



August 11, 2016

Ms. Xueyuan Yu
San Diego Regional Water Quality Control Board
2375 Northside Drive, #100
San Diego, CA 92108

Electronic submission: sandiego@waterboards.ca.gov

Re: Review and Comment of the Draft 2014 California Section (§) 303(d)/305(b) Integrated Report

Dear Ms. Yu,

The City of National City has reviewed the Draft 2014 California §303(d)/305(b) Integrated Report dated July 12, 2016. We appreciate the opportunity to provide comments to the San Diego Regional Water Quality Control Board on this important document. This letter first provides a general comment and then provides specific comments organized by specific constituent or water body condition.

General Comment

1. Although acknowledged by the Regional Board, the age of some of the data used in the listing analysis was greater than 10 years for numerous waterbodies and therefore not likely representative of current water quality conditions. Inclusion of data older than 10 years, and arguably even including data older than five years, will likely not result in a §303d list that is representative of water quality conditions in San Diego County and therefore not useful in the development of water quality priorities.

Specific Comments by Analyte

1. Chlorpyrifos

Lower Sweetwater River was placed on the Draft 2014 §303d list for chlorpyrifos. This listing was based on Copermittee data collected between 2001 and 2008. Re-evaluation of the data available up to October 2010 and to 2015 results in the following findings:

Sweetwater River, Lower, Decision ID 53457; LOE ID 77930 states that three of 14 samples exceeded the chlorpyrifos criterion at SR-MLS and SR-TWAS-1 between 2001 and 2008. Re-analysis of available data (Transitional Monitoring and Assessment Program Report for the San Diego Bay Watershed Management Area (2014-2015)) shows that there have been no exceedances of the chlorpyrifos criterion at SR-MLS or SR-TWAS-1 since 2003. Between 2001 and 2010, three of 16 wet weather samples and zero of two dry weather samples exceeded the criterion at SR-MLS, and zero of two samples for both wet and dry weather exceeded the criterion at SR-TWAS-1 for a total of three out of 22 samples exceeding the chlorpyrifos criterion. Given the age of the exceedances, it is prudent to consider the available data from 2001 through 2014. During this time period, three of 21 wet weather samples and zero of seven dry weather samples exceeded the criterion at SR-MLS, and zero of six samples exceeded the criterion at SR-TWAS-1 during both wet and dry weather. The total number of exceedances between 2001 and 2014 was three out of 40 samples. This does not meet the criteria for listing presented in Table 3.1 of the Listing Policy. See Attachment A for monitoring results.

Additionally, results from the County of San Diego Dry Weather Monitoring from 2006-2009 in the Lower Sweetwater River at sites 909SWT01, 909SWT02, 909SWT03, and 909SWT05 show that zero of 18 samples exceeded the criterion continuous concentration of 0.014 ug/l. Two additional samples were less than the detection limit of 0.04 ug/l; however, this level is not low enough to determine if an exceedance was observed. See Attachment A for monitoring results.

RECOMMEDATION:

Based on the re-analysis of existing data, Lower Sweetwater River should not be included on the 2014 §303d list for Chlorpyrifos.

2. Diazinon

Diazinon was banned from sale in 2005, and since that time significant decreases in concentrations of this pesticide have been observed in receiving water bodies in San Diego County. Due to the inclusion of data greater than 10 years old in the Draft 2014 §303d list evaluation, the number of exceedances for this pesticide meets listing criteria in some water bodies. However, due to the ban on sales of Diazinon in the past 11 years, evaluation of the

data should be limited to data collected since the time of the ban. Additionally, sections 3.10 and 4.10 of the Listing Policy allow for the inclusion of trend evaluation during §303d list development.

The Sweetwater River, Lower is currently proposed for listing on the Draft 2014 §303d list for Diazinon; however there have been no exceedances of the criteria for Diazinon since the early 2000s at any of the stations included in the analysis.

Lower Sweetwater River, Decision ID 53461; LOE ID 77012 states that five of 27 samples exceeded the criterion for Diazinon at SR-MLS and SR-TWAS-1 between 2001 and 2008. Re-analysis of available data (Transitional Monitoring and Assessment Program Report for the San Diego Bay Watershed Management Area (2014-2015)) shows that there have been zero exceedances of the criterion for Diazinon since 2003 at these two monitoring locations (zero of 38 samples). Based on the age of the exceedances (pre-dating the ban on Diazinon); no exceedances since 2003, two year before the ban; and significantly decreasing trend results as shown in the Transitional Monitoring and Assessment Program Report for the San Diego Bay Watershed Management Area (2014-2015) (step six of section 3.10 of the Listing Policy) this pollutant is not likely to exceed the criterion in the future. Therefore, Diazinon should not be included on the 2014 §303d list for the Lower Sweetwater River. See Attachment A for a table of monitoring results.

Additionally, results from the County of San Diego Dry Weather Monitoring from 2006-2009 in the Lower Sweetwater River at sites 909SWT01, 909SWT02, 909SWT03, and 909SWT05 show that zero of 20 samples exceeded the freshwater chronic value of 0.1 ug/l. See Attachment A for monitoring results.

RECOMMENDATION:

It is recommended that the Lower Sweetwater River be removed from the Draft 2014 §303d list due to the ban on the sale of Diazinon, the significantly decreasing trends in Diazinon since 2005, no exceedances of Diazinon since 2003 (zero of 38 samples), and the likelihood that Diazinon will not exceed the criterion in the future.

3. Selenium

Additional data were collected from Paradise Creek (HSA 908.32) by the City of National City for use in the delisting evaluation and compared to the California Toxics Rule (CTR) Freshwater Criterion of 5 µg/l. A total of 46 samples were collected by the City in 2014 in accordance with the project's Quality Assurance Project Plan (see Attachment A). Collected samples were submitted to EnviroMatrix Analytical, Inc., a laboratory certified by the California Department of Health Services, for analysis. All samples had results less than the criterion of 5 µg/l.

According to Table 4.1 of the Listing Policy, a water segment can be delisted if the sample size is between 48 and 59 samples with four or fewer exceedances. The City's 2014 data in combination with SWAMP's 2005-2006 samples listed in the LOE, equate to a total of 50 samples, with four of 50 samples with exceedances.

The City requests that these data be considered as part of the 2014 §303(d) list development process. See Attachment A for monitoring results.

RECOMMENDATION:

It is recommended that Paradise Creek (HSA 908.32) be removed from the Draft 2014 §303d list since the number of exceedances and number of samples meets the delisting requirements (Table 4.1 in the Listing Policy).

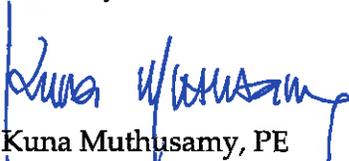
4. Phosphorus

During the previous listing cycle, Paradise Creek (HSA 908.32) was assessed with respect to listing the water body for total phosphorus. Four samples from 2005 and 2006 were reviewed, and the determination was that the water body should not be listed for phosphorus (2008 Integrated Report, decision ID 16949). No new data has been collected for phosphorus since the last listing cycle, but the Draft 2014 §303(d) includes a new listing for phosphorus in Paradise Creek.

RECOMMENDATION

It is recommend to remove Paradise Creek (HSA 908.32) from the Draft 2014 §303(d) List for total phosphorus because the analysis in the previous listing cycle concluded listing Paradise Creek for total phosphorus was not warranted or supported, and no new data has been collected since that time.

Sincerely,



Kuna Muthusamy, PE
Assistant Director of Engineering & Public Works
City of National City

Attachment A

Dry Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark References	Historical Monitoring Data				Long Term and Transitional Monitoring	Long Term Monitoring Only	Long Term and Transitional Monitoring	Long Term and Transitional Monitoring	Frequency Above Benchmarks	Mean Ratio to Benchmarks						
					2009-2010		2010-2011	2011-2012							2012-2013	2013-2014			2014-2015	
					01/06/10	05/18/10	-	09/12/11-09/13/11							05/08/12-05/09/12	-	09/17/13-09/18/13	1/13/14-1/14/14	05/01/14-05/02/14	-
Physical Chemistry																				
2013	Dissolved Oxygen	mg/L	<5.0 (a)	1. Basin Plan																
2007, 2013	pH	pH units	6.5-9.0	1. Basin Plan	7.38	7.39		7.26	7.29				33%	NA ¹						
2007, 2013	Specific Conductivity	µmhos/cm	NA		4,810	4,630		5,010	4,640				0%	0.31						
2007, 2013	Water Temperature	Celsius	NA		12.70	18.10		19.3	16.8											
2013	Color	Color units	20	1. Basin Plan									33%	NA ¹						
2007, 2013	Turbidity	NTU	20	1. Basin Plan	1.4J	2.5		0.98	4				14%	0.54						
Bacteriological																				
2007, 2013	Enterococcus	MPN/100 mL	151 (b)	1. Basin Plan	80	170		130	300				43%	1.14						
2007, 2013	Fecal Coliform	MPN/100 mL	4,000	1. Basin Plan REC-1/REC-2	120	90		20	<20				0%	0.02						
2007, 2013	Total Coliform	MPN/100 mL	NA		800	13,000		1,300	500											
Nutrients																				
2007, 2013	Ammonia as N	mg/L	(c)	6. USEPA Water Quality Criteria (Freshwater)	0.03J	0.14		0.18	0.06J				0%	0.02						
2007, 2013	Nitrate as N	mg/L	10	1. Basin Plan	0.17	0.33		0.063J	0.24				0%	0.02						
2007, 2013	Nitrite as N	mg/L	1	1. Basin Plan	<0.05	0.045J		<0.1	<0.1				0%	0.04						
2007, 2013	Total Kjeldahl Nitrogen	mg/L	NA		0.554J	0.51		0.62	0.46											
2007, 2013	Total Nitrogen (calculated)	mg/L	1	1. Basin Plan	0.724	0.885		0.683	0.7				0%	0.63						
2007	Dissolved Phosphorus	mg/L	0.1	1. Basin Plan	0.132	0.077		0.18	0.097				50%	1.23						
2013	Orthophosphate	mg/L	NA																	
2007, 2013	Total Phosphorus	mg/L	0.1	1. Basin Plan	0.098	0.14		0.21	0.12				71%	1.33						
General Chemistry																				
2007	Biochemical Oxygen Demand	mg/L	10	8. McNeeley (1979)	<2	1.5J		2.7	0.54J				0%	0.14						
2007	Chemical Oxygen Demand	mg/L	120	4. MSGP 2015	40.9	22		29	22				0%	0.23						
2007, 2013	Dissolved Organic Carbon	mg/L	NA		7.8	6.7		5.3	6											
2007, 2013	Total Organic Carbon	mg/L	NA		7.7	6.1		4.3	6.2											
2007	Oil and Grease	mg/L	10	1. Basin Plan, 3. Anacostia River TMDL	<5	<5		<5	2J				0%	0.22						
2013	Sulfate	mg/l	500 (a)	1. Basin Plan				410	420				0%	NA ¹						
2007, 2013	Surfactants (MBAS)	mg/L	0.5	1. Basin Plan	0.074	0.06		0.063	0.057				0%	0.13						
2007, 2013	Total Dissolved Solids	mg/L	1,500 (a)	1. Basin Plan	2,642B	2,700		3,400	2,700				100%	1.96						
2007, 2013	Total Suspended Solids	mg/L	58	14. NSQD, 1. Basin Plan	1.8J	5		2	4				0%	0.07						
2007, 2013	Total Hardness	mg CaCO ₃ /L	NA		978.7	1,100		1,200	1,100											
Total Metals																				
2013	Aluminum	mg/L	0.2 (d)	1. Basin Plan									0%	0.06						
2007	Antimony	mg/L	0.006 (d)	1. Basin Plan	0.0002J	0.00016J		0.00011J	0.00017J				0%	0.02						
2007, 2013	Arsenic	mg/L	0.01 (d)	1. Basin Plan	0.0031	0.0016		0.0014	0.0024				0%	0.17						
2007, 2013	Cadmium	mg/L	0.005 (d)	1. Basin Plan	<0.0004	<0.0001		0.00002J	0.00002J				0%	0.01						
2007, 2013	Chromium	mg/L	0.05 (d)	1. Basin Plan	<0.0005	0.000077J		<0.0002	0.00011J				0%	0.00						
2013	Chromium, Trivalent	mg/L	NA																	
2013	Chromium, Hexavalent	mg/L	0.010 (d)	1. Basin Plan									0%	NA ¹						
2007, 2013	Copper	mg/L	1.0 (d)	1. Basin Plan	0.0005J	0.00063		<0.0005	<0.0005				0%	0.00						
2013	Iron	mg/L	0.3 (a)	1. Basin Plan				0.024	0.024				0%	NA ¹						
2007, 2013	Lead	mg/L	NA		0.000071B	0.000062J		0.00004J	0.00011J				0%	NA ¹						
2013	Manganese	mg/L	0.05 (a)	1. Basin Plan									100%	NA ¹						
2013	Mercury	mg/L	0.002 (d)	1. Basin Plan									0%	NA ¹						
2007, 2013	Nickel	mg/L	0.1 (d)	1. Basin Plan	0.0015	0.0051		0.0011	0.0015				0%	0.03						
2007, 2013	Selenium	mg/L	0.005	16. 40 CFR 131.38	0.0003J	0.00045		<0.0004	0.00043				0%	0.15						
2013	Silver	mg/L	0.1 (d)	1. Basin Plan									0%	NA ¹						
2013	Thallium	mg/L	0.002 (d)	1. Basin Plan									0%	NA ¹						
2007, 2013	Zinc	mg/L	5.0 (d)	1. Basin Plan	0.0023B	0.0017J		0.0011J	0.003J				0%	0.00						
Dissolved Metals																				
2013	Aluminum																			
2007	Antimony	mg/L	0.006	1. Basin Plan	0.0002J	0.00019J		0.0001J	0.00016J				0%	0.02						
2007, 2013	Arsenic	mg/L	0.34 acute / 0.15 chronic	16. 40 CFR 131.38	0.0033	0.0015		0.0014	0.002				0%	0.01						
2007, 2013	Cadmium	mg/L	(e)	16. 40 CFR 131.38	<0.0004	<0.0001		0.00002J	0.00002J				0%	0.01						
2007, 2013	Chromium	mg/L	(e)	16. 40 CFR 131.38	<0.0005	0.000083J		<0.0002	<0.0002				0%	0.00						
2007, 2013	Copper	mg/L	(e)	16. 40 CFR 131.38	0.0005J	0.0007		<0.0005	<0.0005				0%	0.02						
2013	Iron	mg/L	NA																	
2007, 2013	Lead	mg/L	(e)	16. 40 CFR 131.38	<0.0001	<0.0002		0.00002J	<0.0002				0%	0.01						
2013	Manganese	mg/L	NA																	
2013	Mercury	mg/L	NA																	
2007, 2013	Nickel	mg/L	(e)	16. 40 CFR 131.38	0.0014	0.0054		0.001	0.0014				0%	0.02						
2007, 2013	Selenium	mg/L	NA		0.0005	0.00047		<0.0004	0.0004											
2013	Silver	mg/L	(e)	16. 40 CFR 131.38									0%	NA ¹						
2013	Thallium	mg/L	NA																	
2007, 2013	Zinc	mg/L	(e)	16. 40 CFR 131.38	0.0021B	0.0029J		0.0019J	0.0027J				0%	0.01						

No Samples Collected

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Dry Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark References	Historical Monitoring Data					Long Term and Transitional Monitoring	Long Term Monitoring Only	Long Term and Transitional Monitoring	Long Term and Transitional Monitoring	Frequency Above Benchmarks	Mean Ratio to Benchmarks	
					2009-2010		2010-2011	2011-2012								2012-2013
					01/06/10	05/18/10	-	09/12/11-09/13/11	05/08/12-05/09/12	-	09/17/13-09/18/13	1/13/14-1/14/14	05/01/14-05/02/14			-
Organophosphorus Pesticides																
2013	Azinphos methyl (Guthion)	µg/L	NA								<0.010	<0.010	<0.010			
2013	Bolstar	µg/L	NA								<0.010	<0.010	<0.010			
2007, 2013	Chlorpyrifos	µg/L	0.02 acute / 0.014 chronic	12. CA Dept. of Fish & Game, 2000	<0.002	<0.01		<0.01	<0.01		<0.010	<0.010	<0.010	0%	0.32	
2013	Coumaphos	µg/L	NA								<0.010	<0.010	<0.010			
2013	Demeton-o	µg/L	NA								<0.010	<0.010	<0.010			
2013	Demeton-s	µg/L	NA								<0.010	<0.010	<0.010			
2007, 2013	Diazinon	µg/L	0.08 acute / 0.05 chronic	12. CA Dept. of Fish & Game, 2000, 11. Chollas Creek TMDL for Diazinon, 10. USEPA, Aquatic Life Ambient Water Quality Criteria Diazinon	<0.004	<0.01		<0.01	<0.01		<0.010	<0.010	<0.010	0%	0.09	
2013	Dichlorvos	µg/L	NA								<0.010	<0.010	<0.010			
2013	Dimethoate	µg/L	NA								<0.010	<0.010	<0.010			
2013	Disulfoton	µg/L	NA								<0.010	<0.010	<0.010			
2013	Ethoprop	µg/L	NA								<0.010	<0.010	<0.010			
2013	Ethyl parathion	µg/L	NA								<0.010	<0.010	<0.010			
2013	Fensulfothion	µg/L	NA								<0.010	<0.010	<0.010			
2013	Fenthion	µg/L	NA								<0.010	<0.010	<0.010			
2007, 2013	Malathion	µg/L	0.43 acute / 0.1 chronic	13. CA Dept. of Fish & Game, 1998, 5. Goldbook	<0.006	<0.01		<0.01	<0.01		<0.010	<0.010	<0.010	0%	0.47	
2013	Merphos	µg/L	NA								<0.010	<0.010	<0.010			
2013	Methyl parathion	µg/L	NA								<0.010	<0.010	<0.010			
2013	Mevinphos	µg/L	NA								<0.010	<0.010	<0.010			
2013	Naled	µg/L	NA								<0.010	<0.010BS-L	<0.010			
2013	Phorate	µg/L	NA								<0.010	<0.010	<0.010BS-L			
2013	Ronnel	µg/L	NA								<0.010	<0.010	<0.010			
2013	Stirophos	µg/L	NA								<0.010	<0.010	<0.010			
2013	Tokuthion (Prothiofos)	µg/L	NA								<0.010	<0.010	<0.010			
2013	Trichloronate	µg/L	NA								<0.010	<0.010	<0.010			
PCB Congeners																
2013	PCB-8	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-18	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-28	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-44	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-52	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-66	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-77	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-81	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-101	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-105	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-114	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-118	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-123	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-126	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-128	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
2013	PCB-138	µg/L	0.014 (f)	16. 40 CFR 131.38							<0.010	<0.010	<0.010	0%	NA ¹	
Polynuclear Aromatic Hydrocarbons																
2013	1-Methylnaphthalene	µg/L	NA								<0.10	<0.10	<0.10			
2013	1-Methylphenanthrene	µg/L	NA								<0.10	<0.10	<0.10			
2013	2,6-Dimethylnaphthalene	µg/L	NA								<0.10	<0.10	<0.10			
2013	2-Methylnaphthalene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Acenaphthene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Acenaphthylene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Anthracene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Benzo (a) anthracene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Benzo (a) pyrene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Benzo (b) fluoranthene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Benzo (e) pyrene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Benzo (g,h,i) perylene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Benzo (k) fluoranthene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Biphenyl	µg/L	NA								<0.10	<0.10	<0.10			
2013	Chrysene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Dibenzo (a,h) anthracene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Fluoranthene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Fluorene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Indeno (1,2,3-cd) pyrene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Naphthalene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Perylene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Phenanthrene	µg/L	NA								<0.10	<0.10	<0.10			
2013	Pyrene	µg/L	NA								<0.10	<0.10	<0.10			

No Samples Collected

No Samples Collected

No Samples Collected

Dry Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark References	Historical Monitoring Data					Long Term and Transitional Monitoring	Long Term Monitoring Only	Long Term and Transitional Monitoring	Long Term and Transitional Monitoring	Frequency Above Benchmarks	Mean Ratio to Benchmarks					
					2009-2010		2010-2011	2011-2012								2012-2013	2013-2014			2014-2015
					01/06/10	05/18/10	-	09/12/11-09/13/11	05/08/12-05/09/12							-	09/17/13-09/18/13	1/13/14-1/14/14	05/01/14-05/02/14	-
Pyrethroids																				
2013	Allethrin	µg/L	NA																	
2013	Bifenthrin	µg/L	0.0093	15. Anderson et al., 2006									0%	NA ¹						
2013	Cyfluthrin	µg/L	0.344	17. Wheelock et al., 2004									0%	NA ¹						
2013	Cypermethrin	µg/L	0.683	17. Wheelock et al., 2004									0%	NA ¹						
2013	Danitol (Fenprothrin)	µg/L	NA																	
2013	Deltamethrin/Tralomethrin	µg/L	NA																	
2013	Esfenvalerate	µg/L	0.25	17. Wheelock et al., 2004									0%	NA ¹						
2013	Fenvalerate	µg/L	NA																	
2013	Fluvalinate	µg/L	NA																	
2013	L-Cyhalothrin	µg/L	0.2	17. Wheelock et al., 2004									0%	NA ¹						
2013	Permethrin	µg/L	0.021	15. Anderson et al., 2006									0%	NA ¹						
2013	Prallethrin	µg/L	NA																	
2013	Resmethrin	µg/L	NA																	
Toxicity																				
2007, 2013	<i>Ceriodaphnia</i> 96-hr	LC ₅₀ (%)	>100		>100	>100														
2007, 2013	<i>Ceriodaphnia</i> 7-day survival	NOEC (%)	100		100	100							0%	1.00						
2007, 2013	<i>Ceriodaphnia</i> 7-day reproduction	NOEC (%)	100		50	50							17%	1.17						
2007	<i>Hyalella</i> 96-hr	LC ₅₀ (%)	>100		>100	>100							100%	2.67						
2007, 2013	<i>Selenastrum</i> 96-hr	NOEC (%)	100		50	50							0%	1.00						
2007, 2013	<i>Selenastrum</i> 96-hr	NOEC (%)	100		50	50							100%	2.67						
2013	<i>Strongylocentrotus</i> 96-hr	TST	Pass/Fail										0%							

Blank spaces have been verified and no data is available.

NA indicate no criteria or published value was available or applicable to the matrix or program.

(a) Water Quality Benchmark are based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before April 4, 2011) and may vary by hydrologic area.

(b) Water Quality Benchmark for *Enterococcus* is based on the maximum criteria for infrequently used freshwater area by the San Diego Regional Water Quality Control Plan for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before April 4, 2011).

(c) Prior to the 2014-2015 monitoring year, Water Quality Benchmark was calculated based on CMC (salmonids absent) and CCC (early life stages present) using water temperature and pH described in the U.S. EPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999. For 2014-2015 monitoring year, Water Quality Benchmark CMC and CCC were calculated based on pH and water temperature (when applicable) as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.

(d) Water Quality Benchmark for total metals is based on the MUN beneficial as described in the Basin Plan, 1994 (with amendments effective on or before April 4, 2011).

(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000. The Criteria Maximum Concentration (CMC) and Continuous Criteria Concentration (CCC) were used.

(f) Water Quality Benchmark for PCBs is the CCC (USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000).

B-Analyte was detected in the associated method blank.

BS-L-Blank Spike recovery of this analyte was below the control limits. Results may be biased low.

C - Control failed; however, sample showed no toxic response.

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

NA¹ Three or more years of data required to calculate the Mean Ratio to Benchmark.

NR-Sampling of this analyte not required for transitional monitoring (RWQCB Order No. R9-2007-0001) and/or for long term monitoring (RWQCB Order No. R9-2013-0001).

Values with **red bold font and shading** do not meet Water Quality Benchmarks.

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources in Attachment B to Appendix A for benchmark source citations.

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Historical Monitoring Data											
					2001-2002			2002-2003			2003-2004			2004-2005		
					02/17/02	03/17/02	04/25/02	12/16/02	02/11/03	02/25/03	11/12/03	02/03/04	02/18/04	10/17/04	02/11/05	02/18/05
Polynuclear Aromatic Hydrocarbons																
2013	1-Methylnaphthalene	µg/L	NA													
2013	1-Methylphenanthrene	µg/L	NA													
2013	2,6-Dimethylnaphthalene	µg/L	NA													
2013	2-Methylnaphthalene	µg/L	NA													
2013	Acenaphthene	µg/L	NA													
2013	Acenaphthylene	µg/L	NA													
2013	Anthracene	µg/L	NA													
2013	Benzo (a) anthracene	µg/L	NA													
2013	Benzo (a) pyrene	µg/L	NA													
2013	Benzo (b) fluoranthene	µg/L	NA													
2013	Benzo (e) pyrene	µg/L	NA													
2013	Benzo (g,h,i) perylene	µg/L	NA													
2013	Benzo (k) fluoranthene	µg/L	NA													
2013	Biphenyl	µg/L	NA													
2013	Chrysene	µg/L	NA													
2013	Dibenzo (a,h) anthracene	µg/L	NA													
2013	Fluoranthene	µg/L	NA													
2013	Fluorene	µg/L	NA													
2013	Indeno (1,2,3-cd) pyrene	µg/L	NA													
2013	Naphthalene	µg/L	NA													
2013	Perylene	µg/L	NA													
2013	Phenanthrene	µg/L	NA													
2013	Pyrene	µg/L	NA													
Pyrethroids																
2007, 2013	Allethrin	µg/L	NA													
2007, 2013	Bifenthrin	µg/L	0.0093	15. Anderson et al., 2006												
2007, 2013	Cyfluthrin	µg/L	0.344	17. Wheelock et al., 2004												
2007, 2013	Cyhalothrin, Total Lambda	µg/L	0.20	17. Wheelock et al., 2004												
2007, 2013	Cypermethrin	µg/L	0.683	17. Wheelock et al., 2004												
2007, 2013	Danitol (Fenpropathrin)	µg/L	NA													
2007, 2013	Deltamethrin/Tralomethrin ^ε	µg/L	NA													
2007, 2013	Esfenvalerate	µg/L	0.25	17. Wheelock et al., 2004												
2007, 2013	Fenvalerate	µg/L	NA													
2007, 2013	Fluvalinate	µg/L	NA													
2007, 2013	Permethrin	µg/L	0.021	15. Anderson et al., 2006												
2007, 2013	Prallethrin	µg/L	NA													
2007, 2013	Resmethrin	µg/L	NA													
Toxicity																
2007, 2013	<i>Ceriodaphnia</i> 96-hr	LC ₅₀ (%)	>100		>100	70.71	>100	72.22	>100	>100	>100	>100	>100	80.53	>100	>100
2007, 2013	<i>Ceriodaphnia</i> 7-day survival	NOEC (%)	100		100	25	100	50	100	100	100	100	100	25	100	100
2007, 2013	<i>Ceriodaphnia</i> 7-day reproduction	NOEC (%)	100		100	50	50	50	100	100	100	100	100	12.5	50	100
2007	<i>Hyalella</i> 96-hr	LC ₅₀ (%)	>100		>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
2007, 2013	<i>Selenastrum</i> 96-hr	NOEC (%)	100		50	50	25	12.5	100	100	100	100	50	50	100	100
2013	<i>Strongylocentrotus</i> 96-hr	TST	Pass/Fail													

See last page for footnotes and source references.

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Historical Monitoring Data													
					2005-2006			2006-2007			2007-2008	2008-2009	2009-2010		2010-2011	2011-2012		2012-2013
					10/18/05	01/02/06	02/19/06	10/14/06	01/30/07	02/19/07	-	10/05/08	11/28/09	02/06/10	-	10/05/11-10/06/11	02/07/12	-
Physical Chemistry																		
2013	Dissolved Oxygen	mg/L	<5.0 (a)															
2007, 2013	pH	pH units	6.5-9.0	1. Basin Plan	7.66	8.14	8.09	7.80	7.79	7.60		7.49	7.32	7.05		7.55	7.71	
2007, 2013	Specific Conductivity	µmhos/cm	NA		3,430	4,090	2,690	1,890	4,100	3,520		5,180	4,680	3,410		4,380	1,219	
2007, 2013	Water Temperature	Celsius	NA		16.50	15.20	12.20	16.10	11.10	13.10		14.90	12.80	16.30		16.6	13.9	
2013	Color	Color units																
2007, 2013	Turbidity	NTU	20	1. Basin Plan	11.4	9.07	21.7	32.2	9.6	65.8		3.7	5.4	89.7		9.4	16	
Bacteriological																		
2007, 2013	Enterococcus	MPN/100 mL	NA		50,000	5,000	13,000	110,000	3,000	1,300		80,000	340	8,000		50,000	5,000	
2007, 2013	Fecal Coliform	MPN/100 mL	4,000	1. Basin Plan REC-1/REC-2	3,000	8,000	2,300	8,000	170	5,000		230,000	170	17,000		23,000	2,200	
2007, 2013	Total Coliform	MPN/100 mL	NA		130,000	30,000	80,000	50,000	3,000	30,000		500,000	2,300	220,000		80,000	80,000	
Nutrients																		
2007, 2013	Ammonia as N	mg/L	(b)	6. USEPA Water Quality Criteria (Freshwater)	<0.1	<0.1	0.19	0.79	0.67	1.24		0.11	0.1	0.07		0.22	<0.1	
2007, 2013	Nitrate as N	mg/L	10	1. Basin Plan	0.55	1.52	1.44	1.36	<0.05	0.74		0.22	0.36	0.67		0.39	0.64	
2007, 2013	Nitrite as N	mg/L	1	1. Basin Plan	<0.05	<0.05	<0.05	0.06	<0.05	<0.05		<0.05	<0.05	<0.75		0.033J	0.021J	
2007, 2013	Total Kjeldahl Nitrogen	mg/L	NA		1	1.7	2.5	2.2	1.4	2.4		2.4	1.12	0.644J		1	0.89	
2007	Dissolved Phosphorus	mg/L	2	4. MSGP 2015	0.26	0.43	0.24	0.28	0.21	0.32		0.133	0.163	0.263		0.2	0.11	
2013	Orthophosphate	mg/L	NA															
2007, 2013	Total Phosphorus	mg/L	2	4. MSGP 2015	0.52	0.45	0.54	0.4	0.28	0.39		0.19	0.17	0.396		0.24	0.15	
General Chemistry																		
2007, 2013	Biochemical Oxygen Demand	mg/L	30	4. MSGP 2015, 8. McNeeley (1979)	4.96	3.72	2.22	115	3.66	3.36		45.7	5.5	2.9		10	3.5 [†]	
2007	Chemical Oxygen Demand	mg/L	120	4. MSGP 2015	47	44	102	119	54	45		52	36.1	55		34	36	
2007, 2013	Dissolved Organic Carbon	mg/L	NA		5.04	19	10.5	86.9	13.6	12.8		9.7	8.6	9.9		7.6	7.9	
2007, 2013	Total Organic Carbon	mg/L	NA		12.1	14	13.2	88.8	13.8	13		9.9	8.8	9.4		7.6	8.5	
2007, 2013	Oil and Grease	mg/L	10	1. Basin Plan, 3. Anacostia River TMDL, 4. MSGP 2015	<1	<1	<1	<5	<5	<5		14.3	3.4J	<5		1.9J	3.1J	
2013	Sulfate	mg/L	500 (a)	1. Basin Plan														
2007, 2013	Surfactants (MBAS)	mg/L	0.5	1. Basin Plan	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.16	0.1H	0.031		0.1	0.14	
2007, 2013	Total Dissolved Solids	mg/L	1,500 (a)	1. Basin Plan	2,640	2,140	2,070	1,990	2,060	1,290		3,038	2,878	952B		2,900	1,800	
2007, 2013	Total Suspended Solids	mg/L	100	4. MSGP 2015, 1. Basin Plan	<20	<20	<20	45	<20	91		8.2	6.8	106		9	12	
2007, 2013	Total Hardness	mg CaCO ₃ /L	NA		1,130	1,020	966	807	999	626		1,010.8	1,086.9	336.8		1200	950	
Total Metals																		
2013	Aluminum	mg/L	NA															
2007	Antimony	mg/L	NA		<0.005	<0.005	<0.005	0.002	0.002	0.004		0.0009	0.0004J	0.0006		0.0006	0.00072	
2007, 2013	Arsenic	mg/L	NA		0.008	0.005	0.005	0.011	0.002	0.003		0.004	0.0084	0.0046		0.0017	0.002	
2007, 2013	Cadmium	mg/L	NA		<0.001	<0.001	<0.001	0.003	<0.001	<0.001		<0.0004	<0.0004	<0.0004		0.00004J	0.000037J	
2007, 2013	Chromium	mg/L	NA		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		0.0021	0.0006	0.0015		0.0019	0.0008	
2007, 2013	Copper	mg/L	NA		<0.005	0.005	0.005	0.011	0.006	0.012		0.0053	0.0035	0.0059		0.005	0.005	
2013	Iron	mg/L	0.3 (a)	1. Basin Plan														
2007, 2013	Lead	mg/L	NA		<0.002	<0.002	<0.002	0.003	<0.001	0.004		0.0005	0.00026	0.00338		0.00075	0.0013	
2013	Manganese	mg/L	0.05 (a)	1. Basin Plan														
2013	Mercury	mg/L	NA															
2007, 2013	Nickel	mg/L	NA		0.007	0.004	0.003	0.004	0.003	0.004		0.0017	0.003	0.0022		0.005	0.0037	
2007, 2013	Selenium	mg/L	0.005	16. 40 CFR 131.38	<0.005	<0.004	<0.005	<0.004	<0.004	<0.004		0.0002J	<0.0005	0.0013		0.0004	0.00062	
2013	Thallium	mg/L	NA															
2007, 2013	Zinc	mg/L	NA		0.044	<0.02	<0.02	0.047	0.022	0.047		0.021	0.011	0.0261		0.013	0.011	
Dissolved Metals																		
2013	Aluminum	mg/L	NA															
2007	Antimony	mg/L	0.006	1. Basin Plan	<0.005	<0.005	<0.005	<0.002	<0.002	0.002		0.0004J	0.0002J	0.0006		0.00034J	0.00047J	
2007, 2013	Arsenic	mg/L	0.34	16. 40 CFR 131.38	<0.001	<0.001	<0.001	0.002	<0.001	<0.001		0.0041	0.008	0.0039		0.0017	0.0017	
2007, 2013	Cadmium	mg/L	(c)	16. 40 CFR 131.38	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.0004	<0.0004	<0.0004		0.000034J	0.000029J	
2007, 2013	Chromium	mg/L	(c)	16. 40 CFR 131.38	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		0.0018	0.0005	0.0003J		0.0014	0.00043	
2007, 2013	Copper	mg/L	(c)	16. 40 CFR 131.38	<0.005	<0.005	<0.005	0.006	0.004	0.005		0.0026	0.0019	0.0029		0.0031	0.0029	
2013	Iron	mg/L	NA															
2007, 2013	Lead	mg/L	(c)	16. 40 CFR 131.38	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001		<0.0001	0.00009J	0.00007J		0.000039J	0.000071J	
2013	Manganese	mg/L	NA															
2013	Mercury	mg/L	NA															
2007, 2013	Nickel	mg/L	(c)	16. 40 CFR 131.38	<0.002	0.004	0.003	0.004	<0.002	0.002		0.0017	0.0030	0.0014		0.0048	0.0031	
2007, 2013	Selenium	mg/L	NA		<0.005	<0.004	<0.005	<0.004	<0.004	<0.004		0.0002J	0.0003J	0.0007		0.00029J	0.00061	
2013	Thallium	mg/L	NA															
2007, 2013	Zinc	mg/L	(c)	16. 40 CFR 131.38	0.04	<0.02	<0.02	0.023	<0.02	<0.02		0.0135	0.0050	0.0021		0.01	0.0064	

No Sample Collected

No Sample Collected

No Sample Collected

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Historical Monitoring Data													
					2005-2006			2006-2007			2007-2008	2008-2009	2009-2010		2010-2011	2011-2012		2012-2013
					10/18/05	01/02/06	02/19/06	10/14/06	01/30/07	02/19/07	-	10/05/08	11/28/09	02/06/10	-	10/05/11-10/06/11	02/07/12	-
Chlorinated Pesticides																		
2013	Chlordane (tech)	ug/L	2.4	16. 40 CFR 131.38														
Organophosphorus Pesticides																		
2013	Azinphos methyl (Guthion)	µg/L	NA															
2013	Bolstar	µg/L	NA															
2007, 2013	Chlorpyrifos	µg/L	0.02 acute / 0.014 chronic	12. CA Dept. of Fish & Game, 2000	<0.01	<0.02	<0.02	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002		<0.01	<0.01	
2013	Coumaphos	µg/L	NA															
2013	Demeton-o	µg/L	NA															
2013	Demeton-s	µg/L	NA															
2007, 2013	Diazinon	µg/L	0.08 acute / 0.05 chronic	12. CA Dept. of Fish & Game, 2000, 11. Chollas Creek TMDL for Diazinon, 10. USEPA, Aquatic Life Ambient Water Quality Criteria Diazinon	<0.01	<0.02	<0.02	<0.004	<0.004	<0.004		<0.004	<0.004	<0.004		<0.01	<0.01	
2013	Dichlorvos	µg/L	NA															
2013	Dimethoate	µg/L	NA															
2013	Disulfoton	µg/L	NA															
2013	Ethoprop	µg/L	NA															
2013	Ethyl parathion	µg/L	NA															
2013	Fensulfothion	µg/L	NA															
2013	Fenthion	µg/L	NA															
2007, 2013	Malathion	µg/L	0.43	13. CA Dept. of Fish & Game, 1998, 5. Goldbook	<0.01	<0.02	<0.02	0.097	0.063	<0.006		<0.006	<0.006	0.059		<0.01	<0.01	
2013	Merphos	µg/L	NA															
2013	Methyl parathion	µg/L	NA															
2013	Mevinphos	µg/L	NA															
2013	Naled	µg/L	NA															
2013	Phorate	µg/L	NA															
2013	Ronnel	µg/L	NA															
2013	Stirophos	µg/L	NA															
2013	Tokuthion (Prothiofos)	µg/L	NA															
2013	Trichloronate	µg/L	NA															
PCB Congeners																		
2013	PCB-8	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-18	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-28	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-44	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-52	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-66	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-77	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-81	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-101	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-105	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-114	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-118	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-123	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-126	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-128	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-138	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-153	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-156	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-157	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-167	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-169	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-170	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-180	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-187	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-189	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-195	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-206	µg/L	0.014 (d)	16. 40 CFR 131.38														
2013	PCB-209	µg/L	0.014 (d)	16. 40 CFR 131.38														

No Sample Collected

No Sample Collected

No Sample Collected

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Historical Monitoring Data													
					2005-2006			2006-2007			2007-2008	2008-2009	2009-2010		2010-2011	2011-2012		2012-2013
					10/18/05	01/02/06	02/19/06	10/14/06	01/30/07	02/19/07	-	10/05/08	11/28/09	02/06/10	-	10/05/11-10/06/11	02/07/12	-
Polynuclear Aromatic Hydrocarbons																		
2013	1-Methylnaphthalene	µg/L	NA															
2013	1-Methylphenanthrene	µg/L	NA															
2013	2,6-Dimethylnaphthalene	µg/L	NA															
2013	2-Methylnaphthalene	µg/L	NA															
2013	Acenaphthene	µg/L	NA															
2013	Acenaphthylene	µg/L	NA															
2013	Anthracene	µg/L	NA															
2013	Benzo (a) anthracene	µg/L	NA															
2013	Benzo (a) pyrene	µg/L	NA															
2013	Benzo (b) fluoranthene	µg/L	NA															
2013	Benzo (e) pyrene	µg/L	NA															
2013	Benzo (g,h,i) perylene	µg/L	NA															
2013	Benzo (k) fluoranthene	µg/L	NA															
2013	Biphenyl	µg/L	NA															
2013	Chrysene	µg/L	NA															
2013	Dibenzo (a,h) anthracene	µg/L	NA															
2013	Fluoranthene	µg/L	NA															
2013	Fluorene	µg/L	NA															
2013	Indeno (1,2,3-cd) pyrene	µg/L	NA															
2013	Naphthalene	µg/L	NA															
2013	Perylene	µg/L	NA															
2013	Phenanthrene	µg/L	NA															
2013	Pyrene	µg/L	NA															
Pyrethroids																		
2007, 2013	Allethrin	µg/L	NA															
2007, 2013	Bifenthrin	µg/L	0.0093	15. Anderson et al., 2006														
2007, 2013	Cyfluthrin	µg/L	0.344	17. Wheelock et al., 2004														
2007, 2013	Cyhalothrin, Total Lambda	µg/L	0.20	17. Wheelock et al., 2004														
2007, 2013	Cypermethrin	µg/L	0.683	17. Wheelock et al., 2004														
2007, 2013	Danitol (Fenpropathrin)	µg/L	NA															
2007, 2013	Deltamethrin/Tralomethrin ^E	µg/L	NA															
2007, 2013	Esfenvalerate	µg/L	0.25	17. Wheelock et al., 2004														
2007, 2013	Fenvalerate	µg/L	NA															
2007, 2013	Fluvalinate	µg/L	NA															
2007, 2013	Permethrin	µg/L	0.021	15. Anderson et al., 2006														
2007, 2013	Prallethrin	µg/L	NA															
2007, 2013	Resmethrin	µg/L	NA															
Toxicity																		
2007, 2013	<i>Ceriodaphnia</i> 96-hr	LC ₅₀ (%)	>100		>100	>100	>100	>100	>100	>100		>100	>100	>100				
2007, 2013	<i>Ceriodaphnia</i> 7-day survival	NOEC (%)	100		100	100	100	100	100	100		100	100	100				
2007, 2013	<i>Ceriodaphnia</i> 7-day reproduction	NOEC (%)	100		100	100	100	6.25	100	100		50	100	100				
2007	<i>Hyalella</i> 96-hr	LC ₅₀ (%)	>100		>100	>100	>100	>100	>100	>100		>100	>100	>100				
2007, 2013	<i>Selenastrum</i> 96-hr	NOEC (%)	100		50	100	100	100	100	100		50	50	100				
2013	<i>Strongylocentrotus</i> 96-hr	TST	Pass/Fail															

See last page for footnotes and source references.

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Long Term and Transitional Monitoring	Long Term Monitoring	Long Term and Transitional Monitoring	Long Term and Transitional Monitoring	Frequency Above Benchmarks	Mean Ratio to Benchmarks
					2013-2014			2014-2015		
					10/10/13	12/07/13-12/08/13	02/07/14	-		
Physical Chemistry										
2013	Dissolved Oxygen	mg/L	<5.0 (a)		5.58	8.89	5.47		0%	NA ¹
2007, 2013	pH	pH units	6.5-9.0	1. Basin Plan	7.64	7.63	7.48		0%	0.24
2007, 2013	Specific Conductivity	µmhos/cm	NA		4,854	2,450	5,107			
2007, 2013	Water Temperature	Celsius	NA		15.7	12.65	13.77			
2013	Color	Color units			50	25	30		100%	NA ¹
2007, 2013	Turbidity	NTU	20	1. Basin Plan	2.1	52.5	26.8		38%	1.18
Bacteriological										
2007, 2013	Enterococcus	MPN/100 mL	NA		330	28,000	490			
2007, 2013	Fecal Coliform	MPN/100 mL	4,000	1. Basin Plan REC-1/REC-2	330	17,000	<18		38%	3.57
2007, 2013	Total Coliform	MPN/100 mL	NA		7,900	110,000	13,000			
Nutrients										
2007, 2013	Ammonia as N	mg/L	(b)	6. USEPA Water Quality Criteria (Freshwater)	0.18	<0.10	<0.10		0%	0.01
2007, 2013	Nitrate as N	mg/L	10	1. Basin Plan	0.25	0.44	0.22		0%	0.07
2007, 2013	Nitrite as N	mg/L	1	1. Basin Plan	0.032J	<0.10	0.026J		0%	0.04
2007, 2013	Total Kjeldahl Nitrogen	mg/L	NA		0.7	0.54	0.67			
2007	Dissolved Phosphorus	mg/L	2	4. MSGP 2015	0.22	NR	0.11		0%	0.11
2013	Orthophosphate	mg/L	NA		0.18	0.13	0.11			
2007, 2013	Total Phosphorus	mg/L	2	4. MSGP 2015	0.23	0.16	0.13		0%	0.15
General Chemistry										
2007, 2013	Biochemical Oxygen Demand	mg/L	30	4. MSGP 2015, 8. McNeeley (1979)	<2.0	NR	6.2		12%	0.47
2007	Chemical Oxygen Demand	mg/L	120	4. MSGP 2015	36	NR	29		4%	0.52
2007, 2013	Dissolved Organic Carbon	mg/L	NA		9.8	8.6	6.6			
2007, 2013	Total Organic Carbon	mg/L	NA		9.8	8.2	6.4			
2007, 2013	Oil and Grease	mg/L	10	1. Basin Plan, 3. Anacostia River TMDL, 4. MSGP 2015	2.4J	NR	1.8J		4%	0.23
2013	Sulfate	mg/L	500 (a)	1. Basin Plan	430	210	420		0%	NA ¹
2007, 2013	Surfactants (MBAS)	mg/L	0.5	1. Basin Plan	0.096	0.1	0.084		0%	0.36
2007, 2013	Total Dissolved Solids	mg/L	1,500 (a)	1. Basin Plan	3,000	2,800	2,900		77%	1.40
2007, 2013	Total Suspended Solids	mg/L	100	4. MSGP 2015, 1. Basin Plan	28	13	4		8%	0.30
2007, 2013	Total Hardness	mg CaCO ₃ /L	NA		1,240	1,150	1,260			
Total Metals										
2013	Aluminum	mg/L	NA		0.88	0.39	0.033			
2007	Antimony	mg/L	NA		0.0006	NR	0.00021J			
2007, 2013	Arsenic	mg/L	NA		0.0016	0.0016	0.0014			
2007, 2013	Cadmium	mg/L	NA		0.000070J	0.000040J	0.000028J			
2007, 2013	Chromium	mg/L	NA		0.0016	0.0029	0.00015J			
2007, 2013	Copper	mg/L	NA		0.007	0.0052	0.0012			
2013	Iron	mg/L	0.3 (a)	1. Basin Plan	1.3	0.63	0.1		67%	NA ¹
2007, 2013	Lead	mg/L	NA		0.0022	0.0011	0.000089J			
2013	Manganese	mg/L	0.05 (a)	1. Basin Plan	0.16	0.12	0.14		100%	NA ¹
2013	Mercury	mg/L	NA		<0.000050	0.000032J	<0.000050			
2007, 2013	Nickel	mg/L	NA		0.002	0.0079	0.006			
2007, 2013	Selenium	mg/L	0.005	16. 40 CFR 131.38	0.00022J	0.00082	0.0023		0%	0.35
2013	Thallium	mg/L	NA		<0.00020	<0.00020	<0.00020			
2007, 2013	Zinc	mg/L	NA		0.029	0.014	0.0033J			
Dissolved Metals										
2013	Aluminum	mg/L	NA		0.0025J	<0.0050	<0.0050			
2007	Antimony	mg/L	0.006	1. Basin Plan	0.00026J	NR	0.00022J		0%	0.29
2007, 2013	Arsenic	mg/L	0.34	16. 40 CFR 131.38	0.0013	0.0015	0.0013		0%	0.01
2007, 2013	Cadmium	mg/L	(c)	16. 40 CFR 131.38	0.000050J	0.000027J	0.000028J		0%	0.02
2007, 2013	Chromium	mg/L	(c)	16. 40 CFR 131.38	0.00063	0.0022	0.00014J		0%	0.00
2007, 2013	Copper	mg/L	(c)	16. 40 CFR 131.38	0.0038	0.0036	0.0017		0%	0.09
2013	Iron	mg/L	NA		<0.010	<0.010	0.01			
2007, 2013	Lead	mg/L	(c)	16. 40 CFR 131.38	<0.00020	<0.00020	<0.00020		0%	0.00
2013	Manganese	mg/L	NA		0.0018	0.001	0.11			
2013	Mercury	mg/L	NA		<0.000050	0.000030J	<0.000050			
2007, 2013	Nickel	mg/L	(c)	16. 40 CFR 131.38	0.0015	0.0071	0.0074		0%	0.00
2007, 2013	Selenium	mg/L	NA		0.00021J	0.00076	0.0018			
2013	Thallium	mg/L	NA		<0.00020	<0.00020	<0.00020			
2007, 2013	Zinc	mg/L	(c)	16. 40 CFR 131.38	0.013	0.005	0.0042J		0%	0.04

No Sample Collected

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Long Term and Transitional Monitoring	Long Term Monitoring	Long Term and Transitional Monitoring	Long Term and Transitional Monitoring	Frequency Above Benchmarks	Mean Ratio to Benchmarks	
					2013-2014			2014-2015			
					10/10/13	12/07/13-12/08/13	02/07/14	-			
Chlorinated Pesticides											
2013	Chlordane (tech)	ug/L	2.4	16. 40 CFR 131.38	<0.10	<0.10	<0.10		0%	NA ¹	
Organophosphorus Pesticides											
2013	Azinphos methyl (Guthion)	µg/L	NA		<0.010	<0.010	<0.010	No Sample Collected			
2013	Bolstar	µg/L	NA		<0.010	<0.010	<0.010				
2007, 2013	Chlorpyrifos	µg/L	0.02 acute / 0.014 chronic	12. CA Dept. of Fish & Game, 2000	<0.010	<0.010	<0.010			13%	0.50
2013	Coumaphos	µg/L	NA		<0.010	<0.010	<0.010				
2013	Demeton-o	µg/L	NA		<0.010	<0.010BS-L	<0.010				
2013	Demeton-s	µg/L	NA		<0.010	<0.010BS-L	<0.010				
2007, 2013	Diazinon	µg/L	0.08 acute / 0.05 chronic	12. CA Dept. of Fish & Game, 2000, 11. Chollas Creek TMDL for Diazinon, 10. USEPA, Aquatic Life Ambient Water Quality Criteria Diazinon	<0.010	<0.010	<0.010			23%	0.57
2013	Dichlorvos	µg/L	NA		<0.010	<0.010	<0.010				
2013	Dimethoate	µg/L	NA		<0.010	<0.010	<0.010				
2013	Disulfoton	µg/L	NA		<0.010	<0.010BS-L	<0.010				
2013	Ethoprop	µg/L	NA		<0.010	<0.010	<0.010				
2013	Ethyl parathion	µg/L	NA		<0.010	<0.010	<0.010				
2013	Fensulfothion	µg/L	NA		<0.010	<0.010	<0.010				
2013	Fenthion	µg/L	NA		<0.010	<0.010	<0.010				
2007, 2013	Malathion	µg/L	0.43	13. CA Dept. of Fish & Game, 1998, 5. Goldbook	<0.010	<0.010	<0.010			0%	0.11
2013	Merphos	µg/L	NA		<0.010	<0.010	<0.010				
2013	Methyl parathion	µg/L	NA		<0.010	<0.010	<0.010				
2013	Mevinphos	µg/L	NA		<0.010	<0.010	<0.010				
2013	Naled	µg/L	NA		<0.010BS-L	<0.010BS-L	<0.010				
2013	Phorate	µg/L	NA		<0.010	<0.010	<0.010				
2013	Ronnel	µg/L	NA		<0.010	<0.010	<0.010				
2013	Stirophos	µg/L	NA		<0.010	<0.010	<0.010				
2013	Tokuthion (Prothiofos)	µg/L	NA		<0.010	<0.010	<0.010				
2013	Trichloronate	µg/L	NA		<0.010	<0.010	<0.010				
PCB Congeners											
2013	PCB-8	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-18	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-28	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-44	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-52	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-66	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-77	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-81	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-101	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-105	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-114	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-118	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-123	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-126	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-128	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-138	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-153	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-156	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-157	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-167	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-169	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-170	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-180	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-187	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-189	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-195	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-206	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	
2013	PCB-209	µg/L	0.014 (d)	16. 40 CFR 131.38	<0.010	<0.010	<0.010		0%	NA ¹	

Wet Weather Historical Monitoring Table for SR-MLS

Permit Requirement	Analyte	Units	Water Quality Benchmarks	Benchmark Reference	Long Term and Transitional Monitoring	Long Term Monitoring	Long Term and Transitional Monitoring	Long Term and Transitional Monitoring	Frequency Above Benchmarks	Mean Ratio to Benchmarks
					2013-2014			2014-2015		
					10/10/13	12/07/13-12/08/13	02/07/14	-		
Polynuclear Aromatic Hydrocarbons										
2013	1-Methylnaphthalene	µg/L	NA		<0.10	<0.10	<0.10			
2013	1-Methylphenanthrene	µg/L	NA		<0.10	<0.10	<0.10			
2013	2,6-Dimethylnaphthalene	µg/L	NA		<0.10	<0.10	<0.10			
2013	2-Methylnaphthalene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Acenaphthene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Acenaphthylene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Anthracene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Benzo (a) anthracene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Benzo (a) pyrene	µg/L	NA		<0.10BS-L	<0.10	<0.10			
2013	Benzo (b) fluoranthene	µg/L	NA		<0.10BS-L	<0.10	<0.10			
2013	Benzo (e) pyrene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Benzo (g,h,i) perylene	µg/L	NA		<0.10BS-L	<0.10	<0.10			
2013	Benzo (k) fluoranthene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Biphenyl	µg/L	NA		<0.10	<0.10	<0.10			
2013	Chrysene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Dibenzo (a,h) anthracene	µg/L	NA		<0.10BS-L	<0.10	<0.10			
2013	Fluoranthene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Fluorene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Indeno (1,2,3-cd) pyrene	µg/L	NA		<0.10BS-L	<0.10BS-L	<0.10			
2013	Naphthalene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Perylene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Phenanthrene	µg/L	NA		<0.10	<0.10	<0.10			
2013	Pyrene	µg/L	NA		<0.10	<0.10	<0.10			
Pyrethroids										
2007, 2013	Allethrin	µg/L	NA		<0.002	<0.002	<0.002			
2007, 2013	Bifenthrin	µg/L	0.0093	15. Anderson et al., 2006	0.0021	0.0013J	<0.002		20%	1.01
2007, 2013	Cyfluthrin	µg/L	0.344	17. Wheelock et al., 2004	<0.002	<0.002	<0.002		0%	0.02
2007, 2013	Cyhalothrin, Total Lambda	µg/L	0.20	17. Wheelock et al., 2004	0.001J	<0.002	<0.002		0%	0.06
2007, 2013	Cypermethrin	µg/L	0.683	17. Wheelock et al., 2004	<0.002	<0.002	<0.002		0%	0.00
2007, 2013	Danitol (Fenpropathrin)	µg/L	NA		<0.002	<0.002	<0.002			
2007, 2013	Deltamethrin/Tralomethrin ^E	µg/L	NA		<0.002	<0.002	<0.002			
2007, 2013	Esfenvalerate	µg/L	0.25	17. Wheelock et al., 2004	<0.002	<0.002	<0.002		0%	0.00
2007, 2013	Fenvalerate	µg/L	NA		<0.002	<0.002	<0.002			
2007, 2013	Fluvalinate	µg/L	NA		<0.002	<0.002	<0.002			
2007, 2013	Permethrin	µg/L	0.021	15. Anderson et al., 2006	<0.01	<0.01	<0.01		0%	0.21
2007, 2013	Prallethrin	µg/L	NA		<0.002	<0.002	<0.002			
2007, 2013	Resmethrin	µg/L	NA		<0.01	<0.01	<0.01			
Toxicity										
2007, 2013	<i>Ceriodaphnia</i> 96-hr	LC ₅₀ (%)	>100		>100	NR	>100		13%	1.05
2007, 2013	<i>Ceriodaphnia</i> 7-day survival	NOEC (%)	100		100	NR	100		13%	1.30
2007, 2013	<i>Ceriodaphnia</i> 7-day reproduction	NOEC (%)	100		50	NR	50		39%	2.26
2007	<i>Hyalella</i> 96-hr	LC ₅₀ (%)	>100		>100	NR	>100		0%	1.00
2007, 2013	<i>Selenastrum</i> 96-hr	NOEC (%)	100		50	NR	25		48%	1.83
2013	<i>Strongylocentrotus</i> 96-hr	TST	Pass/Fail		Pass	Pass	Pass		0%	

No Sample Collected

See last page for footnotes and source references.

Wet Weather Historical Monitoring Table for SR-MLS

Blank spaces have been verified and no data is available.

(a) Water Quality Benchmark are based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before April 4, 2011).

(b) Prior to the 2014-2015 monitoring year, Water Quality Benchmark was calculated based on CMC (salmonids absent) using pH described in the U.S. EPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999. For 2014-2015 monitoring year, Water Quality Benchmark CMC was calculated based on pH and water temperature (when applicable) as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.

(c) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000. The Criteria Maximum Concentration (CMC) was used.

(d) Water Quality Benchmark for PCBs is the Criteria Continuous Concentration (CCC) was used (USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000). There is no Criteria Maximum Concentration (CMC) for PCBs.

NA indicate no criteria or published value was available or applicable to the matrix or program.

* Indicates detection limit above water quality benchmark.

† Result was from composite sample. The grab sample was analyzed outside of the holding time.

£ Historical results for Deltamethrin/Tralomethrin contain results reported by lab as Deltamethrin.

†† Permethrin was non-detect at the method detection limit of 0.005 µg/L.

B-Analyte was detected in the associated method blank.

BS-L-Blank Spike recovery of this analyte was below the control limits. Results may be biased low.

H-Sample received and or/analyzed past the recommended holding time.

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

NA¹ Three or more years of data required to calculate the Mean Ratio to Benchmark.

NR-Sampling of this analyte not required for transitional monitoring (RWQCB Order No. R9-2007-0001) and/or for long term monitoring (RWQCB Order No. R9-2013-0001).

Values with **red bold font and shading** do not meet Water Quality Benchmarks.

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources in Attachment B to Appendix A for benchmark source citations.

LabSampleID	StationCode	EventCode	ProtocolCode	LocationCode	SampleDate	CollectionTime	CollectionMethodCode	SampleTypeCode	Replicate	CollectionDepth	UnitCollectionDepth	ProjectCode	AgencyCode	CollectionComments	SampleID	PreparationPreservation	PreparationPreservationDate	DigestExtractMethod	DigestExtractDate
954525-002	909SWT01	WQ	Not Recorded	Not Recorded	04/May/2006	11:20	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1806	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-005	909SWT01	WQ	Not Recorded	Not Recorded	19/Jul/2007	12:40	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2120	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-003	909SWT01	WQ	Not Recorded	Not Recorded	28/Jul/2008	11:15	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2455	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-002	909SWT01	WQ	Not Recorded	Not Recorded	04/Jun/2009	10:10	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2637	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
954525-002	909SWT01	WQ	Not Recorded	Not Recorded	04/May/2006	11:20	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1806	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-005	909SWT01	WQ	Not Recorded	Not Recorded	19/Jul/2007	12:40	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2120	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-003	909SWT01	WQ	Not Recorded	Not Recorded	28/Jul/2008	11:15	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2455	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-002	909SWT01	WQ	Not Recorded	Not Recorded	04/Jun/2009	10:10	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2637	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
0505289-05	909SWT02	WQ	Not Recorded	Not Recorded	19/May/2005	11:40	Water_Grab	grab	1	0.1	m	JDWM-2005	COSD_WPP		1324	Not Recorded	01/Jan/1950	EPA 3520B	22/May/2005
954525-004	909SWT02	WQ	Not Recorded	Not Recorded	04/May/2006	12:30	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1808	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-004	909SWT02	WQ	Not Recorded	Not Recorded	19/Jul/2007	11:45	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2119	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-004	909SWT02	WQ	Not Recorded	Not Recorded	28/Jul/2008	11:45	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2456	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-003	909SWT02	WQ	Not Recorded	Not Recorded	04/Jun/2009	11:00	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2638	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
0505289-05	909SWT02	WQ	Not Recorded	Not Recorded	19/May/2005	11:40	Water_Grab	grab	1	0.1	m	JDWM-2005	COSD_WPP		1324	Not Recorded	01/Jan/1950	EPA 3520B	22/May/2005
954525-004	909SWT02	WQ	Not Recorded	Not Recorded	04/May/2006	12:30	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1808	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-004	909SWT02	WQ	Not Recorded	Not Recorded	19/Jul/2007	11:45	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2119	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-004	909SWT02	WQ	Not Recorded	Not Recorded	28/Jul/2008	11:45	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2456	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-003	909SWT02	WQ	Not Recorded	Not Recorded	04/Jun/2009	11:00	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2638	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
954525-001	909SWT03	WQ	Not Recorded	Not Recorded	04/May/2006	10:50	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1805	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-001	909SWT03	WQ	Not Recorded	Not Recorded	19/Jul/2007	10:10	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2116	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
967987-002	909SWT03	WQ	Not Recorded	Not Recorded	19/Jul/2007	10:15	Water_Grab	FieldBLDup	2	0.1	m	JDWM-2007	COSD_WPP		2117	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-001	909SWT03	WQ	Not Recorded	Not Recorded	28/Jul/2008	10:15	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2453	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
977450-002	909SWT03	WQ	Not Recorded	Not Recorded	28/Jul/2008	10:20	Water_Grab	FieldBLDup	2	0.1	m	JDWM-2008	COSD_WPP		2454	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-001	909SWT03	WQ	Not Recorded	Not Recorded	04/Jun/2009	9:45	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2636	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
954525-001	909SWT03	WQ	Not Recorded	Not Recorded	04/May/2006	10:50	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1805	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-001	909SWT03	WQ	Not Recorded	Not Recorded	19/Jul/2007	10:10	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2116	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
967987-002	909SWT03	WQ	Not Recorded	Not Recorded	19/Jul/2007	10:15	Water_Grab	FieldBLDup	2	0.1	m	JDWM-2007	COSD_WPP		2117	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007

LabSampleID	StationCode	EventCode	ProtocolCode	LocationCode	SampleDate	CollectionTime	CollectionMethodCode	SampleTypeCode	Replicate	CollectionDepth	UnitCollectionDepth	ProjectCode	AgencyCode	CollectionComments	SampleID	PreparationPreservation	PreparationPreservationDate	DigestExtractMethod	DigestExtractDate
977450-001	909SWT03	WQ	Not Recorded	Not Recorded	28/Jul/2008	10:15	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2453	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
977450-002	909SWT03	WQ	Not Recorded	Not Recorded	28/Jul/2008	10:20	Water_Grab	FieldBLDup	2	0.1	m	JDWM-2008	COSD_WPP		2454	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-001	909SWT03	WQ	Not Recorded	Not Recorded	04/Jun/2009	9:45	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2636	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
0505289-03	909SWT05	WQ	Not Recorded	Not Recorded	19/May/2005	11:05	Water_Grab	FieldBLDup	2	0.1	m	JDWM-2005	COSD_WPP		1323	Not Recorded	01/Jan/1950	EPA 3520B	22/May/2005
954525-003	909SWT05	WQ	Not Recorded	Not Recorded	04/May/2006	12:00	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1807	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-003	909SWT05	WQ	Not Recorded	Not Recorded	19/Jul/2007	11:15	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2118	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-005	909SWT05	WQ	Not Recorded	Not Recorded	28/Jul/2008	12:30	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2457	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-004	909SWT05	WQ	Not Recorded	Not Recorded	04/Jun/2009	11:35	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2639	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009
0505289-03	909SWT05	WQ	Not Recorded	Not Recorded	19/May/2005	11:05	Water_Grab	FieldBLDup	2	0.1	m	JDWM-2005	COSD_WPP		1323	Not Recorded	01/Jan/1950	EPA 3520B	22/May/2005
954525-003	909SWT05	WQ	Not Recorded	Not Recorded	04/May/2006	12:00	Water_Grab	grab	1	0.1	m	JDWM-2006	COSD_WPP		1807	Not Recorded	01/Jan/1950	Not Recorded	15/May/2006
967987-003	909SWT05	WQ	Not Recorded	Not Recorded	19/Jul/2007	11:15	Water_Grab	grab	1	0.1	m	JDWM-2007	COSD_WPP		2118	Not Recorded	01/Jan/1950	Not Recorded	28/Jul/2007
977450-005	909SWT05	WQ	Not Recorded	Not Recorded	28/Jul/2008	12:30	Water_Grab	grab	1	0.1	m	JDWM-2008	COSD_WPP		2457	Not Recorded	01/Jan/1950	Not Recorded	31/Jul/2008
983663-004	909SWT05	WQ	Not Recorded	Not Recorded	04/Jun/2009	11:35	Water_Grab	grab	1	0.1	m	JDWM-2009	COSD_WPP		2639	Not Recorded	01/Jan/1950	Not Recorded	10/Jun/2009

LabSampleID	StationCode	LabBatch	AnalysisDate	LabReplicate	MatrixName	MethodName	AnalyteName	FractionName	Unit	DilFactor	Result	ResultQualCode	MDL	RL	QA Code	ExpectedValue	LabResultComments
954525-002	909SWT01	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
967987-005	909SWT01	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
977450-003	909SWT01	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
983663-002	909SWT01	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
954525-002	909SWT01	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
967987-005	909SWT01	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
977450-003	909SWT01	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
983663-002	909SWT01	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
0505289-05	909SWT02	EMA_5052201_W_OP	23/May/2005	1	Samplewater	EPA 8141A	Chlorpyrifos	None	ug/l	1	-88 ND	0.04	0.05	None			
954525-004	909SWT02	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
967987-004	909SWT02	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
977450-004	909SWT02	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
983663-003	909SWT02	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
0505289-05	909SWT02	EMA_5052201_W_OP	23/May/2005	1	Samplewater	EPA 8141A	Diazinon	None	ug/l	1	-88 ND	0.04	0.05	None			
954525-004	909SWT02	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
967987-004	909SWT02	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
977450-004	909SWT02	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
983663-003	909SWT02	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
954525-001	909SWT03	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
967987-001	909SWT03	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
967987-002	909SWT03	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
977450-001	909SWT03	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
977450-002	909SWT03	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
983663-001	909SWT03	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
954525-001	909SWT03	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
967987-001	909SWT03	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
967987-002	909SWT03	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			

LabSampleID	StationCode	LabBatch	AnalysisDate	LabReplicate	MatrixName	MethodName	AnalyteName	FractionName	Unit	DilFactor	Result	ResultQualCode	MDL	RL	QA Code	ExpectedValue	LabResultComments
977450-001	909SWT03	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
977450-002	909SWT03	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
983663-001	909SWT03	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
0505289-03	909SWT05	EMA_5052201_W_OP	23/May/2005	1	Samplewater	EPA 8141A	Chlorpyrifos	None	ug/l	1	-88 ND	0.04	0.05	None			
954525-003	909SWT05	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
967987-003	909SWT05	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
977450-005	909SWT05	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
983663-004	909SWT05	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Chlorpyrifos	None	ug/L	1	-88 ND	0.0076	0.05	None			
0505289-03	909SWT05	EMA_5052201_W_OP	23/May/2005	1	Samplewater	EPA 8141A	Diazinon	None	ug/l	1	-88 ND	0.04	0.05	None			
954525-003	909SWT05	TRU_705844_W_OP	15/May/2006	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
967987-003	909SWT05	TRU_706800_W_OP	28/Jul/2007	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
977450-005	909SWT05	TRU_707617_W_OP	31/Jul/2008	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			
983663-004	909SWT05	TRU_708235_W_OP	10/Jun/2009	1	Samplewater	EPA 8081AM	Diazinon	None	ug/L	1	-88 ND	0.0072	0.05	None			

Paradise Creek (HSA 908.32) Selenium Data

StationCode	SampleDate	CollectionTime	CollectionMethodCode	SampleTypeCode	Replicate	CollectionDepth	UnitCollectionDepth	LabCollectionComments	LabBatch	AnalysisDate	MatrixName	MethodName	AnalyteName	FractionName	UnitName	LabReplicate	Result	ResQualCode	MDL	RL	QACode
KP-4	1/24/2014	11:10	Water_Grab	Grab	1	-88 cm			4012919	1/29/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2	1/24/2014	10:30	Water_Grab	Grab	1	-88 cm			4012919	1/29/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-3	1/24/2014	10:55	Water_Grab	Grab	1	-88 cm			4012919	1/29/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2	2/13/2014	16:00	Water_Grab	Grab	1	-88 cm		Field dup collected	4022029	2/20/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2	2/13/2014	15:55	Water_Grab	Grab	2	-88 cm			4022029	2/20/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-3	2/13/2014	15:30	Water_Grab	Grab	1	-88 cm			4022029	2/20/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	1.34 =		0.5	1	None
KP-4	2/13/2014	15:20	Water_Grab	Grab	1	-88 cm			4022029	2/20/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.99 DNQ		0.5	1	JDL
KP-3	2/27/2014	8:25	Water_Grab	Grab	1	-88 cm			4030529	3/6/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	2/27/2014	8:10	Water_Grab	Grab	1	-88 cm			4030529	3/6/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.1	3/10/2014	12:45	Water_Grab	Grab	1	-88 cm			4031755	3/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.2	3/10/2014	12:30	Water_Grab	Grab	1	-88 cm			4031755	3/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-3	3/10/2014	12:20	Water_Grab	Grab	1	-88 cm			4031755	3/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	3/10/2014	12:10	Water_Grab	Grab	1	-88 cm			4031755	3/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2	3/10/2014	12:55	Water_Grab	Grab	1	-88 cm			4031755	3/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	3/25/2014	11:00	Water_Grab	Grab	1	-88 cm			4033028	3/31/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2	3/25/2014	11:40	Water_Grab	Grab	1	-88 cm			4033028	3/31/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-3	3/25/2014	11:15	Water_Grab	Grab	1	-88 cm			4033028	3/31/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.1	3/25/2014	11:35	Water_Grab	Grab	1	-88 cm			4033028	3/31/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.2	3/25/2014	11:25	Water_Grab	Grab	1	-88 cm			4033028	3/31/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-3	4/2/2014	9:50	Water_Grab	Grab	1	-88 cm			4040820	4/9/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	4/2/2014	10:05	Water_Grab	Grab	1	-88 cm			4040820	4/9/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.2	4/2/2014	9:32	Water_Grab	Grab	1	-88 cm			4040820	4/9/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.1	4/2/2014	9:15	Water_Grab	Grab	1	-88 cm			4040820	4/9/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-3	4/29/2014	15:25	Water_Grab	Grab	1	-88 cm			4050523	5/5/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.63 DNQ		0.5	1	JDL
KP-4	4/29/2014	15:10	Water_Grab	Grab	1	-88 cm			4050523	5/5/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.69 DNQ		0.5	1	JDL
KP-2.2	4/29/2014	15:35	Water_Grab	Grab	1	-88 cm			4050523	5/5/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.89 DNQ		0.5	1	JDL
KP-2.1	4/29/2014	15:50	Water_Grab	Grab	1	-88 cm			4050523	5/5/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.77 DNQ		0.5	1	JDL
KP-2	4/29/2014	16:10	Water_Grab	Grab	1	-88 cm			4050523	5/5/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.71 DNQ		0.5	1	JDL
KP-2.1	5/22/2014	12:15	Water_Grab	Grab	1	-88 cm			4052304	5/27/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	5/22/2014	11:45	Water_Grab	Grab	1	-88 cm			4052304	5/27/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.86 DNQ		0.5	1	JDL
KP-3	5/22/2014	11:55	Water_Grab	Grab	1	-88 cm			4052304	5/27/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.79 DNQ		0.5	1	JDL
KP-2.2	5/22/2014	12:05	Water_Grab	Grab	1	-88 cm			4052304	5/27/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.51 DNQ		0.5	1	JDL
KP-2	5/22/2014	12:25	Water_Grab	Grab	1	-88 cm			4052304	5/27/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.52 DNQ		0.5	1	JDL
KP-4	6/4/2014	9:45	Water_Grab	Grab	1	-88 cm		Field dup collected	4060836	6/12/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	6/4/2014	9:50	Water_Grab	Grab	2	-88 cm			4060836	6/12/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2.1	6/4/2014	10:25	Water_Grab	Grab	1	-88 cm			4060836	6/12/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-2	6/4/2014	10:35	Water_Grab	Grab	1	-88 cm			4060836	6/12/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND		0.5	1	None
KP-4	6/12/2014	14:10	Water_Grab	Grab	1	-88 cm		Field dup collected	4061623	6/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.6 DNQ		0.5	1	JDL

StationCode	SampleDate	CollectionTime	CollectionMethodCode	SampleTypeCode	Replicate	CollectionDepth	UnitCollectionDepth	LabCollectionComments	LabBatch	AnalysisDate	MatrixName	MethodName	AnalyteName	FractionName	UnitName	LabReplicate	Result	ResQualCode	MDL	RL	QA Code
KP-4	6/12/2014	14:15	Water_Grab	Grab	2	-88 cm			4061623	6/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.51	DNQ	0.5	1	JDL
KP-3	6/12/2014	14:30	Water_Grab	Grab	1	-88 cm			4061623	6/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.65	DNQ	0.5	1	JDL
KP-2.2	6/12/2014	14:40	Water_Grab	Grab	1	-88 cm			4061623	6/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.96	DNQ	0.5	1	JDL
KP-2.1	6/12/2014	14:50	Water_Grab	Grab	1	-88 cm			4061623	6/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.63	DNQ	0.5	1	JDL
KP-2	6/12/2014	15:00	Water_Grab	Grab	1	-88 cm			4061623	6/17/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	0.62	DNQ	0.5	1	JDL
KP-4	6/20/2014	11:20	Water_Grab	Grab	1	-88 cm		Field dup collected	4062223	6/23/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	
KP-4	6/20/2014	11:25	Water_Grab	Grab	2	-88 cm			4062223	6/23/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	
KP-3	6/20/2014	11:35	Water_Grab	Grab	1	-88 cm			4062223	6/23/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	
KP-2.2	6/20/2014	11:45	Water_Grab	Grab	1	-88 cm			4062223	6/23/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	
KP-2.1	6/20/2014	12:05	Water_Grab	Grab	1	-88 cm			4062223	6/23/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	
KP-2	6/20/2014	12:20	Water_Grab	Grab	1	-88 cm			4062223	6/23/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	
KP-3	7/9/2014	13:25	Water_Grab	Grab	1	-88 cm			4071536	7/15/2014	samplewater	EPA 200.8	Selenium	Total	ug/L	1	ND	0.5	1	None	

CITY OF NATIONAL CITY

PARADISE CREEK SELENIUM MONITORING QUALITY ASSURANCE PROJECT PLAN



APRIL 2014

PREPARED FOR: CITY OF NATIONAL CITY
Engineering Department
1243 National City Boulevard
National City, CA 91950

PREPARED BY: D-MAX ENGINEERING, INC.
7220 Trade Street, Suite 119
San Diego, CA 92121
(858) 586-6600



GROUP A: PROJECT MANAGEMENT

1. APPROVAL SIGNATURES

<u>Title:</u>	<u>Name (Affiliation):</u>	<u>Signature:</u>	<u>Date:</u>
<u>Project Manager</u>	<u>Stephen Manganiello (City of National City)</u>	<u>_____</u>	<u>_____</u>
<u>D-MAX Project Manager</u>	<u>Arsalan Dadkhah (D-MAX Engineering, Inc.)</u>	<u>_____</u>	<u>_____</u>
<u>Project Quality Assurance (QA) Officer</u>	<u>John Quenzer (D-MAX Engineering, Inc.)</u>	<u>_____</u>	<u>_____</u>

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ABBREVIATIONS AND ACRONYMS

µg/L	micrograms per liter
°C	Degrees Celsius
Basin Plan	Water Quality Control Plan for the San Diego Basin
BMP	Best Management Practice
CI	Confidence Interval
City	City of National City
CRM	Certified Reference Materials
CWA	Clean Water Act
D-MAX	D-MAX Engineering, Inc.
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EMA	EnviroMatrix Analytical, Inc.
EPA	U.S. Environmental Protection Agency
FS	Functional Sensitivity
GIS	Geographic Information Systems
mg/L	Milligrams per Liter
mS/cm	Millisiemens per Centimeter
PDL	Practical Detection Limit
PT	Proficiency Test
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QAPrP	Quality Assurance Program Plan
RL	Reporting Limit
RPD	Relative Percent Difference
RWQCB	Regional Water Quality Control Board
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
WQO	Water Quality Objective

3. DISTRIBUTION LIST

<u>Title:</u>	<u>Name (Affiliation):</u>	<u>Telephone No.:</u>	<u>QAPP copies:</u>
Project Manager	Stephen Manganiello (City of National City)	(619) 336-4382	1
D-MAX Project Manager	Arsalan Dadkhah (D-MAX Engineering, Inc.)	(858) 586-6600 x.22	1

4. PROJECT/TASK ORGANIZATION

4.1 Involved Parties and Roles

Table 1. (Element 4) Personnel Responsibilities

Name	Organizational Affiliation	Title	Contact Information (Telephone number, email address)
Stephen Manganiello	City of National City	Project Manager	(619) 336-4382 smanganiello@nationalcityca.gov
Arsalan Dadkhah	D-MAX Engineering, Inc.	D-MAX Project Manager	(858) 586-6600 arsalan@dmmaxinc.com
John Quenzer	D-MAX Engineering, Inc.	QA Officer	(858) 586-6600 jqenzer@dmmaxinc.com
Brianna Martin	D-MAX Engineering, Inc.	Field Activities Coordinator	(858) 586-6600 bmartin@dmmaxinc.com
Jennifer Beyer	EnviroMatrix Analytical, Inc.	QA Director	(858) 560-7717 jbeyer@enviromatrixinc.com

4.2 Quality Assurance Officer Role

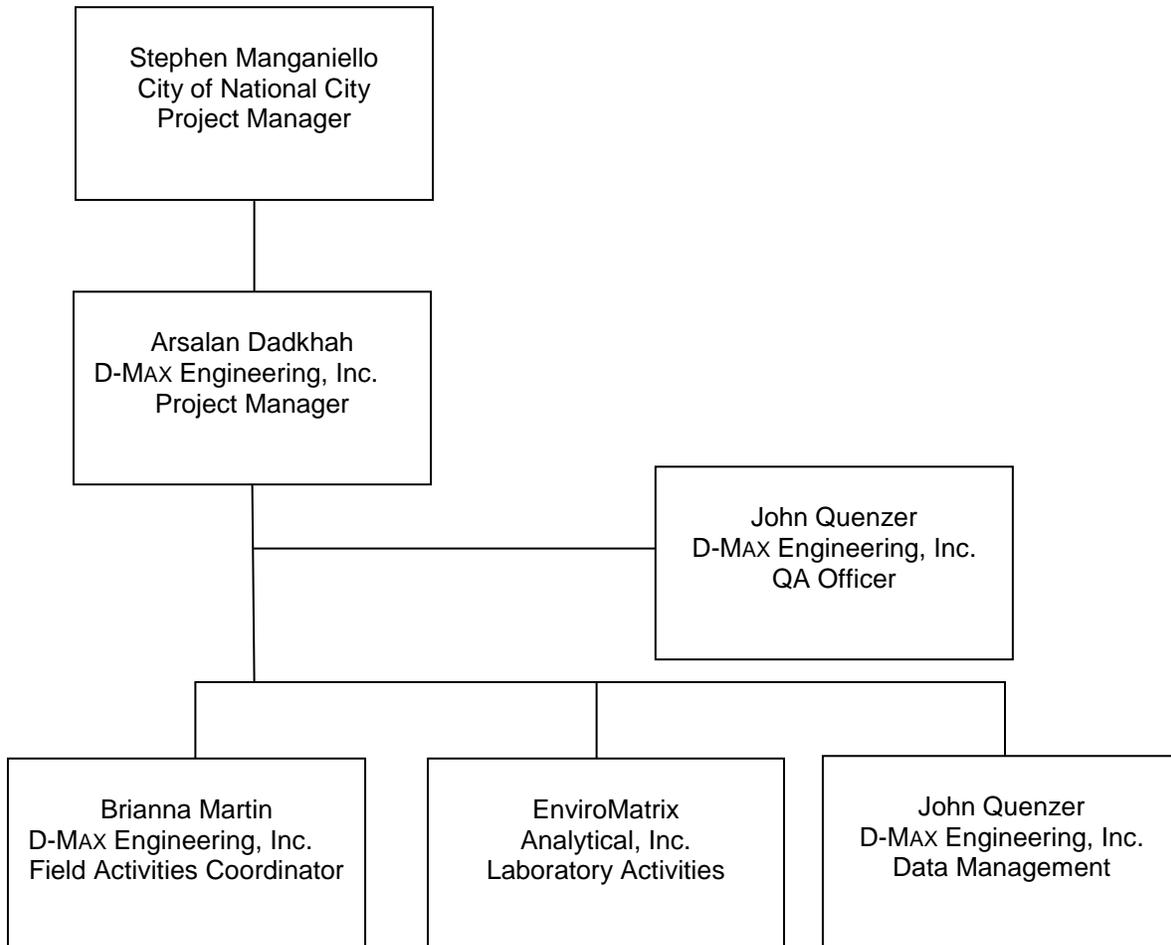
John Quenzer, with D-MAX Engineering, Inc. (D-MAX), will fill the role of the sampling QA Officer and is independent of data generation. This role will include maintaining the official, approved quality assurance and quality control (QA/QC) procedures found in this Quality Assurance Project Plan (QAPP) as part of the monitoring procedures. Mr. Quenzer will also work with Jennifer Beyer, the QA Director for EnviroMatrix Analytical, Inc. (EMA), by communicating all QA/QC issues contained in this QAPP to EMA.

4.3 Persons Responsible for QAPP Update and Maintenance

Changes and updates to this QAPP may be made after a review of the evidence for change by the City's Project Manager or by D-MAX's Project Manager.

4.4 Organizational Chart and Responsibilities

Figure 1. Organizational Chart



5. PROBLEM DEFINITION/BACKGROUND

5.1 Problem Statement

Paradise Creek is on the 2010 Clean Water Act (CWA) 303(d) list of impaired water bodies with a selenium impairment. The Surface Water Ambient Monitoring Program (SWAMP) data collected in 2005 and 2006 indicated selenium results exceeded the water quality objective (WQO) of 5 µg/L in four of four samples. Beneficial uses of Paradise Creek include warm freshwater habitat, wildlife habitat, and non-contact water recreation. Elevated selenium levels pose a threat to warm freshwater habitat. While no Total Maximum Daily Load has been established for Paradise Creek, this water body is of great importance to the City of National City (City) since it runs through the center of the city, directly through Kimball Park at City Hall. Paradise Creek is one of the few urban creeks within the Pueblo San Diego Watershed (908.32) that has not been completely channelized or undergrounded. Paradise Creek is also tributary to Paradise Marsh, which is part of the Sweetwater Marsh National Wildlife Refuge.

5.2 Decisions or Outcomes

The objective of Paradise Creek selenium monitoring is to collect additional selenium data in the portion of the creek adjacent to Kimball Park within the City that would support the removal of the selenium 303(d) listing in the future.

According to the State Water Resources Control Board's *Water Quality Control Policy for Developing California's CWA Section 303(d) List* (2004) for toxicants, the pollutant/water segment combinations should be removed from the 303(d) list if the WQOs or California/National Toxics Rule water quality criteria are not exceeded as follows:

- Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in the table below.
- The binomial distribution cannot be used to support a delisting with sample sizes less than 28.

TABLE 4.1: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR TOXICANTS.	
<i>Null Hypothesis: Actual exceedance proportion ≥ 18 percent.</i>	
<i>Alternate Hypothesis: Actual proportion < 3 percent of the samples</i>	
<i>The minimum effect size is 15 percent.</i>	
Sample Size	Delist if the number of exceedances equal or is less than
28 – 36	2
37 – 47	3
48 – 59	4
60 – 71	5
72 – 82	6
83 – 94	7
95 – 106	8
107 – 117	9
118 – 129	10

For sample sizes greater than 129, the maximum number of measured exceedances allowed is established where α and $\beta \leq 0.10$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.18, TRUE)

β = Excel® Function BINOMDIST(n-k-1, n, 1 - 0.03, TRUE)

where n = the number of samples,

k = maximum number of measured exceedances allowed,

0.03 = acceptable exceedance proportion, and

0.18 = unacceptable exceedance proportion.

5.3 Water Quality or Regulatory Criteria

This monitoring is not performed in response to any specific regulatory requirement. However, the water samples collected during storm events will be compared to the pertinent WQOs, as listed in the Water Quality Control Plan for the San Diego Basin 9 (Basin Plan).

6. PROJECT/TASK DESCRIPTION

6.1 Work Statement and Produced Products

Monitoring will be conducted between January and June 2014 at five sites during dry and wet weather to represent various conditions of the creek. The five monitoring sites selected for this project are described below in Table 2.

The sites selected for monitoring are presented in Table 2, below, and Figure 3 at the end of this section displays a map of the sampling locations.

Table 2. (Element 6) Monitoring Locations

Site	Location	Latitude	Longitude
KP-2	Paradise Creek, adjacent to Kimball Park, east of footbridge (approximately 175 feet), within depressed area of channel	32.67036	-117.10223
KP-2.1	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2	32.67068	-117.1022
KP-2.2	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2.1	32.67099	-117.10201
KP-3	Paradise Creek, adjacent to Kimball Park, approximately 125 feet west of D Ave parking lot	32.67128	-117.10172
KP-4	Paradise Creek, adjacent to Kimball Park, just downstream of three outlet pipes/culvert (upstream-most point of creek segment adjacent to Kimball Park)	32.67146	-117.10133

6.2 Constituents to be Monitored and Measurement Techniques

Specific conductance will be measured with field meters at each site during dry or wet weather sampling. Results will only be used as an indication of tidal influence from the San Diego Bay and will not be otherwise reported. Samples will not be collected if there is evidence of tidal water at the five monitoring locations. Samples collected at each monitoring site will be transported to EMA, a laboratory certified by the California Department of Health Services, and will be analyzed for total selenium.

6.3 Project Schedule

Note that the project timeline, as shown in Table 3 below, is subject to change, based on work scheduling constraints. D-MAX is responsible for providing data and other supporting documentation for the monitoring component of this project to the City of National City.

Table 2. (Element 6) Project Schedule Timeline

Activity	Date of Initiation	Anticipated Date of Completion	Deliverable	Deliverable Due Date
Wet and dry weather sampling	January 2014	June 2014	Final monitoring report	July 2014
Upload monitoring data to CEDEN	June 2014	July 2014	N/A	N/A

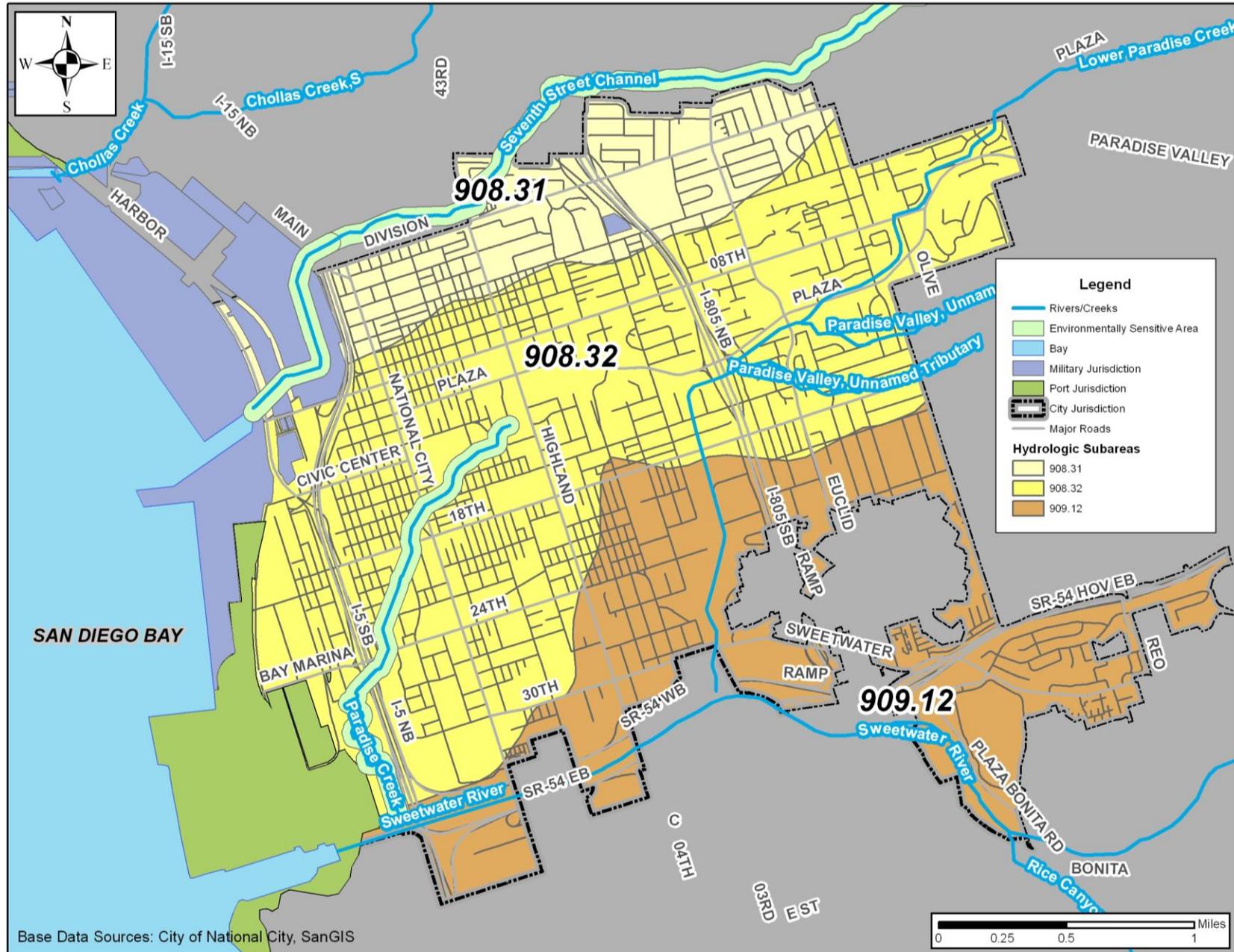
6.4 Geographical Setting

The City of National City is located within the San Diego Bay Watershed and constitutes approximately 1.6 percent of its total area. More specifically, the City is located within two sub-watersheds: Sweetwater Pueblo San Diego and Sweetwater, hydrologic units 908 and 909, respectively. The majority of the southern part of National City drains to the Sweetwater River and ultimately discharges into San Diego Bay. La Paleta Creek (also known as 7th Street Channel) drains the northern part of the City and also discharges into San Diego Bay, while a very small western portion of the City drains directly to the San Diego Bay shoreline. Almost all areas of the City that drain directly to San Diego Bay are within the San Diego Unified Port District. Lastly, the central portion of the City drains to Paradise Creek, a small salt marsh creek, which ultimately discharges into the Sweetwater River. See Figure 2 at the end of this section for a map of the hydrologic subareas encompassing the City of National City.

6.5 Constraints

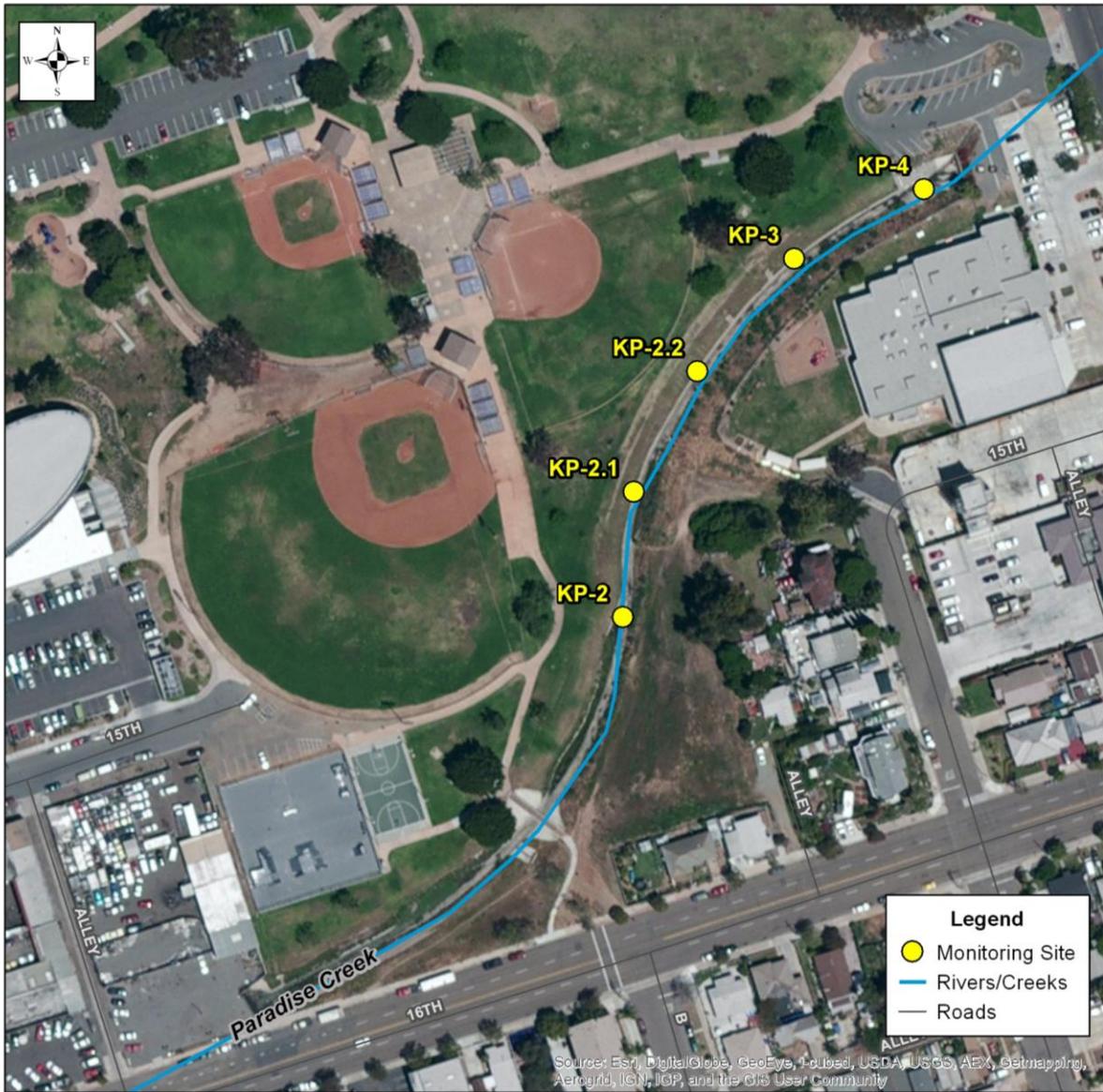
Constraints may include an abnormally dry wet season. In this case, wet weather sampling may not occur. Also, for safety purposes, wet weather sampling will be limited to daylight hours.

Figure 2. Watershed Map with Hydrologic Subareas



Base Data Sources: City of National City, SanGIS

Figure 3. Monitoring Locations Map



7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

7.1 Data Quality Indicators

Measurement or Analyses Type	Applicable Data Quality Indicators
Field Measurement, Conventional Analytes in Water	Accuracy, Comparability, Completeness, Precision, Representativeness, Sensitivity
Laboratory Analysis, Conventional Analytes in Water	Accuracy, Comparability, Completeness, Precision, Representativeness, Sensitivity

Attachment A includes in depth information about the laboratory assessments and controls for each data quality indicator.

Accuracy measures how close results are to a true or expected value. All instruments will be calibrated according to manufacturer instructions.

Bias is the misrepresentation of a set of data that systematically or persistently skews that data. These will be minimized through routine inspection and calibration of the automatic sampler and flow meter and duplicate samples will be collected at a rate of 5% for quality assurance.

Comparability is the extent to which data can be compared between periods of time within the project or between projects. To ensure comparability within and between years, monitoring conducted as part of this project will use the standardized sampling methods, analytical methods, and units of reporting described in this document.

Completeness is the difference between the planned amount of samples and data and the actual amount collected.

Precision is the degree of agreement among repeated measurements of the same characteristic.

Representativeness is the extent to which measurements actually represent the true condition at the time of sample collection.

Sensitivity is the capability of a method or instrument to discriminate between different levels of the variable of interest. Method sensitivity is dealt with by the inclusion of the required Surface Water Ambient Monitoring Program (SWAMP) Target Reporting Limits, where such values exist.

EMA will retain all QA/QC records for laboratory analyses and D-MAX will retain all QA/QC records for field measurements, including field duplicates of laboratory analyses.

7.2 Field and Laboratory Measurement Quality Objectives Tables

Table 3. (Element 7) Measurement Quality Objectives for Field Data

Group	Parameter	Accuracy	Precision	Recovery	Target Reporting Limit	Completeness
Field Measurement, Conventional Analytes in Water	Specific Conductivity (mS/cm)	± 2% of functional sensitivity 1% & 2% of range	± 2% of functional sensitivity 1% & 2% of range	N/A	0.01 mS/cm	No SWAMP requirement; will use 90%

Notes: Specific conductance will be measured with field meters at each site during dry or wet weather sampling, however, results will only be used as an indication of tidal influence from the San Diego Bay and will not be otherwise reported. FS = functional sensitivity; mS/cm = millisiemens per centimeter.

Table 4. (Element 7) Measurement Quality Objectives for Laboratory Data¹

Group	Parameter	Accuracy	Precision	Recovery	Minimum Detection Limit	Target Reporting Limit	Completeness
Laboratory Analysis, Conventional Analytes in Water	Total selenium	Standard Reference Materials (SRM, CRM, PT) within 95% CI stated by provider of material	Laboratory duplicate 20% RPD.	Matrix spike 80% - 120%	0.5 µg/L	1.0 µg/L*	90%

Notes:

¹ Information in this table is based on SWAMP QAPrP 2013.

SRM= standard reference materials; CRM = certified reference materials; PT = proficiency test; CI = confidence interval; RPD = relative percent difference; µg/L = micrograms per Liter.

*Although the SWAMP target reporting limit is 0.30 µg/L for selenium, the lowest reporting limit EMA is capable of reliably achieving is 1.0 µg/L. Because the WQO for selenium is 5 µg/L, five times higher than the lab's minimum reporting limit and 10 times higher than the lab's MDL, this project's target reporting limit and minimum detection limit will be suitable for achieving the goals of this project.

8. SPECIAL TRAINING/CERTIFICATIONS

8.1 Specialized Training or Certifications

All D-MAX staff members performing sampling are trained in proper sampling techniques under the supervision of project field managers. Training includes a review of the SWAMP standard operating procedures (SOPs) for field measurements and sample collection, detailed information on filling sample bottles for the various types of analysis, handling and storage, chain of custody procedures, GPS use, and sample site confirmation.

All laboratory analysis will be conducted by EMA, certified through the Environmental Laboratory Accreditation Program (ELAP #2564) of the California Department of Public Health (formerly the Department of Health Services, or DOHS). Details of EMA's training are discussed in Section 4 of their internal QA/QC plan and are available in Attachment A of this report.

8.2 Training and Certification Documentation

Documentation of field personnel training is maintained at D-MAX Engineering, Inc. Documentation of laboratory certification can be found in the EMA QA/QC plan, available from the laboratory upon request.

8.3 Training Personnel

There are no training personnel applicable to this project.

Table 5. (Element 8) Specialized Personnel Training or Certification

Specialized Training Course Title or Description	Training Provider	Personnel Receiving Training/ Organizational Affiliation	Location of Records & Certificates
Laboratory certification	California ELAP	EnviroMatrix Analytical, Inc.	Lab QA/QC document (Attachment A)

9. DOCUMENTATION AND RECORDS

D-MAX Engineering, Inc. will maintain all records for the field and laboratory sample analyses. Samples sent to EMA are accompanied by a chain of custody form. The laboratory generates records for sample receipt and storage, analyses, and reporting. The results of the laboratory analyses are transmitted to D-MAX in electronic form.

D-MAX will record all of the sampling data in an electronic database compatible with the SWAMP information management standards. Laboratory analytical reports will also be saved electronically as pdf and Excel files. All field and laboratory electronic files will be backed up within the D-MAX server continuously.

Records of field test results and observations, laboratory analytical reports, sampling locations and GPS coordinates, and photographs of sampling locations will be provided by D-MAX. Electronic and hard copies of this information will be available.

An electronic or hard copy of this QAPP and any updates made to the plan will be distributed to all parties involved. See Section 3 – Distribution List.

Table 6. (Element 9) Document and Record Retention, Archival, and Disposition Information

Records	Identify Type Needed	Retention	Archival	Disposition
Sample Collection Records	Field datasheets	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
	Chain of custody forms	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
Field Records	Field datasheets	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
	Site photographs	Electronic (.jpg)	Hard disk	5 years
Analytical Records	Laboratory reports	Electronic (.pdf)	Hard disk	5 years
	Chain of custody forms	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
Data Records	Analytical data	Electronic (.mdb or .xls)	Hard disk	5 years
	Field datasheets	Paper, Electronic (.pdf)	Hard disk	5 years
Assessment Records	Calibration log sheets	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
Data Analysis & Reports	Analysis of data	Electronic	Hard disk	5 years
	Monitoring reports	Electronic (.pdf)	Hard disk	5 years

GROUP B: DATA GENERATION AND ACQUISITION

10. SAMPLING PROCESS DESIGN

Approximately 50 grab samples will be collected by field personnel between January and June 2014, during dry and wet weather to represent various conditions of the creek. Since four samples collected from Paradise Creek have exceeded the WQO in the past, at least 48 samples must have selenium values below the WQO in order to remove the Paradise Creek from the CWA 303(d) list, according to the SWRCB's Water Quality Control Policy for Developing California's CWA Section 303(d) List.

Because Paradise Creek is tidally influenced, samples will only be collected at low tide to avoid sampling of seawater. Based on recent monitoring of low and high tide conditions of the creek, it is known that tidal influence is typically a major source of water at the lower end of the creek segment in question. Seawater has elevated conductivity and salinity that may interfere with the laboratory selenium testing, which would require sample dilution and therefore higher reporting limits. Higher reporting limits may result in data that is not useful for the stated purposes of this study. A tentative specific conductivity limit of 12 mS/cm has been set as a threshold for deciding whether collected samples should be submitted for laboratory analysis. Samples with conductivity values above this threshold will not be submitted for analysis due to a high possibility that significant dilution will be required, and the resultant data will not meet the selenium target reporting limit for this study.

11. SAMPLING METHODS

Field method SOPs are based on *Standard Operating Procedures for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP* (2007), SOP Procedure Number 1.0.

At each site visit, measurements of specific conductance will be performed once from a grab sample. These measurements will be taken in-situ, where feasible, otherwise a clean sample container, rinsed with distilled water and sample water, will be used. Grab samples will be collected for laboratory analysis for the analytes described in Table 8.

When collecting samples, field personnel will wear clean latex gloves to protect themselves and to prevent contamination of the samples. Samples will be collected by manual grab sampling at an approximate depth of six inches below the water surface, pointing the bottle opening upstream, and avoiding floating debris. In shallow water (less than six inches deep), bottles are filled from the surface of the flowing water. A sterile, triple-rinsed glass beaker, or syringe, may be used when flow depth is very shallow. Field datasheets are completed for each site visit.

Samples for laboratory analysis are stored in an ice cooler at ≤ 6 °C, in appropriate sample containers with appropriate preservatives. All samples are to be transported to the laboratory within the specified holding times. Samples will be acidified for preservation once the laboratory is in custody of the samples.

Table 8, on the following page, lists the analytical parameters assessed to represent water quality. Grab samples taken during wet weather conditions will be analyzed for the same list of parameters. If any of the samples cannot be taken or analyses cannot be performed for any reason, the QA/QC Officer will be notified. Any appropriate corrective actions will be documented.

Table 7. (Element 11) Sample Volumes, Methods, Preservation, and Holding Times

Analytical Parameter	Analytical Method	Minimum Sample Volume	Container Type	Preservation (chemical, temperature, light protected)	Maximum Holding Time
Specific conductance	N/A	N/A	Analyzed in field	N/A	N/A
Total selenium	EPA 200.8	500 mL	Polyethylene bottles	Cool to <6 °C and store in the dark. Acidify with HNO ₃ to pH<2	6 months

Notes: N/A = not applicable; mL = milliliter

12. SAMPLE HANDLING AND CUSTODY

The samples collected during monitoring events are labeled with site location, date, sample time, analysis to be performed, sample preservation (if any) and field sampler's name. For each site visit, the time, date, site, and event type are recorded on a field datasheet (Attachment B). Sample containers are stored and transported at ≤ 6 °C in an ice cooler until processed. Samples are delivered to EMA within specific holding times (Table 8). An example chain-of-custody form is included in Appendix C of Attachment A.

13. ANALYTICAL METHODS AND FIELD MEASUREMENTS

Field and laboratory analytical methods are displayed in tables 9 and 10, respectively. The SOPs for the laboratory methods can be found in Attachment A. Laboratory analyses are performed in accordance with the approved method number listed.

Table 8. (Element 13) Field Analytical Methods

Analyte	Laboratory/ Organization	Analytical Method/SOP	Reporting Limit	Units
Specific Conductance	Field monitoring by D-MAX staff	Hanna Instruments HI 991301 Portable pH/EC/TDS/Temperature Meter	0.01	mS/cm

Notes: mg/L = milligrams per Liter; EC = electrical conductivity; TDS = total dissolved solids; mS/cm = millisiemens per centimeter

Table 9. (Element 13) Laboratory Analytical Methods

Analyte	Laboratory/ Organization	Analytical Method/ SOP	Minimum Detection Limit	Reporting Limit	Units
Total selenium	EMA	EPA 200.8	0.500	1.00	µg/L

Notes: µg/L = micrograms per Liter

14. QUALITY CONTROL

Quality control samples will be collected both in the field and in the lab to verify that valid data are recorded. Proper collection of all samples, using clean disposable gloves and appropriate clean containers and preservative, is primary in ensuring the quality of collected data. Field instruments will be

calibrated prior to each day of sampling, and records will be retained by D-MAX Engineering, Inc. An example calibration log sheet is included in Attachment C.

Field duplicates help quantify intrinsic variability associated with sampling activities. Field duplicate samples will be used to replicate field measurements as well as laboratory analyses. Field duplicates are comprised of a second sample taken at a rate of 5%. There are no specific criteria for field duplicate variability, but these data are evaluated in the data analysis/assessment process.

Laboratory blanks, duplicates, matrix spikes and laboratory control standards are used to ensure proper sample handling, identify bias, check for consistent analysis of samples, and verify correct operation of laboratory equipment. All contract laboratory analysis will be performed in accordance with the guidelines of the QA/QC plan of EnviroMatrix Analytical, Inc.

Table 10. (Element 14) Sampling (Field) Quality Control

Matrix: Water		
Sampling SOP: SWAMP Procedure No. 1.0		
Analytical Parameter(s): Conventional in Water		
Analytical Method/SOP Reference: N/A		
# Sample locations: All locations		
Field QC	Frequency/Number per sampling event	Acceptance Limits
Cooler Temperature	≤ 6 °C	0 – 6 °C
Field Duplicate	5%	RPD < 25% (N/A if native concentration of either sample < RL)

Notes: RPD = relative percent difference; RL = reporting limit

Table 11. (Element 14) Analytical Quality Control

Matrix: Water		
Sampling SOP: SWAMP Procedure No. 1.0		
Analytical Parameter(s): Conventional in Water		
Analytical Method/SOP Reference: N/A		
# Sample locations: All locations		
Laboratory QC	Frequency/Number	Acceptance Limits
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	< RL for target analyte
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	RPD < 25% (N/A if native concentration of either sample < RL)
Laboratory Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery RPD < 25% for duplicates

Notes: RPD = relative percent difference; RL = reporting limit

If any of the quality control acceptance limits are not met for field measurements or laboratory analysis, the corresponding batch of data will be flagged to be excluded from analysis and the QA Officer for the project will be notified. The QA Officer will determine whether to re-analyze the sample, if holding times have not been exceeded, or to re-sample at the monitoring location(s).

15. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Field measurement equipment will be checked for operation in accordance with the manufacturer's specifications prior to sampling. Duplicate or back-up equipment will be available to the field crew. Spare instruments and parts are kept in the field sampling vehicle, at the D-MAX or ADS office in the City of San Diego. Quality control for data collected in the field will be accomplished by proper calibration and care of

the instruments used to take the readings and by proper handling of sampling equipment and containers, as described in Section 16 below.

EMA maintains its equipment in accordance with its QA Program Manual, included as Attachment A. Laboratory instrumentation will be calibrated and maintained by EMA staff under the direction of Jennifer Beyer, QA Director. All corrective actions are documented in logbooks for each instrument or piece of equipment. EMA maintains SOPs for each methodology or procedure used, which are standard EPA methods.

Table 12. (Element 15) Testing, Inspection, Maintenance of Sampling Equipment

Instrument/ Equipment	Maintenance Activity, Testing Activity or Inspection Activity	Responsible Person	Frequency	SOP Reference
Hanna Instruments HI 991301 Portable pH/EC/TDS/ Temperature Meter	Clean, inspect, check with conductivity solution, check/replace batteries	D-MAX field staff	Daily inspection and replacement as necessary	SWAMP Procedure Number 1.0
Field Camera	Clean, inspect, check/replace batteries	D-MAX field staff	Daily inspection and replacement as necessary	SWAMP Procedure Number 1.0

16. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

The field meters will be calibrated and checked as recommended by the manufacturer. The sensors and membranes of field meters will be kept moist to preserve the instruments' accuracy during field work. EnviroMatrix Analytical, Inc. maintains calibration practices as part of its QA/QC procedures, included in Attachment A.

Table 13. (Element 16) Instrument/Equipment Calibration and Frequency.

Instrument/ Equipment	SOP Reference	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Hanna Instruments HI 991301 Portable pH/EC/TDS/Temp. Meter	SWAMP Procedure Number 1.0	Calibrate and check with EC 12.88 mS/cm solution	Calibrate and check before each field day, post-field check also for pH	D-MAX field staff

If a field instrument does not pass inspection, the instrument should be recalibrated following its manufacturer's cleaning and maintenance procedures. If measurements continue to fail measurement quality objectives, affected data should not be reported and the instrument should be returned to the manufacturer for maintenance. All troubleshooting and corrective actions should be recorded in the calibration and field data records.

17. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Supplies necessary for this project include calibration standard solutions, reagents, and sample collection bottles provided by EnviroMatrix Analytical, Inc. Upon receipt, all supplies are inspected for leaks or broken seals. Supplies are stored in accordance with manufacturer's recommendations in a secure location. If these chemicals do not meet the acceptance criteria or whenever they exceed their manufacturer recommended shelf life, they are disposed of appropriately and replaced. EnviroMatrix Analytical, Inc. maintains its laboratory supplies in accordance to their QA/QC procedures, included as Attachment A of this report.

Table 14. (Element 17) Inspection/Acceptance Testing Requirements for Consumables and Supplies

Project-Related Supplies/ Consumables	Inspection/Testing Specifications	Acceptance Criteria	Frequency	Responsible Individual
Calibration standard solutions	Check containers and seals for breakage; check expiration dates; ensure proper storage	Containers and seals intact; stored closed in proper conditions; shelf life not exceeded	Upon receipt and each use	D-MAX field staff
Reagents	Check containers and seals for breakage; check expiration dates; ensure proper storage	Containers and seals intact; stored closed in proper conditions; shelf life not exceeded	Upon receipt and each use	D-MAX field staff
Sample collection bottles	Check containers and seals for breakage; ensure proper storage	Containers and seals intact; stored closed in proper conditions	Upon receipt and each use	D-MAX field staff

18. NON-DIRECT MEASUREMENTS

Potential non-direct measurements may be made using historical data collected during previous years of creek monitoring. SWAMP data or data obtained from other agencies may also be used. In addition, photo documentation, topographical maps, land use maps, and hydrological maps generated from San Diego Association of Governments GIS database, may be used.

19. DATA MANAGEMENT

Field datasheets will be checked at the end of the sampling period by D-MAX field staff. Electronic data from EMA is also reviewed by D-MAX, following data entry, for completeness, accuracy, and errors in data entry or transcription. Data will be maintained as previously discussed in Element 9. All document and data hard copies will be retained in a project file, and all document and data electronic copies will be stored on a backed up hard disk at the office of D-MAX Engineering, Inc. EnviroMatrix Analytical will also retain records of all transmitted laboratory reports. Data collected from field and laboratory analysis will be formatted and entered into SWAMP's Information Management System by D-MAX.

GROUP C: ASSESSMENT AND OVERSIGHT

20. ASSESSMENTS AND RESPONSE ACTIONS

Laboratory data will be reviewed for consistency as they are received from the laboratory by D-MAX. D-MAX will also conduct an internal review of the collected field data as soon as the data is made available. Further, the City of National City Project Manager will review the data as reported by D-MAX according to the schedule of deliverables as delineated in Table 3. If a reviewer discovers any discrepancy, the reviewer will discuss the observed discrepancy with the appropriate person responsible for the activity (see Figure 1).

EMA has a defined process for corrective action outlined in their QA/QC Plan, which is included in Attachment A. In the case of a discrepancy in the data, the D-MAX QA Officer will consult with EMA and/or the City of National City Project Manager, as appropriate, to discuss whether the information collected is accurate, what were the cause(s) leading to the deviation, how the deviation might impact data quality, and what corrective actions might be considered. Depending on the type of discrepancy, corrective actions may include, but are not limited to, review of data entry practices, additional training for laboratory personnel, or re-sampling.

The City of National City Project Manager has the power to halt all sampling and analytical work if the deviation(s) noted are considered detrimental to data quality of the project.

21. REPORTS TO MANAGEMENT

At each site visit, the field crew will complete a field datasheet. The datasheet contains information regarding site identification, location, and field measurement results. The City of National City will be notified immediately in the event that there is visual or numeric evidence of a significant threat to water quality. Criteria for a significant threat to water quality consist of evidence of an illegal discharge, observation of unusual water color or odor, numeric results significantly above historical data, and best professional judgment. Monitoring results from laboratory analyses will be reviewed after being received from EMA. If any of the laboratory results indicate evidence of a threat to water quality, the City will be notified immediately.

All monitoring data will be prepared and presented to the City of National City Project Manager. Records of sampling locations and GPS coordinates, field measurement results, laboratory analytical reports, and photographs of sampling locations will also be furnished to the City as needed. The monitoring results will be compared to the applicable WQOs listed in the Basin Plan. Statistical analyses, such as medians, means, maximums, and minimums will be conducted as appropriate to provide the City with the capability of comparing the test results with other published results. Table 3 includes a list of deliverables to be submitted to the City throughout the project.

GROUP D: DATA VALIDATION AND USABILITY

22. DATA REVIEW, VERIFICATION, AND VALIDATION

Data generated by project activities will be reviewed against the data quality objectives previously cited in Element 7 and the quality assurance/quality control practices cited in Elements 14, 15, and 16. Data will be separated into three categories: data meeting all data quality objectives, data failing to meet precision or recovery criteria, and data failing to meet accuracy criteria. Data meeting all data quality objectives, but with failures of quality assurance/quality control practices will be set aside to determine the impact of the failure on data quality. Once determined, the data will be moved into either the first category (meeting all data quality objectives) or the last category (failing to meet quality control practices).

Data in the first category is considered usable by the project. Data falling in the last category is considered unusable. Data falling in the second category will be assessed before it is used in the project, but will likely be excluded from the data set for this particular project. If sufficient evidence is found supporting data quality, the data will be moved to the first category, but will be flagged with a "J" as per EPA specifications.

23. VERIFICATION AND VALIDATION METHODS

Generally, data verification will be performed first internally and then later performed by externally. At each sampling event, the D-MAX's field crew will complete a field datasheet (included as Attachment B).

The datasheet, which contains information regarding site identification and location, visual observations, and field measurement results, will be submitted to D-MAX's QA Officer for review upon completion of sampling to ensure the data have been recorded and processed correctly. The field equipment calibration log sheet will also be submitted upon completion of sampling (see Attachment C). The sampling chain-of-custody form will be reviewed by both EMA and D-MAX upon completion of sampling (included in Appendix C of Attachment A).

Monitoring results from laboratory analyses will be reviewed for validity and completeness by D-MAX's QA Officer after being received from EMA. Each lab report will contain a complete list of sample information such as sample matrixes, blanks, duplicates, etc. An example of a lab report is included as Appendix B of Attachment A. All data entry of field and laboratory results will be checked by D-MAX's QA Officer. D-MAX will review all collected field and lab data and the D-MAX QA Officer will review the lab reports, notifying the EMA QA Director in the case of an inconsistency.

If there is any uncertainty of the validated data the issues, a committee composed of the City of National City Project Manager, the D-MAX Project Manager, the D-MAX QA Officer and Data Manager, the EMA Laboratory Manager/QA Director will work to reconcile and correct data as needed. D-MAX will keep the City of National City informed of any pertinent data inconsistencies as they arise. The committee will attempt to reach unanimous consent on any issues, but the City of National City Project Manager will make the determination if agreement cannot be reached. For this project, there are no differences between validation issues and verification issues.

24. RECONCILIATION WITH USER REQUIREMENTS

The project needs adequate numbers of data points, as represented by the completeness data quality objective in order to perform statistical analyses, such as means, medians, maximums, and minimums. The sampling frequencies that have been developed should provide sufficient data points to complete the necessary statistical analyses such as tests for outliers, trends, etc. The data will be presented in either tables or charts to illustrate trends or relationships and will be uploaded to the SWAMP database in the SWAMP compatible format. Data that do not meet the monitoring quality objectives in the SWAMP QAPrP will be flagged and included in analyses on a case-by-case basis. Rejected data will not be used in analyses. Uncertainty of the validated data will be evaluated using the methods described in Element 23.

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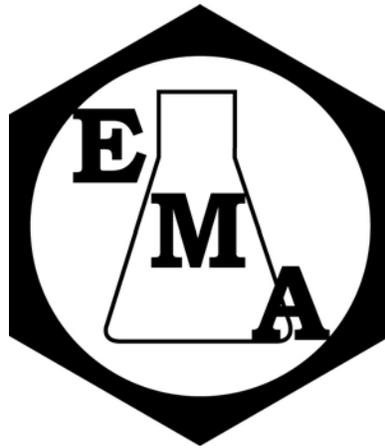
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**Attachment A. Laboratory Quality Assurance Program
Manual and Standard Operating Procedures**

Attachment B. Field Datasheet

Attachment C. Calibration Log Sheet



ENVIROMATRIX ANALYTICAL, INC.

QUALITY ASSURANCE PROGRAM MANUAL

This document has been prepared by EnviroMatrix Analytical, Inc. (EMA) and is approved by EMA Management. It will be reviewed on an annual basis and modified as necessary.

The material contained herein is not to be disclosed to or made available to any third party without the prior expressed written approval of the EMA Quality Assurance Director.

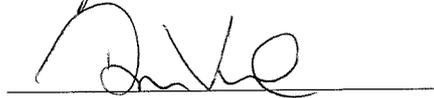
Document Approval and Release

Leland S. Pitt
President/CEO



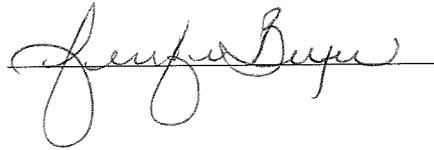
1-9-2013

Dan Verdon
Laboratory Director



1/9/13

Jennifer Beyer
Q.A. Director



1/9/13

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1.0 Quality Assurance Policy

The entire EnviroMatrix Analytical, Inc. (EMA) staff is dedicated to providing reliable, superior quality analytical data to our clients. EMA management believes that Quality Assurance is not simply a management function, but that **every individual** in the laboratory is responsible for ensuring the quality of their analytical data. Therefore, each person within the laboratory is fully trained in evaluating data, monitoring control limits, and taking the corrective action necessary to assure a reliable, superior product for all EMA clients.

1.1 Purpose

The purpose of the Quality Assurance Program is to ensure that all information, data, and resulting decisions compiled under a specific task are technically sound, statistically reliable, and properly documented.

The EMA Quality Assurance Program Manual communicates to employees, clients, and certification organizations EMA's quality assurance policies and procedures.

The Quality Assurance Program Manual defines the purpose, organizational structure, and operating principles of the laboratory. The Quality Assurance Program Manual governs all activities and personnel of EMA including all aspects of administration, sample receipt, sample control, sample preparation, inorganic analysis, organic analysis, quality assurance, sample and waste disposal, data entry, and report production. Any deviation from this program must be approved by the Quality Assurance Director.

Quality Assurance is the structure within an organization which plans, designs, and monitors the frequency and methods of the checks, audits, and reviews necessary to identify problems and dictate corrective actions.

Quality Control is the mechanism or activities through which Quality Assurance achieves its goals. It is the methodical maintenance of strict quality through all activities from sample receipt through report generation; including standard preparation, instrument maintenance, calculation, recording of results, etc.

Quality Control is the function and responsibility of each individual within the laboratory.

1.2 General Description

EMA Quality Policy Statement

“The entire EMA staff is committed to consistently providing our clients with data which is statistically reliable, technically sound, and of the highest quality.”

The contents of this Quality Assurance Program Manual describe the activities which are utilized in order to ensure this commitment is maintained.

Written analytical procedures (Standard Operating Procedures – SOP) are used to ensure strict adherence to approved analytical methods throughout the laboratory. Bench-level quality control measures with established acceptance criteria are included in each analytical procedure employed by the laboratory. Laboratory records and quality control data are monitored by management on a regular basis.

This manual describes the Quality Assurance Program adhered to by EMA and has been written by EMA personnel and approved by Management. All EMA staff has received copies of this manual and is required to comply with the program’s stated goals, requirements, and responsibilities. The Quality Assurance Director has been designated to monitor the program and report program findings to the President and the Laboratory Director.

EMA is a State of California Department of Health Services fully accredited laboratory under the Environmental Laboratory Accreditation Program. EMA is evaluated by external audit under this program and certification is granted for a term of two years. Additional information as to the scope and expiration of this certification is presented in Appendix H.

EMA has been granted approval from the United States Department of Agriculture to handle foreign soil. This approval grants EMA permission to import and ship foreign soil as well as soils from Hawaii, Guam, Puerto Rico, and the US Virgin Islands. The approval is granted for a term of three years and expires May 12, 2013, whereupon it will be renewed.

1.3 Objective

The Quality Assurance Program is designed to provide EMA and its clients with accurate and reliable data.

The Quality Assurance Program ensures that EMA produces valid data for all analytical procedures. In order to accomplish this objective, the following criteria must be achieved:

1. All procedures and practices must be accepted by both the client and/or regulatory agency.

2. A program must be in place to monitor, document, and improve the performance of EMA.
3. There must be a mechanism for correcting problems which are determined by the Quality Assurance Program.

Specific objectives of our performance standards are:

1. Laboratory practices and methodologies are routinely updated and developed as new and improved methods and practices become available.
2. Only trained personnel having the appropriate expertise perform assigned tasks.
3. All data is reviewed prior to release to ensure validity, completeness, accuracy, and precision.

1.4 Intended Use of Data

This Quality Assurance Program Manual applies to the generation of analytical data for environmental monitoring and assessment programs. This Quality Assurance Program has been designed to meet the requirements of various federal and state regulatory agencies with which clients need to comply. The data generated under this Quality Assurance Program is provided in support of investigations or monitoring of sites that will have significant environmental impact on the public and private sector.

2.0 Laboratory Organization and Responsibility

EMA is a full-service environmental laboratory specializing in analytical services and is the sole laboratory operating under this quality management system. EMA maintains two locations that include the main facility and one auxiliary laboratory:

Main Facility	Auxiliary Facility
4340 Viewdridge Avenue	4380 Viewridge Avenue
Suite A	Suite B
San Diego, CA 92123	San Diego, CA 92123
858-560-7717	858-430-0379

EMA provides analytical testing services for the environmental industry. Services include:

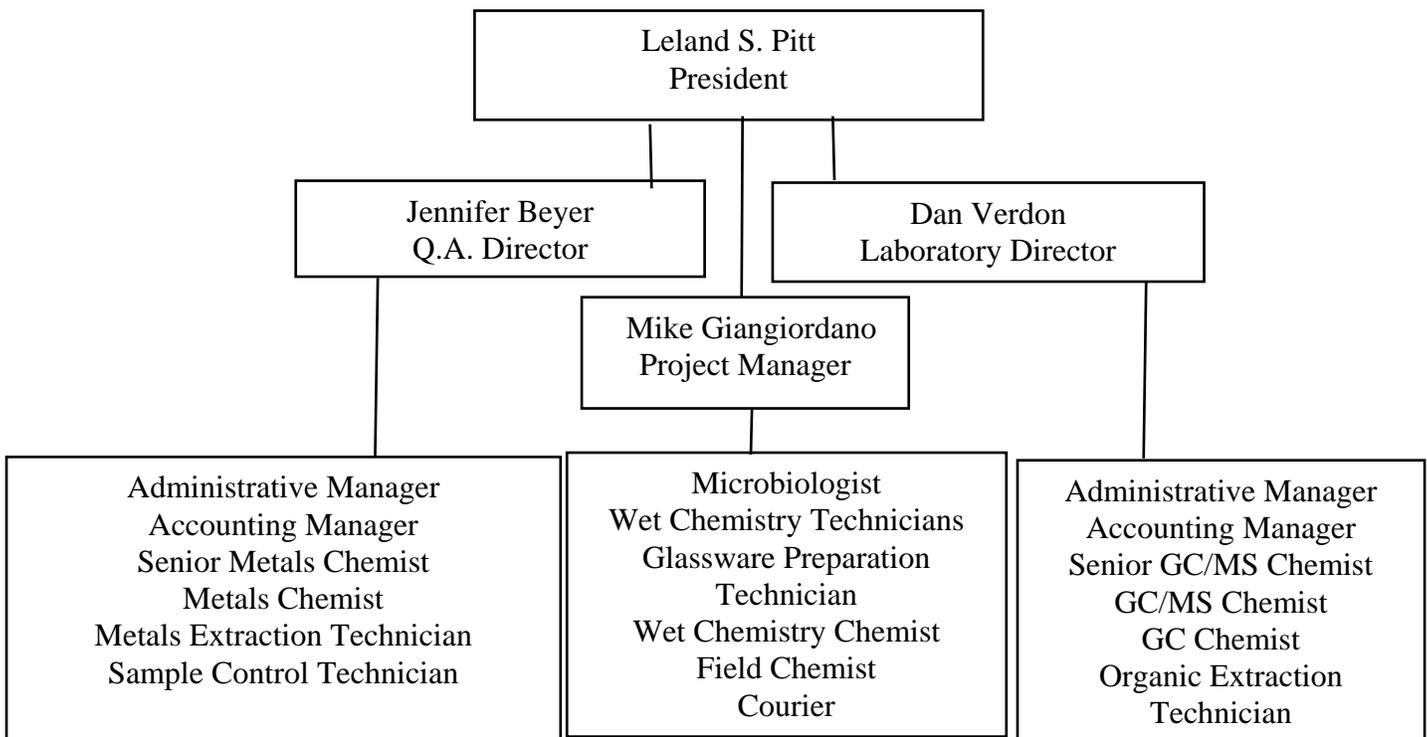
- Classical chemistry (titrametric, gravimetric, colorimetric, infrared, etc.),
- Inorganic chemistry by Atomic Absorption (cold vapor), Inductively Coupled Plasma-Mass Spectrometry, and Inductively Coupled Plasma-Atomic Emission Spectrometry,
- Organic chemistry by Gas Chromatography (GC) and Gas Chromatography/Mass Spectrometry (GC/MS),
- Microbiology by Multiple Tube Fermentation, Presence/Absence Media, and Plate Count.

A list of analytical services and methods performed by EMA is presented in Appendix E.

A list of major instrumentation and equipment used by EMA is presented in Appendix F. EMA has been operating as an analytical laboratory since 1974. EnviroMatrix Analytical, Inc. (EMA) was incorporated in the State of California on July 10, 1992.

The success of the quality assurance program is the responsibility of key laboratory personnel. All laboratory chemists and technicians are vested with the authority to stop work in response to quality related problems. Personnel notify their supervisor and the Quality Assurance Director immediately if any quality related problems or out-of-control events occur. In the temporary absence of their supervisor, lab personnel notify another member of laboratory management.

EnviroMatrix Analytical, Inc. Organizational Chart



2.1 The President

The President of EMA approves overall policy, including the Quality Assurance policy and goals contained in this Quality Assurance Program. The president maintains the ultimate responsibility and authority for quality related matters.

2.2 Laboratory Director

The Laboratory Director is ultimately responsible for the timeliness and reliability of all analytical data.

The Laboratory Director's responsibilities with respect to the Quality Assurance Program are to:

- Supervises all department supervisors and chemistry laboratory personnel;
- Oversee and coordinate instrument and equipment maintenance;
- Review work procedures and daily laboratory practices;
- Training of laboratory personnel;
- Implement and develop new methodologies;
- Oversee the implementation of valid and reliable quality control procedures;
- Oversee the administration of quality control procedures;
- Oversee the implementation of corrective action(s);
- Oversee performance evaluation and auditing;
- Review analytical data and reporting to clients.

2.3 Quality Assurance Director

The Quality Assurance Director is responsible for the operational budgeting, laboratory management, and the Quality Assurance Program activities.

Duties are to:

- Prepare and maintain the financial operational budget;
- Develop mechanisms to carry out quality objectives;
- Administrate quality control procedures;
- Implement corrective action(s);
- Manage a document control numbering system;
- Performance evaluation and auditing;
- Liaison with regulatory agencies;
- Propose Quality Assurance Program amendments, provide feedback, and conduct Quality Assurance training.
- Train and monitor chemists and technicians in implementation of Quality Assurance/Quality Control procedures;
- Review final analytical reports for accuracy and completeness;
- Manages all facets of the EMA safety program.

2.4 Project Managers/Project Coordinators/Sales Manager

The Project Managers and Project Coordinators have responsibilities relating to the Quality Assurance Program. They are to:

- Respond promptly to client needs and inquiries;
- Track project reports to ensure they are delivered on time;
- Communicate any client inquires or concerns promptly to the appropriate management person (i.e.: President, Vice-President/Laboratory Director, or other Project Manager);
- Ensure that all client inquires are resolved by continued communication and follow-up;
- Act as client advocate;
- Determine any client project specific quality assurance or deliverable needs and communicate those needs to the laboratory through written and verbal notification;
- Define, document, and communicate work requirements for specific projects to the laboratory through written and verbal notification;
- Communicate changes in project requirements during the course of work to laboratory personnel through written and verbal notification.

2.5 Sample Control Technician (Sample Receiving Coordinator)

The Sample Control Technician is responsible for sample integrity, sample holding time adherence at receipt, proper container usage, proper sample storage, and sample custody.

Duties include to:

- Receives all client samples and enters project and samples into the EMA Laboratory Information Management System (LIMS);
- Labels all client samples and tracks the internal chain-of-custody.
- Prepares preserved sample containers and adds preservatives to incoming samples where indicated (includes documentation of pH for all metal samples);
- Document sample condition as received;
- Inform client, and/or Laboratory Director or chemists of any holding time considerations;
- Maintains internal chain-of-custody through sample control;
- Ensure and document proper sample container type;
- Control sample storage;
- Implement prescribed procedures for sample receipt and log-in;
- Document project-specific requirements or changes in project requirements during the course of work on the daily in-house aging report;
- Maintains logbook of daily verification of all laboratory balances (as well as refrigerator temperatures).

2.6 Department Supervisors/Senior Chemists

The Laboratory Department Supervisors are responsible for the daily operation of their respective area.

Their duties as they relate to the Quality Assurance Program are to:

- Make recommendations for technical decisions to the Laboratory Director;
- Develop, review, and evaluate test procedures;
- Assist in the training and monitoring of chemists and technicians in implementation of Quality Assurance/Quality Control procedures;
- Ensure completion of analytical work within the requested turn-around time and prior to expiration of sample holding time;
- Initiate or respond to required corrective action(s);
- Perform method detection limit and instrument detection limit studies on instruments used.

2.7 Laboratory Chemists and Technicians

The Chemist's duties as they relate to the Quality Assurance Program are to:

- Comply with Quality Assurance Program requirements and method specified Quality Control;
- Maintain a clean and safe working environment;
- Implement any prescribed corrective action(s);
- Utilize only methodologies as approved by EMA and follow EMA Standard Operating Procedures (SOPs);
- Keep accurate laboratory records;
- Routinely check expiration dates of reagents prior to initiating work, and make fresh reagents when necessary.

2.8 Purchasing Agent/Client Services Coordinator/Administrative Assistant

The Purchasing Agent's duties in relation to the Quality Assurance Program are to notify Laboratory Director immediately if incoming purchase requisitions request materials of a different quality or source (vendor) than prior orders. Purchase requisitions that request materials that vary from prior approved materials must have an indication that the Laboratory Director has approved such action.

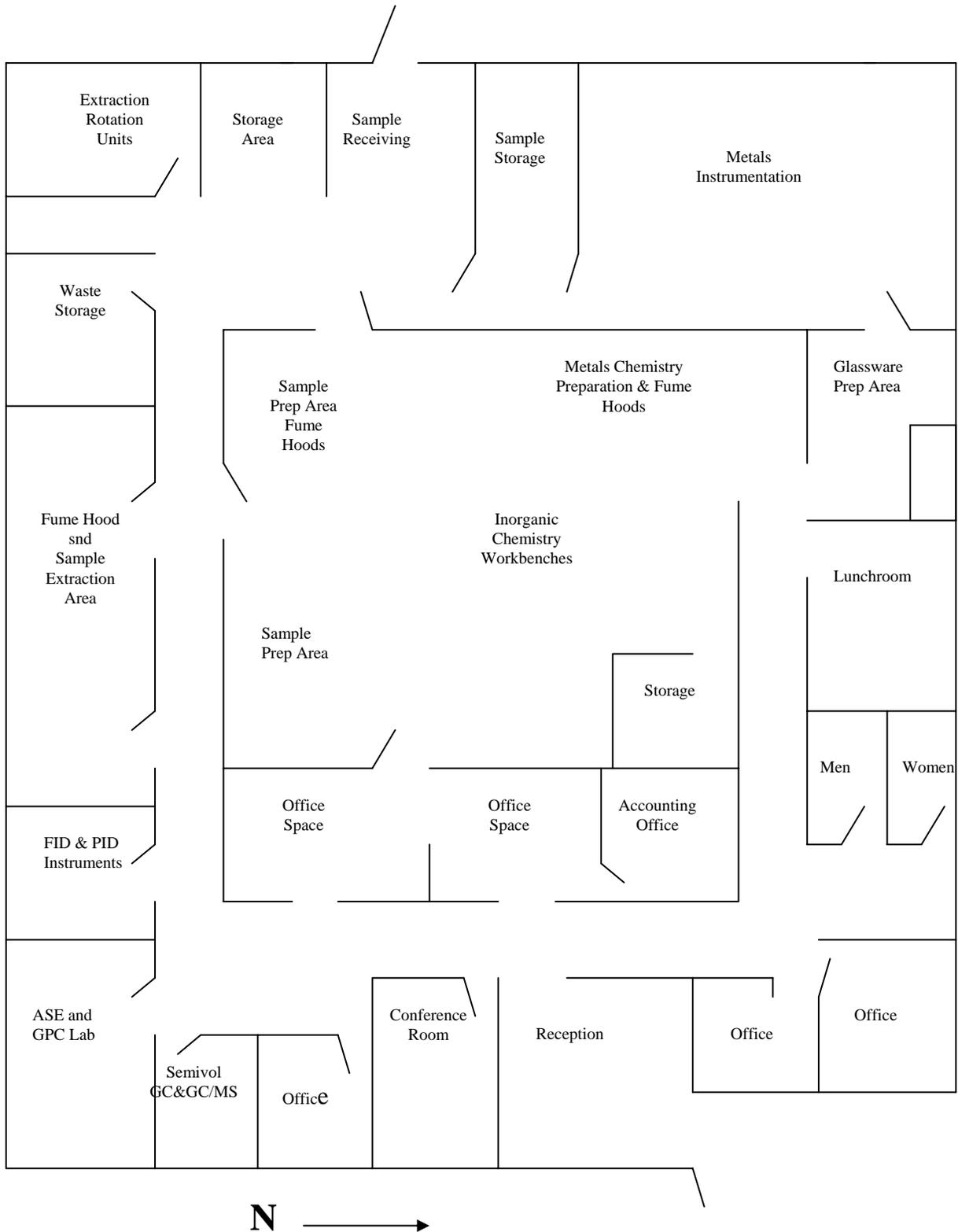
The Client Services Coordinator duties in relation to the Quality Assurance Program are to:

- Ensure completion of report deliverable prior to due date;
- Files and maintains copies of all analytical reports and project information.
- Scans all incoming Chain-Of-Custody forms (COCs) into the EMA Server Files.

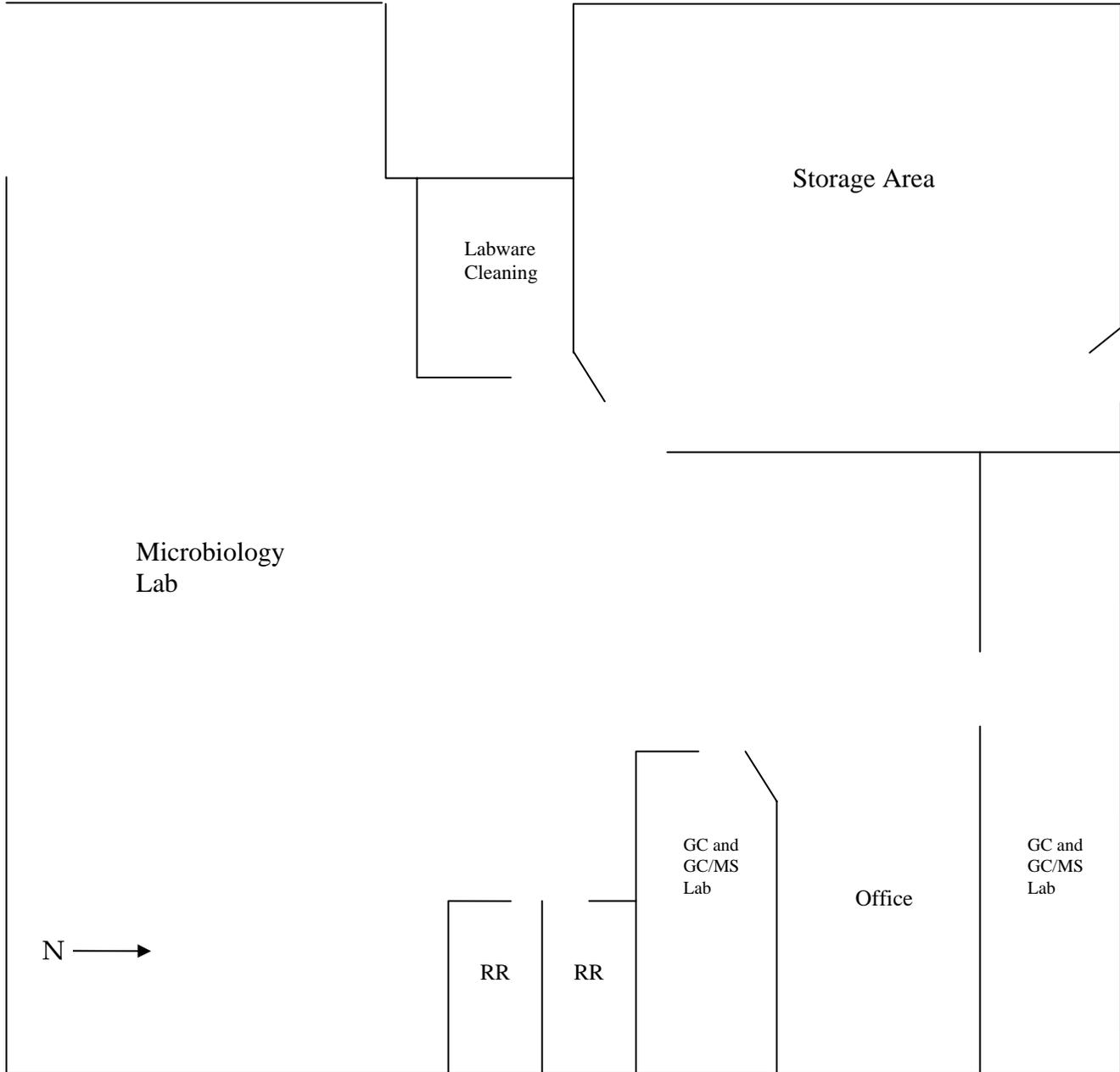
3.0 Facilities

EMA occupies one approximately 6,000 square foot building of which 90% is dedicated to the analytical laboratories. EMA maintains an additional auxiliary laboratory which includes approximately 1800 square foot building within the same business complex of which 65% is dedicated to the analytical laboratories. Separate laboratory areas are dedicated to volatile analyses, semi-volatile analyses, inorganic analyses, microbiological analyses, extraction for organic analyses, digestion for metals analyses, sample receiving/sample preparation, metals analyses, and glassware cleaning.

Facility Map of 4340 Viewridge Ave. Ste. A



Facility Map of 4380 Viewridge Ave. Ste. B



4.0 Personnel Training

EMA provides all personnel with extensive training to assure all employees are provided with the necessary information to make educated, decisive and merited decisions. The guidelines set forth create parameters for all employees to follow that will aid in quality of all laboratory processes.

4.1 Quality Commitment

EMA staff is committed to providing superior service and quality. EMA management believes that achieving excellence requires the dedication of all employees and has established training programs throughout the organization to foster employee involvement and growth.

4.2 Safety Training and Compliance

A formal safety program is established in accordance with local, state and federal requirements. Safety training is provided for all laboratory employees initially upon hire and thereafter on a routine basis. The safety program is maintained by the Safety Officer with the help of the Safety Coordinator and Waste Management Coordinator.

4.3 Qualifications of Laboratory Personnel

EMA is very proud of its highly qualified and professional staff and is committed to furthering the skills of employees at all levels.

Technical training is performed by management and qualified individuals to ensure method proficiency. The staff is updated as to current technical advances at an as-needed basis. All laboratory personnel are required to acknowledge through signature that they have read and understand the SOPs appropriate for their area. All training beyond acknowledgment of SOPs is documented. Continuing qualification of laboratory personnel is demonstrated through systems and performance audits conducted by the Quality Assurance Director. Additionally, Quality Assurance training sessions are conducted by the Quality Assurance Director on a regular basis. External courses and conferences are attended when appropriate. The EMA staff further their expertise through present and past membership in professional organizations such as:

- San Diego Environmental Professionals (SDEP)
- American Council of Independent Laboratories (ACIL)
- Professional Environmental Marketing Association (PEMA)
- Association of Environmental Professionals (AEP)
- San Diego Dry Weather monitoring workgroup
- Stormwater Monitoring Coalition workgroup

All new employees receive a comprehensive orientation to quality assurance, quality control, and safety programs administered by the Quality Assurance Director within approximately the first week of employment. All new personnel, or personnel performing a new analysis, must demonstrate

proficiency through the analysis of Quality Control check samples prior to the analyst conducting independent analysis of client samples.

Copies of all training records, including the results of Precision and Accuracy Studies and single- and double-blind performance evaluations, are maintained in the Quality Assurance program files. Appendix G presents professional profiles of key personnel.

5.0 Quality Assurance Objectives

The objectives of EMA are to supply precise, accurate data reports to clients which are representative of the sample supplied. All data reported are generated and calculated according to recognized standards of the environmental laboratory industry. Data reported by EMA are calculated and reported in units that are consistent with data produced by other organizations. EMA strives to present data reports that are complete and contain all data elements and supporting documentation for the type of deliverable requested by the client.

The precision and accuracy control limits utilized by EMA are based upon limits contained in the published methods. When warranted by EMA's experience with a particular method, more restrictive control limits than those cited in the method are set.

Method performance characteristics are determined prior to method use for analytical methods. This is accomplished through Precision and Accuracy, Method Detection Limit, and Instrument Detection Limit Studies performed according to standard operating procedures. Additionally, Quality Control reference materials are analyzed to verify method performance characteristics. All method performance data is compiled by the individual analyst and is documented and maintained by the Quality Assurance Director in the Quality Assurance program files.

5.1 Data Quality Characteristics

There are five recognized characteristics of data quality. They are:

Accuracy

The degree of agreement of a measurement (or measurement average) with an accepted reference or true value. It is a measure of system bias. It is usually expressed as the difference of "measured" from "true" values, or as a percentage of the difference. The accuracy of laboratory analyses can be evaluated through the concurrent analyses of standard reference materials, if available.

Precision

A measure of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of percent difference between replicates or in terms of the standard deviation.

Completeness

A measure of the amount of valid data obtained compared to the amount expected to be collected under normal conditions; it is usually expressed as a percentage. The completeness objective is calculated on those samples analyzed, not the remainder archived. Data from samples are

considered to be complete if the samples have been properly collected, labeled, stored, prepared, and analyzed and the associated quality control criteria have been met.

Representativeness

Expresses the degree to which data accurately and precisely represents a characteristic of a data population, process condition, or a sample. The samples expected characterization would be compared to that obtained by laboratory analyses to evaluate the representativeness of the data to the expected data.

Comparability

Expresses the confidence with which one data set can be compared to another. To achieve comparability, the data generated will be reported using units specified in the Standard Operating Procedures as appropriate. Analytical results will be comparable to those produced from similar laboratories using the same instrumentation and methodology. This is accomplished through the following practices:

- Demonstrate traceability of standards to NIST or EPA sources.
- Use of standard and approved methodologies.
- Standardized units of measure.
- Standardized Quality Control Acceptance Criteria
- Analysis of Performance Evaluation (PE) samples to demonstrate laboratory performance.

5.2 Completeness, Representativeness, and Comparability

Prior to the results being disseminated, the report is reviewed and evaluated for completeness, representativeness, and comparability.

The report and associated data is evaluated to ensure that it is; sufficient for its intended use, representative of the matrix and conditions being measured, and representative of the method and instrument utilized.

The Laboratory Director will review and approve all EMA reports to clients.

6.0 Sample Custody

The Sample Control Technician is responsible for initiating and maintaining external and internal chain-of-custody, managing and tracking sample storage and distribution, ensuring proper containers, preservation, temperature requirements and adherence to holding time requirements. In the absence of the Sample Control Technician, only properly trained personnel may receive samples with all activities reviewed by the Sample Control Technician or Laboratory Management. All samples received are sent through an additional review process by a qualified employee to ensure the laboratory adheres to the client's needs and representations.

Samples are physical evidence and are handled at EMA according to certain procedural safeguards. The strict adherence to chain-of-custody procedures is critical to legal proceedings and an integral part of a Quality Assurance Program. Chain-of-custody procedures are initiated during sampling events in the field and continued through laboratory analysis, and finally, the ultimate disposal or return of the sample.

EMA chain-of-custody procedures ensure traceability through proper sample handling, Quality Control procedures and internal chain-of-custody. The components of the chain-of-custody procedure include chain-of-custody documentation forms and unique sample identification numbers.

The National Enforcement Investigations Center of EPA defines custody of evidence in the following ways:

1. In a person's physical possession,
2. In view of the person after possession has taken place,
3. Secured by that person so that the sample cannot be tampered with, or
4. Secured by that person in an area which is restricted to unauthorized personnel.

6.1 Laboratory Custody Procedures

EMA has implemented the following standard operating procedures with regard to laboratory internal chain-of-custody:

- Samples are stored in a secure area except when being analyzed or prepared.
- Non-employee access to the laboratory is controlled through the use of limited access points at the facility. Outside personnel can access the building either through the front reception area or the sample receiving area.
- The designated Sample Control Technician controls access to the sample storage area.
- Samples remain in secured sample storage until removed for sample preparation or analysis.
- Each sample container is assigned a unique identifier and this identifier is used to track the sample location and status throughout the analytical process, storage and disposal.
- After the sample is assigned an identifier and logged in, sample tracking is utilized to trace the transfer of the sample from the Sample Control Technician to the chemists.
- Sample tracking is maintained through the internal chain-of-custody program in the EMA LIMS in order to document sample location and responsible party within the laboratory.
- All samples are to be returned to the Sample Control Technician and documented within the chain-of-custody program in the LIM system.
- Any remaining samples are archived in locked storage areas, returned to the client, or disposed of properly as required by the client and federal and state regulations.

The Sample Control Technician is responsible for ensuring that all samples are maintained in a secure area while being logged-in.

Internal sample chain-of-custody is maintained through sample tracking program in the EMA LIMS. This program is used to log samples in and out of sample storage and indicate sample custody at all times. It is the responsibility of all personnel to document when a sample is in their custody.

Coolers containing samples are received through the sample receiving/sample management area. Upon sample receipt at the laboratory, samples are assigned a unique identification number and entered into the sample receipt logbook. All samples are entered into the EMA LIM system. Details include client name, laboratory identification number, parameters requested, date received, date and time sampled, date due and relinquishing parties.

For sample shipments that contain a temperature blank (i.e.: a separate water-filled container for verifying receipt temperature), the temperature of the water in the designated bottles will be obtained using an NIST calibrated thermometer. The thermometer will be inserted into the temperature blank as soon as possible after sample receipt; once equilibrium is reached the temperature will be recorded. In the event that there is no temperature blank present, the temperature of the samples are taken with a probe which indicates the temperature of the sample bottles. The temperature or condition of the samples on receipt will be recorded on the associated chain-of-custody.

If samples are not received within the temperature requirements or if the samples are received outside of the protocol holding time requirements, the client will be contacted and notified of the discrepancy. In the event the client cannot be contacted, the samples will be processed on an as received basis. The discrepancy is noted on the chain-of-custody.

The samples are carefully removed from the shipping container. The condition of the samples will be noted on the associated chain-of-custody form (intact, broken, leaking, etc.). The client will be contacted immediately if there is evidence of damage. Broken/damaged sample bottles will be transferred to the EMA waste drums. The coolers containing the broken samples will be rinsed several times with water; the water will be transferred to the waste drums if necessary.

The Sample Control Technician will verify agreement between the labeled sample containers and the chain-of-custody. In the event of a discrepancy, the client will be contacted immediately.

The samples will be visually inspected to determine that adequate sample volume was collected for the parameters requested, correct sample containers were utilized, and proper preservation was indicated on the label. This will be documented on the chain-of-custody form. Any problems will warrant immediate client contact.

All liquid samples requiring any metals analysis must be verified to have a $\text{pH} < 2$. The Sample Control Technician will maintain a logbook which will contain pH upon receipt, amount of acid added (if necessary) and pH of sample after 24 hours. Samples with $\text{pH} < 2$ are ready for analysis. Those which are above the required pH must be maintained at a pH of 2 or below for at least 24 hours.

If a problem is not resolved with the client during sample delivery, the client will be notified by telephone to clarify any discrepancies found during sample log-in and stipulate corrective actions. All samples that are affected by the problem are placed in the appropriate contaminant free refrigerator and maintained at 4°C until resolved. A record of the telephone call will be kept with the chain-of-custody information in the LIMS system.

If no problems are observed, the samples are placed in sample storage areas controlled by the Sample Control Technician until analysis. Maximum holding times for samples are observed and strict sample control is maintained by the Sample Control Technician.

In the absence of the Sample Control Technician, only personnel who have been trained in sample receipt and sample custody procedures have access to samples in the sample control area.

Controlled custody of digestates and extracts is maintained by transfer documentation on extraction/digestion log forms. Digestates and extracts are stored for thirty days after analysis and are promptly disposed of thereafter.

6.2 Chain-of-custody

To trace sample possession from the time of collection, a chain-of-custody record is completed and accompanies the sample(s).

The chain-of-custody contains the following information:

- Client sample identification number;
- Signature of the collector and any person who has had the sample in their possession;
- Date and time collected;
- Sample type;
- Client name and address,
- Inclusive date of possession;
- Analyses requested;
- Intact seals present on sample containers (if applicable);
- Sample condition when received (temperature, proper container, etc.);
- Samples properly preserved, as applicable;
- Time and date sample was received and by whom.

The chain-of-custody establishes the documentation and control necessary to identify and trace a sample from sample collection to final analysis. It includes sample labeling to ensure proper identification of each sample, secure custody, and provides the recorded support information for potential litigation.

Chain-of-custody forms are used to document the integrity of all samples. To maintain a record of sample collection, transfer between personnel, shipment and receipt by the laboratory, a chain-of-custody form will be filled out for each sample or batch of samples provided by the client.

Whenever the possessions of the samples are transferred, the individual relinquishing the sample(s) signs and records the date and time of sample transfer on the chain-of-custody document. The individual receiving the sample(s) repeats the procedure. This record represents the official documentation for all sample custody transfers until the samples have arrived at the laboratory.

A copy of the chain-of-custody is provided to the client when samples are logged in at the laboratory.

7.0 Sample Security, Storage, and Disposal

The Sample Control Technician is responsible for ensuring that samples are maintained in secured storage areas under the appropriate conditions and are properly disposed of once deemed suitable.

7.1 Sample Security

Samples are kept in secured storage areas except during laboratory analysis. All laboratory personnel who receive samples are responsible for the care and custody of samples from the time each sample is received into that person's possession until the sample is returned to the Sample Control Technician.

The following security measures are employed:

- Doors to the sample storage area are secured at all times.
- Authorized personnel escort all visitors and deliveries through the laboratory from the rear receiving area or the main reception area.
- Laboratory personnel are responsible for the control and maintenance of sample integrity while they have custody of samples.

Information provided by the client about samples, recorded on the chain-of-custody or project documents, is available to analysts and can prove useful guidance when analyzing samples. EMA policies prohibit disclosure of confidential client information to third parties. All laboratory personnel are instructed to maintain confidentiality of client project information.

7.2 Sample Storage

Once samples are logged into the sample tracking system, the Sample Control Technician is responsible for ensuring the following procedures:

- Water samples for volatile analyses are stored in a separate refrigerator reserved only for volatile samples to avoid contamination. Solid samples that are to be analyzed for volatile organic compounds are to be sub-sampled prior to any other analyses being performed on those samples.
- Samples for microbiological analyses are delivered to the analyst and processed immediately. These samples are not stored due to method recommendations.

- Samples are stored in a secured area.
- Samples are removed from the shipping container or cooler and stored in their original containers unless damaged.
- Damaged samples are documented and reported to the Project Manager.
- Sample storage areas are kept secured and tidy at all times.
- Samples are removed from storage only by authorized personnel trained in sample custody procedures.
- Standards are not stored with samples.

7.3 Sample and Waste Disposal

Upon completion of the analysis, any remaining sample will be placed into long-term storage, returned to the client, or disposed of in compliance with all applicable federal, state, and local laws. All samples disposed of are documented in the LIM system by the Sample Control Technician.

When sample analysis and all Quality Control checks have been completed and a final report has been issued, the unused sample will be stored for a period of no less than one week after the sample report was received (30 days maximum if storage space allows; longer archival available with nominal fee).

Any unused portions requested by the client shall be returned.

Laboratory waste is collected in individual laboratory areas in appropriate satellite containers labeled with water-proof labels. Labels identify the hazardous waste collected and all pertinent information from the Material Safety Data Sheets (MSDS). When filled, containers are taken to the Hazardous Waste Room and composited into larger containers for storage until transport to a designated disposal facility. The Safety Officer works with the waste transporters to obtain disposal of waste which meets regulatory standards.

Non-hazardous waters may be disposed of in sink drains as permitted by a wastewater permit granted from the City of San Diego Metropolitan Wastewater Department.

7.4 Sample Preservation and Holding Times

It is critical to sample integrity and data validity that EMA analyze samples within the method stated holding times. EMA follows regulatory guidelines for sample preservation and holding time requirements as specified by the method references. Sample holding time begins with the collection of the sample.

Appendix A contains the Sample Holding Times and Preservation Requirements which identifies holding time requirements by method and parameter for water and soil/wastes.

Adherence to holding time requirements is maintained through several laboratory policies:

- When a sample holding time is identified in terms of hours, the chain-of-custody must indicate the time of sampling.
- The Sample Control Technician verbally notifies the appropriate analyst immediately upon receipt of samples with holding times of 72 or less hours.
- All laboratory personnel receive a daily in-house aging report listing the status of requested analyses for current samples.
- All data is subject to supervisory review and audits in which adherence to holding time requirements are monitored.
- Time of analysis is reported with analytical results when requested.

Accurate sample preservation is critical for following procedural guidelines dictated by recognized standards of the environmental laboratory industry. Preservation of samples is noted in the LIM system and if contradictory to the standardized procedure noted within the chain-of-custody. All liquid samples to be analyzed for metals must be documented in a designated logbook, recording the pH of the sample upon arrival. Liquid samples for metals analysis must be at a pH of 2 or below. Additional acid may be needed to accomplish this requirement (with an adjustment period of 24 hours before analysis). Occasionally samples will come in unpreserved whereupon the Sample Receiving Technician must sub-sample into correct containers pertaining to requested analyses.

8.0 Material Procurement and Control

Only chemicals and supplies of the quality specified in the appropriate method or Standard Operating Procedure shall be used for analyses. Purchase requisitions require review by the Laboratory Director for suitability prior to being issued. The Laboratory Director is responsible for ensuring that the materials being ordered are of the appropriate grade/quality for the methodologies.

The Purchasing Agent verifies that materials ordered are of the same grade/quality previously ordered and are requested from an approved vendor. If any deviations are noted the Purchasing Agent immediately notifies the Laboratory Director for approval/disapproval prior to placing order.

Upon receipt of orders, the purchase order is compared to the grade of material shipped to ensure that the correct quality/grade was received prior to acceptance by the laboratory.

8.1 Containers and Reagents

EMA provides required bottles, ultra-pure water (for use for trip blanks), coolers, sampling instructions, labels, ice packs, and chain-of-custody forms for sample collection. EMA utilizes EPA approved, pre-cleaned glassware for sample collection. Sample container preservatives are certified free from analytes of interest and contaminants. Compliance certificates that indicate freedom from contamination are maintained by the Sample Control Technician for each lot number of preservative and sample container.

Sample containers and preservatives are fully traceable to their sources and lot numbers through use of a logbook maintained by the Sample Control Technician. Containers provided to clients are labeled with the date the containers were prepared. All container and preservative lot numbers used

for each day are recorded in a container preparation logbook along with the date that the preservative lot number was in use.

Upon request, EMA will provide trip blanks to clients.

8.2 Calibration Standards and Reagents

The chemicals and reagents used by EMA are selected with care. Reagent lot numbers are recorded for every analytical batch processed. Analytical reagent grade is the minimum quality used within the laboratory. Ultra pure/trace metal free acids are employed for low detection limit metals analysis. Pesticide grade solvents are used for all organic extractions. The extraction solvents are treated to all steps of the sample preparation and analysis process.

The following acceptance criteria applies to solvents:

- No analyte present at concentrations equal to or greater than one-half the reported detection limit.
- No non-analyte peak present in the test chromatogram greater than 10% of the closest internal standard for GC/MS analysis or which would interfere with the identification and quantitation process for GC analysis.

Records showing the reagent lots employed are maintained for all analyses. The method blank serves as a continual verification of the quality of the reagents as well as the quality of the analytical laboratory environment.

8.3 Equipment Procurement

Only equipment and supplies of the quality specified in the appropriate method or Standard Operating Procedure shall be used for analyses. Purchase requisitions require review by the Laboratory Director for suitability prior to purchase orders being issued. The Laboratory Director is responsible for ensuring that the materials being ordered are of appropriate grade/quality for the methodologies.

Upon receipt of orders, the purchase order and requisition are compared to the grade of the material shipped to ensure that the correct quality/grade was received prior to acceptance by the laboratory. The Sample Control Technician is responsible for receiving products and is required to date and initial the invoice as verification of material acceptance.

9.0 Analytical Procedures

EMA utilizes methodologies from the following accepted standard references:

- Methods for the Chemical Analysis of Water and Wastes,
- EPA-600/4-79-020, Revised 1983.
- Test Methods for Evaluating Solid Waste, EPA-SW-846, Revised 1996.

- Federal Register, 40 CFR Part 136, 2000.
- California Code of Regulations, Title 22, Divisions 4 and 4.5.

Additional methods are taken from:

- Inland Testing Manual, EPA 823-B-98-004, February 1998.
- Recommended Guidelines for Measuring Metals, Organics Compounds in Puget Sound Marine Water, Sediment and Tissue Samples, and related QA/QC Guideleines.
- LUFT Field Manual for Leaking Underground Fuel Tanks, DHS, Rev. March 1989.
- Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998.
- American Society for Testing and Materials (ASTM).
- The United States Geological Survey (USGS).
- Association of Official Analytical Chemists (AOAC).
- NIOSH Analytical Manual.
- Air Resources Board Manual.

Additionally, EMA has developed proprietary in-house methods for some parameters.

Clients are notified by EMA Project Managers through written and/or verbal communication when non-standard or significantly modified methods are to be used. Written or documented verbal client approval is required prior to use of new, non-standard, or significantly modified methods for client sample analysis. In the absence of client direction, selection of a method to be used for analysis is determined by the Laboratory Director.

Each data report issued by EMA includes a reference to the exact method employed for the analysis.

As new methods become promulgated and the laboratory demonstrates capability of performing new methods, SOPs are revised and updated accordingly to replace existing methods. Only the most recent revision for a method is used. Revised SOPs issued to personnel are accompanied by a form which personnel sign and date indication that they have read and understand the procedure.

Capability of performing an analytical method must be demonstrated prior to client sample analysis for all new and modified methods, This is accomplished through personnel training, QC Check sample analysis, Method Detection Limit, Instrument Detection Limit and Precision and Accuracy Studies.

Method capability data is maintained by the Quality Assurance Director in the Quality Assurance program files. The Quality Assurance Director is also responsible for ensuring that the laboratory staff is aware of the most current version for all methods.

10.0 Calibration Procedures

Calibration procedures are required in all areas of a laboratory setting. It is an essential component of quality control providing the correctness (or lack thereof) of laboratory procedures and instrumentation/equipment, to ensure that all aspects of data processing are of the utmost integrity.

10.1 Calibration Procedures and Frequencies

Instrument calibration is critical to generating accurate analytical data. EMA maintains strict controls on the calibration procedures for the various types of analytical equipment. Each instrument is calibrated prior to sample analysis in accordance with method criteria. The specific criteria for calibration can be found in each method SOP. Corrective action must be taken to remedy any out-of-control situations prior to analysis of any samples. Deviations from stated criteria are not acceptable.

Initial demonstration of capability for each instrument and analyst must be conducted before analysis of any samples. This includes performing instrument detection limit (IDL) and method detection limit (MDL) studies as well as having each analyst demonstrate proficiency to perform the method and obtain acceptable results for each analyte. IDL and MDL studies are updated according to each instrument SOP, occurring yearly in some cases or when major changes to the instrumentation are involved.

Instruments are calibrated in accordance with the appropriate analytical method and the manufacturer instructions. The analytical methods cite the appropriate calibration procedures and frequencies. In the event that the calibration specifications are not listed, a minimum correlation coefficient (R^2) of 0.99 or better is required.

Prior to the ongoing of analysis of samples, instruments are either calibrated or their calibrations verified. Calibration curves of signal versus concentration are generated on each analytical instrument. Calibration curves are established for each analyte of interest.

Most methods use either four or five (with a minimum of two) different calibration points for standardization. Current calibration curves are evaluated daily using a continuing calibration curve verification standard (CCV) or a laboratory control sample (LCS) or laboratory blank spike (LBS).

It is EMA's policy to validate all new standards against existing standards prior to use. The new standard's response factor (RF) should be within 10% of the previous standard's RF.

Hardcopy records of all instrument calibrations are maintained in the individual laboratory areas. These records are reviewed and are included in internal audits.

When calibration acceptance criteria or guidelines are available in a method, those criteria, or that of which is more stringent, are utilized. In the absence of method-stated criteria or guidelines, calibration acceptance criteria or guidelines from a similar method are considered to be technically sound.

10.2 Laboratory Standards and Reagents

Analytical standards utilized for method calibration and preparation of quality control samples are traceable to standard reference materials, or a certificate of analyses provided by the manufacturer.

Standards are purchased from approved and reputable commercial vendors such as Aldrich, Fisher Scientific, Supelco, etc. for use in all laboratory analyses. Certificates of analysis and expiration date information are received with standards and are maintained by each analyst.

Standards and reagents are dated upon opening, and the date of expiration recorded (expiration dates are determined by the vendor or indicated in the individual method SOP). This procedure establishes the order of use and eliminates the possibility of exceeding shelf life. A stock or working standard will be assigned an expiration date of the component with the shortest time of expiration.

Standards are protected from degradation, deterioration and contaminations based upon storage requirements and are stored properly to ensure chemical compatibility and integrity.

Each analytical batch corresponds to a sample preparation log (i.e., bench sheet) where all applicable reagent and standard lot numbers are recorded. Control check samples are analyzed with each analytical batch for all analytical procedures to ensure that the reagents used have not degraded or become contaminated.

Stock and working standard solutions are prepared fresh as required by their stability, and are checked regularly for signs of deterioration. Standards are properly labeled as to name, concentration, date prepared, solvent/medium, signature of person preparing the standard, and expiration date. Standards are traceable to analytical batches through the use of standard preparation logs and recorded dates on extraction/preparation logs.

The laboratory has established the following guidelines for the preparation of analytical standards:

1. Laboratory chemists who prepare standards are trained and experienced in calibration and the use of analytical measuring techniques.
2. Analytical reagent grade materials are utilized in preparation of standards.
3. Analytical measurement tools are calibrated to obtain accurate measurements.
4. All data generated are documented immediately in the appropriate standard preparation notebook.
5. Standards are properly labeled and referenced to standard preparation notebooks.

Laboratory contamination is minimized through implementation of a standard operation procedure (SOP) for glassware and lab-ware cleaning. The SOP is followed to ensure the removal of all traces of parameter(s) of interest and contaminants that could interfere with analysis.

Three grades of reagent water are used in the laboratory:

1. City water - The tap water used in the laboratory is supplied from the City of San Diego water supply. Its primary use is for the washing of glassware.
2. De-ionized water - This water is produced by passing tap water through a demineralization system. This water is used for some STLC preparations and as the final rinse for laboratory glassware.
3. Ultra-pure distilled water - This higher quality water is provided to the laboratory by an external supplier and meets specifications for Type I ASTM Reagent Water. This water is used for preparing inorganic and organic reagent blanks, reagent, solutions and standards.

Ultra-pure distilled waters are analyzed upon receipt of a new lot number to make sure that they meet pH and conductivity criteria for ASTM Type I and II Reagent Waters.

10.3 General Laboratory Equipment Calibration Requirements

Laboratory equipment requiring calibration, but not operational calibration, is checked on a routine basis for accuracy. These include; balances, ovens, refrigerators, freezers, automatic pipettes, and thermometers. Additionally, calibration is also performed and documented following maintenance and repair to show a return to control.

Each piece of support equipment is calibrated for every day of use. Calibration is documented in calibration logbooks for each piece of equipment. Acceptance criteria and correction factors observed are stated below or found in the support documents for individual pieces of support equipment. All out-of-control measurements and their resulting actions are documented on a corrective action form. The Laboratory Director and Quality Assurance Director are notified immediately of the out-of-control event. Non-compliant equipment is not used in the process of analyzing client samples. All out-of-compliance monitoring and corrective action measures are documented.

Equipment is calibrated against a standard traceable to NBS or other recognized physical or chemical constants. Calibration procedures are specified by the manufacturer, regulatory agency or method SOP. Procedures provide step-by-step detail for obtaining and documenting results. The data are kept on file in the laboratory and allow traceability to data generated under each equipment calibration. Calibration due dates are maintained by the Quality Assurance Director to maintain proper calibration intervals.

Balances

The calibration of balances are verified before each use with standard Class-S calibration referenced weights to within 0.001 grams of "true weight," and are calibrated annually by a licensed specialist across the full weight range of the balance.

Ovens/Furnace

Oven temperatures will be recorded during each use. The required temperature tolerance is $\pm 2^{\circ}$ C at the operating range of 60 - 300 $^{\circ}$ C for ovens and 500 - 1500 $^{\circ}$ C for furnaces. If the temperature is found to be out-of-control during analysis, the results of that analysis will not be reported and the analysis will be repeated after the oven has stabilized for 8 hours.

Refrigerators/freezers

The temperature in all the refrigerators shall be recorded each working day in the refrigerator logs and maintained at 0 - 6°C. In cases where temperatures are out of these limits, the temperature will be adjusted accordingly with the Lab Director's approval. Freezer control limits are -14°C ± 2°C.

Thermometers

Every thermometer must be checked annually against an NBS thermometer of equal or greater precision. The procedures of ASTM E77-92 for calibration are followed. Errors in temperature indications of the thermometer should not exceed the scale errors as expressed in Table 1 of ASTM E1-83.

Pipets

All automatic pipets are given a unique identification marker and calibrated on a weekly and quarterly basis according to ASTM gravimetric methods and acceptance criteria.

Syringes

Calibration certificates from the manufacturer and frequent replacement of syringes ensure accuracy of measurements.

10.4 Sample Storage Temperature Monitoring

Maintaining appropriate temperature during sample storage is of critical importance in the task of attaining valid data. The following procedures must be followed in order to maintain and monitor appropriate sample storage temperatures.

Upon sample receipt, samples for analysis are transferred to the appropriate storage refrigerators. A daily temperature check is performed to verify refrigerator temperature and these temperature readings are recorded on a log sheet for that refrigerator. Each refrigerator has a unique identification number and a separate Daily Temperature Log is maintained for each refrigerator. The thermometer in each refrigerator is immersed in a liquid such as glycerin or water. If a daily temperature reading exceeds the $4^{\circ} \pm 2^{\circ}\text{C}$ acceptance criterion, all project samples will be transferred to another refrigerator that is documented to be within the acceptable temperature range. The problem will be corrected, and corrective actions will be documented for the faulty refrigerator.

11.0 Analytical Requirements

Analytical instruments are calibrated at regular intervals recommended by the manufacturer and as required by ASTM, EPA, or other standard methods. Calibration of all equipment used and documentation of the calibration will be performed by individual chemists/ technicians as assigned by the Laboratory Director or by independent calibration firm.

11.1 GC/MS System Calibration

The gas chromatograph/mass spectrometer (GC/MS) systems are calibrated for mass and then tuned using specific instrument and method parameters. They are then calibrated for quantitation using the internal standard technique. Specific methods impose variations and/or different acceptance criteria on both the tuning and the calibration practices. These specific requirements are followed per the particular method Standard Operating Procedure.

Mass Calibration and Tuning:

The calibration of each instrument is verified at frequencies specified in the methods. Calibration and tuning the GC/MS systems is instrument specific and includes the following:

- GC/MS mass calibration using perfluorotributylamine (PFTBA);
- The tune of each system is checked using 4-bromofluorobenzene (BFB) for determinations of volatiles and with dcafluorotriphenylphosphine (DFTPP) for determination of semi-volatiles;
- The required ion abundance criteria must be met before determination of any analytes.

The background subtraction performed per the methodologies is straightforward and designed to eliminate column bleed or instrument background ions. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting special requirements are contrary to the objectives of quality assurance and are unacceptable.

11.2 Gas Chromatography System Calibration

The gas chromatography systems are calibrated using either the external or internal standard techniques. The specific acceptance criterion varies for different methods and can be located in the method in question or the EMA Standard Operating Procedure.

External Standard Calibration Procedure

For each analyte, or group of analytes, five or more concentration levels of standard are prepared by adding aliquots of one or more stock standards to volumetric flasks. The standard solutions are then diluted to volume with the appropriate solvent for the method. The lowest concentration standard should be at the concentration of the method detection limit (MDL). The other concentrations should define the working range of the system.

Each of the calibration standards are injected into the GC system using the same technique employed for actual environmental sample extracts. (i.e., 1-5 ul liquid injections, purge & trap, etc.) A series of calibration factors (CFs) are calculated for each analyte, at each standard concentration. The calibration curve is a plot of the relative response vs. the amount injected.

The CF = amount injected/total response (area). Multi-response (multi-peak) compounds use the total area of all peaks for quantitation or the average concentration of several peaks.

Each of the calibration standards is injected into the GC system using the same technique as actual samples. A series of response factors (RFs) are calculated for each analyte, at each standard concentration for the mass peak of interest for each analyte. The linearity (%RSD) is to be determined and compared to the method requirement. If the criterion is not met, the standard analyses must be repeated if quantitation of unknown samples is desired.

If the quantitation criteria are not met, in certain cases, the documentation of the ability to detect the minimum detectable concentration is sufficient to determine the presence or absence of target compounds with "estimated only" concentrations provided or a qualitative determination only.

The working average calibration factor or calibration curve must be verified each working day by the injection of a continuing calibration curve verification standard (CCV). The frequency of verification is detector dependent and varies from once per day to an average of once every five samples. If the response of any analyte is outside the acceptable response for the specified method, a new calibration curve must be prepared for that analyte.

Internal Standard Calibration Procedure:

For each analyte, or group of analytes, five concentration levels of standards are prepared by adding aliquots of one or more stock standards to volumetric flasks. In addition, a known and constant amount of one or more internal standards (IS) is added to each volumetric flask and they are then diluted to volume with an appropriate solvent. The lowest concentration should be at the method detection limit. The other concentrations should define the working range of the system.

Each of the calibration standards is injected into the GC system using the same technique as actual samples. A series of response factors (RFs) are calculated for each analyte, at each standard concentration for the mass peak of interest for each analyte. The linearity (%RSD) is to be determined and compared to the method requirement. If the criterion is not met, the standard analyses must be repeated if quantitation of unknown samples is desired.

The working average response factor must be verified on each working day by the analysis of continuing calibration verification (CCV) standard. The frequency of verification is method specific.

If the response of any analyte is outside the acceptable response for the specified method, a corrective action must be taken before the analysis continues.

If the quantitation criterion is not met, in certain cases, the documentation of the ability to detect the minimum detectable concentration is sufficient to determine the presence or absence of target compounds with "estimated only" concentrations provided or a qualitative determination only.

11.3 Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES) and ICP-Mass Spectroscopy Calibration

The ICP-OES system is calibrated daily by an external standard calibration process. The ICP-MS is calibrated daily using an external and internal standard method calibration process. The calibration specifications may vary from method to method and can be found in the particular reference or EMA SOP for that method.

Daily Standard Calibration Procedures:

For each analyte, or group of analytes, a calibration curve is generated by preparing standards from one or more stock solutions according to the method outlined in the appropriate EMA SOP. Continuing calibration standards, containing the same analyte(s) as the calibration standards are prepared in the same manner at an appropriate concentration within the calibration curve for the specified method.

Before the analysis and determination of elemental concentrations of interest can be determined, the instrument must be calibrated. This is done by creating a calibration curve from the measurement of emission for standard solutions and a blank. To ensure calibration correctness, an initial calibration verification solution (ICV) is analyzed immediately after calibration. The ICV must be prepared from a second source vendor, i.e.; source different from calibration stock standards. Continuation of calibration validation is monitored through the use of a continuing calibration verification (CCV) solution. The CCV standard is analyzed after every 10 samples. Laboratory control samples, matrix control samples, and duplicates are also used to verify calibration and method preparation techniques. Results are generally accepted if they have a percent relative deviation (%RSD) of ≤ 20 . If this criterion is not met, the sample or standard analysis must be repeated.

Results from continuing calibration standards must fall within the method specified acceptance limits. If this criterion is not met, the standard analysis must be repeated. If upon reanalysis, the standard again fails to meet this criterion, a corrective action must be taken, and the entire standardization procedure must be repeated (after source of error is indicated and resolved).

12.0 Detection and Reporting Limits

Detection levels are determined to signify the smallest amount of an analyte that can be detected in a given procedure and within a stated confidence level. These levels (limits) are defined by their purpose, ranging from levels of instrument noise, to method confidence.

12.1 Method Detection Limits

The method detection limit is the minimum concentration of a substance that can be measured with 99% confidence that the analyte concentration is greater than zero. A constituent is added to soil and water matrices to make a concentration near (within one to five times) the expected detection limit. Seven or more replicates of this sample are processed through the entire analytical method.

The MDL is determined using the standard deviation of the replicates. EMA performs Method Detection Limit Studies (MDLs) accordingly, based on each individual method criteria and for all new or modified methods. The results of all MDL studies will be reviewed by the Laboratory Director for approval before client samples are analyzed. For all analysis, the MDLs may not be higher than the regulatory limits for that parameter of interest, (taking into consideration the instrument and method limitations). MDLs must be performed for new or modified analytical methods before the analysis of client samples. All MDL data and documentation are maintained by the QA Director in the QA program files. Experimentally derived MDLs are evaluated by the QA Director and checked against method specific MDL guidelines to ensure method performance comparable to that of peer laboratories.

12.2 Instrument Detection Limits

EMA performs Instrument Detection Limit Studies (IDLs), for initial setup and verification for an analytical instrument and any time there is a major change in or maintenance of instrumentation for a particular method. A standard with a concentration near (within one to three times) the expected instrument detection limit is made. Seven aliquots of this standard is analyzed each day on three non-consecutive days and the IDL is calculated using the pooled standard deviation. The IDL is the minimum concentration of a substance that can be identified by an instrument with 99% confidence that the analyte concentration is greater than zero.

12.3 Reporting Limits

Reporting limits take into account the sample size, matrix effects, and any dilution factors. The Reporting Limit is always greater than or equal to the MDL.

Reporting Limits are evaluated by the QA Director to verify that reporting limits are greater than or equal to the experimentally determined MDL and less than or equal to project-specific reporting limit requirements.

12.4 Practical Quantitation Limits

The practical quantitation limit (PQL) is the lower limit of concentration or amount of substance that must be present before a method is considered to provide quantitative results.

13.0 Analytical Quality Control

When a referenced method contains definitive acceptance criteria and performance criteria or guidelines for QC and calibration samples, those criteria, or more stringent criteria are required by the method SOP. Data is reviewed by the analyst to SOP criteria and accepted or rejected on that basis. When QC and calibration criteria are not listed in the method, criteria from similar methods are considered technically sound for that method.

Documenting that an approach is technically sound belongs to the analyst developing a method and is reviewed for technical merit by the Laboratory Director.

13.1 Quality Control Checks

Method blanks, laboratory control samples, and matrix spikes are required for every analytical batch. Additional QC and calibration checks may be required. The corresponding frequency and performance acceptance criteria are specified in each individual method's SOP. In the absence of SOP instruction, the Laboratory Director is consulted.

The procedures used in the laboratory to ensure analytical data quality include:

Matrix Spike, Matrix Spike Duplicate, and Duplicates - are analyzed with every analytical batch or once in twenty samples, whichever is greater. Analytes stipulated by the method or applicable regulations are spiked into the matrix spike and matrix spike duplicate sample. Selection of the sample to be spiked and/or split depends on the information required and the variety of conditions within a typical sample matrix. In some situations, requirements of the site being sampled may dictate that the person sampling select a sample to be spiked and/or split based on a pre-visit evaluation or on-site inspection. This does not preclude the laboratory's spiking a sample of its own selection. In most cases, the laboratory's selection is based on the attempt to determine the extent of matrix bias or interference on the analyte recovery and sample to sample precision.

Trip Blanks - Analysis of a sealed ultrapure water sample which accompanied samples during transit, collection, and storage. The trip blank measures cumulative contamination derived from the travel blank source water, sample transit, the sample site, and the sample storage.

Field Blank - Similar to a trip blank; the field blank is opened during the sample collection process to measure the same contamination that the trip blank measures as well as the volatile airborne contaminants which may be present at the sample location that will not infiltrate the closed sample container.

Rinse Blank - Pure water which has been poured over field sampling equipment prior to sample collection to determine the possibility of equipment contamination. The rinse blank should be collected prior to use of equipment at each sampling point. It measures the possible combined contamination associated with field sampling equipment, rinse blank source water, sample transit, the sample site, and sample storage.

Source Water Blank - Analysis of the water used to prepare the rinse blanks which measure the background contaminants present in the water used for the rinse blanks.

Laboratory Water Blank - The water used to prepare trip blanks sent out by the laboratory (stored at the laboratory). They are analyzed only if the trip blank demonstrates contamination. The laboratory blank water measures contaminants derived from the laboratory pure water and laboratory sample storage facilities.

Instrument Blank - Laboratory pure water or other pure solvent analyzed at the initiation of an analytical run sequence by an instrument or between high level samples. It measures contamination

which may be present in the instrument from carry-over following the analysis of a high level sample. If contamination is present, the chemist must perform maintenance on the instrument prior to analyzing client samples.

Method Blank/Reagent Blank - Laboratory pure water that has been processed exactly the same as sample as dictated by the method procedure. It contains all of the method reagents and measures combined contamination from the laboratory pure water, the instrument, the reagents, and the sample preparation steps. This type of blank is important in distinguishing between low level field contamination and lab contamination.

Surrogates – A pure compound added to a sample in the laboratory just before processing (according to the appropriate analytical methods) which provide information on the sample extraction procedure and/or the purge efficiency. Surrogate spike recoveries should fall within the control limits set by the laboratory in accordance with the procedures specified in the method.

Laboratory Control Spike and Laboratory Control Spike Duplicate – A certified standard reference material that is spiked into a reagent blank. It is carried through all steps of sample preparation to demonstrate method performance inclusive of sample preparation steps.

Reference Standards/Reference Samples - Purchased reference standards and matrix standards are used routinely to evaluate method/analyst performance. These standards are purchased from reputable sources with certified true values.

Calibration Blanks - A standard prepared in the same manner as other standards except that it contains no analyte. Calibration blanks are used to verify a calibration curve at a low concentration.

Calibration Verification Samples – A standard used to determine the state of calibration of an instrument between periodic calibrations, or after every 10 samples of analysis, depending on method.

Internal Standards - An element or compound that is not an analyte which is added to a prepared sample and is used to quantitate analytes.

Post Digestion Spikes - Post digestion spikes are performed when a new matrix is analyzed. An analyte of interest is spiked into a sample after digestion and analyte recoveries are determined based on the analyte concentration observed.

Interference Check Samples - One or more standards with high concentrations of interfering analytes are analyzed to check compensation for interferences.

Method of Standard Additions - A sample is analyzed and then an aliquot is spiked with the analyte of interest and re-analyzed. The original sample concentration is derived based on the recovery of the standard addition sample. This practice allows for compensation for some matrix effects.

Instrument Adjustment - Requirements and procedures are instrument and method specific. Analytical instrumentation is tuned and aligned in accordance with requirements which are specific to the instrumentation procedures employed. Additionally, EMA has service contracts with instrument manufacturers. All adjustments are documented in the instrument logbook.

Calibration - Performed in accordance with the manufacturers' requirements and the procedures specified in the applicable method. All calibration procedures are documented.

Gases – Only ultra-high purity gases, filtered on line through a 5-micron molecular sieve are used. All carrier gases also flow through an oxygen removal system and a hydrocarbon trap.

Analytical batches - A unique analytical batch number is assigned to each and every set of samples and their corresponding QC Checks. These batch numbers are created by the individual chemist or technician according to standard operating procedures and are documented in notebooks. The QC requirements and number of samples composing an analytical batch vary for each method and are specified in the individual method SOP. An analytical batch consists of a group of samples with similar matrices, which are analyzed together with the same preparation sequence and the same lots of reagents. They are prepared and analyzed within the same time period or in continuous sequential time periods. An analytical batch consists of no more than 20 samples.

Certified Reference Materials – When project requirements call for analysis of certified reference materials (CRMs), applicable CRMs are purchased through the National Institute for Standards & Technology (NIST) or other applicable vendor.

13.2 Control Chart Monitoring

Control charts are used to monitor real-time and long term assessment of data quality. Control charts for each analyte of control are prepared for both water and soil matrices. For organic analyses, the analytes which are charted are those analytes required to be present in the spiking solution based upon the current SW-846 methodology.

Each control chart consists of a center line, an upper and lower warning limit, and an upper and lower control limit. For each chart, a minimum of 20 points is included. Control charts are updated periodically to ensure quality control of analytical methods.

- The center line of the control chart is the mean of the time ordered points.
- The upper/lower control limit is defined as the mean plus/minus 3 times the standard deviation of the points.
- The upper/lower warning limits are defined as the mean plus/minus 2 times the standard deviation of the mean.

A laboratory method will be considered out of statistical control when the following are observed from the control charts:

- Any one point is outside the control limits.

- Any three consecutive points are outside the warning limits.
- Any eight consecutive points are on the same side of the centerline.
- Any six consecutive points are such that each point is larger or smaller than its immediate predecessor
- Any obvious cyclic pattern is seen in the points.

The Laboratory and Quality Assurance Directors generate the control charts using the EMA LIMS system. Out-of-control events will illicit the response of direct notification to the appropriate departmental supervisor whereby an investigation will occur. If it is determined to be an out-of-control event, and not a possible random error, corrective actions such as instrument recalibration and sample reanalysis will be taken. Corrective actions are determined on a case-by-case incidence. All corrective actions shall be documented and maintained in the QA program files.

14.0 Project Documentation

Guidelines set forth by the EPA and other regulatory bodies maintain that a comprehensive set of documentation pertaining to each sample must be thorough and complete. At EMA, Inc. our clients are ensured that all pertinent information, including project parameters scripted by the client, are included in our records for traceability and comparative reasons.

14.1 Recording Raw Data

Laboratory data can be generated in the following ways: instrument generation of electronic data files, local generation of data using instrument software and in-house spreadsheets, and manual recording of observed measurements. Reporting forms are completed by the individual analyst. Raw data is maintained in completed notebooks or data packages. Reduced raw data will be checked for error by peer review, Senior Chemists/Supervisors, and the Laboratory Director and subject to spot checks during internal audits by the QA Director.

14.2 Project Documentation Storage

There are two document categories associated with a project. The first is the project file. This file contains the following documents:

- Contracts, purchase orders, task orders, and other work authorization
- Correspondence and documentation of telephone conversations
- Project Plans and Project QA Plans (if provided)
- Project specific Statements of Work (SOWs), (if applicable)
- Project related internal laboratory correspondence

This file is under the custody of the Project Manager/Q.A. Director and available to all whom may need to retrieve the information. A majority of the information is stored in the EMA LIMS system for direct access.

The second category of document storage pertains to the analytical data gathered for the specific project. The files maintained for this sort of information include a copy of the final project report/QC report, copies of any bench sheets and raw data, as well as references to the file location of the original raw data. These files are kept throughout the lab and are under the custody of all those involved in the data process. The files will be stored in an accessible format for 5 years.

14.3 Communication of Project Requirements

Upon receipt of samples, the Sample Control Technician notes any project-specific requirements on the chain-of-custody and verbally notifies chemists and technicians of any requirements that differ from “standard” methods. These requirements are also documented on the daily in-house aging report issued to all personnel.

When project managers receive notice of changes to project requirements during the course of work, they communicate these changes verbally to the affected chemists or technicians and in a written communication log which is attached to the project documents. They also notify the Sample Control Technician, who documents the changes on the daily in-house aging report issued to all personnel.

15.0 Data Reduction, Validation and Reporting

Data reduction includes all processes that change either the form of expression (i.e.: units) or the quantity of the data values (rounding). Data reduction often involves statistical and mathematical analysis of data and usually results in a reduced subset of the original data set (i.e.: an average of three data points). Wherever employed, mathematical procedures will be verified for accuracy of computation.

All data are generated and reduced in accordance with the method SOPs. The data can be reduced by:

1. Manual computation directly found on an instrument/analysis logbook page or data sheet or
2. Computer processing of raw data via direct instrument linkage or manual entry.

The analyst who generates the data is directly responsible for ensuring that the computations are correct and complete and that all data reduction is documented appropriately for subsequent data review and validation. Any additional equations used in the data reduction process are required to be evident in the documentation. The computations are reviewed on a regular basis for accuracy by the Laboratory Director.

The analyst is responsible for verifying that the data reduction is correct for the project, sample numbers, calibration RFs and/or correlation coefficients, units, detection limits, dilution factors, volumes/weights used and moisture correction (when applicable).

15.1 Laboratory Data

All sample preparation activities are documented by the chemist or technician performing the work in laboratory notebooks or laboratory worksheets. These serve as the primary record for subsequent data reduction.

Laboratory data is generated in the following ways: instrument generation of electronic data files, local generation of data using instrument software and in-house spreadsheets, manual recording of observed measurements. Consistent data collection is achieved through the existence and use of SOPs.

Outputs from all instruments are monitored for readability and consistency. If clarity is less than desired, corrective actions are undertaken to rectify the output based on instrument manufacturers' recommendations.

Laboratory forms, data sheets, logbooks, and reporting forms have a standard format to ensure that all pertinent information is recorded consistently. These forms are generated by the QA Director and are regularly monitored to ensure compliance with established requirements.

Analysts have control over and access to all data they have generated. Limited access policies, including password codes for computer generated data access, maintain security of data.

Data are checked for accuracy and precision by the chemist, the QA Director, and the Laboratory Director. The validity of data shall be supported by the maintenance and inspection of the following records:

- Description of calibration
- Documentation of traceability of standards
- Documentation of analytical methodologies (SOPs) and QC Methodology
- Method blank results to check for contamination and interference
- Laboratory Control Sample results will be inspected as to whether they fall inside the acceptable control limits.

15.2 Laboratory Data Validation and Reporting

Data validation is the systematic process of data evaluation for acceptance or rejection based upon a set of criteria. It is a systematic procedure of reviewing a body of data against a set of criteria to provide assurance of validity prior to its intended use.

Chemistry data validation is performed by the Chemist, Departmental Supervisor, the Laboratory Director, and the QA Director. Validation is accomplished through routine audits of the data collection and flow procedures and by monitoring of QC sample results.

Data validation includes dated and signed entries by chemists on the worksheets and laboratory notebooks used for all samples; the use of sample tracking and numbering systems to track the

progress of the sample in the laboratory; and the use of quality control criteria to reject or accept specific data.

The raw data is compared with the report forms for agreement. The raw data and/or report forms are compared to the final LIMS generated report for agreement. This review is the final assessment of completeness and accuracy of the data. If there is a discrepancy of any type, the standard procedure for verification and confirmation is followed.

If raw data does not agree with the forms, the cause will be determined, the source of the problem will be corrected, and all incorrect data from the point of error will be corrected. A corrective action form will be completed to indicate the corrective action for the results and/or laboratory samples affected. Audit trails are maintained for data changes through analytical batch preparation records.

After all appropriate changes are made; another review of the data in question is performed. This will ensure that forms and raw data agree.

15.3 Data Collection and Flow Audits

Data collection and flow audits are performed routinely and include:

- Review of sample documents for completeness
- Daily review of test results
- Daily review of performance indicators and QC sample results
- Random calculation checks
- Review of all reports prior to and subsequent to data entry
- Review and approval of final report by Laboratory Director

15.4 Data Review

Data review is performed prior to release of the data to the client. It is performed as soon as possible after data acquisition in order to provide sufficient time for corrective action if required.

In the data review process, the data undergo a minimum of two separate reviews. The data are compared to information such as the expected characteristics of the sample, the sample preparation steps, and QC sample data to evaluate the validity of the results.

Corrective action is minimized through the development and implementation of routine internal system controls. Chemists are provided with specific criteria that must be met for each procedure, operation, or measurement system.

In order to prevent transcription errors, all stages of data deliverable preparation are subject to audit, peer review, and supervisory review.

Supporting material, such as chromatograms are compiled by the analyst and incorporated into the data deliverables by the data processor.

The final deliverable is reviewed for transcription and typographical errors by the Laboratory Director prior to release to the client.

15.5 Documentation

Upon completion of the project or job task, the final report will be compiled and includes a brief narrative discussion of the analyses, the analytical results, and the QC results. The final report is reviewed and approved by both the QA Director and the Laboratory Director.

A documentation control system assures that all documents for a given project are accountable and traceable. It includes chain-of-custody records, all logbooks, graphs, raw data, and other miscellaneous items.

15.6 Recordkeeping

Documentation in the laboratory is initiated by the Sample Control Technician who receives samples, assigns laboratory numbers and maintains laboratory custody logbooks which document sample movement in the laboratory.

Samples are processed together in a batch by the analysts. A batch consists of a number of samples carried through the entire analytical procedure, along with QC samples and blanks. All work performed on a sample batch is documented in laboratory logbooks which are described as follows:

Sample Receiving Logbook

This logbook lists samples as they are received into the laboratory and assigned unique sample identification numbers. This number corresponds to the LIMS generated numbering system.

Instrument Maintenance Logbook

A unique logbook is maintained for each system and used to record the maintenance and upkeep of analytical instruments.

Standards Logbook

Used for tracing all laboratory prepared or purchased standards back to certified standards or stock solutions. All standards are entered into the EMA LIMS from the vendor certified standard sheets. It indicates standard traceability. Documented in this logbook are all activities associated with the standard preparation process.

Data Notebook or Bench sheets

This is used to document all activities associated with the analytical process and recording raw data of every batch.

In some instances, analytical data recording and standards preparation may be included in a single notebook.

15.7 Rules Governing the Use of Logbooks

1. Bound notebooks with pre-numbered pages are preferred record-keeping forms. Loose sheets, if used, are ultimately secured in notebooks.
2. All writing must be legible and in ink. All numbers are clear. Corrections are made by drawing one line through the incorrect entry, entering the correct information, initialing, and dating the entry.
3. Complete information should be entered so that in an examination, it can be determined what was done, when and what the results were.
4. If any data are determined to be invalid, reasons are indicated.
5. All relevant information is included (i.e.: the manufacturer and lot number of a chemical, the specific procedure reference, etc.)
6. When work is continued in another notebook or logbook, the number of the first notebook is written in the first page of the new notebook and vice-versa for easy reference.

15.8 Document Control

Document control is accomplished through the use of a centralized location of document inventories. Records, including raw data, supporting documentation, and electronic media are retained for a minimum of 5 years. After on-site storage for one full year, records may be transferred to a secured off-site storage facility. The QA Director maintains control of laboratory generated documents.

The EMA document control system, under the control of the QA Director, ensures that methods and procedures are followed in a consistent manner.

The document control system provides for the following:

- Managerial review and approval of documents prior to issue;
- A unique document control number for each document including the QA Program
- Manual and SOPs;
- A central location for all documents;
- A systematic method for distribution of all documents;
- A tracking system for existing documents;
- Identification of document revisions;
- A mechanism for periodic review of documents;
- Cataloging and archival of outdated materials in secured storage;
- Retrieval of raw data by authorized personnel only;
- A focal point for information exchange;
- Establishment of standardized methods and procedures;
- Scheduled review and revision of documents, including QA program documents.
- Internal systems audits confirm use of current SOPs
- All quality assurance program documents are revised by the QA Director; and,
- Current revisions of documents replace older versions.

15.9 Standard Operating Procedures

The laboratory maintains SOPs for each methodology or procedure used. SOPs are updated frequently for any revisions made. Changes in documents reflect actual procedures being followed. Before any revision is made, documents are submitted to the Quality Assurance Director for approval of the proposed revision. Minor changes are those which do not affect the content or quality of the action being prescribed in the document.

An addendum, subject to review and approval by the Quality Assurance Director, may be attached to a document to reflect policy and procedural changes which become effective between revisions. These changes are then incorporated into the body of the document at the time of the next revision.

15.10 Verification of Software

All computer software used to acquire, process, or report data shall be verified upon initial use and re-verified after any modification. Manual calculations are performed to verify all computer calculations for at least one sample from every analytical batch.

Limited access policies for software and data maintain security and integrity of these systems.

EMA currently uses local and instrument software, and the Element Datasystem Laboratory Information Management Systems (LIMs). Data is backed up on a daily basis and the data storage tape removed off site daily. Additional software quality assurance requirements will be added as deemed necessary.

16.0 Quality Assurance Project Plans

Project specific Quality Assurance Project Plans (QAPjPs) may be developed to meet contract and agency requirements on a project specific basis. These plans discuss specific terms, policies, objectives and QA activities to achieve the data quality objectives of the project. QA Project Plans are generally written in accordance with the US EPA Document Guidelines and Specifications for Preparing Quality Assurance Project Plans.

The QAPjPs follow the format listed below as applicable (additional information is added, if required):

Section	Title Page
1.0	Table of Contents
2.0	Approval Signatory Page
3.0	Introduction
3.1	Project Description
3.2	Background
3.3	Definition of Terms
3.4	Purpose

- 3.5 Scope
- 4.0 Project Organization and Responsibilities
- 5.0 QA Objectives for Measurement Data, in terms of precision, accuracy, completeness, comparability and representativeness
- 6.0 Sampling Requirements
- 7.0 Sample Custody
- 8.0 Calibration Procedures and References
- 9.0 Analytical Procedures
- 10.0 Data Analysis, Validation, and Reporting
- 11.0 Quality Control
 - 11.1 Internal QC Checks
 - 11.2 Performance and System Audits
 - 11.3 Preventative Maintenance Procedures and Schedules
- 12.0 Data Quality Assessment
- 13.0 Corrective Action
- 14.0 QA Reports to Management

17.0 Performance and System Audits

The laboratory is subject to both internal and external audits, in order to monitor the capability and performance of the total measurement systems.

Performance and systems audits are conducted semi-annually by the QA Director and encompass all activities of the laboratory, to assess compliance with established methods, policies and procedures. These audits are both scheduled and unscheduled.

An audit is defined as a systematic check to determine the quality of the laboratory operation and activities. The following are definitions of audit types:

Performance Audit - determines the accuracy of the total measurement system, or portions. Test samples are analyzed and results evaluated.

System Audit - an evaluation of all components of the lab's measurement systems to determine their proper selection and use, including QC procedures.

A copy of audit findings and any proficiency test results obtained are submitted to the EMA President and Laboratory Director in monthly quality assurance reports.

17.1 Performance Audit

A performance audit involves analysis of reference samples of concentrations unknown to laboratory personnel to evaluate analyst/method performance. Reference standards or matrix standards are purchased from reputable suppliers (Environmental Resource Associates and USEPA) or prepared using traceable standards and submitted to the laboratory by the QA Director. The true values or reference values are available only to the QA Director.

Internal performance audits are accomplished by the laboratory through the use of blind check samples (when available), replicate measurement evaluations, and individual proficiency test samples. Results are compared to "true" values and evaluated for accuracy and/or precision. Records are maintained by the QA Director.

EMA is a participant in the EPA Water Pollution (WP), Water Supply (WS) and Soil Proficiency programs. Performance evaluation check samples are analyzed on an annual basis and are submitted to the California Department of Health Service, Environmental Laboratory Accreditation Program and EPA Region 9 for compliance under the State Certification. Please refer to Appendix H for a copy of our external certification.

17.2 Systems Audit

The laboratory systems audit is designed to verify that all QA/QC practices are being followed and that all procedures and protocols are fully understood and upheld by laboratory personnel. It also is used to find problems which may have entered the system or for which the QA/QC program is insufficient. General audit checklists which apply to all lab areas and procedures have been developed, and are used for documenting audit and surveillance findings.

Audits ensure that laboratory quality control criteria are adhered to and proper corrective action is implemented, when required. All inquiries relative to data quality issues are reviewed and any corrective actions identified.

Additional audits performed by various regulatory agencies will be conducted periodically.

System audits are performed to provide an objective evaluation of compliance with established requirements, methods, and procedures. Audits also determine the adequacy of the QA program. Re-audits verify efficacy of corrective actions.

The audits include an evaluation of the work areas, activities, processes, review of documents and records, storage of standards and reagents, housekeeping, good laboratory practice, analytical procedures, and quality control.

The auditor uses a prepared audit checklist, documents the audit in writing, and signs the audit report. The audit report contains sufficient information to stand alone as a document.

Any deficiencies noted during the audit are discussed with the audited department within 5 days of the audit. All corrective actions are taken and a formal response submitted to the auditor following receipt of the audit report. The auditor re-audits the area to determine that the corrective action was implemented and the deficiency corrected.

System audits include an evaluation of the following:

1. Assessment of compliance with the QA Program
2. Verification of and adherence to written procedures

3. Data storage and record keeping
4. Analytical data review and validation procedures

17.3 External Audits

An on-site audit is performed every two years by the California Department of Health Service, Environmental Laboratory Accreditation Program to verify the laboratory has all equipment, documentation, personnel, and standard operation procedures needed for performance of EPA requirements. Other agencies with which EMA has contracts may perform site audits.

17.4 Subcontracted Services Audits

EMA occasionally sends selected analyses to a subcontract laboratory. The most common reason for utilization of a subcontractor facility is that the procedure is not routinely performed by EMA. Subcontracting of analyses is not conducted without client approval.

All subcontract laboratories utilized by EMA on a continuing basis are overseen by EMA Project Managers and require approval of the QA Director prior to use. The subcontractor and EMA agree on the specific quality control, analytical requirements, and acceptance limits to be performed prior to use.

Subcontract laboratories may receive an on-site systems audit by a representative of EMA' staff or be subjected to double-blind performance evaluations.

All data produced by another laboratory is identified.

18.0 Instrument Maintenance Procedures

Preventative maintenance is the program of defensive actions for averting failure of equipment and ensuring optimal performance of instrumentation. These actions may include specification checks, lubrication, cleaning, reconditioning, adjusting, etc.

A preventative maintenance program for the instrumentation ensures fewer interruptions of analyses, personnel efficiency, and lower repair costs. It eliminates premature replacement of parts, and reduces discrepancy among test results.

All EMA laboratory employees using the instrumentation are fully trained; having developed troubleshooting skills that enable them to recognize problems, their causes and appropriate corrective actions, quickly and accurately to reduce equipment failure. Service contracts are maintained for several pieces of equipment to guarantee expedient service and reduce analytical down-time.

Instrument maintenance is deemed necessary when an instrument is inoperable, is not performing acceptably or as expected, or a change in the performance characteristics of the instrument is noted.

EMA maintains maintenance logs and several service contracts for all major instrumentation. Major maintenance and repair of instrumentation is only performed by qualified analysts and manufacturer recommended service representatives.

Following major instrument maintenance and repair activities, a return to analytical control must be demonstrated and documented through performance according to typical QA/QC requirements.

Written equipment maintenance records are kept to document all maintenance and repair activities. Instrument performance criteria are established to determine the need to make adjustments to the instrument operating conditions.

The following are examples of general measures that are performed throughout the laboratory as a part of the preventative maintenance program.

GC/MS Systems

- Injection port liners and gold seals are replaced daily or as deemed necessary.
- Two to three inches of the front of the pre columns or capillary columns are removed as deemed necessary.
- Septa are inspected and replaced (if necessary) before each batch sequence.
- Ion source is cleaned as required.
- Mass Spectrometers are tuned every 12 hours of use.
- Compressed gas cylinders are checked daily.
- Autosampler wash bottles are changed at the beginning of each sequence.
- Gas filters on carrier lines are checked weekly.

GC Systems

- Septa are replaced before starting a new sequence run.
- Compressed gas cylinders are checked daily.
- Solvent blank is injected before starting a new sequence run to demonstrate the system is free of interfering artifacts.
- Flows are checked before starting sequence.
- Autosampler wash bottles are changed at the beginning of each new sequence run.
- Gas filters on carrier lines are checked weekly.

ICP and ICP-MS

- Nebulizer and spray chamber are cleaned as needed.
- Torch, sample cones, center tubes and other consumables are cleaned on a regular basis.
- Tubing is replaced daily or every other day depending on use.
- Filters for the ICP-OES are cleaned weekly.
- Waste containers are disposed of in the proper waste receptacle weekly.
- Lenses are cleaned as deemed necessary.

pH Meters

- Gel-type electrodes are inspected prior to use and cleaned with Alconox-type soap solution to remove oily residues.
- Meter is calibrated daily before use using a two point calibration and verifying with a third point for the slope check. If calibration or slope has deteriorated, the electrode is cleaned and treated with 1N HCL, then recalibrated.
- pH electrodes are stored in fresh pH 7.0 buffer solution when not in use.

Analytical Balances

- All balance surfaces are cleaned daily and covered when not in use.
- Analytical balances are calibrated and cleaned annually by manufacturer's representatives.
- Labels are attached to each balance indicating date of last calibration.
- The accuracy of each balance is checked against "S" Class weights prior to use.

Autoclave

- All interior and exterior surfaces are cleaned daily.
- Sterilization temperatures are monitored to be in control for every sterilization task.

Incubators and Water-baths

- All interior and exterior surfaces are cleaned daily.
- Incubator and water-bath temperatures are monitored two times per day at least four hours apart for temperature control.

19.0 Procedures for Assessing Precision, Accuracy and Completeness

Definitions according to *Standard Methods For The Examination of Water and Wasterwater 20th Ed.*:

Precision: Measure of the degree of agreement among replicate analyses of a sample, usually expressed as the standard deviation.

Accuracy: Combination of bias and precision of an analytical procedure, which reflects the closeness of a measured value to a true value.

Bias: Consistent deviation of measured values from the true value, caused by systematic errors in a procedure.

19.1 Precision

Reproducibility among duplicate samples provides a determination of precision in analytical testing. Precision is determined by splitting actual samples which cover a wide range of concentrations and a variety of commonly encountered interfering materials.

Duplicates and Duplicate Matrix Spiked Samples are run at a frequency of every 10 to every 20 samples analyzed as specified in the particular method or SOP. Acceptable RPD (relative percent difference) results are <20% or <30% depending upon the sample matrix type analyzed and specific analysis performed.

Duplicate

A duplicate is a regular sample which is split and carried through the entire sample preparation and analysis procedure with the sample set. Duplicate results provide information regarding the sample matrix effects, and the method efficiency. Duplicate samples are run at a frequency of one for every 20 samples analyzed, or at a minimum of one per analyzed batch and matrix, whichever is greater.

Matrix Spike

A matrix spike is a regular sample that is split into three sub-samples and two of the replicates are spiked with analyte solution at the same concentration. The two spiked replicates are defined as the matrix spike and the matrix spike duplicate. The matrix spike and the matrix spike duplicate samples are carried through the sample preparation and analysis procedure with the sample set. Matrix spikes are run at a frequency of every 10 to 20 samples analyzed, or at a minimum of once per analyzed batch and matrix, whichever is greater. The matrix spike and matrix spike duplicate results provide information regarding the precision of the matrix spike and matrix spike duplicate, the sample matrix effects, and the method efficiency.

The difference between the matrix spike and the matrix spike duplicate are reported as RPD as calculated below.

$$RPD = \frac{MS - MSD}{\frac{(MS + MSD)}{2}} \times 100$$

RPD = relative percent difference

MS = Matrix Spike Result

MSD = Matrix Spike Duplicate Result

19.2 Accuracy

Accuracy is the degree of difference between observed and actual (known) values. Accuracy is determined by analyzing reference samples. Acceptable percent recoveries for matrix spikes are based upon statistical control limits. Control limits are equal to or narrower than the EPA published control limit ranges for each method.

Percent recovery calculations are determined through the following equation:

$$\% \text{ Recovery} = \frac{(C_o - C_s) \times 100}{C}$$

C_o = Concentration observed in analysis

C = True value of standard

Cs = Concentration observed in unspiked sample

Spike data can be indicative of matrix bias or interference on analyte recovery as well as sample preparation procedure performance. A spiked sample is a regular sample to which a known concentration of analyte is introduced. The sample is then carried through the entire workup or extraction and analysis procedure with the other samples in the sample set. The spike is reported as percent recovery.

20.0 Corrective Actions

The purpose of a formal corrective action process is to identify areas that require improvement and to ensure that long term corrective action is put in place to resolve the problem in a permanent manner.

Corrective actions are required any time project or method requirements are not met or as a result of audit deficiency findings. The laboratory Director and QA Director are notified immediately and the approach and time frame of the corrective action is discussed. The out-of-control situation is documented and the client is notified.

Whenever possible, a long term resolution to the occurrence is desirable. In some instances involving unusual circumstances, a long term corrective action may not be appropriate. This process is designed to handle both types of occurrences and to document the action that was taken. A fundamental goal of the corrective action process is to foster continual improvement in laboratory operations. Corrective actions are monitored to make certain that similar problems do not recur.

Daily quality control procedures are designed to identify the need for corrective action. Most corrective actions are performed by the chemists doing the analysis, and are usually as simple as re-calibrating an instrument should the instrument check sample or CCV fall outside it's acceptable range, or resulting because of a power failure. Most corrective actions are described in methods, standard operating procedures, and instrument manuals.

Corrective actions may also be initiated as a result of various quality assurance activities, including:

- Performance audits
- System audits
- Performance evaluation or check sample studies
- Program audits, and
- Review of raw data

Standard operating procedures for corrective actions are to:

- Define the problem
- Determine the cause(s) of the problem
- Determine possible solutions to the problem
- Implement corrective action

- Verify that the corrective action is effective, and
- Document the corrective action and its effectiveness

All employees must immediately bring to their supervisor's attention any problem or practice which they feel may affect data quality. If control parameters are outside acceptability criteria analysis must cease immediately and all affected samples must be reanalyzed when the system is corrected.

The need for corrective action may result from:

- Instrument malfunction
- Failure of internal QA/QC checks
- Failure to follow-up on performance or system audit findings
- And non-compliance with QA requirements

Corrective actions taken depend on the type of analyses and the extent of the error and are discussed with the Laboratory Supervisor and/or Laboratory Director. If the problem is indeterminate and cannot be controlled, the laboratory evaluates its impact on the data.

The QA Director and Laboratory Director shall determine that corrective actions proposed and agreed upon are actually implemented and successful. When corrective actions are implemented, evidence of their success shall be documented. Corrective action documents are to be signed and dated by the Chemist, and the Laboratory Director.

All corrective action documents are reviewed and maintained by the QA Director in the QA program files.

20.1 Client Concerns

The corrective action procedure is used to handle routine client inquiries concerning data reports. In some cases, an investigation regarding the concern may indicate that no problem was found. In other situations, the investigation may reveal a problem and the corrective action to prevent that occurrence in the future will be required.

The corrective action process involves the following actions:

- Client concerns are addressed accurately and in a timely fashion.
- The concern is properly identified and documented.
- Responsibility for investigation is assigned.
- The cause of the problem is investigated and determined.
- The appropriate long-term corrective action is determined and implemented.
- The complete corrective action process is documented.

If a new data report needs to be issued as a result of the investigation, the Laboratory Director is responsible for issuance of the revised report. All revised data are marked as such.

20.2 Criteria Used for Determining an Out-of-Control Event

Factors that affect data quality require investigation and corrective actions. All out-of-control events are investigated to determine whether the condition indicates a procedure that is truly out-of-control, or a possible random error. Any corrective actions taken are to be documented, whether the analytical batch is repeated or the data was reviewed and released to the client (included in the documentation is the rationale behind this decision).

20.3 Procedures for Stopping Analysis

Whenever an analytical system is out-of-control, investigative-corrective action is initiated. Once corrective actions have been implemented, samples may be reanalyzed. If a sample batch reanalysis is out-of-control following corrective actions, all analytical work for the method will cease immediately. A detailed investigation shall be conducted to identify the source of the problem. Sample security, integrity of standards, glassware preparation, reagents, notebooks, instrument performance, and method adherence shall be included in this investigation.

All actions taken will be documented.

21.0 Timeliness of Data Reports

EMA recognizes the timeliness of data reports is assessed as an important part of the quality of our services from the client's perspective. High quality data when received several weeks late is not acceptable. In recognition of this, EMA tracks all projects from the time they are received to the report completion and mailing (or facsimile transmission) of results. EMA's tracking procedure is designed to monitor and maintain on-time report generation.

All staff queries for their respective analyses a daily basis. Project Managers track the status of all samples as they are processed from the moment they are received through the final delivery of the report. Weekly status meetings are held to assess the status of samples processed in the laboratory. When problems arise, clients are notified well in advance.

EMA monitors our success in the timely delivery of reports to clients on a monthly basis. The date clients are promised delivery is compared to the date actually mailed or faxed to the client. This monitoring serves to identify service trends, helps to maintain timeliness, and ensures that corrective action will be taken before problems occur.

22.0 Quality Assurance Reports to Management

The QA Director completes monthly reports issued to the President and Laboratory Director of EMA regarding quality activities of the laboratory.

- A typical report includes such information as:
- Proposed revisions in the QA program;
- Performance evaluation results;
- Systems audit results;

- Changes in certification status;
- Significant QA concerns and recommendations for resolution; and,
- Accomplishments since previous report.

Copies of quality assurance reports are maintained by the QA Director in the quality assurance program files.

23.0 Quality Assurance Program Revisions

Revisions to the EMA Quality Assurance Program Manual can be made upon written approval of the Laboratory Director and the QA Director. Program revisions are to be presented to the Laboratory staff for implementation immediately following approval. Client-requested QC procedures may be incorporated on a project basis provided the procedures are not in opposition to the objectives of quality assurance and the EMA Quality Assurance Program. Revisions must be documented and kept on file for review.

Appendix A
Sampling Guidelines

General Wet Chemistry Analyses

ANALYSIS/TEST	SPECIFIC METHOD	CONTAINER Water; Soil	PRESERVATIVE	TEMPERATURE	MINIMUM SAMPLE REQUIRED Water; Soil	HOLDING TIME
Alkalinity	SMEWW 2320 B	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	14 days
Ammonia	SMEWW 4500-NH3 B,C	250 ml poly; 4 oz. glass jar	H ₂ SO ₄ to pH < 2	0 - 6°C	50 ml; 5 g	28 days
* BOD	SMEWW 5210 A-B	1 L poly	UNPRESERVED	0 - 6°C	1 L	48 hr
Bicarbonate	SMEWW 2320 B	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	14 days
Carbonate	SMEWW 2320 B	250 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	14 days
Chloride	SMEWW 4500 Cl- C, D	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 50 g	28 days
* Chlorine, Residual	SMEWW 4500 Cl- G	125 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	15 minutes
COD	EPA 410.4, HACH 8000	125 ml poly; 4 oz. glass jar	H ₂ SO ₄ to pH < 2	0 - 6°C	25 ml; 5 g	28 days
* Coliform (Total+Fecal)	SMEWW 9221 B, E	100 ml poly-bacti	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
* Coliform (Total+E. Coli) by Colilert	SMEWW 9223, Colilert®	100 ml poly-bacti	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
Conductivity (E.C.)	EPA 120.1, SMEWW 2510 B	125 ml poly	UNPRESERVED	0 - 6°C	25 ml	28 days
Cyanide (liquid)	EPA 9014, SMEWW 4500 CN C	500 ml poly	NaOH to pH > 12	0 - 6°C	250 ml	14 days
Cyanide (solid)	EPA 9014	4 oz. glass jar	UNPRESERVED	0 - 6°C	25 g	14 days
* Fecal Streptococcus & Enterococcus Groups	SMEWW 9230, Enterolert®	100 ml poly	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
Flashpoint	EPA 1010, 1030	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 100 g	none
Fluoride	EPA 9214, SMEWW 4500 F C	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	28 days
* Heterotrophic Plate Count	SMEWW 9215 B	100 ml poly	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
* Hexavalent Chrome (Cr+6)	EPA 3060, EPA 7196 A, SMEWW 3500 Cr D	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 10 g	24 hr
* MBAS (Surfactants)	SMEWW 5540 C	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	200 ml; 10 g	48 hr
* Nitrate	SMEWW 4500 NO3 E	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 100 g	48 hr
* Nitrite	SMEWW 4500 NO2 B	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 100 g	48 hr
Nitrogen; TKN	SMEWW 4500 N C	250 ml poly; 4 oz. glass jar	H ₂ SO ₄ to pH < 2	0 - 6°C	50 ml; 10 g	28 days
* pH	EPA 9045 C, SMEWW 4500 H+ B	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	25 ml; 10 g	15 minutes
Phenols, Total	EPA 420.1, 9065	250 ml Amber; 4 oz. glass jar	H ₂ SO ₄ to pH < 2	0 - 6°C	250 ml; 50 g	28 days
* Phosphate, Ortho	SMEWW 4500 P E, HACH 8048	125 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 10 g	15 minutes
Phosphorus, Total	SMEWW 4500 P E, HACH8190	125 ml poly; 4 oz. glass jar	H ₂ SO ₄ to pH < 2	0 - 6°C	50 ml; 5 g	28 days
* Solids, Settleable (SS)	SMEWW 2540 F	1 L poly	UNPRESERVED	0 - 6°C	1 liter	48 hr
Solids, Total Dissolved (TDS)	SMEWW 2540 C	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	7 days
Solids, Total Suspended (TSS)	SMEWW 2540 D	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	7 days
Solids, Total	SMEWW 2540 B	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	7 days
Sulfate	SMEWW 4500 SO4 E	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	28 days
Sulfide, Total	EPA 9034, SMEWW 4500 S D	250 ml poly; 4 oz. glass jar	NaOH/Zn Acetate	0 - 6°C	50 ml; 5 g	7 days
Sulfide, Dissolved	SMEWW 4500 S D	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 5 g	7 days
Total Organic Carbon (TOC)	EPA 9060, SMEWW 5310 B	125 ml Amber; 4 oz. glass jar	H ₂ SO ₄ to pH < 2	0 - 6°C	50 ml; 10 g	28 days
* Turbidity	SMEWW 2130 B	250 ml poly	UNPRESERVED	0 - 6°C	50 ml	48 hr
Total Volatile Solids (TVS or VSS)	SMEWW 2540 E	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	28 days

g-gram ml-milliliter

* These analyses have short holding times. Please coordinate delivery time for these analyses.

** Recommended holding times for coliforms are 6 hours. Between 6 - 24 hours holding results become questionable. After 24 hours holding, results are considered unacceptable.

4340 Viewridge Ave., Suite A
 San Diego, CA 92123
 Phone/Fax: (858) 560-7717 / (858) 560-7763

Organic Analyses

ANALYSIS/TEST	SPECIFIC METHOD(S)	CONTAINER Water; Soil	PRESERVATIVE	TEMPERATURE	MINIMUM SAMPLE REQUIRED Water; Soil	HOLDING TIME Water*; Soil
Oil & Grease	EPA 1664A	1 L amber	HCl to pH < 2	0 - 6°C	1 L	28 days
Oil & Grease	EPA 413.2	500 ml amber; 4 oz. glass jar	H ₂ SO ₄ to pH < 2 for liquids	0 - 6°C	500 ml; 50 g	28 days
TRPH	EPA 418.1	500 ml amber; 4 oz. glass jar	H ₂ SO ₄ to pH < 2 for liquids	0 - 6°C	500 ml; 5 g	28 days
Purgeable Halocarbons (Chlorinated Solvents)	EPA 601, EPA 8021 B	(2) 40 ml VOA Vial; 4 oz. glass jar	HCL to pH < 2 for liquids	0 - 6°C	40 ml; 40 g	14 days
Aromatic Volatile Organics	EPA 602, EPA 8021 B	(2) 40 ml VOA Vial; 4 oz. glass jar	HCL to pH < 2 for liquids	0 - 6°C	40 ml; 40 g	14 days
Organochlorine Pesticides and PCBs	EPA 608, EPA 8081, EPA 8082	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 30 g	7/40; 14 days
Organophosphorous Pesticides	EPA 8141	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 40 g	7/40; 14 days
Volatile Organic Compounds (VOCs)	EPA 624, EPA 8260 B	(2) 40 ml VOA Vials; 4 oz. glass jar	HCL to pH < 2 for liquids	0 - 6°C	40 ml; 40 g	14 days
Semi Volatile Organics (SVOCs)	EPA 625, EPA 8270 C	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 40 g	7/40; 14/40 days
Organotin Compounds - Tributyltins (TBT)	GCFPD	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 40 g	7/40; 14/40 days
Total Petroleum Hydrocarbons (TPH) - Gas	EPA 8015 B, DOHS LUFT Method (liquid), ASTM D2887 (solid)	(2) 40 ml VOA Vials; 4 oz. glass jar	HCL to pH < 2 for liquids	0 - 6°C	40 ml; 10 g	14 days
Total Petroleum Hydrocarbons (TPH) - Diesel	EPA 8015 B, DOHS LUFT Method (liquid), ASTM D2887 (solid)	125 ml Amber; 4 oz. glass jar	HCl to pH < 2 for liquids	0 - 6°C	40 ml; 10 g	14 days

Metals Analyses

ANALYSIS/TEST	SPECIFIC METHOD(S)	CONTAINER Water; Soil	PRESERVATIVE	TEMPERATURE	MINIMUM SAMPLE REQUIRED Water; Soil	HOLDING TIME
Hexavalent Chrome (Cr+6)	EPA 3060, EPA 7196 A, SMEWW 3500 Cr D	250 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 10 g	28 days (with preservation)
Mercury	EPA 245.1, EPA 7471, EPA 7470	500 ml poly; 4 oz. glass jar	HNO ₃ to pH < 2	0 - 6°C	500 ml; 100 g	28 days
Metals*	EPA 6010, EPA 6020, EPA 3050, EPA 200.7, EPA 200.8	500 ml poly; 8 oz. glass jar	HNO ₃ to pH < 2	0 - 6°C	500 ml; 100 g	6 mos
STLC metals	Title 22-WET	500 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	500 ml; 200 g	Method Dependant
SPLP metals	EPA 1312	500 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	500 ml; 200 g	Method Dependant
TCLP metals	EPA 1311	500 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	500 ml; 200 g	Method Dependant

* Including but not limited to: Al, Ag, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mn, Mg, Mo, Na, Ni, Pb, Sb, Se, Sn, Ti, Tl, V, Zn

^ 7/40, 14/40 refers to hold time before extract/hold time after extract

Appendix B
Sample Report



03 November 2003

EnviroMatrix Analytical, Inc
Attn: Dave Renfrew
4340 Viewridge Ave., Suite A
San Diego, CA 92123

EMA Log #: 0208147

Project Name: Soil 39

Enclosed are the results of analyses for samples received by the laboratory on 08/15/02 08:59. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

A handwritten signature in black ink, appearing to read 'Dan Verdon', is written over a faint dotted line.

Dan Verdon
Laboratory Director

CA ELAP Certification #: 1931

Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Soil-39 Anions	0208147-01	Soil	08/15/02 08:00	08/15/02 08:59
Known Anions	0208147-02	Soil	08/15/02 08:00	08/15/02 08:59
Known pH	0208147-06	Soil	08/15/02 08:00	08/15/02 08:59
Known Cr+6	0208147-08	Soil	08/15/02 08:00	08/15/02 08:59

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Client Name: Enviromatrix Analytical, Inc
 Project Name: Soil 39

EMA Log #: 0208147

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Soil-39 Anions (0208147-01) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
Fluoride	67.0	3.00	mg/kg	2	2090409	09/03/02	09/03/02	EPA 9214	
Known Anions (0208147-02) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
Chloride	320	0.5	mg/kg	1	2091809	09/17/02	09/17/02	SM4500 Cl C	A-01a
Fluoride	87.5	7.50	"	5	2090409	09/03/02	09/03/02	EPA 9214	
Sulfate as SO4	2660	50.0	"	1	2092006	09/19/02	09/19/02	SM4500 SO4 E	
Known pH (0208147-06) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
pH	4.28	0.10	pH Units	1	2082706	08/26/02	08/26/02	EPA 9045B	A-01
Known Cr+6 (0208147-08) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
Hexavalent Chromium	90.2	4.00	mg/kg	5	2082908	08/26/02	08/27/02	EPA 7196A	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Client Name: Enviromatrix Analytical, Inc
 Project Name: Soil 39

EMA Log #: 0208147

Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2082706										
Reference (2082706-SRM1)				Prepared & Analyzed: 08/26/02						
pH	8.85	0.10	pH Units	9.10		97	96.7-103.3			
Batch 2082908										
Blank (2082908-BLK1)				Prepared: 08/26/02 Analyzed: 08/27/02						
Hexavalent Chromium	ND	0.800	mg/kg							
LCS (2082908-BS1)				Prepared: 08/26/02 Analyzed: 08/27/02						
Hexavalent Chromium	32.0	0.800	mg/kg	40.0		80	80-120			
LCS Dup (2082908-BSD1)				Prepared: 08/26/02 Analyzed: 08/27/02						
Hexavalent Chromium	32.4	0.800	mg/kg	40.0		81	80-120	1	20	
Duplicate (2082908-DUP1)		Source: 0208147-08			Prepared: 08/26/02 Analyzed: 08/27/02					
Hexavalent Chromium	89.6	4.00	mg/kg		90.2			0.7	20	
Batch 2090409										
Blank (2090409-BLK1)				Prepared & Analyzed: 09/03/02						
Fluoride	ND	1.50	mg/kg							
LCS (2090409-BS1)				Prepared & Analyzed: 09/03/02						
Fluoride	1.00	0.100	mg/kg	1.00		100	80-120			
LCS Dup (2090409-BSD1)				Prepared & Analyzed: 09/03/02						
Fluoride	1.00	0.100	mg/kg	1.00		100	80-120	0	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Client Name: Enviromatrix Analytical, Inc
 Project Name: Soil 39

EMA Log #: 0208147

Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2090409

Duplicate (2090409-DUP1)		Source: 0208147-01		Prepared & Analyzed: 09/03/02						
Fluoride	67.0	3.00	mg/kg		67.0			0	20	

Batch 2091809

Blank (2091809-BLK1)		Prepared & Analyzed: 09/17/02								
Chloride	ND	0.05	mg/kg							

LCS (2091809-BS1)		Prepared & Analyzed: 09/17/02								
Chloride	194	0.05	mg/kg	200		97	80-120			

LCS Dup (2091809-BSD1)		Prepared & Analyzed: 09/17/02								
Chloride	200	0.05	mg/kg	200		100	80-120	3	20	

Batch 2092006

Blank (2092006-BLK1)		Prepared & Analyzed: 09/19/02								
Sulfate as SO4	ND	50.0	mg/kg							

LCS (2092006-BS1)		Prepared & Analyzed: 09/19/02								
Sulfate as SO4	10.3	10.0	mg/kg	10.0		103	80-120			

LCS Dup (2092006-BSD1)		Prepared & Analyzed: 09/19/02								
Sulfate as SO4	10.5	10.0	mg/kg	10.0		105	80-120	2	20	

Duplicate (2092006-DUP1)		Source: 0208147-02		Prepared & Analyzed: 09/19/02						
Sulfate as SO4	2960	50.0	mg/kg		2660			11	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

Notes and Definitions

A-01 24 hour holding time does not apply to PT samples.
A-01a Sample for internal QC
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

EnviroMatrix  Analytical, Inc.

Appendix C
Chain-Of-Custody Form

Appendix D
Corrective Action Form

EnviroMatrix Analytical, Inc.

CORRECTIVE ACTION FORM

ISSUED TO:

RESPONSE REQUIRED BY:

CORRECTIVE ACTION REQUESTED BY:

DATE:

_____ (ISSUER) WILL
PROVIDE A BRIEF DESCRIPTION OF HOW PROCEDURE WAS DETERMINED TO BE
OUT-OF-CONTROL:

OUT-OF-CONTROL PROCEDURE(s):

LIST SAMPLE I.D.(s) AFFECTED:

DESCRIBE IMMEDIATE ACTION TAKEN TO REMEDY SITUATION:

DESCRIBE FINAL PLANNED ACTION WHICH WILL CORRECT PROBLEM,
EXPECTED DATE OF FINAL PLANNED ACTION, AND HOW YOU INTEND TO
PREVENT RECURRENCE OF THE PROBLEM:

SIGNATURE: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Appendix E
List of Analytical Services and Methods

Analytical Services and Methods

ANALYSIS	40 CFR	SW-846	OTHER
Oil & Grease			EPA 413.2, 1664A
Total Recoverable Petroleum Hydrocarbons (TRPH)			EPA 418.1
Purgeable Halocarbons	EPA 601		
Purgeable Aromatics	EPA 602		
Organochlorine Pesticides	EPA 608	EPA 8081A	
Organophosphorus Pesticides (OPP)		EPA 8141A	
Oxygenates		EPA 8260B	
Volatile Organics	EPA 624	EPA 8260B (8021B)	
Semi-Volatile Organics	EPA 625	EPA 8270C	
Benzene, Toluene, Xylenes Ethylbenzene, (MTBE)	mod EPA 602	EPA 8260B (8021B)	
Total Petroleum Hydrocarbons (TPH)			EPA 8015B, ASTMD 2887, LUFT
PCBs	EPA 608	EPA 8082	
Extraction Methods		EPA 3510,3520,3540C 3550,3580	
Clean-up Methods		EPA 3610,3620,3630, 3640A,3660,3665	
Multiple Extraction Procedure		EPA 1320	
SPLP		EPA 1312	
STLC (WET)			CCR Chapter 11, Article 5, Appendix II
TCLP		EPA 1311	
Title 22			Title 22
Organotin Compounds (Tributyltin - TBT)			GC-FPD

Analytical Services and Methods (continued)

ANALYSIS	40 CFR	SW-846	OTHER
Aluminum	EPA 200.7, 200.8	EPA 6010B, 6020	
Antimony	EPA 200.7, 200.8	EPA 6010B, 6020	
Arsenic	EPA 200.8	EPA 6020	
Barium	EPA 200.7, 200.8	EPA 6010B, 6020	
Beryllium	EPA 200.7, 200.8	EPA 6010B, 6020	
Boron	EPA 200.7	EPA 6010B	
Cadmium	EPA 200.7, 200.8	EPA 6010B, 6020	
Calcium	EPA 200.7	EPA 6010B	
Chromium	EPA 200.7, 200.8	EPA 6010B, 6020	
Cobalt	EPA 200.7, 200.8	EPA 6010B, 6020	
Copper	EPA 200.7, 200.8	EPA 6010B, 6020	
Gold	EPA 200.7	EPA 6010B	
Hardness	EPA 200.7		SM2340 B
Iron	EPA 200.7, 200.8	EPA 6010B, 6020	
Lead	EPA 200.7, 200.8	EPA 6010B, 6020	
Magnesium	EPA 200.7	EPA 6010B	
Manganese	EPA 200.7, 200.8	EPA 6010B, 6020	
Mercury	EPA 245.1	EPA 7470A, 7471A	
Molybdenum	EPA 200.7, 200.8	EPA 6010B, 6020	
Nickel	EPA 200.7, 200.8	EPA 6010B, 6020	
Potassium	EPA 200.7	EPA 6010B	
Selenium	EPA 200.7, 200.8	EPA 6010B, 6020	
Silver	EPA 200.7, 200.8	EPA 6010B, 6020	
Sodium	EPA 200.7	EPA 6010B	
Thallium	EPA 200.7, 200.8	EPA 6010B, 6020	
Tin	EPA 200.7	EPA 6010B	
Titanium	EPA 200.7	EPA 6010B	
Vanadium	EPA 200.7, 200.8	EPA 6010B, 6020	
Zinc	EPA 200.7, 200.8	EPA 6010B, 6020	
Digestion Methods	EPA 200.7, 200.8, 245.1	EPA 3010A,3020A 3050B,7470,7471	

Analytical Services and Methods (continued)

ANALYSIS	40 CFR	SW-846	OTHER
Acidity		SM2310 B	
Alkalinity-(Bi)Carbonate		SM2320 B	
Ammonia		SM4500-NH ₃ B,C (18 th)	
AVS-SEM			EPA 821R-91-100
BOD		SM5210 B	
Carbon Dioxide		SM4500 CO ₂ C	
cBOD		SM5210 B	
COD			EPA 410.4, HACH 8000
Chloride		SM4500-Cl C,D	
Chlorine, Residual		SM4500-Cl G	
Chromium VI		SM3500 Cr D (18 th /19 th)	EPA 7196A
Coliforms (Total and Fecal)		SM9221 A,B,C,E	
Coliforms (Total) and E. Coli by Colilert		SM9223	Colilert®
Color (True & Apparent)		SM2120 B	
Color (Solid)			Munsel Chart
Conductivity		SM2510 B	EPA 120.1
Cyanide (Reactive)		SM4500-CN C,E,G,I (Section 7.3 SW-846)	EPA 9014
Dissolved Oxygen		SM4500-O G	
Enterococcus		SM9230 C	Enterolert ®
Fecal Streptococcus		SM9230 C	
Flash Point (Ignitability)			EPA 1010,1030
Fluoride		SM4500-F C	EPA 9214
Heterotrophic Plate Count		SM9215 B	
Hexavalent Cr		SM3500 Cr D (18 th /19 th)	EPA 7196A
Langliers Index (Calc)		SM2330 B	
MBAS		SM5540 C	
Nitrate		SM4500-NO ₃ E	
Nitrite		SM4500-NO ₂ B	

Analytical Services and Methods (continued)

ANALYSIS	40 CFR	SW-846	OTHER
Nitrogen, TKN/Total Organic Nitrogen		SM4500 N C	
Odor		SM2150 B	
Oxygen Consumption Rate		SM2710 B	
Paint Filter			EPA 9095 A
pH		SM4500-H+ B	EPA 9045 C
Phenols			EPA 420.1, 9065
Phosphate , Ortho		SM4500-P E	HACH 8048
Phosphorus, Total		SM4500-P E	HACH 8190
Salinity		SM2520 B	
Settleable Solids		SM2540 F	
% Solids/Dry Weight		SM2540 G	
Solids, Total/Dissolved		SM2540 C	
Solids, Total Suspended		SM2540 D	
Sulfate		SM4500-SO ₄ E	
Sulfide (Reactive)		SM4500-S D,F (Section 7.3 SW-846)	EPA 9034
Residue – Total/Filterable/Non-Filterable/Settleable		SM2540 B,C,D,F	
Temperature		SM2550 B	
Total Organic Carbon (TOC) – Dissolved Organic Carbon (DOC)		SM5310 B *Currently Sub-Contracted	EPA 9060 (TOC) *Currently Sub-Contracted
Turbidity		SM2130 B	
VSS, VDS		SM2540 E	

Appendix F
List of Instrumentation and Equipment

Instrumentation

To meet our needs for accurate analytical results, EMA uses sophisticated instruments. Our instruments are calibrated to comply with regulatory detection limits in the parts per billion (ppb) and parts per million (ppm) detection ranges. Listed below are the key instruments that we use for inorganic and organic analyses.

#	INORGANIC INSTRUMENTS	MAKE	MODEL
Inductively Coupled Argon Plasma-Mass Spectrometry (ICP-MS)			
1	ICP-MS Spectrophotometer	Agilent	7500-cx
Inductively Coupled Argon Plasma-Atomic Emission Spectrometry (ICP-AES)			
1	ICP-AES Spectrophotometer	Perkin-Elmer	5300-DV
1	Automated Mercury Analyzer (Cold Vapor/Atomic Absorption Spectrophotometer)	Teledyne Leeman Labs	Hydra II _{AA}
Miscellaneous			
2	48-Well Block Digestor	CPI International	ModBlock
2	10-Position Distillation Block	Enviromental Express	
#	ORGANIC INSTRUMENTS	MAKE	MODEL
Gas Chromatography/Mass Spectrometry			
1	GC/MS	Agilent	5973N
1	GC/MS	Agilent	5973
1	GC/MS	Hewlett Packard	5970S
6	GC	Hewlett Packard	5890A
2	GC	Hewlett Packard	6890
1	GC	Perkin Elmer	Claris 600
Gas Chromatograph Detectors			
3	Mass Spectrometer Detectors		
4	Flame Ionization Detectors		
2	Electron Capture Detectors		
1	Photo Ionization Detectors		
1	Hall Detector (Electrolytic Conductivity)		
1	Flame Photometric Detector		
1	Nitrogen-Phosphorus Detector		

Instrumentation (continued)

#	ORGANIC INSTRUMENTS	MAKE	MODEL
Sample Introduction			
3	Purge and Trap	OI	4460
1	Purge and Trap	OI	MPM-16
1	Purge and Trap	OI	Eclipse/4560
3	VOC Autosampler	OI	4552
Spectrophotometers			
1	Infrared Spectrophotometer	Buck Scientific	404
1	UV/Visible Spectrophotometer	HACH	DR3000
Miscellaneous			
1	Accelerated Solvent Extractor	Dionex	ASE 200
1	Accelerated Solvent Extractor	Dionex	ASE 300
1	GPC Cleanup System	Waters	717
1	Nitrogen Blowdown System	Zymark	TurboVap

In addition to the above listed organic chemistry and inorganic chemistry laboratory equipment, EMA maintains a full wet chemistry laboratory for performing spectrophotometric, titrimetric, and gravimetric analysis and a microbiology laboratory.

Appendix G
Professional Profiles of Key Personnel

Key Personnel

Leland Stanton Pitt, B.S., M.S.
President

Education: Master's of Science in Chemistry, 1981
Delta State University, Cleveland, Mississippi

Bachelor of Science Degree in Biology and Physics, minor in Mathematics, 1969
University of New Mexico, Albuquerque, New Mexico

Professional Experience:

Certified Industrial Hygienist: Southland Labs, Inc. #4303

Certified Marine Chemist: Pacific Chemical Labs, Inc. #654

Certified Asbestos Consultant: Southland Labs, Inc. #97-2209

President

EnviroMatrix Analytical, Inc., San Diego, CA

2002-Present

Responsible for overall business management, business development and strategic planning. As the President EnviroMatrix Analytical, Inc. he is responsible for directing the activities of the business. Responsible for the strategic direction of the laboratory and business development. He provides consultation and recommendation to various clients to determine the specifics of project requirements.

President and Manager

H.M. Pitt Labs, Inc., San Diego, CA

1986-Present

H.M. Pitt Labs, Inc. is an analytical lab specializing in environmental studies and industrial hygiene. Mr. Pitt is currently the consulting CIH for The Port of San Diego, Ninyo & Moore, an environmental and geotechnical science group, and Westair Technologies. As the consulting CIH, Mr. Pitt typically reviews and approves abatement plans (both asbestos and lead, as well as other programs), and is responsible for monitoring and inspections. H.M.Pitt Labs does the monitoring and abatement review for Pacific Ship Repair and Southwest Marine, which removes insulation and asbestos on Navy ships. As a Marine Chemist, he certifies Navy ships and land tanks in the San Diego area and elsewhere when requested. He was the primary Marine Chemist and CIH on the Exxon Valdez ship repair.

Leland Stanton Pitt, B.S., M.S.
President (Continued)

Chemist and Gas Free Engineer

Long Beach Naval Shipyard, Long Beach, CA
1983-1986

Program Manager responsible for certifying spaces and shipboard as safe for production work in shipbuilding and repair. Work required knowledge of general safety and health regulations of CFR 1910, 1915, and 1926, as well as the pertinent Federal, State and D.O.D. regulations. Responsible for technical supervision of 15-25 technicians. Required knowledge of instrumentation associated with analytical chemistry. Civilian equivalent of this position is a Marine Chemist. Required to sample, identify, and quantify typical work place stressors associated with the industrial hygiene-monitoring program. Worked in the chemistry department at the shipyard doing analytical viscosity determinations, flashpoint, fire point, pH, water concentration, particle count, etc. Performed environmental analysis of industrial hygiene samples, i.e., asbestos, lead, organic solvents, etc., utilizing gas chromatography (GC), atomic absorption spectrometry (AA), and infrared spectrophotometers (IR).

Chemist

Office of Safety and Health, Mare Island Naval Shipyard, Vallejo, CA
1981-1983

Responsibilities included monitoring ships and industrial areas for potentially hazardous environments, and enforcing federal safety regulations. Use of various detection equipment: gas chromatography, infrared spectrophotometer analysis (qualitative and quantitative), as well as other methods. Functioned as an assistant gas free engineer and was responsible for certifying confined spaces on ships, fuel tanks, cofferdams and other voids. Began work in industrial hygiene department assisting CIH, IH and IH technicians in survey work on various shipyard stressors: asbestos, lead, solvents, ventilation, noise, etc.

Research Biologist

Stauffer Chemical Company, Greenville, MS
1975-1981

Assigned to Stauffer's experimental research station. Responsible for insecticide, fungicide, plant growth regulators, antidote and insect growth regulators.

Leland Stanton Pitt, B.S., M.S.
President (Continued)

AREAS OF SPECIALTY:

Effects of insecticide, fungicide, plant growth regulators, etc. on soybeans, milo, corn, with some work on barley and wheat. Soybean work has been centered on Verman and other related thiocarbamate herbicides. Corn research responsibilities included varietal testing with Stauffer's proprietary herbicides Sutan, Eptam and Vernam. Also basic antidote work on experimental corn antidotes and herbicides were performed.

Small plot techniques for insecticide screening. These techniques for insecticide screening were developed in order to cope with small technical samples.

Cotton insecticide work with pesticide interaction in both the antidote and insecticide field program.

Research efforts with Imidan on cotton, vegetable crops and fruit trees.

Soybean fungicide work with Captan and other coded experimental biocides.

Paint biocide screening of coded materials for use in commercial paints. Interest in these tests is centered on fungal discoloration and chemical compatibility. Both weathered and new wood surfaces are used.

ADDITIONAL DUTIES:

Respirator coordinator, 1980-81. Solely responsible for Stauffer's respirator program at the Mississippi field station. This included selecting the appropriate DOT and NIOSH certified respirators in accordance with federal regulations and Stauffer's own respirator program.

In January 1981 I attended and graduated from the Occupational Health Services respirator course given by John Pritchard and was certified.

Safety coordinator at the Mississippi field station 1975-78. Responsibilities included respirator monitoring and insuring the compliance to Stauffer's safety program (chemical exposures and handling machinery safety; EPA and OSHA regulations, etc.).

Head of Stauffer's synergist program January 1973 to September 1975. Responsible for developing new and sophisticated bioassay techniques which opened new leads in search of broad spectrum (field crop) synergists beyond household use. Developed ovicide program in two diverse areas: insect growth regulators and formamidine insecticides.

Assigned to Stauffer's Western Research Center Mt. View, Ca. Helped improve screening techniques, which lead to new classes of selective slow acting insecticides. Developed statistical interpretation of joint action.

Leland Stanton Pitt, B.S., M.S.
President (Continued)

Screened experimental compounds for insecticidal/miticidal activity, October 1969 to January 1973. Following this initial testing, more extensive testing was initiated on those leads which seemed both novel and potentially profitable.

Worked as a technician from 1968-1969 in rearing insects and functioned as a lab technician in the biochemistry lab.

RELATED EXPERIENCE:

Master's Thesis work done in "Insecticidal Activity of several benzamides and nicotinamides on the Tobacco Budworm (*Heliothis virescens*).

Graduate work in Chemistry in synthesizing analogs of Dimilin to determine structure/activity relationships and possible new chemical properties of related ureides.

General laboratory experience including radioactive tracing techniques (TLC and liquid scintillation work).

UNITED STATES PATENTS:

#4,123,526

Patented October 31, 1978

THIONOPHOSPHATE INSECTICIDE ACTIVATORS

Assignors Stauffer Chemical Company

George B. Large and Leland S. Pitt

#4,096,251

Patented June 20, 1978

DIETHYL 2-PYRIDINE THIONOPHOSPHONATE AS AN INSECTICIDE ACTIVATOR

Assignors, Stauffer Chemical Company

Leland S. Pitt, George B. Large, Alan MacDonald

#4,083,970

Patented April 11, 1978

ACTIVATED INSECTICIDE COMPOSITION EMPLOYING A CERTAIN PHOSPHORODITHIOATE AND AN ACTIVATOR

Assignors Stauffer Chemical Company

George B. Large And Leland S. Pitt

Leland Stanton Pitt, B.S., M.S.
President (Continued)

#4,072,745

Patented July 12, 1977

SUBSTITUTED VINYL THIOPHOSPHATE ACTIVATORS

Assignors Stauffer Chemical Company

Leland S. Pitt and George B. Large

#4,035,490

Patented July 12, 1977

INSECTICIDAL PHTHALIMIDOTHIOPHOSPHATES ACTIVATED WITH CERTAIN
PHOSPHOROTHIONATES

Assignors Stauffer Chemical Company

George B. Large and Leland S. Pitt

#3,830,887

Patented August 20, 1974

O,) -DILOWERALKYL-O-(1-METHYL-2-PHENYL VINYL) THIOPHOSPHATES

Assignors Stauffer Chemical Company

George B. Large and Leland S. Pitt

PROFESSIONAL ORGANIZATIONS:

Marine Chemists Association

Industrial Hygiene Association

American Chemical Society

Daniel Verdon, B.S.
Laboratory Director

Education: **Bachelor of Science in Chemistry, minor in Computer Science, 1990**
Westmont College, Santa Barbara, California

Professional Experience:

Laboratory Director

EnviroMatrix Analytical, Inc., San Diego, CA

2003 – Present

Responsible for overall management of analytical laboratory production. Selection, training, and directing activities of chemistry laboratory personnel including compensation and termination. Extensive experience with current state, local and federal regulations. Oversees laboratory operations to ensure quality data reduction and review, and ensures that project specifications are met. Holds weekly status meetings to discuss current project status, analyses schedule, and any potential problems or irregularities with laboratory operations.

Senior Chemist

EnviroMatrix Analytical, Inc., San Diego, CA

1993 - 2003

Responsible for all volatile organic compound analyses by Gas Chromatography (GC) and Gas Chromatography Mass Spectrometry (GC/MS), following methods EPA 601, EPA 8010, EPA 624, EPA 8240 and EPA 8260 . Performs all systems maintenance and method development. Responsible for data review and systems management. Ensures that all volatile GC and GC/MS work is performed in compliance with all local, state and federal regulations, and quality assurance program requirements. Additionally, responsible for method and procedure development, and training other analysts.

Environmental Specialist

IT Corporation, Irvine, CA

1992 - 1993

Responsible for operation of mobile chemistry laboratory. Perform field Gas Chromatography analysis. Management and tracking of all CLP data validation projects. Performed CLP data validation (Levels C and D) for HAZWRAP and Comprehensive Long-Term Environmental Action Navy (CLEAN) projects.

Field Analytical Specialist

IT Corporation, Irvine, CA

1990 - 1992

Responsible for sampling and monitoring of ground-water wells, soils, and air at potentially contaminated sites. Performed on-site physical and chemical analyses. Sampled and monitored ground-water wells, industrial discharge, and contaminated soils at various commercial and military facilities.

Daniel Verdon, B.S.
Laboratory Director (Continued)

Consultant

G.V. Industries, Santa Barbara, CA
1990

Development of hazardous waste conformance plan to meet local, state and federal regulations. Development and implementation of emergency response program for G.V. facilities that met local and state regulatory requirements.

Research Assistant

Chemistry Department at Westmont College, Santa Barbara, CA
1989

Development and testing of microprocessor controlled pulse train generator and photon counter for application in optically detected magnetic resonance spectroscopy.

Laboratory Technician

Whittaker Corporation Research Laboratory, Colton, CA
1987 - 1988

Development, testing and formulation of industrial coil coatings (paint) for new product lines.

Training and Certificates:

OSHA 40 Hour 29 CFR 1910.120, November 1990

OSHA 8 Hour 29 CFR 1910.120 Refresher, (Annually)

Chemical Hygiene & Laboratory Safety OSHA and 29 CFR 1910.145C, February 1993

Jennifer Beyer, M.S.
Q.A. Director

Education: **Master of Science in Physical Chemistry, 2007**
San Diego State University, San Diego, CA

Bachelor of Arts in Chemistry, 1997
University of Northern Iowa, Cedar Falls, IA

Professional Experience:

Q.A. Director

EnviroMatrix Analytical, Inc., San Diego, CA

2005 – Present

Responsible for establishing and maintaining the laboratories working budget and approving all purchases and expenditures. Acts as liaison for all regulatory agencies. Responsible for maintaining and implementing the Quality Assurance Manual, QA/QC policies, Standard Operating Procedures, and corrective action documents. Performs data validation and review for adherence to QA requirements. Conducts internal quality audits. Reviews all project and/or contract specific QA requirements for laboratory implementation.

Senior Metals Chemist-Department Supervisor

EnviroMatrix Analytical, Inc., San Diego, CA

2003 - 2005

Responsible for performing ICP and ICP-MS metals analyses following method EPA 6010/6020 and EPA 200.7/200.8 and atomic absorption spectrophotometric analysis using cold vapor generation on a variety of matrices using method EPA 245.1, EPA 7470, and EPA 7471 for mercury. Ensures that analytical data complies with Quality Assurance Program requirements. Performs all aspects of analysis including those relating to troubleshooting instrument problems, detecting analytical interferences due to complex sample matrices, performing system maintenance and method development. Supervises the metals digestion department and the metals extraction department.

Independent Contractor

SDSUF/SPAWAR Systems Center, San Diego, CA

2002 – 2003

Provided technical and analytical support in the field of materials science for the Film Implementation of a Neutron Detector (FIND) Project.

Teachers Assistant (Masters Candidate)

San Diego State University, San Diego, CA

2000-2002

Organized and taught laboratory classes for SDSU Chemistry Department.

Jennifer Beyer, M.S.
Q.A. Director (Continued)

Organic Laboratory Technician
TestAmerica (NET, Inc.), Cedar Falls, IA
1997-1999

Performed laboratory extractions and analyses of environmental contaminants in water and soil samples utilizing EPA test protocols. Performed daily quality control procedures.

Laboratory Technician
AG Processing, Inc., Manning, IA
1997

Performed extensive work on NIR. Wet lab analyses included crude fiber determination, residual oil testing, urease activity, pH, moisture and volatiles testing.

Mike Giangiardano
Wet Chemistry/ Microbiology Supervisor

Education: **Bachelor of Science in Exercise Nutritional Sciences, 2001**
San Diego State University, San Diego, CA

Professional Experience:

Wet Chemistry/ Microbiology Supervisor

Enviromatrix Analytical, Inc., San Diego, CA

2003 – Present

Responsible for overall management of WET Chemistry and Microbiology Departments. Involved in selection and training of personnel in both departments as well as overseeing and performing analytical work designated to such departments. Responsible of for reviewing all data to ensure results are in control and project specifications are met for the above departments. Involved in creating and editing departments S.O.P.'s. Project manager to specific microbiology clients. Responsible for method development and implementation.

Head Microbiologist

Enviromatrix Analytical, Inc., San Diego, CA

2002 – 2003

Responsible for scheduling and executing work load for entire microbiology department. Creating and editing department S.O.P.'s including total and fecal coliform for both drinking and waste waters, Colilert®, Enterolert®, fecal streptococcus, enterococcus, and heterotrophic plate count (HPC). Ensures that all quality controls and assurance procedures are followed and meet requirements dictated by government regulations. Additionally, responsible for method development and training other microbiological personnel. As well as, performing all aspects of analysis including those relating to troubleshooting equipment problems, detecting analytical interferences, and conducting department wide maintenance.

Microbiologist

Enviromatrix Analytical, Inc., San Diego, CA

2001 – 2002

Involved in daily analysis and scheduling of microbiological work including total and fecal coliform for both drinking and waste waters, enterococcus, and fecal streptococcus using multiple tube fermentation (MTF). Also, setting up and executing procedures for Colilert® and heterotrophic plate count (HPC). Carrying out numerous daily quality assurance procedures including the use of control organisms, sterility checks and controls, and surveillance and maintenance of equipment set temperatures and other necessary functions.

Dennis Hickey , B.A.
Senior Organics Chemist

Education: **Bachelor of Arts in Biology, Minor in Organic Chemistry and Sociology, 1985**
University of California, San Diego, CA

Professional Experience:

Senior Organics Chemist

EnviroMatrix Analytical, Inc., San Diego, CA

02/2003 – Present

Responsible for semi-volatile organic compound analyses by Gas Chromatography (GC) and Gas Chromatography Mass Spectrometry (GC/MS), following methods EPA 608, EPA 8015, EPA 625, EPA 8270, EPA 8141, and EPA 8081/8082. Performs systems maintenance and method development. Responsible for data review and systems management. Ensures that semi-volatile GC and GC/MS work is performed in compliance with all local, state and federal regulations, and quality assurance program requirements. Additionally, responsible for method and procedure development, and training other analysts.

Staff Research Associate II

UCSD, San Diego, CA

01/1999 – Present

Provides technical support for undergraduate teaching laboratories. Maintains and troubleshoots laboratory equipment. Supervises pre-runs of experiments and works with faculty to revise and update experiment protocols. Maintains computers in the teaching laboratories. Establishes financial needs of classes and keeps records of financial expenditures.

Staff Scientist & Project Manager

Ceimic Corporation / S-Cubed (A Division of Maxwell Laboratories), San Diego, CA

1986-1998

Operated and maintained automated gas chromatography instrumentation for high precision measurement of volatile and semi-volatile compounds operating in a contract laboratory setting. Was responsible for GC/MS training and troubleshooting. Performed EPA Methods 8270, 8260, 8080, 625, 525, PAH by SIMS, and Isotope Dilution by EPA Method 1625c. Assisted in the validation of method EPA 8141 for the EPA's Office of Research and Development, Las Vegas, Nevada. Assisted in the validation of a multianalyte methodology for human adipose tissue for the EPA's Office of Research and Development, Las Vegas, Nevada. Performed beta testing of the Hewlett-Packard Enviroquant Chemstation Software. Assisted the software developers with recommendations for improvements and quality related functions as it related to GC/MS analyses.

Dennis Hickey, B.A.
Senior Organics Chemist (continued)

Extraction Chemist

Analytical Technologies, Inc., San Diego, CA
1985-1986

Prepared samples in the extraction laboratory for determination of a variety of pollutants including pesticides, herbicides, dioxins, PCBs, and BNAs. Responsible for sample receiving and sample log-in.

Publications:

Hatcher, M.D.; Hickey, D.M.; Marsden, P.J.; and Betowski, L.D.; "Development of a GC/MS Module for RCRA Method 8141"; final report to the U.S. EPA Environmental Protection Agency on Contract 68-03-1958; S-Cubed, San Diego, CA, 1988.

Taylor, V.; Hickey, D.M.; Marsden, P.J. "Single Laboratory Validation of EPA Method 8140"; U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Office of Research and Development, Las Vegas, NV, 1987; EPA-600/4-87-009.

Mona Hanna, PhD
Senior Organics Chemist

Education: **Doctor of Philosophy in Inorganic Chemistry, 1986**
Ain Shams University, Cairo, Egypt

Masters of Arts in Inorganic and Analytical Chemistry, 1982
Ain Shams University, Cairo, Egypt

Bachelor of Arts in General Chemistry, 1978
Ain Shams University, Cairo, Egypt

Professional Experience:

Senior Organic Chemist

EnviroMatrix Analytical, Inc., San Diego, CA

2003-Present

Perform ICP metals analysis following EPA 6010 methods. Also analysis of volatile organic compound following EPA 8260, 8021 methods by using GC and GC/MS. Perform all aspects of analysis including troubleshooting instrument problems, detecting analytical interferences, system maintenance, and method development.

Chemistry Lab Instructor

Mesa College, San Diego, CA

2002 – Present

Teaching fundamental principles, laws of chemical behavior, and the properties of matter. Topics included: techniques of data analysis, auto titrators, UV/Vis spectrophotometer, HPLC, atomic theory, molecular geometry, and gaseous behavior.

Assistant Professor of Inorganic Chemistry

Ain Shams University, Cairo, Egypt

1996-2001

Carried out new research on the complexation and thermal properties of uric acid with some divalent and trivalent metal ions of biological interest. Characterization by FTIR, UV/VIS, and HPLC. Taught analytical, electroanalytical, and inorganic chemistry.

Research Assistant II

SDSU Foundation, San Diego, CA

1994-1996

Responsible for coordinating and analyzing water, soil, and plant tissue samples. Used a Lachat auto-analyzer to measure nutrient content, and a Dorman Organic Carbon Analyzer to assess organic matter content of estuarine waters.

Mona Hanna, PhD
Senior Organics Chemist (Continued)

Organic Chemist/Group Leader
Analytical Technologies Inc., San Diego, CA
1991-1994

Performed environmental analysis on soil, water, and air samples using separator funnel extraction, continuous liquid-liquid extraction, soxhlet extraction, and sonication. Extractions were cleaned using gel permeation chromatography, and alumina, florisil columns.

Appendix H
External Certification



CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

EnviroMatrix Analytical, Inc.

4340 Viewridge Avenue., Suite A

San Diego, CA 92123

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site,
proficiency testing studies, and payment of applicable fees.

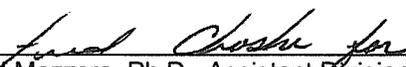
This Certificate is granted in accordance with provisions of
Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **2564**

Expiration Date: **09/30/2014**

Effective Date: **10/01/2012**

Richmond, California
subject to forfeiture or revocation


David Mazzera, Ph.D., Assistant Division Chief
Division of Drinking Water and Environmental Management

NOTICE

The “List of Approved Fields of Testing and Analytes”, as stated on this certificate will be sent to your laboratory upon completion of the entire certification process, which includes an on-site inspection and participation in the appropriate PT studies.



CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing



EnviroMatrix Analytical, Inc.
4340 Viewridge Avenue., Suite A
San Diego, CA 92123
Phone: (858) 560-7717

Certificate No.: 2564
Renew Date: 9/30/2012

Field of Testing: 101 - Microbiology of Drinking Water

101.010	001	Heterotrophic Bacteria	SM9215B
101.020	001	Total Coliform	SM9221A,B
101.021	001	Fecal Coliform	SM9221E (MTF/EC)
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.120	001	Total Coliform (Enumeration)	SM9221A,B,C
101.130	001	Fecal Coliform (Enumeration)	SM9221E (MTF/EC)
101.160	001	Total Coliform (Enumeration)	SM9223

Field of Testing: 102 - Inorganic Chemistry of Drinking Water

102.100	001	Alkalinity	SM2320B
102.120	001	Hardness	SM2340B
102.130	001	Conductivity	SM2510B
102.140	001	Total Dissolved Solids	SM2540C
102.163	001	Chlorine, Free and Total	SM4500-Cl G
102.171	001	Chloride	SM4500-Cl- D
102.190	001	Cyanide, Total	SM4500-CN E
102.192	001	Cyanide, amenable	SM4500-CN G
102.200	001	Fluoride	SM4500-F C
102.220	001	Nitrite	SM4500-NO2 B
102.231	001	Nitrate calc.	SM4500-NO3 E
102.240	001	Phosphate, Ortho	SM4500-P E
102.251	001	Sulfate	SM4500-SO4 E
102.260	001	Total Organic Carbon	SM5310B
102.261	001	DOC	SM5310B
102.270	001	Surfactants	SM5540C
102.520	001	Calcium	EPA 200.7
102.520	002	Magnesium	EPA 200.7
102.520	003	Potassium	EPA 200.7
102.520	005	Sodium	EPA 200.7
102.520	006	Hardness (calc.)	EPA 200.7

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water

103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7

103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8
103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8
103.160	001	Mercury	EPA 245.1

Field of Testing: 107 - Microbiology of Wastewater

107.010	001	Heterotrophic Bacteria	SM9215B
107.020	001	Total Coliform	SM9221B
107.040	001	Fecal Coliform	SM9221C,E (MTF/EC)
107.041	001	Fecal Coliform	SM9221C,E (A-1)
107.100	001	Fecal Streptococci	SM9230B
107.100	002	Enterococci	SM9230B
107.245	001	E. coli	SM9223

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.112	001	Boron	EPA 200.7
108.112	002	Calcium	EPA 200.7
108.112	003	Hardness (calc.)	EPA 200.7
108.112	004	Magnesium	EPA 200.7
108.112	005	Potassium	EPA 200.7
108.112	007	Sodium	EPA 200.7
108.323	001	Chemical Oxygen Demand	EPA 410.4
108.350	001	Total Recoverable Petroleum Hydrocarbons	EPA 418.1

108.360	001	Phenols, Total	EPA 420.1
108.381	001	Oil and Grease	EPA 1664A
108.390	001	Turbidity	SM2130B
108.400	001	Acidity	SM2310B
108.410	001	Alkalinity	SM2320B
108.430	001	Conductivity	SM2510B
108.440	001	Residue, Total	SM2540B
108.441	001	Residue, Filterable	SM2540C
108.442	001	Residue, Non-filterable	SM2540D
108.443	001	Residue, Settleable	SM2540F
108.451	001	Chloride	SM4500-Cl- C
108.465	001	Chlorine	SM4500-Cl G
108.470	001	Cyanide, Manual Distillation	SM4500-CN C
108.472	001	Cyanide, Total	SM4500-CN E
108.480	001	Fluoride	SM4500-F C
108.490	001	pH	SM4500-H+ B
108.491	001	Ammonia	SM4500-NH3 C (18th)
108.510	001	Nitrite	SM4500-NO2 B
108.520	001	Nitrate-nitrite, Total	SM4500-NO3 E
108.531	001	Dissolved Oxygen	SM4500-O G
108.540	001	Phosphate, Ortho	SM4500-P E
108.541	001	Phosphorus, Total	SM4500-P E
108.590	001	Biochemical Oxygen Demand	SM5210B
108.591	001	Carbonaceous BOD	SM5210B
108.610	001	Total Organic Carbon	SM5310B
108.640	001	Surfactants	SM5540C
108.660	001	Chemical Oxygen Demand	HACH8000
108.672	001	Phosphate, Ortho	HACH8048
108.675	001	Phosphorus, Total	HACH8190

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7
109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7

109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	025	Titanium	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.020	001	Aluminum	EPA 200.8
109.020	002	Antimony	EPA 200.8
109.020	003	Arsenic	EPA 200.8
109.020	004	Barium	EPA 200.8
109.020	005	Beryllium	EPA 200.8
109.020	006	Cadmium	EPA 200.8
109.020	007	Chromium	EPA 200.8
109.020	008	Cobalt	EPA 200.8
109.020	009	Copper	EPA 200.8
109.020	010	Lead	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	014	Selenium	EPA 200.8
109.020	015	Silver	EPA 200.8
109.020	016	Thallium	EPA 200.8
109.020	017	Vanadium	EPA 200.8
109.020	018	Zinc	EPA 200.8
109.190	001	Mercury	EPA 245.1
109.811	001	Chromium (VI)	SM3500-Cr D (18th/19th)

Field of Testing: 110 - Volatile Organic Chemistry of Wastewater

110.040	040	Halogenated Hydrocarbons	EPA 624
110.040	041	Aromatic Compounds	EPA 624
110.040	042	Oxygenates	EPA 624

Field of Testing: 111 - Semi-volatile Organic Chemistry of Wastewater

111.101	032	Polynuclear Aromatic Hydrocarbons	EPA 625
111.101	034	Phthalates	EPA 625
111.101	036	Other Extractables	EPA 625
111.170	030	Organochlorine Pesticides	EPA 608
111.170	031	PCBs	EPA 608

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B

114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B
114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.020	001	Antimony	EPA 6020
114.020	002	Arsenic	EPA 6020
114.020	003	Barium	EPA 6020
114.020	004	Beryllium	EPA 6020
114.020	005	Cadmium	EPA 6020
114.020	006	Chromium	EPA 6020
114.020	007	Cobalt	EPA 6020
114.020	008	Copper	EPA 6020
114.020	009	Lead	EPA 6020
114.020	010	Molybdenum	EPA 6020
114.020	011	Nickel	EPA 6020
114.020	012	Selenium	EPA 6020
114.020	013	Silver	EPA 6020
114.020	014	Thallium	EPA 6020
114.020	015	Vanadium	EPA 6020
114.020	016	Zinc	EPA 6020
114.103	001	Chromium (VI)	EPA 7196A
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.222	001	Cyanide	EPA 9014
114.230	001	Sulfides, Total	EPA 9034
114.241	001	Corrosivity - pH Determination	EPA 9045C
114.270	001	Fluoride	EPA 9214

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.020	001	Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II
115.040	001	Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312

Field of Testing: 116 - Volatile Organic Chemistry of Hazardous Waste

116.030	001	Gasoline-range Organics	EPA 8015B
116.040	062	BTEX	EPA 8021B
116.080	000	Volatile Organic Compounds	EPA 8260B

116.080	120	Oxygenates	EPA 8260B
116.110	001	Total Petroleum Hydrocarbons - Gasoline	LUFT

Field of Testing: 117 - Semi-volatile Organic Chemistry of Hazardous Waste

117.010	001	Diesel-range Total Petroleum Hydrocarbons	EPA 8015B
117.016	001	Diesel-range Total Petroleum Hydrocarbons	LUFT
117.017	001	TRPH Screening	EPA 418.1
117.110	000	Extractable Organics	EPA 8270C
117.210	000	Organochlorine Pesticides	EPA 8081A
117.220	000	PCBs	EPA 8082
117.240	000	Organophosphorus Pesticides	EPA 8141A

Field of Testing: 120 - Physical Properties of Hazardous Waste

120.010	001	Ignitability	EPA 1010
120.022	001	Ignitability	EPA 1030
120.040	001	Reactive Cyanide	Section 7.3 SW-846
120.050	001	Reactive Sulfide	Section 7.3 SW-846
120.080	001	Corrosivity - pH Determination	EPA 9045C

Field of Testing: 126 - Microbiology of Recreational Water

126.010	001	Total Coliform (Enumeration)	SM9221A,B,C
126.030	001	Fecal Coliform (Enumeration)	SM9221E
126.061	001	Enterococci	SM9230B
126.080	001	Enterococci	IDEXX

**City of National City
Selenium Monitoring Field Datasheet**

Site ID				Latitude	
Location				Longitude	
	Date		Time	Observer	

ATMOSPHERIC / FLOW CONDITIONS

Weather Clear Partly Cloudy Overcast Fog **Amount of Rainfall** > 0.1" < 0.1"

Tide Low High **Tide Height:** _____ ft.

Last Rain > 72 hours < 72 hours **Water Flow** Dry Ponded Flowing **Flow rate:** _____ gpm

Field Screening Samples Collected? Yes No **Analytical Lab Samples Collected?** Yes No

Water Temp (°C)		Salinity (ppm CaCO3) (optional)	
Specific Conductance (mS/cm)			

COMMENTS: _____

Site ID				Latitude	
Location				Longitude	
	Date		Time	Observer	

ATMOSPHERIC / FLOW CONDITIONS

Weather Clear Partly Cloudy Overcast Fog **Amount of Rainfall** > 0.1" < 0.1"

Tide Low High **Tide Height:** _____ ft.

Last Rain > 72 hours < 72 hours **Water Flow** Dry Ponded Flowing **Flow rate:** _____ gpm

Field Screening Samples Collected? Yes No **Analytical Lab Samples Collected?** Yes No

Water Temp (°C)		Salinity (ppm CaCO3) (optional)	
Specific Conductance (mS/cm)			

COMMENTS: _____
