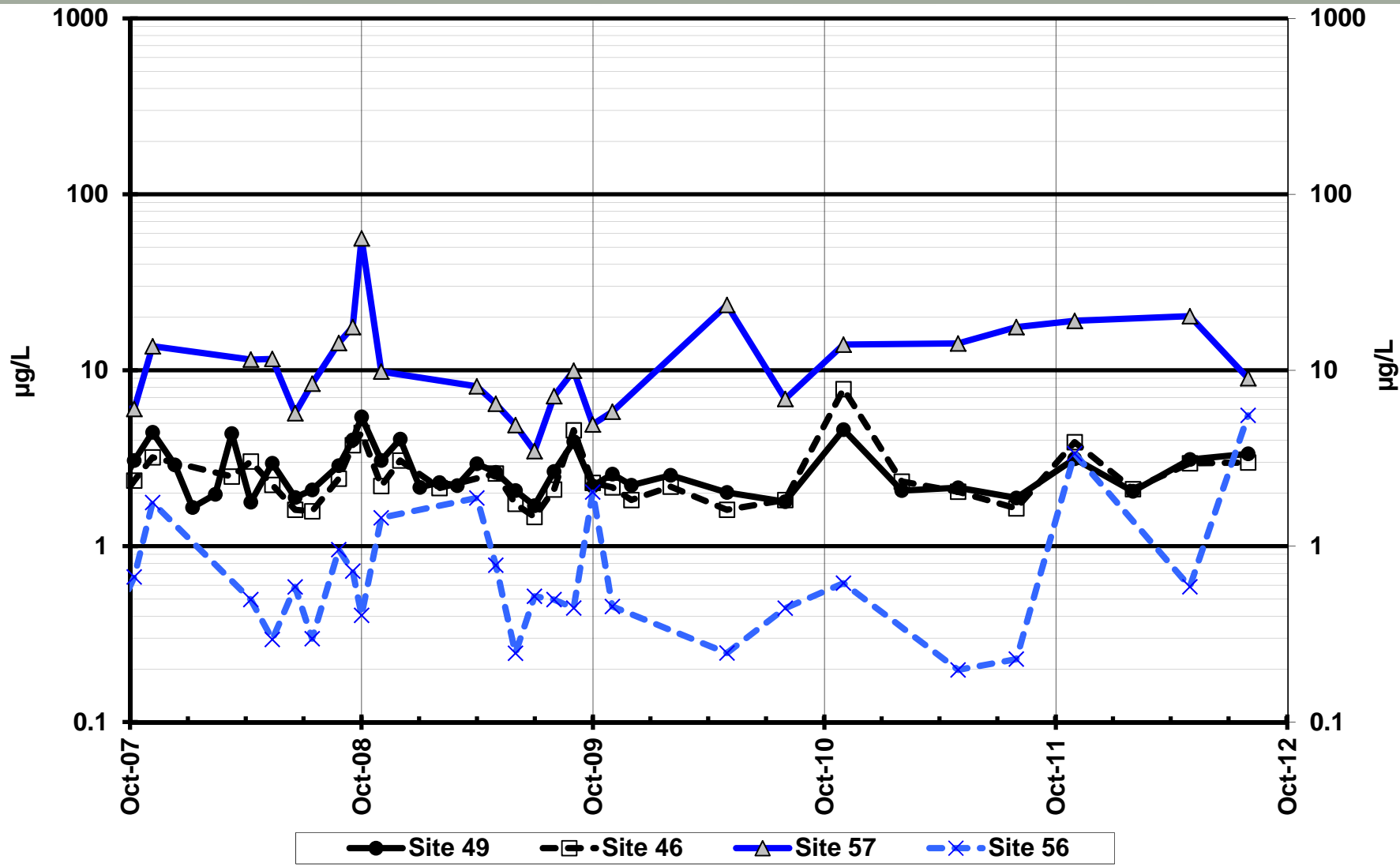
Site 23 Area - Dissolved Lead

(Note: Values reported as <MDL plotted at MDL/2)



Site 23 Area - Dissolved Zinc

(Note: Values reported as <MDL are plotted at 1/2MDL)



Bruin Creek - Site 23 Statistical Testing

2012 Water Year

Mann-Kendall Seasonal Trend Test Probabilities

Site	Cond.	pH	Alkalinity	Sulfate	Diss.-Zinc
49	0.07	0.07	0.40	0.03	0.06
46	0.12	0.46	0.30	0.03	0.02
57	0.14	0.35	0.31	0.32	0.03
56	0.50	0.19	0.42	0.02	0.35

Sen's slope estimate

Site	$\mu\text{S/cm/yr}$	su/yr	mg/L/yr	$\mu\text{g/L/yr}$	$\mu\text{g/L/yr}$
49					
46					+0.19
57					
56				0.71	

Statistical Testing (Comparison of Means)

Assumptions:

- ↑ Conductivity
- ↓ pH
- ↑ Sulfate
- ↓ Alkalinity
- ↑ Dissolved Zinc

Sites Compared:

downgradient – upgradient

06 – 48

54 – 06

46 – 49

56 – 57

Greens Creek (Comparison of Means)

2012 Water Year

Comparison of Medians, Signed-Rank Test Probabilities

Sites	Cond.	pH	Alkalinity	SO ₄	Diss-Zinc
6 - 48	<0.01	0.26	0.01	<0.01	<0.01
54 - 6	<0.01	0.90	0.00	0.02	1.00

Calculated Medians

Site	Cond. (uS/cm)	pH (su)	Alkalinity (mg/l)	SO ₄ (mg/l)	Diss-Zinc (ug/l)
48	92	7.67	38	9.5	3.51
6	106	7.71	37.3	11.3	9.34
54	109	7.57	38.9	11.6	8.39

Bruin Creek & Site 23 Comparison of Means

2012 Water Year

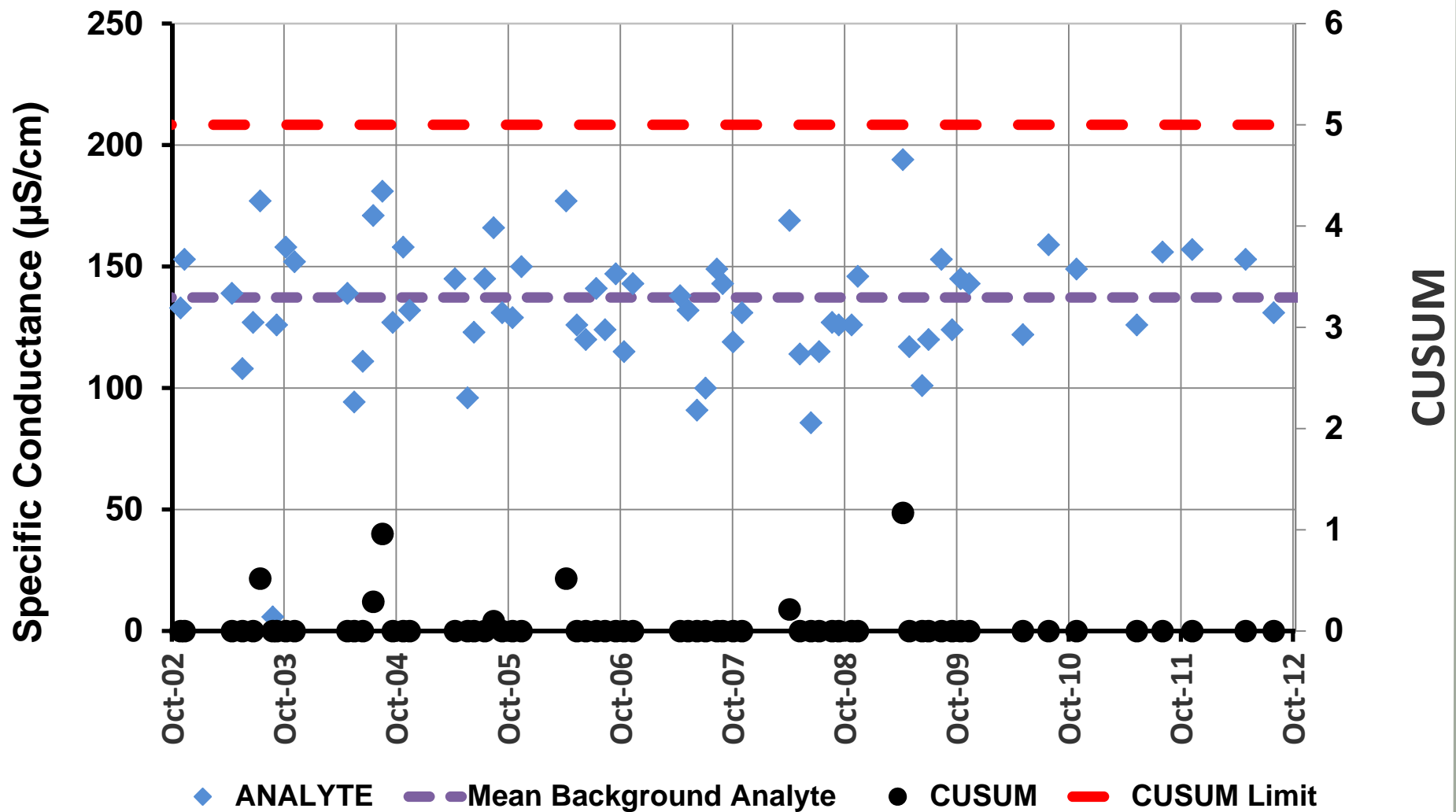
Comparison of Medians, Signed-Rank Test Probabilities

Sites	Cond.	pH	Alkalinity	SO ₄	Diss-Zinc
46 - 49	<0.01	0.94	0.81	0.93	0.31
56 - 57	1.00	0.63	1.00	1.00	1.00

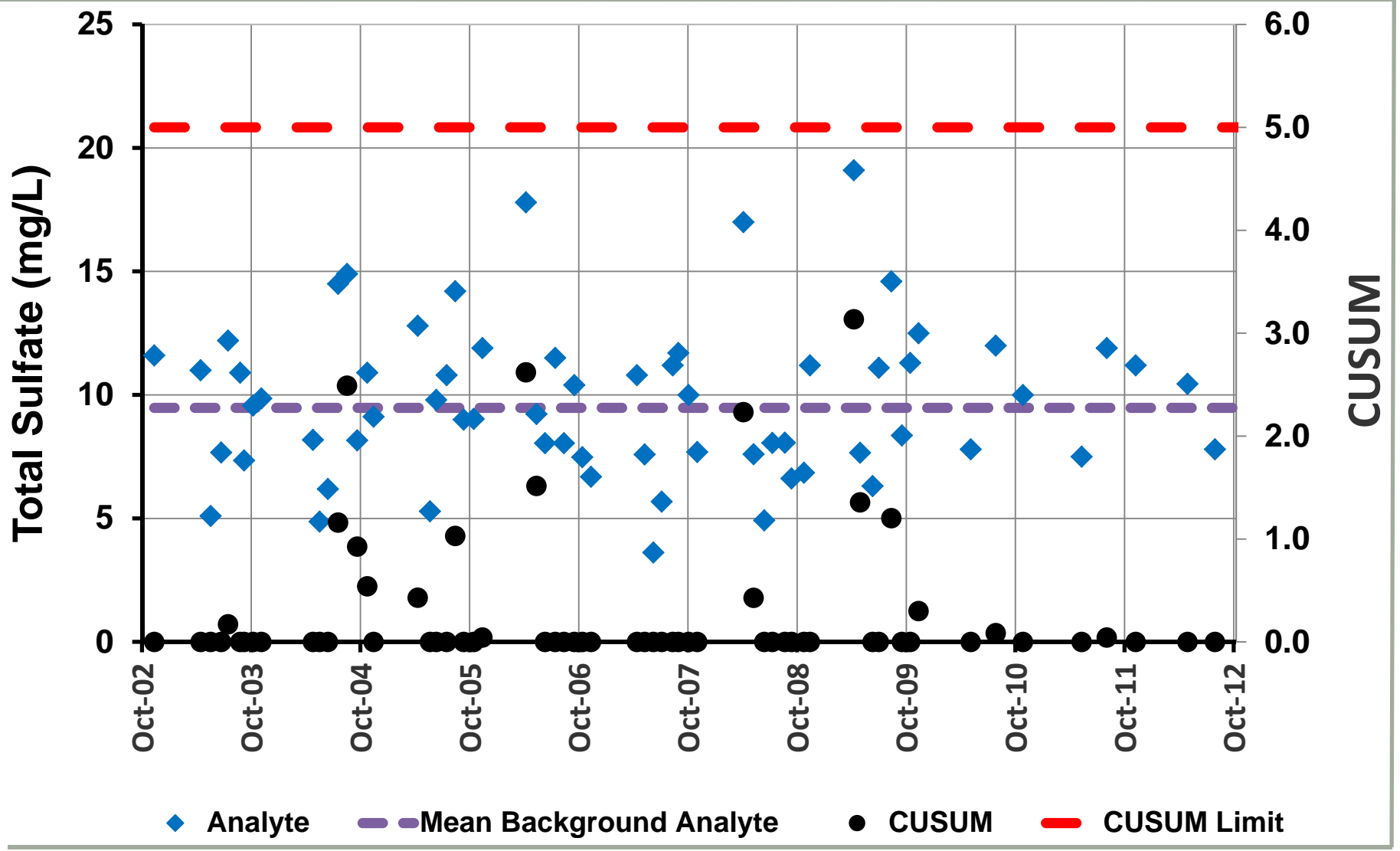
Calculated Medians

Site	Cond. (uS/cm)	pH (su)	Alkalinity (mg/l)	SO ₄ (mg/l)	Diss-Zinc (ug/l)
49	143	7.94	54.1	10	2.11
46	144	7.85	52	10	2.19
57	407	7.70	142	51.2	14.20
56	156	7.70	57.8	10	0.20

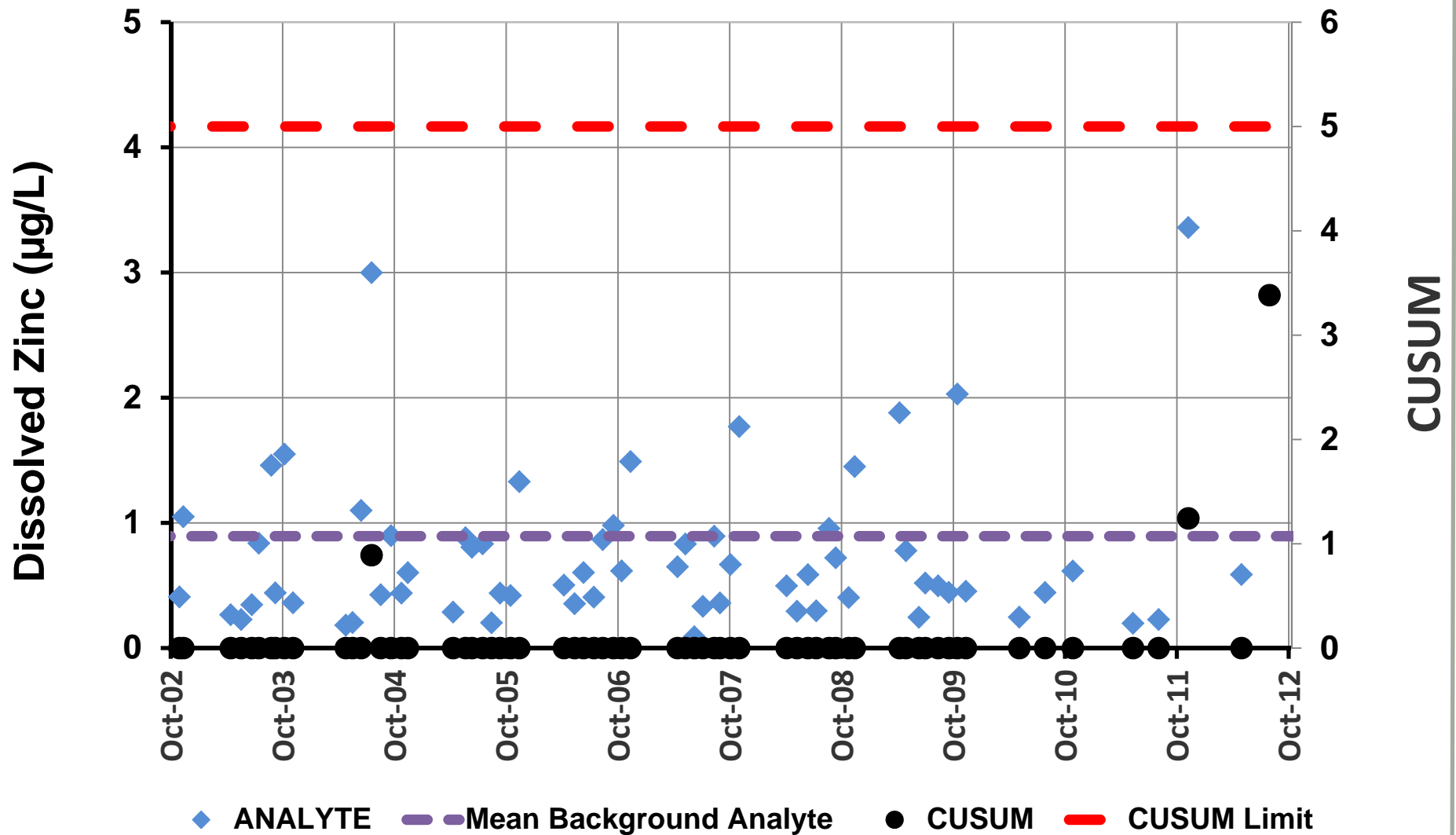
Site 56 Conductivity Measurements Compared to the Combined Shewhart-Cusum Control Limits



Site 56 Total Sulfate Measurements Compared to the Combined Shewhart-Cusum Control Limits



Site 56 Dissolved Zinc Measurements Compared to the Combined Shewhart-Cusum Control Limits



Changes Proposed Last Year

- Change the status of Site 28 (MW-2D) to inactive.
- Change the status of Site 30 (MW-3D) to inactive.
- Change the status of Site 58 (MW-T-00-01C) to inactive.
- Change the status of Site 59 (MW-T-00-01A) to inactive.
- Change the status of Site 56 (MW-D-00-01) to inactive.
- Add and activate Site 609 (Further Creek Lower Reach) to the FWMP.

Changes Proposed Last Year continued

- Add and activate a new site at the confluence of the two streams west of D pile in the Greens Creek floodplain (New Site 61).
- Add and activate a new site on Greens Creek, ¼ mile downstream of Site 54, and adjacent to 7.7 mile along the B road (New site 62).
- These modifications were implemented during the March 2013 FWMP sampling event.

2013 Water Year October 2012 Through September 2013

Site Number	Sample Identifier	Site Name	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
6	006FMS	Middle Greens Creek	P	P	Q	P	Q	P	P	P	P	P	P	P
9	009FMS	Tributary Creek-Lower		Q						Q		Q		Q
13	013FMS	Mine Adit Discharge East		Q						Q			Q	
27	027FMG	Monitoring Well 2S		Q						Q		Q		Q
29	029FMG	Monitoring Well 3S		Q						Q		Q		Q
32	032FMG	Monitoring Well 5S		Q						Q		Q		Q
46	046FMS	Lower Bruin Creek		Q			Q			P			P	
48	048FMS	Upper Greens Creek	P	P	Q	P	Q	P	P	P	P	P	P	P
49	049FMS	Control Site Upper Bruin Creek		Q			Q			P			P	
54	054FMS	Greens Creek below D-Pond	P	P	Q	P	Q	P	P	P	P	P	P	P
57	057FMG	Monitoring Well -23-00-03		Q			Q			Q			Q	
60	060FMS	Althea Creek - Lower		Q						Q		Q		Q
61	061FMS	Greens Creek Floodplain		Q			Q			Q			Q	
62	062FMS	Greens Creek Lower Than 54	P	P	Q	P	Q	P	P	P	P	P	P	P
609	609FMS	Further Creek Lower		Q						Q		Q		Q



STOP