Appendix A:
Monitoring Event Summaries for Toxicity, OC Pesticides, Nutrients, Metals, and Salts

Event 44 – KLI – Water & Sediment

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 44: Quarterly Sampling and Sediment Collection

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Amy Howk (KLI)
Crew #2: Justin Martos (Fugro), Jeff Polis (Fugro)

Sampling Dates: **Receiving water and land use sites:** August 5th and 6th, 2014

Sampling Type: Water Chemistry, Toxicity, Salts and Sediment

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04_WOOD	8/5/14	X	X	X	X	X	
04D_VENTURA	8/6/14	X		X		X	X
01T_ODD2_DCH	8/6/14	X		X	X	X	
02_PCH	8/5/14	X			X		
03_UNIV	8/5/14	X	X	X	X	X	
9B_ADOLF	8/5/14	X	X		X	X	
9BD_ADOLF	8/6/14	X		X		X	X
9A_HOWAR	8/5/14	X			X		
05D_SANT_VCWPD	8/6/14	X		X	X	X	
05_CENTR	8/6/14	X			X		
13_SB_HILL	8/6/14	X				X	X
10_GATE	8/5/14	X	X		X	X	
12_PARK	8/6/14	X			X		
13_BELT	8/5/14	X	X		X	X	
07D_HITCH_LEVEE2	8/5/14	X			X	X	X
07_HITCH	8/5/14	X	X		X	X	
07_MADER	8/6/14	X			X		

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
07D_CTP	8/6/14	X				X	X
07T_DC_H	8/6/14	X				X	

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry.
04D_WOOD	Site was dry.
06T_FC_BR	Site was dry.
06_SOMIS	Site was dry.
9BD_GERRY	Site was dry.

SEDIMENT SAMPLED

Site ID	Sediment Toxicity	Sediment Chemistry
02_PCH	**X**	**X**
03_UNIV	**X**	**X**
04_WOOD	**X**	**X**
06_SOMIS		**X**
07_HITCH		**X**
9A_HOWAR	**X**	**X**
9B_ADOLF		**X**

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was not measured due to tidal influence. Site was sampled near low tide to maximize watershed water.
04D_VENTURA	Intermediate container (Ziploc bag) used to fill sample bottles.
05 CENTR	Intermediate container (Nitrate bottle) used to fill sample bottles.
05D_SANT_VCWPD	Intermediate container (Ziploc bag) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc bag) used to fill sample bottles.
07T_DC_H	Intermediate container (Ziploc bag) used to fill sample bottles.
9BD_ADOLF	Intermediate container (Ziploc bag) used to fill sample bottles.

ADDITIONAL COMMENTS

Sediment chemistry taken at non-toxicity sites were collected into a Ziploc bag and then sub-sampled into the chemistry containers. Sediment chemistry at the toxicity sites were sub-sampled by Pacific EcoRisk after the sediment was homogenized.

FOLLOW UP ACTIONS

None

Prepared by:	Amy Howk, KLI	Date:	August 19, 2014
Reviewed by:	Greg Cotten, KLI	Date:	September 4th, 2014
Approved by:	Michael Marson, LWA	Date:	January 9, 2015

Event 44 – MBC - Water

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 44: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*:
Wayne Dossett, D.J. Schuessler

Sampling Date: 19 August 2014

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents					
	General Water Quality Parameters	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X	X	X			X
01_BPT_15 Central Lagoon	X	X	X			X
01_BPT_3 Eastern Arm	X	X	X			X
01_BPT_6 East Western Arm	X	X	X			X
01_RR_BR Ronald Reagan Bridge	X	X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X	X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	22 August 2014
Approved by:	Michael Marson, LWA	Submittal Date:	07 January 2015

Event 44 – MBC - Sediment

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 44: Mugu Lagoon Sediment

Sampling Crew: MBC *Applied Environmental Sciences*:
Wayne Dossett, James Nunez, D.J. Schuessler

Sampling Date: 19 and 20 August 2014

Sampling Type: Sediment Chemistry, Characteristics and Toxicity

SITES SAMPLED

Site ID	Constituents			
	Sediment Analysis	**Particle Size Distribution**	**Total Organic Carbon**	**Sediment Toxicity Mortality / Growth**
01_BPT_14 Central Western Arm	X	X	X	X
01_BPT_15 Central Lagoon	X	X	X	X
01_BPT_3 Eastern Arm	X	X	X	X
01_BPT_6 East Western Arm	X	X	X	X
01_SG_74 Central Lagoon S. of Drain #7	X	X	X	X

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

None

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	22 August 2014
Approved by:	Michael Marson, LWA	Submittal Date:	07 January 2015

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 45: Quarterly Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Aidas Worthington (KLI)
Crew #2: Justin Martos (Fugro), Jeff Polis (Fugro)

Sampling Dates: **Receiving water and land use sites:** November 12th and 13th 2014

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	11-12-14	X		X	X	X	X
04_WOOD	11-12-14	X	X	X	X	X	
04D_VENTURA	11-13-14	X		X		X	X
01T_ODD2_DCH	11-12-14	X		X	X	X	
02_PCH	11-12-14	X			X		
03_UNIV	11-12-14	X	X	X	X	X	
9B_ADOLF	11-12-14	X	X		X	X	
9BD_ADOLF	11-12-14	X		X		X	X
9A_HOWAR	11-12-14	X			X		
05D_SANT_VCWPD	11-13-14	X		X	X	X	
05_CENTR	11-13-14	X			X		
13_SB_HILL	11-13-14	X				X	X
10_GATE	11-12-14	X	X		X	X	
12_PARK	11-12-14	X			X		
13_BELT	11-12-14	X			X		
06_SOMIS	11-12-14	X	X		X	X	
07_HITCH	11-12-14	X	X		X	X	

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
07_MADER	11-12-14	X			X		
07D_CTP	11-13-14	X				X	X
07T_DC_H	11-12-14	X				X	

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Pump stopped while on site. Could not be sampled.
06T_FC_BR	Site was dry. 11-13-14 @ 09:54
9BD_GERRY	Site was dry. 11-12-14 @12:42, 15:10 and 11-13-14 @ 09:36
07D_HITCH_LEVEE	Site was dry. 11-12-14 @ 9:25

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was not measured due to tidal influence. Site was sampled near low tide to maximize watershed water.
04D_WOOD	Intermediate HDPE sample bottle #07 (Boron) used to fill sample bottles.
04D_VENTURA	Intermediate container (Ziploc® bag) used to fill sample bottles.
05D_SANT_VCWPD	Intermediate HDPE sample bottle #105 (Nitrate) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc® bag) used to fill sample bottles.
07T_DC_H	Intermediate container (Ziploc® bag) used to fill sample bottles.
9BD_ADOLF	Intermediate container (Ziploc® bag) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

QC items:

Mercury blank water was unavailable for CCWTMP-45-ODD2-038. After discussions with LWA (M.Marson) about sampling it the next day it was determined best to leave it rest as an omission.

Mercury Duplicate CCWTMP-45-ODD2-037 was taken in a Physis double bagged narrow mouth container not a wide mouth like the sample taken in bottle number 36.

Prepared by:	Greg Cotten, KLI	Date:	December 4th, 2014
Reviewed by:	Amy Howk, KLI	Date:	December 17th, 2014
Approved by:	Michael Marson, LWA	Date:	January 7th, 2015

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 45: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: James Nuñez, D.J. Schuessler

Sampling Date: 12 November 2014

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
01_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

NOTE

A floodgate to a side channel about 200 yards upstream of the 01_RR_BR sampling location was opened while the MBC field crew was conducting the survey. Water from the side channel was observed flowing

into Calleguas Creek and downstream toward 01_RR_BR the sampling location, although the water from the side channel probably did not reach the station by the time the sampling was completed.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	14 November 2014
Approved by:	Michael Marson, LWA	Submittal Date:	07 January 2015

Event 46 – Storm 1

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 46: Wet Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Aidas Worthington (KLI)
Crew #2: Amy Howk (KLI), Jon Toal (KLI)
Crew #3: Justin Martos (Fugro), Tom Cromwell (Fugro)
Crew #4: Tim Nicely (Fugro), Jeff Polis (Fugro)

Sampling Dates: **Receiving water and land use sites -** December 2nd, 2014

Sampling Type: Stormwater Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	12-2-14	X		X	X	X	X
04_WOOD	12-2-14	X	X	X	X	X	X
04D_VENTURA	12-2-14	X		X		X	X
01T_ODD2_DCH	12-2-14	X		X	X	X	
03_UNIV	12-2-14	X	X	X	X	X	X
9B_BARON	12-2-14	X					X
9B_ADOLF	12-2-14	X	X		X	X	
9BD_ADOLF	12-2-14	X		X		X	X
9BD_GERRY	12-2-14	X		X	X	X	X
9A_HOWAR	12-2-14	X					X
05D_SANT_VCWPD	12-2-14	X		X	X	X	
05_CENTR	12-2-14	X			X		
13_SB_HILL	12-2-14	X				X	X
10_GATE	12-2-14	X	X		X	X	
13_BELT	12-2-14	X	X			X	
06T_FC_BR	12-2-14	X			X	X	

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
06_SOMIS	12-2-14	X	X		X	X	
07D_HITCH_LEVEE2	12-2-14	X			X	X	X
07_HITCH	12-2-14	X	X		X	X	
07_MADER	12-2-14	X			X		
07D_CTP	12-2-14	X				X	X
07T_DC_H	12-2-14	X				X	
07_TIERRA	12-2-14	X					X

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry

DEVIATIONS FROM QAPP

Site ID	Deviation
9A_HOWAR	Intermediate container (bucket) used to fill sample bottles.
05D_SANT_VCWPD	Intermediate container (bucket) used to fill sample bottles.
06_SOMIS	Intermediate container (bucket & bottle 78) used to fill sample bottles.
9BD_ADOLF	Intermediate container (bottle #123 & bottle #124) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

When Turbidity exceeded the measuring capabilities of the field meter (>1000 NTU) then additional Turbidity analysis was requested of Physis Laboratory. The TSS sample was to be used for this analysis and these sites include: 05D_SANT_VCWPD, 05_CENTR, 06T_FC_BR, 06_SOMIS, 9BD_GERRY, 04_WOOD, and 01T_ODD2_DCH.

Turbidity calibration issue with meter 2692 and 3760:

Team 2: 9BD_GERRY, 10_GATE, 13_BELT, 13_SB_HILL and 9A_HOWAR had an additional grab taken in a lab cleaned 250 mL HDPE container for Turbidity analysis within 7 hours with meter # 3755. There was a suspected issue with our 100 NTU calibration solution but not 0 or 1000 NTU. 3755 accepted both 0 and 1000 NTU but was not validated in pre-sampling

calibration. The meter passed post calibrations test of both 100 NTU (read 109 NTU) and 0.0 NTU (read 0.0 NTU) back in the lab the following day. Due to Turbidity calibration uncertainty in meter 3760, both 9B_ADOLF and 9BD_ADOLF were also analyzed by Physis Laboratory. The remaining samples from that meter far exceeded the meters ability and were done by the lab.

Strangely, YSI Sonde 6800 AE would not accept a decimal level mS/cm conductivity calibration. Additional grabs were taken at 07_HITCH, 07D_HITCH_LEVEE2, 07D_CTP, 07_MADER, and 07T_DC_H in new Ziploc® bags and analyzed with meter 3755 which past pre-/post-event calibrations. These grab samples were analyzed within 8 hours.

Due to high and dangerous flows, all flows are estimated except: 04D_WOOD, 9BD_GERRY, and 06T_FC_BR. When possible, tools were used to make measured estimates (e.g. bridges were used to take width estimates, laser measures and grab poles for smaller width estimates, and grab poles for depth measurements when possible, etc).

Prepared by:	Greg Cotten, KLI	Date:	January 27, 2015
Reviewed by:	Amy Howk, KLI	Date:	January 30, 2015
Approved by:	Michael R Marson, LWA	Date:	February 2, 2015

Event 47 – Storm 2

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 47: Wet Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Dani Walker (KLI)
Crew #2: Amy Howk (KLI), Aidas Worthington (KLI)
Crew #3: Justin Martos (Fugro), Jeff Polis (Fugro)
Crew #4 Tim Nicely (Fugro), Tom Cromwell (Fugro)

Sampling Dates: **Receiving water and land use sites:** December 12th, 2014

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	12-12-14	X		X	X	X	X
04_WOOD	12-12-14	X	X	X	X	X	X
04D_VENTURA	12-12-14	X		X		X	X
01T_ODD2_DCH	12-12-14	X		X	X	X	
02D_BROOM	12-12-14	X		X	X	X	
03_UNIV	12-12-14	X	X	X	X	X	X
9B_BARON	12-12-14	X					X
9B_ADOLF	12-12-14	X	X		X	X	
9BD_ADOLF	12-12-14	X		X		X	X
9BD_GERRY	12-12-14	X		X	X	X	X
9A_HOWAR	12-12-14	X					X
05D_SANT_VCWPD	12-12-14	X		X	X	X	
05_CENTR	12-12-14	X			X		
13_SB_HILL	12-12-14	X				X	X
10_GATE	12-12-14	X	X		X	X	
13_BELT	12-12-14	X	X			X	

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
06T_FC_BR	12-12-14	X			X	X	
06_SOMIS	12-12-14	X	X		X	X	
07D_HITCH_LEVEE_2	12-12-14	X			X	X	X
07_HITCH	12-12-14	X	X		X	X	
07_MADER	12-12-14	X			X		
07D_CTP	12-12-14	X				X	X
07T_DC_H	12-12-14	X				X	
07_TIERRA	12-12-14	X					X

SITES NOT SAMPLED

Site ID	Reason for Omission
N/A	All sites were sampled

DEVIATIONS FROM QAPP

Site ID	Deviation
06_SOMIS	A bucket was used as an intermediate container to collect toxicity. The bucket was wiped down with a gloved hand and triple rinsed with site water before using it to collect sample.

ADDITIONAL COMMENTS

Field meter calibration issues:

Team 1 water quality sonde had a conductivity glitch that wouldn't accept a decimal level accuracy and therefore the accuracy of that probe was unacceptable. Conductivity for this team was made from grabs with meter # 2692 on the same day within 7 hours of collection.

Team 2 turbidity sensor wouldn't accept calibration. Turbidity for this meter was analyzed by meter 3755 from grabs within 6.5 hours.

Team 4 meter would not accurately calibrate to a 12,880 so it could not measure a large range of conductivities. It did however exhibit precision during the calibration procedures and therefore was calibrated to 0.0 and 1413. Because all site conductivity levels for this meter were found between 0 - 1413 uS/cm and the meter pasted post calibration check with great accuracy, I feel it's reasonable to accept the field measurements taken with this meter.

Accurate flow measurements were taken at 9BD_GERRY, 07T_DC_H, 07D_HITCH_LEVEE_2, 04D_VENTURA, and 04D_WOOD but because of safety and ability concerns, all other flows for this event were measured estimates. Measured estimates means tools were used to make the estimates and actual measurements were made when possible but there was at least one component of the flow measurement that necessitates these flow be considered estimates.

Turbidity readings that exceeded the meters ability to accurately measure (>1000 NTU) it was requested of Physis Laboratory to perform a turbidity analysis on the TSS sample.

FOLLOW UP ACTIONS

None

Prepared by:	Greg Cotten, KLI	Date:	February 20, 2015
Reviewed by:	Amy Howk, KLI	Date:	February 23, 2015
Approved by:	Michael R. Marson, LWA	Date:	February 24, 2015

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 48: Quarterly Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Amy Howk (KLI)
Crew #2: Tim Nicely (Fugro), Luke Budny (Fugro)

Sampling Dates: **Receiving water and land use sites:** February 3rd and 4th 2015

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	2/4/15	X		X	X	X	X
04_WOOD	2/4/15	X	X	X	X	X	
04D_VENTURA	2/3/15	X		X		X	X
01T_ODD2_DCH	2/3/15	X		X	X	X	
02_PCH	2/3/15	X			X		
03_UNIV	2/4/15	X	X	X	X	X	
9B_ADOLF	2/4/15	X	X		X	X	
9BD_ADOLF	2/3/15	X		X		X	X
9A_HOWAR	2/3/15	X			X		
05D_SANT_VCWPD	2/3/15	X		X	X	X	
05_CENTR	2/3/15	X			X		
13_SB_HILL	2/3/15	X				X	X
10_GATE	2/3/15	X			X		
12_PARK	2/3/15	X			X		
13_BELT	2/4/15	X	X		X	X	
06T_FC_BR	2/3/15	X			X	X	
06_SOMIS	2/4/15	X	X		X	X	

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
07_HITCH	2/4/15	X	X		X	X	
07_MADER	2/3/15	X			X		
07D_CTP	2/3/15	X				X	X
07T_DC_H	2/3/15	X				X	

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry 2-4-15 @ 11:40.
9BD_GERRY	Site was dry 2-3-15 @ 14:00, 15:54 and 2-4-15 @ 11:00, 12:10
07D_HITCH_LEVEE_2	Site was dry 2-4-15 @ 08:15, 09:45

DEVIATIONS FROM QAPP

Site ID	Deviation
04D_WOOD	Intermediate container (Ziploc® bag) used to fill sample bottles.
04D_VENTURA	Intermediate container (Ziploc® bag) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc® bag) used to fill sample bottles.
06_SOMIS	Intermediate HDPE sample bottle #112 (TSS) used to fill Toxicity samples only.
07_HITCH	Intermediate HDPE sample bottle #125 (TSS) used to fill Toxicity samples only.
9BD_ADOLF	Intermediate container (Ziploc® bag) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

The field water quality meter used by Team 2, meter #3760, failed the post-calibration for pH. Initial calibration was valid with a confirmation check of 8.04; however post-calibration was 8.44 for pH 8.0. The same meter measured pH 7.45 for pH 7.0 during the post-calibration check.

Turbidity for Team 1 was measured using a HACH 2100 Q portable turbidimeter. The meter was calibrated prior to sampling and post-calibrated. Samples were taken and read immediately with no waiting time.

Prepared by:	Amy Howk, KLI	Date:	February 19th, 2015
Reviewed by:	Dani Walker, KLI	Date:	February 23rd, 2015
Approved by:	Michael R. Marson, LWA	Date:	February 25th, 2015

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 48: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: James Nuñez & D.J. Schuessler

Sampling Date: 5 February 2015

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
1_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

At Station 01_BPT_15 water quality field data recorded for "1-m depth" was sampled at 0.9 m due to low tidal level.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	6 February 2015
Approved by:	Michael Marson, LWA	Submittal Date:	18 March 2015

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 49: Quarterly Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro
Crew #1: Greg Cotten (KLI), Amy Howk (KLI)
Crew #2: Tim Nicely (Fugro), Lucas Budny (Fugro)

Sampling Dates: **Receiving water and land use sites:** May 5th and 6th, 2015

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	05-05-15	X		X	X	X	X
04_WOOD	05-06-15	X	X	X	X	X	
04D_VENTURA	05-05-15	X		X		X	X
01T_ODD2_DCH	05-06-15	X		X	X	X	
02_PCH	05-06-15	X			X		
03_UNIV	05-06-15	X	X	X	X	X	
9B_ADOLF	05-06-15	X	X		X	X	
9BD_ADOLF	05-05-15	X		X		X	X
9A_HOWAR	05-05-15	X			X		
05D_SANT_VCWPD	05-05-15	X		X	X	X	
05_CENTR	05-05-15	X			X		
13_SB_HILL	05-05-15	X				X	X
10_GATE	05-06-15	X	X		X	X	
12_PARK	05-05-15	X			X		
13_BELT	05-05-15	X			X		
07_HITCH	05-06-15	X	X		X	X	
07_MADER	05-05-15	X			X		

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
07D_CTP	05-05-15	X				X	X
07T_DC_H	05-05-15	X				X	

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry.
06T_FC_BR	Site was dry.
07D_HITCH_LEVEE2	Site was dry.
9BD_GERRY	Site was dry.
06_SOMIS	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was taken in spite of tidal influence.
04_WOOD	The conductivity at the site (3,950 uS/cm) was greater than the accepted range for the designated test species (*Ceriodaphnia dubia*). The QAPP requires the use of *Americamysis bahia*. However, *Hylella azteca* is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized *Hylella azteca* in place of *Americamysis bahia*.
04D_VENTURA	Intermediate container (new Ziploc® bag) was used to fill sample bottles. The bag was triple rinsed before sampling.
07D_CTP	Intermediate container (new Ziploc® bag) was used to fill sample bottles. The bag was triple rinsed before sampling.
07T_DC_H	Intermediate container (new Ziploc® bag) was used to fill sample bottles. The bag was triple rinsed before sampling.
9BD_ADOLF	Intermediate container (new Ziploc® bag) was used to fill sample bottles. The bag was triple rinsed before sampling.
05D_SANT_VCWPD	Intermediate container (new Ziploc® bag) was used to fill sample bottles. The bag was triple rinsed before sampling.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

None

Prepared by:	Greg Cotten, KLI	Date:	May 21, 2015
Reviewed by:	Danielle Walker, KLI	Date:	May 21, 2015
Approved by:	Michael Marson, LWA	Date:	June 11, 2015

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 49: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: Wayne Dossett, D.J. Schuessler

Sampling Date: 4 May 2015

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
1_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	6 May 2015
Approved by:	Michael Marson, LWA	Submittal Date:	July 16, 2015

Event 49 - Tissue

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 49: Mugu Lagoon Tissue

Sampling Crew: MBC *Applied Environmental Sciences*:
James Nunez, Wayne Dossett, D.J. Schuessler

Sampling Date: 18 May 2015

Sampling Type: Mugu Lagoon Tissue Chemistry

SITES SAMPLED

Site ID	Constituents					
	PCBs	**OC Pesticides**	**Chlorpyrifos**	**Metals**	**% Lipids**	**% Moisture**
01_Central Lagoon Mussel Tissue	X	X	X	X	X	X
01_Central Lagoon Bait Fish Tissue	X	X	X	X	X	X
01_Central Lagoon Sport Fish Tissue	X	X	X	X	X	X
01_Western Arm Mussel Tissue	X	X	X	X	X	X
01_Western Arm Bait Fish Tissue	X	X	X	X	X	X
01_Western Arm Sport Fish Tissue	X	X	X	X	X	X

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

None

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	20 May 2015
Approved by:	Michael Marson, LWA	Submittal Date:	July 16, 2015

Appendix B:
Calibration Event Summary for Salts TMDL

The following section provides a summary of the monitoring events not covered by our quarterly or wet weather monitoring completed during the seventh year of monitoring. The continuous sensor sites (03_UNIV, 04_WOOD, 9A_HOWAR, 9B_BARON, & 07_TIERRA) were visited monthly for calibration checks and flow measurements.

SUMMARY OF MONTHLY EVENTS

Monthly sampling events included only measuring electrical conductivity (EC), temperature, and chloride (no grab samples were required during these visits). EC and temperature were measured using a Hach sensION5 meter and chloride was measured with Hach Quantab titration strips. The following section details each monthly event.

Table 1. Monthly sensor site visits

Month	Site ID	Date Visited	EC	Chloride	Discharge
July 2014	04_WOOD	7/11/2014	X	X	X
	03_UNIV	7/10/2014	X	X	X
	07_TIERRA	7/10/2014	X	X	X
	9A_HOWAR	7/10/2014	X	X	X
	9B_BARON	7/10/2014	X	X	X
	04_WOOD	7/16/2014	X	X	X
	9A_HOWAR	7/25/2014			X
	04_WOOD	7/25/2014			X
August 2014	04_WOOD	08/06/2014	X	X	X
	03_UNIV	08/06/2014	X	X	X
	07_TIERRA	08/06/2014	X	X	X
	9A_HOWAR	08/06/2014	X	X	X
	9B_BARON	08/06/2014	X	X	X
September 2014	04_WOOD	09/04/2014	X	X	X
	03_UNIV	09/04/2014	X	X	X
	07_TIERRA	09/04/2014	X	X	X
	9A_HOWAR	09/04/2014	X	X	X
	9B_BARON	09/04/2014	X	X	X
October 2014	04_WOOD	10/02/2014	X	X	X
	03_UNIV	10/02/2014	X	X	X
	07_TIERRA	10/02/2014	X	X	X
	9A_HOWAR	10/02/2014	X	X	X
	9B_BARON	10/02/2014	X	X	X
	04_WOOD	10/30/2014	X	X	X
November 2014	04_WOOD	11/06/2014	X	X	X
	03_UNIV	11/06/2014	X	X	X
	07_TIERRA	11/06/2014	X	X	X
	9A_HOWAR	11/06/2014	X	X	X
	9B_BARON	11/06/2014	X	X	X
December 2014 – Storm 1	04_WOOD	12/02/2014	X		X
	03_UNIV	12/02/2014	X		X
	07_TIERRA	12/02/2014	X		X
	9A_HOWAR	12/02/2014	X		X
	9B_BARON	12/02/2014	X		X

Month	Site ID	Date Visited	EC	Chloride	Discharge
December 2014 – Post storm	04_WOOD	12/05/2014	X	X	X
	03_UNIV	12/05/2014	X	X	X
	07_TIERRA	12/05/2014	X	X	X
	9A_HOWAR	12/05/2014	X	X	X
	9B_BARON	12/05/2014	X	X	X
	03_UNIV	12/08/2014	X	X	
December 2014 – Storm 2	04_WOOD	12/12/2014	X		X
	03_UNIV	12/12/2014	X		X
	07_TIERRA	12/12/2014	X		X
	9A_HOWAR	12/12/2014	X		X
	9B_BARON	12/12/2014	X		X
December 2014 – Post storm	03_UNIV	12/15/2014	X	X	
	9A_HOWAR	12/17/2014	X	X	X
	03_UNIV	12/17/2014	X	X	
	04_WOOD	12/18/2014	X	X	X
	9B_BARON	12/18/2014	X	X	X
	9A_HOWAR	12/18/2014	X	X	X
	07_TIERRA	12/19/2014	X	X	X
January 2015	04_WOOD	01/14/2015	X	X	X
	03_UNIV	01/14/2015	X	X	X
	07_TIERRA	01/14/2015	X	X	X
	9A_HOWAR	01/14/2015	X	X	X
	9B_BARON	01/14/2015	X	X	X
February 2015	04_WOOD	02/04/2015	X	X	X
	03_UNIV	02/04/2015	X	X	X
	07_TIERRA	02/04/2015	X	X	X
	9A_HOWAR	02/04/2015	X	X	X
	9B_BARON	02/04/2015	X	X	X
March 2015	04_WOOD	03/04/2015	X	X	X
	03_UNIV	03/04/2015	X	X	X
	07_TIERRA	03/04/2015	X	X	X
	9A_HOWAR	03/04/2015	X	X	X
	9B_BARON	03/04/2015	X	X	X
	04_WOOD	03/17/2015	X	X	X
	04_WOOD	03/25/2015	X	X	X

Month	Site ID	Date Visited	EC	Chloride	Discharge
April 2015	04_WOOD	04/02/2015	X	X	X
	03_UNIV	04/02/2015	X	X	X
	07_TIERRA	04/02/2015	X	X	X
	9A_HOWAR	04/02/2015	X	X	X
	9B_BARON	04/02/2015	X	X	X
	9A_HOWAR	04/29/2015	X	X	
	07_TIERRA	04/29/2015	X	X	
May 2015	04_WOOD	05/07/2015	X	X	X
	03_UNIV	05/07/2015	X	X	X
	07_TIERRA	05/07/2015	X	X	X
	9A_HOWAR	05/07/2015	X	X	X
	9B_BARON	05/07/2015	X	X	X
June 2015	04_WOOD	06/09/2015	X	X	X
	03_UNIV	06/09/2015	X	X	X
	07_TIERRA	06/09/2015	X	X	X
	9A_HOWAR	06/09/2015	X	X	X
	9B_BARON	06/09/2015	X	X	X
	04_WOOD	06/24/2015	X	X	X
	9A_HOWAR	06/24/2015	X	X	X
	04_WOOD	06/30/2015	X	X	X
	03_UNIV	06/30/2015	X	X	X
	07_TIERRA	06/30/2015	X	X	X
	9B_BARON	06/30/2015	X	X	X

Appendix C:
Rating Curves and EC/Salt Relationships for Salts TMDL Compliance Sites for the July 2014-June 2015 Monitoring Year

RATING CURVES

Continuous water level time series data (5-min intervals) were converted to time series of flow estimates (cfs) using the USGS shift-adjusted rating curve method. The method establishes a base rating for a given date range. Over the date range that shares a base rating, this rating is then shifted, as necessary, for subsets of the data to account for small changes in the geometry of natural channels often caused by deposition, scouring, and vegetation. Rating curves for all sites took the form $Q = c^* (Lvl + a + S)^b$ where,

Q = discharge (cfs)

Lvl = water level or "stage", referenced to depth sensor elevation (cm)

c = scaling coefficient

a = coefficient accounting for the vertical difference between depth sensor elevation (stage = 0) and stage at zero discharge (cm)

b = coefficient accounting for channel shape, natural channels fall between endpoints b=1.5 (square channel), and b=2.5 (triangular channel).

S = stage shift, typically varies over time for natural channels (cm).

Monthly manual measurements of discharge were performed at all sites and are used to establish base ratings and to determine the required "shifts" ("S" in the equation above) over time for the monitoring year. Base rating curve equations are provided in **Table 1**.

Table 1. Rating Curves for Salts TMDL Compliance Sites for Monitoring Year July 2014-June 2015

Site	Rating Curve
03_UNIV[a]	$Q = 0.32*(Lvl - 30.5 + C)^{2.0}$
04_WOOD	$Q = 0.015*(Lvl - 5 + C)^{1.8}$
07_TIERRA	$Q = 0.0185*(Lvl - 21.5 + C)^{2.0}$
9A_HOWAR	$Q = 0.021*(Lvl - 6.0 + C)^{2.0}$
9B_BARON	$Q = 0.044*(Lvl + 0 + C)^{1.65}$

[a] A new base rating curve was developed for 2014-2015 water year and a single relationship is appropriate for both low and high flow conditions (previously, the rating curve was split depending on the water level)

EC/SALT RELATIONSHIPS

Site-specific, linear relationships between specific conductivity (EC) and salt constituents were used to convert continuous EC sensor data to estimate salt concentrations. Surrogate relationships were derived from field data for EC and salts (grab samples for TDS, sulfate, chloride, or boron from quarterly dry plus wet events) using linear regression, in the following form:

[Ion] = A*EC + B, where,

[Ion] = concentration of TDS, sulfate, chloride, or boron (mg/L)

A = slope

EC = specific conductivity (µS/cm)

B = y-intercept

Two scenarios were evaluated to determine whether EC vs. salt relationships at the Salts TMDL compliance sites had significantly changed from those obtained during a one-year pilot study in 2011, which were subsequently used to prepare salt concentration time series for the 2012/2013 and 2013/2014 monitoring years. The first scenario considered a change in the surrogate relationship after June 2012, a date that separates the initial feasibility study and the start of compliance monitoring in late summer 2012. The second scenario considered a change in the surrogate relationship after February 2014, a date selected to reflect drought conditions and a change in the imported water supply source from 100% State Water Project (SWP) water to approximately 80% SWP water and 20% Colorado River water.

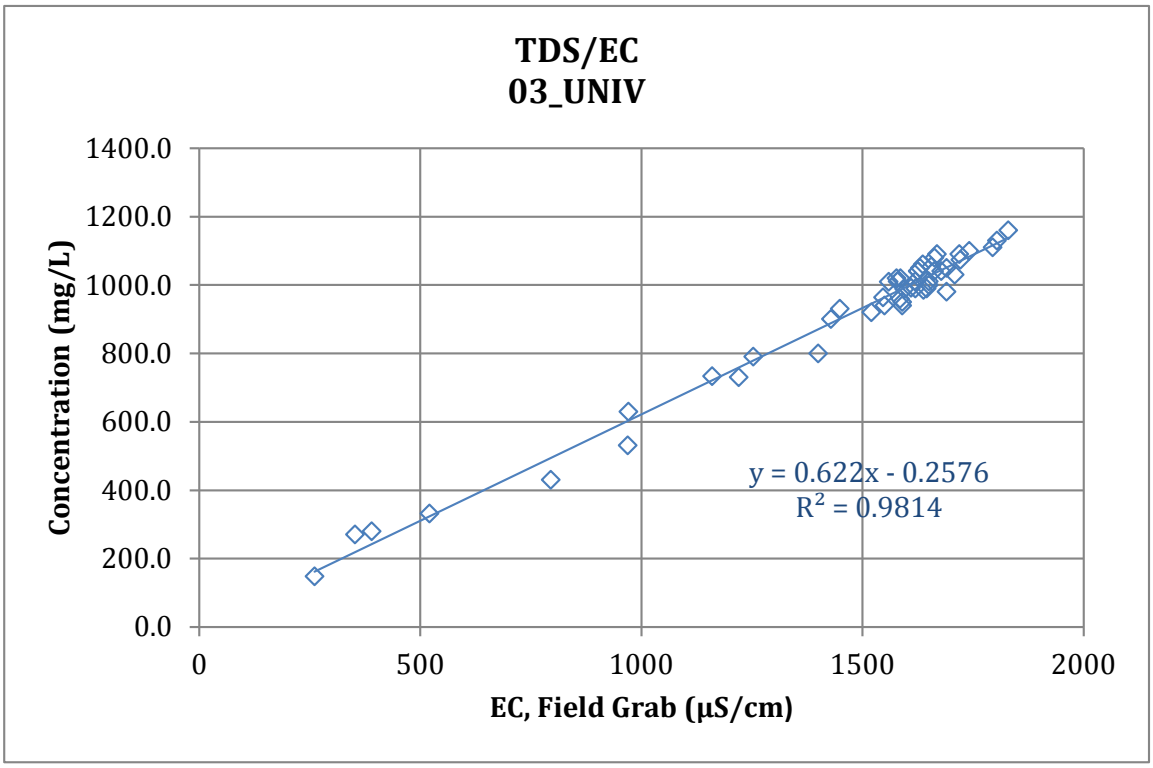
Analysis of covariance (ANCOVA) is a statistical tool for identifying cases where surrogate relationships change; however, further analysis is required to make a decision if the change is both supported by data and is significant enough trigger an update to surrogate relationships.

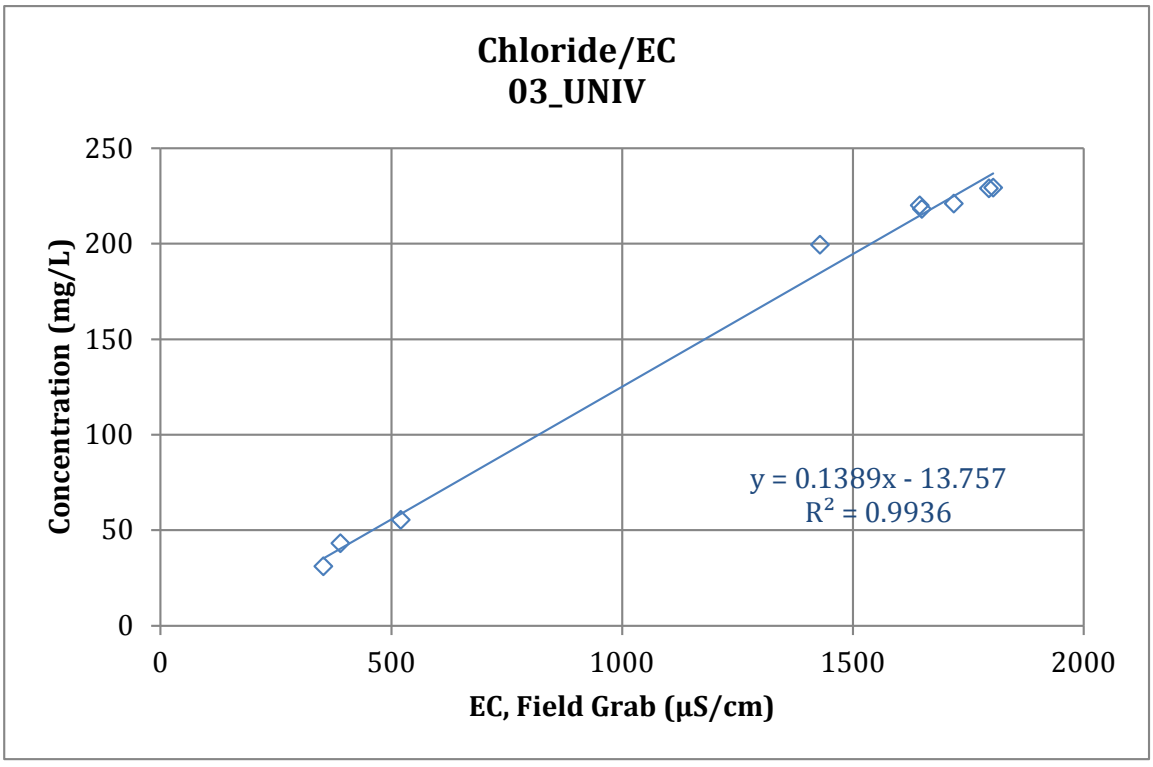
ANCOVA analyses were run to identify cases where there is a statistical possibility that surrogate relationships may have shifted over time, based on one or both of the scenarios described above. Based on this analysis, eight surrogate models were updated for the 2014-2015 water year. Two of the updated surrogate relationships are now based on field data collected starting with the beginning of compliance monitoring in late summer 2012 (EC/B at 07_TIERRA, EC/Cl at 9B_BARON). The other six of the updated surrogate relationships are now based on field data collected starting in February 2014. Relationship parameters and field data date ranges for all surrogate relationships used to process the 2014/2015 EC sensor data are reported in **Table 2**. The surrogate relationships are illustrated in figures following **Table 2**.

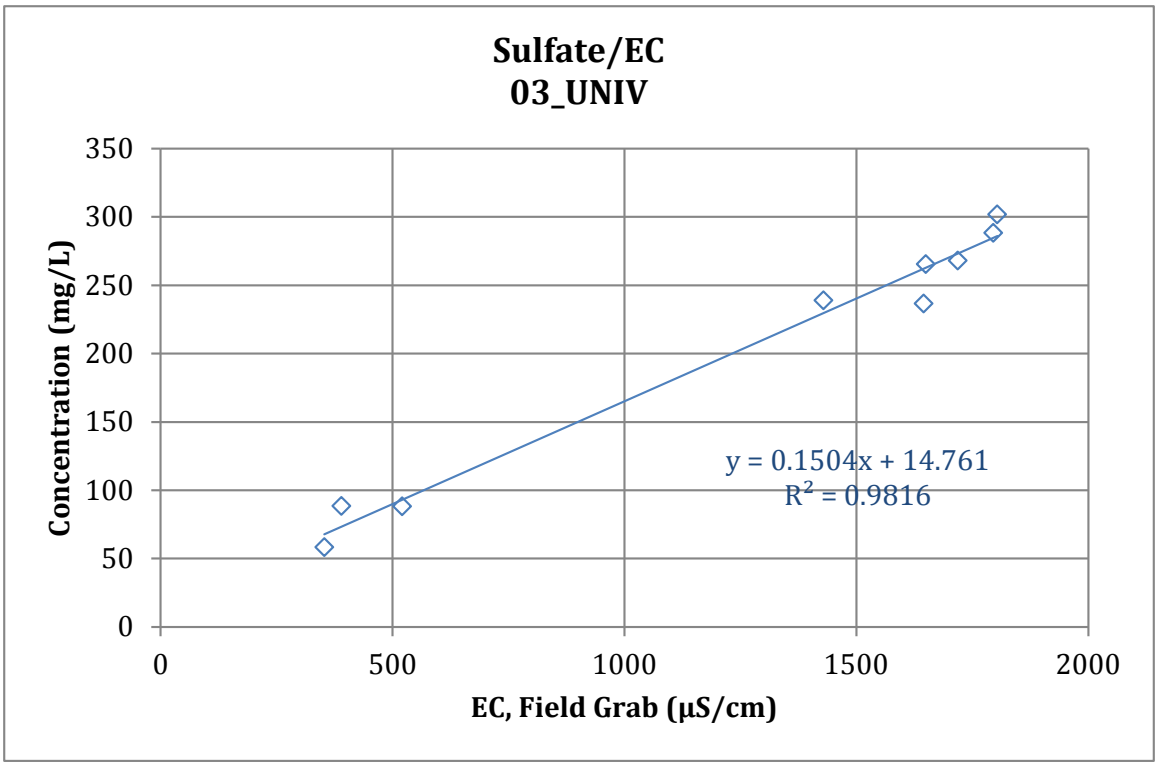
Table 2. Parameters for surrogate relationships used to derive salt concentrations from EC sensor data for monitoring year July 2014-June 2015. Date ranges are for the field data that were used to construct the relationship.

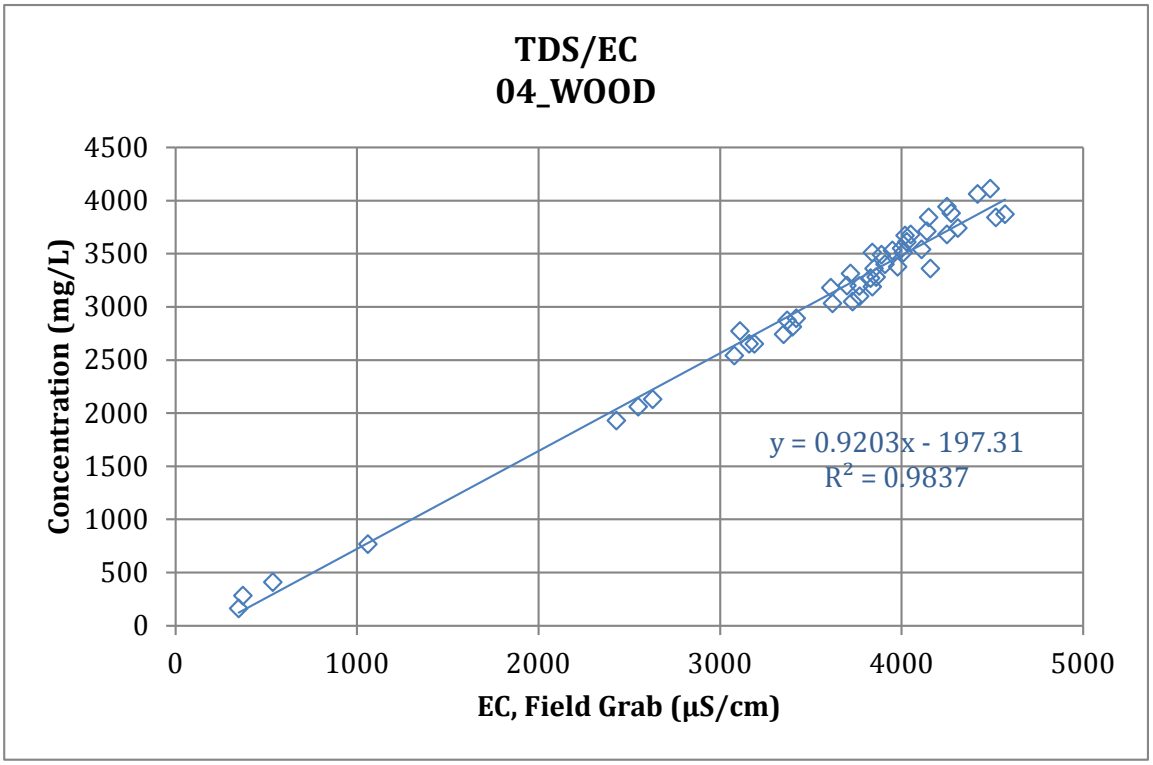
		TDS	Cl	SO4	B
03_UNIV	A	0.6220	0.1389	0.1504	
	B	-0.2576	-13.7568	14.7609	
	R2	0.9814	0.9936	0.9816	
	Count	49	9	9	
	Date Range	1/31/2011 – 6/30/2015[a]	2/28/2014-6/30/2015[a]		
04_WOOD	A	0.9203	0.05086	0.4890	0.0005
	B	-197.3	-6.8498	-104.5639	-0.0930
	R2	0.9837	0.9896	0.9926	0.8731
	Count	48	8	8	48
	Date Range	1/31/2011 – 6/30/2015[a]	2/28/2014-6/30/2015[a]		1/31/2011 – 6/30/2015[a]
07_TIERRA	A	0.7092	0.1081	0.2763	0.0004
	B	-61.26	-11.9364	-39.7200	-0.0406
	R2	0.9816	0.9940	0.9722	0.9735
	Count	37	8	37	16
	Date Range	1/31/2011 – 6/30/2015[a]	2/28/2014-6/30/2015[a]	1/31/2011 – 6/30/2015[a]	8/28/2012-6/30/2015[a]
9A_HOWAR	A	0.6097	0.1380	0.1597	
	B	1.5996	-11.5017	-9.8701	
	R2	0.9854	0.9900	0.9499	
	Count	38	8	37	
	Date Range	1/31/2011 – 6/30/2015[a]	2/28/2014-6/30/2015[a]	1/31/2011 – 6/30/2015[a]	
9B_BARON	A	0.6010	0.1456	0.1533	
	B	-5.5732	-14.3760	-6.0782	
	R2	0.9715	0.9885	0.9632	
	Count	38	16	8	
	Date Range	1/31/2011 – 6/30/2015[a]	8/28/2012-6/30/2015[a]	2/28/2014-6/30/2015[a]	

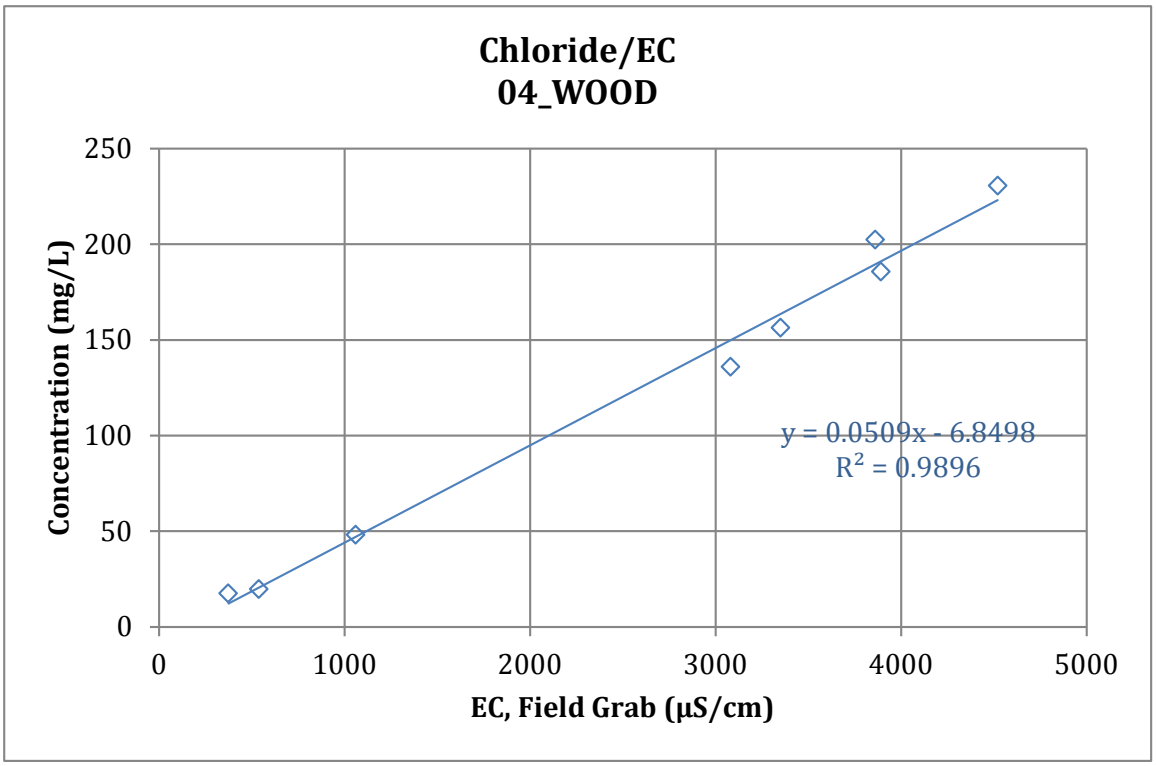
[a] The final field grabs for the July 2014-June 2015 monitoring year were collected on 5/7/2015.

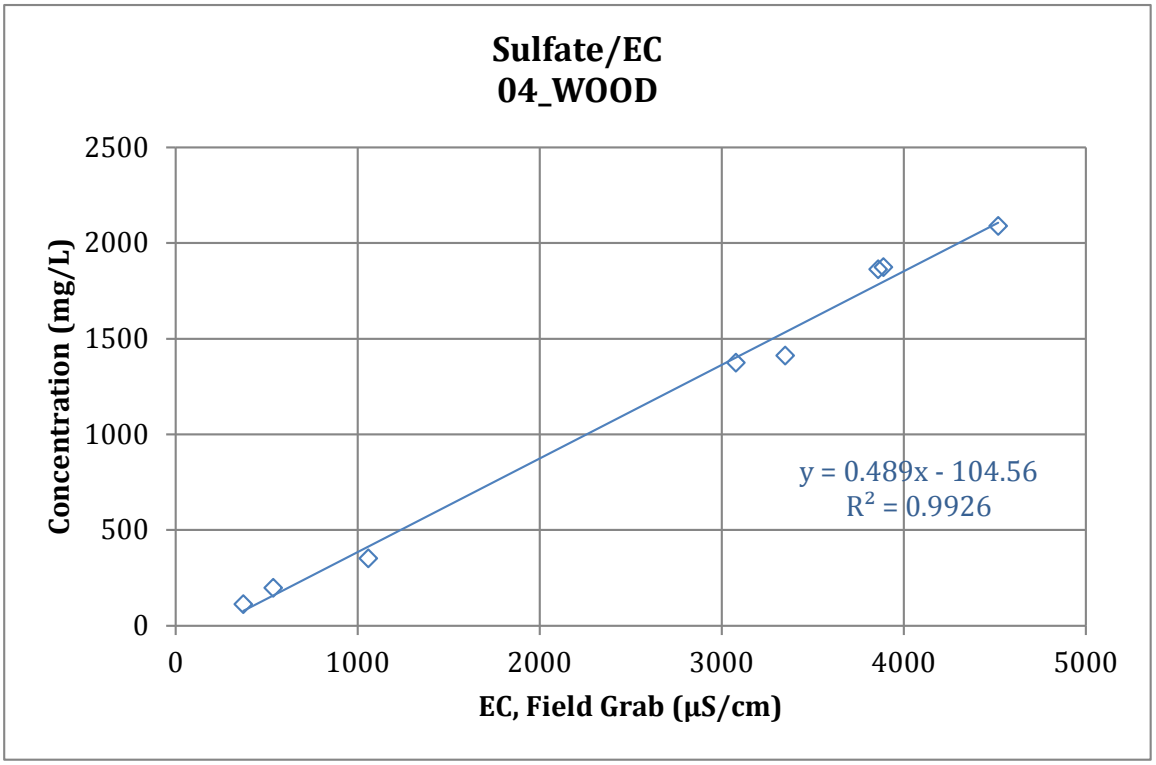

TDS/EC
03_UNIV
Concentration (mg/L)
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.622x - 0.2576
R² = 0.9814

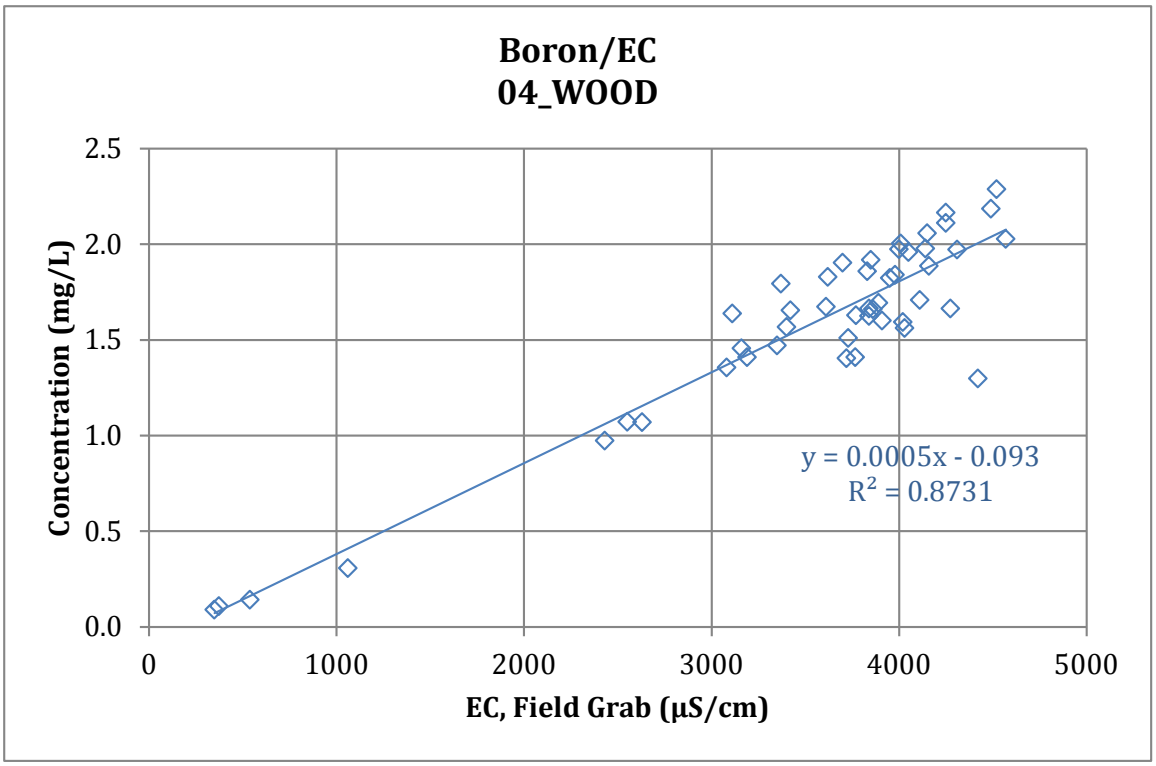

Chloride/EC
03_UNIV
Concentration (mg/L)
250
200
150
100
50
0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1389x - 13.757
R² = 0.9936

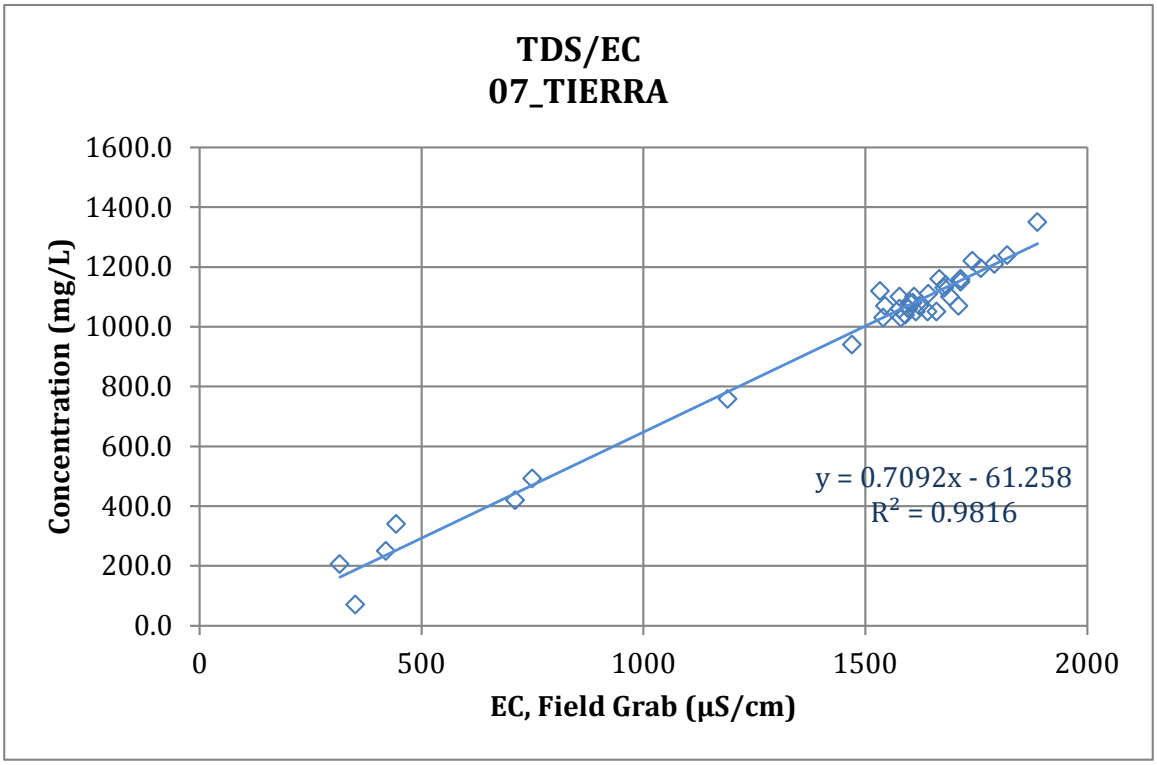

Sulfate/EC
03_UNIV
Concentration (mg/L)
EC, Field Grab (µS/cm)
y = 0.1504x + 14.761
R² = 0.9816
0
50
100
150
200
250
300
350
0
500
1000
1500
2000

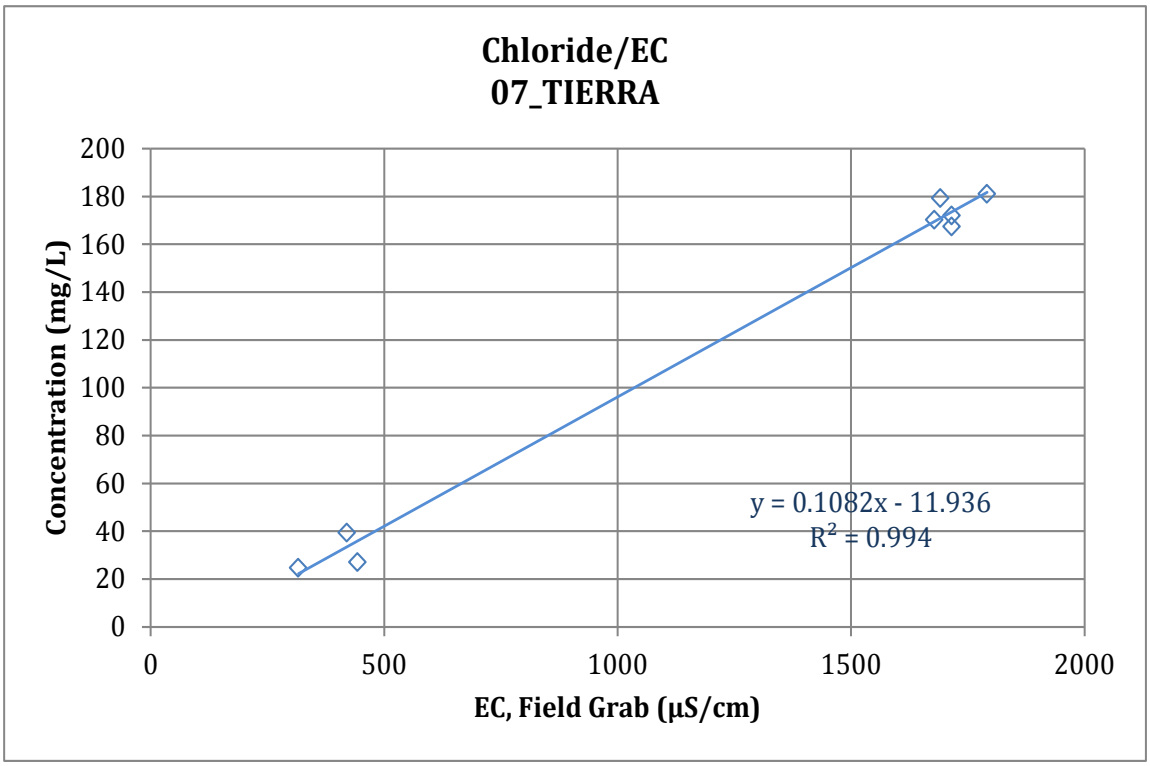

TDS/EC
04_WOOD
Concentration (mg/L)
EC, Field Grab (µS/cm)
y = 0.9203x - 197.31
R² = 0.9837
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
1000
2000
3000
4000
5000

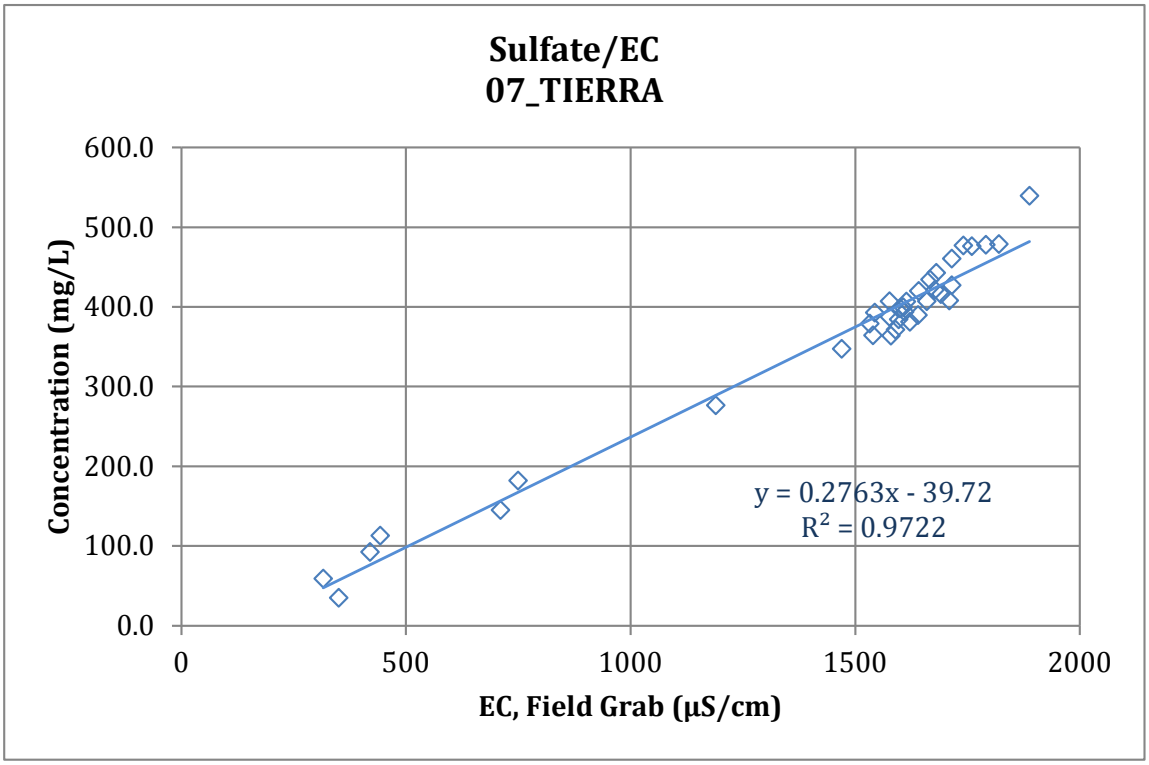

Chloride/EC
04_WOOD
Concentration (mg/L)
250
200
150
100
50
0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.0509x - 6.8498
R² = 0.9896

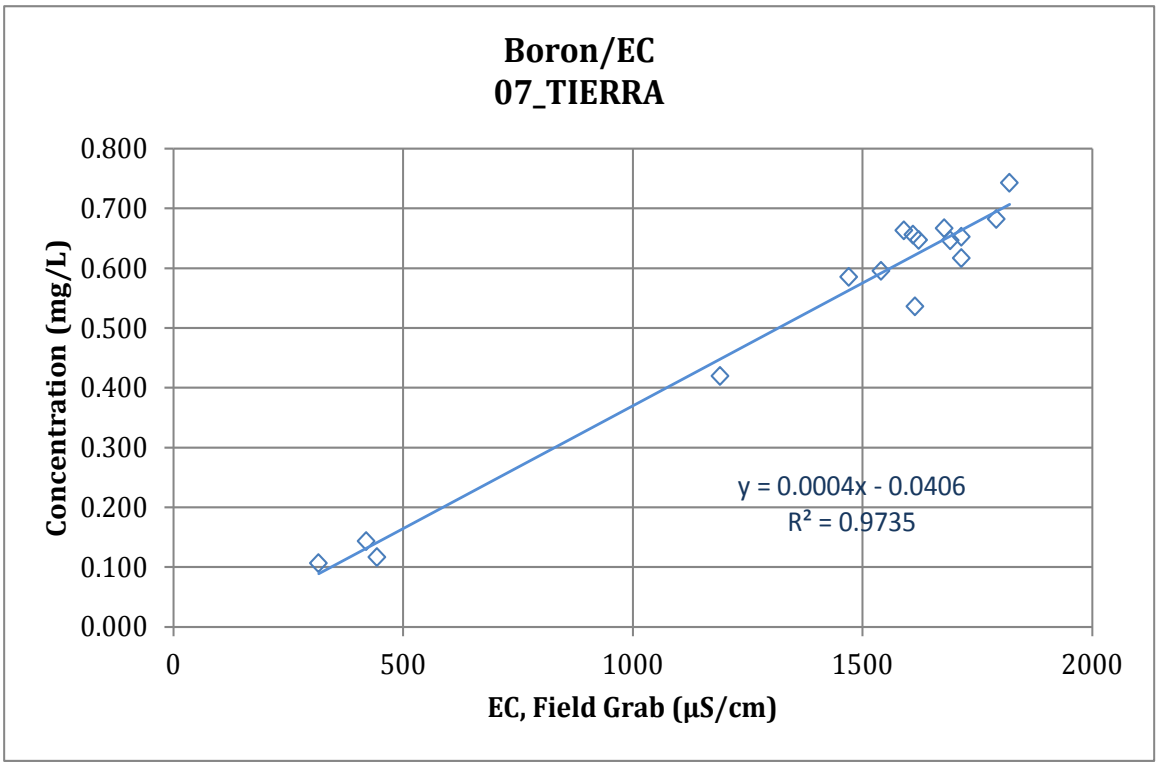

Sulfate/EC
04_WOOD
Concentration (mg/L)
2500
2000
1500
1000
500
0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.489x - 104.56
R² = 0.9926

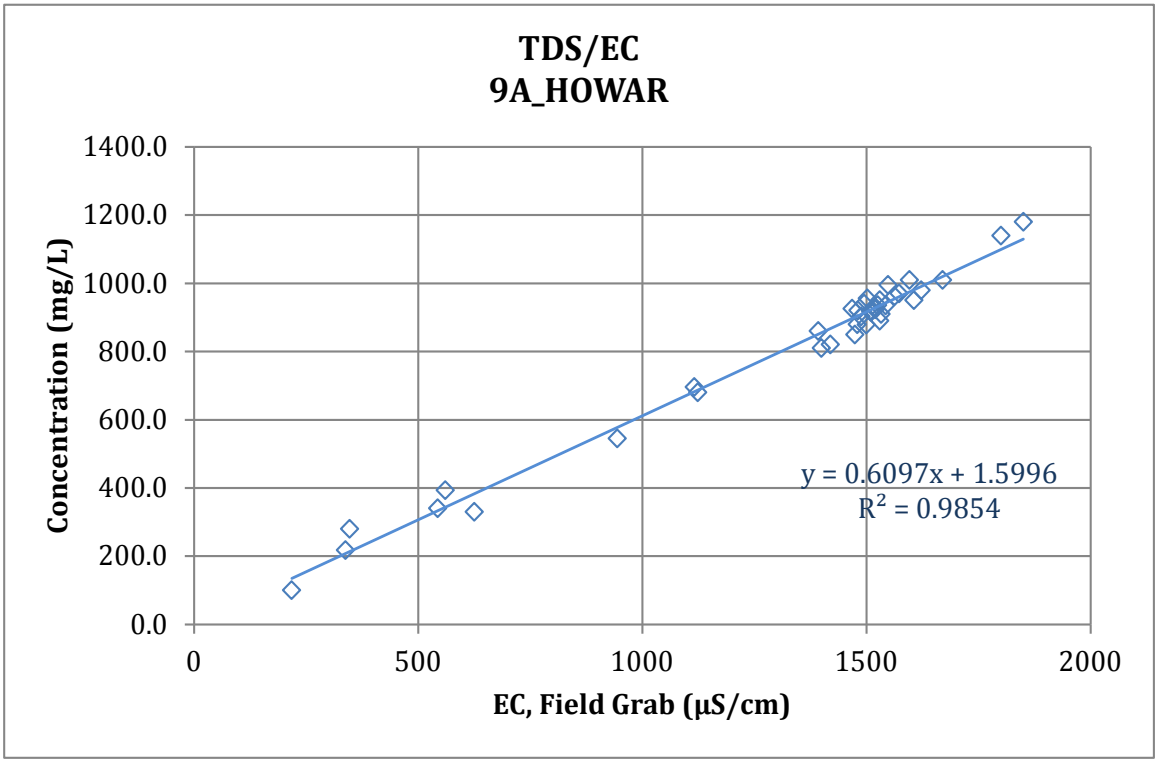

Boron/EC
04_WOOD
Concentration (mg/L)
2.5
2.0
1.5
1.0
0.5
0.0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.0005x - 0.093
R² = 0.8731

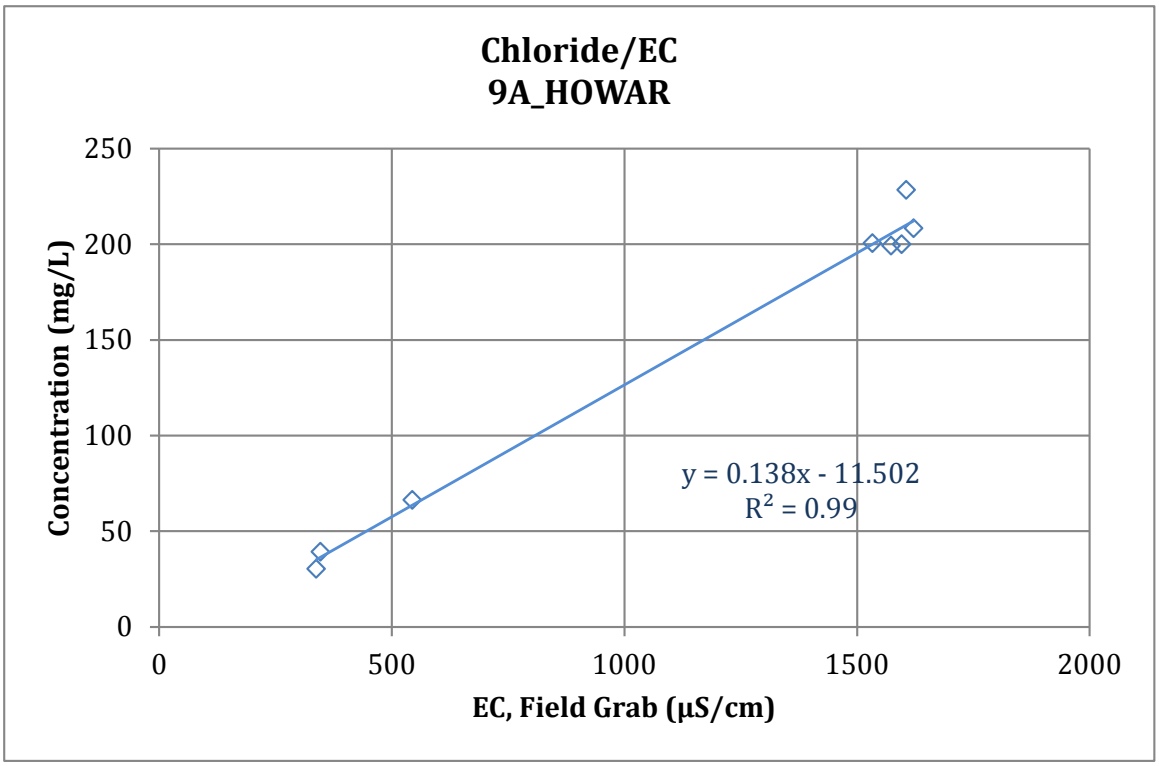

TDS/EC
07_TIERRA
Concentration (mg/L)
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.7092x - 61.258
R² = 0.9816

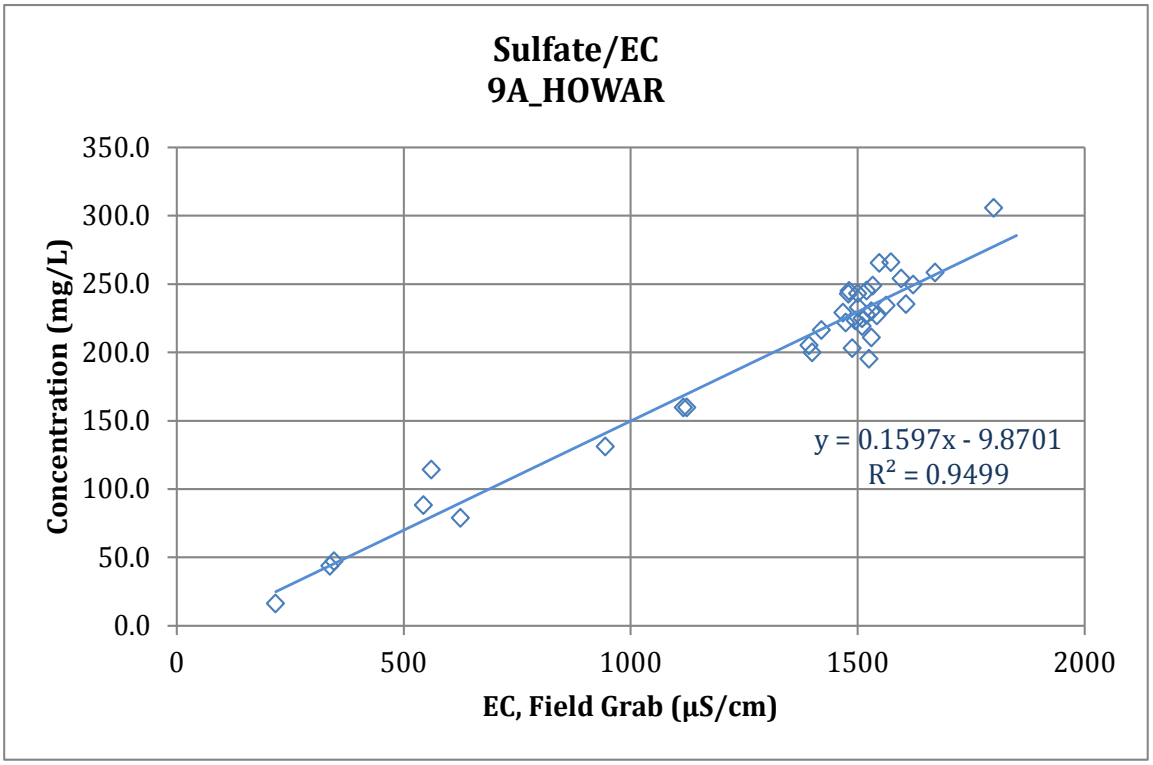

Chloride/EC
07_TIERRA
Concentration (mg/L)
200
180
160
140
120
100
80
60
40
20
0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1082x - 11.936
R² = 0.994

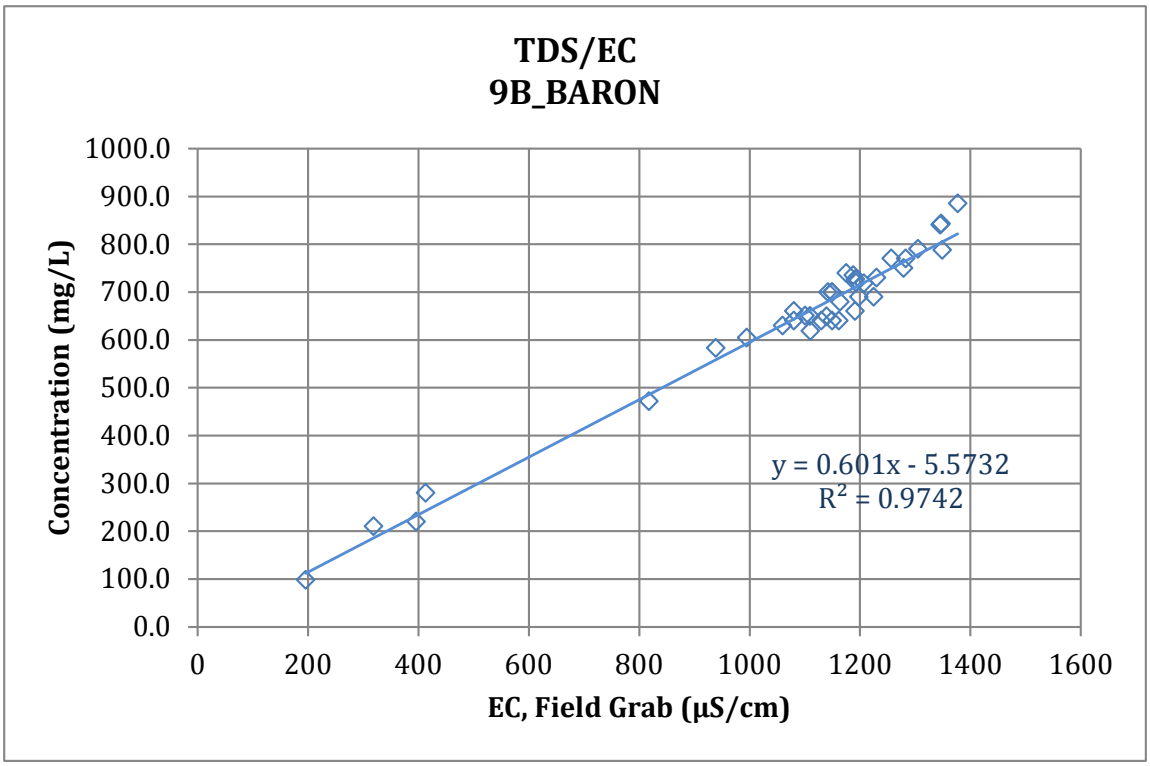

Sulfate/EC
07_TIERRA
Concentration (mg/L)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.2763x - 39.72
R² = 0.9722

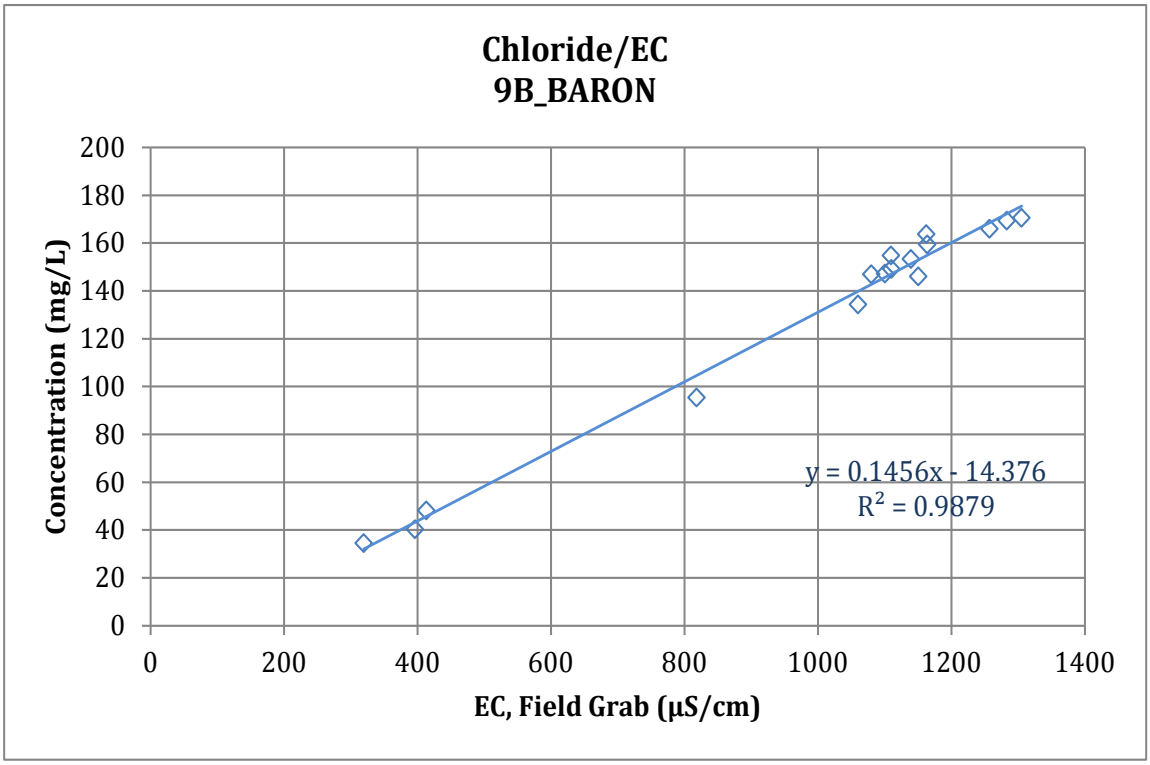

Boron/EC
07_TIERRA
Concentration (mg/L)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.0004x - 0.0406
R² = 0.9735

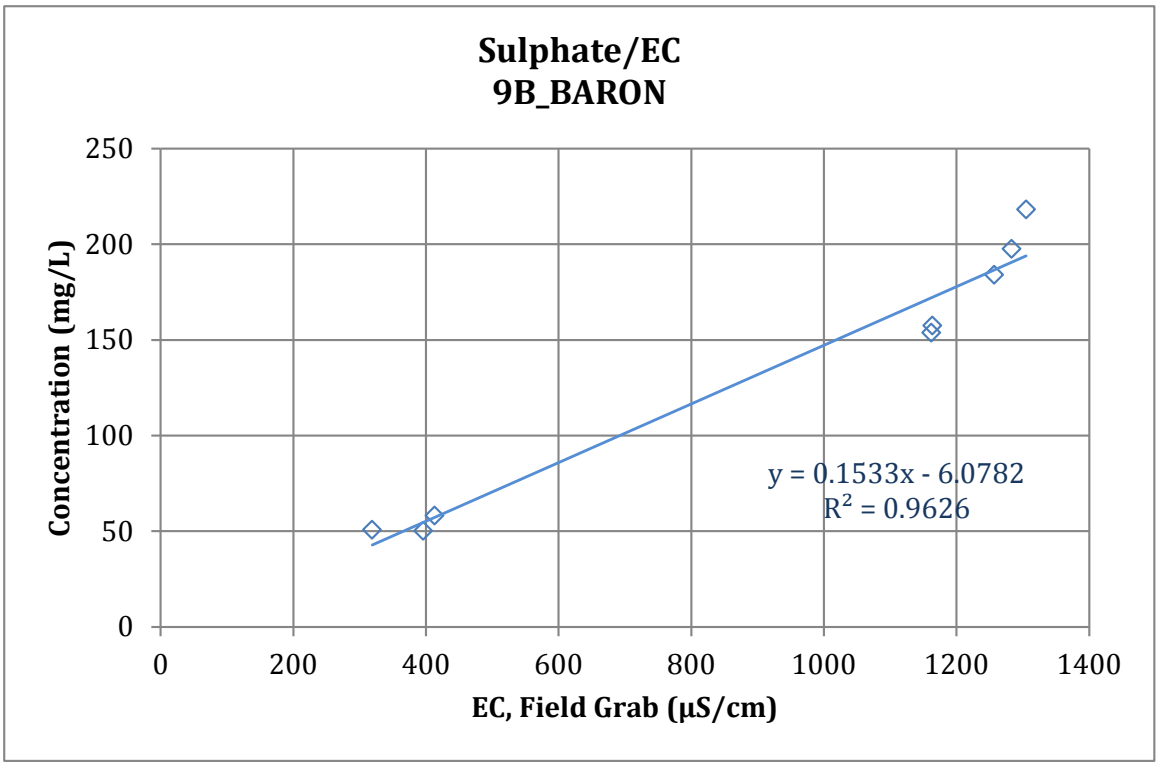

TDS/EC
9A_HOWAR
Concentration (mg/L)
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.6097x + 1.5996
R² = 0.9854


Chloride/EC
9A_HOWAR
Concentration (mg/L)
250
200
150
100
50
0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.138x - 11.502
R² = 0.99


Sulfate/EC
9A_HOWAR
Concentration (mg/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1597x - 9.8701
R² = 0.9499


TDS/EC
9B_BARON
Concentration (mg/L)
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
200
400
600
800
1000
1200
1400
1600
EC, Field Grab (µS/cm)
y = 0.601x - 5.5732
R² = 0.9742


Chloride/EC
9B_BARON
Concentration (mg/L)
200
180
160
140
120
100
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
EC, Field Grab (µS/cm)
y = 0.1456x - 14.376
R² = 0.9879


Sulphate/EC
9B_BARON
Concentration (mg/L)
250
200
150
100
50
0
0
200
400
600
800
1000
1200
1400
EC, Field Grab (µS/cm)
y = 0.1533x - 6.0782
R² = 0.9626

Appendix D:
Toxicity Testing and Toxicity Identification Evaluations (TIE) Summary

TOXICITY TESTING PROCEDURES

For the Calleguas Creek Watershed TMDL Compliance Monitoring Program (CCWTMP), toxicity testing at various locations is conducted to meet total maximum daily load (TMDL) requirements. The following is a brief summary of the procedures for the analytical methods used by the CCWTMP. Specific details concerning the standard operating procedures (SOPs) followed by field crews collecting applicable samples and laboratory analyses are found in the Quality Assurance Project Plan (QAPP).

For the CCWTMP toxicity measures, standard test species were utilized for toxicity testing. *Ceriodaphnia dubia* was used for fresh water aquatic toxicity testing and *Hyalella azteca* for the saline water aquatic toxicity testing and bulk sediment and porewater toxicity testing. *Hyalella azteca* was used to conduct aquatic toxicity testing if sample salinity exceeded 1.5 part per thousand (PPT) but was less than 15 PPT. All test species are standard United States Environmental Protection Agency (USEPA) test species and considered the most applicable for the various types of pollutants impacting the watershed, and all analytical testing procedures were conducted using standard USEPA methods.

The results of each toxicity test are used to trigger further investigations to determine the cause of observed laboratory toxicity if necessary per the QAPP. If testing indicates the presence of significant toxicity in the sample, toxicity identification evaluations (TIEs) procedures are initiated to investigate the cause of toxicity. For the purpose of triggering TIE procedures, significant toxicity is defined as at least 50% mortality. The 50% mortality threshold is consistent with the approach recommended in guidance published by USEPA for conducting TIEs (USEPA, 1996), which recommends a minimum threshold of 50% mortality because the probability of completing a successful TIE decreases rapidly for samples with less than this level of toxicity.[1] A component of the compliance requirement when significant toxicity is found is to initiate a targeted Phase 1 TIE and test to determine the general class of constituent (*i.e.*, non-polar organics) causing toxicity. The targeted TIE focuses on classes of constituents anticipated to be observed in drainages dominated by urban and agricultural discharges and those previously observed to cause toxicity. Phase 2 TIEs may also be utilized to identify specific constituents causing toxicity if warranted. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs.[2,3,4,5] For samples exhibiting toxic effects consistent with

[1] United States Environmental Protection Agency (USEPA). 1996. Marine Toxicity Identification Evaluation. Phase I Guidance Document EPA/600/R-96/054. USEPA, Office of Research and Development, Washington, D.C.

[2] United States Environmental Protection Agency (USEPA). 1991. Methods for Aquatic Toxicity Identification Evaluations: Phase 1 Toxicity Characterization Procedures (Second Edition). EPA-600/6-91/003. USEPA, Environmental Research Laboratory, Duluth, MN.

[3] United States Environmental Protection Agency (USEPA). 1992. Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents Phase 1. EPA/600/6-91/005. USEPA, Office of Research and Development, Washington, D.C.

carbofuran, diazinon, or chlorpyrifos, TIE procedures follow those documented in Bailey *et al*.[6] To address toxicity of unknown causes in sediment (> 50% mortality), sediment porewater was extracted and a Phase 1 TIE was performed. In addition, a Phase 1 TIE was performed on bulk sediment.

The decision to initiate TIE procedures on any sample, including samples exceeding the mortality threshold, as well as the focus and scope of TIE procedures, was determined by the Project Manager and toxicity laboratory staff. When deciding whether to initiate TIE procedures for a specific site and monitoring event, a number of factors were considered, including the level of toxicity, the magnitude of sample mortality and/or reburial levels as compared to lab control results, history of toxicity at the site, the species and endpoints exhibiting toxic effects, as well as the primary technical basis for triggering TIEs described above. A summary of the toxicity results and subsequent TIE actions, including the rationale for initiating TIE procedures for a specific sample are described below.

TOXICITY RESULTS SUMMARY

Freshwater sediment toxicity samples are collected annually during the first event of each monitoring year. In addition, sediment toxicity samples are collected every three years in Mugu Lagoon. As such, freshwater and lagoon sediment toxicity samples were collected during the first event of this monitoring year. Water column toxicity samples are collected at freshwater sites during each of the quarterly and wet weather events. Monitored sites include the following:

- **Sediment Toxicity (Freshwater Sites)**
    - 02_PCH
    - 03_UNIV
    - 04_WOOD
    - 9A_HOWAR
- **Sediment Toxicity (Lagoon Sites)**
    - 01_BPT_3
    - 01_BPT_6
    - 01_BPT_14
    - 01_BPT_15
    - 01_BPT_74

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[4] United States Environmental Protection Agency (USEPA). 1993a. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fourth Edition. EPA/600/4-90/027F. USEPA, Office of Research and Development, Washington, D.C.

[5] United States Environmental Protection Agency (USEPA). 1993b. Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity. EPA/600/R-02/080. USEPA, Office of Research and Development, Washington, D.C.

[6] Bailey, H.C., DiGiorgio, C., Kroll, K., Miller, J.L., Hinton, D.E., Starrett, G. 1996. Development of Procedures for Identifying Pesticide Toxicity in Ambient Waters: Carbofuran, Diazinon, Chlorpyrifos. Environ. Tox. and Chem. V15, No. 6, 837-845.

- **Freshwater Water Column Toxicity**
    - 04_WOOD
    - 03_UNIV
    - 9B_ADOLF
    - 06_SOMIS
    - 07_HITCH
    - 10_GATE (Toxicity Investigation site)
    - 13_BELT (Toxicity Investigation site)

Toxicity samples for sediment were collected at the freshwater and lagoon sites during dry weather Event 44. Water column toxicity testing was conducted during all four dry weather events (Events 44, 45, 48, and 49), and the wet weather events (Events 46 and 47). The following section describes the toxicity samples collected at each site for each event, the results of the tests, and a summary of applicable TIEs initiated per the requirements in the QAPP.

Event 44 Sediment Toxicity

Table 1. Freshwater Sediment Toxicity Event 44 - *Hyalella azteca*

Site ID	*Hyalella azteca*			*Eohaustorius estuarius*		
	Survival	**Growth**	**TIE?**	**Survival**	**Reburial**	**TIE?**
02_PCH	No	No	No			
03_UNIV	Yes[1]	No	No			
04_WOOD	Yes[2]	Yes	No			
9A_HOWAR	No	No	No			
01_BPT_3				No	No	No
01_BPT_6				No	No	No
01_BPT_14				No	No	No
01_BPT_15				No	No	No
01_BPT_74				No	No	No

1. There was a greater than 50 percent reduction in *Hyalella azteca* survival.
2. Although the reduction in the survival/growth response was statistically significant, there was a less than 20 percent reduction relative to the Control.

Event 44 Water Column Toxicity

Table 2. Freshwater Water Column Toxicity Event 39 - *Ceriodaphnia dubia and Hyalella azteca*

Site ID	*Ceriodaphnia dubia*			*Hyalella azteca*	
	Survival	**Reproduction**	**TIE?**	**Survival**	**TIE?**
03_UNIV	No[1]	Yes	Yes		
04_WOOD				Yes	No
07_HITCH	No	Yes	No		
9B_ADOLF	No	Yes	No		
10_GATE	No	Yes	No		
13_BELT	No	No	No		

1. There was no statistically significant difference in survival between the control and the ambient water treatments; however, there was greater than 50 percent mortality in the 100 percent ambient water concentration. As such, a TIE was initiated.

Event 44 Toxicity and TIE Summary

- Freshwater sediment sites exhibited mortality at the 03_UNIV and 04_WOOD sites, but toxicity at the 04_WOOD site was not sufficient (mean percent survival <50 percent) for a TIE to be performed.
- There were no instances of *Eohaustorius estuaries* toxicity in the lagoon sediments.
- A TIE was initiated targeted for organics on the 03_UNIV freshwater sample.
- There were no significant reductions in toxicity by any of the TIE treatments. As such, the TIE results did not indicate a specific cause of the toxicity.
- A follow-up TIE with additional treatments was performed to aid in the identification of the toxicity cause. Toxicity was not observed in the baseline treatment indicating the toxicant may have undergone natural degradation or reduced bioavailability due to sorption. The lack of toxicity persistence suggests an organic compound as the cause of the toxicity.

Event 45 Water Quality Toxicity

Table 3. Water Quality Toxicity Event 45 - *Ceriodaphnia dubia* and *Hyalella azteca*

Site ID	*Ceriodaphnia dubia*			*Hyalella azteca*	
	Survival	**Reproduction**	**TIE?**	**Survival**	**TIE?**
03_UNIV	No	No	No		
04_WOOD				Yes	No
06_SOMIS	No	Yes	No		
07_HITCH	No	Yes	No		
9B_ADOLF	No	No	No		
10_GATE	No	Yes	No		

Event 45 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* at the five freshwater sample sites during the sampling event.
- Significant reductions in reproduction were observed for *Ceriodaphnia dubia* at three of the five sites tested for this organism.
- Significant survival toxicity was observed for *Hyalella azteca* at the 04_WOOD site.
- No TIEs were performed on samples collected for this sampling event.

Event 46 Water Quality Toxicity

Table 4. Water Quality Toxicity Event 46 - *Ceriodaphnia dubia*

Site ID	*Ceriodaphnia dubia*		
	Survival	**Reproduction**	**TIE?**
03_UNIV	Yes	Yes	Yes
04_WOOD	Yes	Yes	No
06_SOMIS	Yes	Yes	Yes
07_HITCH	Yes	Yes	Yes
9B_ADOLF	No	No	No
10_GATE	No	No	No
13_BELT	No	No	No

Event 46 Toxicity and TIE Summary

- Significant mortality was observed for *Ceriodaphnia dubia* at 03_UNIV, 04_WOOD, 06_SOMIS, and 07_HITCH and TIEs were performed on samples collected from the 03_UNIV, 06_SOMIS, and 07_HITCH sites.
- The TIE for the 03_UNIV sample indicated that compounds associated with suspended particulates are contributing to toxicity and that OP pesticides are also contributing to toxicity.
- The TIE for the 06_SOMIS sample indicated that compounds associated with suspended particulates are contributing to toxicity and that non-polar organic compounds are also contributing to toxicity.
- The TIE for the 07_HITCH sample indicated compounds associated with suspended particulates are contributing to toxicity and that OP pesticides are also contributing to toxicity.

Event 47 Water Quality Toxicity

Table 5. Water Quality Toxicity Event 47 - *Ceriodaphnia dubia*

Site ID	*Ceriodaphnia dubia*		
	Survival	**Reproduction**	**TIE?**
03_UNIV	No	No	No
04_WOOD	Yes	Yes	No
06_SOMIS	No	Yes	No
07_HITCH	No	Yes	No
9B_ADOLF	No	Yes	No
10_GATE	No	No	No
13_BELT	No	No	No

Event 47 Toxicity and TIE Summary

- Significant reductions in survival were observed for *Ceriodaphnia dubia* at the 04_WOOD site.
- Significant reduced reproduction was observed for the 04_WOOD, 06_SOMIS, 07_HITCH, and 9B_ADOLF sites.
- A TIE was not performed on any samples collected during the sampling event.

Event 48 Water Quality Toxicity

Table 6. Water Quality Toxicity Event 48 - *Ceriodaphnia dubia* and *Hyalella azteca*

Site ID	*Ceriodaphnia dubia*			*Hyalella azteca*	
	Survival	**Reproduction**	**TIE?**	**Survival**	**TIE?**
03_UNIV	No	No	No		
04_WOOD				No	No
06_SOMIS	No	No	No		
07_HITCH	No	Yes	No		
9B_ADOLF	No	Yes	No		
13_BELT	No	No	No		

Event 48 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* or *Hyalella azteca* for all sites.
- Significant reproduction toxicity for *Ceriodaphnia dubia* was observed at the 07_HITCH and 9B_ADOLF sites.
- A TIE was not performed on any samples collected during the sampling event.

Event 49 Water Quality Toxicity

Table 7. Water Quality Toxicity Event 49 - *Ceriodaphnia dubia* and *Hyalella azteca*

Site ID	*Ceriodaphnia dubia*			*Hyalella azteca*	
	Survival	**Reproduction**	**TIE?**	**Survival**	**TIE?**
03_UNIV	No	No	No		
04_WOOD				Yes	No
07_HITCH	No	Yes	No		
9B_ADOLF	No	No	No		
10_GATE	No	No	No		

Event 49 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia*.
- Significant reduction in survival was observed for *Hyalella azteca* at the 04_WOOD site.
- Significant reproduction toxicity for *Ceriodaphnia dubia* was observed at the 07_HITCH site.
- A TIE was not performed on any samples collected during the sampling event.

Appendix E:
Laboratory QA/QC Results and Discussion

QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control (QA/QC) measures are built into the CCWTMP to assure that collected data are credible. Two types of quality controls were conducted. Field quality controls (to test for field contamination and precision) were conducted by the field crews and include: equipment blanks, field blanks, and field duplicates. Laboratory quality controls (to test for laboratory contamination and precision) were conducted by the labs and include: method blanks, blank spikes, blank spike duplicates, lab duplicates, matrix spikes, matrix spike duplicates, laboratory control samples, and surrogates (organics only). Equipment blanks only apply to the shovels used in sediment sample collection. All field protocols for the collection of clean samples were followed according to the QAPP. The following section lists the quality control failures that occurred during the 2014-2015 monitoring year and any associated qualifiers and comments.

Blank Contamination

Blank samples are used to identify the presents of and potential sources of sample contamination. During the seventh year of monitoring, there were three types of blank samples conducted.

- **Field blanks** are conducted by field crews and are looking for possible contamination in the collection and transportation of samples.
- **Equipment blanks** are done by the field crews and are look for contamination with the sampling equipment.
- **Laboratory blanks** are conducted by the analyzing laboratory and look for contamination in the lab.

A majority of the blank failures were in the metals field blanks. There were only two other blank detections both for Total Kjeldahl Nitrogen (TKN). There were no equipment blank hits and the lab blank hits were all for metals as well. Even though the detections were above the MDL value, most were low compared to the environmental sample, so no qualification was needed. Details of all the blank hits are reported in Table 1 below. The following lists a basic summary of the blank contamination results:

- Field Blanks – 1619 analyzed – 100 detections above the MDL (6.18%) (does not include surrogates)
- Equipment Blanks – 251 analyzed – 0 detections above MDL (0.0%) (does not include lab duplicates or surrogates)
- Laboratory Blanks – 4190 analyzed – 4 detections above MDL (0.10%) (does not include surrogates)

Precision

The purpose of analyzing duplicates is to demonstrate precision (reproducibility) of sample collection, preparation, and analytical methods. The relative percent difference (RPD) is reported for field duplicates, lab duplicates, blank spike duplicates, laboratory control spike (LCS) duplicates, and matrix spike duplicates. An RPD is computed as:

$$RPD = 2 * |O_i - D_i| / (O_i + D_i) * 100$$

Where:

RPD = Relative percent difference
O_i = value of compound *i* in original sample
D_i = value of compound *i* in duplicate sample

QA failures for precision are noted when the RPD between a sample and its duplicate are greater than the acceptance value. Details of all the RPD failures are reported in Table 2 below. The following list summarizes the precision analysis results:

- Field Duplicates – 1918 analyzed – 77 failed RPD (4.01%) (does not include surrogates)
- Laboratory Duplicates – 1713 analyzed – 75 failed RPD (4.38%) (includes surrogates)
- Blank Spike/LCS Duplicates – 3719 analyzed – 24 failed RPD (0.65%) (includes surrogates)
- Matrix Spike Duplicates – 1148 analyzed – 29 failed RPD (2.53%) (includes surrogates)

Accuracy

Accuracy is defined as the degree of agreement of a measurement to an accepted refecence or true value. Accuracy is measured as the percent recovery (%R) of a spiked compound and calculated as:

$$\%R = 100 * [(C_s - C) / S]$$

Where:

%R = percent recovery
C_s = analyzed spiked concentration
C = analyzed concentration of sample matrix
S = known spiked concentration

Percent recoveries of blank spike samples (BS), laboratory control spike samples (LCS), and matrix spike samples (MS) check the accuracy of lab reported sample concentrations. For the BS's and LCS's that fell outside the acceptable range, all were for pesticides constituents, with more than half occurring in the May event from both tissue and water samples. The rest of the failed BS's were scattered across the entire monitoring year. For the matrix spike samples that fell outside the acceptable range, a little less than half of them were from the last event of the year in tissue and water samples. The distribution across nutrients, pesticides, and metals were pretty even. Table 3 summarizes the QA/QC sample results for accuracy that did not meet percent recovery objectives. The following lists the results of the accuracy analysis results:

- Blank Spike/LCS Samples – 7361 Analyzed – 37 fell outside the range (0.50%) (does not include surrogates)
- Matrix Spike Samples – 2324 Analyzed – 83 fell outside the range (3.57%) (does not include surrogates)

Table 1. Blank Contamination Observed

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
General Water Quality								
None								
Nutrients								
Total Kjeldahl Nitrogen (mg/L)	Water	44	Associated_QC1148898_W_CON		0.1		FD RPD	FieldDup RPD Failed
Total Kjeldahl Nitrogen (mg/L)	Water	49	Associated_QC1155252_W_CON		0.21		U	Upper Limit due to analyte found in blank
OC Pesticieds								
None								
PCBs								
None								
OP Pesticides								
None								
Pyrethroid Pesticides								
None								
Metals & Selenium								
Aluminum, Total (µg/L)	Water	45	Physis E-8014 W		2.32		U	Upper Limit due to analyte found in blank
Barium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.27			
Barium, Total (µg/L)	Water	44	Physis E-7132 W		0.35			
Cadmium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.007			
Cadmium, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.0059			
Chromium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.02			
Chromium, Dissolved (µg/L)	Water	46	Physis E-8027 W		0.02			

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Chromium, Total (µg/L)	Water	44	Physis E-7132 W		0.03			
Chromium, Total (µg/L)	Water	45	Physis E-8014 W		0.03			
Chromium, Total (µg/L)	Water	46	Physis E-8027 W		0.03			
Chromium, Total (µg/L)	Water	49	Physis E-8083 W		0.02			
Cobalt, Dissolved (µg/L)	Water	49	Physis E-8083 W		0.36		U	Upper Limit due to analyte found in blank
Cobalt, Total (µg/L)	Water	49	Physis E-8083 W		0.36		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Copper, Dissolved (µg/L)	Water	44	Physis E-7132 W		0.164			
Copper, Dissolved (µg/L)	Water	44	Physis E-7137 W		0.022		LD RPD	LabDup RPD Failed
Copper, Dissolved (µg/L)	Water	44	W4H0652			0.0695		
Copper, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.128			
Copper, Dissolved (µg/L)	Water	45	Physis E-8016 W		0.018		LD RPD	LabDup RPD Failed
Copper, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.008		LD RPD, FD RPD	LabDup RPD Failed, FieldDup RPD Failed
Copper, Dissolved (µg/L)	Water	49	Physis E-8082 W		0.018			
Copper, Total (µg/L)	Water	44	Physis E-7132 W		0.106			
Copper, Total (µg/L)	Water	44	Physis E-7137 W		0.025			
Copper, Total (µg/L)	Water	45	Physis E-8014 W		0.116			
Copper, Total (µg/L)	Water	45	Physis E-8016 W		0.241			
Copper, Total (µg/L)	Water	46	Physis E-8027 W		0.031			
Lead, Dissolved (µg/L)	Water	44	Physis E-7132 W		0.063		LD RPD, FD RPD	LabDup RPD Failed, FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Lead, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.045		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.0185		LD RPD, FD RPD	LabDup RPD Failed, FieldDup RPD Failed
Lead, Dissolved (µg/L)	Water	49	Physis E-8082 W		0.0029		U	Upper Limit due to analyte found in blank
Lead, Dissolved (µg/L)	Water	49	Physis E-8083 W		0.037		U	Upper Limit due to analyte found in blank
Lead, Total (µg/L)	Water	44	Physis E-7132 W		0.197		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Total (µg/L)	Water	45	Physis E-8014 W		0.038		LD RPD, U	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank
Lead, Total (µg/L)	Water	46	Physis E-8027 W		0.023			
Lead, Total (µg/L)	Water	49	Physis E-8083 W		0.005			
Manganese, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.041			
Manganese, Dissolved (µg/L)	Water	47	Physis E-8042 W		0.038			
Manganese, Total (µg/L)	Water	44	Physis E-7132 W		0.016			
Manganese, Total (µg/L)	Water	45	Physis E-8014 W		0.055			
Manganese, Total (µg/L)	Water	47	Physis E-8042 W		0.013			

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Mercury, Dissolved (µg/L)	Water	44	W4H0386			0.012		
Molybdenum, Dissolved (µg/L)	Water	44	Physis E-7132 W		0.15			
Molybdenum, Dissolved (µg/L)	Water	44	Physis E-7137 W		0.032			
Molybdenum, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.23			
Molybdenum, Dissolved (µg/L)	Water	45	Physis E-8016 W		0.083			
Molybdenum, Dissolved (µg/L)	Water	46	Physis E-8027 W		0.05			
Molybdenum, Dissolved (µg/L)	Water	48	Physis E-8055 W		1.01			
Molybdenum, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.005			
Molybdenum, Dissolved (µg/L)	Water	49	Physis E-8082 W		0.013			
Molybdenum, Total (µg/L)	Water	44	Physis E-7132 W		0.11			
Molybdenum, Total (µg/L)	Water	44	Physis E-7137 W		0.026		U	Upper Limit due to analyte found in blank
Molybdenum, Total (µg/L)	Water	45	Physis E-8014 W		0.21			
Molybdenum, Total (µg/L)	Water	45	Physis E-8016 W		0.067			
Molybdenum, Total (µg/L)	Water	46	Physis E-8027 W		0.06			
Molybdenum, Total (µg/L)	Water	48	Physis E-8055 W		0.56			
Molybdenum, Total (µg/L)	Water	49	Physis E-8082 W		0.009			
Nickel, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.03			
Nickel, Dissolved (µg/L)	Water	45	Physis E-8016 W		0.0054			
Nickel, Dissolved (µg/L)	Water	49	Physis E-8082 W		0.0078			
Nickel, Total (µg/L)	Water	44	Physis E-7132 W		0.02			
Nickel, Total (µg/L)	Water	45	Physis E-8014 W		0.33			
Nickel, Total (µg/L)	Water	45	Physis E-8016 W		0.0078			

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Nickel, Total (µg/L)	Water	46	Physis E-8027 W		0.04			
Selenium, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.011			
Selenium, Total (µg/L)	Water	45	Physis E-8014 W		0.03			
Selenium, Total (µg/L)	Water	46	Physis E-8027 W		0.02			
Silver, Dissolved (µg/L)	Water	45	Physis E-8016 W		0.02		LD RPD, U	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank
Silver, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.02			
Silver, Dissolved (µg/L)	Water	49	Physis E-8082 W		0.04		U	Upper Limit due to analyte found in blank
Silver, Dissolved (µg/L)	Water	49	Physis E-8083 W		0.02			
Silver, Total (µg/L)	Water	45	Physis E-8016 W		0.01			
Silver, Total (µg/L)	Water	48	Physis E-8059 W		0.03			
Silver, Total (µg/L)	Water	49	Physis E-8082 W		0.07		U	Upper Limit due to analyte found in blank
Silver, Total (µg/L)	Water	49	Physis E-8083 W		0.01			
Strontium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.14		EST MS/MSD	Estimate due to MS/MSD RPD failed
Strontium, Total (µg/L)	Water	45	Physis E-8014 W		0.04			
Thallium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.02		U	Upper Limit due to analyte found in blank
Thallium, Dissolved (µg/L)	Water	46	Physis E-8027 W		0.09			
Thallium, Dissolved (µg/L)	Water	49	Physis E-8083 W		0.02		U	Upper Limit due to analyte found in blank

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Thallium, Total (µg/L)	Water	45	Physis E-8014 W		0.01		U	Upper Limit due to analyte found in blank
Thallium, Total (µg/L)	Water	46	Physis E-8027 W		0.07			
Thallium, Total (µg/L)	Water	49	Physis E-8083 W		0.02			
Titanium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.15			
Titanium, Dissolved (µg/L)	Water	48	Physis E-8055 W		0.18			
Titanium, Total (µg/L)	Water	48	Physis E-8055 W		0.14			
Vanadium, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.03			
Vanadium, Dissolved (µg/L)	Water	47	Physis E-8042 W		0.1			
Vanadium, Dissolved (µg/L)	Water	48	Physis E-8055 W		0.08			
Vanadium, Total (µg/L)	Water	45	Physis E-8014 W		0.03			
Vanadium, Total (µg/L)	Water	47	Physis E-8042 W		0.06			
Vanadium, Total (µg/L)	Water	48	Physis E-8055 W		0.09			
Zinc, Dissolved (µg/L)	Water	44	Physis E-7137 W		0.1424		FD RPD	FieldDup RPD Failed
Zinc, Dissolved (µg/L)	Water	44	W4H0652			3.72		
Zinc, Dissolved (µg/L)	Water	45	Physis E-8014 W		0.51		U	Upper Limit due to analyte found in blank
Zinc, Dissolved (µg/L)	Water	45	W4L0056			1.85		
Zinc, Dissolved (µg/L)	Water	47	Physis E-8042 W		1.25		FD RPD	FieldDup RPD Failed
Zinc, Dissolved (µg/L)	Water	48	Physis E-8055 W		0.22			
Zinc, Dissolved (µg/L)	Water	48	Physis E-8059 W		0.1782		FD RPD	FieldDup RPD Failed
Zinc, Total (µg/L)	Water	44	Physis E-7137 W		0.3735		U, FD RPD	Upper Limit due to analyte found in blank, FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Zinc, Total (µg/L)	Water	45	Physis E-8014 W		0.5			
Zinc, Total (µg/L)	Water	47	Physis E-8042 W		1.06			
Zinc, Total (µg/L)	Water	48	Physis E-8055 W		0.26			
Zinc, Total (µg/L)	Water	48	Physis E-8059 W		0.13		FD RPD	FieldDup RPD Failed

Table 2. Precision QA/QC Issues

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
General Water Quality										
Clay, <0.0039 mm (%)	Sediment	44	IIRMES_GC-02-129_S_GS	01_BPT_14		***52***			FD RPD	FieldDup RPD Failed
Dissolved Organic Carbon (mg/L)	Water	44	Associated_QC 1148873	01_BPT_14		***34***				
Sand, 0.0625 to <2.0 mm (%)	Sediment	44	IIRMES_GC-02-129_S_GS	01_BPT_14		***44***			FD RPD	FieldDup RPD Failed
Total Hardness (calc) (mg/L)	Water	45	Physis E-8014 W	01T_ODD2_DC H		6	1	***111***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD
Total Organic Carbon, Total (% Dry Weight)	Sediment	44	IIRMES_GC-02-128_S_TOC	07_HITCH			***100***		LD RPD	LabDuplicate RPD Failed
Total Organic Carbon, Total (% Dry Weight)	Sediment	44	IIRMES_GC-02-130_S_TOC	01_BPT_14		***84***			FD RPD	FieldDup RPD Failed
Total Suspended Solids (mg/L)	Water	44	Physis C-17036 W	07T_DC_H			***36***		LD RPD	LabDuplicate RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Total Suspended Solids (mg/L)	Water	45	Physis C-17055 W	01_BPT_15		***76***	22		FD RPD	FieldDup RPD Failed
Total Suspended Solids (mg/L)	Water	48	Physis C-17087 W	01_BPT_3		***42***			FD RPD	FieldDup RPD Failed
Lipid (% Dry Weight)	Tissue	49	Physis C-22113 W	03_UNIV			***32***		LD RPD	LabDuplicate RPD Failed
Nutrients										
Ammonia as N (mg/L)	Water	44	Physis C-18032 W	03_UNIV		***40***				
Nitrite as N (mg/L)	Water	46	Physis C-21138 W	04_WOOD		0	***40***	0		
OrthoPhosphate as P (mg/L)	Water	44	Physis C-21066 W	03_UNIV				***31***		
Total Kjeldahl Nitrogen (mg/L)	Water	44	Associated_QC 1148898_W_CON	10_GATE		***179***			FD RPD	FieldDup RPD Failed
Total Kjeldahl Nitrogen (mg/L)	Water	45	Associated_QC 1151124_W_CON	07_HITCH		***168***			FD RPD	FieldDup RPD Failed
OC Pesticides										
Chlordane, alpha- (ng/dry g)	Sediment	44	Physis O-6068 W	9B_ADOLF			***90***	8		
Chlordane, alpha- (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	14		***89***			
Chlordane, gamma- (ng/dry g)	Sediment	44	Physis O-6068 W	9B_ADOLF			***71***	7		
DDD(o,p') (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		9.5	***40***	14		
DDD(p,p') (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		***34***	***83***	17		
DDE(o,p'), Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***36***			FD RPD	FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
DDE(o,p'), Total (µg/L)	Water	47	Physis O-7042 W	03_UNIV		***53***			H	Holdtime exceeded
DDE(p,p') (ng/dry g)	Sediment	44	Physis O-6068 W	9B_ADOLF			***88***	1	LD RPD	LabDuplicate RPD Failed
DDE(p,p') (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD			***186***	0	LD RPD	LabDuplicate RPD Failed
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	14		13	***368***		
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7134 W	01_Western_Arm	2		6	***93***		
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7148 W	04_WOOD	3		23	***261***	MS <LL, MS >UL, EST MS/MSD	MS failed lower limit, MS failed upper limit, Estimate due to RPD failure between MS/MSD
DDE(p,p'), Total (µg/L)	Water	44	Physis O-6066 W	03_UNIV		***71***				
DDT(o,p') (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD				***32***		
DDT(o,p') (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	8		***33***			
DDT(o,p'), Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***58***			FD RPD	FieldDup RPD Failed
DDT(p,p') (ng/dry g)	Sediment	44	Physis O-6068 W	9B_ADOLF			***118***	***31***	LD RPD, MS <LL, EST MS/MSD	LabDuplicate RPD Failed, MS failed lower limit, Estimate due to RPD failure between MS/MSD
DDT(p,p') (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD				***45***		
DDT(p,p') (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD			***69***		EST MS/MSD	Estimate due to MS/MSD RPD failed
DDT(p,p') (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14				***43***		

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
DDT(p,p') (ng/dry g)	Tissue	49	Physis O-7148 W	04_WOOD	4		15	***31***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to RPD failure between MS/MSD
DDT(p,p'), Total (µg/L)	Water	45	Physis O-6150 W	01T_ODD2_DC H		***48***				
DDT(p,p'), Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***53***			FD RPD	FieldDup RPD Failed
DDT(p,p'), Total (µg/L)	Water	48	Physis O-7060 W	04_WOOD		***86***				
Endosulfan I (ng/dry g)	Tissue	49	Physis O-7134 W	01_Western_Ar m	11		0	***53***	BS <LL	BS failed lower limit
Endosulfan II (ng/dry g)	Water	44	Physis O-6068 W	LABQA	***41***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Endosulfan II (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Ar m	3		0	***49***		
Endrin Aldehyde (ng/dry g)	Tissue	49	Physis O-7150 W	03_UNIV	17		0	***48***	EST MS/MSD	Estimate due to MS/MSD RPD failed
Hexachlorobenz ene (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Ar m	18		***31***			
Hexachlorobenz ene (ng/dry g)	Tissue	49	Physis O-7134 W	01_Western_Ar m	7		***32***	21		
Hexachlorobenz ene, Total (µg/L)	Water	47	Physis O-7042 W	03_UNIV		***38***			H	Holdtime exceeded
Methoxychlor (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD				***39***		
Methoxychlor (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14				***60***		
Nonachlor, trans (ng/dry g)	Sediment	44	Physis O-6068 W	9B_ADOLF			***109***	5		
Tetrachloro-m-xylene-2,4,5,6 (Surrogate), Total (%)	Water	47	Physis O-7042 W	03_UNIV		***32***			H	Holdtime exceeded

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Toxaphene (ng/dry g)	Sediment	44	Physis O-6068 W	9B_ADOLF				***35***		
Toxaphene (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD				***32***		
PCBs										
PCB 049 (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	9		***43***			
PCB 095 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***46***	12		
PCB 095 (ng/dry g)	Tissue	49	Physis O-7148 W	04_WOOD	3		***32***	13		
PCB 101 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		***67***	16	11		
PCB 105 (µg/L)	Water	46	Physis O-7024 W	LABQA	***36***				EST BS/BSD	Estimate due to BS/BSD RPD failed
PCB 105 (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	4		***56***			
PCB 110 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		***33***	7	16		
PCB 110 (ng/dry g)	Tissue	49	Physis O-7148 W	04_WOOD	3		***34***	6		
PCB 112 (Surrogate), Total (%)	Water	44	Physis O-6066 W	03_UNIV		***63***				
PCB 123 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***79***	8		
PCB 126 (ng/dry g)	Tissue	49	Physis O-7134 W	01_Western_Arm	6		***32***	1		
PCB 138 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		29	***115***	15	LD RPD	LabDuplicate RPD Failed
PCB 149 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		12	***59***	11		

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
PCB 149 (ng/dry g)	Tissue	49	Physis O-7148 W	04_WOOD	4		***41***	13		
PCB 151 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***62***	11		
PCB 153 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		5	***89***	12		
PCB 153 (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	1		16	***68***		
PCB 153, Total (µg/L)	Water	47	Physis O-7042 W	03_UNIV		***67***			H	Holdtime exceeded
PCB 156 (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	10		***40***	6		
PCB 156 (ng/dry g)	Tissue	49	Physis O-7134 W	01_Western_Arm	5		***75***	9		
PCB 158 (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	6		***74***			
PCB 167, Total (µg/L)	Water	47	Physis O-7042 W	LABQA	***48***				EST BS/BSD	Estimate due to BS/BSD RPD failed
PCB 168/132 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***62***	15		
PCB 170 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		***33***	13	7		
PCB 174 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***62***	9		
PCB 177 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***46***	10		
PCB 177 (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	6		***34***			
PCB 180 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		26	***70***	9		
PCB 183 (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	20		***44***			
PCB 187 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		0	***71***	8		

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
PCB 187 (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	8		14	***48***		
PCB 194 (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	7		***37***	7		
PCB 195 (ng/dry g)	Tissue	49	Physis O-7130 W	01_Western_Arm	24		***62***			
PCB 198 (Surrogate), Total (%)	Water	44	Physis O-6066 W	03_UNIV		***65***				
PCB 206 (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	5		0	***38***		
PCB 209 (ng/dry g)	Tissue	49	Physis O-7132 W	01_Western_Arm	16		0	***40***		
PCB 209, Total (µg/L)	Water	46	Physis O-7016 W	LABQA	***42***				EST BS/BSD	Estimate due to BS/BSD RPD failed
PCB AROCLOR 1254 (ng/dry g)	Sediment	44	Physis O-6088 W	01_BPT_14		***57***	***89***		LD RPD	LabDuplicate RPD Failed
OP Pesticides										
Azinphos methyl (Guthion) (µg/L)	Water	44	W4H0315	10D_HILL	***33***					
Chlorpyrifos (ng/dry g)	Water	49	Physis O-7132 W	LABQA	***31***				BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Chlorpyrifos (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD			***32***	6		
Chlorpyrifos, Total (µg/L)	Water	45	Physis O-6150 W	01T_ODD2_DCH		***34***			FD RPD	FieldDup RPD Failed
Demeton-s (ng/dry g)	Water	44	Physis O-6072 W	LABQA	***32***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Demeton-s, Total (µg/L)	Water	45	Physis O-6144 W	07D_SIMI	***45***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Diazinon (µg/L)	Water	44	W4H0315	10D_HILL	***29***					
Diazinon (µg/L)	Water	49	W5E1199	10D_HILL				***31***		

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Diazinon, Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***31***			FD RPD	FieldDup RPD Failed
Dimethoate (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD				***31***		
Dimethoate, Total (µg/L)	Water	47	Physis O-7046 W	LABQA	***78***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Disulfoton (ng/dry g)	Water	44	Physis O-6072 W	LABQA	***31***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Disulfoton (ng/dry g)	Sediment	44	Physis O-6072 W	04_WOOD				***40***	EST BS/BSD	Estimate due to BS/BSD RPD failed
Disulfoton, Total (µg/L)	Water	45	Physis O-6144 W	07D_SIMI	***51***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Ethoprop (µg/L)	Water	44	W4H0315	10D_HILL	***27***					
Ethyl parathion (µg/L)	Water	45	W4K0927	10D_HILL				***36***		
Malathion, Total (µg/L)	Water	49	Physis O-7098 W	01T_ODD2_DCH		***48***				
Mevinphos, Total (µg/L)	Water	44	Physis O-6082 W	LABQA	***62***				BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Perylene-d12 (µg/L)	Water	49	W5E1327	10D_HILL	***56***					
Triphenyl phosphate (µg/L)	Water	49	W5E1327	10D_HILL	***53***					
PAHs										
None										
Pyrethroid Pesticides										
Bifenthrin, Total (µg/L)	Water	44	Physis O-6066 W	03_UNIV		***67***				
Bifenthrin, Total (µg/L)	Water	48	Physis O-7060 W	04_WOOD		***167***			FD RPD	FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Cyfluthrin, Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***187***			FD RPD	FieldDup RPD Failed
Esfenvalerate, Total (µg/L)	Water	47	Physis O-7042 W	03_UNIV		***118***			FD RPD	FieldDup RPD Failed
Fenvalerate, Total (µg/L)	Water	47	Physis O-7042 W	03_UNIV		***86***				
L-Cyhalothrin, Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***160***			FD RPD	FieldDup RPD Failed
L-Cyhalothrin, Total (µg/L)	Water	49	Physis O-7098 W	9B_ADOLF		***35***				
Permethrin, cis-, Total (µg/L)	Water	44	Physis O-6066 W	LABQA	***76***				BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Permethrin, cis-, Total (µg/L)	Water	48	Physis O-7056 W	LABQA	***46***					
Permethrin, cis-, Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***184***			FD RPD	FieldDup RPD Failed
Permethrin, trans- (µg/L)	Water	44	Physis O-6066 W	LABQA	***39***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Permethrin, trans-, Total (µg/L)	Water	44	Physis O-6066 W	LABQA	***39***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Permethrin, trans-, Total (µg/L)	Water	46	Physis O-7016 W	04_WOOD		***187***			FD RPD	FieldDup RPD Failed
Metals and Selenium										
Aluminum, Dissolved (µg/L)	Water	45	Physis E-8014 W	01T_ODD2_DC H		***70***	20	3		
Aluminum, Dissolved (µg/L)	Water	45	Physis E-8016 W	01_BPT_14			***70***			
Aluminum, Dissolved (µg/L)	Water	47	Physis E-8042 W	01T_ODD2_DC H			***146***	1	LD RPD	LabDuplicate RPD Failed
Aluminum, Dissolved (µg/L)	Water	47	Physis E-8042 W	03_UNIV		***36***			LD RPD	LabDuplicate RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Aluminum, Dissolved (µg/L)	Water	49	Physis E-8083 W	01T_ODD2_DC H		***46***	23	9		
Aluminum, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***34***			FD RPD	FieldDup RPD Failed
Antimony, Dissolved (µg/L)	Water	47	Physis E-8042 W	03_UNIV		**33**			FD RPD	FieldDup RPD Failed
Arsenic, Dissolved (µg/L)	Water	49	Physis E-8083 W	01T_ODD2_DC H		**32**	9	2	FD RPD	FieldDup RPD Failed
Cadmium, Dissolved (µg/L)	Water	46	Physis E-8027 W	04_WOOD		**41**	**39**	1	LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Chromium, Dissolved (µg/L)	Water	46	Physis E-8029 W	01_RR_BR			**49**		LD RPD	LabDuplicate RPD Failed
Chromium, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		**131**			FD RPD	FieldDup RPD Failed
Cobalt, Dissolved (µg/L)	Water	46	Physis E-8027 W	04_WOOD		**37**	6	0	FD RPD	FieldDup RPD Failed
Cobalt, Total (µg/L)	Water	49	Physis E-8083 W	01T_ODD2_DC H		**65**	**45**		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Copper, Dissolved (µg/L)	Water	44	Physis E-7137 W	01_BPT_14		15	**36**		LD RPD	LabDuplicate RPD Failed
Copper, Dissolved (µg/L)	Water	45	Physis E-8016 W	01_BPT_14			**80**		LD RPD	LabDuplicate RPD Failed
Copper, Dissolved (µg/L)	Water	46	Physis E-8029 W	01_RR_BR			**35**		LD RPD	LabDuplicate RPD Failed
Copper, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_14			**188**		LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Copper, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		**181**			LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Copper, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_14			**61**		LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Copper, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		**34**			LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Copper, Total (µg/L)	Water	49	Physis E-8082 W	01_BPT_6		**36**	27		FD RPD	FieldDup RPD Failed
Iron, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***55***			FD RPD	FieldDup RPD Failed
Lead, Dissolved (µg/L)	Water	44	Physis E-7132 W	01T_ODD2_DC H			***55***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	44	Physis E-7132 W	03_UNIV		***44***	***34***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	45	Physis E-8014 W	01T_ODD2_DC H		***55***	24		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Lead, Dissolved (µg/L)	Water	45	Physis E-8014 W	04D_VENTURA			***56***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	45	Physis E-8014 W	9AD_CAMA			***43***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	45	Physis E-8016 W	01_BPT_14			***126***		LD RPD	LabDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	46	Physis E-8027 W	04_WOOD		***141***	0	0	FD RPD	FieldDup RPD Failed
Lead, Dissolved (µg/L)	Water	47	Physis E-8042 W	01T_ODD2_DCH			***157***	1	LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	47	Physis E-8042 W	03_UNIV		***125***			LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_14			***107***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***108***			LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Lead, Dissolved (µg/L)	Water	49	Physis E-8082 W	01_BPT_6			***104***			
Lead, Dissolved (µg/L)	Water	49	Physis E-8083 W	01T_ODD2_DC H		***35***	13		U	Upper Limit due to analyte found in blank
Lead, Total (µg/L)	Water	44	Physis E-7132 W	01T_ODD2_DC H			***71***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Total (µg/L)	Water	44	Physis E-7132 W	03_UNIV		***40***	***60***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Lead, Total (µg/L)	Water	45	Physis E-8014 W	9AD_CAMA			***57***		LD RPD, U	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank
Lead, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***121***			FD RPD	FieldDup RPD Failed
Lead, Total (µg/L)	Water	49	Physis E-8082 W	01_BPT_6		***54***	7.5		FD RPD	FieldDup RPD Failed
Manganese, Dissolved (µg/L)	Water	46	Physis E-8027 W	04_WOOD		***108***	0	1	FD RPD	FieldDup RPD Failed
Manganese, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***104***			FD RPD	FieldDup RPD Failed
Selenium, Dissolved (µg/L)	Water	45	Physis E-8014 W	9AD_CAMA			***47***		LD RPD	LabDuplicate RPD Failed
Selenium, Dissolved (µg/L)	Water	45	Physis E-8016 W	01_BPT_14			***162***		LD RPD	LabDuplicate RPD Failed
Selenium, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_14			***31***		U	Upper Limit due to analyte found in blank

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Selenium, Dissolved (µg/L)	Water	49	Physis E-8082 W	01_BPT_6		0	***43***			
Selenium, Total (µg/L)	Water	45	Physis E-8016 W	01_BPT_14			***108***		LD RPD	LabDuplicate RPD Failed
Selenium, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***60***				
Silver, Dissolved (µg/L)	Water	44	Physis E-7137 W	01_BPT_14		***36***	29		FD RPD	FieldDup RPD Failed
Silver, Dissolved (µg/L)	Water	45	Physis E-8016 W	01_BPT_14			***50***		LD RPD, U	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank
Silver, Total (µg/L)	Water	45	Physis E-8014 W	9AD_CAMA			***67***			
Strontium, Dissolved (µg/L)	Water	44	Physis E-7132 W	01T_ODD2_DC H				***69***		
Strontium, Dissolved (µg/L)	Water	45	Physis E-8014 W	01T_ODD2_DC H		0	1	***39***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to RPD failure between MS/MSD
Strontium, Dissolved (µg/L)	Water	49	Physis E-8083 W	01T_ODD2_DC H		1	1	***39***	MS <LL, MS >UL, EST MS/MSD	MS failed lower limit, MS failed upper limit, Estimate due to RPD failure between MS/MSD
Thallium, Dissolved (µg/L)	Water	44	Physis E-7132 W	03_UNIV		***40***	***40***	1		
Thallium, Dissolved (µg/L)	Water	45	Physis E-8014 W	01T_ODD2_DC H		***86***	22		U	Upper Limit due to analyte found in blank
Thallium, Dissolved (µg/L)	Water	46	Physis E-8027 W	04_WOOD		***80***	29		U	Upper Limit due to analyte found in blank
Thallium, Dissolved (µg/L)	Water	49	Physis E-8083 W	04D_VENTURA			***67***	0		

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Thallium, Total (µg/L)	Water	44	Physis E-7132 W	03_UNIV		***67***	0			
Thallium, Total (µg/L)	Water	45	Physis E-8014 W	01T_ODD2_DC H		***40***	0		U	Upper Limit due to analyte found in blank
Thallium, Total (µg/L)	Water	45	Physis E-8014 W	9AD_CAMA			***40***		U	Upper Limit due to analyte found in blank
Tin, Total (µg/L)	Water	44	Physis E-7137 W	01_BPT_14		***34***				
Tin, Total (µg/L)	Water	46	Physis E-8027 W	04_WOOD		13	***48***			
Tin, Total (µg/L)	Water	47	Physis E-8042 W	03_UNIV		***133***				
Titanium, Dissolved (µg/L)	Water	49	Physis E-8083 W	01T_ODD2_DC H		8	2	***35***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD
Zinc, Dissolved (µg/L)	Water	44	Physis E-7137 W	01_BPT_14		***92***	17		FD RPD	FieldDup RPD Failed
Zinc, Dissolved (µg/L)	Water	46	Physis E-8027 W	04_WOOD		***47***	5	2	FD RPD	FieldDup RPD Failed
Zinc, Dissolved (µg/L)	Water	47	Physis E-8042 W	03_UNIV		***63***			U, FD RPD	Upper Limit due to analyte found in blank, FieldDup RPD Failed
Zinc, Dissolved (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***65***			U, FD RPD	Upper Limit due to analyte found in blank, FieldDup RPD Failed
Zinc, Dissolved (µg/L)	Water	49	Physis E-8082 W	01_BPT_6		***33***	24		FD RPD	FieldDup RPD Failed
Zinc, Total (µg/L)	Water	44	Physis E-7137 W	01_BPT_14		***33***	22		FD RPD	FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Zinc, Total (µg/L)	Water	48	Physis E-8059 W	01_BPT_3		***46***			U, FD RPD	Upper Limit due to analyte found in blank, FieldDup RPD Failed
Zinc, Total (µg/L)	Water	49	Physis E-8082 W	01_BPT_6		***62***	9		FD RPD	FieldDup RPD Failed

BS/BSD = Blank Spike/Blank Spike Duplicate
MS/MSD = Matrix Spike/Matrix Spike Duplicate
RPD = Relative Percent Difference

Table 3. Accuracy QA/QC Issues

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
General Water Quality											
Total Hardness (calc) (mg/L)	Water	45	Physis E-8014 W	70	130			***14***	***4***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD
Nutrients											
Ammonia as N (mg/dry kg)	Sediment	44	Physis C-18033 W	70	130			***131***	128		
Ammonia as N (mg/dry kg)	Sediment	44	Physis C-18037 W	70	130			***137***	***131***		
Total Kjeldahl Nitrogen (mg/L)	Water	45	Associated_QC1 151080_W_CON	80	120			***320***	***310***	MS >UL	MS failed upper limit
Total Kjeldahl Nitrogen (mg/L)	Water	46	Associated_QC1 151859_W_CON	80	120			***69***	83	MS <LL	MS failed lower limit
OC Pesticides											
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7130 W	50	150			***194***			

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7132 W	50	150			***-24***	81		
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7134 W	50	150			***24***	66		
DDE(p,p') (ng/dry g)	Tissue	49	Physis O-7148 W	50	150			***-12***	***942***	MS <LL, MS >UL, EST MS/MSD	MS failed lower limit, MS failed upper limit, Estimate due to RPD failure between MS/MSD
DDT(o,p') (ng/dry g)	Sediment	44	Physis O-6088 W	50	150			54	***47***		
DDT(p,p') (ng/dry g)	Sediment	44	Physis O-6068 W	50	150			67	***49***	LD RPD	LabDuplicate RPD Failed
DDT(p,p') (ng/dry g)	Sediment	44	Physis O-6088 W	50	150			***48***	***31***		
DDT(p,p') (ng/dry g)	Tissue	49	Physis O-7148 W	50	150			***159***	***218***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to RPD failure between MS/MSD
Endosulfan I (ng/dry g)	Water	49	Physis O-7130 W	50	150	***14***	***16***			BS <LL	BS failed lower limit
Endosulfan I (ng/dry g)	Water	49	Physis O-7132 W	50	150	***14***	***17***			BS <LL	BS failed lower limit
Endosulfan I (ng/dry g)	Water	49	Physis O-7134 W	50	150	***18***	***20***			BS <LL	BS failed lower limit
Endosulfan I (ng/dry g)	Tissue	49	Physis O-7134 W	50	150			***46***	79	BS <LL	BS failed lower limit
Endosulfan II (ng/dry g)	Water	49	Physis O-7130 W	50	150	***33***	***32***			BS <LL	BS failed lower limit
Endosulfan II (ng/dry g)	Water	49	Physis O-7134 W	50	150	***34***	***40***			BS <LL	BS failed lower limit
Endosulfan II (ng/dry g)	Tissue	49	Physis O-7132 W	50	150			***34***	56		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Endrin (ng/dry g)	Tissue	49	Physis O-7130 W	25	125			***149***			
Endrin (ng/dry g)	Tissue	49	Physis O-7134 W	25	125			117	***127***		
Endrin, Total (µg/L)	Water	47	Physis O-7042 W	25	125	125	***132***				
Methoxychlor (ng/dry g)	Sediment	44	Physis O-6088 W	50	150			54	***29***		
PCBs											
PCB 149 (ng/dry g)	Tissue	49	Physis O-7132 W	50	150			***47***	***39***		
PCB 149 (ng/dry g)	Tissue	49	Physis O-7134 W	50	150			55	***43***		
PCB 153 (ng/dry g)	Tissue	49	Physis O-7132 W	50	150			86	***175***		
PCB 194, Total (µg/L)	Water	44	Physis O-6066 W	50	150	***163***	139				
PCB 209 (ng/dry g)	Tissue	49	Physis O-7134 W	50	150			***48***	***39***		
OP Pesticides											
Azinphos methyl (Guthion) (µg/L)	Water	45	W4K0927	0.1	154			140	***167***		
Chlorpyrifos (ng/dry g)	Water	49	Physis O-7130 W	50	150	***27***	***32***			BS <LL	BS failed lower limit
Chlorpyrifos (ng/dry g)	Water	49	Physis O-7132 W	50	150	***27***	***37***			BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Diazinon (µg/L)	Water	48	W5B0473	36	153			***155***	141		
Ethoprop (µg/L)	Water	44	W4H0315	40	153	132	***173***				
Fensulfothion, Total (µg/L)	Water	46	Physis O-7016 W	50	150	60	***45***			BS <LL	BS failed lower limit
Malathion (ng/dry g)	Sediment	44	Physis O-6072 W	50	150			142	***151***		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Mevinphos, Total (µg/L)	Water	44	Physis O-6082 W	50	150	***29***	55			BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Mevinphos, Total (µg/L)	Water	47	Physis O-7042 W	50	150	***43***	56			BS <LL	BS failed lower limit
Mevinphos, Total (µg/L)	Water	48	Physis O-7060 W	50	150	51	***45***			BS <LL	BS failed lower limit
Naled (µg/L)	Water	45	W4K0927	0.1	242			***248***	239		
Phorate, Total (µg/L)	Water	49	Physis O-7094 W	50	150	***47***	50			BS <LL	BS failed lower limit
Phosmet (µg/L)	Water	44	Physis O-6066 W	50	150	54	***45***			BS <LL	BS failed lower limit
Phosmet (ng/dry g)	Water	44	Physis O-6088 W	50	150	51	***49***			BS <LL	BS failed lower limit
Phosmet (ng/dry g)	Sediment	44	Physis O-6072 W	50	150			***158***	***164***		
Phosmet, Total (µg/L)	Water	44	Physis O-6066 W	50	150	54	***45***			BS <LL	BS failed lower limit
Ronnel (µg/L)	Water	48	W5B0473	29	153			***156***	147		
Stirophos (µg/L)	Water	45	W4K0927	0.1	167			141	***183***		
Trichloronate (µg/L)	Water	48	W5B0473	40	150			***156***	146		
Triphenyl phosphate (µg/L)	Water	45	W4K0927	40	163			135	***166***		
Pyrethroid Pesticides											
Allethrin (µg/L)	Water	45	W4K0781	0.1	222			***227***	***261***		
Bifenthrin (ng/dry g)	Sediment	44	Physis O-6072 W	50	150			150	***173***		
Cyfluthrin (µg/L)	Water	49	W5E1327	11	214			***325***	***352***		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Cypermethrin (µg/L)	Water	49	W5E1327	20	206			***289***	***320***		
Deltamethrin/Tralomethrin (µg/L)	Water	49	W5E1327	0.2	230			***243***	***269***		
Fenvalerate/Esfenvalerate (µg/L)	Water	49	W5E1327	32	193			***308***	***330***		
Pendimethalin (µg/L)	Water	45	W4K0781	8	203			197	***233***		
Pendimethalin (µg/L)	Water	49	W5E1327	8	203			***212***	***208***		
Permethrin (µg/L)	Water	49	W5E1327	37	209			***266***	***286***		
Permethrin, cis- (µg/L)	Water	44	Physis O-6066 W	50	150	***37***	82			BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Permethrin, cis- (ng/dry g)	Sediment	44	Physis O-6072 W	50	150			***171***	***176***		
Permethrin, cis-, Total (µg/L)	Water	46	Physis O-7024 W	50	150	57	***45***			BS <LL	BS failed lower limit
Permethrin, trans-, Total (µg/L)	Water	49	Physis O-7094 W	50	150	***162***	139				
Prallethrin (µg/L)	Water	45	W4K0781	11	247			229	***260***		
Metals and Selenium											
Iron, Dissolved (µg/L)	Water	44	Physis E-7132 W	75	125			***137***	119		
Iron, Dissolved (µg/L)	Water	48	Physis E-8055 W	80	120			119	***138***	MS >UL	MS failed upper limit
Mercury, Dissolved (µg/L)	Water	46	Physis E-6102 W	75	125			***133***	***133***	MS >UL	MS failed upper limit
Silver, Dissolved (µg/L)	Water	45	Physis E-8014 W	75	125			78	***73***		
Strontium, Dissolved (µg/L)	Water	44	Physis E-7132 W	75	125			***238***	116		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Strontium, Dissolved (µg/L)	Water	45	Physis E-8014 W	75	125			***372***	***250***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to RPD failure between MS/MSD
Strontium, Dissolved (µg/L)	Water	46	Physis E-8027 W	75	125			***30***	***29***	MS <LL	MS failed lower limit
Strontium, Dissolved (µg/L)	Water	48	Physis E-8055 W	75	125			***263***	***330***	MS >UL	MS failed upper limit
Strontium, Dissolved (µg/L)	Water	48	Physis E-8055 W	75	125			***228***	***187***	MS >UL	MS failed upper limit
Strontium, Dissolved (µg/L)	Water	49	Physis E-8083 W	75	125			***34***	***46***	MS <LL, MS >UL, EST MS/MSD	MS failed lower limit, MS failed upper limit, Estimate due to RPD failure between MS/MSD
Strontium, Dissolved (µg/L)	Water	49	Physis E-8083 W	75	125			***327***	***221***	MS <LL, MS >UL, EST MS/MSD	MS failed lower limit, MS failed upper limit, Estimate due to RPD failure between MS/MSD
Sumithrin (Phenothrin) (µg/L)	Water	49	W5E1327	12	247			***257***	***291***		
Titanium, Dissolved (µg/L)	Water	44	Physis E-7132 W	75	125			***168***	***135***		
Titanium, Dissolved (µg/L)	Water	49	Physis E-8083 W	75	125			***59***	***66***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD

LCL = Lower Control Limit
UCL = Upper Control Limit
MS = Matrix Spike
MS = Matrix Spike Duplicate
LCS = Laboratory Control Spike
LCSD = Laboratory Control Spike Duplicate
%Rec = Percent Recovery