INDIVIDUAL WATER QUALITY ASSESSMENT REPORT
FOR
ALVARADO CHANNEL (UPPER PORTION)
MAP NUMBER 64

Job Number 17204-BA

June 3, 2015

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INDIVIDUAL WATER QUALITY ASSESSMENT REPORT

Site Name/Facility:	Alvarado Channel (Upper Portion)
Master Program Map No.:	Map Number 64
Date:	June 3, 2015
Civil Engineer (name, company, phone number):	Jayne Janda-Timba Rick Engineering Company 5620 Friars Road, San Diego, CA 92110 (619) 688-1448
Register Civil Engineer Number & Expiration Date (place stamp here):	R.C.E. #70649 Exp. 06/2017

REGISTERED PROFESSIONAL ENGINEER
JAYNE MARIE JANDA-TIMBA
NO. 70649
EXP. 6/17
CIVIL
STATE OF CALIFORNIA

Instructions: This form must be completed for each facility following the completion of the Individual Maintenance Plan and prior to any work being conducted in the facility. Attach additional sheets if needed.

EXISTING CONDITIONS

The City of San Diego (City) has developed the Master Storm Water System Maintenance Program (Master Maintenance Program –MMP) to optimize its business processes and environmental protection practices related to channel operation and maintenance activities. The MMP is intended to integrate operation and maintenance planning, implementation and assessment activities with its water quality protection programs. This document provides a summary of the Individual Water Quality Assessment (IWQA) activities conducted within the upper portion of Alvarado Channel (Henceforth referred to as "Upper Alvarado Channel") in order to comply with the MMP's Programmatic Environmental Impact Report (PEIR) and the MMP.

IWQA procedures under the MMP provide a methodology for a water quality management model to evaluate potential water quality benefits and impacts associated with channel maintenance activities. The site-specific field measurements and conditions provide the analytical data to both determine the pollutant load removed, and therefore water quality benefits, resulting from sediment excavation during maintenance and estimate the loss of temporary pollutant sorption/retention capacity as a result of sediment and vegetation removal during channel maintenance. The sediment pollutant load removal, combined with an estimate of pollutant removal during vegetation regrowth between maintenance events, is compared to the estimated loss of total channel pollutant removal capacity due to vegetation removal as a means of assessing potential water quality benefits and impacts of channel maintenance. Channel maintenance eliminates the potential for accumulated pollutants from returning into the water, via natural vegetation decomposition and channel scour. In addition, periodic maintenance facilitates optimal sorption of pollutants in vegetation. Additional factors are also presented, including a suite of water quality improvement activities the City will implement within the San Diego River Watershed.

The IWQA procedures are documented in the Standard Operating Procedure (SOP) to Conduct Water Quality Assessment and Quantification Model for Flood Channel Maintenance found in Appendix A of the ater Quality Assessment, written by Weston Solutions Incorporated in March 2011, Appendix F of the PEIR (herein referred to as the 'White Paper'). The SOP identifies two criteria that must be met for IWQA component implementation: 1) the storm water facility must have fairly consistent dry weather (low) flows, and 2) it must have vegetation capable of assimilation of pollutants. Both of these criteria are met by the sections of Upper Alvarado Channel designated for maintenance at this time. The results of the IWQA procedures established in the White Paper are considered below as one of several lines of evidence assessing the overall water quality benefits and impacts associated with channel maintenance.

The proposed maintenance would occur within a portion of the Upper Alvarado Channel, slightly south of the intersection at Alvarado Court and Alvarado Road, See Figure 1 in Attachment 1 for the channel location. The Upper Alvarado Channel geometry is trapezoidal in shape within the area of study, with both concrete and earth sections throughout the channel. The area of study extends from the location where the channel transitions from an underground culvert, immediately south of Alvarado Road, and flows in a westerly direction for approximately 4,000 feet to a point where the channel is conveyed in a crossing under College Avenue located in the south eastern quadrant of the intersection of Interstate 8 and College Avenue (see Figure 2 in Attachment 1 for area of study). The Upper Alvarado Channel is aligned south of the medical and commercial buildings that are located on the south side of Alvarado Road. For the purposes of this assessment the area of study has been divided into three reaches: Reach 1, Reach 2, and Reach 3. Reaches 2 and 3 are the City's responsibility for maintenance. Based on the Individual Hydrologic and Hydraulic Assessment (IHHA) results the City is proposing to routinely maintain the mid-section of the Upper Alvarado Channel, within Reach 2 only.

Below is a description of each Reach:

Reach 1

Reach 1 extends from the downstream limits of the area of study and continues upstream for approximately 1,700 feet, which is 400 feet upstream of the existing pedestrian bridge that divides the maintenance boundary of the State of California and the City of San Diego. The Reach consists of dense vegetation and is bounded by Alvarado Road to the north and a parking lot to the south. Reach 1 is earthen on its bottom as well as each side. Reach 1 is the most downstream reach and is maintained by the State of California.

Reach 2

The downstream limits of Reach 2 begin approximately 400 feet upstream of the existing pedestrian bridge that divides the maintenance boundary of the State of California and the City of San Diego, and extends upstream approximately 1,100 feet. Reach 2 is a trapezoidal channel that consists of a concrete lined north side slope with an earthen bottom and earthen south side slope. Reach 2 contains dense vegetation and pursuant to the IHHA, is proposed for maintenance.

Reach 3

Reach 3 is the most upstream reach and is approximately 1,200 feet in length. The downstream end of reach 3 begins at the upstream end of Reach 2. The Reach is bounded by residential on the east and west, a commercial and a medical building to the north, and a vegetated slope on the south. The channel at the upstream portion of Reach 3 is located immediately adjacent to a hospital. Reach 3 is a fully concrete lined channel relatively free of vegetation and is not proposed for maintenance pursuant to the IHHA.

The Upper Alvarado Channel area is mapped within the Federal Emergency Management Agency's (FEMA) flood areas; all three reaches and the adjacent buildings are within the FEMA Special Flood Hazard Areas Subject to Inundation by the 1-percent Annual Chance Flood (100-year floodplain) designated Zone AE.

The overall project area is located in the Navajo Community Planning District and specific land-use designations are described in the Navajo Community Plan. The area associated with Reach 2 and 3 is zoned as an Institution land use. The channel area associated with Reach 1 is zoned as University Campus land use.

The upstream end of the maintenance area, located in Reach 2, is located within subarea 114 of the City's Multiple Species Conservation Program's Multi-Habitat Planning Area (MHPA).

The maintenance activities proposed for the designated extents of Reach 2 of the Upper Alvarado Channel include removal of sediment and vegetation. The impact acreage includes the maintenance, access/loading, and staging/stockpiling areas which accumulate to approximately 1.49 acres.

The Upper Alvarado Channel had last been maintained (full vegetation and sediment removal) in January 2011. Prior to that maintenance, cars along the adjacent streets to the north have been flooded on multiple instances and structural flooding may have occurred during a storm event in December 2010.

All channel reaches are briefly described above; however Reach 2 is the focal point of this assessment, as it is

the only reach that is proposed for maintenance. As such, from this point on only Reach 2 will be referred to and assessed.

Description of Channel Geometry (length, width, and depth):

Reach 2 (MMP Map 64)

Reach 2 is a trapezoidal channel with sedimentation and dense vegetation. It is bound by commercial and medical buildings to the north and a vegetated slope to the south. The bottom is approximately 19 feet wide, with one to one side slopes and a depth of approximately 9 feet. The proposed maintenance is approximately 1,110 feet in length by 19 feet in width by 0.2 feet to 1.7 feet in sediment depth, occupying approximately 0.5 acres. Although Reach 2 is the only reach proposed for maintenance and is 1,100 feet in length, the extra 10 feet on the downstream limits of maintenance is used as a gradual transition of grade in the channel bed from the area being maintained to the area not being maintained.

Existing Conditions

Reach 2 of the Upper Alvarado Channel is located within the San Diego River Watershed Management Area (WMA), Hydrologic Area (HA) 907.1 (Lower San Diego), Hydrologic Subarea 907.11 (Mission San Diego) (City of San Diego, 2008). Surface waters in the San Diego River WMA, and elsewhere are subject to comply with the Water Quality Control Plan for the San Diego Basin (Basin Plan, San Diego RWQCB 1994) which designates beneficial uses and established water quality objectives. The San Diego River Watershed Urban Runoff Management Plan (SDR-WURMP, City of San Diego, 2008) identifies the following priority pollutant loading reductions.

- Bacteria Indicators
- Phosphorous
- Total Dissolved Solids (TDS)
- Low Dissolved Oxygen
- Turbidity

The SDR-WURMP identifies residential, park/municipal, commercial and industrial land uses as suspected contributors to discharges of these priority pollutants within the Lower San Diego HA (City of San Diego, 2008).

The Alvarado Channel is a tributary to the Lower San Diego River. In accordance with the Water Quality Control Policy for Developing California's Clean Water Act Section 303 (d) List (SWRCB, 2004), the Lower San Diego River is 303(d) list as an impaired water body, in which standards are not met and a Total Maximum Daily Load (TMDL) is required, but not yet completed, for at least one of the pollutants listed for the segment. The pollutants listed for the Lower San Diego River on the 303(d) list are indicated in Table 1.

TABLE 1. 303(d) Listed Pollutants for the Lower San Diego River

Pollutant	Current TMDL (Yes or No)	Current or Anticipated TMDL Date
Enterococcus	No	2021
Fecal Coliform	Yes	2009
Low Dissolved Oxygen (lower 6 miles)	No	2019
Manganese	No	2021
Nitrogen	No	2021
Phosphorous	No	2019
Total Dissolved Solids (TDS)	No	2019
Toxicity*	No	2021

*This pollutant was not sampled for due to the scope of the project.

On May 8, 2013, the Regional Water Quality Control Board San Diego Region (RWQCB) approved a new

Municipal Storm Water Permit for San Diego, southern Orange, and southwestern Riverside Counties (San Diego RWQCB, 2013). The region-wide NPDES Permit (commonly referred to as the Regional MS4 Permit) is intended to set the framework for municipalities, such as the City, to implement a collaborative watershed-based approach to restore and maintain the health of surface waters. The Regional MS4 Permit requires development of Water Quality Improvement Plans (WQIPs) that will allow the City (and other watershed stakeholders) to prioritize and address pollutants through an appropriate suite of best management practices (BMPs) for each watershed. Water quality BMPs related to channel maintenance activities are outlined later in this report and provide a framework that may be used by the City to address priority pollutants. It is recommended that the relative effectiveness of any implemented water quality and conservation strategies be evaluated and the programs adaptively managed to maximize pollutant and/or stormwater flow reduction benefits over the course of the program lifecycle. This adaptive management approach, coupled with other storm water management techniques implemented by the City as part of the Regional MS4 Permit, may lead to long-term reductions in the need for channel maintenance activities.

Unknown point and nonpoint sources, urban runoff/storm sewers, wastewater, natural resources, and flow regulation/modification are listed among the potential sources for these pollutants.

Dry weather historical monitoring data for the San Diego River have been required under the regional municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) permit R9-2007-0001 (San Diego RWQB 2007) issued to the 21 Municipal Copermitties in San Diego County, including the City of San Diego. The data compiled under this permit was reviewed during the background investigation for this IWQA. Under this historical monitoring, dry weather flow concentrations of total phosphorous, dissolved phosphorous and TDS exceeded water quality benchmarks established in the Basin Plan at least once between January 2010 and May 2012 (Project Clean Water, 2012).

Description of Sediment Sampling Activities (location(s), depth, shipment/deliverer to laboratory(s)):

Allied Geotechnical Engineers personnel collected one sediment sample from Upper Alvarado Channel (UAC-1) on December 22, 2014. The sample was collected from a location as deemed the best representation of the channel condition. The sampling location is shown on Figure 4 Attachment 3. The sampling activities were performed in general accordance with the Standard Operating Procedures (SOP) to Conduct Water Quality Assessment and Quantification Model for Flood Channel Maintenance (Weston Solutions, 2011).

A bulk sediment sample was collected using a clean shovel from ground surface to approximately 24 inches below the top of the existing sediment. The sediment sample was then placed in a clean dedicated 5-gallon bucket. The bucket was tagged with the sample ID, collection date, project number and sampling personnel name. Grain-size analysis was performed on the sample in accordance with the procedures of ASTM D6913. The test results and grain-size distribution curve are presented in Attachment 3.

The sediment at the sampling location contains abundant cobbles. Therefore, sampling for the analytical sample was also performed with a clean shovel. A mound of sediment had accumulated near the center of the channel and at the time of sampling activities, the top of the existing sediment mound was above the water level in the channel.

The sediment sample was placed in a sealed plastic bag. Preliminary screening for the potential presence of organic vapors was performed using a MiniRAE 3000 Volatile Organic Compound Gas Monitor. The sample was then labeled with the sample ID, collection date, project number and sampling personnel name. The sample was then placed on ice in a cooler box and transported to the laboratory under chain-of-custody (COC). COC documents are included with the analytical test results.

Non-dedicated sampling equipment used on this project was decontaminated prior to sampling and between sampling by washing in non-phosphate detergent (Alconox). Sediment analytical testing was performed by Clarkson Laboratory and Supply, Inc. of Chula Vista and American Scientific Laboratories, LLC of Los Angeles. The sediment sample was tested for the constituents listed in table A-3 of the SOP with the exception of Total Dissolved Solids (TDS) which is not applicable to sediment matrix samples. The test results are presented in Attachment 3.

Description of Flow Measurement Activities (location(s) and equipment):

On December 9, 2014, field personnel measured instantaneous flow during “dry weather” conditions at two

cross sections in the Upper Alvarado Channel. "Dry weather" conditions, in a channel, are defined as low flowrates that occur outside of a 72 hour window of days that have more than 0.2 inches of rainfall. It was confirmed that on December 9th , 2014 the Alvarado Channel was flowing under "dry weather" conditions since the last rainfall event of more than 0.2 inches occurred 5 days prior, on December 4th, 2014, according to the National Weather Service's Daily Climatological Reports. The upstream and downstream flow measurement locations surrounding the proposed maintenance area were initially chosen following SOP guidelines, as the upstream and downstream edges of the proposed maintenance area. However, a site visit was conducted to verify the initial selections, which resulted in an adjustment of measuring locations based on accessibility and potential safety hazards to personnel. Locations of each flow measurement site were marked with a hand-held GPS device; see Figure 4 in Attachment 3 for actual measuring locations. Permission to access the locations was obtained from the City of San Diego prior to conducting flow measurement activities. The City of San Diego provided City Maintenance workers to assist field personnel in accessing the sampling locations.

The downstream site, southwest of Alvarado Court, was selected as Sampling Location 1 (the downstream sampling location). Sampling Location 1 is bounded to the north by an existing parking lot and commercial buildings and to the south by open space consisting of thick vegetative cover. Due to limited access to the downstream end of the proposed maintenance area, this location was selected as the closest downstream feasible access point. This location was chosen during a preliminary survey of the sampling locations by the City of San Diego, Rick Engineering Company (RICK), Helix Environmental (Helix), and Allied Geotechnical Services (Allied). Based on observations during the preliminary survey this location was determined to be the safest sampling location in close proximity to the initial chosen sampling location. A downstream site, south of Alvarado Road, was selected as Sampling Location 2 (the upstream sampling location). Sampling Location 2 is bounded to the north by medical and commercial buildings and their associated parking lots and to the south by a small vegetated open space hillside lined with occupied residential housing units.

Upon entering the channel, field personnel extended a measuring tape across the full width of the wetted channel and measured the width of the cross section in total feet. The width was measured from the waterline of the south bank to the waterline of the north bank. Flow velocity was measured using the Marsh McBirney Flow-Mate 2000 Flow Meter at regular horizontal intervals. The flow meter was set at 60% depth for water depth less than 1.5 feet, or 20% and 80% depth for stages greater than 1.5 feet (USGS, 1976). For stages where water depth was greater than 1.5 feet and measurements were taken at 20% and 80% depth, an average of the measurements was calculated to solve for velocity at 60% depth. To minimize interference with flow meter readings, personnel stood downstream and slightly off to the side of the flow meter while facing upstream. The 10 second average flow velocity was recorded at each interval. Distance from the left wetted bank (southern wetted bank) and the associated water depth was recorded with each velocity reading. Field forms that were used to record flow measurements can be found in Attachment 4.

At the downstream sampling location, the total width of the wetted channel measured 24.3 feet across. A total of 22 flow measurements, at a distance of one foot horizontal spacing, were recorded along the width of the wetted downstream channel. Although the channel allowed for 24 measurements to be taken, due to the water being too shallow for a measurable reading by the flow meter at the 23rd and 24th flow measurement locations only 22 recordable measurements were taken.

At the upstream sampling location the total width of the wetted channel measured 19.3 feet across. A total of 17 flow measurements, at a distance of one foot horizontal spacing, were recorded along the width of the wetted upstream channel. Although the width of the wetted upstream channel allowed for 19 flow measurements, field personnel could only retrieve 16 recordable measurements, due to the water being too shallow at the 1st, 3rd, and 19th flow measurement locations for a measurable reading by the flow meter. To conduct representative flow measurements, a certain percent of the flow must be captured.

To calculate total flow (discharge) across the channel the velocity measurements were integrated over the cross-sectional area of the channel at each sampling location. At the upstream sampling location a discharge of 0.47

cubic feet per second (cfs) and at the downstream location a discharge of 0.11 cfs was determined.

Description of Volume Measurement Activities (interval, total number, equipment):

As described in the SOP, the process to estimate the annual treatment volume of water uses one instantaneous flow measurement and a representative data sample. The annual treatment volume, the volume of water in one year that discharges into the maintenance area (Reach 2) of the Upper Alvarado Channel due to low flow conditions, was estimated following the White Paper's SOP. To determine the annual treatment volume, the average number of "dry days" per year was calculated. "Dry days" are days in which the channel experiences "dry weather" low flow conditions. The number of "dry days" was estimated using rainfall data from the County of San Diego's Project Clean Water website. Rainfall data, between 1968 and 2008, from the Fashion Valley ALERT Station (Sensor ID 32) was analyzed to calculate the number of "wet days" in each year. Pursuant to the SOP, "wet days" are defined as the days in which rainfall greater than or equal to 0.2 inches occurs, also including the 3 days (72 hours) following. The number of "dry days" for each year was calculated by subtracting the total number of "wet days" in a year from the total number of days in the wet season, October 1 to June 30. Upper Alvarado Channel is expected to have dry weather flows continuous through the summer months, July 1 through September 30, the days of the summer months are added to the number of "dry days". The White Paper's method for estimating the number of "dry days" takes a conservative approach and assumes that low flow is continuous year round on all days not considered "wet days". Thus the number of "wet days" and "dry days" sum up to the total number of days in a year, 365. From the calculations averaging the number of dry days each year from 1968-2008, it is estimated that the Upper Alvarado Channel experiences 320 dry days annually. The total annual treatment volume was calculated by multiplying the estimated number of dry days per year by the measured instantaneous upstream discharge, 40,625 cubic feet per day (0.47 cfs), resulting in approximately 13,000,000 cubic feet (ft^3) or 97 million gallons per year (See Table 10 in Attachment 6 for annual treatment volume).

The Hydraulic Residence Time (HRT) of the channel was determined by dividing the length of Reach 2, 1,100 feet, by the average of the measured upstream and downstream velocities, .07 feet per second (ft/s). This method is employed by Caltrans when determining the HRT of water quality or bio filtration swale following the Caltrans Storm Water Quality Handbook (Caltrans, 2011). Using the average velocity, a HRT of 4.3 hours was determined.

Description of Water Quality Sampling Activities (location(s), shipment/delivery to laboratory(s)):

On December 9, 2014 field personnel collected surface water grab samples during dry weather flow conditions following SOP guidelines and Surface Water Collection SOP #EH-01 (Syracruse Research Corporation, 2003). Samples were collected at upstream and downstream locations surrounding the proposed maintenance area along Upper Alvarado Channel (See Figure 4 in Attachment 3 for sampling locations).

Sampling Location 1 (the most downstream location) was collected first, followed by Sampling Location 2 (upstream location). For each sample collected, the sampler stood in the horizontal center of the channel, downstream of the sampling location facing upstream. Prior to sample collection, the field personnel allowed sediment that was suspended in the water column to settle out prior to collection. Clean, laboratory supplied bottles labeled with the sample ID, date, time, analytes, project, and name of sampling personnel, were completed, capped and immediately placed on ice within an insulated cooler with ice, and transported to the laboratory by the water quality samplers following Chain of Custody procedures.

The samples were analyzed for constituents, which were determined based on the SOP to include Table A-4 of the SOP, and a thorough review of the 303(d) pollutants listed in Table 1, and TMDLs in the local surface waters. Water sample chemical analyses were conducted by Enviromatrix of San Diego, California, a state-accredited laboratory. The laboratory analytical results can be found in Attachment 3 and tabulated analysis in Attachment 6.

Within the Upper Alvarado Channel all constituents analyzed were below their respective water quality values

with the exception of Total Dissolved Solids (TDS) and Enterococcus. The upstream concentration of TDS (1,780 mg/L) exceeds the water quality benchmark of 1,500 mg/L established by the Basin Plan. The upstream concentration of Enterococcus (1600 CFU/100 mL) exceeds the water quality benchmark of 151 CFU/100 ml.

Description of Wetland Assessment (Existing) Activities (personnel, general conditions):

An assessment of existing wetland conditions of the upper Alvarado creek channel was performed by HELIX biologists to evaluate the ability of the channel to recover to its current condition following maintenance. A scoring system was used which evaluated the following three key macrofeatures: vegetation, hydrosoil, and hydroperiod. The scoring system estimates the influence of maintenance on sorption, deposition, and other transfers and transformations of waterborne pollutants. The methodology follows the one identified in the Water Quality Assessment and Quantification Model for Flood Channel Maintenance White Paper prepared for the Master Stormwater Maintenance PEIR (Weston 2011). Field observations made during water quality and sediment sampling activities on December 9, 2014 as well as information obtained from the IBA site survey on November 5, 2014 were considered in carrying out the Existing Wetland Assessment. Worksheets used for the scoring are included in Attachment 10.

Vegetation

The vegetation recovery score of a storm water facility is defined by the time required for the vegetation to return to its current condition with an assumed removal of greater than 75-percent of the sediment and standing vegetative crop. A score of 0 corresponds to an assumption that the current vegetation will not recover to its current density after removal of the current standing crop. A score of 1 assumes that the current vegetation is comprised of trees and woody species, and recovery would take more than 5 years. A score of 2 indicates that the current standing crop is a mature mix of woody and leafy vegetation (both terrestrial and wetland species), and recovery to the current condition is expected to require 1 to 5 years. A score of 3 corresponds to vegetation comprised of primarily emergent and submerged wetland species which would take approximately 1 year to re-establish to the current condition.

The Upper Alvarado Creek IBA presents the acreage of each vegetation community or land cover type surveyed that will be impacted by maintenance activities in the channel. Five vegetation communities are identified in the IBA for Reach 2 of the Upper Alvarado Creek including freshwater marsh, undisturbed and disturbed southern willow scrub, disturbed habitat (including non-native riparian dominated by fan palm [*Washingtonia* sp.] and castor bean [*Ricinus communis*]), non-native riparian, non-native vegetation/ornamental, and two land cover types: open water and developed/concrete channel. In accordance with the scoring system described above, a score of 0 – 3 was assigned to each of the vegetation communities and land cover types. These scores are listed in Table 1 below.

Table 2
EXISTING Vegetation Community/Land Use Type Scoring

Vegetation Community or Land Cover Type (Holland)	Acres	Vegetation Score	Scoring Rationale
Freshwater marsh	0.31	3	Dominance (> 75%) of emergent wetland species (i.e., *Typha*)

Southern willow scrub	0.08	2	Mature wetland
Open water	0.01	0	No visible vegetation
Non-native Riparian	0.09	1	Monotypic stands of invasive species
Non-native Vegetation/Ornamental	0.04	1	Adjacent upland species
Developed/Concrete channel	0.04	0	No visible vegetation
Disturbed Habitat	0.01	1	Disturbed non-native riparian outside channel and within loading area
TOTAL	**0.57**		
Overall Existing Vegetation Score		**2.13**	

Using the acreage identified in the IBA, an area-weighted average vegetation score was determined to be 2.13 for the Upper Alvarado creek channel which would mean that the current vegetation condition is expected to return within 1-2 years.

Hydrosoil

The importance of the existing hydrosoil condition to a storm water facility is evaluated by estimating how removal of greater than 75 percent of the sediments will affect the organic carbon concentration, particle size distribution, nutrient availability, and overall load removal of contaminants. The evaluation is based on the effects of the potential hydrosoil removal on water depth, flow, hydraulic retention time (HRT), and deposition/settling rates. The evaluation is also based on how the removal of sediments will affect the re-growth of vegetation to current densities and distributions.

The hydrosoil parameter is scored between 0 and 3. A score of 0 represents a high flow or no flow area with little to no deposition likely. A score of 1 corresponds to short-term sand deposition where the likelihood of the accumulation of fines and/or organic carbon is considered low within the next five-year period. A score of 2 anticipates that a heterogeneous mix of sand, organics, and fines is expected to accumulate in the next 1 to 5 years. A score of 3 indicates that a heterogeneous mix of sand, organics, and fines is expected to accumulate within 1 year.

Based on the scoring criteria described above, a hydrosoil score of 0 – 3 was assigned to the Upper Alvarado Creek channel based on the type of substrate and deposition, pH, and Redox value. An existing hydrosoil score of 2 was assigned based upon the combined visible deposition of a mix consisting primarily of sands and cobbles with some deposition of detritus, neutral pH (7.5), and a positive Redox value of 148 mV. A hydrosoil score of 2 indicates that a heterogeneous mix of sand, organics, and fines is expected to accumulate in the next 1 to 5 years.

Hydroperiod

The hydroperiod recovery score of a storm water facility is defined by the time it takes for the storm water facility to recover to an average, optimal depth of 1 to 1.5 feet of overlying water. A score of 0 indicates the expectation that the velocity of storm water flow will prevent sediment deposition. A score of 1 indicates the expectation that some slowdown of flow will occur resulting in some deposition of sand and other coarse grain materials. A score of 2 typically represents a broader channel bottom with an overlying water depth of 0.5 feet resulting in resulting in some deposition of fines. A score of 3 corresponds to a channel with an overlying water depth greater than 1 foot with proportionately greater deposition of fines and organics.

An existing hydroperiod score of 2 was assigned to the Upper Alvarado Creek channel, based upon the combined average water depth of 0.6 ft (ranging from approximately 0.2 ft – 1.7 ft), slow flow (velocity of 0.07 ft/sec) but likely dependent on volume inputs, and a significant hydraulic retention time (HRT) of 4.36 hours. Based on this score, moderate sediment deposition is expected to occur.

Total Existing Recovery Score

The total existing wetland macrofeature assessment score for a storm water facility is derived by adding the

ratings from all three categories (vegetation, hydrosoil, and hydroperiod). An overall score of 0 to 2 is considered a poor rating, 3 to 4 is considered fair, 5 to 7 is comparable to good wetland quality and health, and 8 to 9 represents the best recovery for sorption and deposition of suspended solids and associated contaminants.

Adding the three scores for the Upper Alvarado Creek channel results in an overall existing score of 6.1 for the existing wetlands which indicates good water quality and health (Table 2).

Table 3
Existing Wetland Macrofeature Assessment Scoring

Wetland Macrofeature	Score
Vegetation	2.1
Hydrosoil	2
Hydroperiod	2
Overall Existing Wetland Score	6.1

Description of Wetland Assessment (Recovery) Activities (personnel, general conditions):

Vegetation

In a similar manner to the existing vegetation score, a recovery vegetation score of 0 – 3 was assigned to each vegetation community (excluding land cover types) identified in the IBA. Using the acreage identified in the IBA, an area-weighted average recovery vegetation score was determined to be 2.34 for the Upper Alvarado Creek channel which would mean that the vegetation condition is expected to return within 1-5 years. The recovery vegetation scores are listed in Table 3 below.

Table 4
RECOVERY Vegetation Community Scoring

Vegetation Community (Holland)	Acres	Vegetation Score	Scoring Rationale
Freshwater marsh	0.31	3	Emergent wetland species (i.e., *Typha*) will exhibit regrowth within 1 year
Southern willow scrub	0.08	2	Recovery of mixed vegetation (i.e., *Salix* and *Typha*) will take 1-5 years
Non-native riparian	0.09	1	Recovery of existing trees (i.e., *Washingtonia*) will take more than 5 years
Non-native vegetation	0.04	2	Recovery of encroachment from adjacent upland species will take 1-5 years
TOTAL	**0.52**		
Overall Existing Vegetation Score		**2.34**	

Hydrosoil

A single recovery hydrosoil score of 1 was assigned to the Upper Alvarado Creek channel. This assignment was based on the fact that the sediment currently deposited in the channel primarily consists of cobbles and sand with some fines and that flow is either high (during storms) or low which would result in little deposition within five years of maintenance activities.

Hydroperiod

A single recovery hydroperiod score of 3 was assigned to the Upper Alvarado Creek channel based on criteria in Attachment 10 and best professional judgment. This assignment is based primarily on the fact that the water depth in the channel was generally observed to be 0.5 – 1 ft., and that the regrowth of the freshwater marsh will facilitate the deposition of fines and organics.

Total Estimated Recovery Score

Adding the three scores results in an overall predicted recovery score of 6.34 which is comparable to the existing condition, and indicates good water quality and health (Table 4). In summary, the likely sediment redeposition and recovery of wetland species, including *Typha*, is expected to occur within one to five years.

Table 5
RECOVERY Wetland Macrofeature Assessment Scoring

Wetland Macrofeature	Score
Vegetation	2.34
Hydrosoil	1
Hydroperiod	3
Overall Existing Wetland Score	6.34

Sediment Pollutant Loading Estimates:

Pollutant loading estimates were performed following the guidelines outlined in the SOP. Total sediment volumes of approximately 517 cubic yards (yd^3) are scheduled to be removed from maintenance in Upper Alvarado Channel. These removal volumes were applied to the 1 sample (UAC-1) in pollutant loading calculations. Load removal estimates were corrected for the presence of cobble larger than 1.5 inches in accordance with the SOP. A correction factor of 0.75 was applied to UAC-1 as the presence cobbles was observed at these sediment sampling locations and in the sieve test results, see Attachment 3 for full sieve test results. The resultant pollutant loading estimates and Excel model calculations can be found in Table 8 of Attachment 6.

MAINTENANCE IMPACTS

Evaluation of Benefits / Impacts:
Are there constituents that have potential impacts greater than benefits?
Yes ■ No ☐

If so, identify constituents here and compare measured concentrations to thresholds.

An evaluation of the water quality benefits versus impacts of both proposed channel maintenance area, Reach 2, of the Upper Alvarado Channel was carried out in accordance with the SOP. The maintained pollutant removal estimates were compared to the corresponding existing pollutant removal estimates for each constituent over a three year maintenance period. The results of this comparison can be found in Table 12 in Attachment 6. The results of this comparison show for each constituent that the estimated maintained pollutant removal exceeds the estimated existing pollutant removal, with the exception of nitrate. A difference of 69 pounds (lbs) of impact on nitrate load removal, over the three year maintenance period, is estimated (see Table 12 in Attachment 6). The water quality benchmark for Nitrate as listed in the San Diego Basin Plan is 10 mg/L. The concentration of Nitrate in the water column sample taken at the upstream sampling location is 1.16 mg/L. (for comparisons of each constituent to the listed benchmark in the San Diego Basin Plan see Table 11 in Attachment 6).

Nitrate was found to have a potential impact greater than the benefit. However, as discussed below, a potential temporary increase in water column nitrate concentrations does not represent a significant impact to the water quality.

The anaerobic sediments typical of wetland environments allow for the process of denitrification, in which nitrate is converted to nitrogen gases that are released to the atmosphere. Removal of sediment and vegetation from the maintenance area in the Upper Alvarado Channel will temporarily disturb this denitrification process

and nitrate assimilation by wetland plants, potentially resulting in a temporary increase to water column nitrate concentrations. However, as specified in the White Paper and other publications the removal of vegetation is beneficial to water quality. Periodic removal of vegetation prevents the reintegration of nitrate into the water via natural decomposition of vegetation that is carrying collected nitrate. In addition the regrowth phase of vegetation, facilitated by periodic vegetation removal, allows for optimal sorption rates of pollutants in the vegetation, including nitrate. Lastly, since the measured water column nitrate concentration is below the suggested benchmarks established in the Basin Plan, this temporary disruption does not pose a risk to the water quality.

These results of the water quality impact analysis outlined by the SOP suggest that overall the proposed sediment removal during maintenance of the Upper Alvarado Channel will remove a larger pollutant load than that which is theoretically removed under existing conditions during dry weather flow by natural treatment system processes over three years. The proposed maintenance will therefore provide an overall water quality benefit. Sediment excavation will prevent the re-suspension and downstream transport of sediment-bound pollutants during wet weather, and regrowth of fresh water marsh species within one year will further enhance pollutant removal from the channel.

MITIGATION

If impacts are identified, list potential mitigation efforts (e.g., BMPs type(s) and number(s)) that may be implemented in the watershed:

The results of this IWQA process suggest that there is an overall pollutant reduction benefit due to sediment removal as a result of the proposed maintenance activities, and therefore no additional mitigation measures are necessary. For the constituents analyzed, all but nitrate show an increase in estimated maintained pollutant removal. However, as stated in the SOP, "In cases where the impact is greater than the benefit, but the measured concentrations are less than the water quality objectives established by the San Diego Basin Plan for the water body segment in which the maintenance would occur no risk to the beneficial uses exist. In order to take a conservative approach, maintained channels that result in water column concentrations of the specific pollutants that are monitored under the NPDES Permit that exceed, or are within 25 percent of the water quality objectives established by the San Diego Basin Plan for the water body segment in which the maintenance would occur should have mitigation. In cases where the impact is greater than the benefit, but the maintained channel water column concentrations of the specific pollutants that are monitored under the NPDES Permit will be less than the lower limits described above (25 percent below the water quality objectives), no risk to the beneficial uses exist, and therefore no mitigation is necessary."

Nitrate has a listed water quality objective in the San Diego basin plan of 10 mg/L. The result of the water column sample concentration is 1.16 mg/L and since this measured concentration is less than 25 percent of the established water quality objective in the San Diego Basin Plan (10 mg/l), no mitigation for Nitrate is necessary.

Despite the fact that no additional mitigation is necessary pursuant to the White Paper, mitigation measures may be implemented in order to further decrease pollutant concentrations and improve overall water quality. The applicable mitigation measures, as identified in the PEIR, include: street sweeping, retrofitting residential landscaping to reduce runoff, installing artificial turf, installing inlet devices on storm drains, replacing impermeable surfaces with permeable surfaces, installing modular storm water filtration systems, installing storm water retention basins, installing catch basin media filters, creating vegetated swales, restoring wetlands, and installing check dams. All of the listed mitigation measures would decrease the overall bacteria, metals, pesticides, total dissolved solids, and trash in the water. A summary and table of Applicable PEIR mitigation

measures and benefits can be found in their entirety in Attachment 7. In order to comply with the settlement agreement, the City shall increase frequency of catch basin inspection and as-needed cleaning for one year after maintenance. For every segment that is cleared, the City shall conduct an inspection and cleaning if necessary of every catch basin within 100 feet of the maintained segment, and conduct additional inspections and cleaning if necessary every three months.

REFERENCES

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San Diego RWQCB, 1994. Water Quality Control Plan for the San Diego Basin (9), September 8, 1994 with amendments effective on or before April 4, 2011.

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SWRCB, 2004. Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, September, 2004/

SWRCB, 2010. 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) – Statewide, accessed from: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml May 2013

USEPA 1994. Sediment Sampling. SOP #: 2016 November 17, 1994

LIST OF ATTACHMENTS (Check All That Apply):

Attachment 1: Channel Exhibits

- ❑ Figure 1 – Vicinity Map
- ❑ Figure 2 – Channel Reach Exhibit

Attachment 2: Site Photos

- ❑ Figure 3 - Photo map exhibit
- ❑ Site Photographic Log

Attachment 3: Analytical Sampling Results

- ❑ Figure 4 – Sediment and Water Sampling Locations Map
- ❑ Chain of Custody Sheet(s) for Sediment Sampling
- ❑ Analytical Results of Sediment Sample(s)
- ❑ Sieve Analysis Laboratory Results of Sediment Samples
- ❑ Chain of Custody Sheet(s) for Water Column Sampling
- ❑ Analytical Results of Water Column Sample(s)

Attachment 4: Flow Measurement Model

- ❑ Flow Measurement Field Sheets
- ❑ Flow Measurement Calculation Sheets

Attachment 5: Channel Wetland Assessment

- ❑ Wetland Land Assessment Scoring Field Notes (Existing Condition)
- ❑ Wetland Land Recovery Assessment Field Notes (Maintained Storm Water Facility)

Attachment 6: Impact-Benefits Model

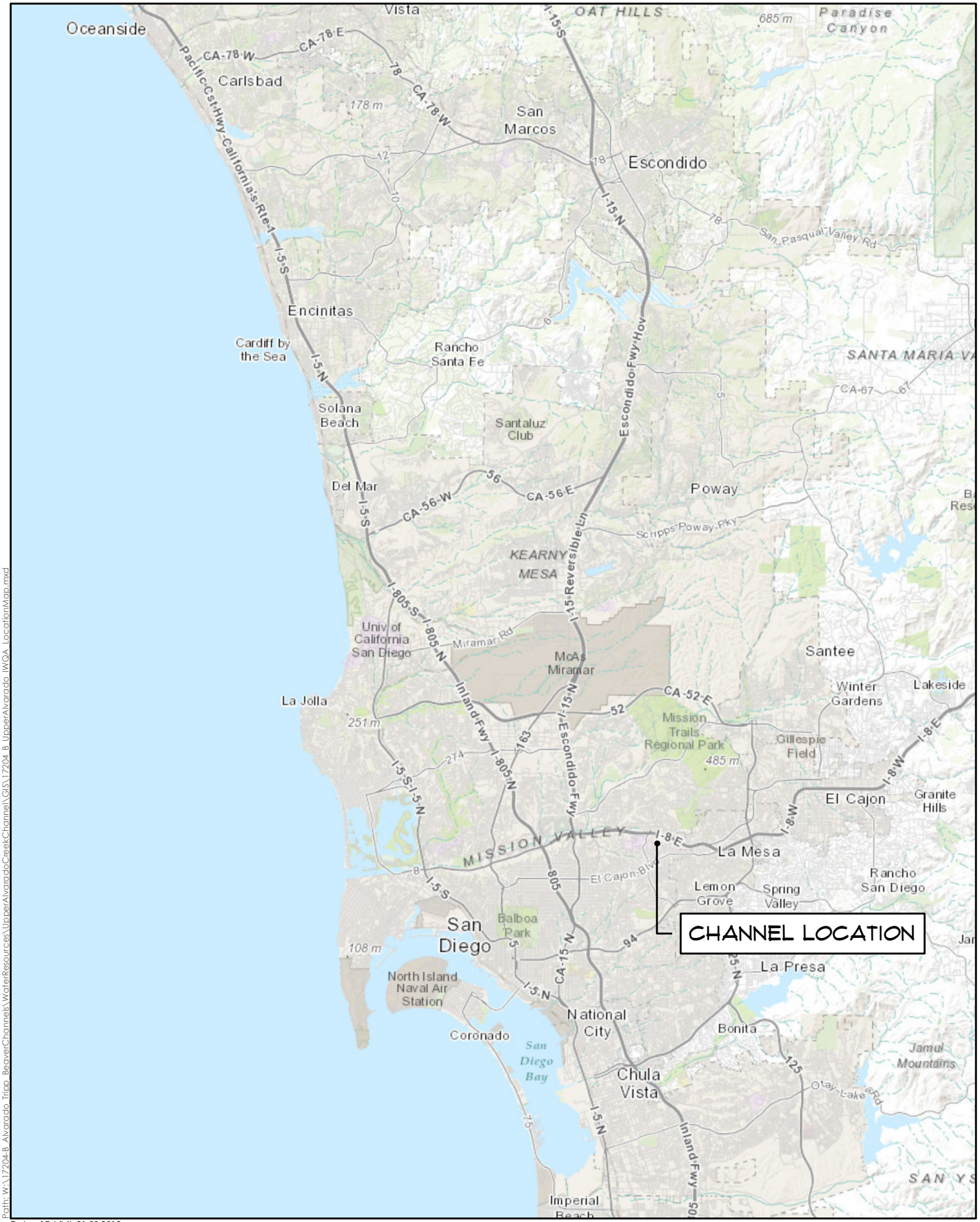
- ❑ Table 6 - Sediment Pollutant Loading Model (Benefit Load Removal in Sediment)
- ❑ Table 7 – Comparison of pollutant concentrations to Human Health Screening Level
- ❑ Table 8 - Potential Water Quality Impacts Model
- ❑ Table 9 – Comparison of Pollutant Concentrations to Water Quality Benchmarks
- ❑ Table 10 - Comparison of Impacts to Benefits

Attachment 7: Potential Mitigation Efforts Model

- ❑ Applicable PEIR Mitigation Measures

ATTACHMENT 1 – CHANNEL EXHIBITS

FIGURE 1 –VICINITY MAP



Path: W:\17204-B Alvarado Trlpp BeaverChannels\WaterResources\UpperAlvaradoCreekChannel\GIS\17204_B_UpperAlvarado_IWQA_LocationMap.mxd

Date of Exhibit: 01.30.2015
Source: ESRI World Topographic Baselayer

RICK ENGINEERING COMPANY

Miles
0 2.5 5
North

Figure 1

IWQA Report - Project Vicinity Map

Upper Alvarado Channel

J-17204 BA

FIGURE 2 – CHANNEL REACH EXHIBIT

REACH 1

Pedestrian Bridge

REACH 2

REACH 3

COLLEGE AV

PRIVATE DY

State of California

City of San Diego

ALVARADO RD

DEL CERRO CT

DEL CERRO AV

DARTFORD WY

AIROSO AV

BROCKBANK PL

E CAMPUS DR

WEST FALLS VIEW DR

EAST FALLS VIEW DR

FALLS WY

RINCON ST

GARY ST

CLEO ST

Jjulie ST

CATOCTIN DR

Legend

- Reach 1
- Reach 2
- Reach 3
- Responsible Party for Maintenance

W:\17204-B_Alvarado_Trlpp_BeaverChannels\WaterResources\UpperAlvaradoCreekChannel\GIS\17204_B_AlvaradoUpper_IWQA_Reaches.mxd

RICK ENGINEERING COMPANY

Scale in Feet

0 200 400

North

Date of Exhibit: 01.30.2015
DigitalGlobe Aerial Image: 04.2013

Figure 2

Upper Alvarado Channel

IWQA Report - Channel Reaches

17204-BA

ATTACHMENT 2 – SITE PHOTOS

FIGURE 3 – PHOTO MAP RESULTS

DEL CERRO CT
DEL CERRO AV
DARTFORD WY
AIROSO AV
ALVARADO RD
COLLEGE AV
State of California
City of San Diego
Pedestrian Bridge
PRIVATE DY
BROCKBANK PL
REACH 2
1
2
E CAMPUS DR
WEST FALLS VIEW DR
EAST FALLS VIEW DR
FALLS WY
GARY ST
CLEO ST
JULIE ST
CATOCTIN DR

Legend

- Reach 2
- Responsible Party for Maintenance
- Picture Locations 6

W:\17204-B_Alvarado_Tripp_BeaverChannels\WaterResources\UpperAlvaradoCreekChannel\GIS\17204_B_AlvaradoUpper_IWQA_SampPhotos.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 200 400
North

Date of Exhibit: 01.30.2015
DigitalGlobe Aerial Image: 04.2013

Figure 3

Upper Alvarado Channel

IWQA Report - Photo Locations

17204-BA

SITE PHOTOGRAPHIC LOG

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
957	**12/09/14**

Direction Photo Taken

Southeast

Description

View upstream of Photo Location 1.

Photo No.	Date
959	**12/09/14**

Direction Photo Taken

Southeast

Description

Upstream view from Photo Location 1.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
960	**12/09/14**

Direction Photo Taken

West

Description

Downstream view from Photo Location 1.

Photo No.	Date
961	**12/09/14**

Direction Photo Taken

South

Description

Sampler collecting water quality sample at Photo Location 1.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
964	**12/09/14**

Direction Photo Taken

South

Description

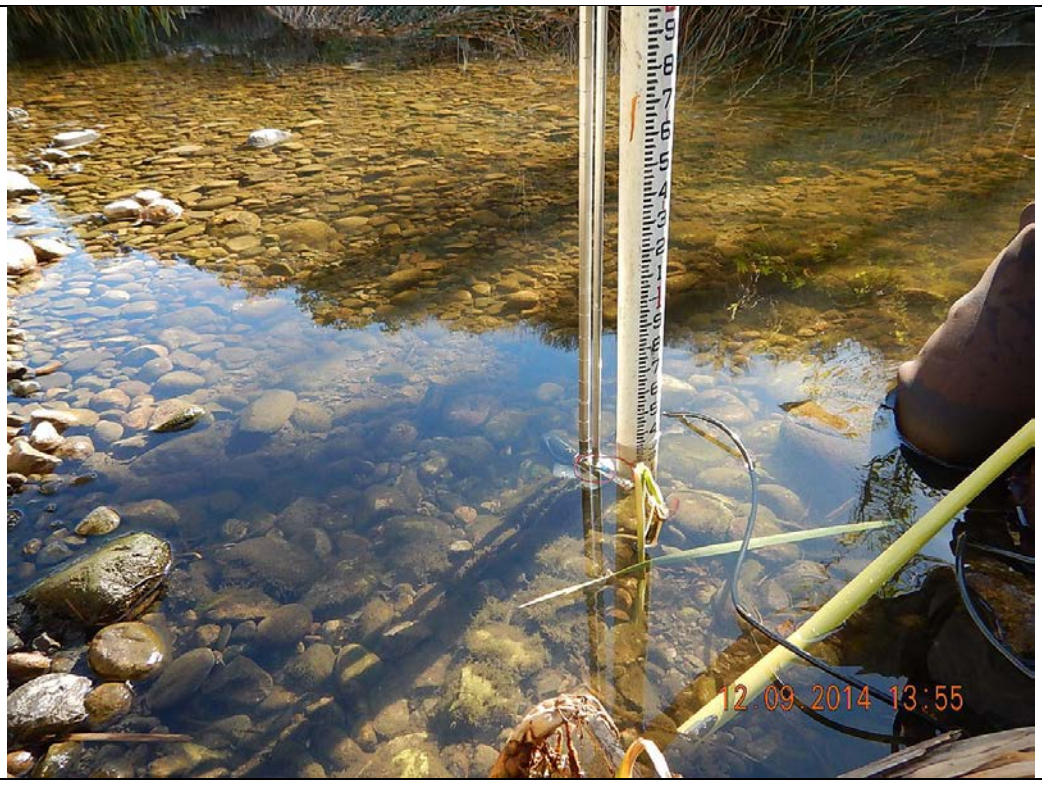
Sampler measuring width of channel at Photo Location 1.

Photo No.	Date
966	**12/09/14**

Direction Photo Taken

Description

Sampler measuring depth and collecting velocity measurements at Photo Location 1.



IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
973	**12/09/14**

Direction Photo Taken

Southeast

Description

Sampler collecting water quality samples at Photo Location 2.

Photo No.	Date
974	**12/09/14**

Direction Photo Taken

Southwest

Description

View of vegetative growth downstream of Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
978	**12/09/14**

Direction Photo Taken

Southwest

Description

View of rolled vegetation downstream of Photo Location 2.

Photo No.	Date
979	**12/09/14**

Direction Photo Taken

Southeast

Description

View upstream of Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
983	**12/09/14**

Direction Photo Taken

Southeast

Description

View upstream of Photo Location 2 of large cobblestones breaching out of the water column.

Photo No.	Date
986	**12/09/14**

Direction Photo Taken

South

Description

Sampler collecting velocity measurements using Marsh-Mcbirney Flow Mater 2000 at Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
988	**12/09/14**

Direction Photo Taken

Southeast

Description

Photo Location 2 of vegetative growth above southern concrete bank and chain link fence above northern concrete bank.

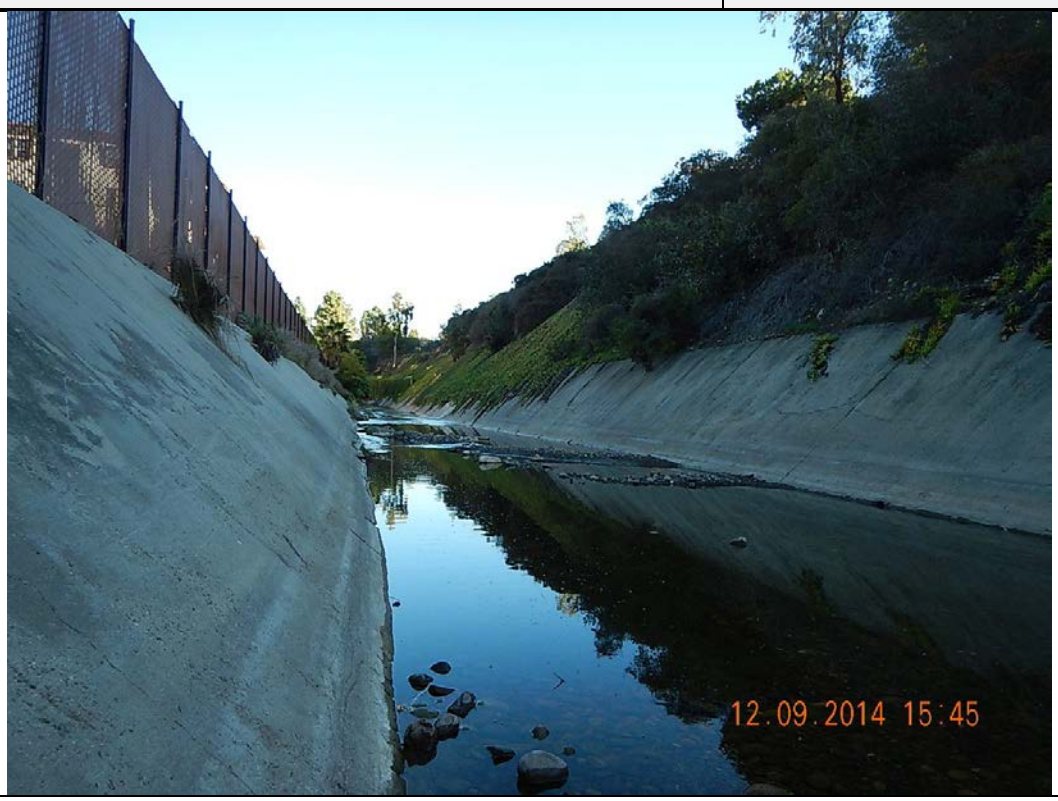


Photo No.	Date
991	**12/09/14**

Direction Photo Taken

South

Description

Sampler measuring depth at Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
995	**12/09/14**

Direction Photo Taken

South

Description

Concrete southern bank and vegetative growth above concrete at Photo Location 2.

Photo No.	Date
997	**12/09/14**

Direction Photo Taken

Northeast

Description

Substrate lining center of channel at Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
1000	**12/09/14**

Direction Photo Taken

South

Description

Substrate lining channel bottom by south bank at Photo Location 2.

Photo No.	Date
1001	**12/09/14**

Direction Photo Taken

Southwest

Description

Downstream view from Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Upper Alvarado Channel	**17204-BA**

Photo No.	Date
1002	**12/09/14**

Direction Photo Taken

Southeast

Description

Upstream view from Photo Location 2.

ATTACHMENT 3 – ANALYTICAL SAMPLING RESULTS

FIGURE 4 – SEDIMENT AND WATER SAMPLING LOCATIONS MAP

COLLEGE AV
Reach 3
PRIVATE DY
BROCKBANK PL
E CAMPUS DR
WEST FALLS VIEW DR
EAST FALLS VIEW DR
FALLS WY
ALVARADO CT
ALVARADO RD
DEL CERRO CT
DEL CERRO AV
DARTFORD WY
ASHLAND AV
AIROSO AV
Downstream (D/S)
Reach 2
UAC-1
Upstream (U/S)
Reach 1
CLEO ST
GARY ST
JULIE ST
CATOCTIN DR

Legend

- Soils Sampling Locations
- Water Sampling Locations
- Channel Maintenance Boundary

W:\17204-B_Alvarado_Tripp_BeaverChannels\WaterResources\UpperAlvaradoCreekChannel\GIS\17204_B_AlvaradoUpper_IWQA_Sampling.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 200 400
North

Date of Exhibit: 01.30.2015
DigitalGlobe Aerial Image: 04.2013

Figure 4

Upper Alvarado Channel

IWQA Report - Sampling Locations

17204-BA

CHAIN OF CUSTODY SHEET(S) FOR WATER COLUMN SAMPLING

eurofins | Calscience

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **14-12-2232**

DATE: 12/24/14

PAGE: 1 OF 1

LABORATORY CLIENT: AMERICAN SCIENTIFIC LABS

ADDRESS: 2520 N. San Fernando Road

CITY: Los Angeles | STATE: CA | ZIP: 90065

TEL: 323-223-9700 | E-MAIL: alen@asllab.com

CLIENT PROJECT NAME / NUMBER: 63209

P.O. NO.:

PROJECT CONTACT: Alen Hosepians

QUOTE NO.

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"): 10 Days

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ ~~5~~ DAYS (STANDARD)

☐ COELT EDF | GLOBAL ID: | LOG CODE:

SPECIAL INSTRUCTIONS: 10 Days.
Analysis: TKN, 8141A and metals by 6020
Total phosphorus

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TKN mg/kg	8141A mg/kg	Total Phosphorus SM4500 P E	Antimony, Arsenic, Cadmium,	Chromium, Copper, Lead,	Manganese, Nickel, Selenium,	Zinc by 6020
1	326445	12/22/14	9:45	Sediment	1				X	X	X	X	X	X	X
2	326446	↓	11:20	↓	1				X	X	X	X	X	X	X
3	326447		12:00		1				X	X	X	X	X	X	X
4	326448		12:45		1				X	X	X	X	X	X	X

Relinquished by: (Signature) Alex	Received by: (Signature/Affiliation) ECI	Date: 12-24-14	Time: 1440
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

01/01/14 Revision

Return to Contents

ASC JOB # 63209

Clarkson Laboratory & Supply Inc.	Client's Name:
Phone (619) 425-1993 Fax (619)425-7917	Address
www.clarksonlab.com	Tel./Fax
E-mail Laura Torres laura@clarksonlab.com	Contact Person: LAURA TORRES

Chain-of-Custody Record

PO# 50082

Survey				Samplers: CUSTOMER					
Station Number	Station Location/Sample ID	Date	Time	Sample Type			Sample Size	No. Of Containers	Analysis Required
				Water		Other			
				Comp	Grab				
1	SO5532-1 326445								
	TCC-1	12/20/14	9:45			Sed	1602	2	
2	SO5532-2-326446								
	LAC-2	12/20/14	11:20			Sed	1602	2	
3	SO5532-3 326447								
	LAC-1	12/20/14	12:00			Sed	1602	2	
4	SO5532-4 326448								
	UAC-1	12/20/14	12:45			Sed	1202	2	

Table A-3 List attached for Organics run EPA 8270C instead of 8310. Report Moisture

Relinquished by: Laura Torres	Received by:	Date/Time 12/20/14 @ 3pm.
Relinquished by:	Received by:	Date/Time
Relinquished by:	Received by:	Date/Time
Relinquished by:	Received by:	Date/Time

Method of Shipment:

Method Preserved: HCl __ HNO_3 ___ H_2SO_4 ___ Ice ___ None X Other ___

Comments:

PLEASE E-MAIL RESULTS

Distribution: Original.--Must Accompany Shipment, 1 Copy--Client (Relinquishing Samples)

ANALYTICAL RESULTS OF WATER COLUMN SAMPLE(S)

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone (619)425-1993
Attn Laura Torres

Number of Pages 4
Date Received 12/23/2014
Date Reported 01/09/2015

Job Number	Ordered	Client
63209	12/23/2014	CLSI

Project ID: S05532-1/2/3/4
Project Name:

Enclosed are the results of analyses on 4 samples analyzed as specified on attached chain of custody.

Wendy Lu
Organics Supervisor

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone: (619)425-1993
Attn: Laura Torres

Project ID: S05532-1/2/3/4

ASL Job Number	Submitted	Client
63209	12/23/2014	CLSI

Method: 300, Nitrite by Ion Chromatography

QC Batch No: 122414-1

Our Lab I.D.		**326445**	**326446**	**326447**	**326448**	
Client Sample I.D.		S05532-1	S05532-2	S05532-3	S05532-4	
Date Sampled		**12/22/2014**	**12/22/2014**	**12/22/2014**	**12/22/2014**	
Date Prepared		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Preparation Method						
Date Analyzed		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Matrix		Sediment	Sediment	Sediment	Sediment	
Units		mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Nitrite as N	**0.500**	**ND**	**0.960**	**0.860**	**ND**	

QUALITY CONTROL REPORT

QC Batch No: 122414-1

Analytes	LCS % REC	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit					
Conventionals										
Nitrite as N	**93**	**95**	**1.9**	**80-120**	**20**					

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone: (619)425-1993
Attn: Laura Torres

Project ID: S05532-1/2/3/4

ASL Job Number	Submitted	Client
63209	12/23/2014	CLSI

Method: 300, Nitrate by Ion Chromatography

QC Batch No: 122414-1

Our Lab I.D.		**326445**	**326446**	**326447**	**326448**	
Client Sample I.D.		S05532-1	S05532-2	S05532-3	S05532-4	
Date Sampled		**12/22/2014**	**12/22/2014**	**12/22/2014**	**12/22/2014**	
Date Prepared		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Preparation Method						
Date Analyzed		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Matrix		Sediment	Sediment	Sediment	Sediment	
Units		mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Nitrate as N	**1.00**	**ND**	**ND**	**ND**	**ND**	

QUALITY CONTROL REPORT

QC Batch No: 122414-1

Analytes	LCS % REC	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit					
Conventionals										
Nitrate as N	**101**	**101**	**<1**	**80-120**	**20**					

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone: (619)425-1993
Attn: Laura Torres

Project ID: S05532-1/2/3/4

ASL Job Number	Submitted	Client
63209	12/23/2014	CLSI

Method: SM2540-G, Percent Solids

QC Batch No: 122414-1

Our Lab I.D.		**326445**	**326446**	**326447**	**326448**	
Client Sample I.D.		S05532-1	S05532-2	S05532-3	S05532-4	
Date Sampled		**12/22/2014**	**12/22/2014**	**12/22/2014**	**12/22/2014**	
Date Prepared		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Preparation Method						
Date Analyzed		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Matrix		Sediment	Sediment	Sediment	Sediment	
Units		percent(%)	percent(%)	percent(%)	percent(%)	
Dilution Factor		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
% Solids	**1.00**	**18.4**	**59.4**	**60.4**	**50.1**	

QUALITY CONTROL REPORT

QC Batch No: 122414-1

Analytes	SM Result	SM DUP Result	RPD %	SM RPD % Limit						
Conventionals										
% Solids	**18.4**	**18.1**	**1.6**	**20**						

eurofins | Calscience

Contents

Client Project Name: 63209
Work Order Number: 14-12-2232

eurofins | Calscience

Work Order Narrative

Work Order: 14-12-2232 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 12/24/14. They were assigned to Work Order 14-12-2232.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

New York NELAP air certification does not certify for all reported methods and analytes, reference the accredited items here: http://www.calscience.com/PDF/New_York.pdf

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

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Sample Summary

Client:	American Scientific Laboratories, LLC	Work Order:	14-12-2232
	2520 North San Fernando Road	Project Name:	63209
	Los Angeles, CA 90065-1324	PO Number:	
		Date/Time Received:	12/24/14 14:40
		Number of Containers:	4
Attn:	Alen Hosepians		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
3264445	14-12-2232-1	12/22/14 09:45	1	Sediment
3264446	14-12-2232-2	12/22/14 11:20	1	Sediment
3264447	14-12-2232-3	12/22/14 12:00	1	Sediment
3264448	14-12-2232-4	12/22/14 12:45	1	Sediment

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 N Org B (M)
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	1200	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	620	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	810	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	1700	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-025-2225**	**N/A**	**Solid**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	ND	10	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 P B/E (M)
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	91	25	50.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	110	25	50.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	91	25	50.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	280	50	100	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-001-5246**	**N/A**	**Solid**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	ND	0.10	0.200	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:25**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	0.545	0.500	1.00	
Arsenic	1.36	0.100	1.00	
Cadmium	1.17	0.100	1.00	
Chromium	9.35	0.100	1.00	
Copper	39.1	0.100	1.00	B
Lead	10.4	0.100	1.00	
Manganese	36.3	0.500	1.00	
Nickel	10.2	0.100	1.00	
Selenium	6.55	0.100	1.00	
Zinc	147	1.00	1.00	B

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:29**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	2.69	0.100	1.00	
Cadmium	0.121	0.100	1.00	
Chromium	4.23	0.100	1.00	
Copper	11.6	0.100	1.00	B
Lead	11.3	0.100	1.00	
Manganese	389	0.500	1.00	
Nickel	3.05	0.100	1.00	
Selenium	0.396	0.100	1.00	
Zinc	93.5	1.00	1.00	B

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:32**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	2.64	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	3.18	0.100	1.00	
Copper	11.3	0.100	1.00	B
Lead	6.84	0.100	1.00	
Manganese	242	0.500	1.00	
Nickel	3.50	0.100	1.00	
Selenium	0.231	0.100	1.00	
Zinc	95.9	1.00	1.00	B

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:35**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	7.33	0.100	1.00	
Cadmium	0.174	0.100	1.00	
Chromium	4.48	0.100	1.00	
Copper	15.3	0.100	1.00	B
Lead	10.6	0.100	1.00	
Manganese	561	0.500	1.00	
Nickel	4.00	0.100	1.00	
Selenium	0.294	0.100	1.00	
Zinc	112	1.00	1.00	B

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-254-278**	**N/A**	**Solid**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:49**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	ND	0.100	1.00	
Copper	0.160	0.100	1.00	
Lead	ND	0.100	1.00	
Manganese	ND	0.500	1.00	
Nickel	ND	0.100	1.00	
Selenium	ND	0.100	1.00	
Zinc	1.09	1.00	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 12:00**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	61	30-130	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 12:46**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	66	30-130	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 13:32**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	60	30-130	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 14:29**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	68	30-130	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-973-147**	**N/A**	**Solid**	**GC 35**	**01/07/15**	**01/09/15 02:01**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	117	30-130	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 P B/E (M)
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
3264445	**Sample**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPS2**
3264445	**Matrix Spike**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPS2**
3264445	**Matrix Spike Duplicate**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPS2**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Phosphorus, Total	91.48	100.0	189.5	98	190.5	99	70-130	1	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
14-12-2197-1	**Sample**	**Sediment**	**ICP/MS 04**	**12/26/14**	**01/05/15 16:00**	**141226S01**
14-12-2197-1	**Matrix Spike**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:59**	**141226S01**
14-12-2197-1	**Matrix Spike Duplicate**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 01:41**	**141226S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	ND	25.00	7.640	31	7.377	30	80-120	4	0-20	3
Arsenic	5.927	25.00	31.30	101	30.58	99	80-120	2	0-20	
Cadmium	0.1701	25.00	25.75	102	26.19	104	80-120	2	0-20	
Chromium	40.47	25.00	69.09	114	62.64	89	80-120	10	0-20	
Copper	25.90	25.00	51.83	104	49.27	93	80-120	5	0-20	
Lead	11.84	25.00	37.42	102	36.78	100	80-120	2	0-20	
Manganese	215.2	25.00	227.8	4X	232.3	4X	80-120	4X	0-20	Q
Nickel	45.00	25.00	66.59	86	66.93	88	80-120	1	0-20	
Selenium	0.2939	25.00	26.89	106	27.53	109	80-120	2	0-20	
Zinc	59.53	25.00	83.69	97	81.45	88	80-120	3	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
14-12-2146-24	**Sample**	**Solid**	**GC 35**	**12/26/14**	**01/09/15 05:05**	**141226S06**
14-12-2146-24	**Matrix Spike**	**Solid**	**GC 35**	**12/26/14**	**01/09/15 03:33**	**141226S06**
14-12-2146-24	**Matrix Spike Duplicate**	**Solid**	**GC 35**	**12/26/14**	**01/09/15 04:19**	**141226S06**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Azinphos Methyl	ND	4.000	2.863	72	1.819	45	30-130	45	0-30	4
Bolstar	ND	4.000	3.022	76	1.941	49	30-130	44	0-30	4
Chlorpyrifos	ND	4.000	2.937	73	1.717	43	30-130	52	0-30	4
Coumaphos	ND	4.000	2.936	73	1.883	47	30-130	44	0-30	4
Diazinon	ND	4.000	2.989	75	1.933	48	30-130	43	0-30	4
Disulfoton	ND	4.000	3.140	78	1.929	48	30-130	48	0-30	4
Ethoprop	ND	4.000	3.142	79	1.948	49	30-130	47	0-30	4
Fensulfothion	ND	4.000	3.244	81	2.063	52	30-130	44	0-30	4
Fenthion	ND	4.000	3.066	77	1.897	47	30-130	47	0-30	4
Merphos	ND	4.000	3.561	89	2.556	64	30-130	33	0-30	4
Methyl Parathion	ND	4.000	3.167	79	1.914	48	30-130	49	0-30	4
Phorate	ND	4.000	3.288	82	2.073	52	30-130	45	0-30	4
Ronnel	ND	4.000	3.050	76	1.861	47	30-130	48	0-30	4
Stirophos	ND	4.000	1.931	48	1.163	29	30-130	50	0-30	3,4
Tokuthion	ND	4.000	2.917	73	1.859	46	30-130	44	0-30	4
Trichloronate	ND	4.000	2.915	73	1.723	43	30-130	51	0-30	4

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - PDS

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
14-12-2197-1	**Sample**	**Sediment**	**ICP/MS 04**	**12/26/14 00:00**	**01/05/15 16:00**	**141226S01**
14-12-2197-1	**PDS**	**Sediment**	**ICP/MS 04**	**12/26/14 00:00**	**12/27/14 01:44**	**141226S01**

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	%Rec. CL	Qualifiers
Antimony	ND	25.00	25.62	102	75-125	
Arsenic	5.927	25.00	30.83	100	75-125	
Cadmium	0.1701	25.00	25.47	101	75-125	
Chromium	40.47	25.00	63.56	92	75-125	
Copper	25.90	25.00	48.75	91	75-125	
Lead	11.84	25.00	37.11	101	75-125	
Manganese	215.2	25.00	241.6	4X	75-125	Q
Nickel	45.00	25.00	67.08	88	75-125	
Selenium	0.2939	25.00	28.01	111	75-125	
Zinc	59.53	25.00	82.17	91	75-125	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Sample Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 N Org B (M)
Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
3264448	**Sample**	**Sediment**	**BUR05**	**12/26/14 00:00**	**12/26/14 16:00**	**E1226TKND1**
3264448	**Sample Duplicate**	**Sediment**	**BUR05**	**12/26/14 00:00**	**12/26/14 16:00**	**E1226TKND1**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Total Kjeldahl Nitrogen	1708	1764	3	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 P B/E (M)
Page 1 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-05-001-5246	**LCS**	**Solid**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**
099-05-001-5246	**LCSD**	**Solid**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Phosphorus, Total	2.000	1.935	97	1.900	95	80-120	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-278	**LCS**	**Solid**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:53**	**141226L01E**
099-15-254-278	**LCSD**	**Solid**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:56**	**141226L01E**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	25.00	25.81	103	25.54	102	80-120	1	0-20	
Arsenic	25.00	27.00	108	27.15	109	80-120	1	0-20	
Cadmium	25.00	25.29	101	25.37	101	80-120	0	0-20	
Chromium	25.00	29.17	117	28.23	113	80-120	3	0-20	
Copper	25.00	27.72	111	27.19	109	80-120	2	0-20	
Lead	25.00	26.60	106	26.51	106	80-120	0	0-20	
Manganese	25.00	25.01	100	24.99	100	80-120	0	0-20	
Nickel	25.00	25.05	100	25.06	100	80-120	0	0-20	
Selenium	25.00	28.12	112	28.51	114	80-120	1	0-20	
Zinc	25.00	29.18	117	27.04	108	80-120	8	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-973-147	**LCS**	**Solid**	**GC 35**	**01/07/15**	**01/09/15 02:47**	**141226L06**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	ME CL	Qualifiers
Azinphos Methyl	4.000	3.784	95	30-130	13-147	
Bolstar	4.000	3.986	100	30-130	13-147	
Chlorpyrifos	4.000	3.780	94	30-130	13-147	
Coumaphos	4.000	3.977	99	30-130	13-147	
Diazinon	4.000	3.583	90	30-130	13-147	
Disulfoton	4.000	4.207	105	30-130	13-147	
Ethoprop	4.000	3.913	98	30-130	13-147	
Fensulfothion	4.000	4.404	110	30-130	13-147	
Fenthion	4.000	4.078	102	30-130	13-147	
Merphos	4.000	4.687	117	30-130	13-147	
Methyl Parathion	4.000	4.252	106	30-130	13-147	
Phorate	4.000	4.294	107	30-130	13-147	
Ronnel	4.000	3.950	99	30-130	13-147	
Stirophos	4.000	2.318	58	30-130	13-147	
Tokuthion	4.000	3.882	97	30-130	13-147	
Trichloronate	4.000	3.753	94	30-130	13-147	

Total number of LCS compounds: 16
Total number of ME compounds: 0
Total number of ME compounds allowed: 1
LCS ME CL validation result: Pass

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 14-12-2232 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 6020	EPA 3050B	598	ICP/MS 04	1
EPA 8141A	EPA 3545	886	GC 35	1
SM 4500 N Org B (M)	N/A	685	BUR05	1
SM 4500 P B/E (M)	N/A	848	UV 7	1

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Glossary of Terms and Qualifiers

Work Order: 14-12-2232 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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WORK ORDER #: 14-12-[12323]2

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: ASL

DATE: 12/24/14

TEMPERATURE: Thermometer ID: SC2 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 2.9 °C - 0.2 °C (CF) = 2.7 °C ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter **Checked by:** 3W

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Checked by:** 3W

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Checked by:** 3W

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☐	☐	☑
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Aqueous samples received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfides ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☑8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Aqueous: ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** 3W

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** 3W

Preservative: **h:** HCL **n:** HNO_3 **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** 3W

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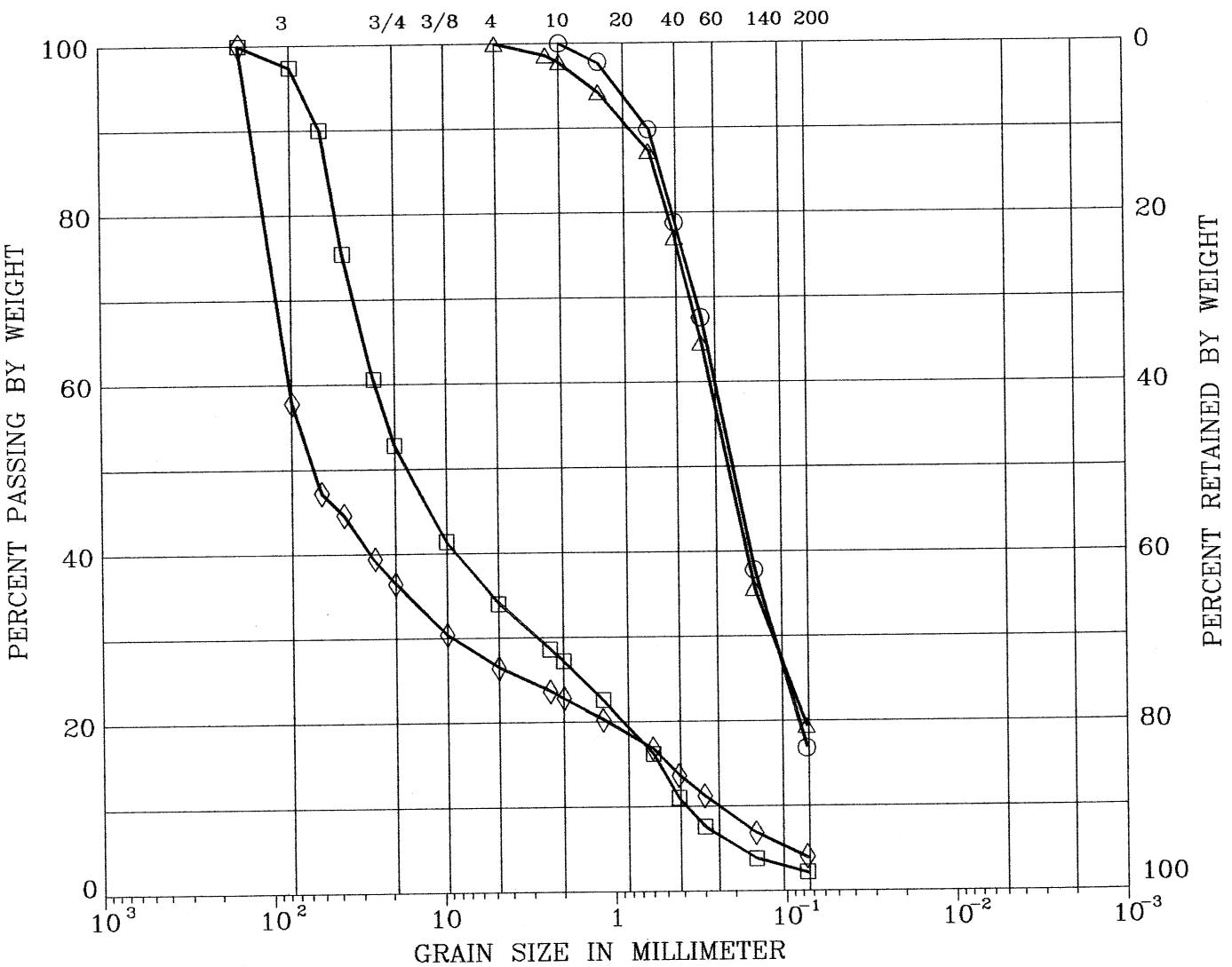
SIEVE ANALYSIS LABORATORY RESULTS OF SEDIMENT SAMPLES

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	TCC−1				SILTY SAND (SM)
□	LAC−1				POORLY GRADED GRAVEL (GP)
△	LAC−2				SILTY SAND (SM)
◇	UAC−1				POORLY GRADED GRAVEL (GP)

Remark :

Project 154 GS−13	CHANNEL MAINTENANCE PROJECT
ALLIED GEOTECHNICAL ENGINEERS, INC.	GRAIN SIZE DISTRIBUTION Figure No.

SUMMARY OF GRAIN SIZE DISTRIBUTION
CITY OF SAN DIEGO CHANNEL MAINTENANCE PROJECT

		% Passing			
	Sample ID	TCC-1	LAC-1	LAC-2	UAC-1
	6"				
	5"				100
	4"		100		75.5
	3"		97.4		57.9
	2"		90		47.1
	1.5"		75.3		44.6
	1"		60.6		39.3
	0.75"		52.8		36.5
U.S. STD.	**0.5"**		45.2		32.3
Sieve	**0.375"**		41.3		30.4
Size	**#4**		34.1	100	26.5
	#8		28.6	98.6	23.6
	#10	100	27.2	97.8	22.8
	#16	97.7	22.6	94.2	20.3
	#30	88.9	16.2	87.3	16.8
	#40	78.9	10.9	77	13.7
	#50	67.6	7.6	64.6	11.2
	#100	37.9	3.8	35.6	6.8
	#200	16.9	2.1	19.4	3.9
Cu		19.5	64.3	29	317.6
Cc		4.1	0.8	5.6	4

TCC = Trip Court Channel
LAC = Lower Alvarado Channel
UAC = Upper Alvarado Channel
Cu = Coefficient of Uniformity
Cc = Coefficient of Curvature

CHAIN OF CUSTODY SHEETS(S) FOR WATER COLUMN SAMPLING

1404 14

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CHAIN-OF-CUSTODY RECORD

EnviroMatrix Analytical, Inc.

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

EMA LOG #:

Client: City of San Diego via Rick Engineering Company

Attn: Kelly Doyle

Samplers(s): Kelly Doyle & Chelsea Ohanesian

Address: 5620 Friars Road
San Diego, CA 92110

Phone: 619 908 3588 Fax: 619-291-4165

Email: Kdoyle@rickengineering.com

Billing Address: 5620 Friars Road
San Diego, CA 92110

Project ID: Upper Alvarado IWQA

Project #: PO #:

Requested Analysis

ID #	Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container # / Type	Oil & Grease □ 413.1 □ 413.2 □ 1664	8015 (TPH) □ Gas □ Diesel □ Ext	624/8260 (VOC) Full BTXE MTBE Oxy Nap	625 / 8270 (SVOC) □ PAH only	608 / 8081 (Organochlorine Pesticides)	608 / 8082 (Polychlorinated Biphenyls)	8141 (Organophosphorus Pesticides)	TBT (Organotin Compounds)	□ pH □ EC □ TSS X TDS	X Nitrate X Nitrite X TKN □ NH3	CAC Title 22/CAM17 Metals □ TTLC □ STLC	TCLP (RCRA) □ Metals □ Organics	Cd Cr Cu (Pb) (Ni) Ag (Zn) □ Dissolved	Coliform, X Total (MTF) X Fecal (MTF)	Colilert, T+E.Coli □ P/A □ Enumeration	Enterococcus, X MTF □ Enterolert	Heterotrophic Plate Count (HPC)	□ BOD □ COD □ Cyanide	DO, Se, Mn, N, Sb, As	Hardness, Total Recon.			
1	Upper Alvarado D/S	12/9/14	12:23	SW	7							X		X	X			X	X		X			X	X			
2	Upper Alvarado U/S	12/9/14	2:13	SW	7							X		X	X			X	X		X			X	X			
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

Matrix Codes: A = Air, DW = Drinking Water, GW = Groundwater, SW = Storm Water
WW = Wastewater, S = Soil, SED = Sediment, SD = Solid, T = Tissue, O = Oil, L = Liquid

Shipped By: □ Courier □ UPS □ FedEx □ USPS X Client Drop Off □ Other

[1]**Turn-Around-Time:** □ Same Day □ 1 day □ 2 day □ 3 day □ 4 day □ 5 day X STD (7 day)

[1]**Reporting Requirements:** □ Fax X PDF □ Excel □ Geotracker/EDF □ Hard Copy □ EDT

[1]**Sample Disposal:** X By Laboratory □ [2]Return to Client: P/U or Delivery □ Archive

Sample Integrity

Correct Containers: Yes No N/A	Containers Properly Preseved: Yes No N/A
Custody Seals Intact: Yes No N/A	Temp @ Receipt: 9.0 °C
COC/Labels Agree: Yes No N/A	Sampled By: Client EMA Autosampler

RELINQUISHED BY	DATE/TIME	RECEIVED BY
Signature	1604	Signature
Print: Kelly Doyle	12-9-14	Print: K. MILLER
Company: Rick Engineering Company		Company: EMA
Signature		Signature
Print		Print
Company:		Company:
Signature		Signature
Print		Print
Company:		Company:

Project/Sample Comments:

[1]Additional costs may apply. Please note there is a $35 minimum charge for all clients.

[2]EMA reserves the right to return any samples that do not match our waste profile.

NOTE: By relinquishing samples to EMA, Inc., client agrees to pay for the services requested on this COC form and any additional analyses performed on this project. Payment for services is due within 30 days from date of invoice. Samples will be disposed of 7 days after report has been finalized unless otherwise noted. All work is subject to EMA's terms and conditions.

ANALYTICAL RESULTS OF WATER COLUMN SAMPLE(S)

Client Name: Rick Engineering Company
Project Name: Upper Alvarado IWQA

EMA Log #: 14L0414

Total Metals by EPA 200 Series Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Upper Alvarado D/S (14L0414-01) Stormwater Sampled: 12/09/14 12:23 Received: 12/09/14 16:04									
Arsenic	ND	0.010	mg/l	1	4121105	12/11/14	12/15/14	EPA 200.7	
Chromium	ND	0.05	"	"	"	"	"	"	
Cadmium	ND	0.01	"	"	"	"	"	"	
Lead	ND	0.05	"	"	"	"	"	"	
Nickel	ND	0.05	"	"	"	"	"	"	
Zinc	**0.07**	0.05	"	"	"	"	"	"	
Copper	ND	0.05	"	"	"	"	"	"	
Manganese	**0.089**	0.030	"	"	"	"	12/15/14	"	
Antimony	ND	0.100	"	"	"	"	12/15/14	"	
Selenium	ND	0.010	"	"	"	"	"	"	
Upper Alvarado U/S (14L0414-02) Stormwater Sampled: 12/09/14 14:13 Received: 12/09/14 16:04									
Arsenic	ND	0.010	mg/l	1	4121105	12/11/14	12/15/14	EPA 200.7	
Chromium	ND	0.05	"	"	"	"	"	"	
Copper	ND	0.05	"	"	"	"	12/15/14	"	
Lead	ND	0.05	"	"	"	"	12/15/14	"	
Nickel	ND	0.05	"	"	"	"	"	"	
Zinc	ND	0.05	"	"	"	"	"	"	
Cadmium	ND	0.01	"	"	"	"	"	"	
Manganese	**0.092**	0.030	"	"	"	"	12/15/14	"	
Antimony	ND	0.100	"	"	"	"	12/15/14	"	
Selenium	ND	0.010	"	"	"	"	"	"	

Client Name: Rick Engineering Company
Project Name: Upper Alvarado IWQA

EMA Log #: 14L0414

Organophosphorus Pesticides by EPA Method 8141A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Upper Alvarado D/S (14L0414-01) Stormwater Sampled: 12/09/14 12:23 Received: 12/09/14 16:04									
Chlorpyrifos	ND	0.05	ug/l	1	4121217	12/16/14	12/17/14	EPA 8141A	
Diazinon	ND	0.05	"	"	"	"	"	"	
Malathion	ND	0.05	"	"	"	"	"	"	
Surrogate: Triphenyl phosphate		*84 %*	*60-130*		"	"	"	"	
Surrogate: Tribuytlphosphate		*88 %*	*60-130*		"	"	"	"	
Upper Alvarado U/S (14L0414-02) Stormwater Sampled: 12/09/14 14:13 Received: 12/09/14 16:04									
Chlorpyrifos	ND	0.05	ug/l	1	4121217	12/16/14	12/17/14	EPA 8141A	
Diazinon	ND	0.05	"	"	"	"	"	"	
Malathion	ND	0.05	"	"	"	"	"	"	
Surrogate: Triphenyl phosphate		*92 %*	*60-130*		"	"	"	"	
Surrogate: Tribuytlphosphate		*92 %*	*60-130*		"	"	"	"	

Client Name: Rick Engineering Company
Project Name: Upper Alvarado IWQA

EMA Log #: 14L0414

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Upper Alvarado D/S (14L0414-01) Stormwater Sampled: 12/09/14 12:23 Received: 12/09/14 16:04									
Hardness (Total)	**711**	100	mg CaCO3/L	10	4121105	12/11/14	12/15/14	EPA 200.7	
Nitrate as N	**1.26**	0.25	mg/l	5	4121423	12/14/14	12/14/14	SM4500 NO3 E	W-02
Nitrate/Nitrite as N	**1.26**	0.25	"	"	"	"	"	"	
Nitrite as N	ND	0.05	"	1	4121420	12/10/14	12/10/14	SM4500 NO2 B	
Total Kjeldahl Nitrogen	**2.2**	0.5	"	"	4121827	12/17/14	12/18/14	SM4500 N C	
Total Nitrogen	**3.5**	0.5	"	"	4121832	12/18/14	12/18/14	Calculation	
Dissolved Oxygen	**11.2**	0.10	"	"	4120964	12/12/14	12/12/14	SM4500-O G	HT-15
Phosphorus, Total	**0.21**	0.05	"	"	4121328	12/13/14	12/13/14	SM4500 P B, E	
Total Dissolved Solids	**1700**	20.0	"	"	4121337	12/13/14	12/15/14	SM2540 C	
Upper Alvarado U/S (14L0414-02) Stormwater Sampled: 12/09/14 14:13 Received: 12/09/14 16:04									
Hardness (Total)	**732**	100	mg CaCO3/L	10	4121105	12/11/14	12/15/14	EPA 200.7	
Nitrate as N	**1.16**	0.25	mg/l	5	4121423	12/14/14	12/14/14	SM4500 NO3 E	W-02
Nitrate/Nitrite as N	**1.16**	0.25	"	"	"	"	"	"	
Nitrite as N	ND	0.05	"	1	4121420	12/10/14	12/10/14	SM4500 NO2 B	
Total Kjeldahl Nitrogen	**0.6**	0.5	"	"	4121827	12/17/14	12/18/14	SM4500 N C	
Total Nitrogen	**1.8**	0.5	"	"	4121832	12/18/14	12/18/14	Calculation	
Dissolved Oxygen	**10.4**	0.10	"	"	4120964	12/12/14	12/12/14	SM4500-O G	HT-15
Phosphorus, Total	ND	0.05	"	"	4121328	12/13/14	12/13/14	SM4500 P B, E	
Total Dissolved Solids	**1780**	20.0	"	"	4121337	12/13/14	12/15/14	SM2540 C	

Client Name: Rick Engineering Company
Project Name: Upper Alvarado IWQA

EMA Log #: 14L0414

Microbiological Parameters by Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Upper Alvarado D/S (14L0414-01) Stormwater Sampled: 12/09/14 12:23 Received: 12/09/14 16:04									
Total Coliforms	**1600**	2	MPN/100 ml	1	4121027	12/09/14	12/13/14	SM 9221 B, E	A-01a
Fecal Coliforms	**500**	2	"	"	"	"	12/12/14	"	
Enterococcus	**1600**	2	"	"	4121028	"	12/13/14	SM 9230 A, B	A-01
Upper Alvarado U/S (14L0414-02) Stormwater Sampled: 12/09/14 14:13 Received: 12/09/14 16:04									
Total Coliforms	**1600**	2	MPN/100 ml	1	4121027	12/09/14	12/13/14	SM 9221 B, E	A-01a
Fecal Coliforms	**130**	2	"	"	"	"	12/12/14	"	
Enterococcus	**1600**	2	"	"	4121028	"	12/13/14	SM 9230 A, B	

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

Total Metals by EPA 200 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4121105										
Blank (4121105-BLK1)				Prepared: 12/11/14 Analyzed: 12/15/14						
Cadmium	ND	0.01	mg/l							
Manganese	ND	0.030	"							
Nickel	ND	0.05	"							
Zinc	ND	0.05	"							
Lead	ND	0.05	"							
Copper	ND	0.05	"							
Chromium	ND	0.05	"							
Antimony	ND	0.100	"							
Arsenic	ND	0.010	"							
Selenium	ND	0.010	"							
LCS (4121105-BS1)				Prepared: 12/11/14 Analyzed: 12/15/14						
Antimony	1.03	0.100	mg/l	1.00		103	75-125			
Chromium	1.00	0.05	"	1.00		100	75-125			
Zinc	1.01	0.05	"	1.00		101	75-125			
Copper	0.99	0.05	"	1.00		99	75-125			
Nickel	1.02	0.05	"	1.00		102	75-125			
Lead	1.01	0.05	"	1.00		101	75-125			
Manganese	0.979	0.030	"	1.00		98	75-125			
Cadmium	1.00	0.01	"	1.00		100	75-125			
Selenium	1.00	0.010	"	1.00		100	75-125			
Arsenic	0.996	0.010	"	1.00		100	75-125			
LCS Dup (4121105-BSD1)				Prepared: 12/11/14 Analyzed: 12/15/14						
Chromium	1.00	0.05	mg/l	1.00		100	75-125	0.2	20	
Cadmium	1.01	0.01	"	1.00		101	75-125	0.9	20	
Copper	0.99	0.05	"	1.00		99	75-125	0.6	20	
Zinc	1.01	0.05	"	1.00		101	75-125	0.3	20	
Manganese	1.00	0.030	"	1.00		100	75-125	2	20	
Nickel	1.02	0.05	"	1.00		102	75-125	0.1	20	
Antimony	1.04	0.100	"	1.00		104	75-125	0.6	20	
Lead	1.02	0.05	"	1.00		102	75-125	1	20	
Selenium	1.02	0.010	"	1.00		102	75-125	2	20	
Arsenic	1.00	0.010	"	1.00		100	75-125	0.8	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

Total Metals by EPA 200 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4121105										
Duplicate (4121105-DUP1)		**Source: 14L0302-01**		Prepared: 12/11/14	Analyzed: 12/15/14					
Cadmium	ND	0.01	mg/l		ND				20	
Copper	ND	0.05	"		ND				20	
Zinc	ND	0.05	"		ND				20	
Lead	ND	0.05	"		ND				20	
Nickel	ND	0.05	"		ND				20	
Chromium	ND	0.05	"		ND				20	
Manganese	ND	0.030	"		ND				20	
Antimony	ND	0.100	"		ND				20	
Selenium	ND	0.010	"		ND				20	
Arsenic	ND	0.010	"		ND				20	
Matrix Spike (4121105-MS1)		**Source: 14L0302-01**		Prepared: 12/11/14	Analyzed: 12/15/14					
Nickel	1.00	0.05	mg/l	1.00	ND	100	75-125			
Cadmium	0.98	0.01	"	1.00	ND	98	75-125			
Manganese	0.964	0.030	"	1.00	ND	96	75-125			
Lead	0.99	0.05	"	1.00	ND	99	75-125			
Copper	0.97	0.05	"	1.00	ND	97	75-125			
Chromium	0.98	0.05	"	1.00	ND	98	75-125			
Antimony	0.978	0.100	"	1.00	ND	98	75-125			
Zinc	1.00	0.05	"	1.00	ND	100	75-125			
Arsenic	0.971	0.010	"	1.00	ND	97	75-125			
Selenium	0.997	0.010	"	1.00	ND	100	75-125			
Matrix Spike (4121105-MS2)		**Source: 14L0427-01**		Prepared: 12/11/14	Analyzed: 12/15/14					
Zinc	1.09	0.05	mg/l	1.00	0.16	94	75-125			
Copper	0.96	0.05	"	1.00	ND	96	75-125			
Antimony	0.998	0.100	"	1.00	ND	100	75-125			
Chromium	0.96	0.05	"	1.00	ND	96	75-125			
Nickel	0.96	0.05	"	1.00	ND	96	75-125			
Lead	0.96	0.05	"	1.00	ND	96	75-125			
Manganese	0.953	0.030	"	1.00	ND	95	75-125			
Cadmium	0.96	0.01	"	1.00	ND	96	75-125			
Arsenic	0.988	0.010	"	1.00	ND	99	75-125			
Selenium	1.01	0.010	"	1.00	0.007	100	75-125			

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

Total Metals by EPA 200 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4121105										
Matrix Spike Dup (4121105-MSD1)		**Source: 14L0302-01**		Prepared: 12/11/14		Analyzed: 12/15/14				
Nickel	0.96	0.05	mg/l	1.00	ND	96	75-125	5	20	
Antimony	0.919	0.100	"	1.00	ND	92	75-125	6	20	
Zinc	0.95	0.05	"	1.00	ND	95	75-125	5	20	
Chromium	0.93	0.05	"	1.00	ND	93	75-125	5	20	
Copper	0.93	0.05	"	1.00	ND	93	75-125	5	20	
Lead	0.94	0.05	"	1.00	ND	94	75-125	5	20	
Manganese	0.904	0.030	"	1.00	ND	90	75-125	6	20	
Cadmium	0.92	0.01	"	1.00	ND	92	75-125	6	20	
Arsenic	0.910	0.010	"	1.00	ND	91	75-125	6	20	
Selenium	0.942	0.010	"	1.00	ND	94	75-125	6	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

Organophosphorus Pesticides by EPA Method 8141A - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4121217										
Blank (4121217-BLK1)				Prepared: 12/16/14 Analyzed: 12/17/14						
Chlorpyrifos	ND	0.05	ug/l							
Diazinon	ND	0.05	"							
Malathion	ND	0.05	"							
Surrogate: Triphenyl phosphate	*0.190*		*"*	*0.250*		*76*	*60-130*			
Surrogate: Tribuytlphosphate	*0.210*		*"*	*0.250*		*84*	*60-130*			
LCS (4121217-BS1)				Prepared: 12/16/14 Analyzed: 12/17/14						
Bolstar	0.40	0.10	ug/l	0.500		80	60-130			
Diazinon	0.44	0.05	"	0.500		88	60-130			
Ethoprop	0.42	0.05	"	0.500		84	60-130			
Mevinphos	0.42	0.25	"	0.500		84	60-130			
Methyl parathion	0.40	0.10	"	0.500		80	60-130			
Phorate	0.43	0.05	"	0.500		86	60-130			
Ronnel	0.59	0.25	"	0.500		118	60-130			
Trichlorinate	0.46	0.05	"	0.500		92	60-130			
Surrogate: Triphenyl phosphate	*0.200*		*"*	*0.250*		*80*	*60-130*			
Surrogate: Tribuytlphosphate	*0.250*		*"*	*0.250*		*100*	*60-130*			
LCS Dup (4121217-BSD1)				Prepared: 12/16/14 Analyzed: 12/17/14						
Bolstar	0.42	0.10	ug/l	0.500		84	60-130	5	30	
Diazinon	0.47	0.05	"	0.500		94	60-130	7	30	
Ethoprop	0.43	0.05	"	0.500		86	60-130	2	30	
Mevinphos	0.42	0.25	"	0.500		84	60-130	0	30	
Methyl parathion	0.43	0.10	"	0.500		86	60-130	7	30	
Phorate	0.41	0.05	"	0.500		82	60-130	5	30	
Ronnel	0.50	0.25	"	0.500		100	60-130	17	30	
Trichlorinate	0.46	0.05	"	0.500		92	60-130	0	30	
Surrogate: Triphenyl phosphate	*0.180*		*"*	*0.250*		*72*	*60-130*			
Surrogate: Tribuytlphosphate	*0.220*		*"*	*0.250*		*88*	*60-130*			

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

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 4120964										
Duplicate (4120964-DUP1)		**Source: 14L0414-01**		Prepared & Analyzed: 12/12/14						
Dissolved Oxygen	11.7	0.10	mg/l		11.2			4	20	
Duplicate (4120964-DUP2)		**Source: 14L0414-02**		Prepared & Analyzed: 12/12/14						
Dissolved Oxygen	10.5	0.10	mg/l		10.4			0.5	20	
Batch 4121105										
Blank (4121105-BLK1)				Prepared: 12/11/14 Analyzed: 12/15/14						
Hardness (Total)	ND	10	mg CaCO3/L							
Duplicate (4121105-DUP1)		**Source: 14L0302-01**		Prepared: 12/11/14 Analyzed: 12/15/14						
Hardness (Total)	ND	10	mg CaCO3/L		ND				20	
Batch 4121328										
Blank (4121328-BLK1)				Prepared & Analyzed: 12/13/14						
Phosphorus, Total	ND	0.05	mg/l							
LCS (4121328-BS1)				Prepared & Analyzed: 12/13/14						
Phosphorus, Total	0.53	0.05	mg/l	0.500		106	80-120			
LCS Dup (4121328-BSD1)				Prepared & Analyzed: 12/13/14						
Phosphorus, Total	0.56	0.05	mg/l	0.500		111	80-120	5	20	
Duplicate (4121328-DUP1)		**Source: 14L0198-02**		Prepared & Analyzed: 12/13/14						
Phosphorus, Total	0.36	0.05	mg/l		0.35			0.8	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

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 4121328										
Matrix Spike (4121328-MS1)		**Source: 14L0198-02**		Prepared & Analyzed: 12/13/14						
Phosphorus, Total	0.89	0.05	mg/l	0.500	0.35	108	80-120			
Matrix Spike Dup (4121328-MSD1)		**Source: 14L0198-02**		Prepared & Analyzed: 12/13/14						
Phosphorus, Total	0.86	0.05	mg/l	0.500	0.35	101	80-120	4	20	
Batch 4121337										
Blank (4121337-BLK1)				Prepared: 12/13/14 Analyzed: 12/15/14						
Total Dissolved Solids	ND	20.0	mg/l							
Duplicate (4121337-DUP1)		**Source: 14L0414-01**		Prepared: 12/13/14 Analyzed: 12/15/14						
Total Dissolved Solids	1780	20.0	mg/l		1700			5	20	
Reference (4121337-SRM1)				Prepared: 12/13/14 Analyzed: 12/15/14						
Total Dissolved Solids	364	20.0	mg/l	370		98	7.84-112.1			
Batch 4121420										
Blank (4121420-BLK1)				Prepared & Analyzed: 12/09/14						
Nitrite as N	ND	0.05	mg/l							
LCS (4121420-BS1)				Prepared & Analyzed: 12/09/14						
Nitrite as N	0.10	0.05	mg/l	0.100		103	80-120			
LCS Dup (4121420-BSD1)				Prepared & Analyzed: 12/09/14						
Nitrite as N	0.10	0.05	mg/l	0.100		101	80-120	2	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

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 4121420										
Duplicate (4121420-DUP1)		**Source: 14L0383-01**		Prepared & Analyzed: 12/09/14						
Nitrite as N	ND	0.05	mg/l		ND				20	
Matrix Spike (4121420-MS1)		**Source: 14L0383-01**		Prepared & Analyzed: 12/09/14						
Nitrite as N	0.10	0.05	mg/l	0.100	ND	101	80-120			
Matrix Spike Dup (4121420-MSD1)		**Source: 14L0383-01**		Prepared & Analyzed: 12/09/14						
Nitrite as N	0.10	0.05	mg/l	0.100	ND	104	80-120	3	20	
Batch 4121423										
Blank (4121423-BLK1)				Prepared & Analyzed: 12/14/14						
Nitrate/Nitrite as N	ND	0.05	mg/l							
Nitrate as N	ND	0.05	"							
LCS (4121423-BS1)				Prepared & Analyzed: 12/14/14						
Nitrate/Nitrite as N	0.51	0.05	mg/l	0.500		102	80-120			
Nitrate as N	0.51	0.05	"	0.500		102	80-120			
LCS Dup (4121423-BSD1)				Prepared & Analyzed: 12/14/14						
Nitrate/Nitrite as N	0.51	0.05	mg/l	0.500		102	80-120	0.6	20	
Nitrate as N	0.51	0.05	"	0.500		102	80-120	0.6	20	
Duplicate (4121423-DUP1)		**Source: 14L0427-03**		Prepared & Analyzed: 12/14/14						
Nitrate/Nitrite as N	6.28	1.25	mg/l		6.40			2	20	
Nitrate as N	6.28	1.25	"		6.40			2	20	
Matrix Spike (4121423-MS1)		**Source: 14L0427-03**		Prepared & Analyzed: 12/14/14						
Nitrate/Nitrite as N	18.6	1.25	mg/l	12.5	6.40	97	80-120			
Nitrate as N	18.6	1.25	"	12.5	6.40	97	80-120			

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

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 4121423										
Matrix Spike Dup (4121423-MSD1)		**Source: 14L0427-03**		Prepared & Analyzed: 12/14/14						
Nitrate/Nitrite as N	19.0	1.25	mg/l	12.5	6.40	101	80-120	2	20	
Nitrate as N	19.0	1.25	"	12.5	6.40	101	80-120	2	20	
Batch 4121827										
Blank (4121827-BLK1)				Prepared: 12/17/14 Analyzed: 12/18/14						
Total Kjeldahl Nitrogen	ND	0.5	mg/l							
LCS (4121827-BS1)				Prepared: 12/17/14 Analyzed: 12/18/14						
Total Kjeldahl Nitrogen	4.7	0.5	mg/l	5.00		94	80-120			
LCS Dup (4121827-BSD1)				Prepared: 12/17/14 Analyzed: 12/18/14						
Total Kjeldahl Nitrogen	4.8	0.5	mg/l	5.00		96	80-120	2	20	
Duplicate (4121827-DUP1)		**Source: 14L0469-05**		Prepared: 12/17/14 Analyzed: 12/18/14						
Total Kjeldahl Nitrogen	0.7	0.5	mg/l		0.6			9	20	
Matrix Spike (4121827-MS1)		**Source: 14L0469-05**		Prepared: 12/17/14 Analyzed: 12/18/14						
Total Kjeldahl Nitrogen	5.3	0.5	mg/l	5.00	0.6	93	80-120			
Matrix Spike Dup (4121827-MSD1)		**Source: 14L0469-05**		Prepared: 12/17/14 Analyzed: 12/18/14						
Total Kjeldahl Nitrogen	5.2	0.5	mg/l	5.00	0.6	91	80-120	2	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0414**
Project Name: Upper Alvarado IWQA

Notes and Definitions

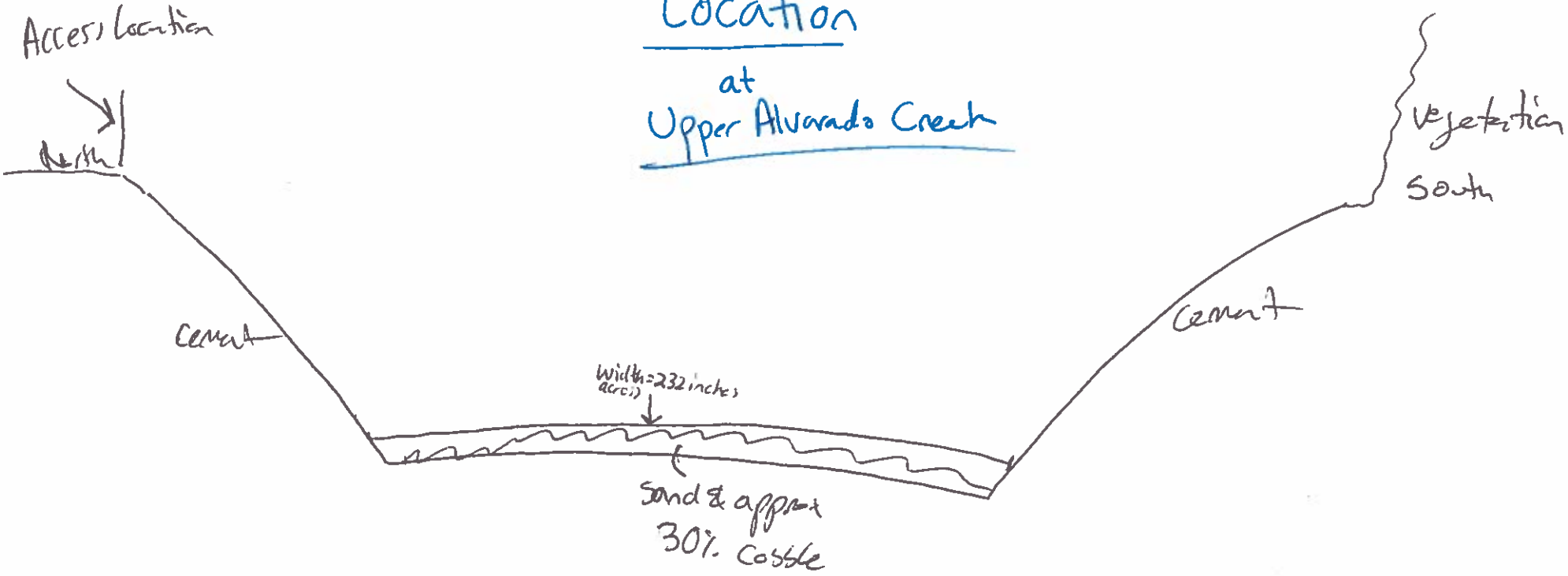
W-02	The sample for nitrate analysis was preserved with H2SO4 after the nitrite portion of the analysis was completed to extend the holding time for the sample. Nitrate results are corrected for the nitrite contribution per the method.
HT-15	This sample was received outside of the EPA's recommended 15 minute holding time for this analysis. However, the sample was analyzed immediately upon receipt.
A-01a	>1600MPN/ mL
A-01	>1600 MPN/ mL
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

ATTACHMENT 4 – FLOW MEASUREMENT MODEL

FLOW MEASUREMENT FIELD SHEETS

Upstream Sampling Location at Upper Alvarado Creek

12/9/14



*Rolled up vegetation approx 20 ft downstream

Cross Section Measurement Field Form

Client:

Project Name: Upper Alvarado - Upstream Location

Field Crew:

Date/Time: 12/9/19

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
1 ft	~~0.19~~	=		2:27 too shallow for reading 2:27, cobbly - cobblestone
2 ft	.19	-0.07		2:27 cobblestone
3 ft	.19	=		2:26 no reading, cobblestone, very shallow, algae
4 ft	.21	0.19		2:27 sand & cobblestone, no vegetation
5 ft	.25	~~0.19~~		~~2:28~~ sand & cobblestone, no vegetation
		0.14		2:30
6 ft	.22	0.08		2:31 sandy with cobblestones, long flowing algae type vegetation
7 ft	.22	0.21		2:32 sandy with cobblestones, long flowing vegetation
8 ft	.25	0.26		2:34 sandy with cobblestones, long flowing vegetation
9 ft	.25	0.21		2:36 sandy with cobblestone, long flowing vegetation
10 ft	.20	0.12		2:39
11 ft	.21	0.11		2:40
12 ft	.20	0.06		2:41

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg, if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

Left and Right Bank are determined when looking downstream

LWB = left wetted bank - where surface water terminates at the left bank

RWB = right wetted bank - where surface water terminates at the right bank

X Measurement = difference in horizontal distance from LWB

Y Depth of Water = difference in vertical distance from channel bottom to surface of water

Velocity - measured with YSI 556 (with flow cell) Flow Meter

Cross Section Measurement Field Form

Client:

Project Name: Upper Alvarado (Upstream Location)

Field Crew:

Date/Time: 12/7/19

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
13ft	.20	0.07		2:41 small cobble, long thin algae, some sand
14ft	.35	0.11		2:43 small cobble, long thin algae with some sand
15ft	.39	0.08		2:44 concrete bottom
16ft	.40	0.06		2:45 concrete bottom
17ft	.40	0.06		concrete approx ~~ends~~ south edge of concrete bank
18ft	<.2	=		too shallow for reading
				* sampling location chosen for upstream sampling where no rocks above surface of water appear. Cross section where sample taken fully submerged in water.
				* ended at 3:52

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg. if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

Left and Right Bank are determined when looking downstream

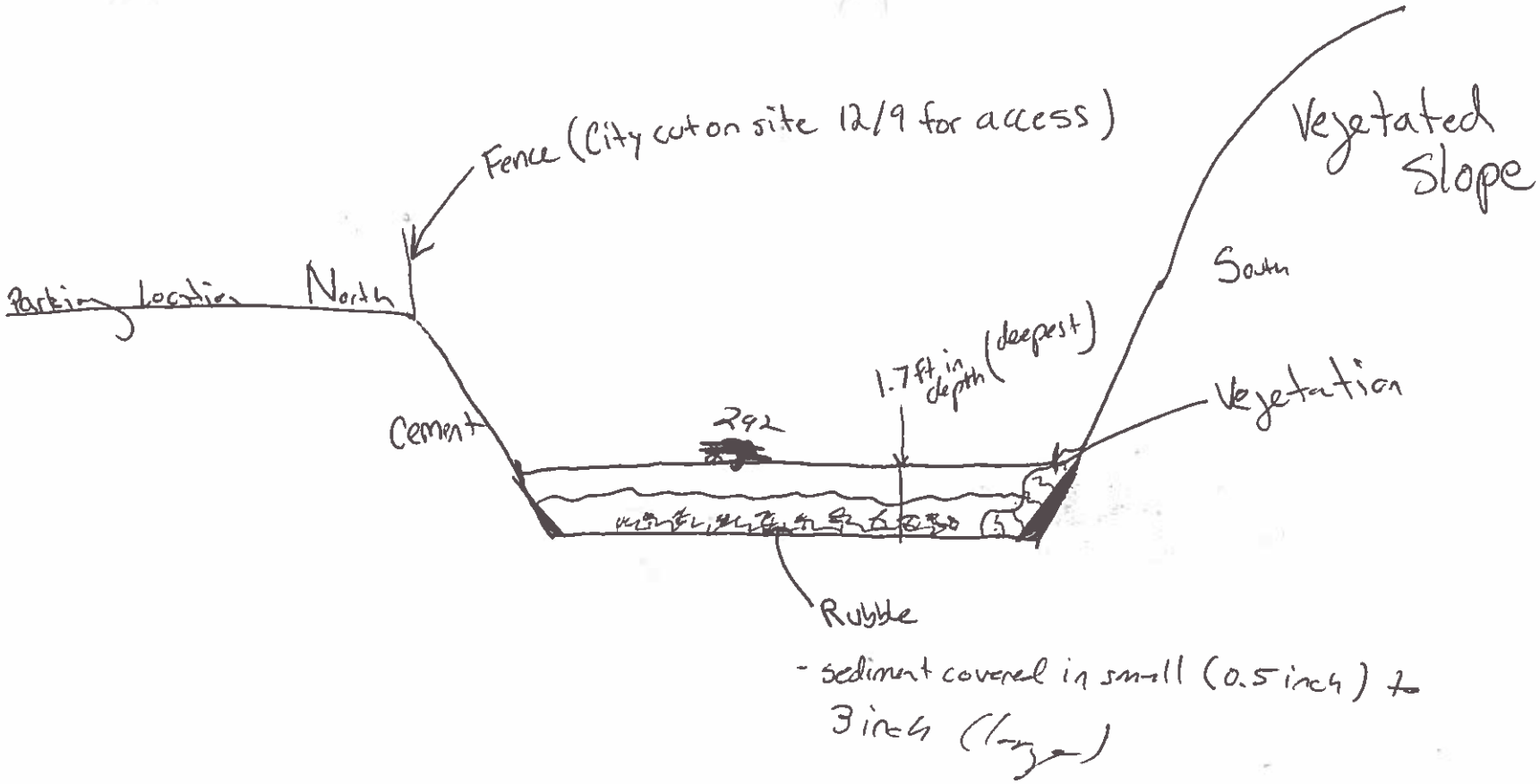
LWB = left wetted bank - where surface water terminates at the left bank

RWB = right wetted bank - where surface water terminates at the right bank

X Measurement = difference in horizontal distance from LWB

Y Depth of Water = difference in vertical distance from channel bottom to surface of water

Velocity - measured with YSI 556 (with flow cell) Flow Meter



Downstream Sampling Location at Upper Alvarado Creek

Weather: Sunny, Clear Skies

12/9/14

Cross Section Measurement Field Form

Client:

Project Name: Upper Alvarado

Field Crew: Kelly, Doyle, Chelsea Charesion, Jasmine

Date/Time: 12/9/14

Location Description: Upper Alvarado (Downstream Sampling location)

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
1ft	.2	-0.12		12:48 very shallow water, very little flow, possible eddy, within 1 foot of cattails to the south, heavy algae, cobblestone
2ft	.32	-0.06		12:54 same as above, still on cobble
3Ft	.3	-0.08		12:57 same as measurement at 1 foot (1st) measurement. Still on cobble
4ft	.4	-0.10		1:02 same as 1 foot from north bank (1st measurement). still on cobble with algae approx 2ft from cattails
5ft	.5	-0.06		1:06 same as 1 foot from north bank. (1st measurment). Still on cobble
6ft	.7	-0.07		1:12 on cobble, algae, possible eddy
7ft	.85	-0.07		1:15 on cobble, algae, possible eddy
8ft	.85	-0.06		1:19 on cobble, algae, possible eddy
9ft	1.25	-0.04		1:24 on cobble, algae, possible eddy
10ft	1.00	-0.02		1:25 on cobble, algae, possible eddy

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg, if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet across), depth and distance from bank shall be measured at approximately 2-foot intervals.

Left and Right Bank are determined when looking downstream

LWB = left wetted bank - where surface water terminates at the left bank

RWB = right wetted bank - where surface water terminates at the right bank

X Measurement = difference in horizontal distance from LWB

Y Depth of Water = difference in vertical distance from channel bottom to surface of water

Velocity - measured with YSI 556 (with flow cell) Flow Meter

Cross Section Measurement Field Form

Client:

Project Name: Upper Alvarado (Downstream sampling location)

Field Crew: Kelly, Doyle, Chel

Date/Time: 12/9/14

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
11ft	1.00	-0.03/0.01		1:29 on cobble, less algae (very minimal), possible eddy -meter cont. changed from -0.03 to -0.01 -average of the velocity measurements will be in between
12Ft	1.15	0.02		-very minimal algae, on cobble, water more clear 1:33
13ft	1.30	0.01		1:34 - very minimal algae, on cobble
14ft	1.4	0.01		1:35 - very minimal algae, on cobble
15ft	1.65	0.04		1:38 ...
16ft	1.7	→		0.01 at 20%. 1:42
		→		-0.02 at 80%.
				-very minimal alga, on cobble
17ft	1.55			-0.01 at 20%. 1:44
				-0.02 at 80%. Mix of larger stones, cobble stones & sand
18ft	1.4	-0.04		-returning to 60's., sandy with larger stones 1:46
19ft	1.2	-0.03		sandy with larger stones 1:48
20ft	0.9	-0.05		sandy

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg. if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

Left and Right Bank are determined when looking downstream

LWB = left wetted bank - where surface water terminates at the left bank

RWB = right wetted bank - where surface water terminates at the right bank

X Measurement = difference in horizontal distance from LWB

Y Depth of Water = difference in vertical distance from channel bottom to surface of water

Velocity - measured with YSI 556 (with flow cell) Flow Meter

Cross Section Measurement Field Form

Client:	Date/Time:
Project Name:	Location Description:
Field Crew:	Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
21 ft	0.85	-0.06		- large rock ~2 ft upstream of velocity measuring rod, sandy bottom, near south slope
22 ft	.55	-0.05		
23 ft	0.2	---		~ approx. 2 → may not be deep enough for reliable sample = no reading

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg. if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

Left and Right Bank are determined when looking downstream
LWB = left wetted bank - where surface water terminates at the left bank
RWB = right wetted bank - where surface water terminates at the right bank
X Measurement = difference in horizontal distance from LWB
Y Depth of Water = difference in vertical distance from channel bottom to surface of water
Velocity - measured with YSI 556 (with flow cell) Flow Meter

FLOW MEASUREMENT CALCULATION SHEETS

Total Flow Calculations

Location ID:	Upper Alvarado	Downstream
Date:	12/9/2014	
Time:	~12:45-2:00 PM	

Average Channel Velocity(ft/s)=	0.021
Total Q (cfs)=	0.11

X Measurement from Left Bank Looking Downstream (ft)	Water Depth (ft)	Velocity (ft/sec)	Effective Segment Area	Q (cfs)	Time Sample was Taken	Notes
1	0.2	-0.12	0	0.00	12:48:00 PM	Very shallow water, very little flow; possible eddy, within 1 foot of cat tail to the south, heavy algae, cobblestone
2	0.32	-0.06	0	0.00	12:54:00 PM	same as above, still on cobble
3	0.3	-0.08	0	0.00	12:57:00 PM	same as above, still on cobble
4	0.4	-0.1	0	0.00	1:02:00 AM	same as above, still on cobble with algae approx 2 ft from caltails
5	0.5	-0.06	0	0.00	1:06:00 AM	Sme as measurement 1 foot from north bank (1st measurement). Still on cobble
6	0.7	-0.07	0	0.00	1:12:00 AM	On cobble, algae, possible eddy
7	0.85	-0.07	0	0.00	1:15:00 AM	On cobble, algae, possible eddy
8	0.85	-0.06	0	0.00	1:19:00 AM	On cobble, algae, possible eddy
9	1.25	-0.04	0	0.00	1:24:00 AM	On cobble, algae, possible eddy
10	1	-0.02	0	0.00	1:25:00 AM	On cobble, algae, possible eddy
11	1	-0.02	0	0.00	1:29:00 AM	on cobble, algae, possible eddy; meter continuously changed from -.03 to -.01, average of the velocity measurements was used.
12	1.15	0.02	1.075	0.02	1:33:00 AM	Very minimal algae, on cobble, water is more clear
13	1.3	0.01	1.225	0.01	1:34:00 AM	Very minimal algae, on cobble
14	1.4	0.01	1.35	0.01	1:35:00 AM	Very minimal algae, on cobble
15	1.65	0.04	1.525	0.06	1:38:00 AM	Very minimal algae, on cobble
16	1.7	0	0	0.00	1:42:00 AM	.01 at 20%; -.02 at 80%; very minimal algae, on cobble
17	1.55	-0.02	0	0.00	1:44:00 AM	-.01 at 20%; -.02 at 80%; very minimal algae, on cobble; mix of larger stones, cobble stones and sand
18	1.4	-0.04	0	0.00	1:46:00 AM	returning to 60%; Sandy with larger stones
19	1.2	-0.03	0	0.00	1:48:00 AM	sandy with larger stones
20	0.9	-0.05	0	0.00		sandy
21	0.85	-0.06	0	0.00		large rock ~2ft upstream of velocity measuring rod, sandy bottom, near south slope
22	0.55	-0.05	0	0.00		
23	<.2	-	0	0.00		approximately <.2 ft, may not be deep enough for reliable sample, no reading

Total Flow Calculations

Location ID:	Upper Alvarado	Upstream
Date:	12/9/2014	
Time:	2:20-3:50 PM	

Average Channel Velocity(ft/s)=	0.122
Total Q (cfs)=	0.47

X Measurement from Left Bank Looking Downstream (ft)	Water Depth (ft)	Velocity (ft/sec)	Effective Segment Area	Q (cfs)	Time Sample was taken	Notes
2	0.19	-0.07	0	0.00	2:25:00 PM	Cobblestone
4	0.21	0.19	0.4	0.08	2:27:00 PM	Sand and cobble stone, no vegetation
5	0.25	0.14	0.23	0.03	2:30:00 PM	Sand and cobble stone, no vegetation
6	0.22	0.08	0.235	0.02	2:31:00 PM	Sandy with Cobblestones, long flowing alge type vegetation
7	0.22	0.21	0.22	0.05	2:32:00 PM	Sandy with Cobblestones, long flowing alge type vegetation
8	0.25	0.26	0.235	0.06	2:34:00 PM	Sandy with Cobblestones, long flowing alge type vegetation
9	0.25	0.21	0.25	0.05	2:36:00 PM	Sandy with Cobblestones, long flowing alge type vegetation
10	0.2	0.12	0.225	0.03	2:39:00 PM	
11	0.21	0.11	0.205	0.02	2:40:00 PM	
12	0.2	0.06	0.205	0.01	2:41:00 PM	
13	0.2	0.07	0.2	0.01	2:41:00 PM	Small cobble, long thin alge, some sand
14	0.35	0.11	0.275	0.03	2:43:00 PM	Small cobble, long thin alge, some sand
15	0.39	0.08	0.37	0.03	2:44:00 PM	Concrete bottom
16	0.4	0.06	0.395	0.02	2:45:00 PM	Concrete bottom
17	0.4	0.06	0.4	0.02		Concrete, approaches south edge of concrete bank
18	0.1	0	0	0.00		

ATTACHMENT 5 – CHANNEL WETLAND ASSESSMENT

WETLAND ASSESSMENT SCORING FIELD NOTES (EXISTING CONDITION)

Upper Alvarado 12/9/2014 JB

WATER QUALITY VALUE

Vegetation – Vegetative cover of water surface, vertical density, & species diversity		
0	• No visible vegetation in wet areas	
1	• Young growth of new inhabitants • Woody and terrestrial species present • Minimal wetland species (submerged and/or emergent macrophytes) • Low surface area coverage and density	DW NNV
2	• Mature population near carrying capacity • >50% coverage of wet areas • Both submerged and emergent wetland species	SWS
3	• Young life-stage and population • >75% coverage of wet areas • Both submerged and emergent wetland species • Wetland species that reproduce through tubers and/or rhizomes (e.g., *Spartina, Typha, Scirpus, Phragmites*)	FWM
Hydrosoil – Sample surficial sediments for ratio of sand to fines (Measure conductivity, redox, and/or pH)		
0	• Concrete or other impermeable substrate • No sand and/or fines, organic carbon, detritus, and/or nutrient source	
1	• Sand and cobble substrate • No visible deposition of fines, organic carbon, and/or detritus • ~~pH<6 or >8~~ • Redox: +100 mV 148 mV	
2	• Less than 50% sand • Some visible deposition of fines, organic carbon, and/or detritus • Neutral pH (6.0 to 8.5) 7.5 • Redox: -100 to +100 mV	2
3	• Less than 25% sand • Visible deposition of fines and other solids • Neutral pH (6.0 to 8.5) • Redox: < -100 mV	
Hydroperiod – Observe water flow, hydraulic retention time, and depth (Measure conductivity, redox, and/or pH)		
0	• No visible surface water	
1	• Very deep (> 2-ft) or very shallow (< 0.5-ft) • Fast flowing and channeling, no deposition of fines • Redox: > +100 mV	
2	• Shallow (0.5 to 1-ft) 0.6 ft (0.2 - 1.7 ft) • Moderate and variable flow depending on volume inputs .07 ft/sec • Observable HRT, some deposition of fines • Redox: -100 to +100 mV	2
3	• Moderate water depth (1 to 2-ft) pools 1.7ft deep (downstream) • Slow flow with a significant HRT (≥ 1 h), deposition of fines 4.36 hr • Redox: < -100 mV	
Total score from all three categories 0-2 = poor, 3-4 = fair, 5-7 = good, 8-9 = best		6.3

average 2.3

@ Downstream 11.68 mg/L DO
137 NTU
1.75 m/s velocity
135 ORP
6.71 pH

WETLAND LAND RECOVERY ASSESSMENT SCORING SHEET (MAINTAINED STORM WATER FACILITY)

UPPER ALVARADO

RECOVERY VALUE & TIMELINE

Assumption: Removal of >75% of solids will result in:

- A change in vegetation density and population diversity?
- Decrease in available organic carbon, sand, nutrients, and detritus?
- Decrease in COC concentrations?
- A change in water depth, flow, HRT, deposition/settling rates?
- A change in substrate for vegetative repopulation?

Vegetation – Timeline to mature life-stage with removal of >75% of sediment and standing crop		
0	• Will not recover in less than 10 years	
1	• Primarily trees and woody species • Recovery: > 5 years • Shift to a less desirable species diversity than current species	DW
2	• Mature habitat with mix of terrestrial and wetland species • Recovery: 1-5 years • Return to current standing crop and diversity	SWS NNV
3	• Primarily emergent and submerged wetland species • Recovery: approximately 1 year • Return to species density and diversity	FWM
Hydrosoil – What is the sedimentation rate and timeline to return to current depth?		
0	• High flow area, narrow and/or shallow channel • No deposition of organic carbon, nutrients and/or detritus	
1	• Flow is significant (during storms) or minimal (dry) • Primarily sand deposition in the short-term • Fines and/or organic carbon will deposit over a > 5 year period	1
2	• Heterogenous mix of sand, organic carbon, and fines in < 1 year	
3	• Heterogenous mix of sand, organic carbon, and fines in 1-5 years	
Hydroperiod – What is timeline for reaching optimal depth of 1 to 2-ft of overlying water?		
0	• Flow remains fast • No evidence of deposition or re-establishment of vegetation • No HRT	
1	• Some decrease of flow resulting in some deposition of sand and other coarse grain materials • Some revegetation • No HRT	
2	• Wide area of the channel • Some deposition of fines and evidence of revegetation • Overlying water depth is less than 1-ft • HRT < 1-h	
3	• Wide area of the channel • Deposition of fines and organics • Overlying water depth is greater than 1-ft (pools) • HRT > 1-h	3
Total score from all three categories 0-2 = poor, 3-4 = fair, 5-7 = good, 8-9 = best		6.43

average 2.43

ATTACHMENT 6 – IMPACT- BENEFITS MODEL

TABLE 6 – SEDIMENT POLLUTANT LOADING MODEL (BENEFIT LOAD REMOVAL IN SEDIMENT)

Table 6 - Sediment Pollutant Loading Model

SAMPLE NAME	MATRIX	SAMPLE DATE	ANALYTE	SURROGATE	RESULT*	REPORTING LIMIT	UNITS	LOAD REMOVAL (mg)	LOAD REMOVAL (lbs)
1	Soil	12/22/2014	% Solid		50.1		%	NA	NA
1	Soil	12/22/2014	Manganese		561	0.5	mg/kg	120590583	265
1	Soil	12/22/2014	Total Kjeldahl Nitrogen		1700	100	mg/kg	365426009	804
1	Soil	12/22/2014	Nitrate as N		ND	1	mg/kg	ND	ND
1	Soil	12/22/2014	Nitrite as N		ND	0.5	mg/kg	ND	ND
1	Soil	12/22/2014	Total Nitrogen		1700	0.5	mg/kg	365426009	804
1	Soil	12/22/2014	Phosphorus, Total as P		280	50	mg/kg	60187813.2	132
1	Soil	12/22/2014	Arsenic		7.33	0.1	mg/kg	1575630.97	3
1	Soil	12/22/2014	Cadmium		0.174	0.1	mg/kg	37402.4268	0
1	Soil	12/22/2014	Chromium		4.48	0.1	mg/kg	963005.011	2
1	Soil	12/22/2014	Copper		15.3	0.1	mg/kg	3288834.08	7
1	Soil	12/22/2014	Nickel		4	0.1	mg/kg	859825.903	2
1	Soil	12/22/2014	Lead		10.6	0.1	mg/kg	2278538.64	5
1	Soil	12/22/2014	Antimony		ND	0.5	mg/kg	ND	ND
1	Soil	12/22/2014	Selenium		0.294	0.1	mg/kg	63197.2039	0
1	Soil	12/22/2014	Zinc		112	1	mg/kg	24075125.3	53
1	Soil	12/22/2014	Malathion	Tributylphosphate	ND	0.5	ug/kg	ND	ND
1	Soil	12/22/2014	Chlorpyrifos	Tributylphosphate	ND	0.5	ug/kg	ND	ND
1	Soil	12/22/2014	Diazinon	Tributylphosphate	ND	0.5	ug/kg	ND	ND

*Total Nitrogen was calculated following the testing laboratory's specified method of adding the concentrations of Total Kjeldahl Nitrogen, Nitrate as N, and Nitrite as N.

Total Removal Volume Estimated at IMP stage

Total Removal Volume	517	yd3
Number Sample Collected	1	unitless
Removal Fraction	1	
Removal Volume	517.0	ft^3/yd
yd3 to ft3	27	
Removal Volume	13,959	ft^3
ρ_{solid} =	165.4	lbs/ft3
ρ_{water}=	62.4	lbs/ft3
Fraction Solid=	0.501	unitless
$\rho_{dry\ insitu}$ =	45.43881614	lbs/ft3
$\%_{Finer}$=	0.446	unitless
CF_{cobble}=	0.74557589	unitless
Sediment Mass	472,904	lbs/mg
lbs to kg	0.4545455	kg/lbs
mg to lbs	0.0000022	lbs/mg

Support Material for Table 6

Equations:

$$\rho_{dry\ insitu} = \frac{(\%_{solid}) * \rho_{water} * \rho_{solid}}{\rho_{solid} - (\%_{Solid}) * \rho_{solid} + (\%_{solid}) * \rho_{water}}$$

$$CF_{cobble} = \frac{\frac{\%\ Finer}{\rho_{dry\ insitu}}}{\frac{\%\ Finer}{\rho_{dry\ insitu}} + \frac{(1-\%Finer)}{\rho_{solid}}}$$

Sediment Mass = Removal Volume * $\rho_{dry\ insitu}$ * CF_{cobble}

Load Removal = Sediment Mass * Measured Concentration

Where: ρ_{solid} = 165.4 lbs/ft^3 ρ_{water} = 62.4 lbs/ft^3 and $\%_{Finer}$ = fraction passing through 1.5 inch sieve based on grain size analysis

Reach #

Sample ID	Reach	Type	% Solid	$\rho_{dry\ insitu}$ (lbs/ft^3)	CF_{cobble}	Removal Volume [1] (cyd)	Sediment Mass (lbs)
1	2	Earthen	50.1	45.4	0.75	517.00	634,280
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Notes:

1) Removal value is specified in maintenance plan and typically determined during IMP process

The approximate sediment removal should come from the IMP process, place notes for backup related to sediment removal numbers here.

TABLE 7 – COMPARISON OF POLLUTANT CONCENTRATION TO HUMAN HEALTH SCREENING LEVEL

Table 7 - Comparison of Pollutant Concentrations to Human Health Screening Levels

Analyte	Concentration (mg/kg)									Human Health	
	Reach										
	2	-	-	-	-	-	-	-	-	CHHSL/RSL (mg/kg)	
	Sample ID										
	1	-	-	-	-	-	-	-	-	Residential	Commercial/Industrial
General Physical											
% Solids	50.1	-	-	-	-	-	-	-	-	NA	NA
Inorganic Non-Metals											
Total Kjeldahl Nitrogen	1700.0	-	-	-	-	-	-	-	-	NA	NA
Nitrate as N	ND	-	-	-	-	-	-	-	-	130,000	1,900,000
Nitrite as N	ND	-	-	-	-	-	-	-	-	7,800	120,000
Total Nitrogen	1700.0	-	-	-	-	-	-	-	-	NA	NA
Phosphorus, Total as P	280.0	-	-	-	-	-	-	-	-	1.6	23
Metals											
Manganese	561.0	-	-	-	-	-	-	-	-	1,800	26,000
Arsenic	7.3	-	-	-	-	-	-	-	-	0.07	0.24
Cadmium	0.2	-	-	-	-	-	-	-	-	1.7	7.5
Chromium *	4.5	-	-	-	-	-	-	-	-	100,000	100,000
Copper	15.3	-	-	-	-	-	-	-	-	3,000	38,000
Nickel	4.0	-	-	-	-	-	-	-	-	1,600	16,000
Lead	10.6	-	-	-	-	-	-	-	-	80	320
Antimony	ND	-	-	-	-	-	-	-	-	30	380
Selenium	0.3	-	-	-	-	-	-	-	-	380	4,800
Zinc	112.0	-	-	-	-	-	-	-	-	23,000	100,000
Organics											
Malathion	ND	-	-	-	-	-	-	-	-	1,200	16,000
Chlorpyrifos	ND	-	-	-	-	-	-	-	-	62	820
Diazinon	ND	-	-	-	-	-	-	-	-	43	580

Notes:

CHHSL - California Human Health Screening Level, Updated as of 2010

RSL- Regional Screening Level, USEPA Region 9

* Human Health Standards Listed for Chromium (III)

mg/kg - milligrams per kilogram

NA- No Human Level available

TABLE 8 – POTENTIAL WATER QUALITY IMPACTS MODEL

Table 8 -Water Quality Impacts Model - Upstream (Sheet 1 of 2)

SAMPLE NAME	MATRIX	SAMPLE DATE	ANALYTE	SURROGATE	RESULT	REPORTING LIMIT	UNITS	E_{NTS}	Corr E_{NTS}	NTS Removal (mg)	NTS Removal (lbs)	NTS Removal (lbs) existing per year	NTS Removal (lbs) existing per maintenance period	Corr E_{NTS}, nyear = 1	Corr E_{NTS}, nyear = 2	Corr E_{NTS}, nyear = 3	NTS Removal (lbs) maintaned nyear = 1	NTS Removal (lbs) maintaned nyear = 2	NTS Removal (lbs) maintaned nyear = 3	NTS Removal (lbs) maintaned TOTAL
Upper Alvarado U/S	Stormwater	12/9/2014	Total Dissolved Solids		1780	20	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Upper Alvarado U/S	Stormwater	12/9/2014	Total Suspended Solids		-	-	mg/l	0.78	0.5694	-	-	-	-	0.244	0.411	0.577	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Arsenic		ND	0.01	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Cadmium		ND	0.01	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Chromium		ND	0.05	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Copper		ND	0.05	mg/l	0.4	0.292	-	-	-	-	0.125	0.211	0.296	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Manganese		0.092	0.03	mg/l	0.63	0.4599	2794316.279	6.147495814	6.147495814	18.44248744	0.197	0.332	0.466	2.6	4.4	6.2	13.3
Upper Alvarado U/S	Stormwater	12/9/2014	Nickel		ND	0.05	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Lead		ND	0.05	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Antimony		ND	0.1	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Selenium		ND	0.01	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Zinc		ND	0.05	mg/l	0.54	0.3942	-	-	-	-	0.169	0.284	0.400	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Total Kjeldahl Nitrogen		0.6	0.5	mg/l	0.15	0.1095	4339000.434	9.545800954	9.545800954	28.63740286	0.047	0.079	0.111	4.1	6.9	9.7	20.7
Upper Alvarado U/S	Stormwater	12/9/2014	Nitrite as N		ND	0.05	mg/l	0.67	0.4891	-	-	-	-	0.210	0.353	0.496	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Nitrate as N		1.16	0.25	mg/l	0.67	0.4891	37469679.3	82.43329446	82.43329446	247.2998834	0.210	0.353	0.496	35.4	59.5	83.6	178.4
Upper Alvarado U/S	Stormwater	12/9/2014	Total Nitrogen		1.8	0.5	mg/l	0.4	0.292	34712003.47	76.36640763	76.36640763	229.0992229	0.125	0.211	0.296	32.8	55.1	77.4	165.3
Upper Alvarado U/S	Stormwater	12/9/2014	Dissolved Oxygen		10.4	0.1	mg/l		0	0	0	0	0	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Upper Alvarado U/S	Stormwater	12/9/2014	Phosphorus, Total as P		ND	0.05	mg/l	0.51	0.3723	-	-	-	-	0.160	0.269	0.377	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Malathion	Triphenyl phosphate, Tribuytlphosphate	ND	0.05	ug/l	0.5	0.365	-	-	-	-	0.157	0.263	0.370	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Chlorpyrifos	Triphenyl phosphate, Tribuytlphosphate	ND	0.05	ug/l	0.5	0.365	-	-	-	-	0.157	0.263	0.370	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Diazinon	Triphenyl phosphate, Tribuytlphosphate	ND	0.05	ug/l	0.5	0.365	-	-	-	-	0.157	0.263	0.370	-	-	-	-
Upper Alvarado U/S	Stormwater	12/9/2014	Total Hardness		732	100	mg $CaCO_3$/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

		Units
Dry Weather Instantaneous Flow (upstream)	0.47	ft3/sec
Daily Flow	40625.28	ft3/day
Days of dry weather flow per year	320	days
Annual Treatment Flow	1.3E+07	ft3/year
Total length	1100	ft
Average channel velocity	0.071603281	ft/sec
HRT	4.267340175	hr
Retention Time Correction Factor	0.177805841	
Existing Vegetation Score	2.3	
Existing Hydrosoil Score	2.0	
Existing Hydroperiod Score	2.0	
Overall Existing Score	6.3	
Existing Efficiency Coefficient	0.73	
L to ft3 conversion	0.035	ft3/L
Overall Recovery Score	6.4	
Maintenance Period	3	years

nyear	Yearly Rec Score	Yearly Eff Coef
1	2.1	0.313333333
2	4.3	0.526666667
3	6.4	0.74

Table 8 -Water Quality Impacts Model - Downstream (Sheet 2 of 2)

This downstream Water Sample is optional and is not utilized in calculations. It is used primarily to aid in verifying the scoring sustem and calculation of flow, volume and retention time

SAMPLE NAME	MATRIX	SAMPLE DATE	ANALYTE	SURROGATE	RESULT	REPORTING LIMIT	UNITS	E_{NTS}	Corr E_{NTS}	NTS Removal (mg)	NTS Removal (lbs)	NTS Removal (lbs) existing per year	NTS Removal (lbs) existing per maintenance period	Corr $E_{NTS,}$ nyear = 1	Corr $E_{NTS,}$ nyear = 2	Corr $E_{NTS,}$ nyear = 3	NTS Removal (lbs) maintaned nyear = 1	NTS Removal (lbs) maintaned nyear = 2	NTS Removal (lbs) maintaned nyear = 3	NTS Removal (lbs) maintaned TOTAL
Upper Alvarado D/S	Water	12/9/2014	Total Dissolved Solids		1780	20	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Upper Alvarado D/S	Water	12/9/2014	Total Suspended Solids		-	-	mg/l	0.78	0.5694	-	-	-	-	0.244	0.411	0.577	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Arsenic		ND	0.01	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Cadmium		ND	0.01	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Chromium		ND	0.05	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Copper		ND	0.05	mg/l	0.4	0.292	-	-	-	-	0.125	0.211	0.296	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Manganese		0.089	0.03	mg/l	0.63	0.4599	2703197.27	5.947033994	5.947033994	17.84110198	0.197	0.332	0.466	2.6	4.3	6.0	12.9
Upper Alvarado D/S	Water	12/9/2014	Nickel		ND	0.05	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Lead		ND	0.05	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Antimony		ND	0.1	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Selenium		ND	0.01	mg/l	0.63	0.4599	-	-	-	-	0.197	0.332	0.466	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Zinc		0.07	0.05	mg/l	0.54	0.3942	1822380.182	4.009236401	4.009236401	12.0277092	0.169	0.284	0.400	1.7	2.9	4.1	8.7
Upper Alvarado D/S	Water	12/9/2014	Total Kjeldahl Nitrogen		2.2	0.5	mg/l	0.15	0.1095	15909668.26	35.00127016	35.00127016	105.0038105	0.047	0.079	0.111	15.0	25.3	35.5	75.8
Upper Alvarado D/S	Water	12/9/2014	Nitrite as N		ND	0.05	mg/l	0.67	0.4891	-	-	-	-	0.210	0.353	0.496	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Nitrate as N		1.26	0.25	mg/l	0.67	0.4891	40699824.07	89.53961295	89.53961295	268.6188388	0.210	0.353	0.496	38.4	64.6	90.8	193.8
Upper Alvarado D/S	Water	12/9/2014	Total Nitrogen		3.5	0.5	mg/l	0.4	0.292	67495562.3	148.4902371	148.4902371	445.4707112	0.125	0.211	0.296	63.7	107.1	150.5	321.4
Upper Alvarado D/S	Water	12/9/2014	Phosphorus, Total as P		0.21	0.05	mg/l	0.51	0.3723	5163410.516	11.35950314	11.35950314	34.07850941	0.160	0.269	0.377	4.9	8.2	11.5	24.6
Upper Alvarado D/S	Water	12/9/2014	Malathion		ND	0.05	ug/l	0.5	0.365	-	-	-	-	0.157	0.263	0.370	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Chlorpyrifos		ND	0.05	ug/l	0.5	0.365	-	-	-	-	0.157	0.263	0.370	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Diazinon		ND	0.05	ug/l	0.5	0.365	-	-	-	-	0.157	0.263	0.370	-	-	-	-
Upper Alvarado D/S	Water	12/9/2014	Total Hardness		711	100	mg $CaCO_3$/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

		Units
Dry Weather Instantaneous Flow (upstream)	0.47	ft3/sec
Daily Flow	40625.28	ft3/day
Days of dry weather flow per year	320	days
Annual Treatment Flow	1.3E+07	ft3/year
Total length	1100	ft
Average upstream velocity	0.071603281	ft/sec
HRT	4.267340175	seconds
HRT- (based on velocity and length)	0.177805841	hr
Existing Vegetation Score	2.3	
Existing Hydrosoil Score	2.0	
Existing Hydroperiod Score	2.0	
Overall Existing Score	6.3	
Existing Efficiency Coefficient	0.73	
L to ft3 conversion	0.035	ft3/L
If Retention Time < 24 hrs: RT correction factor	0.177805841	
If Retention Time > 24 hrs: RT correction factor	1	
Overall Recovery Score	6.4	
Maintenance Period	3	years

nyear	Yearly Rec Score	Yearly Eff Coef
1	2.1	0.313333333
2	4.3	0.526666667
3	6.4	0.74

TABLE 9 – COMPARISON OF POLLUTANT CONCENTRATIONS TO WATER QUALITY BENCHMARKS

Table 9 - Comparison of Pollutant Concentrations to Water Quality Benchmarks

ANALYTE	Sample Date	CONCENTRATION		Water Quality Benchmark	Benchmark Source	Units
		Upstream	Downstream			
		SAMPLE ID-UPSTREAM	SAMPLE ID-DOWNSTREAM			
Wet Chemistry						
Total Dissolved Solids	12/9/2014	1780	1780	1500	Basin Plan Table 3-2	mg/L
Total Suspended Solids	12/9/2014	-	-	50	NA	mg/L
Total Hardness	12/9/2014	732	100	NA	NA	mg/L
Phosphorus, Total as P	12/9/2014	ND	0.21	0.1	Basin Plan page 3-8	mg/L
Totak Kjeldahl Nitrogen	12/9/2014	0.6	2.2	NA	NA	mg/L
Nitrite as N	12/9/2014	ND	ND	1	Basin Plan page 3-25	mg/L
Nitrate as N	12/9/2014	1.16	1.26	10 (Sum of Nitrite and Nitrate as N cannot be >10)	Basin Plan page 3-25	mg/L
Total Nitrogen	12/9/2014	1.8	3.5	1	Basin Plan page 3-8	mg/L
Total Metals						
Arsenic	12/9/2014	ND	ND	0.05	Basin Plan page 3-25 ①	mg/L
Antimony	12/9/2014	ND	ND	0.006	Basin Plan page 3-25 ①	mg/L
Cadmium	12/9/2014	ND	ND	0.005	Basin Plan page 3-25 ①	mg/L
Chromium*	12/9/2014	ND	ND	0.05	Basin Plan page 3-25 ①	mg/L
Copper	12/9/2014	ND	ND	49.6/27.3	40 CFR 131.38	mg/L
Lead	12/9/2014	ND	ND	230.9/9.0	40 CFR 131.38	mg/L
Manganese	12/9/2014	0.092	0.089	1	Basin Plan table 3-2	mg/L
Nickel	12/9/2014	ND	ND	0.1	Basin Plan page 3-25 ①	mg/L
Selenium	12/9/2014	ND	ND	5	40 CFR 131.38	mg/L
Zinc	12/9/2014	ND	0.07	379.3/382.4	40 CFR 131.38	mg/L
Organics						
Malathion	12/9/2014	ND	ND	0.43/0.1	40 CFR 131.38	mg/L
Chlorpyrifos	12/9/2014	ND	ND	0.02/0.014	40 CFR 131.38	mg/L
Diazinon	12/9/2014	ND	ND	0.08/0.05	40 CFR 131.38	mg/L
Bacteriological						
Enterococcus	12/9/2014	1600	1600	151	Basin Plan Page 3-7	CFU/100 mL
Fecal Coliform	12/9/2014	130	500	200	Basin Plan Page 3-6	MPN/100 mL
Total Colform	12/9/2014	1600	1600	NA	NA	MPN/100 mL

Notes:

mg/L- milligrams per liter
mL - milliliters
e - estimated value
NA - No benchmark set
0.43/0.1 - CMC /CCC (Acute/Chronic)
MPN - Most Probable Number
CFU - Colony Forming Units
CA-MCL - California Maximum Contaminant Levels
CMC- Criteria Maximum Concentration
CCC - Continuous Criteria Concentration

① - Per California Code of Regulations, Title 22, Table 64431-A of section 64431

Basin Plan - Water Quality Control Plan for the San Diego Basin (9), September 8, 1994 (with amendments effective on or before April 4, 2011)
40 CFR 131.38 - Establishment of numeric criteria for priority toxic pollutants for the State of California
Calculated - Per USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000
* Chromium benchmarks based on total chromium (Basin Plan) or chromium (III) (40 CFR 131.38)

TABLE 10- COMPARISON OF IMPACTS TO BENEFITS

Table 10 - Comparison of Impacts to Benefits

	Pollutant Removal Benefit					Pollutant Removal Impact	
Analyte	**Estimated Sediment Pollutant Load Removal (lbs)[1]**	**Estimated Annual Existing Pollutant Load Removal Capacity (lbs)**	**Maintenance Period (yrs)**	**Estimated Existing Pollutant Load Removal Capacity per Maintenance Period (Existing Pollutant Removal)(lbs)[2]**	**Estimated Maintained Pollutant Load Removal Capacity per Maintenance Period (Maintained Pollutant Removal) (lbs)[3]**	**Maintained - Existing Pollutant Load Removal capacities (lbs)[4]**	**Pollutant Removal Benefit - Pollutant Removal Impact (lbs)**
Arsenic	3	-	3	-	-	-	3
Cadmium	0	-	3	-	-	-	0
Chromium	2	-	3	-	-	-	2
Copper	7	-	3	-	-	-	7
Manganese	265	6.1	3	18.4	13.3	-5	260
Nickel	2	-	3	-	-	-	2
Lead	5	-	3	-	-	-	5
Antimony	ND	-	3	-	-	-	-
Selenium	0	-	3	-	-	-	0
Zinc	53	-	3	-	-	-	53
Total Kjeldahl Nitrogen	804	9.5	3	28.6	20.7	-8	796
Nitrite as N	ND	-	3	-	-	-	-
Nitrate as N	ND	82.4	3	247.3	178.4	-69	-69
Total Nitrogen	804	76.4	3	229.1	165.3	-64	740
Phosphorus, Total as P	132	-	3	-	-	-	132
Malathion	ND	-	3	-	-	-	-
Chlorpyrifos	ND	-	3	-	-	-	-
Diazinon	ND	-	3	-	-	-	-

Notes:

ND - Not Detected in soil above Laboratory Reporting Limit

1 - The maintained channel will result in pollutant load reductions directly through the removal of sediment pollutants. This column represents the pollutants removed by the dredging effort

2 - In their current condition, each channel possesses characteristics that are similar to a natural treatment system during low flow conditions. This column represents the pollutants removed by the existing channel over a 3 year period.

3 - Once maintenance has occurred, the channel will lose some of its characteristics that are similar to a natural treatment system. This column represents the pollutants removed by the channel post-maintenance, over a 3 year period.

4 - This column represents the loss in pollutant load removal in the channel, over a 3 year period, due to channel maintenance.

ATTACHMENT 7 – POTENTIAL MITIGATION EFFORTS MODEL

APPLICABLE PEIR MITIGATION MEASURES

MITIGATION MONITORING AND REPORTING PROGRAM

Section 21081.6 of the State of California Public Resources Code requires a Lead or Responsible Agency that approves or carries out a project where an environmental impact report (EIR) has identified significant environmental effects to adopt a "reporting or monitoring program for adopted or required changes to mitigate or avoid significant environmental effects." The City of San Diego is the lead Agency for the Master Program PEIR, and, therefore, is responsible for implementation of the MMRP. Because the PEIR recommends measures to mitigate these impacts, an MMRP is required to ensure that adopted mitigation measures are implemented.

As Lead Agency for the proposed project under CEQA, the City of San Diego will administer the MMRP for the following environmental issue areas: biological resources, historical resources, land use policies, paleontological resources, and water quality.

GENERAL

General Mitigation 1: Prior to commencement of work, the ADD Environmental Designee of the Entitlements Division shall verify that mitigation measures for impacts to biological resources (Mitigation Measures 4.3.1 through 4.3.20), historical resources (Mitigation Measures 4.4.1 and 4.4.2), land use policy (Mitigation Measures 4.1.1 through 4.1.13), paleontological resources (Mitigation Measure 4.7.1), and water quality (Mitigation Measures 4.8.1 through 4.8.3) have been included in entirety on the submitted maintenance documents and contract specifications, and included under the heading, "Environmental Mitigation Requirements." In addition, the requirements for a Pre-maintenance Meeting shall be noted on all maintenance documents.

General Mitigation 2: Prior to the commencement of work, a Pre-maintenance Meeting shall be conducted and include, as appropriate, the MMC, SWD Project Manager, Biological Monitor, Historical Monitor, Paleontological Monitor, Water Quality Specialist, and Maintenance Contractor, and other parties of interest.

General Mitigation 3: Prior to the commencement of work, evidence of compliance with other permitting authorities is required, if applicable. Evidence shall include either copies of permits issued, letters of resolution issued by the Responsible Agency documenting compliance, or other evidence documenting compliance and deemed acceptable by the ADD Environmental Designee.

General Mitigation 4: Prior to commencement of work and pursuant to Section 1600 et seq. of the State of California Fish & Game Code, evidence of compliance with Section 1605 is required, if applicable. Evidence shall include either copies of permits issued, letters of resolution issued by the Responsible Agency documenting compliance, or other evidence documenting compliance and deemed acceptable by the ADD Environmental Designee.

WATER QUALITY

Potential impacts to water quality would be reduced to below a level of significance through implementation of the following mitigation measures.

***Mitigation Measure 4.8.1*:** Prior to commencement of any activity within a specific annual maintenance program, a qualified water quality specialist shall prepare an IWQA for each area proposed to be maintained. The IWQA shall be prepared in accordance with the specifications included in the Master Program. If the IWQA indicates that maintenance would impact a water pollutant where the existing level for that pollutant exceeds or is within 25 percent of the standard established by the San Diego Basin Plan, mitigation measures identified in Table 4.8-8 shall be incorporated into the IMP to reduce the impact to within the established standard for that pollutant.

Table 4.8-8
MITIGATION MEASURES FOR REDUCED POLLUTANT REMOVAL CAPACITY

Mitigation Measure	Pollutant Type						
	Bacteria	Metals	Nutrients	Pesticides	Sediment	TDS/ Chloride Sulfates	Trash
Remove kelp on beaches					●	●	
Sweep streets	●	●	●	●	●	●	●
Retrofit residential landscaping to reduce runoff	●	●	●		●		
Install artificial turf	●	●	●	●	●		●
Install inlet devices on storm drains		●	●		●		
Replace impermeable surfaces with permeable surfaces		●	●		●		●
Install modular storm water filtration systems		●	●	●	●	●	●

Install storm water retention basins		●	●	●	●	●	●
Install catch basin media filters		●	●		●	●	●
Create vegetated swales	●	●	●	●	●	●	●
Restore wetlands	●	●	●	●	●	●	●
Install check dams		●			●		●

Mitigation Measure 4.8.2: No maintenance activities within a proposed annual maintenance program shall be initiated before the City's ADD Environmental Designee and state and federal agencies with jurisdiction over maintenance activities have approved the IMPs and IWQAs including proposed mitigation and BMPs for each of the proposed activities. In their review, the ADD Environmental Designee and agencies shall also confirm that the appropriate maintenance protocols have been incorporated into each IMP.

Mitigation Measure 4.8.3: Prior to commencing any activity where the IWQA indicates significant water quality impacts may occur, a pre-maintenance meeting shall be held on site with following in attendance: City's SWD, MM, MMC, and MC. A qualified water quality specialist shall also be present. At this meeting, the water quality specialist shall identify and discuss mitigation measures, protocols and BMPs identified in the IWQA that must be carried out during maintenance. After the meeting, the water quality specialist shall provide DSD with a letter indicating that the applicable mitigation measures, protocols and BMPs identified in the IWQA have been appropriately implemented.