

### 3.0 QA/QC RESULTS

The Quality Assurance Project Plan (QAPP) was developed to establish activities and procedures to assure both chemical and physical measurements would meet the SWAMP requirements and provide the quality of data needed to validate and calibrate future TMDL models. Field sampling and laboratory quality assurance activities and procedures were implemented to objectives provided in the QAPP.

Quality assurance activities began with field protocols designed to minimize errors introduced during field sampling and measurements. Field procedures included calibration of field equipment as well as sample handling and processing procedures. Field QA/QC samples evaluated potential contamination and sampling error prior to sample delivery to the analytical laboratory. Field QA/QC processes included equipment calibration, field protocols to meet analytical holding times, field duplicates, and field blanks. Laboratory QA/QC samples were used to evaluate the analytical process for contamination, accuracy, and reproducibility.

The primary criteria used to evaluate the quality of data are precision, accuracy, completeness, and representativeness. These criteria are described below:

- Precision describes how well repeated measurements agree. Precision measurements were assessed on both field and laboratory duplicates. The results of the duplicate samples were compared to the original samples to estimate a relative percent difference (RPD) between the two samples.
- Accuracy describes how close the measurement is to its true value using calibration standards, reference samples, and spiked samples. The accuracy of chemical measurements was checked by performing LCS/LCSDs and MS/MSDs during each batch of sample analysis at the laboratory. Accuracy was quantified as the percent recovery of the measured value within established control limits. The recoveries of both LCS/LCSDs and MS/MSDs were evaluated.
- Completeness describes the fraction of collected data that is successfully analyzed in the laboratory. While no specific statistical criteria have been generated as part of this project, it is expected that 90 percent of all analyses should be completed when sampled. Completeness was quantified by comparing the number of measurements actually collected to the number of measurements planned to be collected.
- Representativeness describes the degree to which the results of analyses represent the samples collected, and the samples in turn represent natural variability and characteristics of the environmental conditions. The monitoring approach was designed to achieve representativeness by sampling from several locations throughout each lagoon. Sites were chosen to best represent distinctive processes or sections of the estuaries: mass emission sites above the upstream boundary of the estuary, lagoon segment sites based on distinct regions within each, and ocean inlet or lagoon mouth sites defining the boundary condition. Monitoring locations were chosen to be representative of the lagoon processes of interest.

### **3.1 FIELD EQUIPMENT CALIBRATION**

#### **3.1.1 Continuous Monitoring Field Equipment**

The water quality instrumentation was maintained per manufacturer specifications to achieve precision and accuracy requirements.

##### **3.1.1.1 Mass Emission Stations**

Continuous monitoring at the mass emission stations consisted of the following parameters: flow, rain, specific conductivity, temperature, turbidity, and, if applicable, DO and pH. The mass emission stations were distinguished from the other sites as the only sites at which to collect continuous flow and rain data. This section discusses flow and rain data. Section 3.1.1.2 discusses data parameters collected by the data sondes. In accordance with the QAPP, flow, rain, specific conductivity, and temperature were monitored from October 2007 to October 2008. From January 2008 to October 2008, turbidity and, if applicable, DO and pH were monitored resulting in a greater time period than required by the QAPP.

SELC equipment calibration activities were not covered in the QAPP; however, they were conducted as part of their program. Calibration activities were conducted monthly, including flow-validation measurements, stream level offset checks, and maintenance activities on an as-needed basis. Data validation or correction activities were conducted to maintain consistent flow measurements. A summary of these activities is provided below:

- **Agua Hedionda Lagoon:** In April 2008, the ratings table was revised for this location to reflect continued accretion of sediment. Accumulation of sediment on the stream bed results in continuous changes in the stage/discharge relationship. For the period April 2008 through June 2008, a systematic shift (+ 0.52 feet) was made in the October 2007 rating curve to account for the rising stream bed and maintain consistency with on-site flow measurements made on January 30, 2008 and March 28, 2008. This shift applied to discharges from December 1, 2007 to March 31, 2008, and, therefore, the dataset was amended for Agua Hedionda Lagoon.
- **Buena Vista Lagoon:** In April 2008, validating stream flow measurements were made to refine the stream rating table. The accuracy in determining volumetric flow depends on flow rates calculated for this location. During the monitoring period, the stage-discharge relationship at this location was influenced by vegetation and sediment accumulations, and an undetermined change in a downstream control section. This data was considered to be adequate during low flow conditions, and, therefore, the dry weather data were not impacted by this condition. During higher stream stages and discharges, as the water level increased, the vegetation growth exhibited increased impacts on the stream stage-discharge rating relationship. Wet weather events monitored for this program occurred in January and February 2008 prior to the bulk of vegetation and sediment accumulation, and, therefore, the data associated with those events is considered adequate.

- Loma Alta Slough: In April 2008, a new stream rating table was completed for Loma Alta Slough. The new rating table reflected stream flow calibration measurements made on March 28, 2008 and an adjustment in the water level sensor elevation.
- Loma Alta Mass Emission Station flow data: In November 2008, a preliminary assessment of Loma Alta Creek flow data from October 2007 to September 2008 initiated concern that the flows reported during dry weather conditions may have been overestimated flows. This overestimation may be attributable to a manufacturing defect of the pressure transducer. During wet weather events, the impact of higher storm flow appeared to offset the impact of the pressure transducer (PT) overestimation. This data is considered to be adequate as the hydrographs based on the SELC PT flow data were consistent with the hydrographs based on the MACTEC stage data. During dry weather conditions, including index period events, the impact of the PT overestimation relative to the low stream level appeared to result in a greater effect on the flow data. This data is considered to be overestimated because it exhibits daily fluctuations that appear to be driven by environmental factors other than stream level. The proposed approach to resolve this data for modeling purposes includes utilizing the data collected during this monitoring program and subsequent data collected by SELC. At the time of TMDL development for Loma Alta Slough, flow data collected by SELC will need to be requested. The following data sets are qualified in the databased as follows:
  - Flow data considered suspect as a result of instrument malfunction (IMS): October 2007 – December 2007, January 2008 (except during storm events 1/5/08-1/8/08 and 1/23/08 – 1/24/08), February 2008 (except during storm event 2/3/08-2/4/08), and March 2008 – June 21, 2008.
  - Flow data estimated (E): June 21, 2008 – August 13, 2008
- San Elijo Lagoon: In May 2008, the rating table was revised for this location. The new rating table reflected the results of stream channel cross-section surveys conducted on May 12, 2008. This new rating applied to reported stream discharges starting January 1, 2008. The original control location for this site was eroded during storm events in December 2007. The reduction of the stream control was confirmed by site surveys conducted on February 21, 2008 and May 12, 2008.

#### 3.1.1.2 All Monitoring Locations

Water quality parameters including specific conductivity, temperature, turbidity, DO, and pH were measured and logged using a YSI 6600 multi-parameter water quality data sonde installed on-site. Maintenance and calibration were conducted twice monthly on the data sondes. Maintenance activities included calibration, removal of sediment accrued on the data sonde, and battery exchanges. Occasionally, data sonde maintenance caused a spike in the measurements for a period of one to two hours. Data sonde fouling, errors and/or environmental conditions resulted in the following data gaps or qualified data. Continuous Monitoring data gaps for water quality parameters are summarized in Table 3-1.

**Table 3-1: Summary of Continuous Monitoring Data Gaps**

Lagoon	Monitoring Location	Parameter(s)	Date Range	Approximate Duration	Corresponding Monitoring Event
Agua Hedionda	Mass Emission Station	Turbidity	1/1/08 – 1/10/08	10 days	Wet Weather Event 1 (1/5/08 – 1/8/08)
	Segment	Specific conductivity, temperature, and turbidity	4/10/ 2008 – 4/24/2008	14 days	Index Period Event 3 (4/14/08 – 4/16/08)
		Specific conductivity, temperature, and turbidity	7/9/08 – 7/14/08	5 days	NA
	Ocean Inlet 1 Depth 1 (Surface)	Specific conductivity, temperature, and turbidity	1/31/08 – 2/13/08	14 days	Wet Weather Event 3 (2/4/08) and Index Period Event 1 (2/7/08 – 2/8/08, 2/11/08 – 2/13/08)
Buena Vista	Mass Emission Station	Turbidity and DO	1/1/08 – 1/3/08	3 days	NA
		pH	9/17/08 – 9/30/08	13 days	Index Period Event 4 (9/22/08 – 9/24/08)
	Segment	pH	1/9/08 – 2/4/08	26 days	Wet Weather Event 2 (2/23/08 – 2/24/08) and Index Period Event 1 (2/14/08 – 2/15/08)
		Turbidity	8/13/08 – 8/18/08	5 days	NA
Loma Alta	Mass Emission Station	Turbidity	1/1/08 – 1/8/08	8 days	Wet Weather Event 1 (1/5/08 – 1/8/08)
	Segment	Specific conductivity, temperature, turbidity, DO, and pH	1/6/08 – 1/8/08	2 days 1	NA
		Specific conductivity, temperature, turbidity, DO, and pH	2/14/08 – 2/20/08	6 days	NA
	Ocean Inlet	Specific conductivity, temperature, turbidity, DO, and pH	1/1/08 – 1/3/08	3 days1	NA
		Specific conductivity, temperature, turbidity, DO, and pH	1/6/08 – 1/8/08	2 days1	NA
		Specific conductivity, temperature, turbidity, DO, and pH	5/13/08 – 5/20/08	7 days	NA
		Specific conductivity, temperature, turbidity, DO, and pH	7/18/08 – 10/8/08	Lagoon mouth was closed for 3 months1	Index Period Event 3 - data was not required per QAPP.

**Table 3-1: Summary of Continuous Monitoring Data Gaps (continued)**

Lagoon	Monitoring Location	Parameter(s)	Date Range	Approximate Duration	Corresponding Monitoring Event
San Elijo	Mass Emission Station	Turbidity and DO	1/1/08 – 1/10/08	10 days	Wet Weather Event 1 (1/5/08 – 1/8/08)
	Segment 2	Specific conductivity, temperature, turbidity, DO, and pH	2/16/08 – 2/21/08	5 days	NA
		Specific conductivity, temperature, turbidity, DO, and pH	5/2008 – 10/2008	Intermittently over 5 months <sup>1</sup>	Index Period Event 3 low tides only (7/8/08 – 7/9/08)
	Ocean Inlet	Specific conductivity, temperature, turbidity, DO, and pH	2/16/08 – 2/21/08	5 days	NA
		Specific conductivity, temperature, turbidity, DO, and pH	5/2008 – 10/2008	Intermittently over 5 months <sup>1</sup>	Index Period Event 3 low tides only (7/8/08 – 7/10/08)

<sup>1</sup> Data gaps were intermittent and caused by environmental conditions at the sample location. Refer to complete data set for additional detail.

### Agua Hedionda Lagoon

- The turbidity probe was installed on January 10, 2008. No turbidity data was recorded at the Mass Emission Station from January 1, 2008 to January 10, 2008. This data gap coincided with Wet Weather Event 1 (January 5, 2008 to January 8, 2008).
- No data was recorded at the segment site from April 10, 2008 through April 24, 2008 as a result of apparent tampering of the equipment. This data gap coincided with the second week of Index Period Event 3 (April 14, 2008 to April 16, 2008).
- No data was recorded at the lagoon segment site from July 9, 2008 through July 14, 2008 as a result of a conductivity probe error. The sonde was removed for maintenance and re-deployed.
- No data was recorded at the ocean inlet 1 depth 1 (surface) from January 31, 2008 through February 13, 2008 as a result of low battery voltage. Maintenance activities occurred on January 10, 2008 and January 31, 2008 that did not indicate low voltage. This data gap coincided with Wet Weather Event 3 (February 4, 2008) and five out of six days of Index Period Event 1 (February 7, 8, 11, 12, and 13, 2008).
- No turbidity data was recorded at ocean inlet 1 depth 2 (bottom) from May 5, 2008 through May 25, 2008 as a result of a fouled probe. Although other short-term data gaps occurred for intervals of hours to 2 days, they did not coincide with a monitoring event.
- Turbidity was elevated in late June and early July due to an unexplained event during that period. This event occurred at the lagoon segment site and the ocean inlet site 2 at both depths 1 and 2, ruling out either fouling or sensor drift. All three data sondes were calibrated on July 9 and returned to a typical level below 20 NTU. Although these high values do not seem representative of the conditions in this area of the lagoon, data was left in the report as there is not a valid reason to have it removed or adjusted. This data anomaly affected data for Index Period Event 3.
- Elevated turbidity values at the lagoon segment site occurring in September and October were due to frequent probe fouling. Efforts were made in the field to manage this problem, however growth occurred very rapidly. Probe fouling affected data for Index Period Event 4.
- Elevated turbidity values at the ocean inlet 2 depth 2 (bottom) site occurred in late March and April as well as September and October and were due to frequent probe fouling. Efforts were made in the field to manage this problem, however growth occurred very rapidly. Probe fouling affected data for Index Period Event 2 and 4, respectively.

### Buena Vista Lagoon

- The turbidity probe was installed on January 3, 2008. No turbidity data was recorded at the Mass Emission Station from January 1, 2008 to January 3, 2008. This data gap did not coincide with a monitoring event.
- No pH data was recorded at the mass emission station from September 17, 2008 to September 30, 2008 as a result of a cracked pH probe. This data gap coincided with the second week of Index Period Event 4 (September 22, 2008 to September 24, 2008). The pH probe was replaced.
- No turbidity data was recorded from August 13, 2008 to August 18, 2008 as a result of a fouled probe. This data gap did not coincide with a monitoring event.

- No pH data was recorded at the lagoon segment 1 site from January 9, 2008 to February 4, 2008 as a result of outliers. Calibration and maintenance activities were performed on January 9, 2008; January 22, 2008; and February 4, 2008 to resolve this issue. This data gap coincided with Wet Weather Event 2 (January 23 and 24, 2008) and the first week of Index Period Event 1 (January 14, 2008 to January 15, 2008).

#### Loma Alta Slough

- The turbidity probe was installed on January 8, 2008. No turbidity data was recorded at the Mass Emission Station from January 1, 2008 to January 8, 2008. This data gap coincided with Wet Weather Event 1 (January 5, 2008 to January 8, 2008).
- The segment and ocean inlet sites had temporary data gaps from January 6, 2008 through January 8, 2008. The data sondes were exposed to air as a result of reduced water levels. The ocean sand berm at Loma Alta was breached after the storm event on January 5, 2008 causing a reduction in water level at the Loma Alta Slough.
- June 17, 2008 the data sonde at the segment site was replaced as a result of unusual spikes in the data. From June 16, 2008 to June 17, 2008 calibrations and maintenance activities were performed in an attempt to resolve unusual spikes in the data including low DO and high turbidity.
- No turbidity data was recorded from August 13, 2008 to August 18, 2008 as a result of probe fouling. This data gap did not coincide with a monitoring event.
- The lagoon mouth was closed from January 1, 2008 to January 3, 2008. Per the terms of the QAPP, data was not collected at the ocean inlet while the mouth was closed.
- The lagoon mouth was closed from May 12, 2008 to May 21, 2008 as a result of an ocean sand berm constructed by the City of Oceanside. Per the terms of the QAPP, data was not collected at the ocean inlet while the mouth was closed.
- The lagoon mouth was closed from July 18, 2008 to October 8, 2008 as a result of a ocean sand berm constructed by the City of Oceanside. Per the terms of the QAPP, data was not collected at the ocean inlet while the mouth was closed.

#### San Elijo Lagoon

- The turbidity probe was installed on January 10, 2008. No turbidity data was recorded at the Mass Emission Station from January 1, 2008 to January 10, 2008. This data gap coincided with Wet Weather Event 1 (January 5, 2008 to January 8, 2008).
- Data was not recorded at Lagoon Segment Site 2 and the ocean inlet sites from February 16, 2008 to February 21, 2008 as a result of a low battery. The low battery was not detected during maintenance activities because of a faulty gauge.
- May 2008 through October 2008, Lagoon Segment Site 2 and the ocean inlet sites had temporary data gaps corresponding with low tides. The data sondes at these locations were exposed to air as a result of reduced water levels. This data gap coincided with two low tide samples collected at Lagoon Segment Site 2 during Index Period Event 3 (July 8 and 9, 2008). This data gap coincided with three low tide samples collected at the ocean inlet site during Index Period Event 3 (July 8, 2008 to July 10, 2008).

- Flow at the lagoon mouth was restricted from March 28, 2008 to April 4, 2008 and from April 15, 2008 to April 28, 2008 as a result of an accumulation of sand.

### **3.1.2 Wet Weather and Index Period Event Monitoring Equipment**

American Sigma flow meters, automated sampling equipment, rain gauges, and Stingrays used during sample collection of composite and pollutagraph samples were calibrated semi-annually or as-needed based on inspections. American Sigma flow meters and rain gauges were utilized during the wet weather events to provide MACTEC with site-specific conditions such as an increase in rainfall and rise in flow to aid in the mobilization of field crews. Prior to each event and assessed through an event, flow meters, automated sampling equipment, and rain gauges were inspected, maintained and volume calibrated to ensure proportional aliquots were collected for composite samples. During Wet Weather Event 1, one sample location was not sampled which reduced the overall percent completeness for the event to 99 percent as presented in Table 3-2.

- During wet weather event 1, only one depth was monitored at ocean inlet site 2 at Agua Hedionda Lagoon.

The Responsible Parties calibrated Horiba U – 10 instruments on a daily basis prior to recording measurements in the field for storm drain sampling.



**Table 3-2: Summary of Completeness by Event**

<b>Event Category</b>	<b>Lagoon</b>	<b>Total Samples</b>	<b>Total Samples Required</b>	<b>Pecent Complete</b>
Wet Weather Event 1	Agua Hedionda Lagoon	63	71	89
	Buena Vista Lagoon	142	139	102
	Loma Alta Slough	139	139	100
	San Elijo Lagoon	166	165	101
	<b>Event Total</b>	<b>510</b>	<b>514</b>	<b>99</b>
Wet Weather Event 2	Agua Hedionda Lagoon	74	71	104
	Buena Vista Lagoon	151	139	109
	Loma Alta Slough	142	139	102
	San Elijo Lagoon	196	165	119
	<b>Event Total</b>	<b>563</b>	<b>514</b>	<b>110</b>
Wet Weather Event 3	Agua Hedionda Lagoon	40	40	100
	Buena Vista Lagoon	52	52	100
	Loma Alta Slough	52	52	100
	San Elijo Lagoon	78	78	100
	<b>Event Total</b>	<b>222</b>	<b>222</b>	<b>100</b>
Index Period Event 1	Agua Hedionda Lagoon	304	304	100
	Buena Vista Lagoon	476	476	100
	Loma Alta Slough	589	596	99
	San Elijo Lagoon	923	932	99
	<b>Event Total</b>	<b>2292</b>	<b>2308</b>	<b>99</b>
Index Period Event 2	Agua Hedionda Lagoon	304	304	100
	Buena Vista Lagoon	475	475	100
	Loma Alta Slough	594	596	100
	San Elijo Lagoon	930	932	100
	<b>Event Total</b>	<b>2303</b>	<b>2307</b>	<b>100</b>
Index Period Event 3	Agua Hedionda Lagoon	304	304	100
	Buena Vista Lagoon	476	476	100
	Loma Alta Slough	440	440	100
	San Elijo Lagoon	930	932	100
	<b>Event Total</b>	<b>2150</b>	<b>2152</b>	<b>100</b>
Index Period Event 4	Agua Hedionda Lagoon	304	304	100
	Buena Vista Lagoon	476	476	100
	Loma Alta Slough	596	596	100
	San Elijo Lagoon	932	932	100
	<b>Event Total</b>	<b>2308</b>	<b>2308</b>	<b>100</b>

**Table 3-3: Data Quality Objectives and Levels Achieved for Analytical Results**

Constituent	Accuracy					Precision			Recovery		Completeness	
	DQO	Percent Achieved (LCS) <sup>1</sup>	DQO	Percent Achieved (FB) <sup>2</sup>	Percent Achieved (LB) <sup>3</sup>	DQO	Percent Achieved (FD) <sup>4</sup>	Percent Achieved (LD) <sup>5</sup>	DQO	Percent Achieved (MSS) <sup>6</sup>	DQO	Percent Achieved
<i>Enterococcus</i>	NA <sup>7</sup>	NA	<TRL <sup>8</sup>	98.5	100	25% RPD <sup>9</sup>	99	100	NA	NA	90%	99
Total Coliform	NA	NA	<TRL <sup>8</sup>	98.5	100	25% RPD	100	100	NA	NA	90%	99
Fecal Coliform	NA	NA	<TRL <sup>8</sup>	100	100	25% RPD	99	100	NA	NA	90%	99
TSS	NA	NA	<TRL <sup>8</sup>	100	100	25% RPD	54	91	NA	NA	90%	99
TDS	80-120%	100	<TRL <sup>8</sup>	33.3	100	25% RPD	100	100	NA	NA	90%	100
Ammonia-N	80-120%	100	<TRL <sup>8</sup>	12.8 <sup>10</sup>	100	25% RPD	59.3	98.4	80-120%	100	90%	99
CBOD	NA	NA	<TRL <sup>8</sup>	100	100	25% RPD	64	100	NA	NA	90%	100
Chlorophyll <i>a</i>	NA	NA	<TRL <sup>8</sup>	91.5	98.7	25% RPD	53	66	NA	NA	90%	100
Nitrate+Nitrite-N	80-120%	100	<TRL <sup>8</sup>	93.6	100	25% RPD	54.1	96.3	80-120%	100	90%	99
Soluble Reactive Phosphorus (SRP)	80-120%	100	<TRL <sup>8</sup>	95.7	100	25% RPD	67.0	98.3	80-120%	100	90%	99
Total Nitrogen (TN)	80-120%	98.0	<TRL <sup>8</sup>	100	100	25% RPD	48.4	93.9	80-120%	97.9	90%	99
Total Dissolved Nitrogen (TDN)	80-120%	98.0	<TRL <sup>8</sup>	100	100	25% RPD	59.1	98.0	80-120%	100	90%	99
Total Phosphorus (TP)	80-120%	100	<TRL <sup>8</sup>	95.7	100	25% RPD	48.3	97.9	80-120%	100	90%	99
Total Dissolved Phosphorus (TDP)	80-120%	100	<TRL <sup>8</sup>	95.7	100	25% RPD	50.6	97.7	80-120%	100	90%	99
% Total Phosphorus	80-120%	NA	NA	NA	NA	25% RPD	83.3	100	80-120%	100	90%	100
%Organic Carbon	80-120%	100	NA	NA	NA	25% RPD	100	100	80-120%	NA	90%	100
% Total Nitrogen	80-120%	100	NA	NA	NA	25% RPD	100	100	80-120%	NA	90%	100

<sup>1</sup>LCS - Laboratory Control

<sup>2</sup>FB - Field Blank

<sup>3</sup>LB - Laboratory Blank

<sup>4</sup>FD - Field Duplicate

<sup>5</sup>LD - Laboratory Duplicate

<sup>6</sup>Standard MSS – Matrix Spike Sample

<sup>7</sup>NA – Not Applicable

<sup>8</sup>TRL – Target Reporting Limit

<sup>9</sup>RPD – Relative Percent Difference

<sup>10</sup> Note: Ammonia as N: 12.8 percent of filed blanks analyzed had results below the laboratory reported limit of 0.004 mg/L. However, 100 percent of field blanks analyzed had results below the QAPP target reporting limit of 0.05 mg/L for ammonia as nitrogen.

### **3.2 HOLDING TIME REQUIREMENTS**

Holding time requirements are established as part of the analytical method and require samples to be analyzed within a specified time to ensure accurate results. The following 303(d) listed categories and individual analytes exceeded holding times on at least one occasion; bacteria (including *Enterococcus*, total and fecal coliforms); total dissolved solids; and nutrients/eutrophication (including ammonia, nitrate+nitrite, SRP, TN, TDN, TP, and TDP). These data are flagged in the project database with a QA/QC code of “H”.

#### **3.2.1 Bacteria**

Total and fecal coliform samples were transported in coolers with ice to the laboratory within six hours of sample collection. Sample runners and laboratory couriers were utilized to meet the six-hour holding time. However, three samples (*Enterococcus*, total coliform, and fecal coliform) collected during Wet Weather Events 1 and 2 exceeded holding times:

- The first pollutograph sample collected at Loma Alta Lagoon for Wet Weather Event 1 exceeded the holding time limit.
- Pollutograph samples 8 and 9 collected at Loma Alta Lagoon for Wet Weather Event 2 exceeded the holding time limit.

#### **3.2.2 TDS**

Total Dissolved Solids were transported in coolers with ice to the laboratory at the end of each sampling day. One sample collected during Index Period 4 exceeded the holding time:

- Index Period Event 4: The mass emission sample collected on day five of the index period (October 14, 2008) was submitted to the laboratory within the holding time limit on October 14, 2008. However, the sample was not analyzed by the laboratory until November 4, 2008. This exceeded the holding time limit by 21 days.

#### **3.2.3 Nutrients/Eutrophication**

Ammonia as nitrogen, nitrate+nitrite as nitrogen, SRP, TDN, and TP samples were field filtered within six hours of sample collection, kept on ice during the day, and frozen at the end of the sampling day. Samples for TN and TP did not require filtration, but were frozen to maintain the 30-day holding time requirement. The project team utilized dry ice to ship the samples to the appropriate laboratories.

Ammonia as nitrogen, nitrate+nitrite as nitrogen, and SRP samples collected during Wet Weather Event 1, and Index Period Events 1, 3, and 4 exceeded holding time limits. Additionally, TN, TDN, TP, and TDP samples collected during Wet Weather Event 1 exceeded holding time limits. These holding time exceedances are discussed below by event:

- Wet Weather Event 1: Lagoon and ocean inlet samples that exceeded holding time limits were the result of a laboratory distribution error. A total of 18 nutrient samples collected on January 5, 2008 for the first wet weather event from the ocean inlets and segments at Buena Vista Lagoon, Loma Alta Slough, and San Elijo Lagoon were submitted to the laboratory within the holding time limit. However, the laboratory did not distribute the frozen samples until 112 days after the holding time limit. After further discussion with SCCWRP and the laboratories, it was believed that the quality of the data had not been compromised as a result of the exceeded holding time limits because the samples were continuously frozen. For many research projects, nutrient samples are frozen for up to six months. The results are considered acceptable due to no appreciable decay in concentration. To verify that results were within an acceptable range, this data was compared to historical concentrations and found to be within expected ranges. MACTEC implemented the following corrective actions to prevent additional distribution errors from occurring:
  - MACTEC took over nutrient sample distribution from CRG on February 1, 2008.
  - Individual samples were checked against COCs prior to shipment to ensure all samples collected were accounted for and shipped to the correct laboratory (UGA/MSI) by MACTEC.
  - Samples were frozen and shipped by MACTEC with dry ice to keep the samples frozen during transit.
  - A SWAMP-compatible EDD was pre-populated for each lab by MACTEC to confirm there was a result for each sample submitted and to reduce the reporting effort of the laboratory.
  - SWAMP-compatible EDDs and lab reports were checked by MACTEC within 14 days of receipt.
- Index Period Event 3: For ammonia as nitrogen, nitrate+nitrite as nitrogen, and SRP, a total of 112 samples out of 156 exceeded the holding time limits of 28 days. MACTEC checked and delivered samples to the laboratory within 2 to 7 business days. However, the laboratory did not analyze these samples until 1 to 10 days after the holding time limit. A summary of samples impacted per lagoon is provided below:
  - Buena Vista Lagoon: At Buena Vista Lagoon, the mass emission, segment 1, segment 2, and field blank samples collected on days four through six of the index period (July 21 to 23, 2008) exceeded holding times by 2 to 3 days.
  - Loma Alta Slough: At Loma Alta Slough, the mass emission, segment, and transect samples collected on days one through three of the index period (July 7 to 9, 2008) exceeded holding times by 8 to 10 days. The ocean inlet site was not sampled during this index period because the lagoon mouth was closed.

- San Elijo Lagoon: At San Elijo Lagoon, the mass emission, segment 1, segment 2, ocean inlet, storm drain1, storm drain 2, and all transect samples collected on days one through three of the index period (July 7 to 9, 2008) exceeded holding times by 8 to 10 days.

### 3.3 BROKEN VIALS

Sample handling and delivery protocols were established to ensure samples were received intact by the laboratory for analysis. No sample containers were broken during this program. However, sample distribution errors occurred during Wet Weather Event 1 and Index Period Event 1. As a result, the following ammonia as nitrogen, nitrate+nitrite as nitrogen, and SRP samples were not analyzed.

- One ocean inlet sample collected during Index Period Event 1 at San Elijo Lagoon was not received by the appropriate laboratory for analysis.
- One transect sample collected during Index Period Event 1 at Loma Alta Slough was not received by the appropriate laboratory for analysis.

Despite these two missing samples, this program met the DQO of 90 percent completeness by attaining an overall 99 percent completeness for all events shown in Table 3-2 and a 99 percent of all scheduled analysis per constituent as presented in Table 3-3.

### 3.4 FIELD DUPLICATES

Field duplicates were analyzed for a minimum of 10 percent total samples per constituent. The percent of field duplicates that met the data quality objectives for individual constituents is presented in Table 3-3. For those samples that did not meet the DQOs, site variations were evaluated by constituent to reflect the sampling strategy.

High RPDs occurred as a result of small absolute differences at low concentrations that tended to amplify RPDs. This occurred for the following constituents collected during index period events: *Enterococcus*, TSS, ammonia as nitrogen, CBOD, nitrate+nitrite as nitrogen, SRP, TN, TDN, TP, and TDP. High RPDs also reflected the heterogeneous nature of environmental samples, and are considered reasonable. The National Science Foundation, in a review of RPDs for various types of environmental samples, found that storm water samples routinely had RPDs between 60 and 100 percent. This was thought to be caused, in many instances, by the process of splitting samples (due to the potential for large variations in particle sizes and, therefore, constituent concentrations between the primary and duplicate samples).

### 3.4.1 Bacteria

Field duplicates were analyzed for 12 percent of the total bacteria samples collected for this monitoring program. The percent of field duplicates for bacteria (*Enterococcus*, fecal coliform and total coliform) that met the DQOs are provided in Table 3-3. The breakdown by constituent of the field duplicates that met the DQO for precision is as follows:

- *Enterococcus*: Of 112, 111 field duplicates (99 percent) met the DQO for precision.
- Fecal Coliform: Of 112, 111 field duplicates (100 percent) met the DQO for precision.
- Total Coliform: Of 112, 111 field duplicates (99 percent) met the DQO for precision.

### 3.4.2 TDS

Field duplicates were analyzed for 10 percent of the total TDS samples collected at Agua Hedionda Lagoon for this monitoring program. Of 5 total field duplicates analyzed for TDS, 100 percent met the DQO for precision.

### 3.4.3 TSS

Field duplicates were analyzed for 12 percent of the total TSS samples collected for this monitoring program. Of 127, 68 field duplicates (54 percent) analyzed for TSS met the DQO objective.

### 3.4.4 Nutrients/Eutrophication

Field duplicates were analyzed for 12 percent of the total nutrient/eutrophication samples collected at Buena Vista Lagoon, Loma Alta Slough, and San Elijo Lagoon for this monitoring program. The percentages of field duplicates for each constituent that met the DQOs are provided in Table 3-3. The breakdown by constituent of the field duplicates that met the DQO for precision is as follows:

- Ammonia as N: Of 91, 54 field duplicates (59.3 percent) analyzed for ammonia as nitrogen met the DQO for precision.
- CBOD: Of 25, 16 field duplicates (64 percent) analyzed for CBOD met the DQO for precision.
- Chlorophyll *a*: Of 83, 44 field duplicates (53 percent) analyzed for chlorophyll *a*, met the DQO for precision.
- Nitrate+Nitrite: Of 54, 52 field duplicates (54.1 percent) analyzed for nitrate+nitrite met the DQO for precision.
- SRP: Of 88, 9 field duplicates (67 percent) analyzed for SRP, met the DQO for precision.

- TN: Of 93, 45 field duplicates (48.4 percent) analyzed for total nitrogen met the DQO for precision.
- TDN: Of 93, 55 field duplicates (59.1 percent) analyzed for TDN, met the DQO for precision.
- TP: Of 89, 43 field duplicates (48.3 percent) analyzed for total phosphorus met the DQO for precision.
- TDP: Of 77, 39 field duplicates (50.6 percent) analyzed for TDP, met the DQO for precision.

### 3.4.5 Post-storm Sediment

Field duplicates were analyzed for x percent of the total post-storm sediment samples collected at Buena Vista Lagoon, Loma Alta Slough, and San Elijo Lagoon for this monitoring program. The percentages of field duplicates for each constituent that met the DQOs are provided in Table 3-3. The breakdown of the field duplicates that did not meet the DQO for precision is summarized in the following subsections.

- % Total Organic Carbon: Of 6, 6 field duplicates (100 percent) analyzed for % organic carbon, met the DQO for precision.
- % Total Nitrogen: Of 4, 4 field duplicates (100 percent) analyzed for % total nitrogen, met the DQO for precision.
- % Total Phosphorus: Of 5, 6 field duplicates (83.3 percent) analyzed for % total phosphorus, met the DQO for precision.
- % Sand: Of 9, 7 field duplicates (77.8 percent) analyzed for % sand, met the DQO for precision.

## 3.5 LABORATORY DUPLICATES

Laboratory duplicates were analyzed for a minimum of 5 percent of the total number of samples analyzed per constituent. The percentage of duplicates that met the DQOs for individual constituents is presented in Table 3-3.

### Bacteria

- *Enterococcus*: Of 12, 12 laboratory duplicates (100 percent) for bacteria met the DQO.
- Fecal Coliform: Of 12, 12 laboratory duplicates (100 percent) for bacteria met the DQO.
- Total Coliform: Of 12, 12 laboratory duplicates (100 percent) for bacteria met the DQO.

### TDS

- Of 26, 26 laboratory duplicates (100 percent) for TDS met the DQO.

### TSS

- Of 107, 97 laboratory duplicates (91 percent) analyzed for TSS, met the DQO.

### Nutrients/Eutrophication

All of the laboratory duplicates for the individual constituents met the DQO, except for chlorophyll *a*. The breakdown is as follows:

- Ammonia as N: Of 61, 60 laboratory duplicates (98.4 percent) analyzed for ammonia as nitrogen met the DQO for precision.
- CBOD: Of 3, 3 laboratory duplicates (100 percent) analyzed for CBOD met the DQO for precision.
- Chlorophyll *a*: Of 64, 42 laboratory duplicates (66 percent) analyzed for chlorophyll *a*, met the DQO for precision.
- Nitrate+Nitrite: Of 54, 52 laboratory duplicates (96.3 percent) analyzed for nitrate+nitrite met the DQO for precision.
- SRP: Of 60, 59 laboratory duplicates (98.3 percent) analyzed for SRP, met the DQO for precision.
- TN: Of 49, 46 laboratory duplicates (93.9 percent) analyzed for total nitrogen met the DQO for precision.
- TDN: Of 49, 48 laboratory duplicates (98.0 percent) analyzed for TDN, met the DQO for precision.
- TP: Of 47, 46 laboratory duplicates (97.9 percent) analyzed for total phosphorus met the DQO for precision.
- TDP: Of 44, 43 laboratory duplicates (97.7 percent) analyzed for TDP, met the DQO for precision.

### Post-Storm Sediment

Laboratory duplicates were analyzed for x percent of the total post-storm sediment samples collected at Buena Vista Lagoon, Loma Alta Slough, and San Elijo Lagoon for this monitoring program. The percentages of laboratory duplicates for each constituent that met the DQOs are provided in Table 3-3. The breakdown of the laboratory duplicates that met the DQO for precision is as follows.

- % Total Organic Carbon: Of 4, 4 laboratory duplicates (100 percent) analyzed for % organic carbon, met the DQO for precision.
- % Total Nitrogen: Of 2, 2 laboratory duplicates (100 percent) analyzed for % total nitrogen, met the DQO for precision.
- % Total Phosphorus: Of 4, 4 laboratory duplicates (100 percent) analyzed for % total phosphorus, met the DQO for precision.



### **3.6 STANDARD REFERENCE MATERIAL**

Laboratory control samples were analyzed for a minimum of 6 percent of the total samples collected for the following constituents: TDS, ammonia as nitrogen, nitrate+nitrite as nitrogen, SRP, total nitrogen, total dissolved nitrogen, total phosphorus, total dissolved phosphorus, % total organic carbon and % nitrogen. All results met the DQO, except for two samples:

- TDS: Of 46, 46 laboratory control samples (100 percent) analyzed for TDS met the DQO for precision.
- Ammonia as N: Of 77, 77 laboratory control samples (100 percent) analyzed for ammonia as nitrogen met the DQO for precision.
- Nitrate+Nitrite: Of 77, 77 laboratory control samples (100 percent) analyzed for nitrate+nitrite met the DQO for precision.
- SRP: Of 77, 77 laboratory control samples (100 percent) analyzed for SRP met the DQO for precision.
- TN: Of 49, 48 laboratory control samples (98.0 percent) analyzed for total nitrogen met the DQO for precision.
- TDN: Of 49, 48 laboratory control samples (98.0 percent) analyzed for TDN met the DQO for precision.
- TP: Of 49, 49 laboratory control samples (100 percent) analyzed for total phosphorus met the DQO for precision.
- TDP: Of 49, 49 laboratory control samples (100 percent) analyzed for TDP met the DQO for precision.
- % Total Organic Carbon: Of 11, 11 laboratory control samples (100 percent) analyzed for % organic carbon met the DQO for precision.
- % Total Nitrogen: Of 11, 11 laboratory control samples (100 percent) analyzed for % total nitrogen met the DQO for precision.

### **3.7 LABORATORY MATRIX SPIKES**

Matrix spikes/matrix spike duplicates were analyzed on a minimum of 5 percent of the total number of samples collected for the following constituents: TDS, ammonia as nitrogen, nitrate+nitrite as nitrogen, total nitrogen, total dissolved nitrogen, total phosphorus, total dissolved phosphorus and % total phosphorus. All sample results met the DQO, except for the following samples:

- Ammonia as N: Of 63, 63 matrix spikes (100 percent) analyzed for ammonia as nitrogen met the DQO for precision.
- Nitrate+Nitrite: Of 63, 63 matrix spikes (100 percent) analyzed for nitrate+nitrite met the DQO for precision.

- SRP: Of 63, 63 matrix spikes (100 percent) analyzed for SRP, met the DQO for precision.
- TN: Of 48, 47 matrix spikes (97.9 percent) analyzed for total nitrogen met the DQO for precision.
- TDN: Of 47, 47 matrix spikes (100 percent) analyzed for TDN, met the DQO for precision.
- TP: Of 48, 48 matrix spikes (100 percent) analyzed for total phosphorus met the DQO for precision.
- TDP: Of 47, 47 matrix spikes (100 percent) analyzed for TDP, met the DQO for precision.
- % Total Phosphorus: Of 4, 4 matrix spikes (100 percent) analyzed for % total phosphorus, met the DQO for precision.

### 3.8 LABORATORY BLANKS

Laboratory blanks were analyzed on a minimum of 5 percent of the total number of samples collected. All sample results met the DQO except for the following samples:

#### Bacteria

- *Enterococcus*: Of 4, 4 laboratory blanks (100 percent) met the DQO.
- Total Coliform: Of 4, 4 laboratory blanks (100 percent) analyzed for did not meet the DQO.
- Fecal Coliform: Of 4, 4 laboratory blanks (100 percent) analyzed for did not meet the DQO.

#### TDS

- Of 26, 26 laboratory blanks (100 percent) met the DQO.

#### TSS

- Of 100, 100 laboratory blanks (100 percent) met the DQO.

#### Nutrients/Eutrophication

- Ammonia as N: Of 92, 92 laboratory blanks (100 percent) analyzed for ammonia as nitrogen met the DQO for precision.
- CBOD: Of 68, 68 laboratory duplicates (100 percent) analyzed for CBOD met the DQO for precision.
- Chlorophyll *a*: Of 79, 78 laboratory blanks (98.7 percent) met the DQO.
- Nitrate+Nitrite: Of 92, 92 laboratory blanks (100 percent) analyzed for nitrate+nitrite met the DQO for precision.
- SRP: Of 92, 92 laboratory blanks (100 percent) analyzed for SRP met the DQO for precision.
- TN: Of 47, 47 laboratory blanks (100 percent) analyzed for total nitrogen met the DQO for precision.

- TDN: Of 47, 47 laboratory blanks (100 percent) analyzed for TDN met the DQO for precision.
- TP: Of 47, 47 laboratory blanks (100 percent) analyzed for total phosphorus met the DQO for precision.
- TDP: Of 47, 47 laboratory blanks (100 percent) analyzed for TDP met the DQO for precision.

### 3.9 FIELD BLANKS

Field blanks were analyzed on a minimum of 5 percent of total samples collected for all constituents. All sample results met the DQO, except for one *Enterococcus*, one total coliform, two TDS, five chlorophyll *a*, one TN, one TDN, one TP, and one TDP. The samples that did not meet the DQO are discussed in the follow subsections:

#### Bacteria

- *Enterococcus*: Of 66, 65 field blanks (98.5 percent) met the DQO.
- Fecal Coliform: Of 66, 66 field blanks (100 percent) met the DQO.
- Total Coliform: Of 66, 65 field blanks (98.5 percent) met the DQO.

#### TDS

- Of 3, 1 field blanks (33.3 percent) met the DQO.

#### TSS

- Of 67, 67 field blanks (100 percent) met the DQO.

#### Nutrients/Eutrophication

- Ammonia as N: Of 47, 6 field blanks (12.8 percent) analyzed had results greater than the laboratory reported limit of 0.004 mg/L for ammonia as nitrogen met the DQO for precision. However, Of 47, 47 field blanks (100 percent) analyzed had results greater than the QAPP target reporting limit of 0.05 mg/L for ammonia as nitrogen met the DQO for precision.
- Nitrate+Nitrite: Of 47, 44 field blanks (100 percent) analyzed for nitrate+nitrite met the DQO for precision.
- SRP: Of 47, 45 field blanks (95.7 percent) analyzed for SRP, met the DQO for precision.
- TN: Of 47, 47 field blanks (100 percent) analyzed for total nitrogen met the DQO for precision.
- TDN: Of 46, 46 field blanks (100 percent) analyzed for TDN, met the DQO for precision.
- TP: Of 47, 45 field blanks (95.7 percent) analyzed for total phosphorus met the DQO for precision.
- TDP: Of 46, 44 field blanks (95.7 percent) analyzed for TDP, met the DQO for precision.

### 3.9.1 TN/TDN and TP/TDP

Although field blanks analyzed for TN/TDN and TP/TDP had values reported greater than the laboratory MDL of 0.0028 and 0.0021 mg/L, respectively, only one sample per analyte had results greater than the target RL. Upon further review of this data, a number of total dissolved nitrogen and total dissolved phosphorus results were identified as greater than the paired total phosphorus and total nitrogen results. MACTEC conducted an assessment of the total nitrogen, total dissolved nitrogen, total phosphorus, and total dissolved phosphorus results to understand the extent and magnitude of this issue. The laboratory reported values below the MDL and those values used in the data assessment are described below:

- Analyzed equipment blanks on each type of sample processing equipment, including syringes, filters, vials, and glass containers.
- Calculated percent of samples, field blanks, and equipment blanks impacted.
- Calculated the difference between total and dissolved results and identified values greater than the MDL.
- Calculated RPD in terms of the MDL to distinguish laboratory analysis variability.
- Evaluated the difference between the average dissolved and average total results for field samples, field blanks, and equipment blanks.

#### TDN/TN

TDN results are greater by at least 0.0028 (MDL) than their paired TN results in 33 percent of the total samples collected.

- Field Blank samples: TDN results are greater than their paired TN results in 55 percent of total field blank samples.
- Equipment Blank samples: All TN/TDN results were below the target RL of 0.1 mg/L. TDN results are greater by at least 0.0028 than their paired TN results in 69 percent of total equipment blank samples.
- For TN, the average field blank result was 0.0226 and average equipment blank was 0.0369. For TDN, the average field blank result was 0.0284 and average equipment blank was 0.0420.

### TDP/TP

TDP results are greater than their paired TP results in 20 percent of the total samples collected.

- Field Blank samples: TDP results are greater than their paired TP results in 47 percent of total samples field blank samples collected.
- Equipment Blank samples: All TN/TDN results were below the target RL of 0.05 mg/L. TDP results are greater by at least 0.0028 (MDL) than their paired TP results in 19 percent of total field blank samples collected.
- The average field blank result for TP was 0.0013 and average equipment blank was 0.0001. The average field blank result for TDP was 0.0016 and average equipment blank was 0.0002. These values are below the MDL and are considered non-detects for this program per SWAMP guidelines.

Most of the TN, TDN, TP, and TDP results evaluated were present in relatively small concentrations below the target RL and in some cases below the laboratory MDL. The majority of the nitrogen or phosphorus appears to be present in the dissolved state in these samples. The laboratory used an exceptionally low method detection limit that reduces the confidence in the results at the lower limits and increases the possibility of positive results in blank samples. High RPDs occur as a result of small, absolute differences at low concentrations that amplify RPDs. The occurrence of dissolved values greater than paired total values is more evident in the TN/TDN samples than the TP/TDP results. The TN/TDN field blank and equipment blank results show a more substantial difference between dissolved and total samples. The equipment appears to be contributing to the TN/TDN results. The TP/TDP field blank and equipment blank results are most likely a result of laboratory interference and not a likely contributor to the sample results.

### **3.10 ASSESSMENT OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS**

Overall, data quality met program QA/QC objectives. All laboratory and field data generated under this program were reviewed for accuracy, precision and completeness. Data were qualified and flagged in the project database with the appropriate SWAMP QA code. Data was required to be reported in a SWAMP compatible format. Following the review, data results were assigned data qualifiers, as appropriate. Data were qualified using Result Qualifier Codes and Quality Assurance Codes, which are detailed below.

Result Qualifier Codes (ResQualCode) were used in the database to qualify individual sample results.

The following ResQualCodes were assigned to data:

- Non-Detect (ND): The result was below the MDL.
- Detected Not Quantifiable (DNQ): The result was between the MDL and the RL.
- Estimated (E): Estimated value (Note this value was only used for bacteria counts and Loma Alta flow data).

Any constituent reported as non-detect (Numerical Qualifier "<") received an overall qualification of "ND" in the absence of laboratory quality control qualification. Any constituent that reported a value below the RL but at or above the MDL (with a Numerical Qualifier "<") received an overall qualification of "<,DNQ" to identify that the result was report as a less than value and was qualified as a DNQ in the absence of laboratory quality control qualification.

The 2007-2008 monitoring effort resulted in 10,749 chemical measurements. Of these, 2,785 values (26 percent) required data qualifications. Of the 2,785 values, 388 were wet weather results and 2397 were dry weather results. Table 3-3 provides a summary of the ResQualCodes applied to wet weather data and Table 3-4 provides a summary of the ResQualCodes applied to the dry weather data.

QA Codes are used in the database to describe any special conditions or situation occurring during the analysis. No data points were rejected based on these qualifiers. QA Codes are as follows.

- X: The default code, indicating no special conditions, is "X".
- H: A holding time violation occurred. The majority of the "H" qualifiers were attributable to holding-time violations for nutrients as described in Section 3.2.3.
- DGT: Dissolved result was greater than paired Total result; therefore the dissolved result was considered suspect. The "DGT" qualifiers were attributable to the total dissolved nitrogen and phosphorus results as described in Section 3.9.4.
- IMS: Instrument malfunction occurred, data is considered suspect. At Loma Alta Slough, flow data is considered suspect as described in Section 3.1.1.

Based on a review of the project DQOs and the database data qualifiers, the data collected as part of this study was deemed appropriate for use in the CHU Lagoon TMDL Monitoring Program Data Analysis as qualified. No data was rejected. The flagged data was applicable as qualified and can be used considering the constraints placed by the qualifiers.

**Table 3-4: Summary of Wet Weather Qualified Data**

Analyte/Constituent	Qualified Results	% Qualified	ND	% ND	DNQ	% DNQ	E	% E	Total Analyte Result Count
Clay <0.0039 mm	0	0%		0.0%		0.0%		0.0%	33
Granule 2.0 to <4.0 mm	0	0%		0.0%		0.0%		0.0%	11
Sand 0.0625 to <2.0 mm	0	0%		0.0%		0.0%		0.0%	55
Silt 0.0039 to <0.0625 mm	0	0%		0.0%		0.0%		0.0%	44
% Organic Carbon	6	10%		0.0%	6	10.0%		0.0%	60
% Sand	0	0%		0.0%		0.0%		0.0%	85
% Total Nitrogen	23	49%		0.0%	23	48.9%		0.0%	47
% Total Phosphorus	0	0%		0.0%		0.0%		0.0%	60
Enterococcus	3	3%		0.0%	3	2.6%		0.0%	116
Fecal Coliform	0	0%		0.0%		0.0%		0.0%	116
Total Coliform	0	0%		0.0%		0.0%		0.0%	116
TDS	0	0%		0.0%		0.0%		0.0%	16
TSS	5	4%	1	0.7%	4	2.9%		0.0%	138
Ammonia as N	1	1%	1	1.1%		0.0%		0.0%	94
CBOD	39	42%	39	41.9%		0.0%		0.0%	93
Chlorophyll <i>a</i>	0	0%		0.0%		0.0%		0.0%	43
Nitrate + Nitrite as N	5	5%	1	1.1%	4	4.3%		0.0%	94
Soluble Reactive Phosphorus	0	0%		0.0%		0.0%		0.0%	94
Total Nitrogen (calc)	0	0%		0.0%		0.0%		0.0%	94
TDN	35	37%		0.0%	35	37.2%		0.0%	94
TP	92	98%	5	5.3%	87	92.6%		0.0%	94
TDP	94	100%	8	8.5%	86	91.5%		0.0%	94
<b>Total Qualifiers</b>	<b>388</b>	<b>23%</b>	<b>55</b>	<b>3.3%</b>	<b>248</b>	<b>14.7%</b>		<b>0.0%</b>	<b>1691</b>

**Table 3-5: Summary of Dry Weather Qualified Data**

<b>Analyte</b>	<b>Qualified</b>	<b>% Qualified</b>	<b>ND</b>	<b>% ND</b>	<b>DNQ</b>	<b>% DNQ</b>	<b>E</b>	<b>% E</b>	<b>Total Analyte Result Count</b>
Enterococcus	148	18.8%		0.0%	148	18.8%		0.0%	788
Fecal Coliform	112	14.2%		0.0%	112	14.2%		0.0%	788
Total Coliform	85	10.8%		0.0%	57	7.2%	28	3.6%	788
TDS	0	0.0%		0.0%		0.0%		0.0%	24
TSS	176	18.4%	10	1.0%	166	17.4%		0.0%	956
Ammonia as N	4	0.6%		0.0%	4	0.6%		0.0%	652
CBOD	308	68.3%	308	68.3%		0.0%		0.0%	451
Chlorophyll <i>a</i>	46	7.0%	21	3.2%	25	3.8%		0.0%	657
Nitrate + Nitrite as N	200	30.7%	40	6.1%	160	24.5%		0.0%	652
Soluble Reactive Phosphorus	129	19.8%	10	1.5%	119	18.3%		0.0%	652
Total Nitrogen (calc)	8	1.2%	1	0.2%	7	1.1%		0.0%	661
TDN	161	24.4%	1	0.2%	160	24.2%		0.0%	660
TP	489	74.0%	23	3.5%	466	70.5%		0.0%	661
TDP	531	80.5%	101	15.3%	430	65.2%		0.0%	660
Turbidity	0	0.0%		0.0%		0.0%		0.0%	8
<b>Total Qualifiers</b>	<b>2397</b>	<b>26.5%</b>	<b>515</b>	<b>5.7%</b>	<b>1854</b>	<b>20.5%</b>	<b>28</b>	<b>0.3%</b>	<b>9058</b>