Lake Elsinore & San Jacinto Watersheds Authority



City of Lake Elsinore • City of Canyon Lake • County of Riverside Elsinore Valley Municipal Water District • Santa Ana Watershed Project Authority

November 20, 2024

Ms. Jayne Joy Regional Water Quality Control Board 3737 Main Street, Suite 500 Riverside, CA 92501

RE: Final Annual Water Quality Monitoring Report July 2023 – June 2024, Lake Elsinore and Canyon Lake Nutrient TMDL Task Force

Dear Ms. Joy:

The Lake Elsinore and San Jacinto Watershed Authority (LESJWA) is pleased to submit the attached FINAL Lake Elsinore and Canyon Lake Nutrient Total Maximum Daily Load (TMDL) Annual Water Quality Monitoring Report July 2023 – June 2024 on behalf of the Lake Elsinore and Canyon Lake Nutrient TMDL Task Force (LECL Task Force). This Final Report addresses all comments to the Draft Report (submitted on August 15, 2024) to address the following permit/order/waiver requirements, as applicable.

In 2004, the Water Quality Control Plan for the Santa Ana Region was amended to include Nutrient TMDLs and Compliance Dates for Lake Elsinore and Canyon Lake for Total Phosphorus (TP) and Total Nitrogen (TN). The Nutrient TMDLs include the submittal of an annual report of data collected pursuant to an approved Lake Elsinore & Canyon Lake TMDL Monitoring Plan by August 15, 2024, of each year.

Since adoption of the 2004 Nutrient TMDLs, the Santa Ana Water Board (and the State Water Resources Control Board as appropriate) has incorporated TMDL requirements into permits, general orders, and conditional waivers for various watershed sources of TP and TN. The permits, general orders, and waivers have similar but not always identical requirements with respect to Nutrient TMDL implementation and reporting. However, the permits, general orders, and waivers all commonly allow permittees the option of meeting certain requirements through participation in the LECL Task Force, which in turn prepares and submits reports and information on behalf of the LECL Task Force members for permit/order/waiver compliance.

The submittal of the DRAFT Lake Elsinore and Canyon Lake Nutrient TMDL Annual Water Quality Monitoring Report July 2023 – June 2024 on August 15th met certain permit/order/waiver requirements. Specifically, the Comprehensive Nutrient Reduction Plan (CNRP) that is incorporated into the National Pollutant Discharge Elimination System (NPDES) permit for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the Incorporated Cities of Riverside County within the Santa Ana Region (Riverside MS4 Permit) includes as a CNRP Implementation Plan milestone submittal of a draft annual monitoring report by August 15th each year (Attachment A, Table A-1., page A-5). The MS4 agencies, subject to the Riverside MS4 Permit, will provide appropriate certification statements under a separate

cover to the Santa Ana Water Board staff with the final report to ensure compliance with applicable standard provisions.

The LECL Task Force members currently include the following: Riverside County, City of Beaumont, City of Canyon Lake, City of Hemet, City of Lake Elsinore, City of Moreno Valley, City of Murrieta, City of Menifee, City of San Jacinto, City of Riverside, City of Perris, City of Wildomar, Caltrans, California Department of Fish and Wildlife, Elsinore Valley Municipal Water District, March Air Force Reserve Joint Powers Authority, U.S. Air Force March Air Force Base, Eastern Municipal Water District, San Jacinto Agricultural Operators and San Jacinto Dairy and CAFO Operators that are members of the Western Riverside County Agriculture Coalition (WRCAC). The United States Forest Service was a member previously but withdrew from the LECL Task Force in 2012. As consistent with past practices, WRCAC works directly with, and will continue to work with, appropriate Santa Ana Water Board staff to inform staff regarding dairy and agricultural operators that are done on their behalf.

Thank you for your consideration. If you have any questions or concerns regarding this report, please contact me at 951-354-4242.

Respectfully submitted,

1600

Rachel M. Gray LECL TMDL Task Force Administrator

- Enc: Final Annual Water Quality Monitoring Report July 2023 June 2024, Lake Elsinore and Canyon Lake Nutrient TMDL
- C: Jagroop Khela / Santa Ana Regional Water Quality Control Board Terri Reeder / Santa Ana Regional Water Quality Control Board Lauren Briggs / Santa Ana Regional Water Quality Control Board Adam Fischer / Santa Ana Regional Water Quality Control Board

Lake Elsinore and Canyon Lake Watersheds Nutrient TMDL Monitoring 2023-2024 Annual Report - FINAL



Prepared for: Lake Elsinore & San Jacinto Watersheds Project Authority 11615 Sterling Avenue Riverside, California 92503

> Prepared by: WSP USA Environment & Infrastructure 9177 Sky Park Court San Diego, CA 92123

> > November 20, 2024



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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µS/cm	microSiemens per centimeter
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin
CCC	criterion continuous concentration
cf	cubic feet
cfs	cubic feet per second
СМС	criterion maximum concentration
DI	Depth-integrated
DO	dissolved oxygen
EMC	event mean concentration
Ері	epilimnion
EVMWD	Elsinore Valley Municipal Water District
Forest Service	San Bernardino Nation Forest Service
FY	fiscal year
Нуро	hypolimnion
J	concentration between MDL and RL
kg	kilogram
LĂ	load allocation
LESJWA	Lake Elsinore and San Jacinto Watersheds Authority
MDL	Method detection limit
Mgal	million gallons of water
mg/L	milligrams per liter
NA	not applicable
ND	non-detect
NM:LE	not measured lab error
NPDES	National Pollutant Discharge Elimination System
NS	not sampled
NWS	National Weather Service
QAPP	Quality Assurance Project Plan
RCFC&WCD	Riverside County Flood Control and Water Conservation District
RL	Reporting limit
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SAWPA	Santa Ana Watershed Project Authority
SM	Standard Method
Surf	Surface sample (0-2 meter composite)
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TMDL Task Force	Lake Elsinore and Canyon Lake TMDL Task Force
US EPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
WLA	waste load allocation

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1.0 Introduction

The following document summarizes results of compliance monitoring required in support of the Lake Elsinore and Canyon Lake Nutrient Total Maximum Daily Load (TMDL) for the 2023-2024 fiscal year (FY). The monitoring was performed according to the Lake Elsinore & Canyon Lake Nutrient TMDL Monitoring Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, September 2016), and the associated Compliance Monitoring Work Plan (Haley & Aldrich, Inc., July 2016).

1.1 Background

Lake Elsinore is the largest natural freshwater lake in southern California that provides a variety of habitats for terrestrial and aquatic species. While a natural lake, the lake does have a history of drying during extended drought periods, and then being refilled through large storm events over one or more years. To help maintain its water level during periods when the lake would potentially go dry, Elsinore Valey Municipal Water District (EVMWD) discharges approximately 6.0 million gallons per day (MDG) of treated, recycled water into Lake Elsinore. The beneficial uses of the lake include water contact recreation (REC1), non-water contact recreation (REC2), commercial and sportfishing (COMM), warm freshwater habitat (WARM), wildlife habitat (WILD), and rare, threatened or endangered species (RARE)¹. While being a natural lake, it is not in its historically natural condition, as the lake has been modified in various ways to enhance its recreational use and aquatic habitat, including creation of a levee at the lake's south end to increase the water depth/reduce evaporation, and being supplemented with recycled water from EVMWD. Canyon Lake was constructed in 1928 as the Railroad Canyon Reservoir. It is located approximately two miles upstream of Lake Elsinore and water spilled from Canyon Lake is a main source of water for Lake Elsinore during wet years. The beneficial uses of Canyon Lake include municipal and domestic water supply (MUN), agricultural supply (AGR), groundwater recharge (GWR), body contact recreation (REC1), non-body contact recreation (REC2), commercial and sportfishing (COMM), warm freshwater aquatic habitat (WARM), and wildlife habitat (WILD). The beneficial uses of COMM and RARE in Lake Elsinore and COMM in Canyon Lake were approved by the California Regional Water Quality Control Board, Santa Ana Region (RWQCB) as an amendment to the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) under resolution R8-2017-0019 on June 16, 2017, and became effective on October 15, 2018 after being approved by US EPA.

Lake Elsinore and Canyon Lake were first listed by the RWQCB on its Clean Water Act Section 303(d) list of impaired waterbodies in 1994 and 1998, respectively. Both lakes remain on the latest approved 303(d) list, Res. No. 2022-0006. Current impairments identified for these waters included excessive levels of nutrients in both lakes, as well as organic enrichment/low dissolved oxygen (DO), sedimentation/siltation, unknown causes of toxicity, and PCBs/DDTs in Lake Elsinore. The Clean Water Act Section 303(d) requires the development and implementation of a TMDL for waters that do not or are not expected to meet water quality standards (beneficial uses, water quality objectives). In 2000, the RWQCB initiated the development of TMDLs for nutrients for Lake Elsinore and Canyon Lake.

¹ Based on federally listed Riverside fairy shrimp (*Streptocephalus woottoni*) in adjacent wetlands.

In December 2004, the RWQCB adopted amendments to the Basin Plan to incorporate TMDLs for nutrients in Canyon Lake and Lake Elsinore. The amendments were subsequently approved by US EPA on September 30, 2005. The Basin Plan Amendment specifies, among other things, monitoring recommendations to measure progress towards attainment of TMDL thresholds and associated waste load allocations (WLAs) and monitoring to measure compliance towards in-lake numeric water quality targets. Numeric in-lake targets and watershed load allocations have been established and incorporated in the TMDL for nutrients (total nitrogen, phosphorus, and ammonia), DO, and chlorophyll-a (Tables 1-1 and 1-2); however, the ultimate compliance goal for beneficial uses in both lakes is to reduce eutrophication, which can negatively affect biological communities, result in fish kills, and impact recreational use. The recommendations outlined in RWQCB Resolution No. R8-2004-0037 required stakeholders to develop management plans and conduct long-term monitoring and implementation programs aimed at reducing nutrient loads to Lake Elsinore and Canyon Lake. Task 4 of the adopted Lake Elsinore and Canyon Lake TMDL Amendment required stakeholders to prepare and implement a Nutrient Monitoring Program. The program was to include the following:

- 1. A watershed-wide monitoring program to determine compliance with interim and/or final nitrogen and phosphorus loading; compliance with the nitrogen and phosphorus TMDL, and load allocations (LAs), including WLAs.
- 2. A Lake Elsinore in-lake nutrient monitoring program to determine compliance with interim and final nitrogen, phosphorus, chlorophyll-a, and DO numeric targets.
- 3. A Canyon Lake in-lake nutrient monitoring program to determine compliance with interim and final nitrogen, phosphorus, chlorophyll-a, and DO numeric targets.
- 4. A draft annual report summarizing the data collected for the year and evaluating compliance with the TMDL, due August 15 of each year.

Table 1-1. Final In-Lake Numeric Compliance Targets for the 2004 TMDLs (adapted fromTable 5-9n in the Basin Plan, Santa Ana Water Board 2016)

Indicator	Lake Elsinore	Canyon Lake
Total Phosphorus Concentration (Final)	Annual average no greater than 0.1 milligrams/liter (mg/L) to be attained no later than 2020	Annual average no greater than 0.1 mg/L to be attained no later than 2020
Total Nitrogen Concentration (Final)	Annual average no greater than 0.75 mg/L to be attained no later than 2020	Annual average no greater than 0.75 mg/L to be attained no later than 2020
Ammonia Nitrogen Concentration (Final)	Calculated concentrations to be attained no later than 2020 Acute: 1-hour average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the Criterion Maximum Concentration (CMC) (acute criteria), where $CMC = 0.411/(1+10^{7.204})H + 58.4/(1+10^{pH-7.204})$ Chronic: 30-day average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the Criterion Continuous Concentration (CCC) (chronic criteria), where $CCC = (0.0577/(1+10^{7.688-pH}) + 2.487/(1+10^{pH-7.688})) * min (2.85, 1.45*10^{0.028(25-T)})$	Calculated concentrations to be attained no later than 2020 Acute: 1-hour average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CMC (acute criteria), where $CMC = 0.411/(1+10^{7.204-pH}) +$ $58.4/(1+10^{pH-7.204})$ Chronic: 30-day average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CCC (chronic criteria), where $CCC = (0.0577/(1+10^{7.688-pH}) +$ $2.487/(1+10^{pH-7.688})) * min (2.85,$ $1.45*10^{0.028(25-T)}$
Chlorophyll- <i>a</i> Concentration (Final)	Summer average no greater than 25 micrograms/liter (µg/L); to be attained no later than 2020	Annual average no greater than 25 μg/L; to be attained no later than 2020
Dissolved Oxygen Concentration (Final)	No less than 5 mg/L 1 meter (m) above lake bottom; to be attained no later than 2020	Daily average in hypolimnion no less than 5 mg/L; to be attained no later than 2020

Table 1-2. Final Watershed Loading Numeric Load Allocations from the 2004 TMDL(adapted from Table 5-9p in the Basin Plan, Santa Ana Water Board 2016)

TMDL	Final Total Phosphorus TMDL (kg/yr) ^{a, b}	Final Total Nitrogen TMDL (kg/yr) ^{a, b}
Canyon Lake	8,691	37,735
Lake Elsinore	28,584	230,025

a - Final compliance to be achieved as soon as possible, but no later than December 31, 2020.

b - TMDL specified as 10-year running average. Sum all wasteload and allocation sources.

Since August 2001, the Lake Elsinore and San Jacinto Watersheds Authority (LESJWA) has been working with local stakeholders and the RWQCB to identify the source of nutrients impairing each lake and evaluate the impacts to water quality and beneficial uses incurred from nutrient sources.

At that time, LESJWA contracted with the State to serve as a neutral facilitator for the RWQCB to assist in formation of a TMDL workgroup and assist the workgroup in participating with the RWQCB in the development and definition of the TMDLs.

After adoption of the Lake Elsinore and Canyon Lake nutrient TMDLs on December 20, 2004, stakeholders named in the TMDLs began the process to create a formal cost sharing body, or Task Force, to implement several tasks included in the TMDLs.

In November 2006, stakeholders finalized an agreement to form the Lake Elsinore and Canyon Lake TMDL Task Force (hereafter "TMDL Task Force"). The TMDL Task Force consists of representatives from local cities, Riverside County, agriculture and dairy, and the regulatory community. At the request of the stakeholders and RWQCB, LESJWA (staffed by the Santa Ana Watershed Project Authority or "SAWPA") serves as administrator of the TMDL Task Force and oversees the TMDL implementation for Lake Elsinore and Canyon Lake.

LESJWA, in support of the TMDL Task Force, provided funding to meet the requirement of the TMDL by developing a single comprehensive watershed-wide nutrient Monitoring Plan. The Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan was approved by the RWQCB in March 2006, and subsequently implemented by the TMDL Task Force starting in April 2006 through October 2012. During this time frame, in-lake monitoring for both lakes was conducted through the EVMWD National Pollutant Discharge Elimination System (NPDES) compliance program (Order No. R8-2005-0003, NPDES No. CA8000027, Regional Water Reclamation Plant, Lake Elsinore, Riverside County). On October 26, 2012, the RWQCB adopted a resolution (Resolution No. R8-2012-0052) granting the TMDL Task Force a temporary suspension of in-lake TMDL monitoring programs to achieve cost savings that were then applied to implementing lake improvement projects aimed at reducing nutrient impacts in Canyon Lake and Lake Elsinore. As a result, the Lake Elsinore and Canyon Lake Nutrient TMDL field compliance monitoring was not conducted during the 2013-2014 and 2014-2015 fiscal year (FY) cycles.

The in-lake and watershed-wide water quality monitoring for both lakes was resumed in July 2015 as Phase II of the Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Program moving forward. A revised Monitoring Work Plan (Haley & Aldrich 2016) and companion Quality Assurance Project Plan (Amec Foster Wheeler 2016) were prepared and approved by the RWQCB in October 2016.

1.2 Nutrient TMDL Compliance Monitoring Objectives

The primary objectives of the Nutrient TMDL Compliance Monitoring Program are to:

1. Determine in-lake concentrations of causal (total nitrogen and total phosphorus) and response (total ammonia, dissolved oxygen, and chlorophyll-a) targets outlined in the adopted 2004 Lake Elsinore and Canyon Lake Nutrient TMDL through regular monitoring of both lakes.

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- 2. Evaluate trends in causal and response parameter concentrations toward achieving 2004 TMDL numeric targets.
- 3. Quantify the external pollutant loading originating from the watershed above the lakes through stormwater monitoring of the major upstream inputs to Canyon Lake.
- 4. Determine the total nutrient loads into Lake Elsinore and Canyon Lake from their tributaries (i.e., San Jacinto River and Salt Creek).
- 5. Provide water quality data from both in-lake and watershed monitoring to update loading model.

Additionally, the data generated by this monitoring program will help support the needs of other programs by tracking the trends in watershed loading and in-lake concentrations relative to BMPs or any other actions taken in the upstream watershed to reduce nutrient loads.

2.0 San Jacinto River Watershed-Wide Monitoring

Watershed monitoring and reporting was performed by NV5 of San Diego, California.

2.1 Summary of 2023-2024 Wet Weather Watershed Monitoring and Nutrient Loads

A summary of the measured concentrations and estimated annual nutrient loads derived from each of the three monitored locations for the period of July 1, 2023 through June 30, 2024, is presented in **Table 2-1**. A more detailed account, including storm hydrographs and event loads are presented in the following sections for each monitoring location.

Number and Location	Total Annual	al Annual Concentration (mg/L)		Estimated Anr	nnual Load (kg)	
Description	Flow ^a (Mgal)	Total Nitrogen	Total Phosphorus	Total Nitrogen	Total Phosphorus	
Site 3 - Salt Creek at Murrieta Road (USGS 11070465)	1,663	2.10	0.42	13,312	2,668	
Site 4 - San Jacinto River at Goetz Road (USGS 11070365)	5,137	1.37	0.38	26,684	7,371	
Site 6 - San Jacinto River at Ramona Expressway ^b	3	Not Measured ^b	Not Measured ^b	Not Measured ^b	Not Measured ^b	
Site 30 - Canyon Lake Spillway (USGS 11070500)	6,274	1.15	0.15	27,399	3,459	
Site 1 - San Jacinto River at Cranston Guard Station	3,241	Not Measured ^c	Not Measured ^c	Not Measured ^c	Not Measured ^c	

Table 2-1. Summary of 2023-2024 Monitoring

Note:

When a concentration was non-detect, the annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

a - Flow data after 03/06/2024 are provisional and may be subject to change.

b - Mystic Lake did not overflow during the wet weather monitoring period from October 1, 2023, to May 31, 2024. Therefore, no samples were collected from the sampling station at San Jacinto River at Ramona Expressway (Station ID 741) during the 2023-2024 monitoring year.

c -The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, runoff from other local tributaries into Lake Elsinore are not included in this table. Mgal = million gallons; 1 million gallons = 133,680 cubic feet = 3,785,412 L; mg/L = milligrams per liter; kg = kilograms; USGS = United States Geological Survey.

2.2 Historical Wet Weather Watershed Monitoring and Incoming Nutrient Loads

A summary of the historical total nitrogen and total phosphorus water quality monitoring data for the period of July 1, 2014 through June 30, 2024, is presented in **Tables 2-2** to **2-3**. **Table 2-4** presents the 10-year running average of incoming total nitrogen and total phosphorus loads for both lakes in comparison to their TMDL load allocations. In general, the monitoring locations only

flow during storm events and the storm flows account for the estimated annual load of nutrients. Lake Elsinore meets the current 10-year running average TMDL load allocations for both total nitrogen and total phosphorus, Canyon Lake meets TMDL load allocation for total nitrogen and exceeds the TMDL allocation for total phosphorus (**Table 2-4**). The 10-year running average loading for Lake Elsinore was calculated from samples collected at the Canyon Lake Spillway station. These samples represent the catchment area upstream of the Canyon Lake Spillway and correspond to 93.6% of the total area contributing runoff to Lake Elsinore. The remaining 6.4% of the Lake Elsinore catchment is in the immediate area surrounding Lake Elsinore.

Monitoring	Site 3 - Salt Creek at Murrieta Road		Site 4 - Sa River at G	an Jacinto oetz Road	Site 30 - Canyon Lake Spillway	
Year	TN (mg/L)	TP (mg/L)	TN (mg/L)	TP (mg/L)	TN (mg/L)	TP (mg/L)
2014-2015	2.2	0.5	1.8	0.4	NS	NS
2015-2016	2.5	0.5	2.4	1.4	NS	NS
2016-2017	2.1	0.6	2	1.2	1.9	0.4
2017-2018	2.7	0.4	2	0.4	NS	NS
2018-2019	2.4	0.4	1.7	0.6	1.4	0.2
2019-2020	2.4	0.6	1.8	0.7	1.1	0.16
2020-2021	1.9	0.4	1.9	0.5	1.7	0.05
2021-2022	2.7	0.5	2.4	0.6	1.5	ND(<0.003) ^a
2022-2023	2.7	0.5	2.4	0.6	1.5	ND(<0.003) ^a
2023-2024	2.1	0.4	1.4	0.4	1.2	0.15

Table 2-2. Summary of Historical Annual Mean Storm Concentrations Based on Monitoring Year

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).

NS – Not sampled when Canyon Lake does not overtop the Canyon Lake Spillway. The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, runoff from other local tributaries into Lake Elsinore are not included in this table.

a - When a concentration was non-detect, the annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

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Monitoring Year	Site 3 - Salt Creek at Murrieta Road			Site 4 - San Jacinto River at Goetz Road			Site 30 - Canyon Lake Spillway		
	Flow (Mgal)	TN (kg)	TP (kg)	Flow (Mgal)	TN (kg)	TP (kg)	Flow (Mgal)	TN (kg)	TP (kg)
2014-2015ª	908	8721	2610	831	5711	1634	316	NS	NS
2015-2016	515	5,647	1,447	872	7,926	4,624	476	NS	NS
2016-2017	1,596	12,366	4,026	2,802	21,651	14,403	4,850	33,759	6,637
2017-2018	271	2,586	482	393	3,055	810	117	NS	NS
2018-2019	1,394	12,213	2,266	3,208	20,457	7,409	5,893	32,832	5,416
2019-2020	1,645	14,792	3,705	3,290	23,337	8,660	4,497	18,762	2,635
2020-2021	255	1,902	396	519	3,794	992	878	5,626	175
2021-2022	351	3,698	625	537	4,976	1,282	640	3,632	0 ^b
2022-2023	1,240	8,576	1,533	2,821	17,132	4,388	4,037	19,391	1,231
2023-2024	1,663	13,312	2,668	5,137	26,684	7,371	6,274	27,399	3,459

Table 2-3. Summary of Historical Estimated Annual Loads Based on Monitoring Year

NS – Not sampled when Canyon Lake does not overtop the Canyon Lake Spillway. The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, runoff from other local tributaries into Lake Elsinore are not included in this table.

a - Sum of January 1, 2014 to June 30, 2015. All other monitoring year dates are July 1 to June 30.

b - When a concentration was non-detect, the annual load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

Table 2-4. Historical Estimated Annual Loads as a 10-Year Running Average Relative to the 2004 TMDL Wasteload and Load Allocations

Lake	Analyte	10-yr Running Average (kg/yr) ª	TMDL Load Allocation (kg/yr)	% of TMDL Load Allocation
Lake Elsinore ^b	Total Nitrogen	11,736	29,953	39.2%
Lake Elsinores	Total Phosphorus	1,651	6,922	23.9%
	Total Nitrogen	18,490	21,902	84.4%
Canyon Lake ^c		6,292	0.707	196.6%
	Total Phosphorus	-2,002 credit for alum application = 4,290	3,797	113.0%

a - Sum of average 10-year annual loads for the monitoring period January 2014 – December 2023

b – Load allocations taken from Resolution R8-2004-0037 (2004 TMDL) Table 5-9r categorized as Canyon Lake Overflows. Watershed loading estimates for Lake Elsinore were taken from data collected at the Canyon Lake Spillway when it overflows. Internal sediment and atmospheric deposition allocations (Table 5-9r) were subtracted from the total of all allocation sources for both TN and TP to provide a more valid comparison to incoming watershed loads.

c – Load allocations taken from Resolution R8-2004-0037 (2004 TMDL) Table 5-9q. Internal sediment, atmospheric deposition, and supplemental water allocations (Table 5-9q) were subtracted from the total of all allocation sources for both TN and TP to provide a more valid comparison to incoming watershed loads.

2.3 Monitoring Strategy

Phase II of the San Jacinto River Watershed Monitoring Program follows the guidelines detailed in the Lake Elsinore and Canyon Lake Nutrient TMDL Compliance Monitoring Plan. The Phase II San Jacinto River Watershed Monitoring Program sampling activities during the 2023-2024 monitoring period included collection of samples during up to three storm events at the designated monitoring stations throughout the San Jacinto River Watershed. Average nutrient concentrations during the monitored events were used to calculate mass loading during remaining wet weather events that were not monitored to derive total estimated annual mass loads throughout the monitoring year.

2.4 Monitoring Stations and Stream Gauge Locations

To monitor TMDL compliance, five sampling stations were carefully selected to reflect various types of land uses within the San Jacinto River Watershed. Sampling of these locations began in 2006. Sampling station locations were deliberately set up to be within the vicinity of United States Geological Survey (USGS) stream gauge stations. The sampling stations are listed in **Table 2-5** below and shown on **Figure 2-1**.

Three of the five sites (Station IDs 745, 759, and 741) were selected because they are indicative of inputs to Canyon Lake originating from the main stem of the San Jacinto River, Salt Creek, and the watershed above Mystic Lake. The sampling location along the San Jacinto River at Ramona Expressway (Station 741) is located downgradient of Mystic Lake and is only sampled if Mystic Lake is overflowing. Flow has not been observed at this location since a strong El Niño event in the mid-1990s. Because Mystic Lake is an area of active land subsidence, this monitoring station is not expected to flow except under extremely high rainfall conditions.

Station ID	USGS Station ID	Agency	Site Number and Location Description
745	11070465	USGS	Site 3 - Salt Creek at Murrieta Road
759	11070365	USGS	Site 4 - San Jacinto River at Goetz Road
741	11070210	USGS	Site 6 - San Jacinto River at Ramona Expressway
841	11070500	USGS	Site 30 - Canyon Lake Spillway
792 ^a	11069500	USGS	Site 1 - San Jacinto River at Cranston Guard Station

Table 2-5. San Jacinto River Watershed	Monitoring Stations
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a - The Cranston Guard Station (Station 792) was monitored between 2007 and 2011 by the San Bernardino National Forest Service in accordance with their agreement for in-lieu obligations to the Task Force. In 2012, the Forest Service pulled out of the Task Force and no longer provides monitoring support.

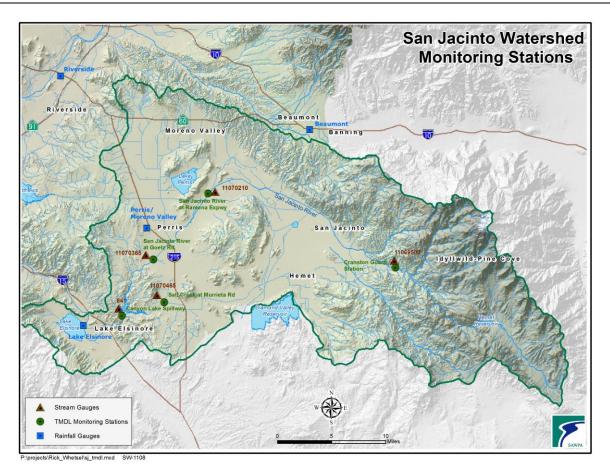


Figure 2-1. San Jacinto River Watershed Monitoring Stations

The fourth site, located below the Canyon Lake Dam (Station ID 841), is indicative of loads entering Lake Elsinore from Canyon Lake and the upstream watershed when the water level overtops the Railroad Canyon Dam Spillway. This site only represents a portion of the total load into Lake Elsinore from upstream of Canyon Lake Dam and does not include runoff from the local watershed. The Railroad Canyon Dam Spillway elevation at Canyon Lake is 1,381.76 feet. Samples are collected from this location during storm events that create lake levels that overtop the dam spillway elevation. The Canyon Lake level is publicly available at the following website:

https://www.evmwd.com/who-we-are/lake-levels

The fifth site at the Cranston Guard Station site on the San Jacinto River (Station 792) was only monitored between 2007 and 2011 by the San Bernardino National Forest Service who no longer provides monitoring support.

2.5 Stream Gauge Records

The USGS monitor stream flow from several gauging stations in the San Jacinto River Watershed. Stream gauging stations maintained and operated for Phase II of the San Jacinto River Watershed Monitoring Program are shown in **Figure 2-1** and identified in **Table 2-5**.

The data record captured per USGS stream gauge is publicly available at the USGS website, where data for the specific gauge numbers provided in **Table 2-6** can be found:

http://waterdata.usgs.gov/ca/nwis/current/?type=flow

A summary of the stream gauge data recorded at each of the stations with measured flow for the monitoring period of July 1, 2023 through June 30, 2024 is presented in **Table 2-6** and visually presented in **Figure 2-2** through **Figure 2-6**. The total monthly flows at each of the USGS stations are reported in **Table 2-6**. In general, the flows are only observed during wet weather storm events and dry weather flows are not observed from each of the USGS stations. The flow data are downloaded from the USGS website and are considered provisional for approximately six months; therefore, flow data presented after March 6, 2024, in this report are provisional. The provisional data provided by the USGS are subject to change and are not citable until reviewed and approved by the USGS.

July 2023-June 2024 Total Monthly Flow (cf)	Site 3 - Salt Creek at Murrieta Road (11070465 ^b) (cf)	Site 4 - San Jacinto River at Goetz Road (11070365 ^b) (cf)	Site 6 - San Jacinto River at Ramona Expressway ^a (11070210 ^b) (cf)	Site 30 - Canyon Lake Spillway (11070500 ^b) (cf)	Site 1 - San Jacinto River at Cranston Guard Station (11069500 ^b) (cf)
July	0	0	0	83,844	2,120,058
August	28,179,828	90,681,606	0	76,518,378	21,019,221
September	0	9,162	0	1,161,324	1,164,555
October	0	0	0	1,019,637	627,894
November	1,948,149	1,405,350	0	13,437,459	1,893,546
December	3,357,414	17,988,030	0	6,760,854	3,269,205
January	25,196,805	55,195,920	0	100,205,883	12,714,048
February	105,898,302	375,588,396	368,460	437,831,973	98,437,212
March	38,860,065	94,857,039	0	106,689,825	119,033,640
April	17,419,698	42,096,204	0	85,343,949	124,772,760
May	0	7,801,866	0	8,469,189	46,446,201
June	1,487,394	1,136,862	0	1,191,519	1,770,138
Mean Annual Flow Volume (cf)	222,347,655	686,760,435	368,460	838,713,834	433,268,478

Table 2-6. Summary of Stream Gauge Data (July 2023 through June 2024)

Notes:

a - No flows originating from the upper watershed were observed at the TMDL monitoring location just downstream of Mystic Lake. b - USGS gauge number

cf = cubic feet

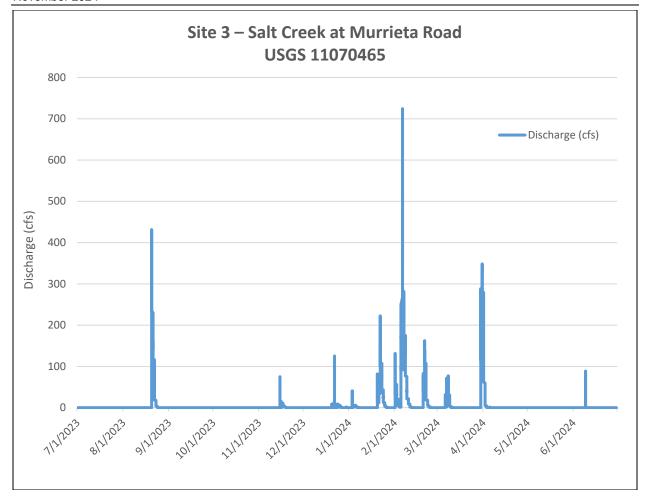


Figure 2-2. Site 3 – Salt Creek at Murrieta Road – Daily Stream Gauge Records

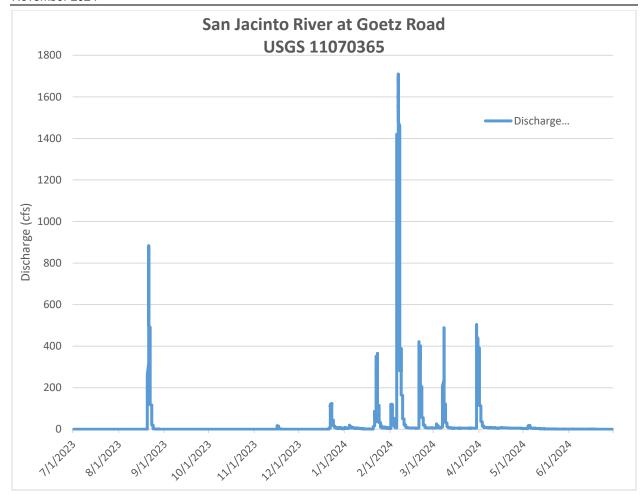


Figure 2-3. Site 4 – San Jacinto River at Goetz Road – Daily Stream Gauge Records

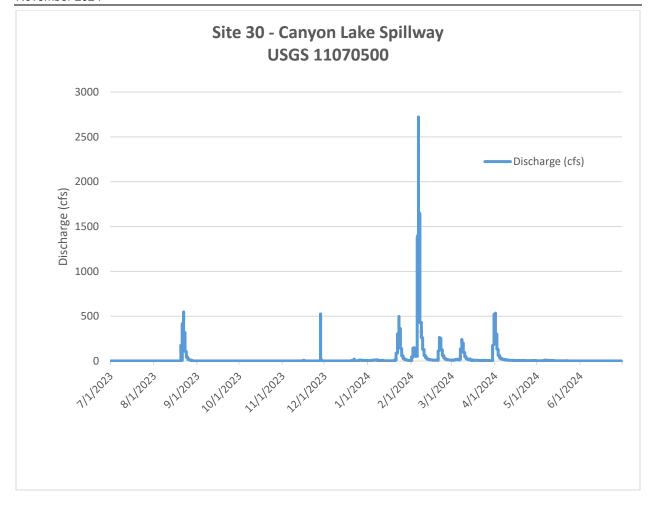


Figure 2-4. Site 30 – Canyon Lake Spillway – Daily Stream Gauge Records

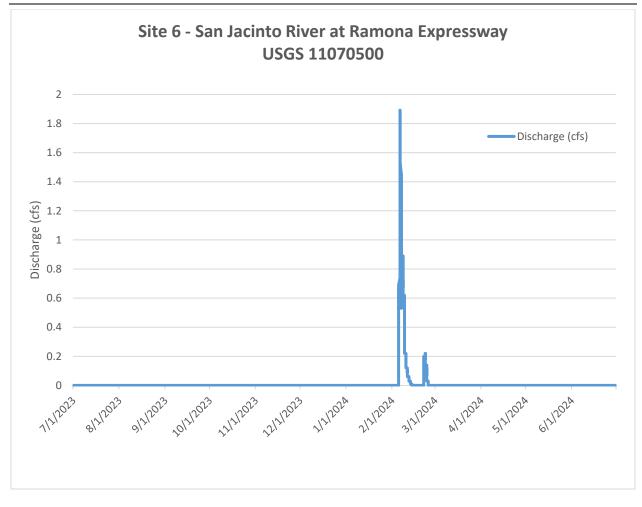


Figure 2-5. Site 6 – San Jacinto River at Ramona Expressway – Daily Stream Gauge Records

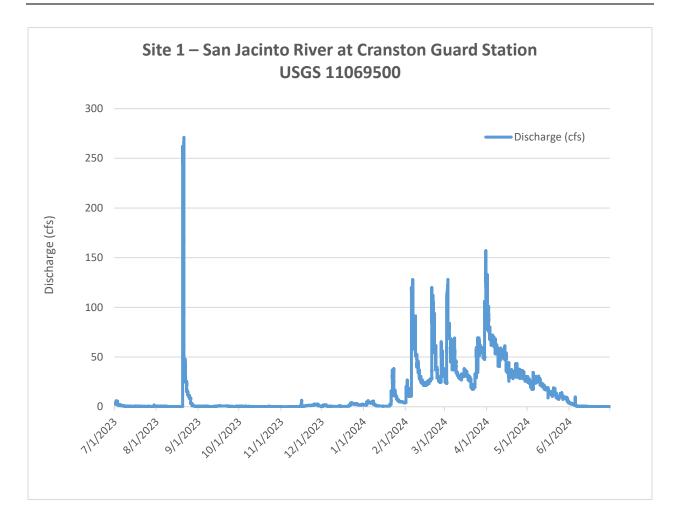


Figure 2-6. Site 1 – San Jacinto River at Cranston Guard Station – Daily Stream Gauge Records

2.6 Sampling Strategy

Phase II of the San Jacinto River Watershed Monitoring Program includes collecting water quality samples during up to three storm events at the designated monitoring stations throughout the San Jacinto River Watershed. Throughout the wet weather monitoring period from October 1, 2023, to May 31, 2024, the National Weather Service (NWS) forecasts were monitored to determine when storm events met the mobilization criteria. The mobilization criteria for sampling requires an NWS quantitative precipitation forecast greater than a 1.0-inch forecast within 24 hours from October 1 through December 31, and greater than an 0.5-inch forecast within 24 hours from January 1 through May 31.

Flow-weighted composite samples were collected during the storm events at the designated monitoring stations. Discrete time-weighted sample aliquots were collected over the rising limb (increasing flow) and the falling limb (decreasing flow) of the hydrograph using automatic sampling equipment (e.g., ISCO autosamplers). The first sample aliquot was taken at or shortly

after the time that storm water runoff began, and each subsequent aliquot of equal volume was collected at intervals of approximately 2 hours across the hydrograph, depending on the forecasted size of the storm event. Flow rates and volumes were based on data from USGS stream gauges located near the sampling stations. Upon completion of sampling, field teams downloaded the USGS flow data and subsampled each time-weighted discrete sample to create a single flow-weighted composite sample for laboratory analysis.

The following protocols were applied:

- Sampling commenced once flow was established in the channel.
- Field measurements (temperature, pH, conductivity, dissolved oxygen, and turbidity) were recorded in the field during the rising limb of the hydrograph using portable calibrated YSI multi-parameter meters, or equivalent.
- Biochemical Oxygen Demand and Chemical Oxygen Demand were analyzed for the first discrete grab sample only.

Sampling and analysis followed the guidelines detailed in the Lake Elsinore and Canyon Lake Nutrient TMDL Compliance Monitoring Plan (Haley & Aldrich, Inc., July 2016). More detail regarding the sampling approach (e.g., compositing, sample naming conventions) are described in the Lake Elsinore and Canyon Lake Nutrient TMDL Compliance QAPP (Amec Foster Wheeler, September 2016). These documents are available at the following website under the monitoring tab:

https://sawpa.gov/task-force/lake-elsinore-and-canyon-lake-tmdl-task-force/

Samples for all analytical chemistry measurements were submitted Weck Laboratories Inc. located in Industry, California.

2.7 San Jacinto River Watershed Monitoring Events

Water quality samples were collected during the three storm events that met the mobilization criteria during the wet weather monitoring period from October 1, 2023, to May 31, 2024.

The first monitoring event occurred on January 20-26, 2024. Water quality samples were collected at Salt Creek at Murrieta Road (Station ID 745), San Jacinto River at Goetz Road (Station ID 759), and Canyon Lake Spillway (Station ID 841). A peak flow of 222 cfs was recorded at Salt Creek at Murrieta Road (Station ID 745), a peak flow of 364 cfs was recorded at San Jacinto River at Goetz Road (Station ID 759), and a peak flow of 495 cfs was recorded at Canyon Lake Spillway (Station ID 841). No flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 1.26 to 1.98 inches of rainfall was recorded in the region during this storm (RCFCWCD 2024).

The second monitoring event occurred on February 1-4, 2024. Water quality samples were collected at Salt Creek at Murrieta Road (Station ID 745), San Jacinto River at Goetz Road (Station ID 759), and Canyon Lake Spillway (Station ID 841). A peak flow of 131 cfs was recorded

at Salt Creek at Murrieta Road (Station ID 745), a peak flow of 120 cfs was recorded at San Jacinto River at Goetz Road (Station ID 759), and a peak flow of 147 cfs was recorded at Canyon Lake Spillway (Station ID 841). No flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 0.79 to 1.03 inches of rainfall was recorded in the region during this storm (RCFCWCD 2024).

The third monitoring event occurred on February 20-24, 2024. Water quality samples were collected at Salt Creek at Murrieta Road (Station ID 745), San Jacinto River at Goetz Road (Station ID 759), and Canyon Lake Spillway (Station ID 841). A peak flow of 162 cfs was recorded at Salt Creek at Murrieta Road (Station ID 745), a peak flow of 421 cfs was recorded at San Jacinto River at Goetz Road (Station ID 759), and a peak flow of 260 cfs was recorded at Canyon Lake Spillway (Station ID 759), and a peak flow of 260 cfs was recorded at Canyon Lake Spillway (Station ID 841). No flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 0.69 to 2.32 inches of rainfall was recorded in the region during this storm (RCFCWCD 2024).

Mass loads for each chemical constituent at each location were calculated as the product of the event mean concentrations and the storm volumes for each storm event. The annual loads were calculated as the sum of the monitored event loads and the storm events where no sampling occurred, which are the product of the storm volumes for the storm events not monitored and the annual mean concentrations.

2.8 San Jacinto River Watershed Annual Water Quality Summary

A summary of watershed water quality monitoring data for each of the four monitoring locations for the monitoring period of July 1, 2023, through June 30, 2024, is presented below. The complete set of analytical laboratory report results is included in **Appendix A**. Included with each summary of the monitoring data are the concentrations for each analyte. Also included are the estimated storm event loads and annual loads for each analyte.

2.8.1 Summary of Monitoring Data – Salt Creek at Murrieta Road

Water quality samples were collected during three storm events at Salt Creek at Murrieta Road (Station ID 745) during the wet weather monitoring period from October 1, 2023, to May 31, 2024.

During the storm event on January 20-26, 2024, a total of 57 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070465), flow for the storm event was estimated at 547 acre-feet or 178 million gallons (Mgal), which represents approximately 10.7% of the total annual flow.

During the storm event on February 1-4, 2024, a total of 21 discrete time-weighted samples were collected across the hydrograph at four-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070465), flow for the storm event was estimated at 181 acre-feet or 59 Mgal, which represents approximately 3.5% of the total annual flow.

During the storm event on February 20-24, 2024, a total of 36 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070465), flow for the storm event was estimated at 453 acre-feet or 147 Mgal, which represents approximately 8.9% of the total annual flow.

Photos taken during the storm events are provided in Figure 2-7 through Figure 2-9.



Figure 2-7. Storm Event at Salt Creek at Murrieta Road (January 20-26, 2024)



Figure 2-8. Storm Event at Salt Creek at Murrieta Road (February 1-4, 2024)²



Figure 2-9. Storm Event at Salt Creek at Murrieta Road (February 20-24, 2024)

² Photo from February 2024 was not available, image is a representative photo from 2022.

Event and annual mean concentrations for each analyte are presented in **Table 2-7**. Event and annual loads for each analyte are presented in **Table 2-8**. Concentrations for nutrients for the three storm events ranged from 1.9 to 2.3 milligrams per liter (mg/L) for total nitrogen, and 0.41 to 0.44 mg/L for total phosphorus (**Table 2-7**). Based on flow data provided by the nearby USGS stream gauge (Station ID 11070465), the total annual flow was estimated at 222,347,655 cubic feet (cf) or 1,663 Mgal for the period of July 1, 2023, through June 30, 2024. The estimated annual nutrient load was calculated to be 13,312 kg for total nitrogen and 2,668 kg for total phosphorus (**Table 2-8**) for the period of July 1, 2023 through June 30, 2024.

Analyte	Units	Event 1	Event 2	Event 3	Annual Mean	Annual Geomean
Ammonia-Nitrogen	mg/L	0.071(J)	0.17	0.15	0.13	0.12
Chemical Oxygen Demand	mg/L	29	21	24	24.7	24.5
Kjeldahl Nitrogen	mg/L	1.8	1.3	1.2	1.43	1.41
Nitrate as N	mg/L	0.49	0.57	0.83	0.63	0.61
Nitrite as N	mg/L	ND(<0.042) ^a	48(J)	50(J)	49.0 ^b	49.0 ^b
Organic Nitrogen	mg/L	1.7	1.1	1.1	1.30	1.27
Total Nitrogen	mg/L	2.3	1.9	2.1	2.10	2.09
Total Phosphorus	mg/L	0.44	0.42	0.41	0.42	0.42
Ortho Phosphate Phosphorus	mg/L	0.26	0.3	0.3	0.29	0.29
Total Dissolved Solids	mg/L	430	310	410	383	379
Total Hardness	mg/L	156	140	173	156	156
Total Suspended Solids	mg/L	70	59	39	56.0	54.4

Table 2-7. Water Quality Concentrations at Salt Creek at Murrieta Road

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).

J- Reported value was detected above the MDL, but below the RL.

a - When the result was ND the detection limit is shown in parenthesis.

b –The annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

Analyte	Units	Load Event 1	Load Event 2	Load Event 3	Annual Load	
Ammonia-Nitrogen	kg	48	38	84	800	
Chemical Oxygen Demand	kg	19,577	4,682	13,430	157,041	
Kjeldahl Nitrogen	kg	1,215	290	671	9,112	
Nitrate as N	kg	331	127	464	3,971	
Nitrite as N	kg	0 ^a	10,701	27,979	275,772	
Organic Nitrogen	kg	1,148	245	616	8,299	
Total Nitrogen	kg	1,553	424	1,175	13,312	
Total Phosphorus	kg	297	94	229	2,668	
Ortho Phosphate Phosphorus	kg	176	67	168	1,797	
Total Dissolved Solids	kg	290,275	69,109	229,428	2,443,614	
Total Hardness	kg	105,309	31,210	96,807	989,764	
Total Suspended Solids	kg	47,254	13,153	21,824	353,193	

Table 2-8. Water Quality Event and Annual Loads at Salt Creek at Murrieta Road

a - When a concentration was non-detect, the load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

Hydrographs with the discrete time-weighted sample aliquot times are provided in **Figure 2-10** through **Figure 2-12**. The figures were developed based on flow data provided by the nearby USGS stream gauge (Station ID 11070465).

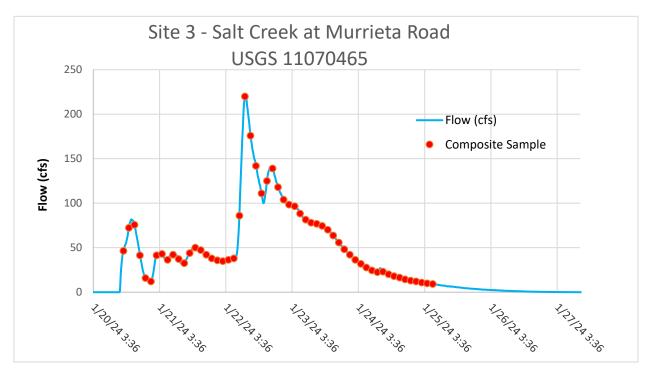


Figure 2-10. Hydrograph of First Storm Event at Salt Creek at Murrieta Road (January 20-26, 2024)

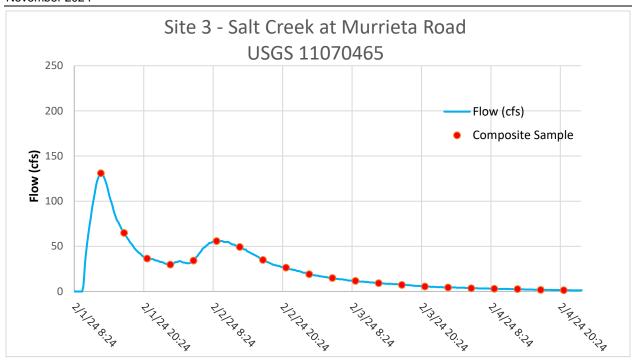


Figure 2-11. Hydrograph of Second Storm Event at Salt Creek at Murrieta Road (February 1-4, 2024)

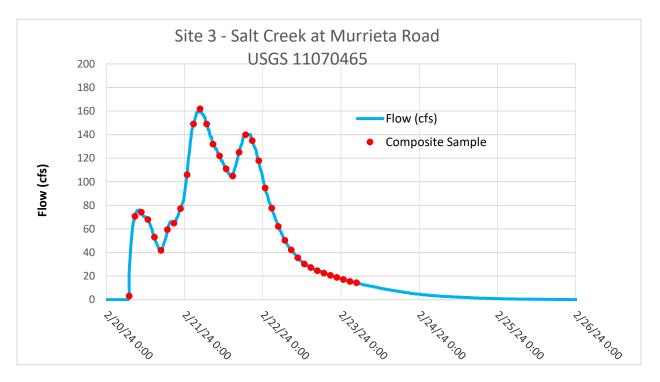


Figure 2-12. Hydrograph of Third Storm Event at Salt Creek at Murrieta Road (February 20-24, 2024)

2.8.2 Summary of Monitoring Data – San Jacinto River at Goetz Road

Water quality samples were collected during three storm events at San Jacinto River at Goetz Road (Station ID 759) during the wet weather monitoring period from October 1, 2023, to May 31, 2024.

During the storm event on January 20-26, 2024 a total of 57 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070365), flow for the storm event was estimated at 1,034 acre-feet or 337 Mgal, which represents approximately 6.5% of the total annual flow.

During the storm event on February 1-4, 2024, a total of 24 discrete time-weighted samples were collected across the hydrograph at four-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070365), flow for the storm event was estimated at 299 acre-feet or 98 Mgal, which represents approximately 1.9% of the total annual flow.

During the storm event on February 20-24, 2024, a total of 41 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070365), flow for the storm event was estimated at 1,315 acre-feet or 429 Mgal, which represents approximately 8.3% of the total annual flow.

Photos taken during the storm events are provided in Figure 2-13 through Figure 2-15.



Figure 2-13. Storm Event at San Jacinto River at Goetz Road (January 20-26. 2024)

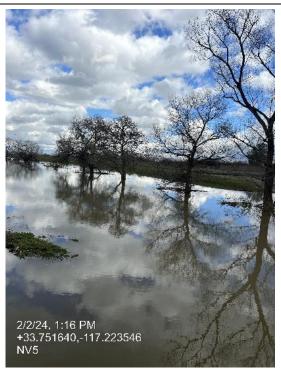


Figure 2-14. Storm Event at San Jacinto River at Goetz Road (February 1-4, 2024)



Figure 2-15. Storm Event at San Jacinto River at Goetz Road (February 20-24, 2024)

Event and annual mean concentrations for each analyte are presented in **Table 2-9**. Event and annual loads for each analyte are presented in **Table 2-10**. Concentrations for nutrients for the three storm events ranged from 1.3 to 1.5 mg/L for total nitrogen, and 0.34 to 0.44 mg/L for total phosphorus (**Table 2-9**). Based on flow data provided by the nearby USGS stream gauge (Station

ID 11070365), the total annual flow was estimated at 686,760,435 cf or 5,137 Mgal for the period of July 1, 2023, through June 30, 2024. The estimated annual nutrient load was calculated to be 26,684 kg for total nitrogen and 7,371 kg for total phosphorus (**Error! Reference source not found. 2-10**) for the period of July 1, 2023 through June 30, 2024.

Analyte	Units	Event 1	Event 2	Event 3	Annual Mean	Annual Geomean
Ammonia-Nitrogen	mg/L	0.031(J)	0.08(J)	0.12	0.08	0.07
Chemical Oxygen Demand	mg/L	30	65	18	37.7	32.7
Kjeldahl Nitrogen	mg/L	0.75	0.75	0.68	0.73	0.73
Nitrate as N	mg/L	0.57	0.53	0.74	0.61	0.61
Nitrite as N	mg/L	ND<(0.042) ^a	ND<(0.042) ^a	63(J)	63.0 ^b	63.0 ^b
Organic Nitrogen	mg/L	0.72	0.67	0.56	0.65	0.65
Total Nitrogen	mg/L	1.3	1.3	1.5	1.37	1.36
Total Phosphorus	mg/L	0.34	0.35	0.44	0.38	0.37
Ortho Phosphate Phosphorus	mg/L	0.2	0.22	0.31	0.24	0.24
Total Dissolved Solids	mg/L	150	160	120	143	142
Total Hardness	mg/L	63.3	73.6	61.5	66.1	65.9
Total Suspended Solids	mg/L	53	45	39	45.7	45.3

Table 2-9. Water Quality Concentrations at San Jacinto River at Goetz Road

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).

J- Reported value was detected above the MDL, but below the RL.

a – When the result was ND the detection limit is shown in parenthesis.

b –The annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

Table 2-10. Water Quality Event and Annual Loads at San Jacinto River at Goetz Road

Analyte	Units	Load Event 1	Load Event 2	Load Event 3	Annual Load
Ammonia-Nitrogen	kg	40	30	195	1,510
Chemical Oxygen Demand	kg	38,293	23,992	29,207	700,891
Kjeldahl Nitrogen	kg	957	277	1,103	14,094
Nitrate as N	kg	728	196	1,201	12,047
Nitrite as N	kg	0 ^a	0 ^a	102,225	1,121,485
Organic Nitrogen	kg	919	247	909	12,591
Total Nitrogen	kg	1,659	480	2,434	26,684
Total Phosphorus	kg	434	129	714	7,371
Ortho Phosphate Phosphorus	kg	255	81	503	4,776
Total Dissolved Solids	kg	191,466	59,057	194,715	2,764,188
Total Hardness	kg	80,798	27,166	99,791	1,277,709
Total Suspended Solids	kg	67,651	16,610	63,282	886,372

a - When a concentration was non-detect, the load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

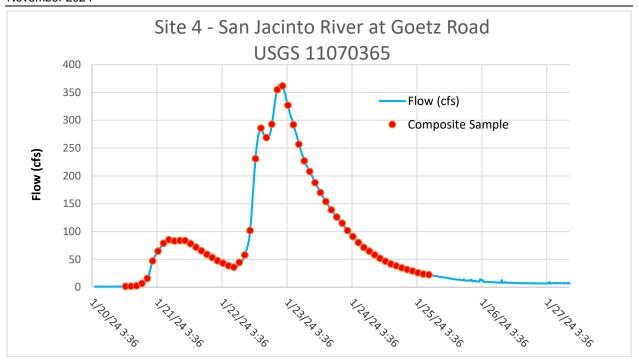


Figure 2-16. Hydrograph of First Storm Event at San Jacinto River at Goetz Road (January 20-26, 2024)



Figure 2-17. Hydrograph of Second Storm Event at San Jacinto River at Goetz Road (February 1-4, 2024)

Hydrographs with the discrete time-weighted sample aliquot times are provided in **Figure 2-16** through **Figure 2-18**. The figure was developed based on flow data provided by the nearby USGS stream gauge (Station ID 11070365).

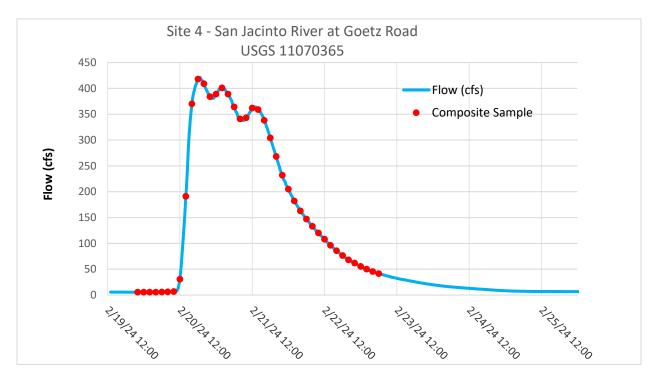


Figure 2-18. Hydrograph of Third Storm Event at San Jacinto River at Goetz Road (February 20-24, 2024)

2.8.3 Summary of Monitoring Data – San Jacinto River at Ramona Expressway

Mystic Lake did not overflow during the wet weather monitoring period from October 1, 2023, to May 31, 2024. Therefore, no samples were collected from the sampling station at San Jacinto River at Ramona Expressway (Station ID 741) during the 2023-2024 monitoring year. Flows from the local area and from overflow of the upstream levee structure were observed at the San Jacinto River at Ramona Expressway (Station ID 741) from February 5, 2024, through February 14, 2024, and from February 22, 2024, through February 25, 2024. However, these flows did not originate from Mystic Lake.

2.8.4 Summary of Monitoring Data – Canyon Lake Spillway

Water quality samples were collected during three storm events at Canyon Lake Spillway (Station ID 841) during the wet weather monitoring period from October 1, 2023, to May 31, 2024.

During the storm event on January 20-26, 2024, a total of 51 discrete time-weighted samples were collected across the hydrograph at two-hour intervals for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the

spillway) and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070500), flow for the storm event was estimated at 1,995 acre-feet or 650 Mgal, which represents approximately 10.3% of the total annual inflow to Lake Elsinore from Canyon Lake.

During the storm event on February 1-4, 2024, a total of 21 discrete time-weighted samples were collected across the hydrograph at four-hour intervals for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070500), flow for the storm event was estimated at 645 acre-feet or 210 Mgal, which represents approximately 3.4% of the total annual inflow to Lake Elsinore from Canyon Lake.

During the storm event on February 20-24, 2024, a total of 33 discrete time-weighted samples were collected across the hydrograph at two-hour intervals for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070500), flow for the storm event was estimated at 1,197 acre-feet or 390 Mgal, which represents approximately 6.2% of the total annual inflow to Lake Elsinore from Canyon Lake.

Note that this USGS stream gauge is located below the Canyon Lake Dam at a location that does occasionally capture other flows from the surrounding local watershed. The flows from Canyon Lake do not include runoff from the local surrounding watershed into Lake Elsinore. Photos taken during the storm events are provided in **Figure 2-19** through **Figure 2-21**.



Figure 2-19. Storm Event Sampling Below the Canyon Lake Spillway (January 20-26, 2024)



Figure 2-20. Storm Event Sampling Below the Canyon Lake Spillway (February 1-4, 2024)

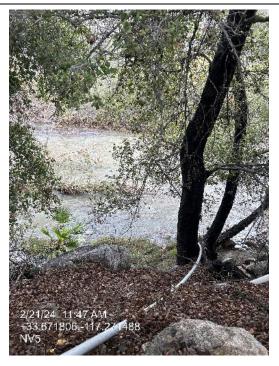


Figure 2-21. Storm Event Sampling Below the Canyon Lake Spillway (February 20-24, 2024)

Event and annual mean concentrations of each analyte are presented in **Table 2-11**. Event and annual loads for each analyte are presented in **Table 2-12**. Concentrations of nutrients for the three storm events ranged from 0.95 to 1.4 mg/L for total nitrogen and 0.061 to 0.3 mg/L for total phosphorus (**Table 2-11**). Based on flow data provided by the nearby USGS stream gauge (Station ID 11070500), the total annual flow was estimated at 838,713,834 cf or 6,274 Mgal for the period of July 1, 2023, through June 30, 2024. The USGS stream gauge (Station ID 11070500) located downstream of the Canyon Lake Spillway (Station ID 841) sampling location has minimal dry weather flow and storm flows account for the vast majority of the estimated annual load of nutrients exiting Canyon Lake. The estimated annual nutrient load was calculated to be 27, 399 kg for total nitrogen and 3,459 kg for total phosphorus (**Table 2-12**) for the period of July 1, 2023, through June 30, 2024.

Hydrographs with the discrete time-weighted sample aliquot times are provided in **Figure 2-22** through **Figure 2-24**. The figure was developed based on flow data provided by the nearby USGS stream gauge (Station ID 11070365). A hydrograph of the Canyon Lake Level at Railroad Canyon Dam Spillway compared to the spillway elevation is provided in **Figure 2-25**.

Table 2	Table 2-11. Water Quality Concentrations at Canyon Lake Spillway											
Analyte	Units	Event 1	Event 2	Event 3	Annual Mean	Annual Geomean						
Ammonia-Nitrogen	mg/L	0.021(J)	0.066(J)	.087(J)	0.06	0.049						
Chemical Oxygen Demand	mg/L	32	23	18	24.3	23.7						
Kjeldahl Nitrogen	mg/L	0.76	0.74	0.74	0.75	0.747						
Nitrate as N	mg/L	0.29	0.21	0.63	0.38	0.337						
Nitrite as N	mg/L	ND(<0.042) ^a	ND(<0.042) ^a	ND(<0.042) ^a	ND(<0.042) ^b	ND(<0.042) ^b						
Organic Nitrogen	mg/L	0.74	0.68	0.66	0.69	0.69						
Total Nitrogen	mg/L	1.1	0.95	1.4	1.15	1.14						
Total Phosphorus	mg/L	0.061	0.081	0.3	0.15	0.11						
Ortho Phosphate Phosphorus	mg/L	ND(<0.0071) ^a	0.011	0.22	0.12 ^b	0.049 ^b						
Total Dissolved Solids	mg/L	500	440	250	397	380						
Total Hardness	mg/L	239	_ c	131	185	180						
Total Suspended Solids	mg/L	10	9	15	11.3	11.1						

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).

J- Reported value was detected above the MDL, but below the RL.

a - When the result was ND the detection limit is shown in parenthesis.

b – The annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

c – Due to laboratory error, total hardness was not analyzed and reported.

	-			-	
Analyte	Units	Load Event 1	Load Event 2	Load Event 3	Annual Load
Ammonia-Nitrogen	kg	52	53	128	1,336
Chemical Oxygen Demand	kg	78,759	18,311	26,581	586,366
Kjeldahl Nitrogen	kg	1,871	589	1,093	17,751
Nitrate as N	kg	714	167	930	8,974
Nitrite as N	kg	0 ^a	0 ^a	0 ^a	0 ^a
Organic Nitrogen	kg	1,821	541	975	16,521
Total Nitrogen	kg	2,707	756	2,067	27,399
Total Phosphorus	kg	150	64	443	3,459
Ortho Phosphate Phosphorus	kg	0 ^a	9	325	2,530
Total Dissolved Solids	kg	1,230,616	350,304	369,174	9,492,971
Total Hardness	kg	588,234	147,287 ^b	193,447	4,446,865
Total Suspended Solids	kg	24,612	7,165	22,150	269,439

 Table 2-12.
 Water Quality Event and Annual Loads at Canyon Lake Spillway

a - When a concentration was non-detect, the load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

b - Total hardness annual mean concentration was used to estimate value for event load, due to missing data from laboratory error.

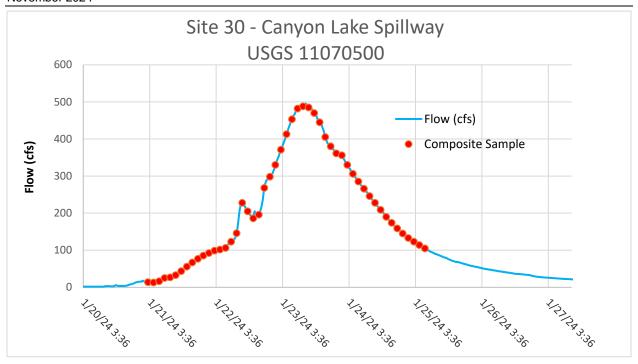


Figure 2-22. Hydrograph of First Storm Event at Canyon Lake Spillway (January 20-26, 2024)

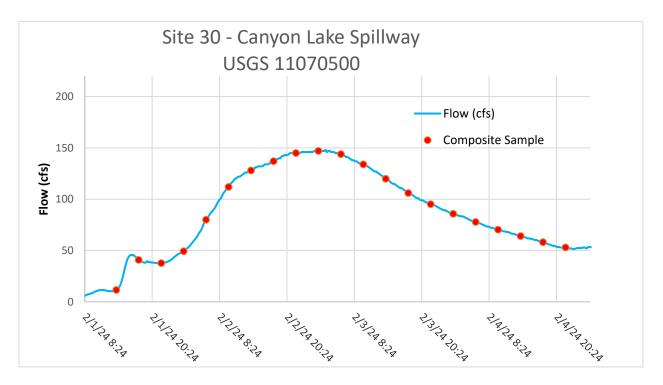


Figure 2-23. Hydrograph of Second Storm Event at Canyon Lake Spillway (February 1-4. 2024)

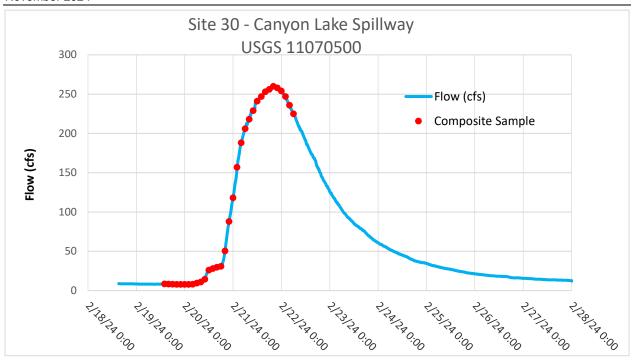


Figure 2-24. Hydrograph of Third Storm Event at Canyon Lake Spillway (February 20-24, 2024)

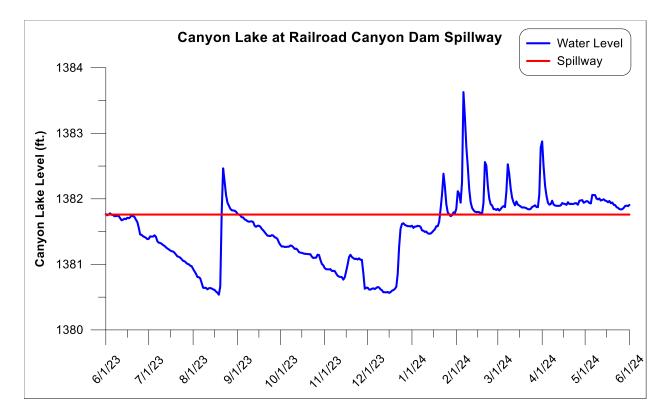


Figure 2-25. Canyon Lake Level at Railroad Canyon Dam Spillway

2.9 San Jacinto River Watershed Rainfall Records

The RCFC&WCD maintains rainfall records for rain gauges located within or near the San Jacinto River Watershed as shown in **Table 2-13**.

Station ID	Station Description	Latitude	Longitude	Elevation (ft.)
67	Lake Elsinore	33.668712	-117.332380	1281
152	Perris	33.786980	-117.231831	1494
155	Perris / Moreno Valley – Pigeon Pass	33.987703	-117.270221	1902
186	Hemet / San Jacinto	33.787067	-116.959024	1554
248	Winchester	33.702903	-117.090382	1466

Table 2-13.	San Jacinto River Watershed Rainfall Gauges
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Rainfall data recorded at these five stations for the period July 1, 2023, through June 30, 2024, are summarized in **Table 2-14**.

Monthly Rainfall (inches)	Lake Elsinore	Perris CDF	Pigeon Pass	Hemet / San Jacinto	Winchester
Jul	0.02	0	0	0	0
Aug	2.09	2.18	3.02	1.54	1.87
Sep	0.02	0.02	0.11	0	0.05
Oct	0.02	0.02	0.28	0.02	0.16
Nov	0.26	0.49	0.54	1.16	0.64
Dec	0.73	1.08	1.26	0.81	0.75
Jan	1.51	1.99	2.04	2.33	2.30
Feb	5.06	7.71	9.67	5.20	5.95
Mar	2.52	2.89	2.55	1.83	1.90
Apr	1.05	0.92	0.67	0.67	1.06
May	0.06	0	0.22	0.13	0.05
Jun	0	0	0	0	0
Annual Rainfall (inches)	13.34	17.30	20.36	13.69	14.73

 Table 2-14.
 Summary Rainfall Data (July 2023 to June 2024)

3.0 In-Lake Monitoring

3.1 Background

Routine in-lake monitoring was initiated in 2006 by local stakeholders in cooperation with the RWQCB at three open water locations in Lake Elsinore and four locations in Canyon Lake. Initially, monitoring consisted of monthly sampling October to May, and biweekly sampling June to September, with grab samples collected at the surface, within the water column, and/or as depth-integrated samples (depending on the lake and the analyte). Based on modifications adopted to the sampling program (RWQCB Resolution No. R8-2011-0023), in 2011-2012 sampling locations in Lake Elsinore and Canyon Lake were reduced to one and four stations, respectively, for analytical chemistry. This decision was based on a review of available data that indicated consistent similar nutrient concentrations and physical water quality parameters among the three sampling sites in Lake Elsinore and two sites in the East Basin of Canyon Lake. This cost savings allowed for shifting resources toward several implementation strategies aimed at reducing nutrient impacts in both lakes as described in RWQCB Resolution No. R8-2011-0023. All in-lake monitoring was then suspended temporarily during the 2013-2014 and 2014-2015 FYs to further redirect resources toward implementing in-lake best management practices. Starting in FY 2015-2016, ongoing in-lake sampling was resumed and is required to estimate progress toward attaining nutrient TMDL targets and calculating annual and 10-year running averages. The following sections describe monitoring methods and results in both lakes for the FY 2023-2024.

3.2 Historical In-Lake Monitoring Concentrations

A summary of TMDL water quality monitoring data parameters of interest during the period of January 1, 2011, through June 30, 2024 is presented in **Tables 3-1 and 3-2**. These tables present historical calendar-year annual means since 2011 for each of the numeric targets outlined in the 2004 TMDL. The tables also present the 10-year running averages for each parameter and the number of annual means (total nitrogen, total phosphorus, dissolved oxygen, and chlorophyll-a) and individual samples (total ammonia) within each 10-year period that did not achieve the TMDL target.

Parameter	2020 TMDL Target	Calendar Year	Number of Samples Collected	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2014-2023 Ten Year Average ^a (Percent of Annual Means/Samples Not Meeting TMDL Target)	2015-2024 Ten Year Average ^a (Percent of Annual Means/Samples Not Meeting TMDL Target)
Total Phosphorus ^b	<0.1 mg/L (Annual Average)	2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2023 2024	14 9 NA 3 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0.294 0.162 NA 0.383 0.416 0.181 0.162 0.154 0.219 0.227 0.146 0.221 0.207	mg/L	0.246 (100%)	0.238 (100%)	0.236 (100%)	0.234 (100%)	0.232 (100%)
Total Nitrogen ^b	<0.75 mg/L (Annual Average)	2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2022 2023 2024	14 9 NA 3 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	3.88 3.32 NA NA 6.10 7.28 4.68 5.56 4.50 3.99 4.30 5.00 4.05 2.58	- mg/L	4.91 (100%)	4.97 (100%)	5.18 (100%)	5.05 (100%)	4.80 (100%)
Total Ammonia ^c	Exceedance Thresholds Calculated from Site Specific Water Quality Conditions During each Event	2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024	15 9 NA NA 3 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0.049 0.096 NA NA 0.357 0.176 0.124 0.097 0.229 0.312 0.199 0.253 0.339 0.580	mg/L	0.180 (2004- CMC: 0%; CCC: 10%)	0.199 (2004- CMC: 0%; CCC: 13%)	0.218 (2004- CMC: 0%; CCC: 15%)	0.232 (2004- CMC: 0%; CCC: 16%)	0.266 (2004- CMC: 0%; CCC: 16%)

Table 3-1. Summary of Historical TMDL Data for Lake Elsinore Based on Calendar Year¹

Parameter	2020 TMDL Target	Calendar Year	Number of Samples Collected	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2014-2023 Ten Year Average ^a (Percent of Annual Means Not Meeting TMDL Target)	2015-2024 Ten Year Average ^a (Percent of Annual Means/Samples Not Meeting TMDL Target)
Depth- Integrated Chlorophyll-a (Summer) ^b	≤ 25 mg/L (Summer Average)	2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2021 2022 2023 2024	8 NA NA 1 4 4 4 4 2 3 3 4 4 4 1	169 200 NA 326 258 148 87 89 212 147 122 129 27.6	μg/L	186 (100%)	183 (100%)	174 (100%)	169 (100%)	154 (100%)
Dissolved Oxygen (1-m from lake bottom) ^b	>5 mg/L 1-m from lake bottom	2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2022 2023 2024	15 8 NA 3 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	3.4 4.8 NA 2.9 4.2 4.9 3.2 3.3 2.8 2.7 3.6 4.7 3.0	mg/L	3.7 (100%)	3.6 (100%)	3.4 (100%)	3.6 (100%)	3.5 (100%)

Table 3-1 (cont.).	Summary of Historical TMDL Data for Lake Elsinore Based on Calendar Year ¹
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Notes:

mg-milligram; ug- microgram; L-liter; m-meter,

CCC- Criterion Continuous Concentration; CMC- Criterion Maximum Concentration

Values in Bold indicate an exceedance of one or more TMDL criteria

The CCC and CMC were calculated using the 2004 TMDL formulas.

1- Reported values and compliance summary based on sampling at the central sampling location in Lake Elsinore (LE02).

a- includes data January 2014 - June 2024.

b- exceedance frequency based annual means

c- exceedance frequency based on individual samples exceeding corresponding sample-specific CMC or CCC

NA - not applicable, data not collected in 2013-2014

Parameter	2020 TMDL Target	Calendar Year	Number of Sampling Events	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2014-2023 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2015-2024 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)
		2011	15	0.850						
		2012	8	0.327						
		2013	2	0.266						
		2014	15	0.246						
		2015 2016	7	0.084						
Total	<0.1 mg/L	2016	6	0.099 0.249		0.244	0.167	0.138	0.125	0.130
	(Annual	2017	6	0.249	mg/L	(70%)	(60%)	(50%)	(50%)	(50%)
Phosphorus ^b	Average)	2018	6	0.038		(70%)	(60%)	(50%)	(50%)	(50%)
	C ,	2015	6	0.133						
		2020	6	0.084						
		2022	6	0.036						
		2023	6	0.138						
		2024	3	0.291						
		2011	15	1.57						
		2012	8	2.41						
		2013	NA	NA						
		2014	NA	NA						
		2015	3	1.50	-					
	<0.75 mg/L	2016	7	1.47		4.50	4.65	4.52	4.54	4.50
Total Nitrogen ^b	(Annual	2017	6	1.30	mg/L	1.59	1.65	1.53	1.51	1.53
rotarititogen	Average)	2018	6	1.37		(100%)	(100%)	(100%)	(100%)	(100%)
	Average	2019	6	1.50						
		2020	6	1.62						
		2021	6	2.06						
		2022 2023	<u>6</u>	1.43 1.31						
		2023	3	1.71						
		2011	14	0.765						
		2012	8	0.251						
	Exceedance	2013	NA	NA						
	Thresholds	2014	NA	NA						
		2015	3	0.577						
	Calculated from	2016	7	0.270						
Tatal Ammania ^c	Site Specific	2017	6	0.301	mg/L	0.444	0.437	0.444	0.446	0.460
Total Ammonia ^c	Water Quality	2018	6	0.326	IIIB/L	(CMC: 0%; CCC: 6%)	(CMC: 0%; CCC: 4%)	(CMC: 0%; CCC: 5%)	(CMC: 0%; CCC: 5%)	(CMC: 0%; CCC: 5%)
	Conditions	2019	6	0.471				,		
	During each	2020	6	0.593						
		2021	6	0.707						
	Event	2022	6	0.305						
		2023	6	0.467						
		2024	3	0.580						

Table 3-2. Summary of Historical TMDL Data for Canyon Lake Based on Calendar Year ¹

Parameter	2020 TMDL Target	Calendar Year	Number of Sampling Events	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2014-2023 Ten Year Average ^a (Percent of Annual Means Not Meeting TMDL Target)	2015-2024 Ten Year Average ^a (Percent of Annual Means/Samples Not Meeting TMDL Target)
		2011	15	52.7						
		2012	8	69.3				35.5		
		2013	2	59.5						
		2014	15	56.8		43.0 (80%)				
		2015	3	60.2					31.6 (60%)	
Depth-	Depth- < 25 μg/L	2016	7	29.7			20.0			28.1 (50%)
Integrated	(Annual	2017	6	29.4	μg/L		39.9			
	Chlorophyll-a ^b Average)	2018	6	27.9	P-0/ -		(70%)	(70%)		
Chlorophyli-a	Average)	2019	6	21.6						
		2020	6	22.7						
		2021	6	21.8						
	-	2022	6	25.4	-					
		2023	8	20.5						
		2024	3	22.1						
		2011 2012	<u>11</u> 6	0.3						
		2012	NA	0.8 NA						
		2013	NA	NA						
		2014	3	4.0						
Dissolved	/	2015	7	1.3						
	>5 mg/L	2010	5	0.3		0.9	0.9	0.8	0.7	0.8
Oxygen	Hypolimnion	2018	5	0.4	mg/L	(100%)	(100%)	(100%)	(100%)	(100%)
(Hypolimnion) ^{b,d}	(Daily Average)	2019	4	0.2		(100%)	(10070)	(100%)	(10070)	(10070)
		2020	3	0.03						
		2021	4	0.2						
		2022	4	0.3						
		2023	3	0.0						
		2024	1	1.5						

Table 3-2 (cont.).	Summary of Historical TMDL Data for Canyon Lake Based on Calendar Year ¹
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Notes:

mg-milligram; ug- microgram; L-liter; m-meter,

CCC- Criterion Continuous Concentration; CMC- Criterion Maximum Concentration

Values in Bold indicate an exceedance of one or more TMDL criteria

The CCC and CMC were calculated using 2004 TMDL formulas.

1- Reported values and compliance summary based on a lake-wide average for each sampling date (Sites CL07, CL08, CL09, and CL10)

a- includes data January 2014 - June 2024.

b- exceedance frequency based annual means

c- exceedance frequency based on individual samples exceeding corresponding sample-specific CMC or CCC

NA - not applicable, data not collected in 2013-2014

3.3 Lake Elsinore Monitoring

3.3.1 Sampling Station Locations and Frequency

To maintain consistency and facilitate the assessment of trends toward meeting compliance goals, the in-lake monitoring design was resumed in July 2015 using the three former stations outlined in the approved Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan (LESJWA, 2006; **Figure 3-1**, **Table 3-3**). Analytical chemistry samples and in-situ water column profile readings were collected at Site LE02, while only in-situ water column profile readings were performed at the remaining two stations (LE01 and LE03). Profile readings for all three stations were taken in both the morning and afternoon. Water chemistry samples collected at Site LE02 were analyzed for those constituents outlined in **Table 3-4**. Sampling in Lake Elsinore was conducted monthly during summer months (June-September) and bi-monthly (i.e., every other month) for the remainder of the monitoring year, for a total of eight sampling events per year. In-lake TMDL sampling events were coordinated to correspond with satellite overpass dates to facilitate the comparison of in-lake and satellite derived chlorophyll-a data (see Section 3.4).

Site	Latitude	Longitude
LE01	33.668978°	-117.364185°
LE02	33.663344°	-117.354213°
LE03	33.654939°	-117.341653°

Table 3-3. Lake Elsinore TMDL Monitoring Locations

Table 3-4. In-lake Analytical Constituents and Methods for Lake Elsing	ore
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Parameter	Analysis Method	Sampling Method
Analytic	cal Chemistry	
Nitrite Nitrogen (NO2-N)	EPA 353.2	Depth Integrated
Nitrate Nitrogen (NO ₃ -N)	EPA 353.2	Depth Integrated
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	Depth Integrated
Total Nitrogen (TN) ¹	Calculated	Depth Integrated
Ammonia Nitrogen (NH4-N)	EPA 350.1	Depth Integrated
Sulfide	SM 4500S2 D	Depth Integrated
Total Phosphorus (TP)	EPA 365.3	Depth Integrated
Soluble Reactive Phosphorus (SRP / Ortho-P)	EPA 365.3, EPA 353.2	Depth Integrated
Chlorophyll-a	SM 10200H	Surface (0-2m) & Depth Integrated
Total Dissolved Solids (TDS)	SM 2540 C	Depth Integrated

US EPA - United States Environmental Protection Agency; m- meter; SM- standard method

¹ Total Nitrogen calculated as TKN+NO₂+NO₃

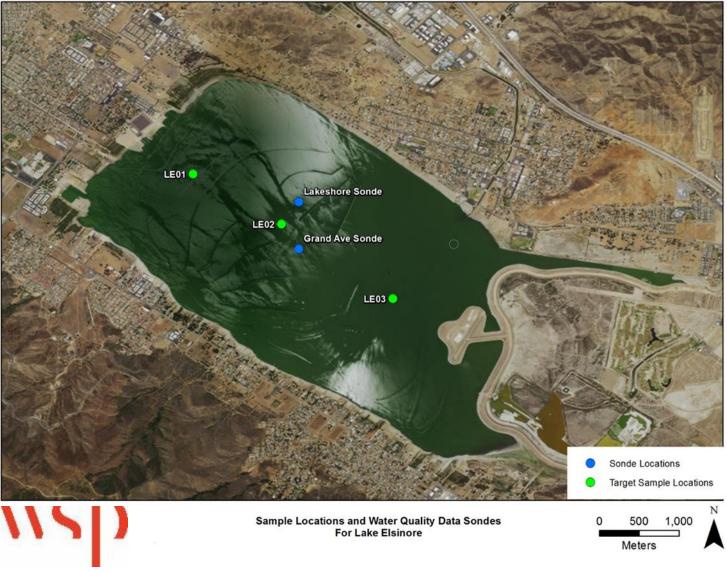


Figure 3-1. Lake Elsinore Sampling Locations

3.3.2 Sampling Methods

Depth-integrated composite samples for analytical chemistry were collected at Site LE02 by utilizing a peristaltic pump and lowering/raising an inlet tube through the water column at a uniform speed, creating a composite sample of the entire water column. Two samples were collected for chlorophyll-a: 1) a full depth-integrated composite sample as described above; and 2) a 0-2-meter (m) depth-integrated composite surface sample. All samples for chemical analysis were placed and held on wet ice immediately following collection and transferred to a local courier or shipping company on the same day of collection. Samples for analysis of nutrients, ammonia, sulfide, and total dissolved solids (TDS) were submitted to Weck Laboratories Inc., located in City of Industry, California. Samples for analysis of chlorophyll-a were submitted to Physis Environmental Laboratories Inc., located in Anaheim, California.

Secchi disk readings for water clarity, as well as in-situ water column profile data, were typically recorded between 7:00 and 9:00 in the morning at all three Lake Elsinore stations using precalibrated hand-held YSI field meters or equivalent for pH, temperature, DO, and specific conductivity at 1-m intervals throughout the water column. This data was used to assess lateral and vertical spatial variability within the lake. End-of-the-day water column profiles (i.e., after ~2:00pm) were also recorded for the same in-situ parameters at all three stations to assess any potential temporal variability in these parameters over the course of a day. For water quality reporting purposes, the morning and afternoon in situ measurements were averaged at each site on each date.

Satellite imagery was used as a tool to remotely measure chlorophyll-a concentrations at the water surface. These images provide a more complete picture of spatial variability that can exist for these two parameters at any given point in time. In-lake sampling dates were selected to correspond with satellite overpasses to enable comparison of analytical laboratory and satellite derived chlorophyll-a concentrations. Processed satellite imagery and associated reports were provided by EOMAP GmbH & co. KG (EOMAP) based in Germany (Castle Seefeld Schlosshof).

3.3.3 Water Quality Summary

A summary of the in-lake monitoring events for Lake Elsinore for the period of July 1, 2023 to June 30, 2024, is presented below. A total of eight Lake Elsinore events were sampled during this period under the TMDL monitoring program, with five occurring in 2023 (July 17, August 1, September 20, October 10 and December 4) and three in 2024 (February 27, April 17 and June 5). Complete monthly water column profile measurements are provided in Appendix B. Detailed analytical chemistry lab reports for each event are contained in Appendix C. Satellite imagery reports for each event are provided in Appendix D. Current data in the context of historical water quality monitoring results from 2002-present are presented in Appendix E.

A summary of mean water column profile values for each site and monitoring event are presented in **Tables 3-5 and 3-6**. Water column mean profile statistics for each site across the entire monitoring period are presented in **Table 3-7**. Mean values for water column measurements for each site, as well as the lake-wide mean are also summarized graphically in **Figures 3-2** through

Table 3-5. In-Situ Water Quality Parameter Measurements in Lake Elsinore – 2023 Monthly Means for Each Site (July – Dec 2023)

<u>`</u>		Jul	-23	Aug	g-23	Sep	o-23	Oc	t-23	Dec	:-23
Site	Measure	Water Column Mean	1m from Bottom								
	Temp (°C)	26.9	25.2	27.9	28.0	24.8	24.3	22.6	22.6	14.2	13.9
LE01	Cond (µS/cm)	3266	3259	3303	3303	3279	3279	3324	3326	3340	3340
LEUI	рН	8.63	8.26	8.61	8.68	8.55	8.42	8.76	8.74	8.73	8.68
	DO (mg/L)	3.8	<u>0.0</u>	0.3	<u>0.1</u>	4.3	<u>1.8</u>	5.1	<u>4.9</u>	9.4	8.5
	Temp (°C)	26.7	25.1	27.9	28.0	24.4	24.2	22.7	22.2	14.1	13.8
LE02	Cond (µS/cm)	3266	3260	3293	3293	3274	3274	3325	3329	3332	3337
LEUZ	рН	8.61	8.34	8.62	8.68	8.53	8.50	8.69	8.42	8.72	8.64
	DO (mg/L)	3.4	<u>0.0</u>	0.2	<u>0.1</u>	4.5	<u>3.6</u>	4.4	<u>0.3</u>	9.2	7.4
	Temp (°C)	26.7	25.5	27.7	27.3	24.6	24.4	22.8	22.0	14.2	14.0
1 502	Cond (µS/cm)	3265	3261	3243	3279	3274	3274	3327	3330	3316	3326
LE03	рН	8.69	8.40	8.53	8.28	8.47	8.45	8.71	8.41	8.73	8.66
	DO (mg/L)	4.0	<u>0.1</u>	0.3	<u>0.1</u>	3.8	<u>3.1</u>	4.8	<u>0.4</u>	8.5	7.1
	Temp (°C)	26.8	25.2	27.8	27.8	24.6	24.3	22.7	22.3	14.1	13.9
Lake-wide	Cond (µS/cm)	3266	3260	3279	3292	3276	3275	3325	3328	3329	3334
Average	рН	8.64	8.33	8.59	8.55	8.52	8.45	8.72	8.52	8.73	8.66
	DO (mg/L)	3.7	<u>0.1</u>	0.3	<u>0.1</u>	4.2	<u>2.8</u>	4.8	<u>1.8</u>	9.0	7.7

Notes:

°C = degrees Celsius; µS/cm = microSiemens per centimeter; m= meter; mg/L = milligrams per liter

2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in bottom 1m of sampling site

Bold Underline - Indicates not meeting the 2020 TMDL target

Italicize - Indicates exceedance of Basin Plan water quality objective

Table 3-6. In-Situ Water Quality Parameter Measurements in Lake Elsinore – 2024Monthly Means for Each Site (February – June 2024)

		Feb-24		Apr-24		Jun-24		2023-2024 FY Mean		
Site	Measure	Water Column Mean	1m from Bottom							
	Temp (°C)	13.7	12.9	18.0	17.0	23.5	23.0	21.5	20.8	
LE01	Cond (µS/cm)	2660	2725	2478	2477	2559	2559	3026	3033	
LEVI	рН	8.20	7.88	8.58	8.34	8.95	8.88	8.63	8.48	
	DO (mg/L)	5.7	<u>1.5</u>	11.0	7.7	9.8	7.9	6.2	<u>4.1</u>	
	Temp (°C)	13.6	12.6	17.6	16.4	23.2	22.5	21.3	20.6	
LE02	Cond (µS/cm)	2660	2750	2481	2486	2560	2561	3024	3036	
LEUZ	рН	8.12	7.80	8.44	7.99	8.87	8.69	8.58	8.38	
	DO (mg/L)	4.7	<u>0.4</u>	9.3	<u>3.8</u>	8.3	4.6	5.5	<u>2.5</u>	
	Temp (°C)	13.8	12.9	17.7	16.8	23.3	22.4	21.3	20.6	
LE03	Cond (µS/cm)	2635	2736	2480	2483	2562	2563	3013	3031	
LEUS	рН	8.16	7.85	8.50	8.13	8.78	8.40	8.57	8.32	
	DO (mg/L)	5.0	<u>0.3</u>	10.1	6.3	7.3	<u>0.5</u>	5.5	<u>2.2</u>	
	Temp (°C)	13.7	12.8	17.7	16.7	23.3	22.6	21.3	20.7	
Lake-wide	Cond (µS/cm)	2652	2737	2480	2482	2560	2561	3021	3033	
Mean	рН	8.16	7.84	8.51	8.15	8.87	8.65	8.59	8.39	
	DO (mg/L)	5.1	<u>0.7</u>	10.2	6.0	8.5	<u>4.4</u>	5.7	<u>2.9</u>	

Notes:

 $^{\circ}$ C = degrees Celsius; μ S/cm = microSiemens per centimeter; m= meter; mg/L = milligrams per liter

2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in bottom 1m of sampling site

Bold Underline - Indicates not meeting the 2020 TMDL target

Italicize - Indicates exceedance of Basin Plan water quality objective

3-7. The measurements during the morning and afternoon of any given monitoring event were averaged prior to being summarized in the tables and figures.

In prior years, the greatest DO concentrations throughout the water column (both water column mean and 1-meter from bottom) have been observed in the winter and early spring across all three monitoring locations. However, this monitoring year, possibly as a result of the larger volume of incoming water from the storm season, the DO concentrations for the water column mean and 1-m from the bottom dropped in February 2024. Concentrations of DO near the bottom, while typically lower, resembled values usually observed in the summer months when the lake exhibits stratification. Notable decreases in pH and conductivity were also observed during the February monitoring event. All three sites then exhibited an increase in the water column mean and 1-meter from bottom DO concentration beginning in April 2024. It was at this time that a divergence between the two readings began to form as well. These diverging measurements indicate that the lake was beginning to stratify as it warmed, supported by the concurrent increased temperatures recorded during the April and June 2024 events and historical trends that demonstrate stratification of the lake typically beginning during this period. The 12-month rolling mean DO concentration 1-m above the lake bottom at Site LE02 ranged from 2.4 to 4.3 mg/L, never rising above the 2020 TMDL target of 5.0 mg/L (**Figure 3-2**).

Conductivity exhibited a gradual increase from July through December 2023, from a lake wide average of 3266 to 3329 microSiemens per centimeter (μ S/cm) before decreasing each subsequent month through April 2024 to a low of 2,480 μ S/cm. The low conductivity values observed in Spring 2024, particularly the large decrease between December 2023 and February 2024, were due to the substantial rainfall during that period, with the area receiving 9.05 inches of precipitation in February alone. In addition, on February 9, 2024 EVMWD ceased discharge of the recycled water to the lake when lake elevation surpassed 1247 feet (ft), the contractual threshold based on a 2003 settlement agreement between EVMWD and City of Lake Elsinore. While the recycled water had ceased during this period (restarted in August 6, 2024), it is unlikely that this contributed significantly to the decrease in overall lake specific conductivity.

The lake wide average water column mean pH for all monitoring events ranged from 8.16 to 8.87. In the three prior monitoring years higher pH values were observed above 9.0 standard units (SU), up to 9.31 last monitoring year when particularly intense algal bloom in late summer occurred. The lower pH values observed this monitoring year are likely the result of the two preceding winters which were wetter than normal, increasing the lake level and decreasing conductivity. In addition, the low conductivity values observed between February to April appeared to coincide with a cladoceran (Daphnia sp.) bloom which feed on algae. During this time, the high cladoceran density led to a reduction in the lake algal concentrations, which subsequently lowered the pH values. As highlighted in past monitoring reports, there is a strong correlation between algal photosynthesis processes and pH, especially in lakes with a significant algal biomass. Algal photosynthesis is a process that absorbs carbon dioxide from the water, promoting cell growth. As the algae extract carbon dioxide, the water's pH levels rise due to a decrease in carbonate and bicarbonate levels.

This decrease in algal concentration between February and April 2024, presumably as a result of the decreased conductivity and explosion of the cladoceran (water flea) population, was also seen in a dramatic increase in water clarity as measured with Secchi disk. Water clarity increased from

0.66-ft in December 2023 to 5.6 ft in April 2024. (**Figure 3-7**). The pattern observed for the depth integrated and surface chlorophyll-a concentrations followed water clarity closely, with concentrations decreasing substantially between February and April 2024 (**Figure 3-10**).

For further inter-year comparisons of in-situ water quality parameters, **Table 3-7** includes lakewide averages observed for the current 2023-24 monitoring year, as well as the prior 2019-20, 2020-21, and 2021-22 monitoring years.

		Measure	LE01	LE02	LE03	Lake-wide Average (July 2023- June 2024)	Lake-wide Average (July 2022- June 2023)	Lake-wide Average (July 2021- June 2022)	Lake-wide Average (July 2020- June 2021)	Lake-wide Average (July 2019- June 2020)	Lake-wide Average (July 2018- June 2019)
		Temp (°C)	13.7	13.6	13.8	13.7	10.7	11.7	13.0	12.0	11.4
	Min	Cond (µS/cm)	2478	2481	2480	2480	2935	3610	3144	2880	3329
	IVIIII	рН	8.20	8.12	8.16	8.16	8.75	8.67	8.56	8.97	8.76
		DO (mg/L)	0.3	0.2	0.3	0.3	2.7	1.8	1.9	2.8	3.9
		Temp (°C)	27.9	27.9	27.7	27.8	27.9	27.6	27.3	27.4	28.3
Water Column	Мах	Cond (µS/cm)	3340	3332	3327	3333	4509	4127	3474	3895	5224
Mean	wax	рН	8.95	8.87	8.78	8.87	9.31	9.03	9.16	9.28	9.10
		DO (mg/L)	11.0	9.3	10.1	10.2	10.5	10.7	8.5	11.6	10.4
		Temp (°C)	21.5	21.3	21.3	21.3	20.6	21.4	21.5	20.5	20.9
	Average	Cond (µS/cm)	3026	3024	3013	3021	3793	3819	3322	3562	4473
	Average	рН	8.63	8.58	8.57	8.59	8.98	8.79	8.81	9.15	8.93
		DO (mg/L)	6.2	5.5	5.5	5.7	6.3	5.4	5.1	5.9	6.6
		Temp (°C)	12.9	12.6	12.9	12.8	10.6	11.4	12.9	11.6	11.2
	Min	Cond (µS/cm)	2477	2486	2483	2482	2942	3608	3144	3007	3330
	WIIN	рН	7.88	7.80	7.85	7.84	8.67	8.60	8.50	8.85	8.70
		DO (mg/L)	0.0	0.0	0.1	0.1	0.5	0.3	0.2	0.1	1.3
		Temp (°C)	28.0	28.0	27.3	27.8	27.3	27.2	26.8	27.2	27.7
Ame from Dottom	Max	Cond (µS/cm)	3340	3337	3330	3335	4509	4124	3478	3896	5232
1m from Bottom	Max	рН	8.88	8.69	8.66	8.74	9.27	<i>8.9</i> 8	9.07	9.23	9.03
		DO (mg/L)	8.5	7.4	7.1	7.7	9.5	10.5	8.1	8.3	8.8
		Temp (°C)	20.8	20.6	20.6	20.7	20.2	21	21.0	20.1	20.5
	Average	Cond (µS/cm)	3033	3036	3031	3033	3794	3817	3322	3578	4478
	Average	рН	8.48	8.38	8.32	8.39	8.92	8.74	8.73	9.07	8.88
		DO (mg/L)	<u>4.1</u>	<u>2.5</u>	<u>2.2</u>	<u>2.9</u>	<u>4.8</u>	<u>3.8</u>	<u>3.0</u>	<u>3.7</u>	<u>4.5</u>

Notes:

Values are annual mean statistics for each site and annual lake wide averages.

°C = degrees Celsius; µS/cm = microSiemens per centimeter; m= meter; mg/L = milligrams per liter

2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in bottom 1m of sampling site <u>Bold Underline</u> - Indicates not meeting the 2020 TMDL target *Italicize* – Indicates exceedance of Basin Plan water quality objective

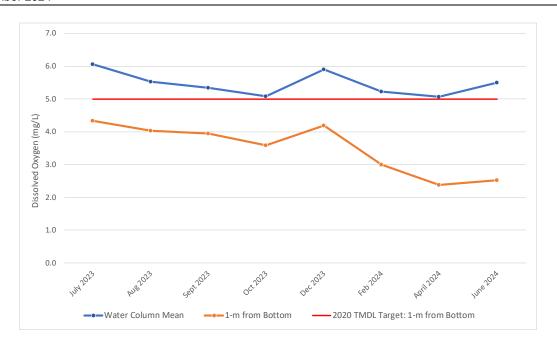


Figure 3-2. Water Column Mean Dissolved Oxygen 12-month Rolling Average – Lake Elsinore for Site LE02

Each data point is calculated by averaging the measurement from each event with the previous seven events (i.e., one year of data) to obtain a rolling average. Therefore, the full graph represents data collected from August 2022 to June 2024.

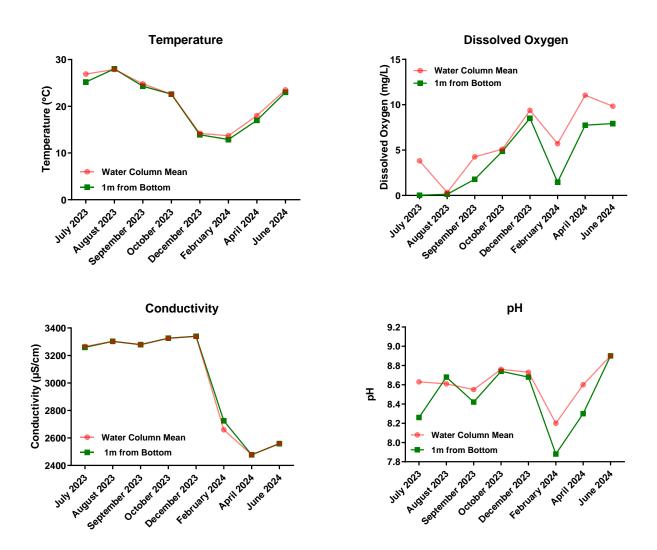


Figure 3-3. In-Situ Physical Water Quality Parameters - Lake Elsinore - Site LE01

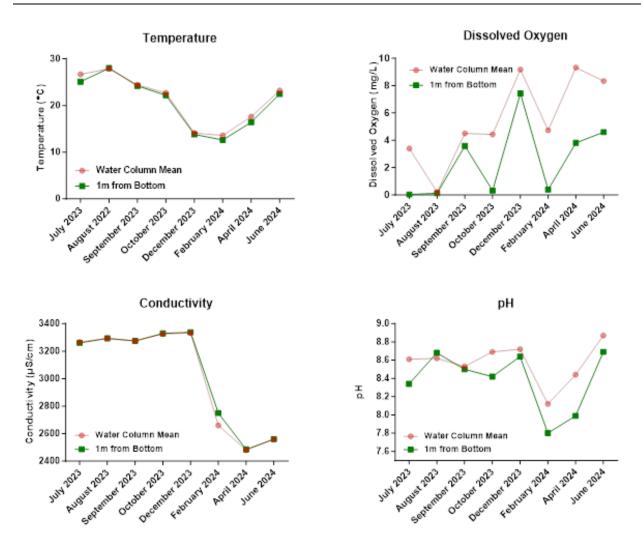


Figure 3-4. In- Situ Physical Water Quality Parameters - Lake Elsinore Site LE02

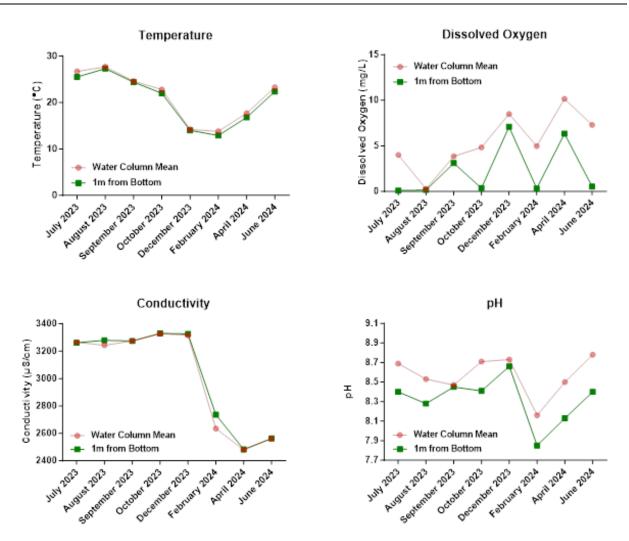


Figure 3-5. In- Situ Physical Water Quality Parameters - Lake Elsinore Site LE03

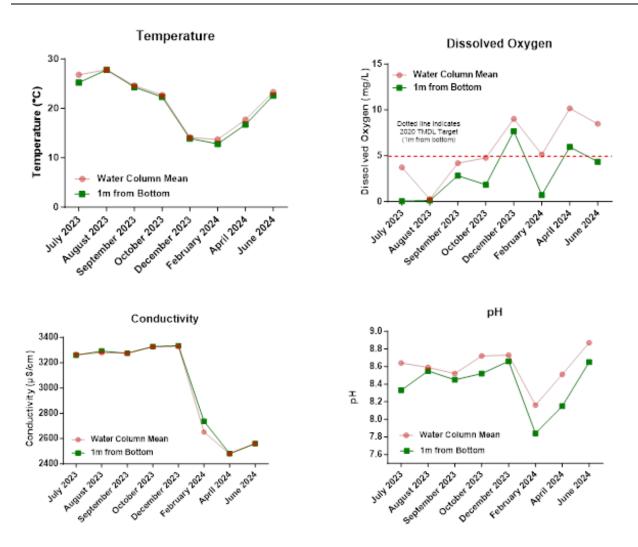
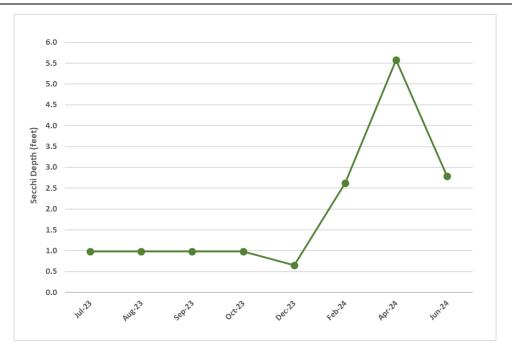
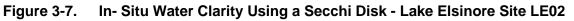


Figure 3-6. Monthly Lake-wide Mean of In-Situ Physical Water Quality Parameters – Mean of All Three Stations





Analytical Chemistry

Monthly and annual summary analytical concentrations at Site LE02 are presented in **Tables 3-8 and 3-9**, respectively. Concentrations of analytes at Site LE02 are graphically presented in **Figures 3-8 through 3-10**.

Total nitrogen concentrations were generally steady from July to December 2023 ranging from 3.5 to 4.4, with a slight dip in August. The remaining monitoring months exhibited a continuous decrease to a low of 2.3 mg/L in June 2024 (**Figure 3-8**). The annual mean concentration of total nitrogen was 3.5 mg/L (4.8 mg/L in the previous monitoring year). The total nitrogen 1-year rolling average concentration, calculated by averaging the measurement from each event with the previous seven events (i.e., one year of data), is shown in **Figure 3-9**. While there is a decreasing trend in the rolling average total nitrogen concentration over time all values over the past 5 years exceeded the current 2020 TMDL annual target of 0.75 mg/L (**Figure 3-9**).

Total phosphorus concentrations ranged from 0.19 to 0.28 mg/L across all monitoring events, with an annual mean concentration of 0.23 mg/L (0.15 mg/L the previous year). Although some variability was observed, there was a general increase in total phosphorus between July and December 2023. Following this, concentrations of total phosphorus were lower February through June 2024 likely as a result of the substantial rainfall totals (**Figure 3-8**). Although concentrations of phosphorus declined during the 2024 monitoring events, the rolling average steadily increased from 0.16 to 0.23 mg/L over the course of the monitoring year. The 10-year rolling average for total phosphorus over the past 5 years exceeded the current 2020 TMDL annual target of 0.1 mg/L (**Figure 3-9**).

Total ammonia-N concentrations were variable across the monitoring year, with the highest concentration observed in July 2023 (0.90 mg/L). Monitoring year concentrations ranged from 0.080 to 0.90 mg/L, with an annual mean of 0.53 mg/L (**Table 3-8**). Concentrations followed a decreasing trend starting in July through December, then increased in February and April, before decreasing again in June. This decrease in total ammonia concentration in the late summer and winter is not uncommon in Lake Elsinore; the previous two monitoring years have shown a somewhat similar pattern and may be tied to the destratification cycle of the lake. Two exceedances of the 2004 TMDL total ammonia Criterion Continuous Concentration (CCC) objective were observed in July (0.90 mg/L) and August 2023 (0.69 mg/L). No samples exceeded the acute total ammonia Criterion Maximum Concentration (CMC) objective.³

Total dissolved solids (TDS) concentrations were stable between July and December before decreasing in February, as a result of stormwater input. December 2023 was the only month to reach the Basin Plan Water Quality Objective criteria of 2000 mg/L.

Depth-integrated concentrations of chlorophyll-a ranged from 23.5 to 161 μ g/L across all eight sampling events, while the surface (0-2m) chlorophyll-a concentrations ranged from 36 to 169 μ g/L. Variable concentrations were observed across the summer and early fall months, followed by a substantial decrease between December 2023 and February 2024 where the depth integrated chlorophyll-a concentration stayed near the 2020 TMDL target of 25 μ g/L for the remainder of the monitoring year (**Figure 3-10**). These low concentrations of chlorophyll-a concentration stayed near the phytoplanktonic algae. Surface chlorophyll-a concentration specific and the increased density of *Daphnia* sp. feeding on the phytoplanktonic algae. Surface chlorophyll-a concentration observed in samples collected during the summer months (June 2023 through September 2023) was 123 μ g/L for depth-integrated samples and 148 μ g/L for surface samples, both exceeding the current 2020 TMDL summer average target of 25 μ g/L for depth-integrated samples and 114 μ g/L for surface samples.

³Note that the water quality objectives for total ammonia vary for each sampling event based on site-specific pH, temperature, and salinity values measured at the time of collection.

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Table 3-8. Month	y Analytica	Chemistry	Results for	Lake Elsinore in 2023-202	4
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Compound	Units	MDL	RL	Depth Integrated or Surface Sample	July 2023	August 2023	September 2023	October 2023	December 2023	February 2024	April 2024	June 2024	Annual Average
					General	Chemistry							
Total Dissolved Solids	mg/L	4.0	10	DI	1800	1900	1900	1900	2000	1500	1500	1500	1750
Sulfide	mg/L	0.05	0.1	DI	1.5	0.80	ND<0.05	0.10	ND<0.05	ND<0.05	ND<0.05	ND	0.30
Nitrate as N	mg/L	0.04	0.2	DI	ND<0.04	ND<0.04	ND<0.04	0.043 J	0.14 J	0.32	0.12	0.06	0.09
Nitrite as N	mg/L	0.029-0.042	0.1	DI	ND<0.042	ND<0.042	0.05 J	0.06 J	ND<0.042	ND<0.042	ND<0.029	0.05 J	0.02
Total Kjeldahl Nitrogen	mg/L	0.065-0.26	0.1-0.4	DI	4.0	3.5	4.3	4.2	4.2	2.7	2.4	2.2	3.4
Total Nitrogen ^a	mg/L	NA	NA	DI	4.0	3.5	4.4	4.3	4.3	3.0	2.5	2.3	<u>3.5</u>
Ammonia-Nitrogen	mg/L	0.017	0.1	DI	<u>0.90*</u>	<u>0.69*</u>	0.38	0.45	0.08 J	0.63	0.85	0.26	0.53
Unionized Ammonia ^b	mg/L	NA	NA	DI	0.16	0.15	0.05	0.08	0.01	0.02	0.06	0.07	0.08
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	DI	0.12	0.02	0.01	0.02	0.02	0.15	0.17	0.09	0.07
Total Phosphorus	mg/L	0.0067	0.01	DI	0.23	0.22	0.26	0.24	0.28	0.20	0.23	0.19	0.23
	Chlorophyll-a												
Chlorophyll-a	µg/L	NA	1.0	Surf	169	125	141	160	159	39.0	85.4	36.3	114
Chlorophyll-a	µg/L	NA	1.0	DI	104	91.0	147	80.8	161	23.5	26.7	27.6	83

Notes:

When a concentration was non-detect (ND), the annual mean value for compliance purposes was calculated by converting ND values to zero. If the result of the calculated mean was non-zero, but below the corresponding MDL, the mean value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - The concentration of unionized ammonia was calculated using equation by Thursby (1986), based on site specific pH and temperature recorded at each location.

c - Sample measured out of holding time

ND - Not detected; NA - Not Applicable/ available

DI = Depth integrated; Surf = Surface 0-2m

µg/L – micrograms per liter; mg/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J - Reported value is an estimate as detection was above the MDL, but below the RL
 <u>Bold Underline</u> - Indicates exceedance of 2020 TMDL Objective for annual average
 * Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC (ammonia exceedance is on an event basis due to its reliance upon pH and temperature at the time of collection)

Table 3-9. Analytical Chemistry Summary for Lake Elsinore – Annual Mean Statistics for 2023-2024

Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Depth Integrated or Surface Sample	Min	Мах	Summer Average ^d	Annual Average
				General Chemistry					
Total Dissolved Solids	mg/L	4.0	10	2000 ²	DI	1500	2000	1850	1750
Sulfide	mg/L	0.05	0.1	NA	DI	ND (<0.05)	1.5	0.58	0.30
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.32	ND (<0.04)	0.09
Nitrite as N	mg/L	0.029-0.042	0.1	NA	DI	ND (<0.04)	0.06	ND (<0.04)	0.02
Total Kjeldahl Nitrogen	mg/L	0.065-0.26	0.1-0.4	NA	DI	2.2	4.3	3.8	3.4
Total Nitrogen ^a	mg/L	NA	NA	0.75 ^{b1}	DI	2.3	4.4	3.8	<u>3.5</u>
Ammonia-Nitrogen	mg/L	0.017	0.1	2004 - CMC: 1.692-6.948 ^{c1} ; CCC: 0.351- 2.097 ^{c1}	DI	0.08	<u>0.90*</u>	0.51	0.53
Unionized Ammonia ^c	mg/L	NA	NA	NA	DI	0.01	0.16	0.10	0.08
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	0.01	0.17	0.04	0.07
Total Phosphorus	mg/L	0.0067	0.01	0.1 ^{b1}	DI	0.19	0.28	0.22	<u>0.23</u>
				Chlorophyll-a					
Chlorophyll-a	µg/L	NA	1.0	25 ^{d1}	Surf	36	169	<u>148</u>	114
Chlorophyll-a	µg/L	NA	1.0	25 ^{d1}	DI	24	161	<u>123</u>	83

Notes:

When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the annual average value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - Annual average

c - The range of TMDL target thresholds apply to individual samples, not applicable to annual means

d - Summer average (June 2023 - September 2023)

1 - 2020 TMDL Target, based on Table 5-9n of 2004 TMDL

2 - Santa Ana Region Basin Plan Water Quality Objective

NA - Not applicable/ available; ND - not detected

DI = Depth integrated; Surf = Surface 0-2m

mg/L - micrograms per liter; ug/L - milligrams per liter; MDL - method detection limit; RL - reporting limit; J - Reported value was detected above the MDL, but below the RL

Bold Underline - Indicates exceedance of 2020 TMDL target

* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC (ammonia exceedance is on an event basis due to its reliance upon pH and temperature at the time of collection)

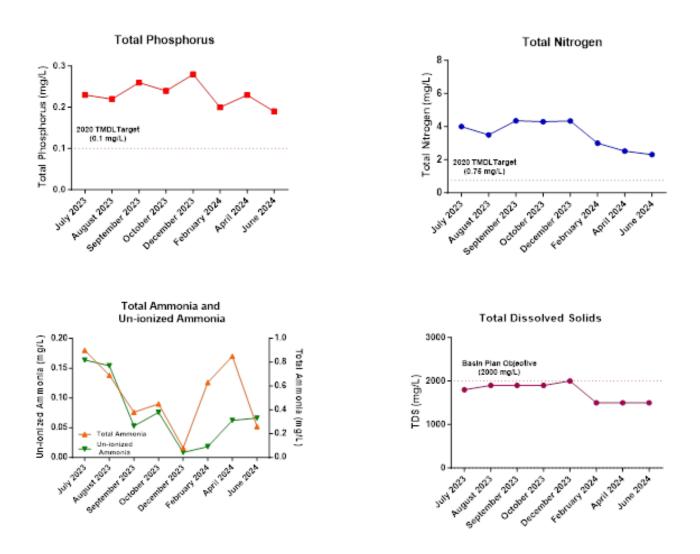
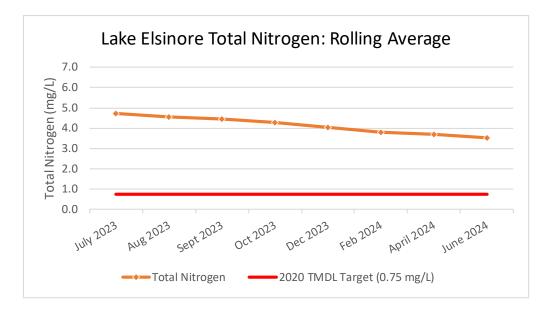


Figure 3-8. Lake Elsinore Analytical Chemistry – Depth-Integrated Samples Site LE02 (July 2023-June 2024)

Long term trends can be found in Appendix E



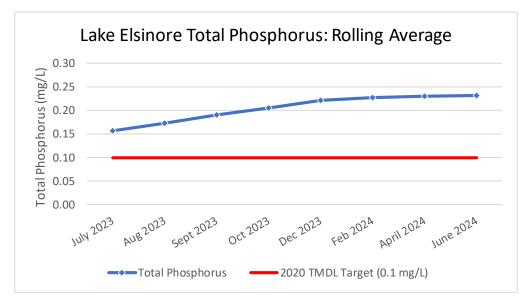


Figure 3-9. Lake Elsinore Analytical Chemistry – Total Nitrogen and Total Phosphorus Rolling Averages (July 2023 – June 2024)

Each data point is calculated by averaging the value of each event with the previous seven events (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2022 to June 2024.

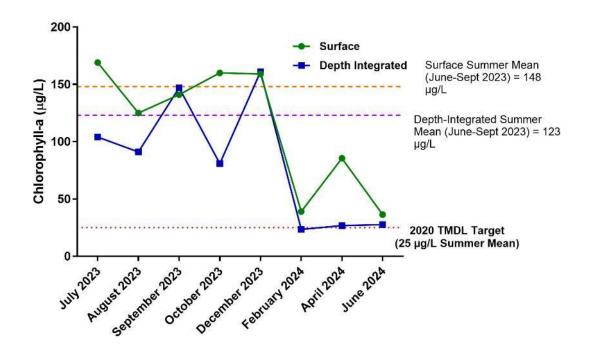


Figure 3-10. Lake Elsinore Analytical Chemistry – Depth-Integrated and Surface Chlorophyll-a at Site LE02

Long term trends can be found in Appendix E

3.4 Canyon Lake Monitoring

3.4.1 Sampling Station Locations and Frequency

As with Lake Elsinore, sampling parameters and locations in Canyon Lake were based on the TMDL monitoring conducted between 2006 and 2012 to provide consistency in assessing trends toward meeting compliance goals. The in-lake monitoring design halted in 2012 was resumed in July 2015 using the four stations outlined in the approved Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan (LESJWA, 2006; **Figure 3-11**, **Table 3-10**). Two sites are located in the main body of the lake (CL07 near the dam and CL08 in the northern arm), and two in the East Bay (CL09 and CL10). Samples for analytical chemistry and chlorophyll-a were collected at all four sites, in addition to morning and afternoon in-situ water column profile readings.

Sampling in Canyon Lake was conducted bi-monthly (i.e., every other month) concurrent with the TMDL sampling in Lake Elsinore and was also coordinated with satellite overpass dates (see Section 3.4).

Site	Latitude	Longitude
CL07	33.678027°	-117.275135°
CL08	33.688211°	-117.268944°
CL09	33.681100°	-117.258892°
CL10	33.679495°	-117.250669°

 Table 3-10.
 Canyon Lake TMDL Monitoring Locations

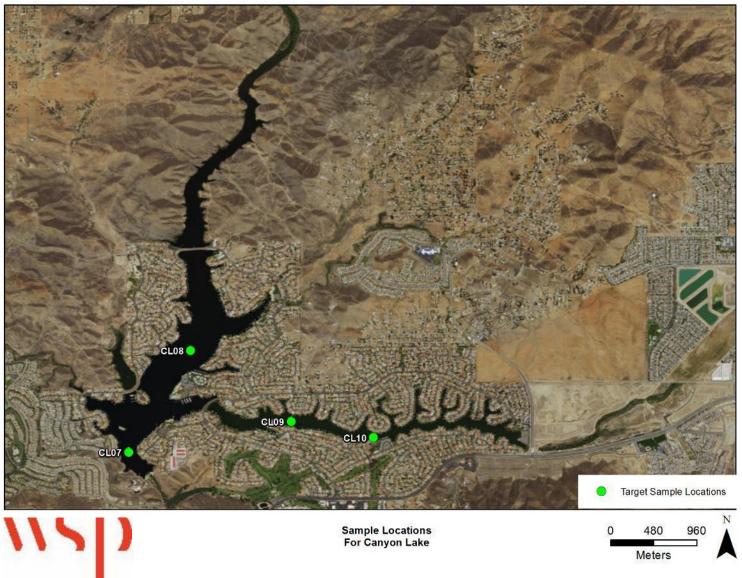


Figure 3-11. Canyon Lake Sampling Locations

3.4.2 Sampling Methods

Samples for analytical chemistry were collected in the same manner as in Lake Elsinore using a peristaltic pump to collect depth-integrated composite samples. Two samples were collected for chlorophyll-a: 1) a full depth-integrated composite sample; and 2) a 0-2-m depth-integrated composite surface sample. All analytical samples were held on wet ice immediately following collection and transferred to a local courier or shipping company on the same day of collection. Samples for analysis of nutrients, ammonia, sulfide, TDS, total suspended solids and chlorophyll-a were submitted to Weck Laboratories Inc., located in City of Industry, California with methods summarized in **Table 3-11**.

Beginning with the February 2017 sampling event, the TMDL Task Force directed that the preand post-alum application monitoring be integrated into the routine TMDL monitoring, given that the monitored analytes were largely identical to the TMDL monitoring, with the exception of aluminum and total suspended solids. Given this directive, total/dissolved aluminum and total suspended solids were added to the nutrient TMDL monitoring analyte list for all subsequent routine TMDL monitoring events on Canyon Lake. During the 2023-2024 monitoring period, Canyon Lake alum applications were performed during the weeks of October 2, 2023 and April 22, 2024. Pre-alum application monitoring events were performed on September 20, 2023 and on April 17, 2024. The subsequent respective bi-monthly TMDL events on October 10, 2023 and June 5, 2024 serving as the post-alum application monitoring.

In-situ water column profile data was recorded in the morning at all four Canyon Lake stations using pre-calibrated hand-held YSI field meters or equivalent for pH, temperature, DO, and specific conductivity at 1-m intervals throughout the water column. These data were used to assess lateral and vertical spatial variability within the lake. End-of-the-day water column profiles (i.e., after ~2:00pm) were also recorded for the same suite of in-situ parameters at all stations to assess any potential temporal variability in these parameters over the course of a day. Water clarity was also assessed with a Secchi disk at all stations. For water quality reporting purposes, the morning and afternoon in situ measurements were averaged at each site on each date.

Satellite imagery was used to remotely measure chlorophyll-a concentrations at the water surface in Canyon Lake.

Parameter	Analysis SOP #	Sampling Method			
	Analytical Chemistry	·			
Nitrite Nitrogen (NO2-N)	EPA 353.2	Depth Integrated			
Nitrate Nitrogen (NO ₃ -N)	EPA 353.2	Depth Integrated			
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	Depth Integrated			
Total Nitrogen (TN)	Calculated	Depth Integrated			
Ammonia Nitrogen (NH4-N)	EPA 350.1	Depth Integrated			
Sulfide	SM 4500S2 D	Depth Integrated			
Total Phosphorus (TP)	EPA 365.3	Depth Integrated			
Soluble Reactive Phosphorus (SRP / Ortho-P)	EPA 365.3	Depth Integrated			
Chlorophyll-a	SM 10200H	Surface (0-2m) & Depth Integrated			
Total Dissolved Solids (TDS)	SM 2540 C	Depth Integrated			
Total Suspended Solids (TSS)	SM 2540D	Depth Integrated			
Total Aluminum	EPA 200.7	Depth Integrated			
Dissolved Aluminum	EPA 200.7	Depth Integrated			

Table 3-11. In-lake Analytical Constituents and Methods for Canyon Lake (2023-2024)

Notes:

US EPA - United States Environmental Protection Agency; m- meter; SM- standard method

3.4.3 Water Quality Summary

A summary of the in-lake monitoring events for Canyon Lake for the period of July 1, 2023 to June 30, 2024 is presented below. A total of six events were sampled under the TMDL monitoring program, with three occurring in 2023 (August 01, October 10, and December 04) and three in 2024 (February 27, April 17, and June 05). Complete monthly water column profiles can be found in Appendix B. Detailed analytical chemistry lab reports for each event are contained in Appendix C. Satellite imagery reports for each event are provided in Appendix D. Current data in the context of historical water quality monitoring results from 2002-present are presented in Appendix E.

Water Column Profiles

A summary of water column profile mean values for each site and monitoring event are presented in **Tables 3-12 and 3-13**. A summary of water column profile mean values for each basin (i.e., Main Lake and East) are presented in **Tables 3-14 and 3-15**. Water column profile mean statistics for each site across the entire monitoring period are presented in **Table 3-16**. Mean water column values across the annual cycle are also summarized graphically in **Figures 3-12 to 3-16**. Mean profile values are gathered by averaging morning and afternoon readings across sites.

For the purposes of this report, the epilimnion is defined as the region of the water column above the thermocline, while the hypolimnion is the region of the water column below the thermocline, with both regions exhibiting relatively stable temperatures. The thermocline portion of the water column is defined as the region between the epilimnion and hypolimnion where a marked drop in temperature per unit of depth is evident (i.e., >1.0°C change over 1-m depth differential). Measurements within the thermocline were excluded from epilimnion and hypolimnion averaging.

Full water column means included data recorded from all three zones when stratification was present.

For both the Main Basin and East Basin, temperatures exhibited a similar pattern to the previous monitoring year with the lowest temperatures occurring during the winter months (December and February) and the highest temperatures in August and October. Dissolved oxygen concentrations (as water column mean) were relatively stable compared to the previous three monitoring years, remaining within a fairly narrow band across the monitoring period for both basins. As with previous years, the lake exhibited stratification in August and October 2023, becoming destratified December through April, before becoming stratified again in late Spring 2024 (**Figures 3-12 and 3-13**). When the thermocline develops, typically beginning in late spring and lasting through fall, DO concentrations within the epilimnion and hypolimnion diverge with hypolimnion concentrations falling substantially during that timeframe. Lake-wide water column mean DO for the current monitoring year was 5.3 mg/L, down from the mean of 6.7 mg/L in the 2022-2023 monitoring year. This year's DO concentration is more similar to the monitoring years of July 2018 to June 2021 (**Table 3-16**). The rolling 12-month DO concentration was never above the 2020 TMDL target of 5.0 mg/L in the hypolimnion (**Figure 3-14**). The rolling average of the full water column mean was above 5.0 mg/L for all monitoring dates (**Figure 3-15**).

Specific conductivity within the epilimnion and hypolimnion (when stratified) and the water column was stable through December. A large decline in specific conductivity was observed in February 2024 related to rainfall, followed by increases in April and June 2024. Mean specific conductivity in the full water column mean ranged from 465 to 813 μ S/cm and 786 to 971 μ S/cm, in the Main Basin and East Basin, respectively (**Tables 3-14 and 3-15, Figures 3-12 and 3-13**). Mean monthly full water column values for pH were similar between the two Basins, with values ranging from 7.64 to 8.42 and 7.17 to 8.05 for the East Basin and Main Basin, respectively.

Secchi depths between the two Basins showed slightly different patterns. A large increase in Secchi depth (increased clarity) was observed in October in the Main Basin, with a peak of 7.4 feet visibility, before decreasing through April to 1.8-ft. The East Basin had a steady decline in clarity from August through February before increasing then through June (**Figure 3-16**). The increase in water clarity within the Main Basin during the October 2023 event could be related to the alum application applied in the weeks prior to the event. The binding of phosphorus in the water column from alum applications reduces the available nutrients and in turn reduces the planktonic algae. This is also evident as chlorophyll-a exhibited a corresponding decline in October and December of 2023.

For further comparisons regarding in-situ water quality parameters, **Table 3-16** includes lake-wide averages observed for the current 2023-24 monitoring year, as well as the prior 5 monitoring years.

In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Table 3-12. Means for Each Site (August – December 2023)

				Aug-23			Oct-23			Dec-23	
Basin	Site	Measure	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
		Temp (°C)	19.5	29.4	13.0	18.7	22.8	13.2	14.9		
	CL07	Cond (µS/cm)	784	783	788	768	758	787	818		
	CLU7	pН	7.71	8.63	7.18	7.07	7.26	6.84	7.29		
Main Basin		DO (mg/L)	2.8	8.8	<u>0.0</u>	3.2	6.1	<u>0.0</u>	1.3		
Iviaiii Dasiii	CLO8	Temp (°C)	25.0	29.5	14.8	21.7	22.8	15.4	14.9		
	CI 08	Cond (µS/cm)	774	776	772	755	752	780	808		
	CLUB	pН	8.14	8.72	7.19	7.27	7.36	6.89	7.50		
		DO (mg/L)	4.8	8.5	<u>0.0</u>	4.4	5.5	<u>0.0</u>	4.6		
	CL09	Temp (°C)	25.5	29.5	15.2	21.4	22.6	16.3	14.4		
	CI 00	Cond (µS/cm)	924	887	988	913	894	978	957		
	CLO9 -	pН	7.97	8.49	7.09	7.40	7.59	6.75	7.63		
Fact Pacin		DO (mg/L)	4.9	7.7	<u>0.0</u>	4.7	6.1	<u>0.0</u>	5.1		
East Dasiri		Temp (°C)	29.8			23.4			14.6		
	CI 10	Cond (µS/cm)	901			921			986		
	CL10	рН	8.53			7.89			8.11		
		DO (mg/L)	7.9			9.1			8.8		
		Temp (°C)	24.9	29.4	14.3	21.3	22.8	15.0	14.7		
Lako wido A	ake-wide Average	Cond (µS/cm)	846	815	849	839	801	848	892		
Lake-wide A		рН	8.09	8.61	7.15	7.41	7.40	6.83	7.63		
		DO (mg/L)	5.1	8.3	<u>0.0</u>	5.3	5.9	<u>0.0</u>	5.0		

Notes:

Epi = epilimnion; Hypo = hypolimnion; -- not applicable due to lack of thermocline

2020 TMDL target for Dissolved Oxygen (DQ) is no less than 5 mg/L in the hypolimnion <u>Bold Underline</u> - Indicates exceedance of 2020 TMDL target *Italicize* – Indicates exceedance of Basin Plan Water Quality Objective

In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Site (February – June 2024) Table 3-13.

				Feb-24			Apr-24			Jun-24	
Basin	Site	Measure	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
		Temp (°C)	12.3			15.0			17.5	24.8	15.7
	CI 07	Cond (µS/cm)	484			586			635	652	635
	CL07	рН	7.60			7.93			7.76	9.16	7.76
Main Bacin	ti Basin ti	DO (mg/L)	4.5			4.4			2.6	10.1	<u>2.6</u>
IVIdili Dasili	the Basin A series of the formula in the Basin is the Bas	Temp (°C)	12.5			15.7			20.5	25.0	17.4
	CL08 CL08 CL08 CL08 CL09 CL09	Cond (µS/cm)	447			581			648	657	633
		рН	7.72			8.17			8.19	9.14	7.72
		DO (mg/L)	5.8			5.8			4.0	9.4	<u>1.9</u>
		Temp (°C)	13.2			16.0			20.4	24.8	13.7
	CI 00	Temp (°C) Cond (μS/cm) pH DO (mg/L) Temp (°C) Cond (μS/cm) pH	777			817			905	847	968
	CL09		7.79			8.21			8.07	9.00	7.09
Foot Doolo		DO (mg/L)	5.1			5.7			4.7	10.4	<u>0.0</u>
Edst Ddsin	Basin CL09 pH DO (mg/l	Temp (°C)	14.4			18.6			25.0		
	CI 10	Cond (µS/cm)	796			837			927		
	CL10 Cor	рН	8.08			8.63			8.50		
		DO (mg/L)	8.2			8.2			7.3		
		Temp (°C)	13.1			16.3			20.8	24.9	15.6
Lake-wid		Cond (µS/cm)	626			705			779	719	745
Average		рН	7.80			8.23			8.13	9.10	7.52
		DO (mg/L)	5.9			6.0			4.7	10.0	<u>1.5</u>

Notes:

Epi = epilimnion; Hypo = hypolimnion; -- not applicable due to lack of thermocline 2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion

Bold Underline - Indicates exceedance of 2020 TMDL target Italicize – Indicates exceedance of Basin Plan Water Quality Objective

Table 3-14. In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Basin (August – December 2023)

			Aug-23			Oct-23			Dec-23	
Basin	Measure	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
	Temp (°C)	22.2	29.4	13.9	20.2	22.8	14.3	14.9		
Main	Cond (µS/cm)	779	780	780	761	755	784	813		
IVIdIII	pН	7.92	8.67	7.18	7.17	7.31	6.86	7.40		
	DO (mg/L)	3.8	8.6	<u>0.0</u>	3.8	5.8	<u>0.0</u>	2.9		
	Temp (°C)	27.6	29.5	15.2	22.4	22.6	16.3	14.5		
Fast	Cond (µS/cm)	913	887	988	917	894	978	971		
East	рН	8.25	8.49	7.09	7.64	7.59	6.75	7.87		
	DO (mg/L)	6.4	7.7	<u>0.0</u>	6.9	6.1	<u>0.0</u>	7.0		
	Temp (°C)	24.9	29.5	14.5	21.3	22.7	15.3	14.7		
Lake-wide	Cond (µS/cm)	846	833	884	839	824	881	892		
Average	рН	8.09	8.58	7.13	7.41	7.45	6.81	7.63		
	DO (mg/L)	5.1	8.2	<u>0.0</u>	5.3	6.0	<u>0.0</u>	5.0		

Notes:

Epi = epilimnion; Hypo = hypolimnion; -- not applicable due to lack of thermocline

2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion

Bold Underline - Indicates exceedance of 2020 TMDL target

Italicize - Indicates exceedance of Basin Plan Water Quality Objective

Table 3-15. In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Basin (February – June 2024)

			Feb-24			Apr-24			Jun-24	
Basin	Measure	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
	Temp (°C)	12.4			15.4			19.0	24.9	16.6
Main	Cond (µS/cm)	465			584			642	655	634
IVIdIII	рН	7.66			8.05			7.97	9.15	7.74
	DO (mg/L)	5.1			5.1			3.3	9.8	<u>2.2</u>
	Temp (°C)	13.8			17.3			22.7	24.8	13.7
Fact	Cond (µS/cm)	786			827			916	847	968
East	рН	7.94			8.42			8.28	9.00	7.09
	DO (mg/L)	6.7			6.9			6.0	10.4	<u>0.0</u>
	Temp (°C)	13.1			16.3			20.8	24.9	15.1
Lake-wide	Cond (µS/cm)	626			705			779	751	801
Average	рН	7.80			8.23			8.13	9.07	7.41
	DO (mg/L)	5.9			6.0			4.7	10.1	<u>1.1</u>

Notes:

Epi = epilimnion; Hypo = hypolimnion; -- not applicable due to lack of thermocline 2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion

Bold Underline - Indicates exceedance of 2020 TMDL target

Table 3-16.In-Situ Water Quality Parameter Measurements for Canyon Lake - Annual
Mean Statistics for Each Site (August 2023 – June 2024) and Comparison to Previous
Monitoring Events

							•							
		Measure	CL07	CL08	Main Basin	CL09	CL10	East Basin	Lake-wide Average (July 2023- June 2024)	Lake-wide Average (July 2022- June 2023)	Lake-wide Average (July 2021- June 2022)	Lake-wide Average (July 2020- June 2021)	Lake-wide Average (July 2019- June 2020)	Lake-wide Average (July 2018- June 2019)
		Temp (°C)	12.3	12.5	12.4	22.8	14.8	18.8	15.6	11.3	12.4	12.8	12.1	11.6
	Min	Cond (µS/cm)	484	447	465	777	796	786	626	702	939	740	583	519
	IVIIII	рН	7.07	7.27	7.17	7.40	7.89	7.64	7.41	7.51	7.72	7.45	7.59	7.40
		DO (mg/L)	1.3	4.0	2.7	4.7	7.3	6.0	4.3	4.6	5.4	3.8	4.3	3.1
		Temp (°C)	19.5	25.0	22.2	25.5	29.8	27.6	24.9	26.2	25.6	24.3	24.6	26.7
Water Column	Max	Cond (µS/cm)	818	808	813	957	986	971	892	1157	1102	960	894	1069
Mean	IVIAX	рН	7.93	8.19	8.06	8.21	8.63	8.42	8.24	8.32	8.29	8.26	8.57	8.20
		DO (mg/L)	4.5	5.8	5.2	5.7	9.1	7.4	6.3	10.4	9.1	7.6	8.7	8.3
		Temp (°C)	16.3	18.4	17.3	18.5	21.0	19.7	18.5	18.2	19.4	18.9	17.8	18.6
	A	Cond (µS/cm)	679	669	674	882	895	888	781	969	1016	839	767	839
	Average	pН	7.56	7.83	7.70	7.85	8.29	8.07	7.88	7.98	8.04	7.92	8.05	7.85
		DO (mg/L)	3.1	4.9	4.0	5.0	8.2	6.6	5.3	6.7	7.2	5.4	5.8	5.5
		Temp (°C)	22.8	22.8	22.8	22.6		22.6	22.8	24.4	20.1	20.4	24.9	20.2
		Cond (µS/cm)	652	657	655	847	-	847	719	771	930	685	594	594
	Min	pH	7.26	7.36	7.31	7.59		7.59	7.40	8.34	8.20	8.21	8.58	8.40
		DO (mg/L)	6.1	5.5	5.8	6.1		6.1	5.9	7.2	7.9	7.7	7.3	6.7
		Temp (°C)	29.4	29.5	29.4	29.5		29.5	29.4	28.8	28.5	28.3	27.7	28.1
	Max	Cond (µS/cm)	783	776	780	894		894	818	1138	1077	923	716	920
Epilimnion	iviax	pH	9.16	9.14	9.15	9.00		9.00	9.10	8.58	8.60	9.13	9.55	8.91
		DO (mg/L)	10.1	9.4	9.8	10.4		10.4	10.0	8.2	10.6	11.2	11.0	9.1
		Temp (°C)	25.7	25.8	25.7	25.7		25.7	25.7	26.6	24.9	24.9	26.5	24.6
		Cond (µS/cm)	731	728	730	876		876	778	975	1012	803	660	734
	Average	pH	8.35	8.41	8.38	8.36		8.36	8.37	8.45	8.42	8.61	9.05	8.60
		DO (mg/L)	8.3	7.8	8.1	8.1		8.1	8.1	7.7	9.5	9.2	9.0	7.8
		Temp (°C)	13.0	14.8	13.9	13.7		13.7	13.8	13.1	13.2	13.7	14.3	12.5
		Cond (µS/cm)	635	633	634	968		968	745	832	923	800	760	657
	Min	pH	6.84	6.89	6.86	6.75		6.75	6.83	7.03	7.13	6.93	7.06	7.06
		DO (mg/L)	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.2
		Temp (°C)	15.7	17.4	16.6	16.3		16.3	16.5	17.2	19.5	16.9	14.9	17.2
	May	Cond (µS/cm)	788	780	784	988		988	852	1062	1056	942	788	888
Hypolimnion	Max	pH	7.76	7.72	7.74	7.09		7.09	7.52	7.21	7.49	7.29	7.35	7.21
		DO (mg/L)	2.6	1.9	2.2	0.0		0.0	1.5	0.1	1.0	0.8	0.2	0.3
		Temp (°C)	13.9	15.9	14.9	15.1		15.1	15.0	15.3	16.5	15.2	14.6	14.4
		Cond (µS/cm)	737	728	733	978		978	814	956	995	870	776	744
	Average	pH	7.26	7.26	7.26	6.97		6.97	7.17	7.11	7.29	7.10	7.22	7.14
		DO (mg/L)	0.9	0.6	0.7	0.0		0.0	0.5	0.1	0.4	0.2	0.1	0.2

Notes:

-- not applicable due to lack of thermocline

Values reported for epilimnion and hypolimnion are the arithmetic mean of measurements collected across all months sampled in which stratification was present. Main Basin = mean of Sites CL07 and CL08

East Basin = mean of Sites CL09 and CL10

2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion

Bold Underline - Indicates exceedance of 2020 TMDL target

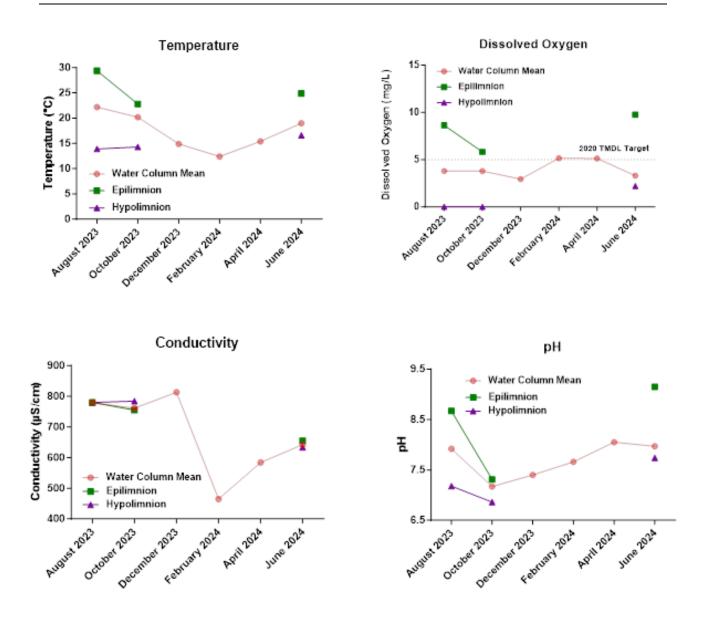


Figure 3-12. Mean In-Situ Physical Water Quality Parameters – Canyon Lake Main Basin (Values represent the mean of Sites CL07 & CL08. Missing epilimnion and hypolimnion values represent time periods when no stratification was present)

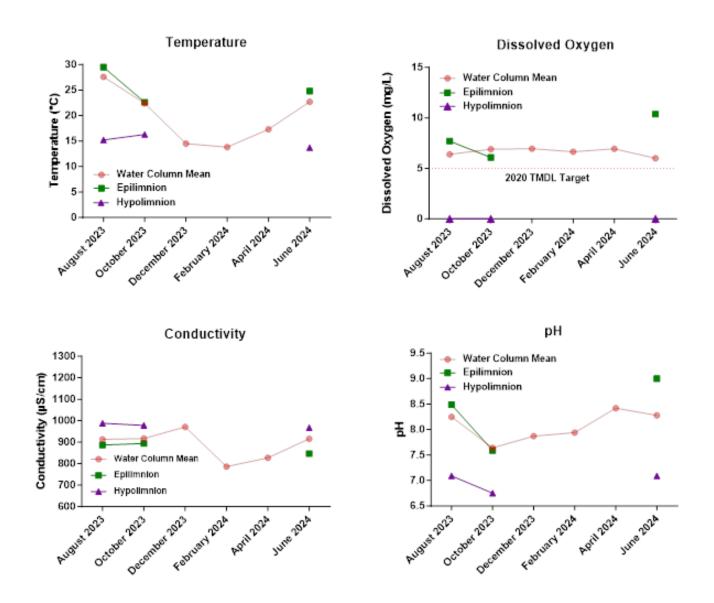


Figure 3-13. Mean In-Situ Physical Water Quality Parameters - Canyon Lake East Basin (Values represent the mean of Sites CL09 & CL10. Missing epilimnion and hypolimnion values represent time periods when no stratification was present.)

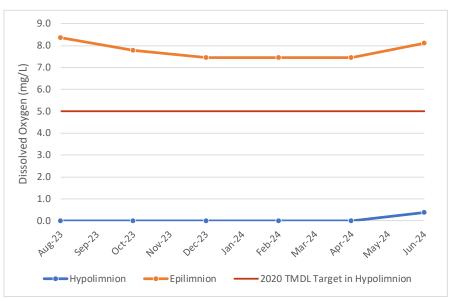


Figure 3-14. Rolling Average Concentrations of Dissolved Oxygen in the Epilimnion and Hypolimnion of Canyon Lake

Means are calculated by averaging the values from all 4 sites of each event with the previous five event values (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2022 to June 2024. Events in which a thermocline was not present were not included in rolling average.

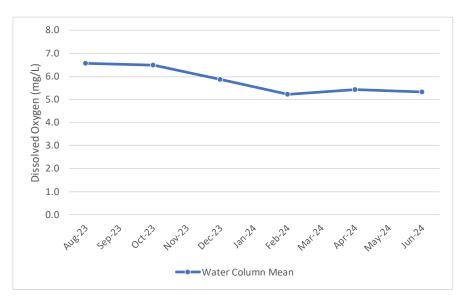


Figure 3-15. Rolling Average Concentration of Dissolved Oxygen - Full Vertical Water Column in Canyon Lake

Each data point is calculated by averaging the values from all 4 sites of each event with the previous five event values (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2022 to June 2024.

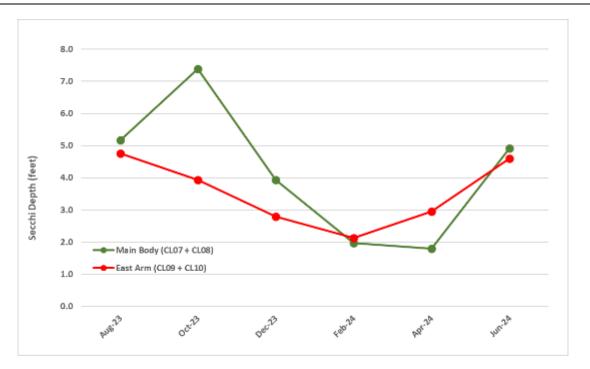


Figure 3-16. In-Situ Water Clarity Using a Secchi Disk– Main and East Basins

Analytical Chemistry

Analytical chemical concentration summaries for each monitoring event in Canyon Lake are presented in **Tables 3-17 and 3-18**. A summary of analytical chemistry mean statistics for each site across the entire monitoring period is presented in **Tables 3-19 through 3-21**. Concentrations of analytes are presented graphically in **Figures 3-17 and 3-18**.

Depth-integrated concentrations of individual total nitrogen samples in the Main Basin (Sites CL07 and CL08) ranged from 0.8 to 2.3 mg/L across the six sampling events, with a Main Basin annual mean of 1.5 mg/L (slight increase from the 2022-23 annual mean of 1.4 mg/L). Individual total nitrogen sample concentrations within the East Basin ranged from 0.8 to 2.6 mg/L across the six sampling events, with an annual mean of 1.5 mg/L (remaining the same as the 2022-23 annual mean). Lake-wide rolling average for total nitrogen saw an initial decrease in concentrations from the prior monitoring year before steadily increasing over the last few events. 10-year rolling average concentrations of total nitrogen over the past 5 years ranged from 1.3 to 1.6 mg/L; all exceeding the current 2020 TMDL target of 0.75 mg/L (**Figure 3-19**).

Depth-integrated total phosphorus concentrations in both basins remained low and relatively stable across the first three months of the monitoring period, but then rose sharply in February and April 2024 before dropping in June in the East Basin. The period between the December 2023 and April 2024 sampling events is when the majority of the rain fell in the region and likely contributed to the spike in total phosphorus. The total suspended solids increased in February 2024 likely as a result of the suspended fine sediment load brought into the lake by storm flows and could have been responsible for the increase in total phosphorus (i.e., elemental phosphorus). As total suspended solids began to decrease by April, total phosphorus levels

remained steady before decreasing (East Basin only). Total phosphorus concentrations of individual samples in the Main Basin ranged from 0.04 to 0.32 mg/L, with an annual Main Basin mean of 0.19 mg/L (an increase from the 2022-23 annual mean of 0.09 mg/L). Total phosphorus concentrations in the East Basin ranged from 0.03 to 0.43 mg/L, with an annual mean of 0.19 mg/L (an increase from the 2022-23 annual mean of 0.13 mg/L). Total phosphorus concentrations in the East Basin ranged from 0.03 to 0.43 mg/L, with an annual mean of 0.19 mg/L (an increase from the 2022-23 annual mean of 0.13 mg/L). The lake-wide rolling average for total phosphorus in Canyon Lake ranged from 0.12 to 0.19 mg/L (**Figure 3-19**). 10-yr rolling average values over the past 5-years were all above the current 2020 TMDL target of 0.1 mg/L.

During the 2023-2024 monitoring year, two alum applications occurred in Canyon Lake. The first during the week of October 2, 2023, with pre-alum application water quality monitoring occurring before the application and being conducted by the application team. The second alum application was during the week of April 22, 2024, with the pre-alum monitoring occurring on April 17, 2024. Total phosphorus had a notable decrease following the first alum treatment in both basins, while a substantial decrease was noted only in the East Basin after the second application. Total phosphorus in the main basin following the second alum treatment remained steady after the April 2024 application. The regular application of alum since September 2013 has served to reduce the annual mean water column total phosphorus concentration in Canyon Lake in comparison to those measured prior to the alum applications (see historical figures in Appendix E).

Although pre-alum monitoring indicated good conditions for application, shortly following the April 2024 alum application a minor and transient fish die-off of exclusively shad occurred. As a conservative measure, WSP mobilized field staff to visit the lake at the request of Lake Elsinore and San Jacinto Watersheds Authority (LESJWA) staff to investigate a potential cause of the fish die off. While many factors were evaluated including, harmful algal blooms, as well as concentrations of DO, ammonia, and aluminum, no single definitive factor was identified as a cause for the limited die off of threadfin shad observed in late April 2024. Observations of elevated pH, and low DO in deeper waters, along with results showing higher concentrations of total aluminum, suggest that this alum application might be one of several possible causes. While the aluminum concentrations measured following the fish die off were below the EPA acute CMC. two of the three samples were only 100 µg/L below it and were greater than the CCC (samples collected at Sierra Park and Northern Causeway). These results indicate that it was possible the aluminum concentration could have exceeded the acute CMC for a short time period in limited portions of the lake, resulting in a limited short-term fish die off. It should be noted there have been prior samples collected in Canyon Lake with much higher aluminum concentrations (up to 6,300 ug/L) with no associated fish die off. A detailed technical memorandum summarizing the fish die-off investigation is included in Appendix F.

Depth-integrated concentrations of total ammonia in the Main Basin (Sites CL07 and CL08) ranged from 0.4 to 1.7 mg/L across the six sampling events, with a Main Basin annual mean of 0.60 mg/L (a slight increase from the 2022-23 annual mean of 0.56 mg/L). Individual total ammonia sample concentrations within the East Basin ranged from ND (<0.017) to 1.8 mg/L across the six sampling events, with an annual mean of 0.58 mg/L (up from the 2022-23 annual mean of 0.47 mg/L). Concentrations showed a similar pattern to previous years with the highest values in August, a decrease across the winter months, and then an increase in spring. This pattern is likely tied to the annual stratification cycle of the lake, where the Main Basin exhibits a stratification beginning in early spring (April) through early Fall (October). During this time low dissolved oxygen in the hypolimnion facilitates the release of phosphorus and ammonia from the

sediments. Due to the increased depths in the Main Basin, stronger stratification develops accounting for higher ammonia concentrations (particularly at the deepest Site CL07) and longer periods of stratification. The total ammonia concentrations of 1.6 mg/L (June 2023) at Site CL09 exceeded the corresponding CCC objectives of 1.57 mg/L (**Table 3-17**). This same site exceeded the CCC during the previous monitoring year in August and October 2022. No other total ammonia concentrations exceeded the CCC or CMC.

Total dissolved solids concentration in both basins remained somewhat stable between August and December 2023. Both basins displayed a decrease in TDS from December to February as a result of winter storms, with the Main Basin exhibiting a sharper decline due to its higher volume input from the San Jacinto River. The TDS concentration of individual samples in the Main Basin ranged from 260 to 500 mg/L, with an average of 405 mg/L. The average concentration of individual sample TDS in the East Basin were slightly higher, ranging from 480 to 610 mg/L, with a average of 550 mg/L. All individual samples lake-wide fell below the Basin Plan water quality objective of 700 mg/L for TDS for Canyon Lake.

Mean chlorophyll-a concentrations in both basins exhibited a steady decline August through December 2023. Once falling below the 2020 TMDL target of 25 μ g/L in October 2023, the mean depth-integrated concentration in the Main Basin remained below the target for the remainder of the monitoring year. The mean chlorophyll-a concentration in the East Basin also dropped below 25 μ g/L in October 2023 but exhibited an increase to 41 and 34 μ g/L in April and June 2024, respectively. The depth-integrated concentration of individual samples in the Main Basin across all six sampling events ranged from ND (<1.0 μ g/L) to 34 μ g/L, with a mean of 16 μ g/L (**Figure 3-18**). Depth-integrated chlorophyll-a samples in the East Basin ranged from ND (<1.0 μ g/L) to 80 μ g/L, with an annual mean of 27 μ g/L. Rolling 10-year average concentrations of depth-integrated lake-wide chlorophyll-a remained below the 2020 TMDL target of 25 μ g/L for the entire monitoring period (**Figure 3-19**). Monthly average lake-wide depth-integrated chlorophyll-a concentrations were also below with the 2020 TMDL target except for June 2024 (25.1 μ g/L).

Concentrations of total and dissolved aluminum are measured in Canyon Lake to assess any potential long-term influence that the alum additions may have on water column aluminum concentrations relative to existing water quality objectives. Concentrations of total aluminum individual samples ranged from 25 to 840 μ g/L in the Main Basin and 70 to 310 μ g/L in the East Basin.

All total aluminum concentrations measured as part of the TMDL monitoring events were below calculated chronic Criteria Continuous Concentration (CCC) and acute Criteria Maximum Concentration (CMC) values based on the US EPA's Final Aquatic Life Ambient Water Quality Criteria for Aluminum⁴ (US EPA, 2018) when using the water column mean pH for each station/date combination, and a default total organic carbon and hardness value. Dissolved aluminum concentrations ranged from ND (<0.041 μ g/L) to 110 μ g/L in the Main Basin and ND (<0.041 μ g/L) to 250 μ g/L in the East Basin.

⁴ Aquatic Life Criteria - Aluminum | US EPA

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Table 3-17. Analytical Chemistry Results for Canyon Lake - Monthly Depth-Integrated Results (Aug – Dec 2023)

				Depth		Augus	st 2023			Octobe	er 2023			Decemi	ber 2023	
Compound	Units	MDL	RL	Integrated or	Main	Basin	East	Basin	Main	Basin	East	Basin	Main	Basin	East	Basin
Compound	Ginto	ind L		Surface Sample	CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10
							General (Chemistry								
Total Dissolved Solids	mg/L	4.0	10	DI	500	500	600	540	470	450	550	580	500	490	600	610
Total Suspended Solids	mg/L	5.0	5.0	DI	4.0J	4.0J	6.0	4.0J	4.0J	2.0J	6.0	6.0	3.0J	4.0J	6.0	7.0
Sulfide	mg/L	0.05-0.5	0.1	DI	3.5	0.30	3.5	ND<0.05	10	2.5	6.0	ND<0.05	0.90	ND<0.05	ND<0.05	ND<0.05
Nitrate as N	mg/L	0.04	0.2	DI	ND<0.04	ND<0.04	0.042J	0.11J	ND<0.04	0.052J	0.044J	ND<0.04	ND<0.04	0.048J	0.063J	0.078J
Nitrite as N	mg/L	0.042	0.1	DI	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.042
Total Kjeldahl Nitrogen	mg/L	0.065	0.1	DI	1.5	0.76	1.5	0.72	2.3	0.89	2.6	0.81	1.3	1.0	1.1	0.97
Total Nitrogen ^a	mg/L	NA	NA	DI	1.5	0.8	1.5	0.83	2.3	0.94	2.6	0.81	1.3	1.0	1.2	1.0
Ammonia-Nitrogen	mg/L	0.017	0.1	DI	0.88	0.04J	0.72	0.02J	1.7	0.33	1.8	0.02J	0.74	0.42	0.36	0.21
Unionized Ammonia ^b	mg/L	NA	NA	DI	0.015	0.003	0.035	0.004	0.007	0.003	0.018	0.001	0.004	0.003	0.004	0.005
Ortho Phosphate Phosphorus	mg/L	0.007	0.01	DI	0.13	0.03	0.05	ND<0.0071	0.14	0.03	0.11	0.01J	0.02	0.01	0.01	0.01
Total Phosphorus	mg/L	0.0067	0.01	DI	0.16	0.06	0.10	0.03	0.17	0.06	0.18	0.05	0.05	0.04	0.05	0.06
Total Aluminum	ug/L	22	50	DI	68	97	92	130	110	150	180	300	25J	44J	110	160
Dissolved Aluminum	ug/L	41	50	DI	58	85	71	110	51	110	140	250	ND<41	ND<41	ND<41	ND<41
							Chloro	phyll-a	-							
Chlorophyll-a	µg/L	NA	1.0	Surf (0-2m)	11.8	14.4	11	12	5.3	6	15	8	6	12	14	14
Chlorophyll-a	µg/L	NA	1.0	DI	25	34	65	10	10	14	24	18	6	14	14	16

Notes:

When a concentration was non-detect (ND), the annual mean value for compliance purposes was calculated by converting ND values to zero. If the result of the calculated mean was non-zero, but below the corresponding MDL, the mean value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - The concentration of unionized ammonia was calculated using equation by Thursby (1986), based on site specific pH and temperature recorded at each location.

ND - Not detected; NA - Not Applicable/ available

DI = Depth integrated; Surf = Surface 0-2m

µg/L - micrograms per liter; mg/L - milligrams per liter; MDL - method detection limit; RL - reporting limit; J - Reported value is an estimate detection was above the MDL, but below the RL

Table 3-18. Analytical Chemistry Results for Canyon Lake- Monthly Depth-Integrated Results (Feb – June 2024)

				Depth		Februa	ary 2024			April	2024			June	2024	
Compound	Units	MDL	RL	Integrated or	Main	Basin	East	Basin	Main	Basin	East	Basin	Main	Basin	East	Basin
				Surface Sample	CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10
							General C	hemistry								
Total Dissolved Solids	mg/L	4.0	10	DI	270	260	480	540	350	330	500	510	370	370	530	560
Total Suspended Solids	mg/L	5	5	DI	12	13	6.0	9.0	ND<5.0	6.0	ND<5.0	7.0	ND<5.0	6.0	6.0	6.0
Sulfide	mg/L	0.05-0.5	0.1	DI	ND<0.05	ND<0.05	ND<0.05	ND<0.05	0.1	ND<0.05	2.0	0.2	0.4	0.4	0.6	ND<0.0
Nitrate as N	mg/L	0.022 - 0.04	0.2	DI	0.67	0.69	0.59	0.66	0.088J	1.1	0.056J	0.070J	ND<0.04	ND<0.04	ND<0.04	ND<0.0
Nitrite as N	mg/L	0.029 - 0.042	0.1	DI	ND<0.042	ND<0.042	ND<0.042	ND<0.042	ND<0.029	0.11J	ND<0.029	ND<0.029	ND<0.042	ND<0.042	ND<0.042	ND<0.0
Total Kjeldahl Nitrogen	mg/L	0.065	0.1	DI	1.1	0.82	1.2	1.2	1.1	0.87	2.1	1.2	2.0	1.4	2.5	0.87
Total Nitrogen ^a	mg/L	NA	NA	DI	1.8	1.5	1.8	1.9	1.2	2.1	2.2	1.3	2.0	1.4	2.5	0.87
Ammonia-Nitrogen	mg/L	0.017	0.1	DI	0.16	0.11	0.42	0.31	0.61	0.21	1.3	0.22	1.3	0.72	<u>1.6*</u>	ND <0.0
Unionized Ammonia ^b	mg/L	NA	NA	DI	0.001	0.001	0.005	0.007	0.012	0.008	0.063	0.021	0.024	0.030	0.067	ND
Ortho Phosphate Phosphorus	mg/L	0.007	0.01	DI	0.25	0.24	0.36	0.34	0.28	0.19	0.38	0.24	0.29	0.21	0.20	0.01
Total Phosphorus	mg/L	0.0067	0.01	DI	0.29	0.29	0.39	0.37	0.31	0.25	0.43	0.33	0.32	0.25	0.26	0.064
Total Aluminum	ug/L	22	50	DI	770	840	220	310	41J	75	73	70	77	130	150	240
Dissolved Aluminum	ug/L	41	50	DI	71	99	ND<41	ND<41	ND<41	ND<41	ND<41	ND<41	78	110	130	240
	•	· ·			•		Chloro	phyll-a	•		•		•			•
Chlorophyll-a	µg/L	NA	1.0	Surf (0-2m)	43	58	34	27	23	19	9	139	11	14	16	18
Chlorophyll-a	µg/L	NA	1.0	DI	21	21	11	11	8	8	3	80	17	17	47	20

Notes:

When a concentration was non-detect (ND), the annual mean value for compliance purposes was calculated by converting ND values to zero. If the result of the calculated mean was non-zero, but below the corresponding MDL, the mean value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - The concentration of unionized ammonia was calculated using equation by Thursby (1986), based on site specific pH and temperature recorded at each location.

c - Sample measured out of holding time

ND - Not detected; NA - Not Applicable/ available

DI = Depth integrated; Surf = Surface 0-2m

µg/L - micrograms per liter; mg/L - milligrams per liter; MDL - method detection limit; RL - reporting limit; J - Reported value is an estimate detection was above the MDL, but below the RL

* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC (ammonia exceedance is on an event basis due to its reliance upon pH and temperature at the time of collection)

Table 3-19. Analytical Chemistry Results for Canyon Lake - Annual Mean Statistics for Each Site in the Main Basin

					Depth		CL07			CL08			Main Basin	
Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Integrated or Surface Sample	Min	Max	Avg	Min	Max	Avg	Min	Мах	Avg
					Gene	ral Chemistry								
Total Dissolved Solids	mg/L	4.0	10	700 ²	DI	270	500	410	260	500	400	260	500	405
Total Suspended Solids	mg/L	NA	5	NA	DI	ND (<5)	12.0	3.8	ND (<5)	13	6	ND (<5)	13	5
Sulfide	mg/L	0.05-0.5	0.1	NA	DI	ND (<0.05)	10.0	2.5	ND (<0.05)	2.5	0.53	ND (<0.05)	10.0	1.5
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.67	0.13	ND (<0.04)	1.10	0.32	ND (<0.04)	1.10	0.22
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	0.00	0.00	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	0.11	0.009
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	NA	DI	1.10	2.3	1.6	0.76	1.4	1.0	0.76	2.3	1.3
Total Nitrogen ^a	mg/L	NA	NA	0.75 ^{b1}	DI	1.2	2.3	<u>1.7</u>	0.76	2.1	<u>1.3</u>	0.76	2.3	<u>1.5</u>
Ammonia-Nitrogen	mg/L	0.017	0.1	2004- CMC: 3.08-34.17 ^{c1} ; CCC:0.49-4.95 ^{c1}	DI	0.16	1.7	0.9	0.04	0.72	0.31	0.04	1.7	0.60
Unionized Ammonia ^c	mg/L	NA	NA	NA	DI	0.001	0.024	0.011	0.001	0.030	0.008	0.001	0.030	0.009
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	0.016	0.29	0.18	ND (<0.003)	0.24	0.12	ND (<0.003)	0.29	0.15
Total Phosphorus	mg/L	0.0067	0.01	0.1 ^{b1}	DI	0.05	0.32	<u>0.22</u>	0.04	0.29	<u>0.16</u>	0.04	0.32	<u>0.19</u>
Total Aluminum	ug/L	22-41	50	NA	DI	25	770	182	44	840	223	25	840	202
Dissolved Aluminum	ug/L	41	50	NA	DI	ND (<41)	78	43	ND (<41)	110	67	ND (<41)	110	55
					Ch	lorophyll-a								
Chlorophyll-a	µg/L	NA	1.0	25 ^{b1}	Surf (0-2m)	ND (<1.0)	43	17	ND (<1.0)	58	21	ND (<1.0)	58	19
Chlorophyll-a	µg/L	NA	1.0	25 ^{b1}	DI	ND (<1.0)	25	15	ND (<1.0)	34	18	ND (<1.0)	34	16

Notes:

When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the average value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - Annual average

c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable to annual means.

1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL

2 - Santa Ana Region Basin Plan Objective

NA - Not applicable/ available; ND - not detected

DI = Depth integrated; Surf = Surface 0-2m

mg/L - micrograms per liter; ug/L - milligrams per liter; MDL - method detection limit; RL - reporting limit; J - Reported value was detected above the MDL, but below the RL

Bold Underline - Indicates exceedance of 2020 TMDL target. TN, TP, and CHL-a TMDL criteria are all based on annual average. Ammonia TMDL criteria are based on sample specific calculated criteria based pH and temperature at the time of collection.

Table 3-20. Analytical Chemistry Results for Canyon Lake - Annual Mean Statistics for Each Site in the East Basin

					Depth		CL09			CL10			East Basin	
Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Integrated or Surface Sample	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
					Gene	ral Chemistry								
Total Dissolved Solids	mg/L	4.0	10	700 ²	DI	480	600	543	510	610	557	480	610	550
Total Suspended Solids	mg/L	NA	5	NA	DI	0.0	6.0	5.0	4.00	9	6.5	0.00	9	5.8
Sulfide	mg/L	0.05-0.5	0.1	NA	DI	ND (<0.05)	6.0	2.0	ND (<0.05)	0.20	0.03	ND (<0.05)	6.0	1.0
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.59	0.13	ND (<0.04)	0.66	0.15	ND (<0.04)	0.66	0.14
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	NA	DI	1.1	2.6	1.8	0.72	1.2	1.0	0.72	2.6	1.4
Total Nitrogen ^a	mg/L	NA	NA	0.75 ¹	DI	1.2	2.6	<u>2.0</u>	0.00	1.9	<u>1.0</u>	0.81	<u>2.6</u>	<u>1.5</u>
Ammonia-Nitrogen	mg/L	0.017	0.1	2004- CMC: 3.08-34.17 ^{c1} ; CCC:0.49-4.95 ^{c1}	DI	0.36	1.8	1.03	ND (<0.017)	0.31	0.13	ND (<0.017)	1.8	0.58
Unionized Ammonia ^c	mg/L	NA	NA	NA	DI	0.0	0.067	0.03	0.0	0.02	0.01	0.0	0.07	0.02
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	ND (<0.003)	0.38	0.18	ND (<0.003)	0.34	0.10	ND (<0.003)	0.38	0.14
Total Phosphorus	mg/L	0.0067	0.01	0.1 ¹	DI	0.05	0.43	<u>0.24</u>	0.03	0.37	<u>0.15</u>	0.03	0.43	<u>0.19</u>
Total Aluminum	ug/L	22-41	50	NA	DI	73	220	138	70	310	202	70	310	170
Dissolved Aluminum	ug/L	41	50	NA	DI	ND (<41)	ND (<41)	ND (<41)	ND (<41)	250	100	ND (<41)	250	78
					Ch	lorophyll-a								
Chlorophyll-a	µg/L	NA	1.0	25 ¹	Surf (0-2m)	ND (<1.0)	34	16	ND (<1.0)	139	<u>36</u>	ND (<1.0)	139	<u>26</u>
Chlorophyll-a	µg/L	NA	1.0	25 ¹	DI	ND (<1.0)	65	<u>27</u>	ND (<1.0)	80	<u>26</u>	ND (<1.0)	80	<u>27</u>

Notes:

When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the average value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - Annual average

c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable to annual means.

1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL

2 - 2015 TMDL Target, based on Table 5-9n of 2004 TMDL

3 - Santa Ana Region Basin Plan Water Quality Objective

NA - Not applicable/ available; ND - not detected

DI = Depth integrated; Surf = Surface 0-2m

mg/L - micrograms per liter; ug/L - milligrams per liter; MDL - method detection limit; RL - reporting limit; J - Reported value was detected above the MDL, but below the RL

Bold Underline - Indicates exceedance of 2020 TMDL target. TN, TP, and CHL-a TMDL criteria are all based on annual average. Ammonia TMDL criteria are based on sample specific calculated criteria based pH and temperature at the time of collection.

Table 3-21. Analytical Chemistry Results for Canyon Lake - Annual Mean Statistics for Main and East Basins

Compound	Units	MDL	RL	Basin Plan WQO or	Depth Integrated or		Main Basin			East Basin		La	ake-wide Avera	ge
Compound	Units	MDL	KL	TMDL Target	Surface Sample	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
					Ge	eneral Chemistry	,							
Total Dissolved Solids	mg/L	4.0	10	700 ²	DI	260	500	405	480	610	550	260	610	478
Total Suspended Solids	mg/L	NA	5	NA	DI	ND (<5)	13	4.8	0.00	9	5.8	ND (<5)	13	5.3
Sulfide	mg/L	0.05-0.5	0.1	NA	DI	ND (<0.05)	10	1.5	ND (<0.05)	6.0	1.0	ND (<0.05)	10	1.3
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	1.1	0.22	ND (<0.04)	0.66	0.14	ND (<0.04)	1.1	0.18
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	0.11	0.01	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	0.11	0.005
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	NA	DI	0.8	2.3	1.3	0.7	2.6	1.4	0.7	2.6	1.3
Total Nitrogen ^a	mg/L	NA	NA	0.75 ¹	DI	0.76	2.3	<u>1.5</u>	0.00	2.6	<u>1.5</u>	0.00	2.6	<u>1.5</u>
Ammonia-Nitrogen	mg/L	0.017	0.1	2004- CMC: 3.08-34.17 ^{c1} ; CCC:0.49-4.95 ^{c1}	DI	0.04	1.7	0.6	ND (<0.017)	1.8	0.58	ND (<0.017)	1.8	0.6
Unionized Ammonia ^c	mg/L	NA	NA	NA	DI	0.0	0.03	0.01	0.0	0.07	0.02	0.0	0.07	0.01
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	ND (<0.003)	0.29	0.15	ND (<0.003)	0.38	0.14	ND (<0.003)	0.38	0.15
Total Phosphorus	mg/L	0.0067	0.01	0.1 ¹	DI	0.04	0.32	<u>0.19</u>	0.03	0.43	<u>0.19</u>	0.03	0.43	<u>0.19</u>
Total Aluminum	ug/L	22-41	50	NA	DI	25	840	202	70	310	170	25	840	186
Dissolved Aluminum	ug/L	41	50	NA	DI	ND (<41)	110	55	ND (<41)	250	78	ND (<41)	250	67
				·		Chlorophyll-a		•						<u>.</u>
Chlorophyll-a	µg/L	NA	1.0	25 ¹	Surf (0-2m)	ND (<1.0)	58	19	ND (<1.0)	139	<u>26</u>	ND (<1.0)	139	22
Chlorophyll-a	µg/L	NA	1.0	25 ¹	DI	ND (<1.0)	34	16	ND (<1.0)	80	27	ND (<1.0)	80	21

Notes:

When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the average value was reported as ND.

a - Total Nitrogen = TKN+NO₂+NO₃

b - Annual average

c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable to annual means.

1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL

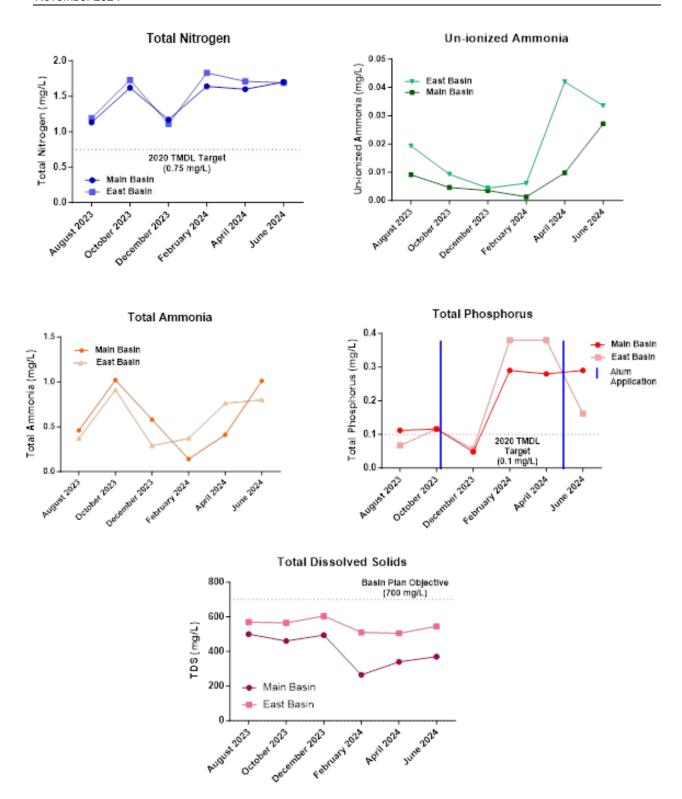
2 - Santa Ana Region Basin Plan Water Quality Objective

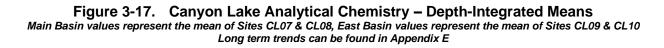
NA - Not applicable/ available; ND - not detected

DI = Depth integrated; Surf = Surface 0-2m

mg/L - micrograms per liter; ug/L - milligrams per liter; MDL - method detection limit; RL - reporting limit; J - Reported value was detected above the MDL, but below the RL

Bold Underline - Indicates exceedance of 2020 TMDL target. TN, TP, and CHL-a TMDL criteria are all based on annual average. Ammonia TMDL criteria are based on sample specific calculated criteria based pH and temperature at the time of collection.





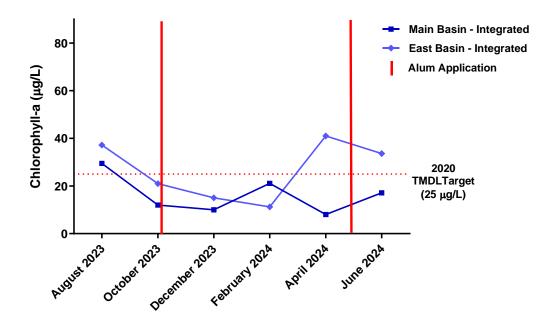


Figure 3-18. Canyon Lake Analytical Chemistry – Depth-Integrated Chlorophyll-a

Main Basin values represent the mean of Sites CL07 & CL08, East Basin values represent the mean of Sites CL09 & CL10 Long term trends can be found in Appendix E

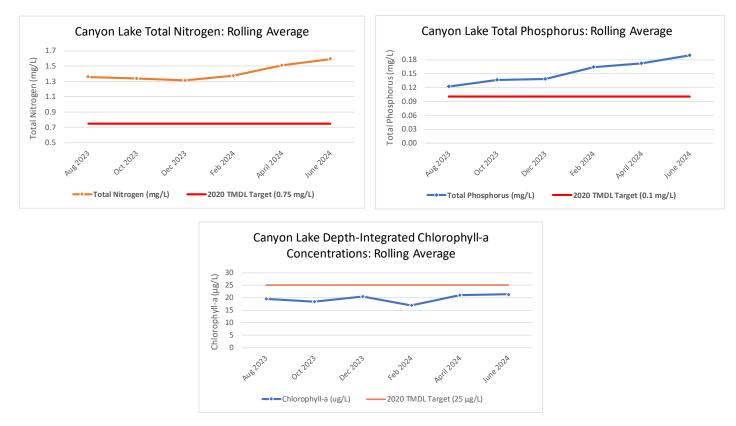


Figure 3-19. Canyon Lake Lake-wide Analytical Chemistry- Rolling Averages

Each data point is calculated by averaging the value from each event across all 4 sites with the previous five events across all 4 sites (i.e., one year of data) to obtain a rolling average. Therefore, each graph represents data collected from October 2022 to June 2024.

3.5 Satellite Imagery

In 2015-2016 and following, the TMDL Task Force contracted with satellite vendor EOMAP to conduct remote sensing using LandSat and Sentinel-2 satellite imagery to estimate chlorophyll-a and turbidity concentrations in Lake Elsinore and Canyon Lake. Using 30-m (LandSat) or 10-m (Sentinel-2) pixel resolution, this effort produced maps of the lakes showing graphical, color-coded images of chlorophyll-a and turbidity concentrations at up to approximately 1,000 unique data points across Canyon Lake and approximately 11,000 unique data points across Lake Elsinore. This tool provides a snapshot of conditions throughout the lakes at a given point in time, as opposed to the single data points provided at water quality collection locations and dates. The satellite images are also able to provide a sense of the relative variability in algae concentrations across the lake that can be rather dramatic and missed by measuring individual values from only a few discrete locations. However, the satellite imagery only represents approximately the upper 3-ft of the water column depending on water clarity, and therefore cannot completely replace manual sampling where depth-integrated values are required.

As part of the TMDL compliance monitoring, satellite imagery depicting surficial lake-wide chlorophyll-a and turbidity concentrations in Lake Elsinore and Canyon Lake were generated for

each in-lake monitoring event. Satellite images for each lake during the eight monitoring events evaluated in the report are presented in **Figures 3-20 and 3-21**. Spatial variability in chlorophylla is evident, providing a more complete assessment of algal density conditions across each lake.

To quantify the data presented in the satellite images, cumulative frequency distribution (CDF) plots showing lake-wide chlorophyll-a concentrations based on individual pixel data from the satellite measurements are provided in **Figures 3-22 and 3-23**. Satellite derived mean and median concentrations along with measured in-lake chlorophyll-a concentrations in the surface composite (0-2m) sample are provided for each date showing how these single samples compare to concentrations throughout the entire lake. Mean and median lake-wide values were derived from satellite imagery data treating each pixel as a unique individual data point.

The satellite images for Lake Elsinore show mid to high concentrations of chlorophyll-a in July 2023, then a decrease in August. Images for September through December show an increase, and then a significant decline in chlorophyll-a in February. Satellite imagery then shows low chlorophyll-a concentrations through June. These patterns largely match the in-lake surface analytical values. The increase in surface analytical chlorophyll-a concentration in April to $85 \mu g/L$ was not identified with satellite imagery at the location of Site LE02. It is possible that a small patch of algae may have "spiked" this sample causing an analytical concentration that did not represent average the lower spatial average concentration of chlorophyll-a in the area near Site LE02.

Generally, the chlorophyll-a concentrations derived from Canyon Lake satellite imagery matched the in-lake analytical concentrations. The one exception to this was in February 2024 which showed high chlorophyll-a throughout much of the Main Basin. Higher satellite derived chlorophyll-a concentrations were also observed during February in the San Jacinto River just upstream of the causeway separating the Main Body of the lake from the North Ski Basin. A large series of storms had hit the region between January and February 2024 carrying large amounts of flow and suspended sediment likely causing interference with the satellite imagery due to the highly turbid water within the river and lake. It is unlikely that lake-wide chlorophyll-a concentrations in the Main Body which were 21 μ g/L at both CL07 and CL08 for this sampling event.

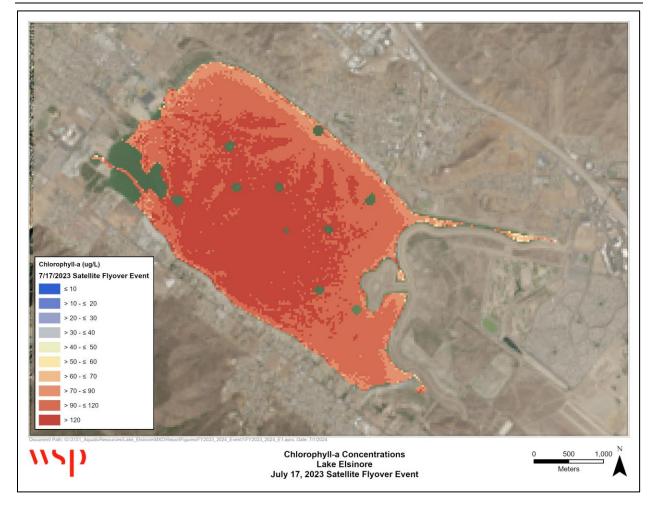


Figure 3-20a. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore

(Data gaps are due to sun glare)

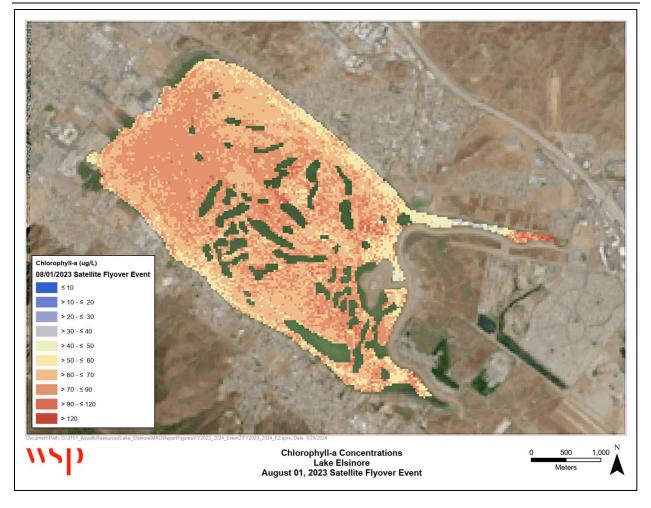


Figure 3-20b. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

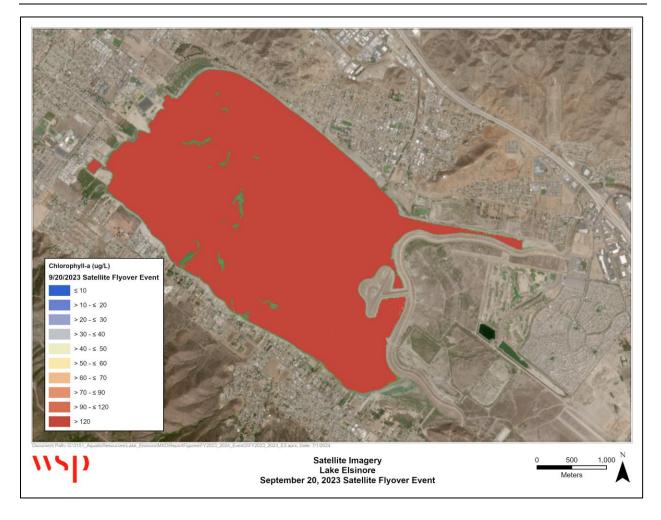


Figure 3-20c. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

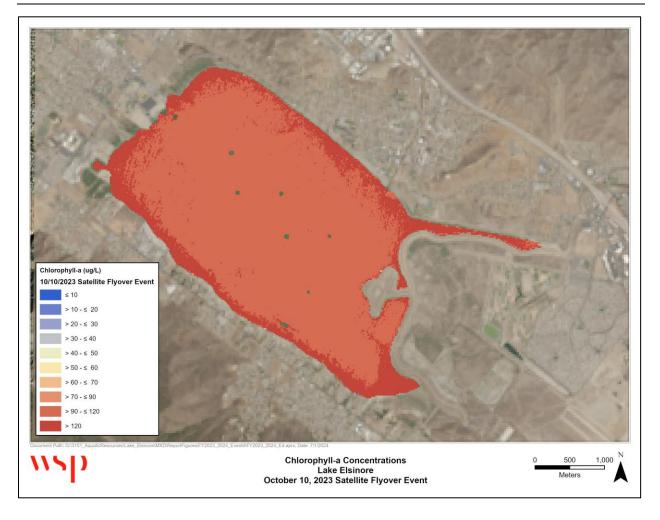


Figure 3-20d. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

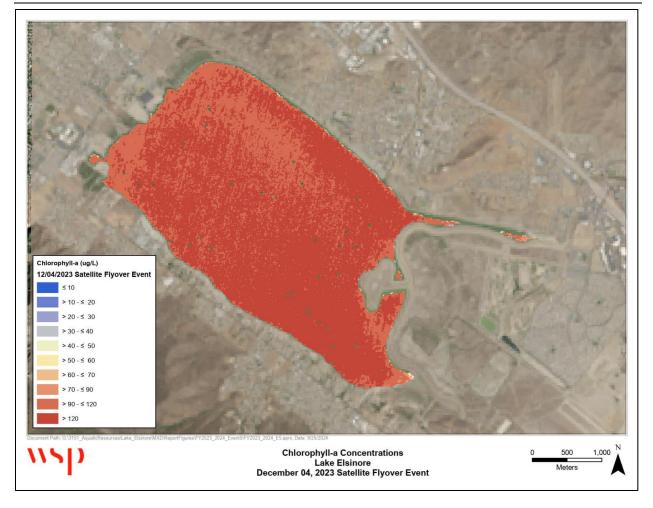


Figure 3-20e. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

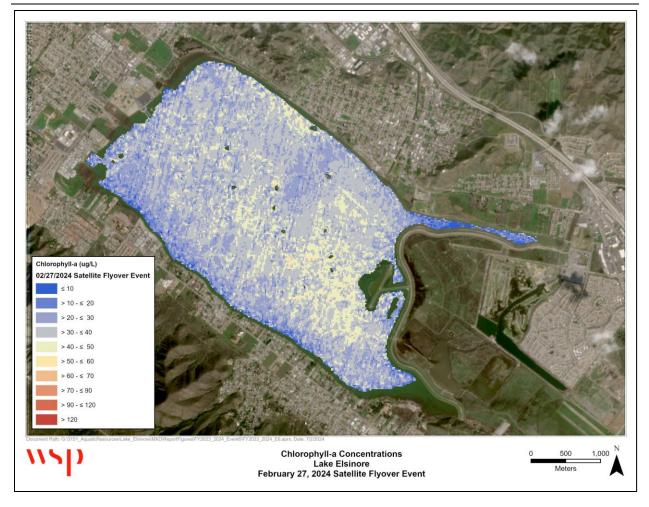


Figure 3-20f. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

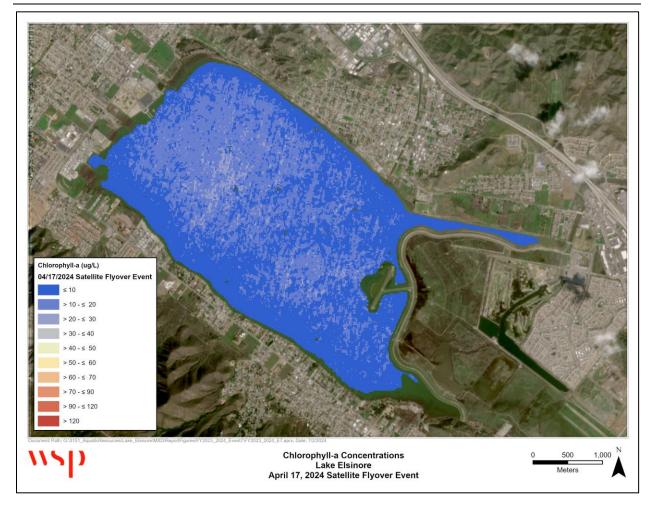


Figure 3-20g. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

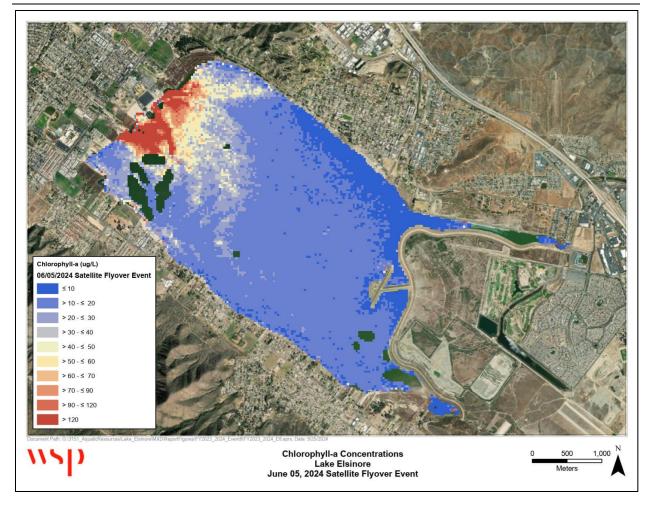


Figure 3-20h. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore (Data gaps are due to sun glare)

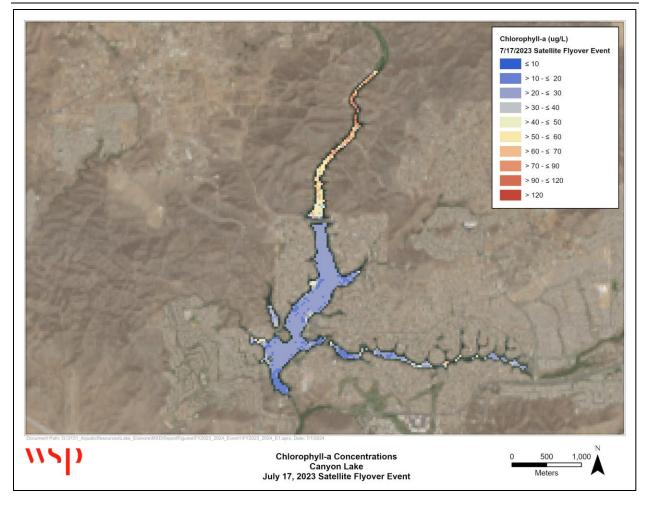


Figure 3-21a. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake

(Data gaps are due to sun glare)

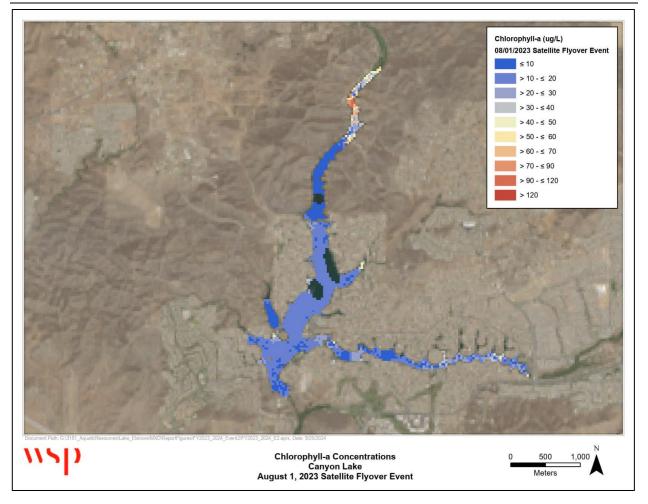


Figure 3-21b. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)

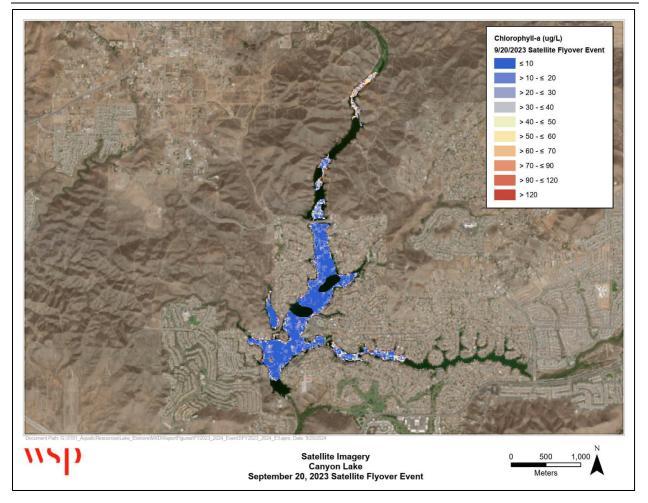


Figure 3-21c. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)

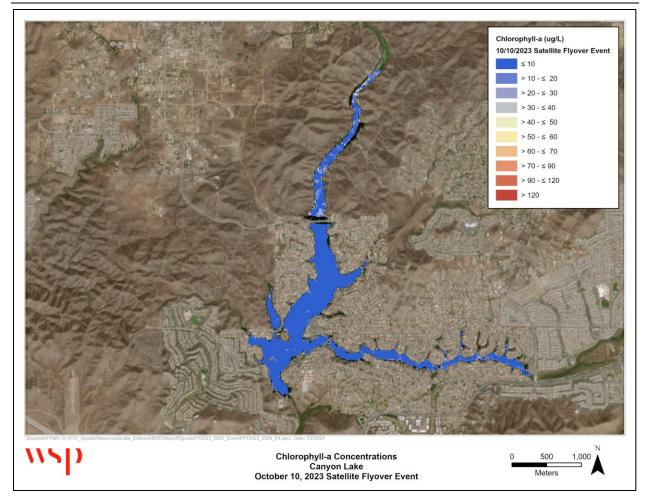


Figure 3-21d. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)

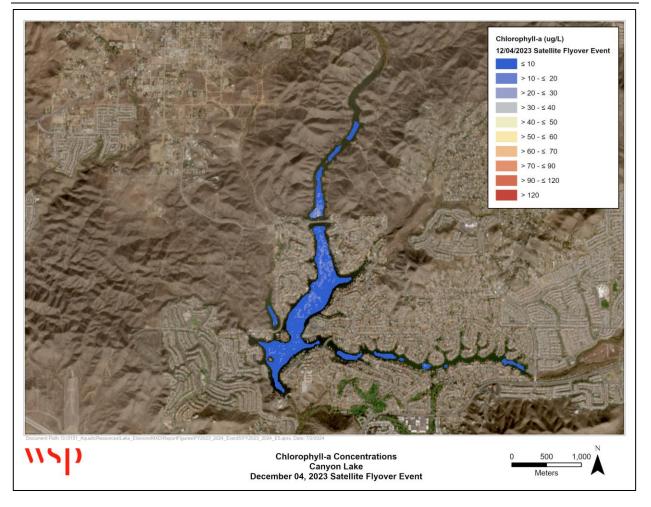


Figure 3-21e. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)

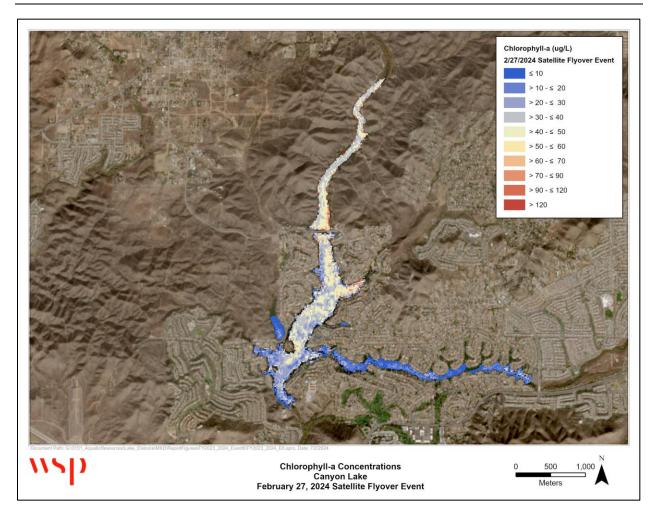


Figure 3-21f. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)

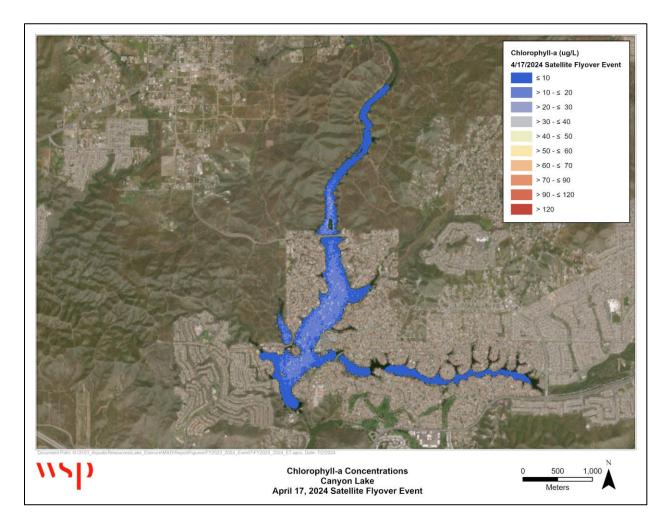


Figure 3-21g. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)

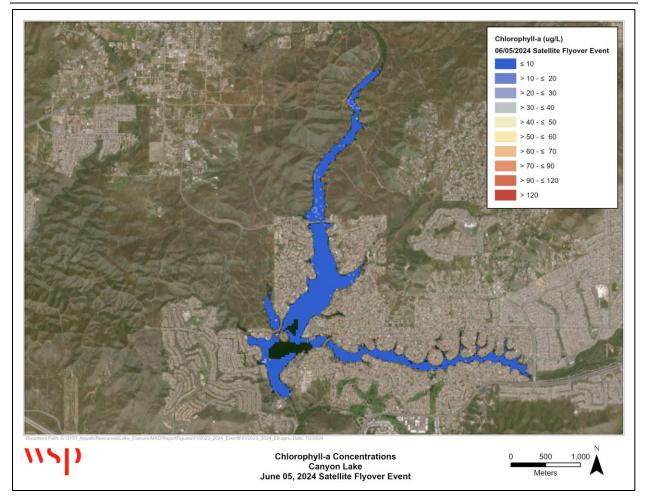
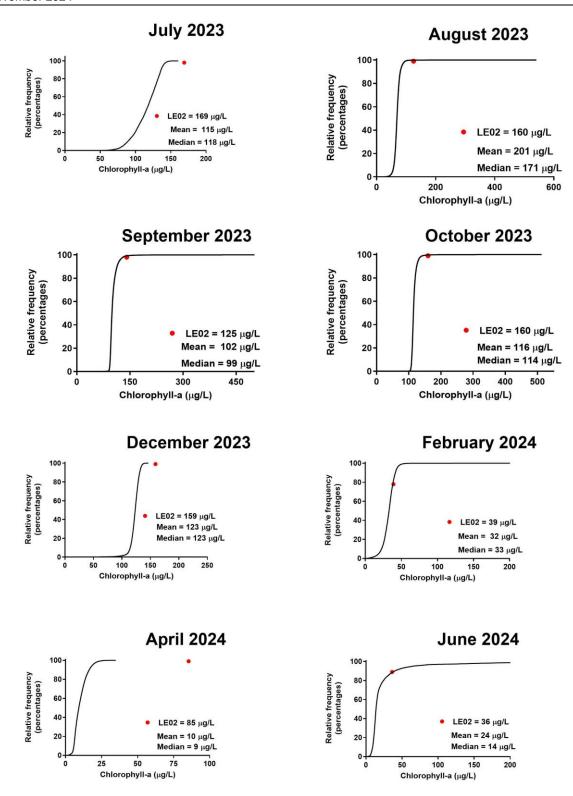
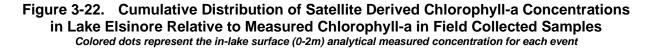


Figure 3-21h. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake (Data gaps are due to sun glare)





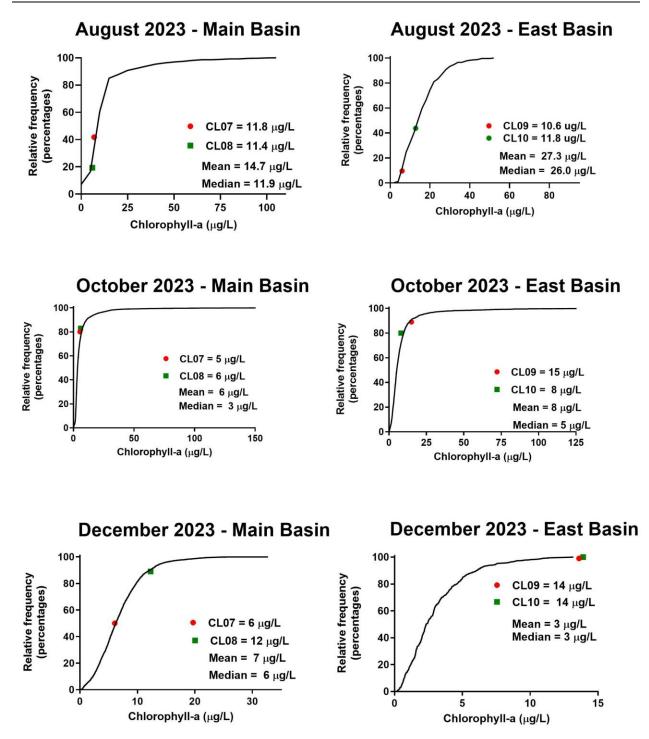


Figure 3-23. Cumulative Distribution of Satellite Derived Chlorophyll-a Concentrations in Canyon Lake Relative to Measured Chlorophyll-a in Field Collected Samples Colored dots represent the in-lake surface (0-2m) analytical measured concentration for each event

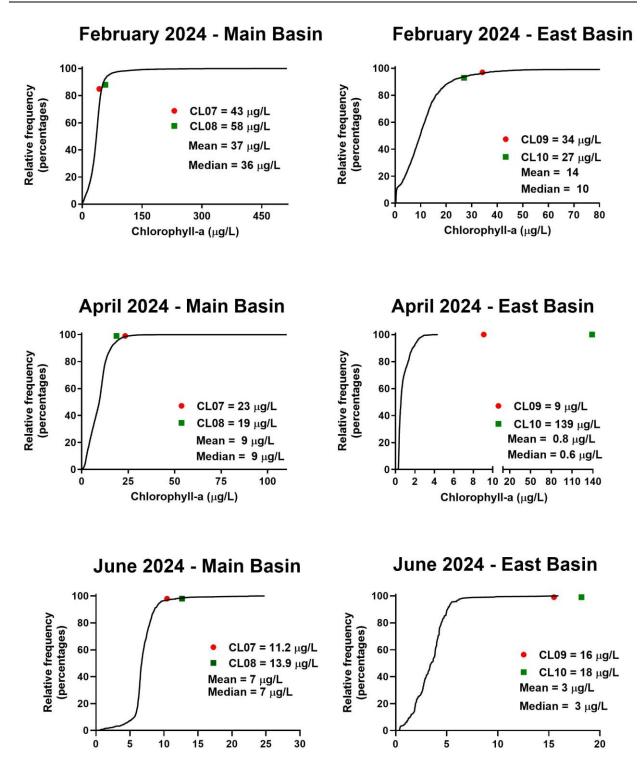


Figure 3-23 (continued). Cumulative Distribution of Satellite Derived Chlorophyll-a Concentrations in Canyon Lake Relative to Measured Chlorophyll-a in Field Collected Samples

Colored dots represent the in-lake surface (0-2m) analytical measured concentration for each event No satellite data available for February 2023 East Basin. April 2023 East Basin satellite data below detection limit.

4.0 Conclusions

Sampling was conducted during the July 2023 to June 2024 monitoring year according to the Lake Elsinore and Canyon Lake Nutrient Monitoring Work Plan (Haley & Aldrich 2016) and companion Quality Assurance Project Plan (Amec Foster Wheeler 2016) to fulfill the requirements outlined in RWQCB Resolution No. R8-2004-0037. A total of 8 monitoring events were conducted in Lake Elsinore (monthly June to September, bi-monthly otherwise) and 6 monitoring events in Canyon Lake (bi-monthly). A total of three storm events were sampled in the watershed, occurring on January 20, 2024; February 1, 2024; and February 20, 2024.

The following summarizes the data collected during the 2023-2024 monitoring year, noting any exceedances of TMDL targets, and any relevant observations pertaining to results obtained.

4.1 Watershed Monitoring

A summary of watershed water quality monitoring data for each of the four monitoring locations for the monitoring period of July 1, 2023 through June 30, 2024 is provided below.

- Concentrations of nutrients for the three storm events monitored at Salt Creek at Murrieta Road (Station ID 745) ranged from 1.9 to 2.3 mg/L for total nitrogen, and 0.41 to 0.44 mg/L for total phosphorus. Based on flow data provided by the nearby USGS stream gauge (Station ID 11070465), the total annual flow was estimated at 222,347,655 cf. The estimated annual nutrient load was calculated to be 13,312 kg for total nitrogen and 2,668 kg for total phosphorus.
- 2. Concentrations of nutrients for the three storm events monitored at San Jacinto River at Goetz Road (Station ID 759) ranged from 1.3 to 1.5 mg/L for total nitrogen, and 0.34 to 0.44 mg/L for total phosphorus. Based on flow data provided by the nearby USGS stream gauge (Station ID 11070365), the total annual flow was estimated at 686,760,435 cf. The estimated annual nutrient load was calculated to be 26,684 kg for total nitrogen and 7,371 kg for total phosphorus.
- 3. Concentrations of nutrients for the three storm events monitored at Canyon Lake Spillway (Station ID 841) ranged from 0.95 to 1.4 mg/L for total nitrogen, and from 0.06 to 0.30 mg/L for total phosphorus. Based on flow data provided by the nearby USGS stream gauge (Station ID 11070500), the total annual flow was estimated at 838,713,834 cf. The estimated annual nutrient load was calculated to be 27,399 kg for total nitrogen and 3,459 kg for total phosphorus.
- 4. No samples were collected from the sampling station at San Jacinto River at Ramona Expressway (Station ID 741) during the 2023-2024 monitoring year. Flows from the local area and from overflow of the upstream levee structure were observed at the San Jacinto River at Ramona Expressway (Station ID 741) from February 5, 2024, through February 14, 2024, and from February 22, 2024, through February 25, 2024. However, these flows did not originate from Mystic Lake.

4.2 In-Lake Monitoring

4.2.1 Lake Elsinore

- The Lake Elsinore annual monitoring year means for total nitrogen and total phosphorus were 3.5 mg/L and 0.23 mg/L respectively, with both exceeding their associated 2020 TMDL limits. Annual mean total phosphorous concentration increased from the previous monitoring year (0.15 mg/L in 2022-2023), while total nitrogen exhibited a decrease (4.8 mg/L in 2022-2023).
- 2. The annual mean for total ammonia was 0.53 mg/L, an increase from the previous monitoring year mean (0.24 mg/L). All total ammonia concentrations were below CMC threshold, however two exceeded the CCC threshold in July 2023 (0.90 mg/L) and August 2023 (0.69 mg/L). The 2022-2023 monitoring year had two total ammonia exceedances of the CCC thresholds in July 2022 and December 2022.
- 3. The DO concentration 1-m above the lake bottom as a 12-month rolling average at Site LE02 remained below the 2020 TMDL target (>5.0 mg/L) for the entire monitoring year. Identical results were observed during the 2022-2023 monitoring year. The average full-water column DO concentration at LE02 during the 2023-2024 monitoring year was 5.7 mg/L, and the 12-month rolling average was above the 2020 TMDL target (>5.0 mg/L) for the entire monitoring year.
- 4. The mean chlorophyll-a concentration observed in samples collected during the summer TMDL compliance period (June 2023 through September 2023) was 123 μ g/L for depthintegrated samples and 148 μ g/L for surface samples. These concentrations both exceed the 2020 TMDL target of 25 μ g/L chlorophyll-a. The mean summer depthintegrated 2023 chlorophyll-a value was lower than that observed during the previous summer of 2022 (160 μ g/L), however the mean 2023 summer surface chlorophyll-a value was higher than that of the previous summer (122 μ g/L).

4.2.2 Canyon Lake

- 1. The annual average lake-wide concentrations of total nitrogen and total phosphorus in Canyon Lake was 1.5 mg/L and 0.19 mg/L, respectively. Both the total nitrogen and total phosphorus mean exceeded their 2020 TMDL limits of 0.75 mg/L and 0.1 mg/L, respectively. The annual mean total nitrogen concentration increased slightly from the previous monitoring year (1.4 mg/L in 2022-2023). While the lake-wide annual mean for total phosphorus at 0.19 mg/L was above its 2020 TMDL target of 0.1 mg/L, this was likely due to the higher volumes of storms and their associated suspended sediment loads during the wet season this monitoring year.
- 2. The annual mean lake-wide concentration of total ammonia was 0.59 mg/L. This value is higher than the previous two monitoring years which had a mean total ammonia of 0.50 mg/L and 0.48 mg/L. One sample, Site CL09 exceeded its corresponding total ammonia CCC threshold value (1.60 mg/L in June 2024; The only site to exceed its CCC

in the previous two monitoring years was also CL09. No samples exceeded the total ammonia CMC value.

- 3. The lake-wide DO concentration in the hypolimnion (when the lake was stratified) ranged from 0.0 to 0.9 mg/L. The rolling 12-month mean DO concentration in the hypolimnion was never above the 2020 TMDL target of >5.0 mg/L. The magnitude of stratification in Canyon Lake, particularly in the Main Basin, as well as its duration limits the ability of the lake to meet the 2020 TMDL target for DO. The lake is stratified during large portions of the year, during which there is almost no mixing between the upper epilimnion and lower hypolimnion. During this time, the DO in the hypolimnion declines substantially as sediment processes deplete the oxygen. However, the lake-wide average DO concentration was 5.3 mg/L when averaging values across all monitored sites and depths during the 2023-2024 period.
- 4. The mean annual lake-wide depth-integrated chlorophyll-a concentration was 21 μ g/L (depth-integrated) and 22 μ g/L for surface samples. Both concentrations are below the 2020 TMDL target of 25 μ g/L. These values are similar to the previous monitoring year of 23 μ g/L and 19 μ g/L, for the depth-integrated and surface samples.
- 5. Although pre-alum monitoring indicated good conditions for application, shortly following the April 2024 alum application a minor and transient fish die-off of a singles species, threadfin shad, occurred. Although no single definitive factor was identified as a cause for the limited die off of threadfin shad observed in late April 2024, observations of elevated pH, and low DO in deeper waters, along with results showing higher concentrations of total aluminum, suggest that this alum application might be one of several possible causes. Results of this investigation indicate that it was possible the aluminum concentration could have exceeded the acute CMC for a short time period in limited portions of the lake, resulting in a limited short-term fish die off. It should be noted there have been prior samples collected in Canyon Lake with much higher aluminum concentrations (up to 6,300 ug/L) with no associated fish die off. A more detailed technical memorandum summarizing the fish die-off investigation is included in Appendix F.

The highest total aluminum concentration was measured at 840 μ g/L at Site CL08 in the Main Basin in February 2024. None of the samples collected as part of the TMDL monitoring effort exceeded the 2018 EPA water chronic water quality objective (CCC) or the Criterion Maximum Concentration (CMC). It appears that alum continues to have the desired effect of lowering total phosphorus and chlorophyll-a.

5.0 References

- Amec Foster Wheeler. 2016. Quality Assurance Project Plan for Lake Elsinore, Canyon Lake, and San Jacinto River Watershed TMDL Monitoring Program. May 2016.
- Amec Foster Wheeler. 2017. Lake Elsinore and Canyon Lake Watersheds Nutrient TMDL Monitoring, 2016-2017 Annual Report. Prepared for the Lake Elsinore & San Jacinto Watersheds Project Authority, August 2017.
- Haley & Aldrich, Inc. 2016. Lake Elsinore and Canyon Lake Nutrient TMDL Compliance Monitoring Work Plan for Lake Elsinore and San Jacinto Watershed Authority. Riverside, CA. April 2016.
- Lake Elsinore and San Jacinto Watersheds Authority (LESJWA). 2006. Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan. CA Regional Water Quality Control Board, Santa Ana Region. February.
- Montgomery Watson and Elsinore Valley Municipal Water District (MWH/ EVMWD). 2009. Canyon Lake Bacteria Characterization Study. Technical Memorandum prepared for the Lake Elsinore and Canyon Lake TMDL Task Force. December 1, 2009
- Riverside County Flood Control and Water Conservation District (RCFCWCD). 2021. Hydrologic Data Collection, Rain Fall Reports.
- Santa Ana Regional Water Quality Control Board. 2007. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake, No. R8-2004-0037.
- Santa Ana Regional Water Quality Control Board. 2007. Resolution Approving Plans and Schedules Submitted by the Canyon Lake/Lake Elsinore TMDL Task Force and Individual Discharger Groups Pursuant to the Lake Elsinore and Canyon Lake Nutrient Total Maximum Daily Loads Specified in the Water Quality Control Plan for the Santa Ana River Basin. Resolution R8-2007-0083.
- Thursby, C.B. 1986. Memorandum to David J. Hansen, U.S. EPA, Narragansett, Rhode Island.
- United States Environmental Protection Agency (US EPA). 2018. 2018 Final Aquatic Life Ambient Water Quality Criteria for Aluminum. EPA-822-R-18-001. U.S. EPA Office of Water. December 2018. EPA-822-R-18-001

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APPENDIX A

WATERSHED ANALYTICAL REPORTS



FINAL REPORT

Nork Orders:	4A22097
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Project: Lake Elsinore and Canyon Lake Nutrient TMDL

Attn: Garth Engelhorn

Client: NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

Report Date:	2/09/2024
Received Date:	01/22/2024
Turnaround Time:	Normal
Phones:	(562) 495-5777
Fax:	(562) 495-5877
P.O. #:	
Billing Code:	

ELAP-CA #1132 • EPA-UCMR #CA00211 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Garth Engelhorn,

Enclosed are the results of analyses for samples received 1/22/24 with the Chain-of-Custody document. The samples were received in good condition, at 1.9 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

in In

Kim G. Tu Project Manager

4A22097





Certificate of Analysis

FINAL REPORT

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient TMDL

 Project Manager:
 Garth Engelhorn

Reported: 02/09/2024 09:40

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-012124	Austin Kay	4A22097-01	Water	01/21/24 08:10	
S-04-012124	Austin Kay	4A22097-02	Water	01/21/24 08:40	
CLS-012124	Austin Kay	4A22097-03	Water	01/21/24 07:40	



Sample Results

4A22097-01 (Water)

S-03-012124 Sample:

Analyte

Sample:

Analyte

Sample:

Analyte

Method: EPA 410.4

Method: SM 5210B

Batch ID: W4A1742

Batch ID: W4A1726

Chemical Oxygen Demand

Biochemical Oxygen Demand

Method: EPA 410.4

Method: SM 5210B

Batch ID: W4A1742

Batch ID: W4A1726

Chemical Oxygen Demand

CLS-012124

Method: FPA 410.4

Method: SM 5210B

Batch ID: W4A1742

Batch ID: W4A1726

Chemical Oxygen Demand

S-04-012124

Certificate of Analysis

Dil

Sampled: 01/21/24 8:10 by Austin Kay

Analyzed

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

MRL

Units

Result

MDL

Reported: 02/09/2024 09:40

Qualifier

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods Instr: UVVIS04 Preparation: _NONE (WETCHEM) Prepared: 01/22/24 17:20 Analyst: UVVIS04 2.9 5.0 1 01/24/24 29 mg/l Instr: INC07 Prepared: 01/22/24 13:52 Analyst: JLS Preparation: _NONE (WETCHEM) **Biochemical Oxygen Demand** 2.0 2.0 mg/l 1 01/27/24 44 Sample Results Sampled: 01/21/24 8:40 by Austin Kay 4A22097-02 (Water) Result MDL MRL Units Dil Analyzed Qualifier Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods Instr: UVVIS04 Preparation: _NONE (WETCHEM) Prepared: 01/22/24 17:20 Analyst: UVVIS04 2.9 5001/24/24 30 mg/l 1 Instr: INC07 Preparation: _NONE (WETCHEM) Prepared: 01/22/24 13:52 Analyst: JLS 01/27/24 **Biochemical Oxygen Demand** 2.0 20 6.2 mg/l 1 Sample Results Sampled: 01/21/24 7:40 by Austin Kay 4A22097-03 (Water) Result MDL MRL Units Dil Analyzed Qualifier Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods Instr: UVVIS04 Prepared: 01/22/24 17:20 Analyst: UVVIS04 Preparation: NONE (WETCHEM) 2.9 5.0 01/24/24 32 mg/l 1

Instr: INC07

20

Prepared: 01/22/24 13:52

mg/l

1

2.0

32

Preparation: _NONE (WETCHEM)

Analyst: JLS

01/27/24



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128 Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

.

Reported: 02/09/2024 09:40

Quality Control Results

Conventional Chemistry/Physical Para	meters by	APHA/E	PA/ASTI	A Methods	5						
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifie
Batch: W4A1726 - SM 5210B											
Blank (W4A1726-BLK1) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared mg/l	l: 01/22/24	Analyze	d: 01/2	27/24			
Blank (W4A1726-BLK2) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared mg/l	l: 01/22/24	Analyze	d: 01/2	27/24			
Blank (W4A1726-BLK3) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared mg/l	l: 01/22/24	Analyze	d: 01/2	27/24			
LCS (W4A1726-BS1) Biochemical Oxygen Demand	202	2.0	2.0	Prepared mg/l	1: 01/22/24 198	Analyze		2 7/24 85-115			
Duplicate (W4A1726-DUP1) Biochemical Oxygen Demand	Source: 4.43	4A22089 2.0	9-01 2.0	Prepared mg/l	l: 01/22/24	Analyze 4.45	d: 01/2	27/24	0.3	20	
atch: W4A1742 - EPA 410.4											
Blank (W4A1742-BLK1) Chemical Oxygen Demand	ND	2.9	5.0	Prepared mg/l	l: 01/22/24	Analyze	d: 01/2	24/24			
LCS (W4A1742-BS1) Chemical Oxygen Demand	104	2.9	5.0	Prepared mg/l	1: 01/22/24 100	Analyze	d: 01/2 104	2 4/24 90-110			
Duplicate (W4A1742-DUP1) Chemical Oxygen Demand	Source: 1680	4A2213 12	1-04 20	Prepared mg/l	l: 01/22/24	Analyze 1640	d: 01/2	24/24	3	15	
Matrix Spike (W4A1742-MS1) Chemical Oxygen Demand	Source: 202	4A2213 12	5-01 20	Prepared mg/l	1: 01/22/24 200	Analyze ND	d: 01/2 101	2 4/24 90-110			
Matrix Spike (W4A1742-MS2) Chemical Oxygen Demand		4A2213 12	1-02 20	Prepared mg/l	1: 01/22/24 2000	Analyze 397	d: 01/2 97	2 4/24 90-110			
Matrix Spike Dup (W4A1742-MSD1)	Source:	4A2213	5-01	Prepared	l: 01/22/24	Analyze	d: 01/2	24/24			
Chemical Oxygen Demand		12	20	mg/l	200	ND		90-110	6	15	
Matrix Spike Dup (W4A1742-MSD2)	Source:	4A2213	1-02	Prepared	l: 01/22/24	Analyze	d: 01/2	24/24			
Chemical Oxygen Demand	2300	12	20	mg/l	2000	397	95	90-110	2	15	



Certificate of Analysis

FINAL REPORT

TMDL Project Manager: Garth Engelhorn

Project Number: Lake Elsinore and Canyon Lake Nutrient

Reported: 02/09/2024 09:40

Project Manager: Ga

Notes and Definitions

ltem	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.



FINAL REPORT

Work Orders:	4A25085
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Project: Lake Elsinore and Canyon Lake Nutrient TMDL

Attn: Garth Engelhorn

Client: NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

Report Date:	2/26/2024
Received Date:	1/25/2024
Turnaround Time:	Normal
Phones:	(562) 495-5777
Fax:	(562) 495-5877
P.O. #:	
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Garth Engelhorn,

Enclosed are the results of analyses for samples received 1/25/24 with the Chain-of-Custody document. The samples were received in good condition, at 11.2 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kenneth C. Oda For Kim G. Tu Project Manager

4A25085





Certificate of Analysis

FINAL REPORT

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient TMDL

 Project Manager:
 Garth Engelhorn

Reported: 02/26/2024 12:27

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-04-012524	Austin Kay	4A25085-01	Water	01/25/24 08:00	
S-03-012524	Austin Kay	4A25085-02	Water	01/25/24 06:35	
CLS-012524	Austin Kay	4A25085-03	Water	01/25/24 09:00	



Sample Results

Sample: S-04-012524

Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

Reported: 02/26/2024 12:27

Sampled: 01/25/24 8:00 by Austin Kay

4A25085-01 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM M	lethods					
Method: [CALC]			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02		2:33		Analyst: YMT
Nitrogen, Total	1.3	0.036	0.20	mg/l		02/14/24	
Method: _Various			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]	0.047	Prepared: 02		2:33		Analyst: YMT
Organic Nitrogen, Total	0.72	0.017	0.10	mg/l		02/14/24	
Method: EPA 350.1			Instr: AA06				
Batch ID: W4B0278	Preparation: _NONE (WETCHEM		Prepared: 02			00/00/04	Analyst: ymt
Ammonia as N	0.031	0.017	0.10	mg/l	1	02/06/24	J
Method: EPA 351.2			Instr: AA06				_
Batch ID: W4B0924	Preparation: _NONE (WETCHEM		Prepared: 02				Analyst: YMT
ТКМ	0.75	0.13	0.20	mg/l	1	02/14/24	M-02
Method: EPA 353.2			Instr: AA01				
Batch ID: W4A2238	Preparation: _NONE (WETCHEN		Prepared: 01				Analyst: ISM
	0.57	0.040	0.20	mg/l	1	01/26/24 18:1	
	ND	42	100	ug/l	1	01/26/24 18:1	4
NO2+NO3 as N	600	36	200	ug/l	1	01/26/24	
Method: EPA 365.3			Instr: UVVISC)4			
Batch ID: W4A2109	Preparation: _NONE (WETCHEM	-	Prepared: 01			04/05/04 40 4	Analyst: rob
o-Phosphate as P	0.20	0.0071	0.010	mg/l	1	01/25/24 18:1	4
Method: EPA 365.3			Instr: UVVISC)5			
Batch ID: W4B1213	Preparation: _NONE (WETCHEM		Prepared: 02			00/10/04	Analyst: rob
Phosphorus as P, Total	0.34	0.0067	0.010	mg/l	1	02/16/24	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4A2344	Preparation: _NONE (WETCHEM	-	Prepared: 01			04/00/04	Analyst: bel
Total Dissolved Solids	150	4.0	10	mg/l	1	01/29/24	
Method: SM 2540D			Instr: OVEN1	-			
Batch ID: W4A2596	Preparation: _NONE (WETCHEM	1)	Prepared: 01			04/04/04	Analyst: kac
Total Suspended Solids	53		5	mg/l	1	01/31/24	
Metals by EPA 200 Series Methods							
Method: [CALC]			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 01		3:13		Analyst: kvm
Hardness as CaCO3, Total	63.3	0.121	3.31	mg/l		02/09/24	
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4A2472	Preparation: EPA 200.2	0.00.40	Prepared: 01				Analyst: kvm
Calcium, Total		0.0240	0.500	mg/l	1	02/09/24	
Magnesium, Total	4.44	0.0148	0.500	mg/l	1	02/09/24	
4A25085							Page 3 of 12



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	Project Number: Project Manager:	Lake Elsinore and Canyon Lake Nutrient TMDL Garth Engelhorn				02/	Reported: 26/2024 12:27
Sample Results			-				(Continued)
Sample: S-04-012524				Sample	ed: 01/2	25/24 8:00 by	y Austin Kay
4A25085-01 (Water)							(Continued)
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Metals by EPA 200 Series Methods	(Continued)						
Method: EPA 200.7 Batch ID: W4A2472	Preparation: EPA 200.2		Instr: ICP03 Prepared: 01	1/30/2/ 13.	12		Analyst: kvm
			rieparea.	1/30/24 13.	15		(Continued)
Sample Results							
Sample: S-03-012524				Sample	ed: 01/2	25/24 6:35 by	y Austin Kay
4A25085-02 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	arameters by APHA/EPA/ASTM M	ethods					
Method: [CALC]			Instr: [CALC]		22		
Batch ID: [CALC] Nitrogen, Total	Preparation: [CALC] 2.3	0.036	Prepared: 02 0.20	2/12/24 12: mg/l	33	F 02/14/24	Analyst: YMT
-	2.0	0.000		Ū		02/14/24	
Method: _Various Batch ID: [CALC]	Preparation: [CALC]		Instr: [CALC] Prepared: 02		22	,	Analyst: YMT
Organic Nitrogen, Total	1.7	0.017	0.10	mg/l	55	02/14/24	
Method: EPA 350.1			Instr: AA06				
Batch ID: W4B0278	Preparation: _NONE (WETCHEM	1)	Prepared: 02	2/05/24 11:	30		Analyst: ymt
Ammonia as N	0.071	0.017	0.10	mg/l	1	02/06/24	J
Method: EPA 351.2			Instr: AA06				
Batch ID: W4B0924	Preparation: _NONE (WETCHEN		Prepared: 02				Analyst: YMT
TKN	1.8	0.13	0.20	mg/l	1	02/14/24	M-02
Method: EPA 353.2			Instr: AA01				
Batch ID: W4A2238 Nitrate as N	Preparation: _NONE (WETCHEM 0.49	1) 0.040	Prepared: 01 0.20		32 1	01/26/24 18:15	Analyst: ISM
	0.49 ND	42	100	mg/l ug/l	1	01/26/24 18:15	
	520	36	200	ug/l	1	01/26/24	
	020	00		Ū		0 1/20/21	
Method: EPA 365.3 Batch ID: W4A2109	Preparation: _NONE (WETCHEM	1)	Instr: UVVISO Prepared: 01		59		Analyst: rob
o-Phosphate as P	0.26	0.0071	0.010	mg/l	1	01/25/24 18:14	-
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W4B1213	Preparation: _NONE (WETCHEM	1)	Prepared: 02		59		Analyst: rob
Phosphorus as P, Total	0.44	0.0067	0.010	mg/l	1	02/16/24	
Method: SM 2540C			Instr: OVEN1	17			
Batch ID: W4A2344	Preparation: _NONE (WETCHEN		Prepared: 01			0.1/00/01	Analyst: bel
Total Dissolved Solids	430	4.0	10	mg/l	1	01/29/24	
Method: SM 2540D			Instr: OVEN1				
Batch ID: W4A2596 Total Suspended Solids	Preparation: _NONE (WETCHEM	1)	Prepared: 01 5	1/31/24 12: mg/l	00	01/31/24	Analyst: kac
4A25085	/0		5	mg/i	I	01/01/24	Page 4 of 12
IA23003							raye 4 01 12



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	Project Number Project Manager	TMDL		nyon Lake N	Nutrient	02	Reported: /26/2024 12:27
Sample Results							(Continued)
Sample: S-03-012524				Sampl	ed: 01/2	5/24 6:35 k	oy Austin Kay
4A25085-02 (Water)							(Continued)
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	rameters by APHA/EPA/ASTM I	Methods ((Continued)				
Method: SM 2540D			Instr: OVEN	N15			
Batch ID: W4A2596	Preparation: _NONE (WETCHE	M)	Prepared:	01/31/24 12	:00		Analyst: kac
Metals by EPA 200 Series Methods							
Method: [CALC]			Instr: [CALC	[]			
Batch ID: [CALC]	Preparation: [CALC]		Prepared:	01/30/24 13	:13		Analyst: kvm
Hardness as CaCO3, Total		0.121	3.31	mg/l		02/09/24	
Method: EPA 200.7			Instr: ICP03	3			
Batch ID: W4A2472	Preparation: EPA 200.2		Prepared:	01/30/24 13	:13		Analyst: kvm
Calcium, Total		0.0240	0.500	mg/l	1	02/09/24	
Magnesium, Total	15.4	0.0148	0.500	mg/l	1	02/09/24	



Sample Results

CLS-012524 Sample:

Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

Reported: 02/26/2024 12:27

(Continued)

Sampled: 01/25/24 9:00 by Austin Kay

4A25085-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Para Method: [CALC]	meters by APHA/EPA/ASTM I	Vethods	Instr: [CALC]				
Batch ID: [CALC] Nitrogen, Total	Preparation: [CALC] 1.1	0.036	Prepared: 02, 0.10	/12/24 12:3 mg/l	33	02/14/24	Analyst: YMT
Method: _Various Batch ID: [CALC] Organic Nitrogen, Total	Preparation: [CALC]	0.017	Instr: [CALC] Prepared: 02, 0.10	/12/24 12:3 mg/l	33	02/14/24	Analyst: YMT
Method: EPA 350.1 Batch ID: W4B0278 Ammonia as N	Preparation: _NONE (WETCHE 0.021	M) 0.017	Instr: AA06 Prepared: 02, 0.10	/05/24 11:3 mg/l	30 1	02/06/24	Analyst: ymt J
Method: EPA 351.2 Batch ID: W4B0924 TKN	Preparation: _NONE (WETCHE 0.76	M) 0.065	Instr: AA06 Prepared: 02, 0.10	/12/24 12:3 mg/l	33 1	02/14/24	Analyst: YMT
	Preparation: _NONE (WETCHE 0.29 ND	M) 0.040 42	Instr: AA01 Prepared: 01, 0.20 100	/26/24 16:3 mg/l ug/l	32 1 1	01/26/24 18:1 01/26/24 18:1	
	300	36	200	ug/l	1	01/26/24	0
Method: EPA 365.3 Batch ID: W4A2109 o-Phosphate as P	Preparation: _NONE (WETCHE	M) 0.0071	Instr: UVVIS0 Prepared: 01, 0.010		59 1	01/25/24 18:1	Analyst: rob
Method: EPA 365.3 Batch ID: W4B1213 Phosphorus as P, Total	Preparation: _NONE (WETCHE 0.061	M) 0.0067	Instr: UVVIS0 Prepared: 02 0.010		59 1	02/16/24	Analyst: rob
Method: SM 2540C Batch ID: W4A2344 Total Dissolved Solids	Preparation: _NONE (WETCHE 500	M) 4.0	Instr: OVEN1 Prepared: 01, 10		59 1	01/29/24	Analyst: bel
Method: SM 2540D Batch ID: W4A2596 Total Suspended Solids	Preparation: _NONE (WETCHE 10	M)	Instr: OVEN1 Prepared: 01, 5		00 1	01/31/24	Analyst: kac
Metals by EPA 200 Series Methods Method: [CALC] Batch ID: [CALC] Hardness as CaCO3, Total	Preparation: [CALC]	0.121	Instr: [CALC] Prepared: 01, 3.31	/30/24 13: ⁻ mg/l	13	02/09/24	Analyst: kvm
	Preparation: EPA 200.2 64.0 19.1	0.0240 0.0148	Instr: ICP03 Prepared: 01, 0.500 0.500	/30/24 13: mg/l mg/l	13 1 1	02/09/24 02/09/24	Analyst: kvm
4A25085				Ŭ			Page 6 of 12



Certificate of Analysis FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	•	Lake Elsinore and Canyon Lake Nutrient TMDL Garth Engelhorn				Repor 02/26/2024 12				
Sample Results	r ojoot managor.	Guitin Ei	igoinonn				(Continued)			
Sample: CLS-012524				Sample	ed: 01/2	5/24 9:00	oy Austin Kay			
4A25085-03 (Water)							(Continued)			
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier			
Metals by EPA 200 Series Methods (C	Continued)									
Method: EPA 200.7			Instr: ICP03	3						
Batch ID: W4A2472	Preparation: EPA 200.2		Prepared:	01/30/24 13:	:13		Analyst: kvm			



FINAL REPORT

15092 Avenue of Science, Suite 200 San Diego, CA 92128		Proiect I	Manager:	TMDL Garth En	aelhorn					02/26/2	2024 12:2
			nanagor.	Gurar En	gomorr						
Quality Control Res											
Conventional Chemistry/Physical Para	meters by	APHA/E	EPA/ASTN	/ Method				0/ DEC			
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4A2109 - EPA 365.3											
Blank (W4A2109-BLK1)				Pre	pared & A	nalyzed: 0	1/25/2	4			
o-Phosphate as P	ND	0.0071	0.010	mg/l							
LCS (W4A2109-BS1)					pared & A	nalyzed: 0					
o-Phosphate as P	0.205	0.0071	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W4A2109-MS1)		: 4A2403			pared & A						
o-Phosphate as P	41.5	0.71	1.0	mg/l	20.0	21.8	98	85-112			
Matrix Spike Dup (W4A2109-MSD1) o-Phosphate as P		: 4A2403 0.71	7-03		pared & A 20.0	nalyzed: 0 21.8		4 85-112	0.2	20	
·	41.4	0.71	1.0	mg/l	20.0	21.0	90	00-112	0.2	20	
Batch: W4A2238 - EPA 353.2											
Blank (W4A2238-BLK1) Nitrate as N	ND	0.040	0.20	Pre mg/l	pared & A	nalyzed: 0	1/26/2	4			
Nitrite as N		42	100	ug/l							
NO2+NO3 as N		36	200	ug/l							
				Ū	pared & A	nalvzad. O	1/26/2	Л			
Blank (W4A2238-BLK2) Nitrate as N	ND	0.040	0.20	mg/l	pareu & A	nalyzeu. U	1/20/2	4			A-01
Nitrite as N	ND	42	100	ug/l							A-01
NO2+NO3 as N	ND	36	200	ug/l							A-01
LCS (W4A2238-BS1)				Pre	pared & A	nalyzed: 0	1/26/2	4			
Nitrate as N		0.040	0.20	mg/l	1.00	-	98	90-110			
Nitrite as N		42	100	ug/l	1000		101	90-110			
NO2+NO3 as N	984	36	200	ug/l	1000		98	90-110			
LCS (W4A2238-BS2)	0.070	0.040			pared & A	nalyzed: 0					
Nitrate as N	0.973 1040		0.20	mg/l	1.00			90-110 90-110			A-01
Nitrite as N NO2+NO3 as N		42 36	100 200	ug/l ug/l	1000 1000		104 97	90-110 90-110			A-01 A-01
				•							A-01
Matrix Spike (W4A2238-MS1) Nitrate as N		: 3L2100 0.040	2-02 0.20	Pre mg/l	pared & A 2.00	nalyzed: 0 0.407	1/26/2 98	4 90-110			
Nitrite as N		42	100	ug/l	1000	ND	100	90-110			
NO2+NO3 as N	2370	36	200	ug/l	2000	407	98	90-110			
Matrix Spike (W4A2238-MS2)	Source	: 4A2300	1_01	Pro	pared & A	nalvzed· 0	1/26/2	4			
Nitrate as N		0.040	0.20	mg/l	2.00	ND	97	90-110			
Nitrite as N	1020	42	100	ug/l	1000	ND	102	90-110			
NO2+NO3 as N	1940	36	200	ug/l	2000	ND	97	90-110			
Matrix Spike Dup (W4A2238-MSD1) Nitrate as N		3L2100	2-02 0.20	Pre mg/l	pared & A 2.00	nalyzed: 0 0.407	1/26/2 97	4 90-110	1	20	
Nitrite as N	995	42	100	ug/l	1000	ND	100	90-110	0.2	20	
NO2+NO3 as N	2340	36	200	ug/l	2000	407	97	90-110	1	20	
Matrix Spike Dup (W4A2238-MSD2)	Source	: 4A2300	1-01	Pre	pared & A	nalyzed: 0	1/26/2	4			
Nitrate as N		0.040	0.20	mg/l	2.00	ND	96	90-110	0.5	20	

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FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128		-		Lake Elsinc TMDL Garth Enge		nyon Lak	e Nutrie	ent		02/26/2	Reported: 2024 12:27
Quality Control Result		Project Ma	anayer.	Gartin Enge						(Co	ontinued)
Conventional Chemistry/Physical Parame		APHA/FF	A/ASTN	1 Methods	(Continue	d)					
	-				Spike	Source		%REC		RPD	
Analyte Batch: W4A2238 - EPA 353.2 (Continued)	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Matrix Spike Dup (W4A2238-MSD2)	Source	4A23001	-01	Prona	red & Ana	alvzed· 0'	1/26/2	4			
Nitrite as N	- 1010	42	100	ug/l	1000	ND	101	9 0-110	1	20	
NO2+NO3 as N	- 1930	36	200	ug/l	2000	ND	96	90-110	0.5	20	
Batch: W4A2344 - SM 2540C											
Blank (W4A2344-BLK1)			10		red & Ana	alyzed: 0	1/29/2	4			
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W4A2344-BS1) Total Dissolved Solids	807	4.0	10	Prepa mg/l	red & Ana 824	alyzed: 0		4 97-103			
				-		h made O					
Duplicate (W4A2344-DUP1) Total Dissolved Solids	-35600	4A26032 4.0	- U I 10	mg/l	red & Ana	36200	1/29/24	4	2	10	
Duplicate (W4A2344-DUP2)	Source:	4A26057	-01	Prepa	red & Ana	alvzed: 0	1/29/2	4			
Total Dissolved Solids	-38300	4.0	10	mg/l		38800	.,,_		1	10	
Batch: W4A2596 - SM 2540D											
Blank (W4A2596-BLK1)				Prepa	red & Ana	alyzed: 0	1/31/2	4			
Total Suspended Solids	0.400		5	mg/l							J
LCS (W4A2596-BS1)	64.6		-		red & Ana	alyzed: 0					
Total Suspended Solids	61.6		5	mg/l	58.8			90-110			
Duplicate (W4A2596-DUP1) Total Suspended Solids	Source:	4A25078	- 01 5	Prepa mg/l	red & Ana	1170 alyzed: 0	1/31/2	4	2	10	
Duplicate (W4A2596-DUP2)	Sourco	4A26073	_01	Ū	red & Ana		1/21/2	4			
Total Suspended Solids	184	4420075	5	mg/l		182	1/31/2	•	1	10	
Batch: W4B0278 - EPA 350.1											
Blank (W4B0278-BLK1)				Prepared:	02/05/24	Analyze	d: 02/0	06/24			
Ammonia as N		0.017	0.10	mg/l		-					
Blank (W4B0278-BLK2)				Prepared:	02/05/24	Analyze	d: 02/0	06/24			
Ammonia as N		0.017	0.10	mg/l							
LCS (W4B0278-BS1) Ammonia as N	0.248	0.017	0.10	Prepared: mg/l	02/05/24 0.250	Analyze	ed: 02/0)6/24 90-110			
	0.240	0.017	0.10	0							
LCS (W4B0278-BS2) Ammonia as N	0.247	0.017	0.10	Prepared: mg/l	02/05/24	Analyze	99	90-110			
Matrix Spike (W4B0278-MS1)	Source	4A25049	-01	Prepared:	02/05/24	Analyze	d. 02/0	6/24			
Ammonia as N	0.400	0.017	0.10	mg/l	0.250	0.159	97	90-110			
Matrix Spike (W4B0278-MS2)	Source:	4A26100	-05	Prepared:	02/05/24	Analyze	d: 02/0	06/24			
Ammonia as N	0.252	0.017	0.10	mg/l	0.250	ND		90-110			
Matrix Spike Dup (W4B0278-MSD1)		4A25049		Prepared:		-			0.04	45	
Ammonia as N	0.400	0.017	0.10	mg/l	0.250	0.159	97		0.04	15	
Matrix Spike Dup (W4B0278-MSD2) Ammonia as N	Source: 0.254	4A26100	- 05 0.10	Prepared: mg/l	02/05/24 0.250	Analyze ND)6/24 90-110	0.6	15	
	0.204		0.10		0.200				5.0		

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FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128				Lake Elsinore and Canyon Lake Nutrient TMDL Garth Engelhorn						Reported: 02/26/2024 12:27		
Quality Control Result		rojoot iii	inger.							(Co	ontinued)	
Conventional Chemistry/Physical Paramet	ters by	APHA/EP	A/ASTN	1 Methods	(Continue	d)						
					Spike	Source		%REC		RPD		
Analyte Batch: W4B0924 - EPA 351.2	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier	
Blank (W4B0924-EFA 551.2 Blank (W4B0924-BLK1) TKN	ND	0.065	0.10	Prepared: mg/l	02/12/24	Analyzeo	l: 02/ 1	4/24				
LCS (W4B0924-BS1) TKN	0.996	0.065	0.10	Prepared: mg/l	02/12/24 1.00	Analyzeo		4/24 90-110				
	Source: 2.07	4B01152 0.065	- 03 0.10	Prepared: mg/l	02/12/24 1.00	Analyzec 1.06	d: 02/1 101					
Matrix Spike Dup (W4B0924-MSD1) TKN	Source: 2.07	4B01152 0.065	- 03 0.10	Prepared: mg/l	02/12/24 1.00	Analyzed 1.06	d: 02/1 101	4/24 90-110	0.08	10		
Batch: W4B1213 - EPA 365.3												
Blank (W4B1213-BLK1) Phosphorus as P, Total	ND	0.0067	0.010	Prepared: mg/l	02/14/24	Analyzed	d: 02/ 1	6/24				
LCS (W4B1213-BS1) Phosphorus as P, Total	0.196	0.0067	0.010	Prepared: mg/l	02/14/24 0.200	Analyzed	1: 02/1 98	6/24 90-110				
Matrix Spike (W4B1213-MS1) Phosphorus as P, Total		4A23128 0.0067	- 07 0.010	Prepared: mg/l	02/14/24 0.200	Analyzed 0.0160	d: 02/1 96	6/24 90-110				
		4A23128	- 07 0.010	Ū	02/14/24 0.200	Analyzed 0.0160	d: 02/1 98	6/24 90-110	2	20		



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128 Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Reported: 02/26/2024 12:27

Project Manager: Garth Engelhorn

(Continued)

Quality Control Results

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4A2472 - EPA 200.7	Court	N.D.	IVINE	onits	Level	Result		Linits		2	Qualifier
Blank (W4A2472-BLK1)				Prepared	l: 01/30/24	Analyze	ed: 02/0	9/24			
Calcium, Total	ND	0.0240	0.500	mg/l		-					
Magnesium, Total	n n ND	0.0148	0.500	mg/l							
LCS (W4A2472-BS1)				Prepared	l: 01/30/24	Analyze	ed: 02/0	9/24			
Calcium, Total	48.7	0.0240	0.500	mg/l	50.2	-	97	85-115			
Magnesium, Total	48.5	0.0148	0.500	mg/l	50.2		97	85-115			
Matrix Spike (W4A2472-MS1)	Source	: 4A2405	4-17	Prepared	l: 01/30/24	Analyze	ed: 02/0	9/24			
Calcium, Total	146	0.0240	0.500	mg/l	50.2	101	91	70-130			
Magnesium, Total	108	0.0148	0.500	mg/l	50.2	60.6	94	70-130			
Matrix Spike (W4A2472-MS2)	Source	: 4A2405	4-20	Prepared	l: 01/30/24	Analyze	ed: 02/0	9/24			
Calcium, Total	- 147	0.0240	0.500	mg/l	50.2	100	93	70-130			
Magnesium, Total	108	0.0148	0.500	mg/l	50.2	60.0	95	70-130			
Matrix Spike Dup (W4A2472-MSD1)	Source	: 4A2405	4-17	Prepared	l: 01/30/24	Analyze	ed: 02/0	9/24			
Calcium, Total	148	0.0240	0.500	mg/l	50.2	101	93	70-130	0.8	30	
Magnesium, Total	- 109	0.0148	0.500	mg/l	50.2	60.6	96	70-130	0.8	30	
Matrix Spike Dup (W4A2472-MSD2)	Source	: 4A2405	4-20	Prepared	l: 01/30/24	Analyze	ed: 02/0	9/24			
Calcium, Total	146	0.0240	0.500	mg/l	50.2	100	91	70-130	0.6	30	
Magnesium, Total	- 107	0.0148	0.500	mg/l	50.2	60.0	94	70-130	0.5	30	



Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Reported: 02/26/2024 12:27

Project Manager: Garth Engelhorn

Notes and Definitions

ltem	Definition
A-01	Filtered.
J	Estimated conc. detected <mrl and="">MDL.</mrl>
M-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.
[CALC]	An automated calculation using unrounded values then rounding the final result (scientific rounding rules). Calculations do not contain direct qualifiers; please refer to the individual components of the calculation for any qualifiers
Any rem	aining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
All result	s are expressed on wet weight basis unless otherwise specified.
All samp	les collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.
Hardnes	s as CaCO3, Total consist of the following components Magnesium, Total; and Calcium, Total
Nitrogen	, Total consist of the following components NO2+NO3 as N; and TKN

Organic Nitrogen, Total consist of the following components TKN; and Ammonia as N



FINAL REPORT

Work Orders:	4B02110
Project:	Lake Elsinore and Canyon Lake Nutrient TMDL
Attn:	Garth Engelhorn
Client:	NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

 Report Date:
 2/21/2024

 Received Date:
 2/2/2024

 Turnaround Time:
 Normal

 Phones:
 (562) 495-5777

 Fax:
 (562) 495-5877

 P.O. #:
 Billing Code:

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Garth Engelhorn,

Enclosed are the results of analyses for samples received 2/02/24 with the Chain-of-Custody document. The samples were received in good condition, at 1.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kenneth C. Oda For Kim G. Tu Project Manager

4B02110





Certificate of Analysis

02/01/24 15:10

02/01/24 16:00

FINAL REPORT

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient TMDL

 Project Manager:
 Garth Engelhorn

4B02110-04

4B02110-05

Water

Water

Reported: 02/21/2024 12:29

Qualifiers

Sample Summary Sample Name Sampled By Lab ID Matrix Sampled S-03-020124-01 Austin Kay 4B02110-01 Water 02/01/24 14:40 S-03-020124-02 Austin Kay 4B02110-02 Water 02/01/24 14:40 Water 02/01/24 14:50 S-03-020124-03 Austin Kay 4B02110-03

Austin Kay

Austin Kay

S-03-020124-03 S-04-020124-01 CLS-020 24-01



Certificate of Analysis

FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	Project Number: Project Manager:	TMDL		yon Lake N	Nutrient	02	Reported: /21/2024 12:29
Sample Results	Froject Manager.	Gartif	Ingemon				
Sample: S-03-020124-01				Sample	ed: 02/01	1/24 14:40 b	y Austin Kay
				campi		, <u> </u>	y rasen ray
4B02110-01 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	rameters by APHA/EPA/ASTM M	ethods					
Method: EPA 410.4			Instr: UVVIS				
Batch ID: W4B1073	Preparation: _NONE (WETCHEM 21	l) 2.9	Prepared: 0. 5.0		:42 1	02/14/24	Analyst: jls
, , , , , , , , , , , , , , , , , , ,	21	2.9		mg/l	1	02/14/24	
Method: SM 5210B			Instr: INC14				
Batch ID: W4B0195	Preparation: _NONE (WETCHEM	-	Prepared: 0			00/07/04	Analyst: JLS
Biochemical Oxygen Demand	4.2	2.0	2.0	mg/l	1	02/07/24	
Sample Results							
Sample: S-03-020124-02				Sample	-d· 02/0	1/24 14·40 k	y Austin Kay
				bumph	24. 02,0	.,	y rasen ray
4002110 02 (Mator)							
4B02110-02 (Water)			MOL		D'I	A I	
Analyte Conventional Chemistry/Physical Pa	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Method: EPA 410.4		ethous		05			
Batch ID: W4B1073	Preparation: _NONE (WETCHEM	I)	Instr: UVVIS Prepared: 0		.10		Analyst: jls
		2.9	5.0	mg/l	1	02/14/24	Analyst. Jis
				-			
Method: SM 5210B		N	Instr: INC14				American U.C.
Batch ID: W4B0195 Biochemical Oxygen Demand	Preparation: _NONE (WETCHEM 4.4	1) 2.0	Prepared: 0. 2.0	2/02/24 13 mg/l	1	02/07/24	Analyst: JLS
Sample Results		2.0			·	02/07/21	
10000				Comorali		1/24 14.50 4	. Austin Kau
Sample: S-03-020124-03				Sample	ea: 02/0	1/24 14:50 0	y Austin Kay
4B02110-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	rameters by APHA/EPA/ASTM M	ethods		~ -			
Method: EPA 410.4		N	Instr: UVVIS		40		
Batch ID: W4B1073 Chemical Oxygen Demand	Preparation: _NONE (WETCHEM	l) 2.9	Prepared: 0. 5.0	2/13/24 16 mg/l	:42 1	02/14/24	Analyst: jls
		2.9		U	1	02/14/24	
Method: SM 5210B			Instr: INC14				
Batch ID: W4B0195	Preparation: _NONE (WETCHEM	-	Prepared: 0			02/07/24	Analyst: JLS
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l	1	02/07/24	



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	Project Number: Project Manager:	TMDL		Reported: 02/21/2024 12:29			
Sample Results							(Continued)
Sample: S-04-020124-01				Sample	ed: 02/01	l/24 15:10 b	y Austin Kay
4B02110-04 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM M	ethods					
Method: EPA 410.4			Instr: UVVIS	05			
Batch ID: W4B1073	Preparation: _NONE (WETCHEM	l)	Prepared: 0	2/13/24 16	:42		Analyst: jls
Chemical Oxygen Demand	65	2.9	5.0	mg/l	1	02/14/24	
Method: SM 5210B			Instr: INC14				
Batch ID: W4B0195	Preparation: _NONE (WETCHEM	l)	Prepared: 0	2/02/24 13	:33		Analyst: JLS
Biochemical Oxygen Demand		2.0	2.0	mg/l	1	02/07/24	
Sample Results							(Continued)
Sample: CLS-020 24-01				Sample	d: 02/01	l/24 16:00 b	y Austin Kay
4B02110-05 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	rameters by APHA/EPA/ASTM M	ethods					
Method: EPA 410.4			Instr: UVVIS	05			
Batch ID: W4B1073	Preparation: _NONE (WETCHEM	l)	Prepared: 0	2/13/24 16	:42		Analyst: jls
Chemical Oxygen Demand	23	2.9	5.0	mg/l	1	02/14/24	
Method: SM 5210B			Instr: INC14				
Batch ID: W4B0195	Preparation: _NONE (WETCHEM	l)	Prepared: 0	2/02/24 13	:33		Analyst: JLS
Biochemical Oxygen Demand	3.2	2.0	2.0	mg/l	1	02/07/24	



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128 Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Reported: 02/21/2024 12:29

Project Manager: Garth Engelhorn

Quality Control Results

Conventional Chemistry/Physical Parame	eters by <i>i</i>	APHA/EP	A/ASTN	1 Methods							
					Spike	Source	N/DEC	%REC		RPD	o
Analyte Batch: W4B0195 - SM 5210B	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Blank (W4B0195-BLK1)				Prepared:	02/02/24	Apolyza	4. 02/0	7/24			
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l	02/02/24	Analyze	u. 02/t	7724			
Blank (W4B0195-BLK2)				Prepared:	02/02/24	Analyze	d: 02/0	7/24			
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W4B0195-BLK3)				Prepared:	02/02/24	Analyze	d: 02/0	7/24			
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
LCS (W4B0195-BS1)				Prepared:		Analyze					
Biochemical Oxygen Demand	208	2.0	2.0	mg/l	198		105	85-115			
Duplicate (W4B0195-DUP1)		4B02051-	-	Prepared:	02/02/24	-	d: 02/0	7/24			
Biochemical Oxygen Demand	6.22	2.0	2.0	mg/l		7.85			23	20	QR-03
Batch: W4B1073 - EPA 410.4											
Blank (W4B1073-BLK1)				Prepared:	02/13/24	Analyze	d: 02/1	4/24			
Chemical Oxygen Demand		2.9	5.0	mg/l							
LCS (W4B1073-BS1)	047	0.0	5.0	Prepared:		Analyze					
Chemical Oxygen Demand	94.7	2.9	5.0	mg/l	100		95	90-110			
Duplicate (W4B1073-DUP1) Chemical Oxygen Demand	Source:	4B09089- 2.9	• 01 5.0	Prepared: mg/l	02/13/24	Analyze ND	d: 02/1	4/24		15	
,,,				Ū						15	
Matrix Spike (W4B1073-MS1) Chemical Oxygen Demand	Source: 196	4B02110- 12	03 20	Prepared: mg/l	02/13/24 200	Analyze ND	d: 02/1 98	4/24 90-110			
Matrix Spike (W4B1073-MS2)	Source	4B05060-	01	Prepared:	02/13/24	Analyze	d· 02/1	4/24			
Chemical Oxygen Demand	194	12	20	mg/l	200	ND	97	90-110			
Matrix Spike Dup (W4B1073-MSD1)		4B02110-		Prepared:							
Chemical Oxygen Demand	197	12	20	mg/l	200	ND	98	90-110	0.3	15	
Matrix Spike Dup (W4B1073-MSD2)		4B05060-	-	Prepared:		-					
Chemical Oxygen Demand	187	12	20	mg/l	200	ND	93	90-110	4	15	



Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Reported: 02/21/2024 12:29

Project Manager: Garth Engelhorn

Notes and Definitions

ltem	Definition
QR-03	The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.
Any rem	aining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
All result	ts are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.



1005000

Certificate of Analysis

FINAL REPORT

Work Orders:	4B05082
Project:	Lake Elsinore and Canyon Lake Nutrient TMDL
Attn:	Garth Engelhorn
Client:	NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

 Report Date:
 3/19/2024

 Received Date:
 2/5/2024

 Turnaround Time:
 Normal

 Phones:
 (562) 495-5777

 Fax:
 (562) 495-5877

 P.O. #:
 Billing Code:

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Garth Engelhorn,

Enclosed are the results of analyses for samples received 2/05/24 with the Chain-of-Custody document. The samples were received in good condition, at 12.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kenneth C. Oda For Kim G. Tu Project Manager

4B05082





S-04-020524-01

CLS-020424-01

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

Sa

Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

4B05082-04

4B05082-05

Water

Water

02/05/24 01:00

02/04/24 22:00

Reported:

Qualifiers

Sample Summary				
Sample Name	Sampled By	Lab ID	Matrix	Sampled
S-03-020424-01	Austin Kay, Matt Millenburg	4B05082-01	Water	02/04/24 21:00
S-03-020424-02	Austin Kay, Matt Millenburg	4B05082-02	Water	02/04/24 21:00
S-03-020524-03	Austin Kay, Matt	4B05082-03	Water	02/05/24 08:30

Millenburg

Austin Kay, Matt

Millenburg

Austin Kay, Matt

Millenburg



Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

Reported: 03/19/2024 08:22

Sample Results

Sample: S-03-020424-01 4B05082-01 (Water)			Samp	led: 02/04,	/24 2 [.]	1:00 by Aust	in Kay, Matt Millenburg
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	rameters by APHA/EPA/ASTM Me	thods					
Method: [CALC] Batch ID: [CALC] Nitrogen, Total	Preparation: [CALC]	0.036	Instr: [CALC] Prepared: 02/2 0.10	22/24 11:31 mg/l		02/28/24	Analyst: ymt
Method: _Various Batch ID: [CALC] Organic Nitrogen, Total	Preparation: [CALC]	0.017	Instr: [CALC] Prepared: 02/2 0.10	-		02/29/24	Analyst: ymt
Method: EPA 350.1 Batch ID: W4B1848 Ammonia as N	Preparation: _NONE (WETCHEM) 0.17	0.017	Instr: AA06 Prepared: 02/2 0.10	U)	02/29/24	Analyst: YMT
Method: EPA 351.2 Batch ID: W4B1868 TKN	Preparation: _NONE (WETCHEM) 1.3	0.065	Instr: AA06 Prepared: 02/2 0.10	22/24 11:31 mg/l	1	02/28/24	Analyst: ymt
	Preparation: _NONE (WETCHEM) 0.57 48	0.040	Instr: AA01 Prepared: 02/0 0.20 100	06/24 13:49 mg/l ug/l) 1 1	02/06/24 17:2 02/06/24 17:2	
NO2+NO3 as N		36	200	ug/l	1	02/06/24	0 0
Method: EPA 365.3 Batch ID: W4B0400 o-Phosphate as P	Preparation: _NONE (WETCHEM) 0.30	0.0071	Instr: UVVIS04 Prepared: 02/0 0.010) 1	02/06/24 15:4	Analyst: rob 8
Method: EPA 365.3 Batch ID: W4B1872 Phosphorus as P, Total	Preparation: _NONE (WETCHEM) 0.42	0.0067	Instr: UVVIS05 Prepared: 02/2 0.010		, 1	02/26/24	Analyst: rob
Method: EPA 410.4 Batch ID: W4B1555 Chemical Oxygen Demand	Preparation: _NONE (WETCHEM) 31	2.9	Instr: UVVIS05 Prepared: 02/2 5.0		; 1	02/21/24	Analyst: jls
Method: SM 2540C Batch ID: W4B0379 Total Dissolved Solids	Preparation: _NONE (WETCHEM) 310	4.0	Instr: OVEN17 Prepared: 02/0 10		5	02/06/24	Analyst: bel
Method: SM 2540D Batch ID: W4B0682 Total Suspended Solids	Preparation: _NONE (WETCHEM) 59		Instr: OVEN15 Prepared: 02/0 5	08/24 12:27 mg/l	, 1	02/08/24	Analyst: kac
Method: SM 5210B Batch ID: W4B0298 Biochemical Oxygen Demand	Preparation: _NONE (WETCHEM) 4.5	2.0	Instr: INC07 Prepared: 02/0 2.0	05/24 14:03 mg/l	3 1	02/11/24	Analyst: jls <mark>BS-H</mark>

Metals by EPA 200 Series Methods



FINAL REPORT

	nvironmental - Oceanside ue of Science, Suite 200		Project Number:	Lake Els TMDL	inore and Car	nyon Lake N	lutrient	03/	Reported: 19/2024 08:22
San Diego, (CA 92128	F	Project Manager:	Garth Er	ngelhorn				
Sa	mple Results								(Continued)
Sample:	S-03-020424-01				Sar	mpled: 02/0)4/24 21	:00 by Austi	n Kay, Matt Millenburg
	4B05082-01 (Water)								(Continued)
Analyte			Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Metals by E	PA 200 Series Methods (Continued)							
Method: [0	CALC]				Instr: [CALC	[]			
Batch ID:	[CALC]	Preparation:	CALC]		Prepared: (02/09/24 09:	:51	1	Analyst: kvm
Hardness	as CaCO3, Total		140	0.121	3.31	mg/l		02/20/24	
Method: E	PA 200.7				Instr: ICP03	3			
Batch ID:	W4B0765	Preparation:	EPA 200.2		Prepared: (02/09/24 09:	:51	1	Analyst: kvm
Calcium,	Fotal		35.4	0.0240	0.500	mg/l	1	02/20/24	
Magnesiu	m, Total		12.5	0.0148	0.500	mg/l	1	02/20/24	



Certificate of Analysis

FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	Project Number: Project Manager:	TMDL	-	Lake Nutri		Reported: 3/19/2024 08:22
Sample Results	Project Manager.	Gartin Eng	genom			(Continued)
Sample: S-03-020424-02			Sample	ed: 02/04/2	24 21:00 by Au	stin Kay, Matt Millenburg
4B05082-02 (Water)						-
Analyte Conventional Chemistry/Physical Par	Result	MDL	MRL U	Inits	Dil Analyzed	l Qualifier
Method: [CALC]	ameters by APHA/EPA/ASTM M	ethoas	Instr: [CALC]			
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02/22	2/24 11:31		Analyst: ymt
Nitrogen, Total	2.0	0.036	0.10 r	mg/l	02/28/24	•
Method: _Various			Instr: [CALC]			
Batch ID: [CALC]	Preparation: [CALC]	0.047	Prepared: 02/22			Analyst: ymt
Organic Nitrogen, Total	1.2	0.017	0.10 r	mg/l	02/29/24	
Method: EPA 350.1		4)	Instr: AA06	0/24 11.00		
Batch ID: W4B1848 Ammonia as N	Preparation: _NONE (WETCHEM 0.17	0.017	Prepared: 02/22 0.10 r	2/24 11:00 mg/l	1 02/29/24	Analyst: YMT
Method: EPA 351.2			Instr: AA06	0		
Batch ID: W4B1868	Preparation: _NONE (WETCHEM	1)	Prepared: 02/22	2/24 11:31		Analyst: ymt
TKN	1.3	0.065	•	mg/l	1 02/28/24	
Method: EPA 353.2			Instr: AA01			
Batch ID: W4B0420	Preparation: _NONE (WETCHEM	-	Prepared: 02/06			Analyst: ISM
	0.56 56	0.040		mg/l	1 02/06/24 17	
Nitrite as N NO2+NO3 as N		42 36		ug/l ug/l	1 02/06/24 17 1 02/06/24	
		30		uy/i	1 02/06/24	
Method: EPA 365.3 Batch ID: W4B0400	Preparation: _NONE (WETCHEM	4)	Instr: UVVIS04 Prepared: 02/06	5/2/ 11.10		Analyst: rob
o-Phosphate as P	0.30	0.0071	•	mg/l	1 02/06/24 15	-
Method: EPA 365.3			Instr: UVVIS05			
Batch ID: W4B1872	Preparation: _NONE (WETCHEM	1)	Prepared: 02/22	2/24 11:37		Analyst: rob
Phosphorus as P, Total	0.42	0.0067	0.010 r	mg/l	1 02/26/24	
Method: EPA 410.4			Instr: UVVIS05			
Batch ID: W4B1555	Preparation: _NONE (WETCHEN		Prepared: 02/20		4 00/04/04	Analyst: jls
Chemical Oxygen Demand	29	2.9		mg/l	1 02/21/24	
Method: SM 2540C Batch ID: W4B0379	Preparation: _NONE (WETCHEM	4)	Instr: OVEN17 Prepared: 02/06	C/24 10.26		Analyst: bel
Total Dissolved Solids	310	4.0	•	mg/l	1 02/06/24	-
Method: SM 2540D			Instr: OVEN15			
Batch ID: W4B0682	Preparation: _NONE (WETCHEM	1)	Prepared: 02/08	3/24 12:27		Analyst: kac
Total Suspended Solids	55		5 r	mg/l	1 02/08/24	
Method: SM 5210B			Instr: INC07			
Batch ID: W4B0298 Biochomical Oxygon Domand	Preparation: _NONE (WETCHEN 4.7	1) 2.0	Prepared: 02/05 2.0 r		1 02/11/24	Analyst: jls BS-H
Biochemical Oxygen Demand	4.7	2.0	2.0 Г	mg/l	1 02/11/24	D9-U

Metals by EPA 200 Series Methods

4B05082



FINAL REPORT

NV5 - Alta Environmental - Oceansi 15092 Avenue of Science, Suite 200	··· ,···	Lake Elsi TMDL	inore and Can	Reported: 03/19/2024 08:22			
San Diego, CA 92128	Project Manager:	Garth En	gelhorn				
Sample Results							(Continued)
Sample: S-03-020424-02			Sam	npled: 02/0)4/24 21	:00 by Austi	n Kay, Matt Millenburg
4B05082-02 (Water)							(Continued)
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Metals by EPA 200 Series Method	s (Continued)						
Method: [CALC]			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02	2/09/24 09	:51		Analyst: kvm
Hardness as CaCO3, Total	136	0.121	3.31	mg/l		02/20/24	
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4B0765	Preparation: EPA 200.2		Prepared: 02	2/09/24 09:	:51		Analyst: kvm
Calcium, Total	34.6	0.0240	0.500	mg/l	1	02/20/24	
Magnesium, Total	12.2	0.0148	0.500	mg/l	1	02/20/24	



Certificate of Analysis

FINAL REPORT

	Due is of Neural en	Laka Ela	in and Canad	na Laka Nivi			Demonte de
NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	TMDL	inore and Canyo	on Lake Nut	nent		Reported: 19/2024 08:22
San Diego, CA 92128	Project Manager:	Garth En	ngelhorn				
Sample Results							(Continued)
Sample: S-03-020524-03 4B05082-03 (Water)			Samj	oled: 02/05	5/24	8:30 by Austi	n Kay, Matt Millenburg
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM M	lethods					
Method: [CALC]			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02/	22/24 11:31			Analyst: ymt
Nitrogen, Total	ND	0.036	0.10	mg/l		02/28/24	
Method: _Various			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02/				Analyst: ymt
Organic Nitrogen, Total	ND	0.017	0.10	mg/l		02/29/24	
Method: EPA 350.1			Instr: AA06				
Batch ID: W4B1848	Preparation: _NONE (WETCHEM		Prepared: 02/				nalyst: YMT
Ammonia as N	ND	0.017	0.10	mg/l	1	02/29/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4B1868	Preparation: _NONE (WETCHEM		Prepared: 02/				Analyst: ymt
TKN	ND	0.065	0.10	mg/l	1	02/28/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B0420 Nitrate as N	Preparation: _NONE (WETCHEN ND	1) 0.040	Prepared: 02/ 0.20	'06/24 13:49 mg/l) 1	02/06/24 17:22	Analyst: ISM
Nitrite as N		42	100		1	02/06/24 17:22	
NO2+NO3 as N		42 36	200	ug/l			
	ND	30		ug/l	1	02/06/24	
Method: EPA 365.3		•	Instr: UVVIS04				
Batch ID: W4B0400 o-Phosphate as P	Preparation: _NONE (WETCHEM	1) 0.0071	Prepared: 02/ 0.010	'06/24 11:49 mg/l) 1	02/06/24 15:44	Analyst: rob
		0.0071		J		02/00/24 13:44	
Method: EPA 365.3		1)	Instr: UVVIS0		,		A I
Batch ID: W4B1872 Phosphorus as P, Total	Preparation: _NONE (WETCHEN ND	0.0067	Prepared: 02/ 0.010	22/24 11:37 mg/l	1	02/26/24	Analyst: rob
•		0.0007		-		02/20/24	
Method: EPA 410.4 Batch ID: W4B1555	Propositions NONE WETCHEN	4)	Instr: UVVISO				A nativeti ile
Chemical Oxygen Demand	Preparation: _NONE (WETCHEN	2.9	Prepared: 02/ 5.0	20/24 11:56 mg/l) 1	02/21/24	Analyst: jls
				J	-		
Method: SM 2540C Batch ID: W4B0379	Preparation: _NONE (WETCHEM	4)	Instr: OVEN17 Prepared: 02/		:		Analyst: bel
Total Dissolved Solids	ND	4.0	10	mg/l	, 1	02/06/24	Analyst. Der
Method: SM 2540D			Instr: OVEN15	U			
Batch ID: W4B0816	Preparation: _NONE (WETCHEM	4)	Prepared: 02/		l		Analyst: kac
Total Suspended Solids	ND	')	5	mg/l	1	02/09/24	ninaryst. Kac
Method: SM 5210B			Instr: INC07	-			
Batch ID: W4B0298	Preparation: _NONE (WETCHEM	1)	Prepared: 02/	05/24 14.03			Analyst: jls
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l	, 1	02/11/24	Q-08
				-			

Metals by EPA 200 Series Methods

4B05082



Certificate of Analysis FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	Lake Els TMDL	inore and Ca	nyon Lake N		Reported: /19/2024 08:22	
San Diego, CA 92128	Project Manager:	Garth Er	ngelhorn				
Sample Results							(Continued)
Sample: S-03-020524-03			Sa	mpled: 02/	05/24	8:30 by Aust	Millenburg
4B05082-03 (Water)							(Continued)
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Metals by EPA 200 Series Methods (Co	ntinued)						
Method: [CALC]			Instr: [CALC	C]			
Batch ID: [CALC] F	reparation: [CALC]		Prepared:	02/09/24 09:	51		Analyst: kvm
Hardness as CaCO3, Total	ND	0.121	3.31	mg/l		02/20/24	
Method: EPA 200.7			Instr: ICP03	3			
Batch ID: W4B0765 F	reparation: EPA 200.2		Prepared:	02/09/24 09:	51		Analyst: kvm
Calcium, Total	0.0356	0.0240	0.500	mg/l	1	02/20/24	J
Magnesium, Total	ND	0.0148	0.500	mg/l	1	02/20/24	



Certificate of Analysis

FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	TMDL		on Lake Nut	rient		Reported: (19/2024 08:22
San Diego, CA 92128 Sample Results	Project Manager:	Garin En	geinom				(Continued)
Sample: S-04-020524-01			Sam	pled: 02/05	5/24	1:00 by Aust	in Kay, Matt Millenburg
4B05082-04 (Water)							
Analyte Conventional Chemistry/Physical Par	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Method: [CALC]	ameters by APHA/EPA/ASTM M	ethoas	Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02	/22/24 11:31			Analyst: ymt
Nitrogen, Total	1.3	0.036	0.10	mg/l		02/28/24	, , , , , , , , , ,
Method: _Various			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02	/22/24 11:31			Analyst: ymt
Organic Nitrogen, Total	0.67	0.017	0.10	mg/l		02/29/24	
Method: EPA 350.1			Instr: AA06				
Batch ID: W4B1848	Preparation: _NONE (WETCHEN	1)	Prepared: 02	/22/24 11:00)		Analyst: YMT
Ammonia as N	0.080	0.017	0.10	mg/l	1	02/29/24	J
Method: EPA 351.2			Instr: AA06				
Batch ID: W4B1868	Preparation: _NONE (WETCHEM		Prepared: 02,				Analyst: ymt
ТКМ	0.75	0.065	0.10	mg/l	1	02/28/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B0420	Preparation: _NONE (WETCHEM	-	Prepared: 02,				Analyst: ISM
	0.53	0.040	0.20	mg/l	1	02/06/24 17:2	
	ND	42	100	ug/l	1	02/06/24 17:2	3
NO2+NO3 as N		36	200	ug/l	1	02/06/24	
Method: EPA 365.3			Instr: UVVIS0				
Batch ID: W4B0400	Preparation: _NONE (WETCHEN	1) 0.0071	Prepared: 02, 0.010		1	02/06/24 15:4	Analyst: rob
o-Phosphate as P	0.22	0.0071		mg/l	1	02/06/24 15.4	9
Method: EPA 365.3		•	Instr: UVVIS0				
Batch ID: W4B1872 Phosphorus as P, Total	Preparation: _NONE (WETCHEM 0.35	1) 0.0067	Prepared: 02, 0.010	/22/24 11:37 mg/l	1	02/26/24	Analyst: rob
•	0.35	0.0007		-		02/20/24	
Method: EPA 410.4		A)	Instr: UVVIS0				Anna kunsta ila
Batch ID: W4B1555 Chemical Oxygen Demand	Preparation: _NONE (WETCHEM 23	1) 2.9	Prepared: 02, 5.0	/20/24 11:56 mg/l	1	02/21/24	Analyst: jls
		2.0		-	•	02/2 //2 /	
Method: SM 2540C Batch ID: W4B0379	Preparation: _NONE (WETCHEM	4)	Instr: OVEN1 Prepared: 02				Analyst: bel
Total Dissolved Solids	160	4.0	10	mg/l	1	02/06/24	Analyst. Der
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W4B0816	Preparation: _NONE (WETCHEM	1)	Prepared: 02,				Analyst: kac
Total Suspended Solids	45	-,	5	mg/l	1	02/09/24	,
Method: SM 5210B			Instr: INC07				
Batch ID: W4B0298	Preparation: _NONE (WETCHEM	1)	Prepared: 02	/05/24 14:03			Analyst: jls
Biochemical Oxygen Demand		2.0	2.0	mg/l	1	02/11/24	BS-H

Metals by EPA 200 Series Methods

4B05082



Certificate of Analysis FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	Lake Els TMDL	inore and Car	nyon Lake N	lutrient	t Reported: 03/19/2024 08:22		
San Diego, CA 92128	Project Manager:	Garth Er	ngelhorn					
Sample Results							(Continued)	
Sample: S-04-020524-01			Sa	mpled: 02/	05/24	1:00 by Aust	Millenburg	
4B05082-04 (Water)							(Continued)	
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier	
Metals by EPA 200 Series Methods	(Continued)							
Method: [CALC]			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: (02/09/24 09:	51		Analyst: kvm	
Hardness as CaCO3, Total	73.6	0.121	3.31	mg/l		02/20/24		
Method: EPA 200.7			Instr: ICP03	3				
Batch ID: W4B0765	Preparation: EPA 200.2		Prepared:	02/09/24 09:	51		Analyst: kvm	
Calcium, Total	20.8	0.0240	0.500	mg/l	1	02/20/24		
Magnesium, Total	5.23	0.0148	0.500	mg/l	1	02/20/24		



Certificate of Analysis

FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	TMDL	-	on Lake Nutr	rient	03	Reported: /19/2024 08:22
San Diego, CA 92128	Project Manager:	Garth Eng	gelhorn				(Continued)
Sample: CLS-020424-01			Samp	led: 02/04/	/24 2	2:00 by Aust	in Kay, Matt Millenburg
4B05082-05 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTIM M	ethoas					
Method: [CALC] Batch ID: [CALC]	Preparation: [CALC]		Instr: [CALC] Prepared: 02/	22/2/ 11.21			Analyst: ymt
Nitrogen, Total	0.95	0.036	0.10	mg/l		02/28/24	Analyst. ymt
Method: _Various			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02/	22/24 11:31			Analyst: ymt
Organic Nitrogen, Total	0.68	0.017	0.10	mg/l		02/29/24	Hang Sta yint
Method: EPA 350.1			Instr: AA06				
Batch ID: W4B1848	Preparation: NONE (WETCHEM	1)	Prepared: 02/	22/24 11:00			Analyst: YMT
Ammonia as N	0.066	0.017	0.10	mg/l	1	02/29/24	J
Method: EPA 351.2			Instr: AA06				
Batch ID: W4B1868	Preparation: _NONE (WETCHEM	1)	Prepared: 02/	22/24 11:31			Analyst: ymt
TKN	0.74	0.065	0.10	mg/l	1	02/28/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B0420	Preparation: _NONE (WETCHEM	1)	Prepared: 02/	06/24 13:49			Analyst: ISM
Nitrate as N	0.21	0.040	0.20	mg/l	1	02/06/24 17:2	4
Nitrite as N	ND	42	100	ug/l	1	02/06/24 17:2	4
NO2+NO3 as N	210	36	200	ug/l	1	02/06/24	
Method: EPA 365.3			Instr: UVVIS04	1			
Batch ID: W4B0400	Preparation: _NONE (WETCHEM	1)	Prepared: 02/	06/24 11:49			Analyst: rob
o-Phosphate as P	0.011	0.0071	0.010	mg/l	1	02/06/24 15:5	0
Method: EPA 365.3			Instr: UVVIS05	5			
Batch ID: W4B1872	Preparation: _NONE (WETCHEM	1)	Prepared: 02/	22/24 11:37			Analyst: rob
Phosphorus as P, Total	0.081	0.0067	0.010	mg/l	1	02/26/24	
Method: EPA 410.4			Instr: UVVIS05	5			
Batch ID: W4B1555	Preparation: _NONE (WETCHEM		Prepared: 02/				Analyst: jls
Chemical Oxygen Demand		2.9	5.0	mg/l	1	02/21/24	
Method: SM 2540C			Instr: OVEN17				
Batch ID: W4B0379	Preparation: _NONE (WETCHEM		Prepared: 02/				Analyst: bel
Total Dissolved Solids	440	4.0	10	mg/l	1	02/06/24	
Method: SM 2540D			Instr: OVEN15				
Batch ID: W4B0682	Preparation: _NONE (WETCHEM	1)	Prepared: 02/			00/00/04	Analyst: kac
Total Suspended Solids	9		5	mg/l	1	02/08/24	
Method: SM 5210B			Instr: INC07				
Batch ID: W4B0298	Preparation: _NONE (WETCHEN		Prepared: 02/			00/44/04	Analyst: jls
Biochemical Oxygen Demand	2.6	2.0	2.0	mg/l	1	02/11/24	BS-H

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FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128 Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

Reported: 03/19/2024 08:22

Project Manager: Garth

Quality Control Results

Analyta	Docult	MD	MD	Unite	Spike	Source	% PEC	%REC	000	RPD	Qualifia
Analyte atch: W4B0298 - SM 5210B	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifie
Blank (W4B0298-BLK1)				Prepared:	02/05/24	Analyza	d. 02/	11/24			
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l	02/05/24	Analyze	u. 02/	11/24			
				-	02/05/24	A	J. 02 (11/24			
Blank (W4B0298-BLK2) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared: mg/l	02/05/24	Analyze	a: 02/	11/24			
				Ū	00 /0E /0 A	A I	1.02/	14 /2 4			
Blank (W4B0298-BLK3) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared: mg/l	02/05/24	Analyze	a: 02/	11/24			
				Ū	00 /0E /0 A	A I	1.02/	14 /2 4			
LCS (W4B0298-BS1) Biochemical Oxygen Demand	236	2.0	2.0	Prepared: mg/l	198	Analyze		85-115			BS-
				-	02/05/24	A I	1.02/	14 /0 4			
Duplicate (W4B0298-DUP1) Biochemical Oxygen Demand	Source	: 4B05086 2.0	2.0	Prepared: mg/l	02/05/24	ND	a: 02/	11/24		20	
	.12	2.0	2.0								
Batch: W4B0379 - SM 2540C											
Blank (W4B0379-BLK1) Total Dissolved Solids		4.0	10	Prepa mg/l	red & Ana	lyzed: 0	2/06/2	4			
		4.0	10	-							
LCS (W4B0379-BS1) Total Dissolved Solids	803	4.0	10	Prepa mg/l	red & Ana 824	lyzed: 0		4 97-103			
	000			Ū							
Duplicate (W4B0379-DUP1) Total Dissolved Solids	Source	: 4805088 4.0	3-01 10		red & Ana	1yzed: 02 577	2/06/2	4	0.3	10	
		4.0	10	mg/l					0.5	10	
Duplicate (W4B0379-DUP2) Total Dissolved Solids	Source	: 4B05127 4.0	7- 01 10		red & Ana	1yzed: 02 479	2/06/2	4	0.4	10	
		4.0	10	mg/l		479			0.4	10	
atch: W4B0400 - EPA 365.3											
Blank (W4B0400-BLK1)		0.0074	0.040		red & Ana	lyzed: 0	2/06/2	4			
o-Phosphate as P	ND	0.0071	0.010	mg/l							
LCS (W4B0400-BS1)	0.400	0.0074	0.040		red & Ana	lyzed: 0					
o-Phosphate as P	- 0.198	0.0071	0.010	mg/l	0.200		99	88-111			
Matrix Spike (W4B0400-MS1)		: 4B05082			red & Ana						
o-Phosphate as P	0.198	0.0071	0.010	mg/l	0.200	ND	99	85-112			
Matrix Spike Dup (W4B0400-MSD1)		: 4B05082		-	red & Ana	-					
o-Phosphate as P	0.210	0.0071	0.010	mg/l	0.200	ND	105	85-112	6	20	
atch: W4B0420 - EPA 353.2											
Blank (W4B0420-BLK1)				Prepa	red & Ana	lyzed: 0	2/06/2	4			
Nitrate as N	нв	0.040	0.15	mg/l							
Nitrite as N		42	100	ug/l							
NO2+NO3 as N		36	200	ug/l							
Blank (W4B0420-BLK2)					red & Ana	lyzed: 0	2/06/2	4			
Nitrate as N		0.040	0.15	mg/l							A-0
Nitrite as N		42	100	ug/l							A-0
NO2+NO3 as N	ND	36	200	ug/l							A-0
				•							

4B05082



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200		Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn								Reported: 03/19/2024 08:22		
San Diego, CA 92128		Project N	lanager:	Garth Eng	gelhorn					(Cc	ontinued)	
Quality Control Result	[S									(00	intinueu)	
Conventional Chemistry/Physical Parame	eters by	APHA/E	PA/ASTN	/ Method	s (Continu	ed)						
					Spike	Source	W DEC	%REC		RPD	0	
Analyte Batch: W4B0420 - EPA 353.2 (Continued)	Result	MDL	MRL	Units	Level	Result	%REC	Limits	KPD	Limit	Qualifier	
LCS (W4B0420-BS1)				Dro	pared & Ar	alvzad. O	2/06/2					
Nitrate as N	- 0.990	0.040	0.15	mg/l	1.00	lalyzeu. U	99	9 0-110				
Nitrite as N	997	42	100	ug/l	1000		100	90-110				
NO2+NO3 as N	990	36	200	ug/l	1000		99	90-110				
LCS (W4B0420-BS2)				Pre	pared & Ar	nalvzed: 0	2/06/2	4				
Nitrate as N	0.997	0.040	0.15	mg/l	1.00	,	100	90-110			A-01	
Nitrite as N		42	100	ug/l	1000		101	90-110			A-01	
NO2+NO3 as N	997	36	200	ug/l	1000		100	90-110			A-01	
Matrix Spike (W4B0420-MS1)	Source	: 4B0508	8-03	Pre	pared & Ar	nalyzed: 0	2/06/2	4				
Nitrate as N		0.040	0.15	mg/l	2.00	0.389	99	90-110				
Nitrite as N		42	100	ug/l	1000	ND	98	90-110				
NO2+NO3 as N	- 2370	36	200	ug/l	2000	389	99	90-110				
		: 4B05122	2-01	Pre	pared & Ar	nalyzed: 0	2/06/2					
Nitrate as N		0.040	0.15	mg/l	2.00	4.23	104	90-110				
Nitrite as N		42	100	ug/l	1000	ND	103	90-110				
NO2+NO3 as N	6320	36	200	ug/l	2000	4230	104	90-110				
		: 4B0508			pared & Ar	-						
Nitrate as N		0.040	0.15	mg/l	2.00	0.389	99	90-110	0.4	20		
Nitrite as N		42	100	ug/l	1000	ND	98	90-110	0.4	20		
NO2+NO3 as N	- 2360	36	200	ug/l	2000	389	99	90-110	0.4	20		
······································		: 4B05122	-		pared & Ar	-						
Nitrate as N Nitrite as N		0.040	0.15	mg/l	2.00	4.23	105	90-110 90-110	0.2	20		
NO2+NO3 as N		42 36	100 200	ug/l	1000 2000	ND 4230	105 105	90-110 90-110	2 0.2	20 20		
	0330	30	200	ug/l	2000	4230	105	90-110	0.2	20		
Batch: W4B0682 - SM 2540D												
Blank (W4B0682-BLK1)	0.000		4		pared & Ar	nalyzed: 0	2/08/2	4				
Total Suspended Solids	- 0.300		1	mg/l							J	
LCS (W4B0682-BS1)	<u> </u>		4		pared & Ar	nalyzed: 0						
Total Suspended Solids	62.3		1	mg/l	57.8		108	90-110				
Duplicate (W4B0682-DUP1)		: 4B0213	1-01		pared & Ar	-	2/08/2	4	4	10		
Total Suspended Solids	235		1	mg/l		225			4	10		
Duplicate (W4B0682-DUP2) Total Suspended Solids	Source 560	: 4B0612	7-01 1	Pre mg/l	pared & Ar	1alyzed: 0 550	2/08/2	4	2	10		
Batch: W4B0816 - SM 2540D												
Blank (W4B0816-BLK1)				Pre	pared & Ar	nalvzed: 0	2/09/2	4				
Total Suspended Solids	n n ND		5	mg/l								
LCS (W4B0816-BS1) Total Suspended Solids	- 55.5		5	Pre mg/l	pared & Ar 55.4	nalyzed: 0		4 90-110				
		. 400500		-		aber 1 A						
Duplicate (W4B0816-DUP1)	Source	: 4B0508	8-01	Pre	pared & Ar	ialyzed: 0	2/09/2	4		5	10 (47	



Certificate of Analysis FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128		-		Lake Elsino TMDL Garth Engel		iyon Lake	e Nutrie	nt			Reported: 024 08:22
Quality Control Results										(Co	ntinued)
Conventional Chemistry/Physical Parameters	s by A	APHA/EP	A/ASTN	1 Methods (Continue	d)					
Analyte Res	sult	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4B0816 - SM 2540D (Continued)											
	urce: - 140	4B05088-	01 5	Prepa mg/l	red & Ana	lyzed: 02 138	/09/24	Ļ	1	10	
	urce: 0.7	4B05139-	01 5	Prepa mg/l	red & Ana	lyzed: 02 30.7	/09/24	L	0	10	
Batch: W4B1555 - EPA 410.4											
Blank (W4B1555-BLK1) Chemical Oxygen Demand	ND	2.9	5.0	Prepared: mg/l	02/20/24	Analyze	d: 02/2	1/24			
LCS (W4B1555-BS1)				Prepared:	02/20/24	Analyze	d: 02/2	1/24			
. ,	5.0	2.9	5.0	mg/l	100	,	95	90-110			
	urce: - 370	4B08112 - 12	01 20	Prepared: mg/l	02/20/24	Analyzee 2360	d: 02/2	1/24	0.6	15	
Matrix Spike (W4B1555-MS1)SouChemical Oxygen Demand1		4B05082 - 5.8	03 10	Prepared: mg/l	02/20/24 200	Analyzee ND	d: 02/2 92	1/24 90-110			
Matrix Spike (W4B1555-MS2)SouChemical Oxygen Demand24		4B09138 - 5.8	01 10	Prepared: mg/l	02/20/24 2000	Analyze		1/24 90-110			
		4B05082-		Prepared:							
• • •	193	4605082 - 5.8	10	mg/l	200	ND	97	90-110	4	15	
	u rce: 540	4B09138- 5.8	01 10	Prepared: mg/l	02/20/24 2000	Analyze 499		1/24 90-110	6	15	
Batch: W4B1848 - EPA 350.1											
Blank (W4B1848-BLK1) Ammonia as N	ND	0.017	0.10	Prepared: mg/l	02/22/24	Analyze	d: 02/2	9/24			
Blank (W4B1848-BLK2) Ammonia as N	ND	0.017	0.10	Prepared: mg/l	02/22/24	Analyze	d: 02/2	9/24			
LCS (W4B1848-BS1)				Prepared:	02/22/24	Analyze	d: 02/2	9/24			
	256	0.017	0.10	mg/l	0.250	, ,		90-110			
LCS (W4B1848-BS2)				Prepared:		Analyze					
Ammonia as N 0.2	243	0.017	0.10	mg/l	0.250		97	90-110			
Matrix Spike (W4B1848-MS1)SouAmmonia as N0.3		4B06037- 0.017	03 0.10	Prepared: mg/l	02/22/24 0.250	Analyze 0.136		9/24 90-110			
		4B07015- 0.017	01 0.10	Prepared: mg/l	02/22/24 0.250	Analyzee ND	d: 02/2 95	9/24 90-110			
		4B06037- 0.017	03 0.10	Prepared: mg/l	02/22/24 0.250	Analyze 0.136		9/24 90-110	0.06	15	
		4B07015-	01	Prepared:	02/22/24	Analyze	d: 02/2	9/24			
		0.017	0.10	mg/l	0.250	ND		90-110	0.2	15	
Batch: W4B1868 - EPA 351.2											
Blank (W4B1868-BLK1)				Prepared:	02/22/24	Analyze	d: 02/2	8/24			

4B05082



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128	-		Lake Elsinc TMDL Garth Enge		nyon Lak	e Nutrie	ent		03/19/2	Reported: 2024 08:22
Quality Control Results		U	5						(Co	ontinued)
Conventional Chemistry/Physical Parameters b	y APHA/EF	PA/ASTN	/ Methods	(Continue	d)					
Analyte Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4B1868 - EPA 351.2 (Continued)										
Blank (W4B1868-BLK1) TKN ND	0.065	0.10	Prepared: mg/l	02/22/24	Analyze	d: 02/2	28/24			
Blank (W4B1868-BLK2) TKN ND	0.065	0.10	Prepared: mg/l	02/22/24	Analyze	d: 02/2	28/24			
LCS (W4B1868-BS1) TKN 0.940	0.065	0.10	Prepared: mg/l	02/22/24 1.00	Analyze	ed: 02/2 94				
LCS (W4B1868-BS2) TKN 0.931	0.065	0.10	Prepared: mg/l	02/22/24 1.00	Analyze	ed: 02/2 93				
Matrix Spike (W4B1868-MS1)SourceTKN2.17	e: 4B16059 0.065	-01 0.10	Prepared: mg/l	02/22/24 1.00	Analyze 1.10		28/24 90-110			
Matrix Spike (W4B1868-MS2) Source TKN 1.85	e: 4B16059 0.065	-02 0.10	Prepared: mg/l	02/22/24 1.00	Analyze 0.848		28/24 90-110			
Matrix Spike Dup (W4B1868-MSD1)SourceTKN2.12	e: 4B16059 0.065	-01 0.10	Prepared: mg/l	02/22/24 1.00	Analyze 1.10	-	2 8/24 90-110	2	10	
Matrix Spike Dup (W4B1868-MSD2)SourceTKN1.73	e: 4B16059 0.065	-02 0.10	Prepared: mg/l	02/22/24 1.00	Analyze 0.848		2 8/24 90-110	7	10	MS-01
Batch: W4B1872 - EPA 365.3 Blank (W4B1872-BLK1) Phosphorus as P. Total	0.0067	0.010	Prepared: mg/l	02/22/24	Analyze	ed: 02/2	26/24			
LCS (W4B1872-BS1) Phosphorus as P, Total 0.194		0.010	Prepared:	02/22/24 0.200	Analyze	ed: 02/2				
	e: 4B05082		Prepared: mg/l		Analyze ND	• ·				
	e: 4B05082	2- 03 0.010	Prepared: mg/l	02/22/24 0.200	Analyze ND	ed: 02/2 98	2 6/24 90-110	2	20	



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128 Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Reported: 03/19/2024 08:22

Project Manager: Garth Engelhorn

(Continued)

Quality Control Results

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4B0765 - EPA 200.7				•••••							
Blank (W4B0765-BLK1)				Prepare	d: 02/09/24	Analyze	ed: 02/2	20/24			
Calcium, Total	n n n n n ND	0.0240	0.500	mg/l		_					
Magnesium, Total		0.0148	0.500	mg/l							
LCS (W4B0765-BS1)				Prepare	d: 02/09/24	Analyze	ed: 02/2	20/24			
Calcium, Total	51.0	0.0240	0.500	mg/l	50.2	-	102	85-115			
Magnesium, Total	49.9	0.0148	0.500	mg/l	50.2		99	85-115			
Matrix Spike (W4B0765-MS1)	Source	: 4B0213	6-01	Prepare	d: 02/09/24	Analyze	ed: 02/2	20/24			
Calcium, Total	52.3	0.0240	0.500	mg/l	50.2	2.00	100	70-130			
Magnesium, Total	49.3	0.0148	0.500	mg/l	50.2	0.110	98	70-130			
Matrix Spike (W4B0765-MS2)	Source	: 4B0505	8-01	Prepare	d: 02/09/24	Analyze	ed: 02/2	20/24			
Calcium, Total	53.1	0.0240	0.500	mg/l	50.2	1.70	102	70-130			
Magnesium, Total	50.4	0.0148	0.500	mg/l	50.2	0.326	100	70-130			
Matrix Spike Dup (W4B0765-MSD1)	Source	: 4B0213	6-01	Prepare	d: 02/09/24	Analyze	ed: 02/2	20/24			
Calcium, Total	51.6	0.0240	0.500	mg/l	50.2	2.00	99	70-130	1	30	
Magnesium, Total	48.6	0.0148	0.500	mg/l	50.2	0.110	97	70-130	2	30	
Matrix Spike Dup (W4B0765-MSD2)	Source	: 4B0505	8-01	Prepare	d: 02/09/24	Analyze	ed: 02/2	20/24			
Calcium, Total	52.2	0.0240	0.500	mg/l	50.2	1.70	101	70-130	2	30	
Magnesium, Total	49.6	0.0148	0.500	mg/l	50.2	0.326	98	70-130	2	30	



Certificate of Analysis

FINAL REPORT

TMDL

Project Number: Lake Elsinore and Canyon Lake Nutrient

Reported: 03/19/2024 08:22

Project Manager: Garth Engelhorn

Notes and Definitions

ltem	Definition
A-01	Filtered
BS-H	The recovery of this analyte in the BS/LCS was over the control limit. Sample result is suspect.
J	Estimated conc. detected <mrl and="">MDL.</mrl>
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
Q-08	High bias in the QC sample does not affect sample result since analyte was not detected or below the reporting limit.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	Method Reporting Limit (MRL) is the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.
[CALC]	An automated calculation using unrounded values then rounding the final result (scientific rounding rules). Calculations do not contain direct qualifiers; please refer to the individual components of the calculation for any qualifiers
Any rema	aining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
All result	s are expressed on wet weight basis unless otherwise specified.
All samp	les collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

Hardness as CaCO3, Total consist of the following components Magnesium, Total; and Calcium, Total

Nitrogen, Total consist of the following components NO2+NO3 as N; and TKN

Organic Nitrogen, Total consist of the following components TKN; and Ammonia as N $\,$



FINAL REPORT

Work Orders:	4B20174
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Project: Lake Elsinore and Canyon Lake Nutrient TMDL

Attn: Garth Engelhorn

Client: NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

Report Date:	3/06/2024
Received Date:	2/20/2024
Turnaround Time:	Normal
Phones:	(562) 495-5777
Fax:	(562) 495-5877
P.O. #:	
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Garth Engelhorn,

Enclosed are the results of analyses for samples received 2/20/24 with the Chain-of-Custody document. The samples were received in good condition, at 3.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kenneth C. Oda For Kim G. Tu Project Manager

4B20174





Certificate of Analysis

FINAL REPORT

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient TMDL

 Project Manager:
 Garth Engelhorn

Reported: 03/06/2024 09:07

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-012124	Matt Muilenburg	4B20174-01	Water	02/20/24 15:20	
S-04-012124	Matt Muilenburg	4B20174-02	Water	02/20/24 15:56	
LLS-012124	Matt Muilenburg	4B20174-03	Water	02/20/24 14:05	



Certificate of Analysis

FINAL REPORT

-	TMDL		yon Lake	Nutrient	03/	Reported: /06/2024 09:07
					02/20/24 45	201 14 11
			2	sampled:	02/20/24 15	Muilenburg
Result	мы	MRI	Units	Dil	Analyzed	Qualifier
		IVINE	Units		Analyzea	Quuinci
		Instr UVVIS	05			
Preparation: NONE (WETCHEM))			7.30		Analyst: jls
24	2.9	5.0	mg/l	1	03/04/24	r maryou jio
		Instr: INC07				
Proparation: NONE (WETCHEM))			0.10		Analyst: JLS
-	2.0	2.0		1	02/26/24	Analyst. JES
			Ū			
				sampied.	02/20/24 15	Muilenburg
Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
ameters by APHA/EPA/ASTM Me	ethods					
		Instr: UVVIS	05			
Preparation: _NONE (WETCHEM))	Prepared: 0	3/01/24 1	7:30		Analyst: jls
	2.9	5.0	mg/l	1	03/04/24	
		Instr: INC07				
Preparation: _NONE (WETCHEM))	Prepared: 0		0:10		Analyst: JLS
3.9	2.0	2.0	mg/l	1	02/26/24	
			(Sampled [.]	02/20/24 14	05 by Matt
				bumpicu.	02,20,211	Muilenburg
Posult	МП	MDI	Unite	Dil	Analyzad	Qualifier
			Units		Analyzeu	Quaimer
ameters by APHA/EPA/ASTM Me						
ameters by APHA/EPA/ASTM Me	ethods	Instr: UVVIS	05	7.30		Analyst: ils
	ethods		05	7:30 1	03/04/24	Analyst: jls
ameters by APHA/EPA/ASTM Me Preparation: _NONE (WETCHEM)	ethods	Instr: UVVIS Prepared: 0. 5.0	05 3/01/24 1 mg/l		03/04/24	Analyst: jls
ameters by APHA/EPA/ASTM Me Preparation: _NONE (WETCHEM)	ethods) 2.9	Instr: UVVIS Prepared: 0	05 3/01/24 1 mg/l	1	03/04/24	Analyst: jls Analyst: JLS
	Project Manager: Result ameters by APHA/EPA/ASTM Me Preparation: _NONE (WETCHEM) 	TMDL Project Manager: Garth Er Result MDL ameters by APHA/EPA/ASTM Met- Preparation: NONE (WETCHEM) 24 2.9 Preparation: NONE (WETCHEM) 4.2 2.0 Result MDL 2.0 Result MDL 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	TMDL Project Manager: Garth Engelhorn Result MDL MRL ameters by APHA/EPA/ASTM Methods Instr: UVVIS Preparation: NONE (WETCHEM) Prepared: 0 24 2.9 5.0 Preparation: NONE (WETCHEM) Prepared: 0 2.0 2.0 2.0 Preparation: NONE (WETCHEM) Prepared: 0 2.0 2.0 2.0 Prepared: Instr: INC07 Preparation: NONE (WETCHEM) Prepared: 0 2.0 2.0 2.0 Prepared: Instr: UVVIS Preparation: NONE (WETCHEM) Prepared: 0 3.9 2.0 2.0 2.0	TMDL Project Manager: Garth Engelhorn Result MDL MRL Units ameters by APHA/EPA/ASTM Methods Instr: UVVIS05 Instr: UVVIS05 Preparation: _NONE (WETCHEM) Prepared: 03/01/24 1 Instr: INC07 Preparation: _NONE (WETCHEM) Instr: INC07 Prepared: 02/21/24 1 2.0 2.0 mg/l Instr: UVVIS05 Instr: INC07 Preparation: _NONE (WETCHEM) Prepared: 02/21/24 1 1 2.0 mg/l Instr: UVVIS05 Instr: UVVIS05 Preparation: _NONE (WETCHEM) Instr: UVVIS05 Prepared: 03/01/24 1 5.0 mg/l Instr: UVVIS05 Instr: UVVIS05 Prepared: 03/01/24 1 5.0 mg/l 1 3.9 2.0 2.0 mg/l	Project Manager: Garth Engelhorn Sampled: Sampled: Sampled: MDL MRL Units DI Instr: UVVIS05 Preparation: NONE (WETCHEM) Instr: INC07 Prepared: 02/21/24 10:10 Instr: INC07 Preparation: NONE (WETCHEM) 2.0 MRL Units DI Result MDL MRL Units DI Preparation: NONE (WETCHEM) Instr: INC07 Prepared: 02/21/24 10:10 Instr: UVVIS05 Preparation: NONE (WETCHEM) Instr: UVVIS05 Prepared: 03/01/24 17:30 Instr: INC07 Preparation: NONE (WETCHEM) Instr: UVVIS05 Prepared: 03/01/24 17:30 Instr: UVVIS05 Preparation: NONE (WETCHEM) Instr: INC07 Prepared: 03/01/24 17:30 Instr: INC07 Preparation: NONE (WETCHEM) 2.0 Instr: INC07 Prepared: 02/21/24 10:10 Instr: INC07 Preparation: NONE (WETCHEM) 2.0 mage Instr: INC07 Prepared: 02/21/24 10:10 Instr: INC07 Prepared: 0.2/21/24 10:10 2.0 mg/l 1 Instr: INC07 Instr: INC07 Instr: INC07	TMDL 03/ Project Manager: Garth Engelhorn Sampled: 02/20/24 19 Sampled: 02/20/24 19 Sampled: 02/20/24 19 Instr: Units Dil Analyzed Instr: UVVIS05 Instr: UVVIS05 Preparation: NONE (WETCHEM) Prepared: 03/01/24 17:30 03/04/24 Instr: INSTR: INSTR: INSTR: UNOT 03/04/24 Preparation: NONE (WETCHEM) Prepared: 02/21/24 10:10 02/26/24 Result MDL MRL Units Dil Analyzed Instr: UVVIS05 Instr: UVVIS05 Instr: Instr: UNIts Dil Analyzed Instr: UVVIS05 Instr: UVVIS05 Instr: UNIts Dil Analyzed Instr: UVVIS05 Instr: UVVIS05 Instr: Instr: UVVIS05 Instr: UVVIS05 Instr: Instr: UVVIS05 Instr: Instr: UNIts Dil 03/04/24 Instr: Instr: Instr:



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient TMDL

 Project Manager:
 Garth Engelhorn

Reported: 03/06/2024 09:07

Quality Control Results

Conventional Chemistry/Physical Parame	eters by	APHA/EF	PA/ASTM	Methods							
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4B1662 - SM 5210B											
Blank (W4B1662-BLK1) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared: mg/l	02/21/24	Analyze	d: 02/2	6/24			
Blank (W4B1662-BLK2) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared: mg/l	02/21/24	Analyze	d: 02/2	6/24			
Blank (W4B1662-BLK3) Biochemical Oxygen Demand	ND	2.0	2.0	Prepared:	02/21/24	Analyze	d: 02/2	6/24			
LCS (W4B1662-BS1) Biochemical Oxygen Demand	210	2.0	2.0	Prepared:	02/21/24 198	Analyze		6/24 85-115			
LCS (W4B1662-BS2) Biochemical Oxygen Demand	213	2.0	2.0	Prepared:	02/21/24 198	Analyze		9/24 85-115			
LCS (W4B1662-BS3) Biochemical Oxygen Demand	224	2.0	2.0	Prepared: mg/l	02/21/24 198	Analyze		9/24 85-115			
LCS (W4B1662-BS4) Biochemical Oxygen Demand	216	2.0	2.0	Prepared: mg/l	02/21/24 198	Analyze		9/24 85-115			
LCS (W4B1662-BS5) Biochemical Oxygen Demand	210	2.0	2.0	Prepared: mg/l	02/21/24 198	Analyze		9/24 85-115			
Duplicate (W4B1662-DUP1) Biochemical Oxygen Demand	Source: 2.03	4B20174 2.0	- 03 2.0	Prepared: mg/l	02/21/24	Analyze	d: 02/2	6/24	2	20	
Batch: W4C0098 - EPA 410.4											
Blank (W4C0098-BLK1) Chemical Oxygen Demand	ND	2.9	5.0	Prepared: mg/l	03/01/24	Analyze	d: 03/0	2/24			
LCS (W4C0098-BS1) Chemical Oxygen Demand		2.9	5.0	Prepared: mg/l	03/01/24 100	Analyze	d: 03/0 94	2/24 90-110			
Duplicate (W4C0098-DUP1) Chemical Oxygen Demand	Source: 3680	4B22061 12	- 01 20	Prepared: mg/l	03/01/24	Analyze 3620	d: 03/0	2/24	2	15	
Matrix Spike (W4C0098-MS1) Chemical Oxygen Demand	Source: 197	4B21160 12	- 03 20	Prepared: mg/l	03/01/24 200	Analyze ND	d: 03/0 98	4/24 90-110			
Matrix Spike (W4C0098-MS2) Chemical Oxygen Demand	Source: 2310	4B22136 12	- 01 20	Prepared: mg/l	03/01/24 2000	Analyze	d: 03/0 102	2/24 90-110			
Matrix Spike Dup (W4C0098-MSD1) Chemical Oxygen Demand	Source: 193	4B21160 12	- 03 20	Prepared: mg/l	03/01/24 200	Analyze ND	d: 03/0 97	4/24 90-110	2	15	
Matrix Spike Dup (W4C0098-MSD2) Chemical Oxygen Demand	Source: 2360	4B22136 12	- 01 20	Prepared: mg/l	03/01/24 2000	Analyze 265		2/24 90-110	2	15	



Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient

Reported: 03/06/2024 09:07

Project Manager: Garth Engelhorn

Notes and Definitions

ltem	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.



FINAL REPORT

Work Orders: 4B23077

Project: Lake Elsinore and Canyon Lake Nutrient TMDL

Attn: Garth Engelhorn

Client: NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128
 Report Date:
 3/26/2024

 Received Date:
 2/23/2024

 Turnaround Time:
 Normal

 Phones:
 (562) 495-5777

 Fax:
 (562) 495-5877

 P.O. #:
 Billing Code:

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. The report may include analytes that are not currently accreditable by some state agencies or accrediting bodies. This analytical report must be reproduced in its entirety.

Dear Garth Engelhorn,

Enclosed are the results of analyses for samples received 2/23/24 with the Chain-of-Custody document. The samples were received in good condition, at 4.5 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kenneth C. Oda For Kim G. Tu Project Manager

4B23077





Certificate of Analysis

FINAL REPORT

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient

 TMDL

 Project Manager:
 Garth Engelhorn

Reported: 03/26/2024 09:50

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-022324	Matt M.	4B23077-01	Water	02/23/24 07:00	
S-04-022324	Matt M.	4B23077-02	Water	02/23/24 08:00	
CLS-022324	Matt M.	4B23077-03	Water	02/23/24 08:00	



Sample Results

Sample: S-03-022324

Certificate of Analysis

FINAL REPORT

 Project Number:
 Lake Elsinore and Canyon Lake Nutrient TMDL

 Project Manager:
 Garth Engelhorn

Reported: 03/26/2024 09:50

Sampled: 02/23/24 7:00 by Matt M.

4B23077-01 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa Method: [CALC]	rameters by APHA/EPA/ASTM M	ethods	Instr: [CALC]				
Batch ID: [CALC] Nitrogen, Total	Preparation: [CALC] 2.1	0.036	Prepared: 03 0.20	3/15/24 14 mg/l	:18	03/18/24	Analyst: YMT
Method: _Various Batch ID: [CALC] Organic Nitrogen, Total	Preparation: [CALC]	0.017	Instr: [CALC] Prepared: 03 0.10	3/15/24 14 mg/l	:18	03/18/24	Analyst: YMT
Method: EPA 350.1	1.1	0.017	Instr: AA06	mg/i		00/10/24	
Batch ID: W4C1185 Ammonia as N	Preparation: _NONE (WETCHEM 0.15) 0.017	Prepared: 03 0.10	3/14/24 18 mg/l	:43 1	03/15/24	Analyst: YMT
Method: EPA 351.2 Batch ID: W4C1267	Preparation: _NONE (WETCHEM)	Instr: AA06 Prepared: 03	3/15/24 14	:18		Analyst: YMT
	1.2	0.13	0.20	mg/l	1	03/18/24	M-02
Method: EPA 353.2 Batch ID: W4B2023	Preparation: _NONE (WETCHEM		Instr: AA01 Prepared: 02				Analyst: ISM
Nitrite as N	0.83 50	0.040 42	0.20 100	mg/l ug/l	1 1	02/23/24 18:3 02/23/24 18:3	
NO2+NO3 as N Method: EPA 365.3		36	200 Instr: UVVIS0	ug/l	1	02/23/24	
Batch ID: W4B2025 o-Phosphate as P	Preparation: _NONE (WETCHEM 0.30) 0.0071	Prepared: 02 0.010		:31 1	02/23/24 18:2	Analyst: rob 4
Method: EPA 365.3 Batch ID: W4C1413 Phosphorus as P, Total	Preparation: _NONE (WETCHEM 0.41) 0.0067	Instr: UVVIS0 Prepared: 03 0.010		:44 1	03/21/24	Analyst: rob
Method: SM 2540C Batch ID: W4B2072 Total Dissolved Solids	Preparation: _NONE (WETCHEM 410) 4.0	Instr: OVEN1 Prepared: 02 10		:25 1	02/26/24	Analyst: bel
Method: SM 2540D Batch ID: W4B2510 Total Suspended Solids	Preparation: _NONE (WETCHEM 39)	Instr: OVEN1 Prepared: 02 5		:43 1	02/29/24	Analyst: hhl
Metals by EPA 200 Series Methods							
Method: [CALC] Batch ID: [CALC] Hardness as CaCO3, Total	Preparation: [CALC] 173	0.121	Instr: [CALC] Prepared: 02 3.31	2/27/24 13 mg/l	:20	03/04/24	Analyst: kvm
Method: EPA 200.7 Batch ID: W4B2216	Preparation: EPA 200.2		Instr: ICP03 Prepared: 02				Analyst: kvm
	43.3 15.7	0.0240 0.0148	0.500 0.500	mg/l mg/l	1 1	03/04/24 03/04/24	
4000077							D (12



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	Lake Els TMDL	sinore and Can	yon Lake N	utrient	03/2	Reported 6/2024 09:50
San Diego, CA 92128	Project Manager:		ngelhorn	03/2	03/20/2024 03.3		
Sample Results						(Continued)
Sample: S-03-022324				Sam	oled: 0	2/23/24 7:00	by Matt M.
4B23077-01 (Water)						(Continued)
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Metals by EPA 200 Series Methods	(Continued)						
Method: EPA 200.7			Instr: ICP03	0 10 T 10 A 40 A		_	
Batch ID: W4B2216	Preparation: EPA 200.2		Prepared: 0	2/27/24 13:2	20		nalyst: kvm
Sample Results						(Continued)
Sample: S-04-022324				Samj	oled: 0	2/23/24 8:00	by Matt M.
4B23077-02 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	rameters by APHA/EPA/ASTM M	lethods					
Method: [CALC]			Instr: [CALC]	-			
Batch ID: [CALC] Nitrogen, Total	Preparation: [CALC]	0.036	Prepared: 0 0.20	3/15/24 14: mg/l	18	Ai 03/18/24	nalyst: YMT
	1.5	0.000		0		03/10/24	
Method: _Various	Proventions [CALC]		Instr: [CALC]		10		
Batch ID: [CALC] Organic Nitrogen, Total	Preparation: [CALC]	0.017	Prepared: 0 0.10	3/15/24 14: mg/l	18	03/18/24	nalyst: YMT
Method: EPA 350.1 Batch ID: W4C1185	Preparation: _NONE (WETCHEM	4)	Instr: AA06 Prepared: 0	2/1//2/ 18.	12	Δ.	nalyst: YMT
Ammonia as N	0.12	0.017	0.10	mg/l	+J 1	03/15/24	iaiyst. Tivit
Method: EPA 351.2			Instr: AA06	-			
Batch ID: W4C1267	Preparation: _NONE (WETCHEM	1)	Prepared: 0	3/15/24 14:1	18	Aı	nalyst: YMT
TKN	0.68	0.13	0.20	mg/l	1	03/18/24	M-02
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B2023	Preparation: _NONE (WETCHEM	1)	Prepared: 0	2/23/24 17:2	28	А	nalyst: ISM
Nitrate as N	0.74	0.040	0.20	mg/l	1	02/23/24 18:33	
Nitrite as N	63	42	100	ug/l	1	02/23/24 18:33	J
NO2+NO3 as N		36	200	ug/l	1	02/23/24	
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W4B2025	Preparation: _NONE (WETCHEM	1)	Prepared: 0	2/23/24 17:3	31	4	nalyst: rob
o-Phosphate as P	0.31	0.0071	0.010	mg/l	1	02/23/24 18:24	
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W4C1413	Preparation: _NONE (WETCHEN	1)	Prepared: 0		14	A	nalyst: rob
Phosphorus as P, Total	0.44	0.0067	0.010	mg/l	1	03/21/24	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W4B2072	Preparation: _NONE (WETCHEM		Prepared: 0				Analyst: bel
Total Dissolved Solids	120	4.0	10	mg/l	1	02/26/24	
Method: SM 2540D			Instr: OVEN				
Batch ID: W4B2510	Preparation: _NONE (WETCHEM	1)	Prepared: 0				Analyst: hhl
Total Suspended Solids			5	mg/l	1	02/29/24	D 4 4 4
4B23077							Page 4 of 12



Certificate of Analysis FINAL REPORT

-	nvironmental - Oceanside le of Science, Suite 200 CA 92128	Project Numb Project Manag		TMDL		nyon Lake N	lutrient	03	Reported: /26/2024 09:50
Sa	mple Results								(Continued)
Sample:	S-04-022324					Sam	pled: 02	2/23/24 8:0	0 by Matt M.
	4B23077-02 (Water)								(Continued)
Analyte		Resu	lt	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventiona	al Chemistry/Physical Par	ameters by APHA/EPA/ASTN	/ M	ethods (Continued)				
Method: SI	VI 2540D				Instr: OVEN	115			
Batch ID:	W4B2510	Preparation: _NONE (WETCH	HEM)	Prepared:	02/29/24 15	:43		Analyst: hhl
Metals by El	PA 200 Series Methods								
Method: [C	ALC]				Instr: [CALC]			
Batch ID:	[CALC]	Preparation: [CALC]			Prepared:	02/27/24 13	:20		Analyst: kvm
Hardness	as CaCO3, Total		.5	0.121	3.31	mg/l		03/04/24	
Method: EF	PA 200.7				Instr: ICP03	}			
Batch ID:	W4B2216	Preparation: EPA 200.2			Prepared:	02/27/24 13	:20		Analyst: kvm
Calcium, T	otal		.0	0.0240	0.500	mg/l	1	03/04/24	
Magnesiur	n, Total	4.()3	0.0148	0.500	mg/l	1	03/04/24	



Sample Results

Sample: CLS-022324

Certificate of Analysis

FINAL REPORT

Project Number:	Lake Elsinore and Canyon Lake Nutrient TMDL
Project Manager:	Garth Engelhorn

03/26/2024 09:50

Reported:

(Continued)

Sampled: 02/23/24 8:00 by Matt M.

4B23077-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	arameters by APHA/EPA/ASTM M	lethods					
Method: [CALC]			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 03		4:18		Analyst: YMT
Nitrogen, Total	1.4	0.036	0.10	mg/l		03/18/24	
Method: _Various			Instr: [CALC]				
Batch ID: [CALC]	Preparation: [CALC]		Prepared: 03	8/15/24 14	4:18		Analyst: YMT
Organic Nitrogen, Total	0.66	0.017	0.10	mg/l		03/18/24	
Method: EPA 350.1			Instr: AA06				
Batch ID: W4C1185	Preparation: _NONE (WETCHEN	1)	Prepared: 03	8/14/24 18	8:43		Analyst: YMT
Ammonia as N	0.087	0.017	0.10	mg/l	1	03/15/24	J
Method: EPA 351.2			Instr: AA06				
Batch ID: W4C1267	Preparation: _NONE (WETCHEN	1)	Prepared: 03	8/15/24 14	4:18		Analyst: YMT
TKN	0.74	0.065	0.10	mg/l	1	03/18/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B2023	Preparation: _NONE (WETCHEN	1)	Prepared: 02	2/23/24 1	7:28		Analyst: ISM
Nitrate as N	0.63	0.040	0.20	mg/l	1	02/23/24 18:3	4
Nitrite as N	ND	42	100	ug/l	1	02/23/24 18:3	4
NO2+NO3 as N		36	200	ug/l	1	02/23/24	
Method: EPA 365.3			Instr: UVVIS)4			
Batch ID: W4B2025	Preparation: _NONE (WETCHEN	1)	Prepared: 02		7:31		Analyst: rob
o-Phosphate as P	0.22	0.0071	0.010	mg/l	1	02/23/24 18:2	-
Method: EPA 365.3			Instr: UVVIS)5			
Batch ID: W4C1413	Preparation: _NONE (WETCHEN	1)	Prepared: 03		8:44		Analyst: rob
Phosphorus as P, Total	0.30	0.0067	0.010	mg/l	1	03/21/24	,
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4B2072	Preparation: _NONE (WETCHEN	1)	Prepared: 02		9.25		Analyst: bel
Total Dissolved Solids	250	4.0	10	mg/l	1	02/26/24	Finalysia Ser
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W4B2510	Preparation: _NONE (WETCHEN	4)	Prepared: 02		5.43		Analyst: hhl
Total Suspended Solids	15	")	5	mg/l	1	02/29/24	Analyst. IIII
Metals by EPA 200 Series Methods				-			
-			Instr: [CALC]				
Method: [CALC] Batch ID: [CALC]	Preparation: [CALC]		Prepared: 02	0/07/04 1	3.20		Analyst: kvm
Hardness as CaCO3, Total	131	0.121	3.31	mg/l	5.20	03/04/24	
Method: EPA 200.7				5			
Batch ID: W4B2216	Preparation: EPA 200.2		Instr: ICP03 Prepared: 02	0/07/01 1	3.20		Analyst: kvm
Calcium, Total	35.3	0.0240	0.500	mg/l	5.20 1	03/04/24	Analyst. KVIII
Magnesium, Total		0.0148	0.500	mg/l	1	03/04/24	
	10.0				•		
4B23077							Daga 6 of 12



Certificate of Analysis FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:	TMDL		03	Reported: 8/26/2024 09:50		
San Diego, CA 92128	Project Manager:	Garth Er	igeinorn				
Sample Results							(Continued)
Sample: CLS-022324				Sam	nled: 02	2/23/24 8.0	0 by Matt M.
4B23077-03 (Water)					.p.c	-,,	(Continued)
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Metals by EPA 200 Series Methods (Continued)							
Method: EPA 200.7			Instr: ICP03	3			
Batch ID: W4B2216 Preparation	on: EPA 200.2		Prepared:	02/27/24 13	:20		Analyst: kvm



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL Project Manager: Garth Engelhorn

Reported: 03/26/2024 09:50

Quality Control Re	sults
--------------------	-------

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifie
atch: W4B2023 - EPA 353.2											
Blank (W4B2023-BLK1)				Pre	bared & Ai	nalyzed: 02	2/23/24	4			
Nitrate as N	ND	0.040	0.15	mg/l		,					
Nitrite as N		42	100	ug/l							
NO2+NO3 as N		36	200	ug/l							
LCS (W4B2023-BS1)				Pre	oared & A	nalyzed: 02	2/23/24	4			
Nitrate as N		0.040	0.15	mg/l	1.00		98	90-110			
Nitrite as N		42	100	ug/l	1000		100	90-110			
NO2+NO3 as N	981	36	200	ug/l	1000		98	90-110			
Matrix Spike (W4B2023-MS1)		: 4B22114			bared & A						
Nitrate as N		0.040	0.15	mg/l	2.00	0.484	96	90-110			
Nitrite as N		42	100	ug/l	1000	ND	101	90-110			
NO2+NO3 as N	2400	36	200	ug/l	2000	497	95	90-110			
Matrix Spike (W4B2023-MS2)		: 4B22129			pared & A	-					
Nitrate as N		0.040	0.15	mg/l	2.00	3.21	98	90-110			
Nitrite as N		42	100	ug/l	1000	ND	102	90-110			
NO2+NO3 as N		36	200	ug/l	2000	3210	98	90-110			
Matrix Spike Dup (W4B2023-MSD1)		: 4B22114			bared & A						
Nitrate as N		0.040	0.15	mg/l	2.00	0.484	96	90-110	0	20	
Nitrite as N		42	100	ug/l	1000	ND	101	90-110	0	20	
NO2+NO3 as N	2400	36	200	ug/l	2000	497	95	90-110	0	20	
Matrix Spike Dup (W4B2023-MSD2) Nitrate as N		: 4B22129			bared & A	-			0.2	20	
Nitrite as N		0.040	0.15	mg/l	2.00	3.21	97	90-110	0.2	20	
		42	100	ug/l	1000	ND	102	90-110	0	20	
NO2+NO3 as N	5160	36	200	ug/l	2000	3210	98	90-110	0.2	20	
atch: W4B2025 - EPA 365.3											
Blank (W4B2025-BLK1)		0.0074	0.010		pared & A	nalyzed: 02	2/23/24	4			
o-Phosphate as P	ND	0.0071	0.010	mg/l							
LCS (W4B2025-BS1)		0.007/	0.040		bared & A	nalyzed: 02					
o-Phosphate as P	0.202	0.0071	0.010	mg/l	0.200		101	88-111			
Matrix Spike (W4B2025-MS1)		: 4B23077			bared & A	-					
o-Phosphate as P	0.423	0.0071	0.010	mg/l	0.200	0.221	101	85-112			
Matrix Spike Dup (W4B2025-MSD1) o-Phosphate as P		4B2307 0.0071	7-03 0.010	Pre mg/l	oared & An 0.200	nalyzed: 02 0.221		4 85-112	0.2	20	
atch: W4B2072 - SM 2540C											
Blank (W4B2072-BLK1) Total Dissolved Solids	ND	4.0	10	Prej mg/l	pared & A	nalyzed: 02	2/26/24	4			
LCS (W4B2072-BS1) Total Dissolved Solids	804	4.0	10	Pre mg/l	oared & A 824	nalyzed: 02		4 97-103			
Duplicate (W4B2072-DUP1)	6	: 4B2209(-		nalyzed: 02					



Certificate of Analysis FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128		-		Lake Elsino TMDL Garth Enge		nyon Lake	e Nutrie	ent			Reported: 2024 09:50
Quality Control Results	S									(Co	ontinued)
Conventional Chemistry/Physical Paramet	ers by	APHA/EP	A/ASTN	/ Methods	(Continue	d)					
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4B2072 - SM 2540C (Continued)											
Duplicate (W4B2072-DUP1) S Total Dissolved Solids S	Source: 4730	4B22090 4.0	- 02 10	Prepa mg/l	red & Ana	4640	2/26/24	4	2	10	
	Source: 6100	4B22123 4.0	- 01 10	Prepa mg/l	red & Ana	lyzed: 02 5880	2/26/24	4	4	10	
Batch: W4B2510 - SM 2540D											
Blank (W4B2510-BLK1) Total Suspended Solids	a ND		5	Prepa mg/l	red & Ana	lyzed: 02	2/29/24	4			
LCS (W4B2510-BS1)	00.0		-	-	red & Ana	lyzed: 02					
Total Suspended Solids			5	mg/l	63.0			90-110			
Duplicate (W4B2510-DUP1) S Total Suspended Solids S	248	4B22105	- 01 5	mg/l	red & Ana	270 270	2/29/24	4	8	10	
Duplicate (W4B2510-DUP2) S Total Suspended Solids S	Source: 394	4B23102	- 01 5	Prepa mg/l	red & Ana	lyzed: 02 379	2/29/24	4	4	10	
Batch: W4C1185 - EPA 350.1											
Blank (W4C1185-BLK1) Ammonia as N	a a ND	0.017	0.10	Prepared: mg/l	03/14/24	Analyze	d: 03/1	5/24			
Blank (W4C1185-BLK2) Ammonia as N	n nND	0.017	0.10	Prepared: mg/l	03/14/24	Analyze	d: 03/1	5/24			
LCS (W4C1185-BS1) Ammonia as N	0.234	0.017	0.10	Prepared: mg/l	03/14/24 0.250	Analyze		5/24 90-110			
LCS (W4C1185-BS2) Ammonia as N	0.233	0.017	0.10	Prepared: mg/l	03/14/24 0.250	Analyze	d: 03/ 1 93	90-110			
	Source: 0.233	4B21113 0.017	- 12 0.10	Prepared: mg/l	03/14/24 0.250						
	Source: 0.277	4B23057 0.017	- 01 0.10	Prepared: mg/l	03/14/24 0.250	Analyze 0.0353	d: 03/1 97	-			
Matrix Spike Dup (W4C1185-MSD1) S Ammonia as N		4B21113 0.017	- 12 0.10	Prepared: mg/l	03/14/24 0.250	Analyze ND		1 5/24 90-110	2	15	
Matrix Spike Dup (W4C1185-MSD2) S Ammonia as N		4B23057 0.017	- 01 0.10	Prepared: mg/l	03/14/24 0.250	Analyze 0.0353		90-110	0.2	15	
Batch: W4C1267 - EPA 351.2											
Blank (W4C1267-BLK1) TKN		0.065	0.10	Prepared: mg/l	03/15/24	Analyze	d: 03/1	8/24			
Blank (W4C1267-BLK2) TKN	- ND	0.065	0.10	Prepared: mg/l	03/15/24	Analyze	d: 03/1	8/24			
LCS (W4C1267-BS1) TKN	1.04	0.065	0.10	Prepared: mg/l	03/15/24 1.00	Analyze		1 8/24 90-110			
LCS (W4C1267-BS2)				Prepared:	03/15/24	Analyze	d: 03/1	8/24			



NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200	Project Number:		Lake Elsinore and Canyon Lake Nutrient							Reported:
San Diego, CA 92128	Project N	lanager:	Garth Enge	elhorn						
Quality Control Results									(Cc	ontinued)
Conventional Chemistry/Physical Parameters b	y APHA/E	PA/ASTN	/ Methods	(Continue	d)					
				Spike	Source		%REC		RPD	
Analyte Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W4C1267 - EPA 351.2 (Continued)										
LCS (W4C1267-BS2)				03/15/24	Analyze					
TKN 1.02	0.065	0.10	mg/l	1.00		102	90-110			
Matrix Spike (W4C1267-MS1) Source	e: 4B22090	0-02	Prepared	03/15/24	Analyze	ed: 03/1	18/24			
TKN 3.32		0.20	mg/l	2.00	1.25	104	90-110			
Matrix Spike (W4C1267-MS2) Source	e: 4B29072	2-04	Prepared	03/15/24	Analyze	ed: 03/1	18/24			
TKN 1.76	0.065	0.10	mg/l	1.00	0.815		90-110			
Matrix Spike Dup (W4C1267-MSD1) Source	e: 4B22090	1-02	Proparad	03/15/24	Analyza	d. 03/1	18/24			
TKN 3.34		0.20	mg/l	2.00	1.25		90-110	0.4	10	
Materia Saila Dua (MAC1267 MSD2)	- 4B2007	0.04	Drenered	02/15/24	Analyza	d. 02 //	10/24			
Matrix Spike Dup (W4C1267-MSD2) Source		2- 04 0.10	ma/l	03/15/24	0.815	88 88	90-110	4	10	MS-01
Batch: W4C1413 - EPA 365.3										
Blank (W4C1413-BLK1)				03/18/24	Analyze	ed: 03/2	21/24			
Phosphorus as P, Total ND	0.0067	0.010	mg/l							
LCS (W4C1413-BS1)			Prepared	03/18/24	Analyze	ed: 03/2	21/24			
Phosphorus as P, Total 0.198	0.0067	0.010	mg/l	0.200		99	90-110			
Matrix Spike (W4C1413-MS1) Source	e: 4B06002	2-01	Prepared	03/18/24	Analyze	ed: 03/2	21/24			
Phosphorus as P, Total 0.263		0.010	mg/l	0.200	0.0650		90-110			
Matrix Spike Dup (W4C1413-MSD1) Source	e: 4B06002	2-01	Prepared	03/18/24	Analyze	d: 03/2	21/24			
Phosphorus as P, Total 0.266		0.010	mg/l	0.200	0.0650		90-110	1	20	



FINAL REPORT

NV5 - Alta Environmental - Oceanside 15092 Avenue of Science, Suite 200 San Diego, CA 92128 Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Reported: 03/26/2024 09:50

Project Manager: Garth Engelhorn

(Continued)

Quality Control Results

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4B2216 - EPA 200.7	Result	MDL	WIKE	onits	Level	Result	/onec	Linits	NF D	Linin	Quaimer
Blank (W4B2216-BLK1)				Prepared	: 02/27/24	Analyze	ed: 03/0	4/24			
Calcium, Total	ND	0.0240	0.500	mg/l		2					
Magnesium, Total		0.0148	0.500	mg/l							
LCS (W4B2216-BS1)				Prepared	: 02/27/24	Analyze	ed: 03/0	04/24			
Calcium, Total	50.9	0.0240	0.500	mg/l	50.2	-	101	85-115			
Magnesium, Total	50.5	0.0148	0.500	mg/l	50.2		101	85-115			
Matrix Spike (W4B2216-MS1)	Source	: 4B2209	1-01	Prepared	: 02/27/24	Analyze	ed: 03/0	04/24			
Calcium, Total	53.2	0.0240	0.500	mg/l	50.2	3.56	99	70-130			
Magnesium, Total	50.9	0.0148	0.500	mg/l	50.2	1.60	98	70-130			
Matrix Spike (W4B2216-MS2)	Source	: 4B2305	7-01	Prepared	: 02/27/24	Analyze	ed: 03/0	04/24			
Calcium, Total	65.9	0.0240	0.500	mg/l	50.2	15.6	100	70-130			
Magnesium, Total	53.7	0.0148	0.500	mg/l	50.2	4.02	99	70-130			
Matrix Spike Dup (W4B2216-MSD1)	Source	: 4B2209	1-01	Prepared	: 02/27/24	Analyze	ed: 03/0	04/24			
Calcium, Total	52.7	0.0240	0.500	mg/l	50.2	3.56	98	70-130	0.8	30	
Magnesium, Total	50.4	0.0148	0.500	mg/l	50.2	1.60	97	70-130	0.9	30	
Matrix Spike Dup (W4B2216-MSD2)	Source	: 4B2305	7-01	Prepared	: 02/27/24	Analyze	ed: 03/0	4/24			
Calcium, Total	66.0	0.0240	0.500	mg/l	50.2	15.6	100	70-130	0.2	30	
Magnesium, Total	53.8	0.0148	0.500	mg/l	50.2	4.02	99	70-130	0.1	30	



Certificate of Analysis

FINAL REPORT

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL **Reported:** 03/26/2024 09:50

Project Manager: Garth Engelhorn

Notes and Definitions

ltem	Definition
J	Estimated conc. detected <mrl and="">MDL.</mrl>
M-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	Method Reporting Limit (MRL) is the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.
[CALC]	An automated calculation using unrounded values then rounding the final result (scientific rounding rules). Calculations do not contain direct qualifiers; please refer to the individual components of the calculation for any qualifiers
Any rema	aining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
All result	s are expressed on wet weight basis unless otherwise specified.
All samp	les collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.
Hardnes	s as CaCO3, Total consist of the following components Magnesium, Total; and Calcium, Total
Nitrogen	, Total consist of the following components NO2+NO3 as N; and TKN
Organic	Nitrogen, Total consist of the following components TKN; and Ammonia as N

APPENDIX B

WATER COLUMN PROFILE DATASHEETS

Lake Elsinore and Canyon Lake TMDL Monitoring 2023-24

FIELD DATASHEET

Date: $7/7/23$ Location (C	Sircle): Lake Elsinore/Canyon Lake Station:
Time on Station: /025 Time	off Station: 1030 Staff Initials: 1/J///
Weather Conditions: <u>clear</u>	Wind (mph & direction): 1-2 mph E
Lat: On target	Long: 00
Water Depth (m): 6.8~	Secchi Depth (m): $O_{,3}$
Water Chemistry Sample?: YN SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when

full (after first 250 mL are filtered).

-

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.6	3274	9.02	10.00	12				-
1	28,8	3274	9.00	8.72	13				
2	28.3	3272	8,96	6.56	14				
3	26.6	3263	8.57	0,25	15				
. 4	25.6	3257	8,52	0.08	16				
5	25.1	3258	8,31	0,03	17				
6	25.0	3259	8.19	0.02	18				
Xbis	24.7	3262	8.17	0.00	19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

Date: 7/17 Locatio	n: <u>Lake Elsinore</u>	Station:	602
Time on Station: 0750	Time off Station:_	0935 Staf	f Initials: $\mathcal{NJ}/\mathcal{HK}$
Weather Conditions:		Wind (mph & direct	ion): 1- Inph E
Lat:		Long: OA	
Water Depth (m): 7.7~		Secchi Depth (m):	0.3m
Water Chemistry Sample Times:	Chl-a Sample	?(Y)N <u>Algae</u>	Taxonomy Sample? Y N
Surface: 0805 Surface DUP: 0845 Depth Int: 0815 Depth Int. DUP: 0900 Bottom: 0830 Bottom DUP: 0905 Surface TMDL: <u>0910</u>	Surface DUP v Depth Int. volu Depth Int. DUI Surface TMDL **Do not excer (~500 mL fill v	•	$\frac{220}{10}$ $\frac{230}{215}$ when filtering chlorophyll scard lower chamber when

Comments:

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	
0	27.8	3267	8,91	6.85	31.4	24.45	
0.5	27.8	3269	8.91	6.90	34.7	24.42	
1	27.8	3269	8.91	6.83	37.0	23.76	
2	27.8	3270	8.90	6.72	40.1	25.47	
3	26.4	3261	8.57	0.18	~11.8	21,27	
4	26.1	3262	8.53	0.06	-175.7	23,75	
5	25.0	5262	8.29	0.01	-270.9	10,64	
6	24.8	3261	8,24	0.00	- 300.3	10,10	
7	24.6	3262	8.11	0.00	- 313,2	5.93	
8						and the second sec	
9		5					
10							
11							

WSP USA E&I Inc.

Lake Elsinore and Canyon Lake TMDL Monitoring 2023-24

FIELD DATASHEET					
Date: 7//7 Location (Circle): Lake Elsinore/Cany	von Lake Station: LE03				
Time on Station: 0735 Time off Station: 0745	Staff Initials: $\frac{\sqrt{J}}{Hk}$				
Weather Conditions: Char Wind (m	ph & direction): 1-2 mph E				
Lat: Long:	01				
Water Depth (m): <u>6.0 m</u> Secchi D	Depth (m): $0, 3m$				
Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) SAMPLE TIME: Surface volume filtered	Plankton Sample?: Y (N ⁷) (ml):				
Depth-Integrated volum	e filtered (ml):				
. (~500 mL fill volume p	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).				

Comments:

checked DO drop twice and both were the same between 3+4 meters large drop from 7 to 0

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	27.6	3267	8.93	7.60	12			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
1	27.6	3268	8.93	7.81	13		,		
2	27.6	3267	8,93	7,80	14	•			
3	26.7	3268	8.92	7.70	15				
4	25.9	3261	8.54	0.32	16				
5	\$5.6	3261	8.46	0,17	17		· · ·		
\$ 5.5	25.4	3560	8.45	0.08	18		•		
7					19				
8					20	•			
9					21				
10					22				
11					23				

	FIELD DATASHEET		
Date: 7/17/23 Location (C	ircle): Lake Elsinore/Canyo	n Lake	Station: Grand
Time on Station: 0955 Time	off Station: 1000	Staff Initials	s:/5/HK
Weather Conditions: Clear	Wind (mp	h & direction):_	1-2 mph E
Lat:	Long:	DI	<u>n</u>
Water Depth (m): 7.2~	Secchi De	pth (m):	O.3m
Water Chemistry Sample?: Y	Chl-a Sample?: YN Surface volume filtered (ankton Sample?: Y/N
	Depth-Integrated volume	filtered (ml):	
	*Do not exceed 7 PSI or 1 (~500 mL fill volume pr full (after first 250 mL a	eferred). Discar	

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.5	3276	9.08	11.95	12		•		
1	28.4	3268	9.03	8,98	13				
2	27.8	3269	8.90	6.48	14				
3	27.0	3270	8.60	0,46	15	,			
4	25.7	3260	8.52	0.15	16				
5	25.1	3261	8.28	0.09	17				
6	24.9	3261	8,24	0.07	18				
6.52	24.7	3262	8.16	0.05	19				
8					20				
9					21				
10					22				
11					23	· · · · ·			

FIELD DATASHEET
Date: 7/17/23 Location (Circle): Lake Elsinore/Canyon Lake Station: 10/10/10
Time on Station: 1005 Time off Station: 1010 Staff Initials: NJ/HK
Weather Conditions: Clear Wind (mph & direction): 1-2 mph E
Lat: <u>01</u> Long: <u>01</u>
Water Depth (m): $\delta, 3 \sim$ Secchi Depth (m): $0, 3 \sim$
Water Chemistry Sample?: Y Y Y Plankton Sample?: Y Y SAMPLE TIME:
. Depth-Integrated volume filtered (ml):
*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.9	3277	9.02	10,44	12				
1	28.3	3270	9.00	7,77	13				
2	27.2	3268	8.72	2,54	14				
3	26.7	3264	8.59	0,/5-	15				
4	25,5	3263	8.50	0.07	16				
5	25.4	3257	8.46	0.04	17				
6	25.2	7258	8.40	0.02	18				
7	24.9	3263	8.14	0.00	19				
8	24.6	3264	8.11	0.00	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: $\frac{7}{17}$ Location	(Circle): Lake Elsinore/Canyon Lake	Station: DO line
Time on Station: 10.15 Tim	ne off Station: Staf	f Initials: <u>////////////////////////////////////</u>
Weather Conditions:	Wind (mph & dire	ction):
Lat:	Long:	
Water Depth (m): 7.5	Secchi Depth (m):	
Water Chemistry Sample? Y N SAMPLE TIME:	Chl-a Sample?: Y /N Surface volume filtered (ml):	
V	Depth-Integrated volume filtered	(ml):
phusphate	*Do not exceed 7 PSI or 14 in. Hg (~500 mL fill volume preferred). full (after first 250 mL are filtere	Discard lower chamber when

Comments:

odor phosphorous /anoxic

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	2			2.76	12				-
1				4.00	13				
2				3.21	14				
. 3				2.42	15				
4				0.05	16				
5				0.01	17				
6				0,00	18				
7				0.00	19				
8					20				
9					21				
10					22				
11					23				

]	FIELD DATASHEET
Date: $\frac{7}{17}/23$ Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: <u>401</u>
Time on Station: $\frac{310}{100}$ Time	off Station: /3/5 Staff Initials: ~/J
Weather Conditions: Cleer; hot	Wind (mph & direction): Smph Str
Lat:	Long:
Water Depth (m): 6.8m	Secchi Depth (m):
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	31,2	32.84	9.14	19.06	12				
1	28.4	3272	9.01	10.12	13				
2	28.1	3272	8,93	5.57	14				
3	27.0	32.65	8.56	0.18	15				
4	26.3	3257	8.55	0.08	16				
5	25.3	3258	8.33	0.04	17				
6	24.7	7262	8,16	0.01	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD I	DATASHEET
Date: $\frac{7/17/23}{2}$ Location (Circle): Lak	e/Elsinore/Canyon Lake Station: <u>LE02</u>
Time on Station: 1300 Time off Station	n: 305 Staff Initials: $1/J//K$
Weather Conditions: <u>Clearinghot</u>	Wind (mph & direction): <u>Smph</u>
Lat:	Long:
Water Depth (m): 7,7m	Secchi Depth (m):
	mple?: Y(N) Plankton Sample?: V/N volume filtered (ml):
Depth-In	ntegrated volume filtered (ml):
(~500 r	exceed 7 PSI or 14 in. Hg when filtering chlorophyll nL fill volume preferred). Discard lower chamber when er first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	30.7	3287	9.16	15.83	12				
1	28.6	3277	9.12	12.88	.13				
2	28,0	3272	8,84	4,30	14				
3	27.1	7267	8.60	0.30	15				
4	26.5	3262	8.56	0.16	16				
5	26.0	3260	8.50	0.09	17				
6	25.3	3258	8.43	0.06	18				
7	24,9	3264	8.11	0.03	19				
8		·			20				
9					21				
10					22				
11					23				

	FIELD DATASHEET	
Date $\frac{7}{17/23}$ Location (Circle): Lake Elsinore/Canyon I	Lake Station: <u>LE03</u>
		Staff Initials: NJ/HK
Weather Conditions:	hot Wind (mph 8	z direction): 1 5 mgh # SW
Lat:	Long:	<u>M</u>
Water Depth (m): 6.0~	Secchi Depth	(m):
Water Chemistry Sample?: Y(N) SAMPLE TIME:	Chl-a Sample?: Y/N Surface volume filtered (ml)	
	Depth-Integrated volume filt	tered (ml):
		n. Hg when filtering chlorophyll rred). Discard lower chamber when filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.7	3260	9.13	14.40	12	•			
1	28.0	1270	8.88	6,72	13				
2	27.0	3284	8,71	3.03	14				
3	26.7	3263	8,64	0.11	15				
4	26.1	3261	8.53	0.05	16				
5	25.4	3260	8,34	0,01	17				
Y ^{5.5}	25.0	3264	8,20	0.00	18				
7					19				
8	`				20				
9					21				
10					22				-
11					23				

	FIELD DATASHEET
Date: $\frac{\delta}{23}$ Location (Circle): Lake Elsinore/Canyon Lake Station: <u>101</u>
	e off Station: 1130 Staff Initials: NJ KP
Weather Conditions: <u>slight cla</u>	d Wind (mph & direction): $1-2$ SE
Lat:	Long:
Water Depth (m): 6.5	Secchi Depth (m): 0.3
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y /N Plankton Sample?: Y /N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in Ha when filtering chlorophyll

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

7 dead carp

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.2	3299	8.73	1.10	12	•			
1	28.1	3300	8,71	0,50	13				
2	28.1	3301	8.69	0.20	14				
3	28.0	3302	8,69	0.15	15				
4	28.0	3302	8.68	0.13	16				
5	28.0	3303	8,68	0.13	17				
6	26.7	3311	8.09	0.12	18				
7					19				
8					20				
9					21				
10					22			-	
11					23				

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

Date: 0	8/1/23	Location: Lake El	sinore	Station: 4202							
Time on S	Station: 0912	Time off	f Station:	1105	Staff Initials:	NJKP					
Weather C	Conditions: <u>partl</u>	y daudy; dris	nzle	Wind (mph & d	irection): /	2 SE					
Lat: Long:											
Water De	Water Depth (m): $7.6m$ Secchi Depth (m): 0.3										
Water Cl	nemistry Sample	Times: Chl-	<u>a Sample</u> s	<u>(Y)</u> N <u>A</u>	lgae Taxonomy	Sample (: Y)N					
Surface D Depth Int. Depth Int. Bottom: _ Bottom D Surface T Comment	Surface: 0936 Surface volume filtered (ml): 180 Surface DUP: 1010 Surface DUP volume filtered (ml): 175 A Depth Int: 0933 Depth Int. volume filtered (ml): 175 A Depth Int. DUP: 1018 Depth Int. DUP volume filtered (ml): 220 A Bottom: 0950 Surface TMDL: volume filtered (ml): 255 Bottom DUP: 1030 **Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyllSurface TMDL: 1050 (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).Comments: pvt recording										
Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)					
0	27.9	3282	5.69	0.61	31,6	22,33					
0.5	28.0	32.89	8,70	0.40	22.6	22,76					
1	28.0	3290	8,69	0,21	-102.6	20.23					
2	25.0	3292	8.69	0.13	-102.6	21,41					
3	28.0	3292	8,69	0.13	-102.4	24,18					

1	28.0	3290	8,69	0,21	-102.6	20.23
2	25.0	3292	8.69	0,13	-102.6	21,41
3	28.0	3292	8,69	0.13	-102.4	24,18
4	28.0	3292	8,68	0.13	-102.3	23.56
5	28.0	3292	8.68	0.12	-102.3	22.54
6	28.0	3293	8.68	0.12	-102.3	23.48
7	27.3	3309	8.18	0.11	-256.7	4,58
8						-2,
· 9						
10					and the second	
11			•			

WSP USA E&I Inc.

	FIELD DATASHEET	
Date: $\frac{8}{1/23}$ Location	(Circle): Lake Elsinore/Canyon Lake Station: <u>したの</u> ろ	
Time on Station: 0845 Ti	me off Station: 0855 Staff Initials: NJ/KP	-
Weather Conditions: partly c	a dy light can Wind (mph & direction): 1-2 mph SE	-
Lat: 0/	Long: <u>0</u>	
Water Depth (m): 5.3	Secchi Depth (m): 0.2m	
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y N Plankton Sample?: Y N Surface volume filtered (ml):)
	Depth-Integrated volume filtered (ml):	
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber wher full (after first 250 mL are filtered).	1

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0 -	27.9	3290	8.68	0.73	12				
1	28.0	3193	8,64	0.41	13				
2	28.0	3200	8.65	0.18	14				
3	28.0	3216	8.65	0.16	15				
4	28.0	3223	8.68	0.15	16				
5	27.3	3279	8.28	0.14	17				
\$5,5	26.8	3298	8.11	0.15	18				
7					19				
8					20				
9					21				
10					22				
11					23				

	FIELD DATASHEET	
Date: $\frac{\delta}{2}$ Location (C	Circle): Lake Elsinore/Canyon Lake	Station: Grand
Time on Station: 700 Time	e off Station: <u>0910</u> Staff In	itials: <u>VJ/KP</u>
Weather Conditions: partly cloud	<u>, dcla</u> ele Wind (mph & direction	on): /-2 5K
Lat:	Long:(/	<u>^</u>
Water Depth (m): 7.1 M	Secchi Depth (m):	0,3~
Water Chemistry Sample?: Y /N SAMPLE TIME:	Chl-a Sample?: Y N Surface volume filtered (ml):	Plankton Sample?: Y
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg wh	nen filtering chlorophyll

_

(~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
- 0	27.9	7285	8.70	0.64	12				
1	27.9	3285	8.70	0,43	13		-		
2	27.9	3286	8.70	0.26	14				
3	27.9	3287	8,69	0.18	15				
4	27.9	3288	8.69	0.16	16				
5	27.9	3288	8.69	0,14	17				
6	27.6	3292	8.48	0.15	18				
76.5~		3299	8.08	0.14	19				
8					20				
9					21				
10					22				
11					23				

Lat: $\mathcal{O} \cap$ Long: $\mathcal{O} \cap$ Water Depth (m): $\mathcal{O} \circ \mathcal{O} \circ \mathcal{O}$ Secchi Depth (m): $\mathcal{O} \circ \mathcal{O} \circ \mathcal{O}$ Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)	I	FIELD DATASHEET
Weather Conditions: $Sight Clouds$ Wind (mph & direction): $l - 2 Sis$ Lat: On Long: On Water Depth (m): Sis On Secchi Depth (m): $Oissingter Sis$ Water Chemistry Sample?: Y N Sample?: Y N Chl-a Sample?: Y N Plankton Sample?: Y N SAMPLE TIME: Depth-Integrated volume filtered (ml): *Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when $Sistingter Sister S$		
Lat: On Long: On Water Depth (m): $\overline{\mathcal{O}}$. $\overline{\mathcal{O}}$. Secchi Depth (m): $\overline{\mathcal{O}}$. $\overline{\mathcal{O}}$. Water Chemistry Sample?: Y (N) Secchi Depth (m): $\overline{\mathcal{O}}$. $\overline{\mathcal{O}}$. SAMPLE TIME: Chl-a Sample?: Y (N) Plankton Sample?: Y (N) Depth-Integrated volume filtered (ml): Depth-Integrated volume filtered (ml): *Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when	Time on Station: 1110 Time	off Station: 118 Staff Initials: <u>NJ-KP</u>
Water Depth (m): \mathcal{O} , \mathcal{O} Water Chemistry Sample?: Y /N Chl-a Sample?: Y /N SAMPLE TIME: Chl-a Sample?: Y /N Plankton Sample?: Y /N Plankton Sample?: Y /N Depth-Integrated volume filtered (ml):	Weather Conditions: <u>Slight Clouds</u>	Wind (mph & direction): $25E$
Water Chemistry Sample?: Y /N Chl-a Sample?: Y /N Plankton Sample?: Y /N SAMPLE TIME:	Lat:()	Long:
SAMPLE TIME: Surface volume filtered (ml): Depth-Integrated volume filtered (ml): Depth-Integrated volume filtered (ml): *Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when	Water Depth (m): $\mathcal{O} \mathcal{O} \mathcal{O}$	Secchi Depth (m): \mathcal{O} , $\mathcal{Z}_{\mathcal{M}}$
*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when	Water Chemistry Sample?: Y (N) SAMPLE TIME:	Chl-a Sample?: Y /N Plankton Sample?: Y /N Surface volume filtered (ml):
(~500 mL fill volume preferred). Discard lower chamber when		Depth-Integrated volume filtered (ml):
Commenter	Comments:	(~500 mL fill volume preferred). Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	28,3	3294	8.85	2:17	12				
1	28,0	32.95	8,72	0.32	13				
2	28,0	3297	8,70	0.16	14				
3	28,0	3297	8,69	0.15	15				
4	28,0	3298	8,69	0,/3	16				
5	27.9	3299	8.69	6.13	17				
6	27.9	3299	8.69	0.12	18				
7	26.5	3309	8.02	0,//	19				
×17.5	26,5	3309	8.01	0.[[20				
9					21				
10					22				
11					23				

/

FIELD DATASHEET

Date: <u>6/1/23</u> Locati	on (Circle): Lake Elsinore/Canyon Lake Station: CLD7
Time on Station: 1045	Time off Station: 173 Staff Initials: <u>HK/KB</u>
Weather Conditions: Partly (Wind (mph & direction): $D-2$ W
Lat:	Long:
Water Depth (m): 5.0	Secchi Depth (m): 1.65
Water Chemistry Sample? Y N SAMPLE TIME:	Chl-a Sampler: Y) N Plankton Sample?: Y N Surface volume filtered (ml): 500
CLASUME: 1115	Depth-Integrated volume filtered (ml): <u>500</u>
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
1 0 • • •	29:6	779	8.74	9.35	12	12.6	792	7.12	0,00
1	29.5	779	8.74	9.39	13	12.5	795	7.11	0,00
2	29.3	779	8.74	9.32	14	12.4	798	7.09	0.0D
3.	29.2	780	8.71	9.10	His	12.4	799	7.08	0,00
4	28.8	795	8.12	Bill	16	-			
5	24.0	794	7.74	0.20	17				
6	20.7	763	7.68	0.73	18				
7	194.0	756	7-35	U.OZ	19				
8	14.2	765	7.19	ð.00	20				
9	14,4	777	7.16	0.0.0	21				
10	13.4	78D	7.14	D.00	22				
11	12.8	787	7.14	0.00	23		-		

Lake Elsinore and Canyon Lake TMDL Monitoring 2021-22 2021-22 2021-22

FIELD DATASHEET

Date: $\frac{1123}{123}$ Location (Cir	cle): Lake Elsinore/Canyon Lake Station: \mathcal{CLOP}
Time on Station: 1000 Time of	off Station: 1040 Staff Initials: HK/KB
Weather Conditions: far fly Cloud	Wind (mph & direction): West $0-2$
Lat:	Long:()/
Water Depth (m): 8,5	Secchi Depth (m): 1,5
Water Chemistry Sample?: W N SAMPLE TIME: (015	Chl-a Sample? (Y) N Plankton Sample?: $Y(N)$ Surface volume filtered (ml): $SOO \sim h$
(LASURF: 1030	Depth-Integrated volume filtered (ml): 450,4
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	29.4	776	8,74	8.97	12				
1	29.4	776	8 70	8,70	13				
2	29.3	775	8.69	8.87	14				
3	29.2	776		8.67	15				
4	29.1	776	8.63	4.01	16				
5	25.8	800	7.65	0.23	17				
6	21.7	757	7.52	D.24	18				
7	16.2	756	7.18	0.00	19				
8	14.6	775	7.14	0.00	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: $S/(23)$ Location (Circle): Lake Elsinore/Canyon Lake Station: <u>CLO</u>	9
Time on Station: 0910 Tim	ne off Station: 0950 Staff Initials: +1K/K	B
Weather Conditions: <u>SUNNY / Au</u>	$\frac{1}{10000000000000000000000000000000000$	/
Lat: 01	Long:	
Water Depth (m):,	Secchi Depth (m):	
Water Chemistry Sample?:(Y) N SAMPLE TIME:()915	Chl-a Sample? (Y) N Plankton Sample?: Surface volume filtered (ml): 480	YN
CLASURF! 0930	Depth-Integrated volume filtered (ml): 375 mL	
090	*Do not exceed 7 PSI or 14 in. Hg when filtering chloroph (~500 mL fill volume preferred). Discard lower chamber full (after first 250 mL are filtered).	•

Comments:

AM Rainshower prior to sampling

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.2	883	8.55	775	12		·		
1	29.3	P84	8.53	7.76	13				
2	29.2	882	8.52	7.72	_14	•			
3	29.2	883	8.49	7.54	15		- - -		
4	28,9	895	8.21	8.22	16				
5	23,3	991	7.16	0.29	17		•		
6	101	988	7.08	0,06	18				
765	15,7	991	7.07	0.00	19			•	
8					20				
9					21				
10				-	22				
11					23				

FIELD DATASHEET

	rcle): Lake Elsinore/Canyon Lake	Station: <u>CLID</u>
Time on Station: 0820 Time	off Station: 0900 Staff Init	ials: HK
Weather Conditions: SUMNY 3 SIN	ght Wind Wind (mph & direction): 0-2 West
Lat:()^	Long:	00
Water Depth (m): 3	Secchi Depth (m):	3
Water Chemistry Sample?: (V) N SAMPLE TIME:	Chl-a Sample? (Y) N Surface volume filtered (ml): <u>Soo</u>	Plankton Sample?: Y(N)
CL-A SURF! 0845	Depth-Integrated volume filtered (ml)	: 500
0013	*Do not exceed 7 PSI or 14 in. Hg whe (~500 mL fill volume preferred). Dis full (after first 250 mL are filtered).	

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
··· 0···	29.1	904	8.43	7.52	12				
1	29.2	904	8.42	7.42	13				
2	29.2	905	8.41	7,44	14				
3	291.2	907	8.39	7.27	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: $8 1 23$ Location (0	Circle): Lake Elsinore/Canyon Lake	Station: <u>CLD</u>
Time on Station: <u>1400</u> Tim	e off Station: <u>1415</u> Staff I	nitials: NHK-1KB
Weather Conditions: Partly CIC	$\mathcal{V} \mathcal{A} \mathcal{Y}$ Wind (mph & direct	ion): D-Z
Lat:()/	Long:	01
Water Depth (m): 15.0	Secchi Depth (m):	
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y (N) Surface volume filtered (ml):	Plankton Sample?: YN
	Depth-Integrated volume filtered (n	nl):
	*Do not exceed 7 PSI or 14 in. Hg w (~500 mL fill volume preferred). If full (after first 250 mL are filtered)	Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
- 0	30.7	781	8.82	9.64	12	12:5	\$798	7.12	00. O
1	30.0	778	8.85	10.03	13	12.5	799	7.21	00.0
2	29.5	779	8.86	10.05	14	12.4	798	7.7	1.00
3	29.3	778	18.8	9.65	HATS145	12.4	797	7.72	60. O -
4	27.7	804 B	7.68	3.34	16				
5	24.5	802	7.64	0.32	17				
6	19.90	759	7.65	0.95	18				
7	16.7	755	7.41	80.0	19			-	
8	14.5	769	7.77	0.00	20				
9	13.2	775	7.27	0,00	21				
10	12.8	780	7.27	00,0	22				
11	12.6	797	7.24	<i>b.00</i>	23				

FIELD DATASHEET

Date: 81123 Location (Cir	rele): Lake Elsinore/Canyon Lake	Station: CLO8
Time on Station: 1420 Time	off Station: 1430 Staff I	nitials: HK 1KB
Weather Conditions: Partly CION	Wind (mph & direct	ion):W
Lat:)へ	Long:	Un
Water Depth (m): 9.5	Secchi Depth (m):	
Water Chemistry Sample?: Y(N) SAMPLE TIME:	Chl-a Sample?: Y /N Surface volume filtered (ml):	Plankton Sample?: Y(N)
	Depth-Integrated volume filtered (r	
	*Do not exceed 7 PSI or 14 in. Hg v (~500 mL fill volume preferred). I full (after first 250 mL are filtered	Discard lower chamber when

Comments:

.

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	• pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
~ 0	30.6	777	8.8)	9.4b	12	-	-		
1	30.2	776	8.83	9.72	13				
2	29.7	775	8.85	9.91	14				
3	29.3	774	8.79	9.38	15				
4	28.7	783	8.47	6.87	16				
5	24.2	787	7.68	0.42	17				
6	20.1	758	7.60	0,57	- 18				
7	16.8	757	7.30	D.DD	19				
8	15.0	769	7.23	0.00	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: <u>8/1/23</u> Location (Ci	ircle): Lake Elsinore/Canyon Lake	Station: <u>CL0 9</u>
Time on Station: 150% Time	off Station: 1515 Staff	Initials: <u>HK/KB</u>
Weather Conditions: Day +14 Choud	Wind (mph & direc	tion): 0-2 W
Lat: 0/	Long:	01
Water Depth (m): $\overline{7} \cdot 1$	Secchi Depth (m):	
Water Chemistry Sample?: Y/N SAMPLE TIME:	Chl-a Sample?: Y/N Surface volume fil tered (ml):	Plankton Sample?: Y/N
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg (~500 mL fill volume preferred). full (after first 250 mL are filtered	Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DØ (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	30.9	8169	9.70	8.63	- 12				
1	30.2	880	8.75	9.13	13				
2	29.6	889	8.67	8.53	14				
3	29.4	891	8.60	7.92	15				
4	29.0	910	7.86	3.93	16				
5	23.0	977	7.17	0.19	17				
6	17.7	992	PO.F	PO.07	18				
765	14.7	984	710	D.00	19				
8					20				
9					21				
10					22				
11					23		· · ·		

FIELD DATASHEET

Date: <u>61123</u> L	ocation (Circle): Lake Elsinore/Canyon Lake Station:	LID
Time on Station: <u>145 2</u>	Time off Station:/455 Staff Initials:/	CB_
Weather Conditions: Pary	Wind (mph & direction): 2-4MpH	\mathbb{N}
Lat:0^	Long: <u>O</u>	-
Water Depth (m): 3	Secchi Depth (m):	
Water Chemistry Sample?: Y SAMPLE TIME:	N Chl-a Sample?: Y N Plankton Sample Surface volume filtered (ml):	ple?: Y(N)
	Depth-Integrated volume filtered (ml):	
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlo (~500 mL fill volume preferred). Discard lower char full (after first 250 mL are filtered).	

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	31.0	887	8.67	8.49	12		••••		· · · -
1	30.8	887	8.67	8.57	13				
2	30.2	899	8.66	8.67	14				
3	29.7	916	8.56	8.21	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

/	FIELD DATAS		
Date: $\frac{\eta/2\sigma/\partial^{3}}{\partial \sigma}$ Location (C	ircle): Lake Elsino) re/Canyon L	ake Station: <u>LEO/</u>
Time on Station: 1020 Time	e off Station: ///	ds	Staff Initials: $\frac{1}{3}$
Weather Conditions: overast	V	Vind (mph &	direction): <u>Ymph 5</u>
Lat:	L	.ong:	01
Water Depth (m): $6.6 \times$	S	ecchi Depth	(m):(<i>)</i> .
Water Chemistry Sample?: Y /N) SAMPLE TIME:	Chl-a Sample?: Surface volume	Y //N filtered (ml):	Plankton Sample?: Y
	Depth-Integrated	d volume filte	ered (ml):
		olume prefer	. Hg when filtering chlorophyll red). Discard lower chamber when ltered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24,9	3278	-8.65	6,95	12			-	-
1	24.9	3278	8.64	6,13	13				
2	24.8	3278	8.59	4,34	14				
3	24.5	3279	8.49	2.81	15				
4	24.3	3279	8.46	2.34	16				
5	24,3	3278	8.44	1.86	17				
6	24,3	3279	8,43	1.89	18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

Date: $9/20/23$ Location: La	ake Elsinore	Statio	on: <u>LE02</u>
Time on Station: 0755 Tim	me off Station:	0955	Staff Initials: <u>NT/IAK</u>
Weather Conditions: overast		Wind (mph &	direction): 2-3 mph 5
Lat:		Long:	00
Water Depth (m): 7.6		Secchi Depth (m):
Water Chemistry Sample Times:	Chl-a Samples	?: Y / N <u>A</u>	Algae Taxonomy Sample?: Y / N
Surface: 0810 Surface DUP: 0855 Depth Int: 0825 Depth Int. DUP: 0855 Bottom: 0835 Bottom DUP: 0920 Surface TMDL: 0935	Surface TMDL: **Do not excee	blume filtered (n me filtered (ml) volume filtered volume filtered d 7 PSI or 14 in olume preferred	ml): 125 : 145 d (ml): 145 d (ml): 145 d (ml): 190 n. Hg when filtering chlorophyll d). Discard lower chamber when

Comments:

.

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	24,2	3272	8.48	41.15	152.6	11,67
0.5	24.2	5273	8.118	3.99	147.6	12.16
1	24.2	3273	8.48	3.96	144.2	11.86
2	24,2	7273	8,48	J. 91	141.11	11.40
3	24.2	3273	8.48	3.87	139.2	11.29
4	24.2	3273	8.49	3.86	137.5	11,86
5	24,2	3279	8.49	3.84	136.0	11.98
6	24,2	3273	8.49	3.84	133,8	11.53
7	24.2	7273	8.49	3.85	122.4	11,47
8						
9						
10						
11			1		10	

FIELD DATASHEET

Date: $\frac{9/20/23}{2}$ Location (Circle): Lake Elsinore/Canyon Lake Station: <u>203</u>
Time on Station: 0745 Time	the off Station: 0750 Staff Initials: NJ/HK
Weather Conditions: <u>Overcast</u>	Wind (mph & direction): $\partial^{-3} \gamma_{\mu}h$ S
Lat: On	Long:Oh
Water Depth (m): S G	Secchi Depth (m): 0.3m
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y / N Plankton Sample?: Y / N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.4	32:73	8.39	3,34	12				
1	24,4	3273	8:40	3.19	13				
2	24.4	3274	8.40	3.13	14				
3	24.4	3274	8.40	3.08	15				
4	24,4	3273	8.41	3.02	16				
5	24,4	3274	8.41	3.03	17				
×5.5	24,4	3274	8,42	3.05	18				
7					19				
8					20				
9					21				
10				1. 1.	22		r		
11				2. 4 2. 4	23				

WSP USA E&I Inc.

	FIELD DATASHEET	
Date: $\frac{1}{20/37}$ Location (Circle): Lake Elsinore/Canyon Lake	Station: 4-1-01
Time on Station: $/322$ Time	ne off Station: 1326 Sta	aff Initials: <u>VJ/HK</u>
Weather Conditions: Clear, Summy	Wind (mph & dia	rection): <u>LI-Smph Slv</u>
Lat:On	Long:	on
Water Depth (m): 6.6~	Secchi Depth (m):
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y / N Surface volume filtered (ml):	Plankton Sample?: Y / N
1	Depth-Integrated volume filtere	(ml):
	*Do not exceed 7 PSI or 14 in. H (~500 mL fill volume preferred full (after first 250 mL are filte	1). Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	26.2	3283	8.84	11,90	12				
1	26.0	3280	8.82	10,24	13				
2	25.2	3279	8.57	4,20	14				
3	24.7	3279	8.50	2.54	15				
4	24,4	3279	8.42	1.96	16				
5	24,3	3279	8.40	1.69	17				
6	24.3	3279	8.39	1.55	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET
Date: $\frac{1}{20/23}$ Location (Circle): Lake Elsinore/Canyon Lake Station: $\frac{1}{202}$
Time on Station: $0 3/3$ Time off Station: $13/4$ Staff Initials: $\sqrt{J}/1/K$
Weather Conditions: <u>Clear 5 uny</u> Wind (mph & direction): <u>4-5 mph SL</u>
Lat: Long: 0/
Water Depth (m): 7.6~ Secchi Depth (m):
Water Chemistry Sample?: Y /N Chl-a Sample?: Y /N Plankton Sample?: Y /N SAMPLE TIME: Surface volume filtered (ml):
Depth-Integrated volume filtered (ml):
*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	26.3	7280	8.82	11.04	-12				· · · ·
1	24.7	3274	8,78	8,85	13				
2	24.5	3274	8.55	4.31	14				
3	સ્પ.પ	3275	8.51	3.76	15				
4	24,2	3275	8.50	3.32	16				
5	24.2	3274	8,50	3,38	17				
6	24.2	3274	8,50	3.32	18				
7	24.2	1276	8.47	2.71	19				_
8					20				
9					21				
10					22				
11	1				23				

	FIELD DATASHEET	
Date: $\frac{9/20/23}{2}$ Location (Circle): Lake Elsinore Canyo	on Lake Station: <u>203</u>
Time on Station: 1305 Tin	ne off Station: <u>]] 10</u>	Staff Initials: J////
Weather Conditions: <u>Clear</u>	Wind (mp	oh & direction): <u>4-5 mph 5w</u>
Lat:()/\	1	Ch
Water Depth (m): S, q_{M}	Secchi De	epth (m):
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y / N Surface volume filtered (Plankton Sample?: Y / N (ml):
	Depth-Integrated volume	e filtered (ml):
		14 in. Hg when filtering chlorophyll referred). Discard lower chamber when are filtered).
Comments:		

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Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	25.8	8.80	3279	10.97	12	9.82			
1	25.3	3276	8.68	7.36	13				
2	24.7	3276	8.44	3,20	14				
3	24,4	3376	8.40	2.68	15				
4	24.4	3274	8,47	2.74	16				
5	24.3	3273	8.48	3.17	17				
A212	24.3	3273	8.49	3.07	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/23 Location (C	ircle): Kake Elsinore/Canyon Lake	Station: BGrand
Time on Station: 1000 Time	off Station: 1005 Staff	Initials: <u>HK/NJ</u>
Weather Conditions: PONTIN CLOUD	Wind (mph & direct	tion): 3-4 m.ph 5
Lat:	Long: ON tar	9
Water Depth (m): 7 . 1	Secchi Depth (m):	0.3
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y (N) Surface volume filtered (ml):	Plankton Sample?: Y (N)
	Depth-Integrated volume filtered (m1):
	*Do not exceed 7 PSI or 14 in. Hg (~500 mL fill volume preferred). I full (after first 250 mL are filtered	Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.3	3274	8,58	4.4a	12				
1	24.3	3274	8.56	4.11	13				
2	24.3	3274	8.56	4.07	- 14				
3	24.3	3274	8.54	3.71	15				
4	24.3	3275	8.54	3.59	16				
5	24.3	3275	8.53	3.48	17				
6	24.3	3275	8.52	3.26	18				
7,6.5	25243	3275	8.51	3,07	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/23 Location (C	ircle): Lake Elsinore/Canyon Lake Station: <u>Lake Vie</u> w
Time on Station: 1011 Time	off Station: 1016 Staff Initials: <u>AIKINJ</u>
Weather Conditions: Partly Cluvel	Wind (mph & direction): $4 mph S$
Lat: 0h target	Long:
Water Depth (m): 7.9	Secchi Depth (m): 0,3
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y / D Plankton Sample?: Y / D Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
• •	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24,4	3273	8.65	6.43	12		,		
1	24,3	3273	8,59	5.24	13				
2	24.3	3274	8,53	3.70	14				
3	24,2	3274	8.53	3,63	15	• .			
4	24,2	3274	8,52	3,54	16				
5	24,2	3275	8.51	3.33	17				
6	24,1	3276	8.49	2.9/	18				
7	24.1	3276	8,49	2.83	19				
7~	24,1	3276	8.48	2.85	20				
9					21				
10					22				
11					23				

	FIELD DATASHEET
Date: $10/10/23$ Location (Circle): Lake Elsinore/Canyon Lake Station: <u>- Eo1</u>
Time on Station: /000 Tim	ne off Station: 1003 Staff Initials: 1770
Weather Conditions: <u>Clear</u> ; Su	Wind (mph & direction): $2-3 - h SSK$
Lat:()^	Long: ()
Water Depth (m): 6.5m	Secchi Depth (m): $(), \leq m$
Water Chemistry Sample?: Y / SAMPLE TIME:	Chl-a Sample?: Y / N Plankton Sample?: Y / N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0 -	22.5	7315	8.89	6.73	12				
1	22.7	3322	8.80	5.79	13				
2	22.6	3323	8.78	5,40	14				
3	22.6	3324	8.76	5.22	15				
4	22.6	3323	8.75	5.13	16				
5	22.6	3324	8,74	4.96	17				
6	22.5	3326	8.45	0.40	18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

Date: $\frac{10}{10} = 3$ Location	n: Lake Elsinore	Station: LEO2
Time on Station: 0755	Time off Station:0932	S Staff Initials: NT/TD
Weather Conditions: <u>fog</u>	Wind	(mph & direction): 2-3-ph SSE
Lat:	Long:	on
Water Depth (m): 7.6m	Secchi	Depth (m): 0.3-1
Water Chemistry Sample Times:	<u>Chl-a Sample</u> s?(Y)N	Algae Taxonomy Sample? YN
Surface: 0810 Surface DUP: 0850 Depth Int: 0825 Depth Int. DUP: 0900 Bottom: 0830 Bottom DUP: 0910 Surface TMDL: <u>0920</u>		Filtered (ml) : 185 ared (ml) : 185 e filtered (ml) : 195 e filtered (ml) : 155 I or 14 in. Hg when filtering chlorophyll preferred). Discard lower chamber when

Comments:

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	22.9	3319	8.78	6,39	37.8	12.3
0.5	22.9	3321	8.79	6.42	43.7	13.4
1	22.9	3321	8.80	6.41	47.7	12,5
2	22.9	3322	8.79	6,30	51.4	13.0
3	22.9	3323	8.77	5.86	54.7	13.8
4	22,9	3324	8.74	4.75	57.8	12.4
5	22.1	3334	8.44	0.46	-14.1	11.3
6	21.9	3327	8.39	0.29	-165.2	11,3
7	21.9	3327	8.37	0.23	- 182.7	11.6
8						
9					C. Same	
10				· · ·	-	
11						

FIEL	D	DA	٩T	'AS	HE	ET

Date: $\frac{10/10/23}{10/23}$ Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: $\angle E O3$
Time on Station: 0745 Time	off Station: 0750 Staff Initials: $NJ/70$
Weather Conditions: <u>fog</u>	Wind (mph & direction): 2-3 mph SSE
Lat:	Long:
Water Depth (m): 5.8	Secchi Depth (m): $0.3 \sim$
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when

full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	22.9	3321	8,78	6.08	12		-		
1	22,9	3321	8.77	6.04	13				
2	22.9	3322	8.75	5.98	14				
3	22.9	3322	8.74	5.78	15				
4	22.8	3324	8.71	4.90	16				
5	22.0	3327	8.36	0.41	17				
\$ 5.5	22,0	3327	8.36	0.29	18				
7					<u>,</u> 19				
8					20				
9					21				
10					-22				
11					23				

FIELD DATA	ASHEET
Date: <u>10/10/23</u> Location (Circle): Lake Elsi	inore/Canyon Lake Station: 4/-0/
Time on Station: 1433 Time off Station:	<u>1440</u> Staff Initials: <u>NJ</u> /Th
Weather Conditions: Clear Sugar	Wind (mph & direction): <u>Smph S</u>
Lat:	Long:
Water Depth (m):6.5 m	Secchi Depth (m):
Water Chemistry Sample?: Y N Chl-a Sample SAMPLE TIME: Surface volum	e?: Y /N Plankton Sample?: Y / N ne filtered (ml):
Depth-Integra	ated volume filtered (ml):
(~500 mL fi	d 7 PSI or 14 in. Hg when filtering chlorophyll ll volume preferred). Discard lower chamber when 1 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.1	3321	9.04	11.30	12				
1	22.8	3326	8.81	5.46	13				
2	22.7	3327	8.75	5,16	14				
3	22.7	3327	8,75	4,91	_ 15				
4	22.6	3327	8,74	4.71	16				
5	22.6	7328	8.74	4.78	17				
6	22.4	3329	8.74	1.50	18				
7					19				
8					20				
9					21			· ·	
10					22				
11					23				

FIELD DATASHEET

Date: $\frac{10}{10/23}$ Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: 402
Time on Station: 1425 Time	off Station: 1430 Staff Initials: NS/TD
Weather Conditions: Char ; sunny	Wind (mph & direction): Smph S
Lat:Ó	Long: CM
Water Depth (m): 7.6_{-1}	Secchi Depth (m):
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y /N Plankton Sample?: Y /N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

(~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.5	3373	9.05	12.25	12				:
1	23,3	3322	8. <i>8</i> 9	7.11	13				
2	22.9	3324	8.84	5,53	14				
3	22.8	3325	8,78	5.02	15				
4	22,8	3325	8.77	4.81	16				
. 5	22.7	3325	8.75	4,69	17				
6	22.5	3330	8.45	0.33	18				
7	21.9	3330	8.40	0.27	19				
8					20				
9					21				
10					22				
11					23				

FIELD DA	ATASHEET
Date: 10/10/23 Location (Circle): Lake	Elsinore/Canyon Lake Station: <u>LE03</u>
Time on Station: 1415 Time off Station	1420 Staff Initials: NJ/TD
Weather Conditions: Clear	Wind (mph & direction): 5mph 5
Lat:	Long:
Water Depth (m): $S.\mathcal{S}_{M}$	Secchi Depth (m): 174
June 1	nple?: Y / N Plankton Sample?: X / N rolume filtered (ml):
Depth-In	tegrated volume filtered (ml):
(~500 m	Acceed 7 PSL or 14 in. Hg when filtering chlorophyll L fill volume preferred). Discard lower chamber when ar first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.3	3345	9.40	19.96	12			•	
1	23.0	3327	8.94	7,32	13				
2	22,8	3322	8.87	5,30	14				
3	82.7	3319	8.81	4.53	15				,
4	22.5	3330	8,60	0.46	16				
5	22.0	3332	8.45	0.29	17				
6	22.0	3332	8.44	0.25	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATA	ASHEET
Date: $\frac{10/10/23}{2}$ Location (Circle) Lake Els	inore Canyon Lake Station: <u>Grand</u>
	0945 Staff Initials: $NJ/7P$
Weather Conditions: <u>Clear</u> 5 Juny	Wind (mph & direction): 2-3-mph SSE
Lat:0	Long: Un
Water Depth (m): 7.0-	Secchi Depth (m): $O.3$
Water Chemistry Sample?: Y N Chl-a Sample SAMPLE TIME: Surface volume	e?: Y N Plankton Sample?: Y N ne filtered (ml):
Depth-Integra	ated volume filtered (fnl):
(~500 mL fi	d 7 PSI or 14 in. Hg when filtering chlorophyll If volume preferred). Discard lower chamber when st 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.0	3316	8,88	7.82	12				
1	23.0	3321	8.87	7.75	13				
2	22.9	3395	8.80	6.21	14				
3	22.9	3395	8.79	5.58	15				
4	22.8	3324	8,74	2.21	16				
5	22.2	3327	8.48	0.29	17				
6	22.0	3326	8.46	0.24	18				
×6.5	21.9	3328	8.44	0.23	19				
8					20				
9					21				
10		1			22				
11	<u> </u>				23				

FIELD DATASHEET

Date: 10/10/23 Location	(Circle): Lake Elsingre/Canyon Lake Station: Lakeshar
Time on Station: 0950 Tim	ne off Station: 0955 Staff Initials: $\sqrt{3/75}$
Weather Conditions: clear ; son	Wind (mph & direction): $2 - 3 - \frac{1}{2} + $
Lat:	Long: () /
Water Depth (m): 7.8m	Secchi Depth (m): 0.3
Water Chemistry Sample?: Y	Chl-a Sample?: Y N Plankton Sample?: Y N Surface volume filtered (ml): Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSL or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.2	3323	8.90	8.42	12				
1	23:1	3322	8.89	7.90	13	• •			
2	23.0	3323	8.86	6.75	14				
3	23.0	3323	8,84	6.53	15				
4	22.9	3323	8,83	6.24	16				
5	22.9	3323	8.80	5.46	17				
6	22.4	3328	8,46	0.46	18				
7	21.8	3328	8.38	0.31	19				
87.5	21,8	3329	8.36	0.27	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 1011023 Location (C	Sircle): Lake Elsinore/Canyon Lake Station:
Time on Station: 1025 Time	e off Station: <u>\\ D O</u> Staff Initials: <u>17K/KB</u>
Weather Conditions: CNCON 354nr	Wind (mph & direction): $0 - 1$
Lat:	Long: <u>ON</u> target
Water Depth (m): 15.2	Secchi Depth (m): \
Water Chemistry Sample?: Y / N SAMPLE TIME: <u>\0 40</u>	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml): 500
Surfau: 1050	Depth-Integrated volume filtered (ml): 500
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).
Common contras	

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
- 0	23.3	753	7,40	8.63	12	13.2	777	6.92	0.00
1	23.3	754	7.37	8.62	13	13.0	784	6.90	0.00
2	23.2	754	7.36	8.44	14	12.9	790	6.85	00.0
3	23:1	753	7.34	8.25	15	12.9	839	10.62	0.00
4	23.0	753	7.33	8.22	16				•
5	23.0	757	7.19	3.80	17			1	
4.6	22.1	746	7.04	1.25	18				
* 7	21.0	767	6.98	0.00	19				
8	18.3	757	6.90	0.00	20				
9	15.0	767	6.93	00.0	21				
10	13.9	771	6.95	00.0	22				•
11	13.4	773	6.94	0.00	23		· .		

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FIELD DATASHEET

Date: 010 Location (Ci	rcle): Lake Elsinore/Canyon	Lake Station: <u>CL08</u>
Time on Station: 0950 Time	off Station: 1020	Staff Initials: $\frac{11K}{KP}$
Weather Conditions: Clear and	SUNNY Wind (mph	& direction): ()
Lat:	Long: <u>OM</u>	target
Water Depth (m): <u></u> , 2	Secchi Dept	target h(m): 2.4
Water Chemistry Sample?: Y / N SAMPLE TIME: <u>\0 0 0</u>	Chl-a Sample?:Y N Surface volume filtered (ml	Plankton Sample?: Y / N
0-20 1015	Depth-Integrated volume fi	ltered (ml): SU
		in. Hg when filtering chlorophyll erred). Discard lower chamber when filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	,Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.2	747	7.65	8.71	12			-	
1	23.3	747	7.59	8.71	13				
2	23.2	747	7.57	8.50	14	-			
3	23.2	747	7.55	8.52	15				
4	22.7	765	7.23	5.13	16				
5	22.4	752	7.18	2.67	17				
6	22.1	760	7.10	0.40	18				
7	21.0	757	6.99	D.00	19				
8	17.7	760	691	0.00	20				
9	15.2	783	6.89	0.00	21				
10					22.				
11					23				

FIELD DATASHEET

Date: 10 110 23 Location (Ci	ircle): Lake Elsinore/Canyon Lake Station: <u>CLO</u>
Time on Station: <u>0904</u> Time	off Station: 0934 Staff Initials: <u>HK1KS</u>
Weather Conditions: <u>CIEAL SSVY</u>	Wind (mph & direction): $() -)$
Lat:	Long: ON target
Water Depth (m): 7.7	Secchi Depth (m): <u>\2</u>
Water Chemistry Sample?: Y/N SAMPLE TIME: 10915	Chl-a Sample? (Y) N Plankton Sample?: Y / N Surface volume filtered (ml): 500
	Depth-Integrated volume filtered (ml): <u>450</u>
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
· 0	23.0	890	7.88	9.87	12		-		
1	23.0	888	7.85	9.83	13				
2	23.0	889	7.83	9.69	14		-		
3	23.0	890	7.81	9.62	'15		-		
4	22.4	886	744	0.40	16				
5	22.0	876	7.23	D.18	17		· · ·		-
6	20.7	938	6.81	0.06	18				
7	17.4	988	6.77	00.0	19				
7.58	15.5	983	1277	0.00	20				
¹ 9	•		• •		21				
10				```	22	·			
11				ø	23				

WSP USA E&I Inc.

FIELD DATASHEET

Date: 1011012023 Location	(Circle): Lake F	Isinore/Canyon Lake	Station: CL_10
Time on Station: 0825 Time	me off Station:[]	855 Staff	Initials: <u>HK KB</u>
Weather Conditions: <u>Urlar'</u> Su	nny	Wind (mph & direct	tion): D-Mph
Lat:	· .	Long: UN +al	get
Water Depth (m): 3.L		Secchi Depth (m):	1.2
Water Chemistry Sample?: Y / N SAMPLE TIME: 0 & 3 5	Chl-a Sam Surface vo	ole?: 0/N lume filtered (ml):00	Plankton Sample?: Y / N
0-2m CL-A: 0850	*Do not exc (~500 mL		when filtering chlorophyll Discard lower chamber when

Comments:

· 编辑:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	23.1	921	7.95	9.85	12				
1	23.3	922	7.95	9,75	13				
2	23.3	925	7.88	9.19	14				
3	22.8	917	7.59	2.84	15				
4		•	2000 1997 1997		16				
5					17				
6					18				
7			•		19				
8					20				
9 .					21				
10					22				
11		. Cen	•		23				

FIELD DATASHEET

Date: 10125 Location	(Circle): Lake Elsinore/Canyon L	ake Station: <u>() 07</u>
Time on Station: 1432 Tim	ne off Station: 1441	Staff Initials: 1-14-14-18-
Weather Conditions: CLEAV '3 S	Unny Wind (mph &	direction): Tmph SW
Lat:	Long: <u>Ny</u>	arget
Water Depth (m): 14.2	Long: <u>M</u> Secchi Depth	(m): <u>2.1</u>
Water Chemistry Sample?: Y / 🕅 SAMPLE TIME:	Chl-a Sample?: Y / N Surface volume filtered (ml):	Plankton Sample?: Y / N
	Depth-Integrated volume filt	ered (ml):
		1. Hg when filtering chlorophyll rred). Discard lower chamber when iltered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
- 0	24:3	756	7.42	8.87	12	13.2	782	6.91	0.0
1	23.9	75 le	7.43	9.25	13	13.1	184	16.89	0.0
2	23,3	755	87:40	8.71	14	13.1	789	6.64	0.0
3	23.2	754	7.38	8.68	15				
4	23.1	754	7.35	8.46	16				
5	22.6	762	7.16	4.72	17				
6	22.2	765	7.07	1.90	18				
7	20.1	766	6.96	2:20 Dist	19				
8	18.4	755	6.90	0.02	20				
9	16.2	762	6.90	0.00	21				
10	14.5	768	6.92	0.0	22				
11	13.6	773	6.93	0.0	23				

FIELD DATASHEET

Date: \0\\0\25 Locatio	n (Circle): Lake Elsinore/Canyon Lake	Station: CL 08
Time on Station: 1412	Time off Station: 1420 Staf	f Initials: HK KB
Weather Conditions: CLEAN 3.	JUNNY Wind (mph & dire	ection): 3-5 NE SW
Lat:	Long: ON tax	get
Water Depth (m): , 1	Secchi Depth (m):	1.5
Water Chemistry Sample?: Y	Chl-a Sample?: Y / N Surface volume filtered (ml):	Plankton Sample?: Y / N
	Depth-Integrated volume filtered	(ml):
	*Do not exceed 7 PSI or 14 in. H (~500 mL fill volume preferred) full (after first 250 mL are filter	. Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24:5	749	7.69	9.07	12				
1	24.2	748	7.70	9.41	13				
2	23.4	749	7.65	9.11	14				
3	23.1	754	₽K746	8.72	15				
4	22.8	762	7.24	5.58	16				
5	22.5	752	7.15	3.34	17				
6	22.1	747	7.07	0.38	18				
7	21.6	746	7.01	0.05	19				
8	19.4	758	6.91	0.D	20				ļ
9	15.6	777	6.88	0.0	21				
10					22				
11	1				23				

FIELD DATASHEET

Date: 1011023 Location (C	Circle): Lake Elsinore/Canyon Lake Station: $CLOQ$
Time on Station: 13479 1349 Time	e off Station: 1358 Staff Initials: HK KB
Weather Conditions: Clear 3 Su	Mind (mph & direction): $3-5$ MESW
Lat:	Long: ON target
Water Depth (m): -1 -1	Secchi Depth (m): 1.1
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.7	891	8.12	10.98	12	- -			
1	23.6	890	8.14	11.53	13				
2	23.3	890	8.14	11.2.6	14				
3	23.0	890	7.89	9.60	15				
4	22.6	895	7.20	21.848	16	,			
5	22.1	878	7.15	0.25	17				
6	20.6	921	6.79	0,05	18		~		
7	18.3	976	6.73	00.0	19				
\$ 7.5	17.1	973	6.763	00.0	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 1010123 Location (Circle): Lake Elsinore/Canyon Lake	Station: <u>CLID</u>
Time on Station: <u>1336</u> Tir	ne off Station: 1339 Staff Ir	nitials: <u>HKB</u>
Weather Conditions: CICOY 3 S	Unny Wind (mph & direction	on): 3-5 HESW
Lat:	Long: ON TAVE	14
Water Depth (m): 3.5 3.9	Secchi Depth (m):	2
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y N Surface volume filtered (ml):	Plankton Sample?: Y / N
	Depth-Integrated volume filtered (m	ıl):
	*Do not exceed 7 PSI or 14 in. Hg w (~500 mL fill volume preferred). D	

full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
· 0	24.3	930	8.05	11.26	12				
1	24.0	932	8.11	11.81	13				
2	23.3	912	7.94	10.35	14				
3	23.1	910	7.65	7.59	15				
4					16				
5					17				
6					18				
7					19				
. 8					20				
9					21				
10					22				
11	•				23				

Lake Elsinore TNTP Offset Monitoring 2022-23

FIELD DATASHEET

	1 /					¢.	
Date: 12	14/23	Location: Lake Els			n: 1202	,	
Time on S	tation: 0870	Time off	Station:	002	Staff Initials: 🔨	S/HK	
Weather C	Conditions: par	thy Cloudy			irection): 2 - 3.		
	00	(Long:	on		
Water Dep	pth (m): 7 .	7		Secchi Depth (n	n): () ,) .	~	•
Water Ch	emistry Sample	<u>Times:</u> <u>Chl-a</u>	a Samples'		gae Taxonomy	<u>Sample</u> ?:(Y) N	
Surface D Depth Int: Depth Int. Bottom: Bottom D	DUP: 0920 0900 UP: 0930 hl:A imist : 0	Surfa Depti Depti **Dc (~500 full (250 ~L	<i>the DUP volute of the Int.</i> volute <i>h Int.</i> volute <i>h Int.</i> DUP of not exceed of mL fill volute of the fill		l): 200 255 (ml): 225 Hg when filterin . Discard lower c	_ ng chlorophyll	• • <u>8</u> 3 ;
Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	рН	DO (mg/L)	ORP (mV)	Turbidity (NTU)]
0	14.0	2292	8.76	9.90	108.0	26.54]
0.5	14.0	3331	8.75	9,93	106.5	27.14	
1	14.0	3331	8.74	9.91	105.7	27.70	
2	14.0	3331	8,73	9.89	105.2	27.77	4
3	14.0	3331	8,74	9.96	104.8	27.80	1
4	74.0 13.9 ~5	3332	8.66	8,25	105.7	26.50	1

7.50

7.63

7.33

105.7

105.9

106.0

24.99

25.93

27.84

'n

5

6

7

13.9

13.8

13.8

8.64

8.63

8.62

3332

3337

3337

Lake Elsinore TNTP Offset Monitoring 2022-23

FIELD DATASHEET

Date: $12/4$ Location	: <u>Lake Elsinore</u>	Sta	ation: LEO2	
Time on Station: 820	Time off Station:	1002	Staff Initials: <u>ト</u> ろ	HK
Weather Conditions: PAV thy CL	oudy	Wind (mph a	& direction): 2-3	NE
Lat: on target		Long:		
Water Depth (m): 7.7		Secchi Dept	h (m): (), 2 ~	
Water Chemistry Sample Times:	<u>Chl-a Sampl</u>	<u>e</u> s?: Y / N	<u>Algae Taxonomy Sam</u>	<u>ple</u> ?: Y / N
Surface:	Surface volur	ne filtered (ml)	• <u></u> , · · · · · · · · · · · · · · · · · ·	
Surface DUP:	Surface DUP	volume filtered	1 (ml):	
Depth Int:	Depth Int. vo	lume filtered (n	nl):	
Depth Int. DUP:	Depth Int. DU	JP volume filte	red (ml):	• •
Bottom:	**Do not exc	eed 7 PSI or 14	in. Hg when filtering cl	hlorophyll
Bottom DUP:	(~500 mL fill	volume prefer	red). Discard lower chan	ber when
	full (after firs	t 250mL filter	volume).	

<u>Comments</u>: post readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	14,6	3333	8,92	12.44	195.5	27.49
0.5	14.4	3334	8.87	11.78	194.3	28.18
1	14.1	3332	8.80	10.81	193.9	28.H
2	14.1	2332	8.79	10.14	194.0	25.54
3	14.1	3332	8.75	9.75	193.4	26.43
4	14.0	3333	8.72	9.43	192.6	27.54
5	13.9	3333	8,64	7.39	193.1	25.64
6	13.8	3335	8.63	7.35	192.1	27.24
7	13.8	3338	8.45	7.27	190.Le	26.75
8						
9					1	
10	-					
11				· · · · · · · · · · · · · · · · · · ·		

	Lake Elsinore and Canyon Lake TMDL Monitoring 2023-24
	FIELD DATASHEET
Date: $\frac{12/4}{23}$ Location (C	ircle): I ake Elsinore/Canyon Lake Station: <u>LE03</u>
Time on Station: Time Time	off Station: 815 Staff Initials: NJ/HK
Weather Conditions: partly cludy	Wind (mph & direction): $\frac{2-3}{\gamma h}$ NE
Lat:0^	Long: Un
Water Depth (m): 5.8~	Secchi Depth (m): 0, 2~
Water Chemistry Sample?: Y / (N) SAMPLE TIME:	Chl-a Sample?: Y N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

.

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14,1	3312	8.79	8.95	12				
[~] 1	14.1	3313	8.77	8.61	13				
2	14,1	3312	8.75	8.69	14				
3	14.1	3313	8.74	8.52	15				
4	14.0	3314	8.72	7.89	16				
5	14.0	3328	8.67	6,87	17				
X ^{5.5}	14.0	7770	8.64	6.73	18				
7					19				
8					20				
9_					21				
10					22				-
11					23				

FIELD DATASHEET

Date: 12 14 123 Location (Circle): Lake Elsinore/Canyon	Lake Station: LEO
Time on Station: 103 Tim	e off Station: 1040	Staff Initials: NJ HK
Weather Conditions: partly Cic	Wind (mph	& direction): 2-3 mph NE
Lat: ON target	Long:	
Water Depth (m): 4.8	Secchi Dep	th (m): 0,2 ~
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y	Plankton Sample?: Y(N)
	Depth-Integrated volume f	iltered (ml):
		in. Hg when filtering chlorophyll ferred). Discard lower chamber when e filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.1	3343	8.87	11.23	. 12				
1	14.1	3338	8.74	8.68	13				
2	13.9	3338	2.69	8.46	14				
3	13.9	3339	8.68	8,17	15				
4	13,9	3340	8.67	0,00	16				
5	13.8	3340	8.66	7.94	17				
6	13.8	3342	8.64	7.60	18				i i i
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: $\frac{12}{4}$ Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: 1201
	off Station: 1452 Staff Initials: NJ/HK
Weather Conditions: Clear; Sunny	Wind (mph & direction): <u>2-3mph NE</u>
Lat: UN	Long: 01
Water Depth (m):6.8	Secchi Depth (m):
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y N Plankton Sample?: Y N Surface volume filtered (ml): Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	16.2	3343	8,97	15.37	12				
1	14.3	3344	8.83	12.12	13		·		
2	14.1	3338	8.70	8.84	14				
3	14.0	82EC	8,68	8.87	15				
4	13.9	3339	8,69	9.15	16				
5	13.9	3340	8.69	9.05	17				
6	13.8	3341	8.66	7.85	18				
7					19				
8					20				
9					21				
10					22				
11					23				

]	FIELD DATASHEET
	rcle): Lake Elsinore/Canyon Lake Station: 1/202
Time on Station: 1437 Time	off Station: 1442 Staff Initials: NJHK
Weather Conditions: Clear ; Sunny	Wind (mph & direction): $2-3$ MPH NE
Lat:	Long: 0/
Water Depth (m): 7,7	Secchi Depth (m):
Water Chemistry Sample?: Y / 🕥 SAMPLE TIME:	Chl-a Sample?: Y / S Plankton Sample?: Y / Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.4	3330	9.08	17.23	12				
1	14.3	3331	8.77	10.04	13				
2	14,1	3327	8.75	9.70	14				
3	14.1	3328	8,76	10.04	15				
4	14.0	3331	8,73	7,88	16				
5	13,9	3334	8,66	7.35	17				
6	13.8	3336	8.65	7.21	18				
7	13.8	3339	8.64	6.97	19				
8					20				
9					21				
10					22				
11					23				

FIELD DA	TASHEET
Date: $\frac{12/4}{23}$ Location (Circle): Lake I	Elsinore/Canyon Lake Station: <u>LEOS</u>
Time on Station: 1427 Time off Station:	1434 Staff Initials: <u>NJ/HK</u>
Weather Conditions: Clear: Sunny	Wind (mph & direction): 2-3 - 1 h NE
Lat:/	Long: OM
Water Depth (m): 5.8	Secchi Depth (m):
Water Chemistry Sample?: Y N Chl-a Sam SAMPLE TIME:	ple?: Y N Plankton Sample?: Y N
Depth-Inte	grated volume filtered (ml):
(~500 mL	ceed 7 PSI or 14 in. Hg when filtering chlorophyll fill volume preferred). Discard lower chamber when first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15,4	2295	9.12	16.50	12				
1	14.3	3307	8,75	8.57	13				
2	14.0	3313	8,69	8.00	14				
. 3	14.0	3317	8.67	7,60	15				
4	14.0	3321	8.66	7,35	16				
5	14.0	3323	8.65	7,31	17				
62.2	14.0	3323	8.65	7.31	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/4/23 Location (Cir	cle): Lake Elsinore/Canyon Lake	Station: Lake Shope
Time on Station: 1020 Time of	off Station: 1028 Staff In	nitials:KJ/HK
Weather Conditions: partly Cloud	Wind (mph & directi	ion): 2-3 mph NE
Lat: Un target	Long:	
Water Depth (m): $0 \cdot 1 \sim$	Secchi Depth (m):). 2 m
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y /N Surface volume filtered (ml):	Plankton Sample?: Y /N
	Depth-Integrated volume filtered (m	al):
• • • • • • • • •	*Do not exceed 7 PSI or 14 in. Hg w (~500 mL fill volume preferred). D full (after first 250 mL are filtered)	Discard lower chamber when

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14,4	3342	8,85	10.95	12				
1	N.I	3335	8,79	\$9.81	13				
2	14.0	3334	8.73	9.28	14				
3	14.0	3334	8.71	9.14	15				
4	13,9	3334	8.71	9,13	16				
5	13.9	3334	8.70	જ.89	17				
6	13.9	3338	8.66	7.56	18				
7	13.8	3342	8.62	7.15	19				
\$ 7.5	13.8	3343	8.102	7.04	20				
9					21				
10					22				
11					23				

WSP USA E&I Inc.

FIELD DATASHEET

Date: 12/4/23 Location (Cir	cle): Lake Elsinore/Canyon Lake Station: Grand
Time on Station: 1008 Time of	ff Station: 1016 Staff Initials: NITHK
Weather Conditions: Partly Cloud	Wind (mph & direction): 2-3 NE
Lat: ON tanget	Long:
Water Depth (m): $7 \cdot 0$	Secchi Depth (m):
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: YN Plankton Sample?: YN
	Depth-Integrated volume filtered (ml):
,	Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.3	3315	8.87	11.58	12				
1	M.1	3324	8.79	10.43	13				
2	14.1	3322	8.78	10.04	1 4				
3	14.0	3324	8.7V	9.38	15				
4	13.9	3339	8.64	7.37	16				
5	13.9	3342	8.63	6.92	17				
6	13.9	3342	8.62	6.93	18				
16.5	13,9	3343	8.62	6.68	19				
8					20		· · ·		
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: <u>12/4123</u> Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: <u>CLØ</u> 7
Time on Station: 1100 Time	off Station: 1140 Staff Initials: JR/TD
Weather Conditions: Swny, Sligh	H <u>Clouds</u> Wind (mph & direction): <u>1</u> mph <u>B</u> W
Lat: On target	Long: On target
Water Depth (m): 14.61 (me	ascuring ape) Secchi Depth (m): 1.3
Water Chemistry Sample? (Y/N SAMPLE TIME: <u>1/30</u>	Chl-a Sample? (Ý)/ N Plankton Sample?: Y / N Surface volume filtered (ml): 265
depth intergrated	Depth-Integrated volume filtered (ml): <u> </u>
Surface: 1140	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).
Comments:	·
strong sulfure	Smell AM Readings

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15:33	817	7.40	2,76	12	14,8	819	7,29	1,46
1	15.2	818	7.40	2,75	13	14.7	821	730	1.47
2	14.9	818	7.38	2,36	14	14,7	828	7,14	0,12
3	14,9	817	7.36	1,99	15				
4	14.9	817	7.34	1.64	16				
5	14.9	817	7.30	0.43	17				
6	14,8	817	7.26	0,10	18				
7	14.8	817	7.25	0	19				
8	14,8	817	7,24	0	20				
9	14,8	818	7,25	0,49	21				
10	14,8	818	7.26	0.81	22				
11	14.8	818	7.27	1.08	23				

FIELD DATASHEET

Date: 2/4/23 Location (Ci	rcle): Lake Elsino	ore Canyon Lake	Station: <u>CLØ8</u>
Time on Station: 1015 Time	off Station: 10)55 Staff	Initials: <u>JR/TD</u>
Weather Conditions: Sunny, Sight	ly Cloudy	Wind (mph & direc	tion): <u>1 mph 星</u> (い)
Lat: Oh taraet	U	Long:01/	target
Water Depth (m): 7.49 (me	tape)	Secchi Depth (m):_	1.1
Water Chemistry Sample? (Y)/N SAMPLE TIME: 1040 Depth integrated		\widehat{Y}/N filtered (ml): <u>5</u> d volume filtered (
surface:	(~500 mL fill		when filtering chlorophyll Discard lower chamber when d).

Comments:

ş

AM1 Moving	Readings
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	•	U,		0 -					
Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.0	806	7:53	4.85	12		-		
1	14.9	806	7,52	4,85	13				
2	14.8	806	7,50	4,50	14				
3	14.8	807	7,47	4,18	15				
4	14,8	808	7.45	3,86	16				
5	14,8	809	7.43	3,66	17				
6	14.8	810	7,42	3,57	18				
7	14,8	810	7.42	3,48	19				
8	•				20				
9					21				· · · <u>-</u> · · · -
10					22				
11	10				23				

FIELD DATASHEET

۰.

I	Date: $12/4123$ Location (Circle): Lake Elsinore/Canyon Lake Station: $CLS9$										
]	Time on Station: 0920 Time off Station: 1000 Staff Initials: JR/TD_										
۲	Weather Conditions: Sunny Slight Wind (mph & direction): <u>1 mph & W</u>										
Lat: ON towart Long: ON towart											
Water Depth (m): 5.3 tape) Secchi Depth (m): 6.8											
Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N SAMPLE TIME: 0945 Surface volume filtered (ml): 255										D	
•	Depthi	intelguo	nH	÷]	Depth-Integ	grated volu	ume filtere	d (ml):	<u>55</u>		
		e: 09	55	*]	(~500 mL	fill volum		Ig when filt 1). Discard 1 red).			L
	<u>Pre-reodings/AM morming</u> strong sulfir smell										
1	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	
	-			-		• • •	-	Cond	-		, Normal States
	(m)	(°C)	Cond (µS/cm)	(units)	(mg/L)	(m)	-	Cond	-		
	(m) 0	(°C)	Cond (µS/cm) 954	(units) 7,64	(mg/L) 4,92	(m) 12	-	Cond	-		1 1
	(m) 0 1	(°C) 4.5 4.4	Cond (μS/cm) 954 953	(units) 7,64 7,61	(mg/L) 4.92 4.77 4.66	(m) 12 13	-	Cond	-		
	(m) 0 1 2	(°C) 4.5 4.4 4.3	Cond (μS/cm) 954 953 953	(units) 7.64 7.61 7.59	(mg/L) 4,92 4,77	(m) 12 13 14	-	Cond	-		
	(m) 0 1 2 3	(°C) 4.5 4.5 4.4 <i> </i> 4.3 4.2	Cond (μS/cm) 954 953 953 955	(units) 7,64 7,61 7,59 7,60 7,62	(mg/L) 4,92 4,77 4,66 4,81	(m) 12 13 14 15	-	Cond	-		
	(m) 0 1 2 3 4	(°C) 14.5 14.4 14.3 14.2 14.2	Cond (μS/cm) 954 953 955 965 965	(units) 7.64 7.61 7.59 7.60 7.60 7.62	(mg/L) 4.92 4.77 4.66 4.81 5.03	(m) 12 13 14 15 16	-	Cond	-		
	(m) 0 1 2 3 4 5	(°C) 14.5 14.4 14.3 14.2 14.2	Cond (μS/cm) 954 953 955 965 965	(units) 7,64 7,61 7,59 7,60 7,62	(mg/L) 4.92 4.77 4.66 4.81 5.03 5.10	(m) 12 13 14 15 16 17	-	Cond	-		
	(m) 0 1 2 3 4 5 6	(°C) 14.5 14.4 14.3 14.2 14.2	Cond (μS/cm) 954 953 955 965 965	(units) 7,64 7,61 7,59 7,60 7,62	(mg/L) 4.92 4.77 4.66 4.81 5.03	(m) 12 13 14 15 16 17 18	-	Cond	-		
	(m) 0 1 2 3 4 5 6 7	(°C) 14.5 14.4 14.3 14.2 14.2	Cond (μS/cm) 954 953 955 965 965	(units) 7,64 7,61 7,59 7,60 7,62	(mg/L) 4.92 4.77 4.66 4.81 5.03 5.10	(m) 12 13 14 15 16 17 18 19	-	Cond	-		

11

23

FIELD DATASHEET

Date: 12/4/2023 Location (C	Circle): Lake Elsinore Canyon Lake Station: <u>CL10</u>
Time on Station: 0825 Time	e off Station: 0915 Staff Initials: JR/TD
Weather Conditions: SUNNY, Slight	clouds Wind (mph & direction): 1 mph Ew
Lat: ON target	Long: ON target
Water Depth (m): 4,2	Secchi Depth (m): 0,9
Water Chemistry Sample: (Y)/N SAMPLE TIME: <u>0855</u> Depth intergrated T	Chl-a Sample? Y N Plankton Sample?: Y N Surface volume filtered (ml): 250
peptil intergrated st	Depth-Integrated volume filtered (ml): <u>250</u>
curface: 0905	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

(~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

-ik -	Pre-	read	lings,	morn	ing	·				
	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
	0	14.3	975	7.98	8.13	12 -	· · ·	- 14 - 1		
	1	14.3	975	7,95	7.98	13		·		
	2	14.2	977	7.93	7.82	14				
	3	14.2	976	7.94	7.88	15				
* so ent	3.5A*	14.2	1034	8.15	8.78	16				
Sedivitan	5					17				
distruction	6					18				
Bediment distrubed at bottom reording	7					19				
160,01.	8					20				
	9					21				
	10					22				
	11					23				

FIELD DATASHEET

Date: 12/4/23 Location (Cir	cle): Lake Elsinore/Canyon Lake Station: CLIØ
Time on Station: 1353 Time of	off Station: 1358 Staff Initials: JR/TD
Weather Conditions: Sunny w/ less	clouds Wind (mph & direction): 5 mph N
Lat: Oh forget	Long: On touget
Water Depth (m): 3.7	Secchi Depth (m): //A
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample?: Y / N Plankton Sample?: Y / N Surface volume filtered (ml):
SAIVII LE TIIVIE.	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

PM Readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
• 0	16.8	979	8.23	9.97	12				
1	15.1	972	8.28	9,74	13				
2	14.3	969	8.07	8.53	14				
3	14.2	994	8.26		15				
3.5×	14.3	1006	8.29	9.57	16				
5					17			 	
6					18				
7					19				
8					20				
9					21				
10				1	22				
11					23				

FIELD DATASHEET

Date: 12/4123 Location (Circle): Lake Elsinore/Canyon Lake Station: CLØ9									
Time on St	Time on Station: 1405 Time off Station: 1410 Staff Initials: JR/TD								
Weather C	Weather Conditions:SunnyWind (mph & direction):SmphNMEWLat: ON $target$ Long: OP $target$ IWater Depth (m): 6.8 (Govrmin)Secchi Depth (m): NA								
Lat:	on to	U rget			Long:_	on	tor	get	1
Water Dep	oth (m):(, ₆) (6	aourmin)		Secchi	Depth (m)): <u> </u>	$\frac{f}{O}$	
Water Che	mistry San	nple?: Y / N		Chl-a Samp Surface vol			Plan	kton Sa mp	ole?: Y / N
				Depth-Integ			d (ml):		
							Ig when filt (). Discard l		
Comments	5:			full (after f					No. of Concession, Survey, Sur
ſ		0	1.						- and a second construction of
Y	/~(Reac	lings						
Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	15,5	9265	7.69	5.77	12				
1	14.8	9,50	7.68	5,63	13				
2	14.3	951	7.61	4.65	14				
3	14.3	9,55	7.58	4,69	15				
4	14.3	9264	7.67	5.69	16				
5	14.3	9464	7,68	5.66	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/	14/22	2 Loca	tion (Circl	e): Lake E	lsinore/Ca	nyon Lake	St St	ation: <u>C</u>	LØ B
Time on S	Time on Station: 1420 Time off Station: 1428 Staff Initials: JR/TN								
Weather C	Conditions:	Sunny v	y less i	louds	Wind ((mph & di	rection): <u>5</u>	mph	NNEU
Lat:	. Ón	tare	jet		Long:_	oŋ	tave	<u>yct</u>	
Water Dep	oth (m):	Sunny v tare	armin)		Secchi	Depth (m):	λ.	NNEU
Water Che	emistry Sar	nple?: Y / N	1 (Chl-a Samp Surface vol	ole?: Y / N		Plan		ble?: Y / N
				Depth-Inter					
				(~500 mL	fill volum	e preferred	Ig when filt l). Discard I		
Comment	<u>s:</u>			full (after	first 250 m	L are filte	red).		
PM Readings									
	f pr	Kei	ading	-S					
Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
	Temp	Sp. Cond	pH	DO		-	Cond		
(m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L) 7:30	(m)	-	Cond		
(m) 0	Тетр (°С) (6 1	Sp. Cond (µS/cm) ⊕ ₂ 07	pH (units) 7,73	DO (mg/L) 7:30	(m) 12	-	Cond		
(m) 0 1	Temp (°C) [6,] 15,3	Sp. Cond (μS/cm) Θ ₂ 0 7 Θ ₃ 0 5	pH (units) 7,73 7,74	DO (mg/L) 7.30 7.43 5.95	(m) 12 13	-	Cond		
(m) 0 1 2	Temp (°C) [6,] 15,3	Sp. Cond (μS/cm) Β ₂ 0 7 Β ₃ 0 7 Β ₃ 0 5 Β ₃ 0 9 Θ ₅ 0 θ	pH (units) 7,73 7,74 7,66 7,52	DO (mg/L) 7.30 7.43 5.95	(m) 12 13 14	-	Cond		
(m) 0 1 2 3	Temp (°C) 16,1 15,3 15,0 14, 2 8	Sp. Cond (μS/cm) ⊕ ₂ 0 7 Θ ₂ 0 9 Θ ₂ 0 9 Θ ₂ 0 6 Θ ₄ 0 6	pH (units) 7,73 7,74 7,66	DO (mg/L) 7.30 7.43 5.95 4.68	(m) 12 13 14 15	-	Cond		
(m) 0 1 2 3 4	Temp (°C) 16,1 15,3 15,0 14,28 14,8	Sp. Cond (μS/cm) ⊕ ₂ 0 7 Θ ₃ 0 9 Θ ₃ 0 9 Θ ₄ 0 6 Θ ₄ 0 6	pH (units) 7,73 7,74 7,66 7,62 7,62 7,45 7,42	DO (mg/L) 7.30 7.43 5.95 4.68 4.2	(m) 12 13 14 15 16	-	Cond		
(m) 0 1 2 3 4 5	Temp (°C) 16,1 15,3 15,0 14, 2 8 14,8 14,8	Sp. Cond (μS/cm) ⊕ ₂ 0 7 Θ ₃ 0 9 Θ ₃ 0 9 Θ ₄ 0 0 Θ ₄ 0 6 Θ ₄ 0 0 Θ ₄ 0 0	pH (units) 7,73 7,74 7,66 7,62 7,62 7,45 7,42	DO (mg/L) 7.30 7.43 5.95 4.68 4.21 3.90 3.62	(m) 12 13 14 15 16 17 18	-	Cond		
(m) 0 1 2 3 4 5 6	Temp (°C) 16,1 15,3 15,0 14,28 14,8 14,8 14,8	Sp. Cond (μS/cm) Β ₂ Ο 7 Β ₂ Ο 5 Β ₂ Ο β Β ₂ Ο β Β ₄ Ο β Β ₄ Ο β Β ₄ Ο β Β ₄ Ο β	pH (units) 7,73 7,74 7,66 7,62 7,62 7,45 7,45 7,40	DO (mg/L) 7.30 7.43 5.95 4.68 4.21 3.90 3.62	(m) 12 13 14 15 16 17 18	-	Cond		
(m) 0 1 2 3 4 5 6	Temp (°C) 16,1 15,3 15,0 14,28 14,8 14,8 14,8	Sp. Cond (μS/cm) Β ₂ Ο 7 Β ₂ Ο 5 Β ₂ Ο β Β ₂ Ο β Β ₄ Ο β Β ₄ Ο β Β ₄ Ο β Β ₄ Ο β	pH (units) 7,73 7,74 7,66 7,62 7,62 7,45 7,45 7,40	DO (mg/L) 7.30 7.43 5.95 4.68 4.21 3.90 3.62	(m) 12 13 14 15 16 17 18	-	Cond		

FIELD DATASHEET

Date: <u>12/4/23</u> Location (Circ	cle): Lake Elsin	nore/Canyon La	ike	Station: CLØ7
Time on Station: 1433 Time of	off Station:	1446	Staff Initia	IS: TRITO
Weather Conditions: Survey w/ 103	s clouds	Wind (mph &	direction):	5 NNE
Lat: On farget		Long:	ont	arget
Water Depth (m): 15.4 CGour	nin)	Secchi Depth	(m): / ⁄	A
Water Chemistry Sample?: Y / N SAMPLE TIME:	Chl-a Sample ⁴ Surface volum	?: Y / N ne filtered (ml);	Р	lankton Sample?: Y / N
	Depth Integra	ted volume filte	ered (ml):_	
	(~500 mL fil		red). Disca	filtering chlorophyll rd-lower chamber when

PM	PM Readings								
Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	15.8	817	7,48	4,28	12	14.8	818	7.25	0.94
1	15,2	818	7,42	3,28	13	14.7	827	7,24	0,77
2	15.0	817	7.37	2,53	14	14.6	831	7.14	0.03
3	148	816	7.31	1.47	15				
4	14.9	816	7.24	0.12	16				
5	14.8	816	7,22	0.04	17				
6	14.8	816	7.22	0.44	18				
7	14.8	816	7.24	1.04	19				
8	14.8	818	7.27	1.84	20				
9	14.8	816	7,28	1.80	21				
10	14.8	817	7,27	1.53	22				
11)4,8	814	7.26	1.43	23				

FIELD DATASHEET

Date: $\frac{2}{27/24}$ Location (Cir	cle): Lake Elsinore/Canyor	n Lake Statio	n: <u>LEOI</u>
Time on Station: / 010 Time of	off Station: 1015	Staff Initials:	NJ/RV
Weather Conditions: partly clare	Wind (mpl	n & direction):	L- 3mph SF
Lat: 00	Long:	00	
Water Depth (m):	Secchi Dep	oth (m):O. 8	m
Water Chemistry Sample?: Y	Chl-a Sample?: Y N Surface volume filtered (r		n Sample?: Y /
	Depth-Integrated volume	filtered (ml):	
	*Do not exceed 7 PSI or 1 4 (~500 mL fill volume pro full (after first 250 mL ar	eferred). Discard low	

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
··· •0 · ·	15.0	2559	8.62	11.45	12		-		
1	14,5	2562	8.62	11.47	13				
2	14.4	2574	8.55	10,04	14				
3	13.6	2689	8.16	5,34	15	-			
4	17,3	2.702	8.01	3.84	16				
5	13.1	2705	7.95	3.02	17				
6	13,0	2727	7.87	1.16	18				
7	12.7	2742	7.81	0.37	19				
8	12.7	2744	7.81	0.31	20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

Date: 2/27/24 Location	: <u>Lake Elsinore</u>	Station: Lizoz
Time on Station: 0700	Time off Station:	0930 Staff Initials: NJ/RV
Weather Conditions: Cloudy		Wind (mph & direction): 1 mph SE
Lat:0		Long:() ()
Water Depth (m): 9.5	· · · · · · · · · · · · · · · · · · ·	Secchi Depth (m): $\mathcal{O}_{\mathcal{A}} \mathcal{F}_{\mathcal{M}}$
Water Chemistry Sample Times:	Chl-a Samples	s? Y/N <u>Algae Taxonomy Sample</u> ? Y/N
Surface: 0820 Surface DUP: 0855 Depth Int: 0830 Depth Int. DUP: 0855 Bottom: 0840 Bottom DUP: 0910 Surface TMDL: 0915	Surface DUP v Depth Int. volu Depth Int. DUF Surface TMDL **Do not excee (~500 mL fill v	e filtered (ml): 500 mL volume filtered (ml): 500 mL ume filtered (ml): 500 mL P volume filtered (ml): 500 \therefore volume filtered (ml): 500 \therefore volume filtered (ml): 500 ed 7 PSI or 14 in. Hg when filtering chlorophyll volume preferred). Discard lower chamber when 250mL filter volume).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	14.5	2516	8.55	10.52	81.5	6.67
0.5	14,6	2515	8,54	10.56	84.9	6.77
1	14.6	2517	8.53	10.52	86.5	6.72
2	14.6	2532	8.50	9.54	89.7	7.32
3	17.7	2649	8,13	5,32	95.7	4.23
4	13.4	2705	8,01	3.84	98.2	3.18
5	13.2	2680	8,05	4.31	98.5	4.20
6	13.1	2712	7.90	2.26	100.7	2.75
7	12.8	2739	7.79	0.68	97.4	7.29
8	12.6	2752	7.78	0.36	-109. 9 A . 8	10.34
9	12.6	2751	7.78	0.25	-153.2	9.96
10						
11						

	FIELD DATASHEET	
Date: $\frac{2}{27/24}$ Location (C	Sircle): Lake Elsinore/Canyon Lake	Station: LEOS
Time on Station: 0745 Time	e off Station: Staff	Initials: <u>NJ RV</u>
Weather Conditions: Cloudy	Wind (mph & direc	ction): 0755
Lat:()^	Long:	00
Water Depth (m): 7.8	Secchi Depth (m):	0, 8m
Water Chemistry Sample?: Y /N SAMPLE TIME:	Chl-a Sample?: Y / 🕢 Surface volume filtered (ml):	Plankton Sample?: YN
	Depth-Integrated volume filtered	(ml):
	*Do not exceed 7 PSI or 14 in. Hg (~500 mL fill volume preferred). full (after first 250 mL are filtere	Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.7-	3-226	8,53	9,96	12		-		
1	14.7	2509	8,51	9.93	13				
2	14.7	2511	8.49	9.77	14		-		
3	14.3	2584	8,29	7.04	15				
4	13.4	2665	8.11	5.04	16				
5	13,2	2703	7.93	2.33	17				
6	13.1	2718	7,84	1.47	18				
7	12,9	2736	7.81	0,32	19				
\$7.5	12.9	2732	7,77	0.28	20				
9					21				
10					22				
11					23				

	Lake Elsinore and Canyon Lake TMDL Monitoring 2023-24
	FIELD DATASHEET
Date: $\frac{2}{27}$ Location (Circle): Lake Elsinore/Canyon Lake Station: <u>- FOI</u>
	e off Station: 1515 Staff Initials: NJ/RV
Weather Conditions: putty claud	Wind (mph & direction): <u>3-4-ph hr</u>
Lat:	Long: <u>ON</u>
Water Depth (m): 8,4	Secchi Depth (m):
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.2	2552	8.67	11.72	12				
1	15.2	2553	8,66	11.79	- 13				
2.	14,8	2555	8161	11.23	14				
3	13.9	2652	8.31	6,58	15				
4	13.5	2705	8,07	4.33	16				
5	13,3	2703	8.03	3,63	17				
6	13.2	2703	8.01	3,40	18				
7	13,(2707	7.94	2,56	19				
8	12.8	2738	7,84	0,57	20				· .
9					21				
10					22				
11					23				



FIELD DATASHEET

Date: $\mathcal{P}/\partial 7/\partial 4$ Location (Cir	rcle): Lake Elsipore/Canyon Lake Station: <u>LE02</u>
	off Station: 1505 Staff Initials: NJ/RV
Weather Conditions: profil- cloud	Wind (mph & direction): $\Re J - 4 \gamma h h$
Lat:0^	Long: () (1)
Water Depth (m): 9.5	Secchi Depth (m): () . 8 ~
Water Chemistry Sample?: YN SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in Ha when filtering chloronbyll

^tDo not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.2	2233	8.66	10.99	12				
1	1512	2534	8,63	11.22	13				
2	14.8	2545	8.53	10.11	14				
3	13.7	2675	19,19	5.16	15				
4	13.4	2703	8,05	3.45	16				
5	13.2	2711	7.97	2.89	17				
6	13.0	2718	7.92	152	18				
7	12.7	2741	7.84	0.73	19				
8	12.6	2748	7.82	0.40	20	-			
9	12.6	2748	7.81	0.34	21				
10					22				
11					23				

	FIELD DATASHEET
	cation (Circle): Lake Elsinore/Canyon Lake Station: LEO3
Time on Station: @ 1950	Time off Station: 1455 Staff Initials: NS/RV
Weather Conditions:	
Lat:(//	Long: U/
Water Depth (m): 7,8	$\underline{M} \qquad \qquad \text{Secchi Depth (m):} \underbrace{O \ \&}_{M}$
Water Chemistry Sample?: Y	N Chl-a Sample?: Y N Plankton Sample?: Y N Surface volume fikered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

Do not exceed 7 **PSI** or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.5	2-502	8.65	11.02	12				
1	15.5	2501	8,64	10.94	13				
2	14.7	2502	8.55	9.54	14				
3	13.5	2656	8,23	4.94	15				
4	13.3	2681	8.05	3.65	16				
5	13.1	2720	7.93	1.96	17				
6	12.9	2732	7.85	0.48	18				
7	12.8	a 736	7.99	0.32	19				
\$7.5	12.8	2735	7.87	0.31	20				
9					21				
10					22				
11					23				

WSP USA E&I Inc.

FIELD DATASHEET

Date: 22121 Location (C	ircle): Lake Elsinore/Canyon Lake Station: Lake Shove
Time on Station: 0950 Time	off Station: 1000 Staff Initials: NJ / DV
Weather Conditions: Cloudy	Wind (mph & direction): 2-3 MPH SE
Lat: 0N	Long: DN
Water Depth (m): 10 m	Secchi Depth (m): 0.8 (v)
Water Chemistry Sample?: Y /	Chl-a Sample?: Y / N Plankton Sample?: Y / N
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Dep (m		Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
: 0) -	14.8	2524	8.58	10.76	12	•			
1		14.7	2528	8.57	10.66	13				
2		14.5	2534	8,54	10.40	14				
3	;	14.4	2557	8.45	8.98	15				
4	ļ	14.1	2677	8.14	5.33	16				
5	5	13.4	2688	8.08	4.52	17				
6	5	13.1	2704	7.87	1.76	18				
7	,	13.0	27412	7.84	1.43	19				
8	3	12.10	2746	7,80	0.38	20				
9	•	12.6	2150	7.79	0.33	21				
en 1	09,5	12.6	2750	7.78	0.27	22				
1				•		23				

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FIELD DATASHEET

Date: <u>1</u> Location (C	ircle): Lake Elsinore/Canyon Lake	Station: Grand
Time on Station: 0935 Time	off Station: 0945 Staff I	nitials: NJ RJ
Weather Conditions: Partly cli	Wind (mph & direction	ion): 2-3 MPH SE
Lat:ON	Long:ON	<u> </u>
Water Depth (m): $9.0 $	Secchi Depth (m):	0.8 m
Water Chemistry Sample?: Y / 🕅 SAMPLE TIME:	Chl-a Sample?: Y (N) Surface volume filtered (ml):	Plankton Sample?: Y / N
	Depth-Integrated volume filtered (n	nl):
	*Do not exceed 7 PSI or 14 in. Hg w (~500 mL fill volume preferred). If full (after first 250 mL are filtered)	Discard lower chamber when

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Comments:

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.9	2520	8.57	10.64	12			·	
1	14.7	2528	8.56	10.60	13				
2	74,4	2-552	8.46	4.37	14				
3	13.8	2660	6.30	6.27	15				
4	13.4	2677	8.10	4.54	16				
5	13.2	2673	8,07	4.38	17				
6	13.1	2704	7.41	2.08	18				
7	12.8	2741	7.83	0.64	19				
8	la.7	2750	7.80	0.39	20				
\$ 8.S	12.7	2750	7.81	0:33	21				
10					22				١
11					23				

FIELD DATASHEET

Date: <u>2/27/24</u> Location	(Circle): Lake Elsinore/Canyon Lake	Station: <u>CLO7</u>
		Initials: HK/TD
Weather Conditions: 90% COVE	Wind (mph & direc	tion):
Lat: ON target	Long: On to	Nget
Water Depth (m): 14, 4	Secchi Depth (m):	0.5
Water Chemistry Sample?:(Y) N SAMPLE TIME: <u>(160</u>	Chl-a Sample? (Y) N Surface volume filtered (ml): 50	Plankton Sample?: Y (N)
S. C.	Depth-Integrated volume filtered (ml): <u>500</u>
sourface intergrated: 1205	*Do not exceed 7 PSI or 14 in. Hg (~500 mL fill volume preferred). full (after first 250 mL are filtered	Discard lower chamber when

Pre	Rec	ading							
Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14,4	416	9,14	14.0	12	115	541	7,15	1.2
1	14,00	421	8,97	12,5	13	11.5	543	7,14	0,8
2	13.82	432	8,19	8.0	14	11.5	549	7.08	0.6
3	12.6	429	7.68	5,5	15				
4	12.3	439	7.47	4,3	16				
5	12.2	450	7,40	4.0	17				
6	11.9	458	7,33	3.7	18				
7	11.8	483	7,31	3.1	19				
8	11.6	503	7.26	2.7	20				
9	11.6	512	7,23	2.5	21				
10	11.65	530	7.20	1.9	22				
11	11.5	536	7.18	1.6	23				

FIELD DATASHEET

Date: 2/27/24 Location (C	Circle): Lake Elsinore Canyon Lake Station: <u>CLOB</u>
Time on Station: 1030 Time	e off Station: 1120 Staff Initials: HK/TO
Weather Conditions: 100% Cloud	<u>Coverage</u> Wind (mph & direction): 2 mph S
Lat: On target	Long: On target
Water Depth (m): <u>9,5</u>	Secchi Depth (m): 0.7
Water Chemistry Sample (Y) N SAMPLE TIME: <u>650</u>	Chl-a Sample? (YN Plankton Sample?: Y/(N) Surface volume filtered (ml): 355
	Depth-Integrated volume filtered (ml): 500-1
Sinface intergrated 1 1105	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

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Pre 1	Read	ings							
Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.0	403	9.02	13,1	12				
1	13,4	416	8.16	9.0	13				
2	13.2	422	7.89	7.5	14				
3	13.0	411	7,70	5.8	15				
4	12.4	407	7.55	4.7	16				
5	12.3	443	7.45	4.2	17				
6	11.8	467	7.34	3.3	<u>18</u>				
7	11.6	480	7.29	3.0	19				
8	11.5	507	7.25	2.3	20				
9	11.5	529	7.20	1.2	21				
10					22				
11					23				

FIELD DATASHEET

Date: <u>2/27/24</u> Location (Ci	rcle): Lake Elsinor Canyon Lake Station: <u>CLO9</u>
Time on Station: 0930 Time	off Station: 1015 Staff Initials: HK/TD
Weather Conditions: 100% Cloud	Coverage Wind (mph & direction):
Lat: Ou target	Long: on target
Water Depth (m): 6,7	Secchi Depth (m): 0105
Water Chemistry Sample (: Y) N SAMPLE TIME: 0950	Chl-a Sample?: Y/N Plankton Sample?: Y N Surface volume filtered (ml): 500 500
surface intergrated:1000	Depth-Integrated volume filtered (ml): 500
som a mingratar. Iw	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Pre	Pre Reading									
Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	
0	14.4	603	8,78	13.0	12					
1	14,4	604	8.73	12.7	13					
2	14.D	647	7.91	7,4	14					
3	13.2	840	7.45	3.	15					
4	12.8	911	7,28	1.j	16					
5	12.4	883	7.22	0.6	17					
6	11.9	855	7,18	0.2	18					
765	11.7	852	7.14	0.06	19					
8					20					
9					21					
10					22					
11					23					

FIELD DATASHEET

Date: <u>2/27/24</u> Location (C	Circle): Lake Elsinore Canyon Lake Station: <u>CLIO</u>
Time on Station: 0820 Time	e off Station: 0920 Staff Initials: <u>HK/TD</u>
Weather Conditions: <u>90% c/pud C</u>	Wind (mph & direction): 2mph S
Lat: On target	Long: on target
Water Depth (m): 4.	Secchi Depth (m): 0.65
Water Chemistry Sample? Y N SAMPLE TIME: 49 09 20	Chl-a Sample? \bigcirc N Plankton Sample?: Y N Surface volume filtered (ml): $\frac{500}{475}$ $\frac{475}{475}$ $\frac{4}{500}$ Depth-Integrated volume filtered (ml): $\frac{475}{475}$
surface intergrated = 0855	Depth-Integrated volume filtered (ml): 4754500
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when
1	full (after first 250 mL are filtered).

Pre	Reac	lings			c.	·			
Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.6	650	8.61	12.6	12				
1	14.6	651	8,61	12,5	13				
2	14.6	768	8.14	9.6	14				
3	13.7	926	7.33	2.6	15				
¥35	13.3	988	7.23	1.2	16				
. 5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/27/24 Location ((Circle): Lake Elsinore Canyon L	ake Station: <u>CL07</u>
Time on Station: 1352 Tim	ne off Station: 1400	Staff Initials: HK-HD
Weather Conditions: Partly CI	Wind (mph &	direction): 5 mph SW
Lat:		tavge
Water Depth (m): 15-2	Secchi Depth	(m): <u>0.5</u>
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y N Surface volume filtered (ml)	Plankton Sample?: Y/N
	Depth-Integrated volume filt	tered (ml):
	*Do not exceed 7 PSI or 14 in	n. Hg when filtering chlorophyll

Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Afternoon

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
. 0	15.8	414	9.44	16.0	12	11.5	539	7.20	1.4
1	14.0	421	9.16	14.3	13	11.5	544	7.17	0.8
2	13.4	420	8.13	8.4	14	11.5	551	7.15	0.9
3	12.6	429	7.64	5.4	14.518	11.5	556	7.14	05
4	12.3	433	7.50	4.5	16				
5	12.1	442	7.40	4.2	17				
6	12.0	455	7.33	3.8	18				
7	1.8	481	7.31	3.2	19				
8	11.7	498	7.20	2.6	20				
9	11.6	508	7.26	2.5	21				
10	llile	5190	7.25	2.2	22				
11	1115	528	7.23	2.0	23				

WSP USA E&I Inc.

	FIELD DATASHEET	* 8
Date: 212712024 Location	n (Circle): Lake Elsinore/Canyon Lake	Station: CLD&
Time on Station: 1410 T	time off Station: 1419 Staff In	itials: HW/TD
Weather Conditions: <u>CWVdy</u>		m): Smph SW
Lat:	Long: DN FW	get
Water Depth (m): 9.5	Secchi Depth (m):	
Water Chemistry Sample?: YN SAMPLE TIME:	Chl-a Sample?: Y /N Surface volume filtered (ml):	Plankton Sample?: YN
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg wh (~500 mL fill volume preferred). Di	

full (after first 250 mL are filtered).

Comments:

Afternoon

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.9	398	9.42	16.3	12				
1	13.8	396	8.85	12.6	13		-		
2	13.7	374	8.12	9.1	14				
3	12.5	399	7.46	وركا	15				
4	12.2	426	7.47	4.2	16				
5	11.9	452	7.35	r.9	17				
6	11.8	475	7.29	3.3	18				
7	11.5	505	7.23	2.4	19				
8	11.5	504	7-21	1.9	20				
9	11.5	523	7.19	1.6	21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/27/2024 Location (Cir	cle): Lake Elsinore/Canyon Lake Station: HK-
Time on Station: 1455 Time of	off Station: 1500 Staff Initials: CL 09
Weather Conditions: pavtly SUN	My Wind (mph & direction): 5Mph SW
Lat:	Long: 60 target
Water Depth (m): $9 \cdot 0$	Secchi Depth (m): 0. US
Water Chemistry Sample?: Y (N) SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):

*Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	16.4	622	9.24	15.8	12				
1	14.9	598	9.20	15.7	13			-	
2	14.2	613	8.35	10.3	14				
3	13.4	801	7.66	4.3	15				
4	12.9	915	7.42	1.7	16				
5	12.0	845	732	0, 7	17				
6	11.8	853	7.28	0.3	18				
7	11.7	853	7.24	0.1	19				
7.58	11.7	894	7.18	0.07	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 212112024 Location (C	Circle): Lake Elsinore/Canyon Lake	Station: CL 10
Time on Station: 1443 Time	e off Station: 1447 Sta	ff Initials: <u>HK/TP</u>
Weather Conditions: Davtly CU	Wind (mph & dir	rection): SSW
Lat:	Long: ON tak	qe
Water Depth (m): $3 \cdot 9$	Secchi Depth (m)	0.65
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y N Surface volume filtered (ml):	Plankton Sample?: Y/N
	Depth-Integrated volume filtered	1 (ml):
	*Do not exceed 7 PSI or 14 in. H	g when filtering chlorophyll

Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Afternoon

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.8	481655	7.20	3,00	12				
1	176.8	651	9.05	150	13				
2	14.4	695	7.93	8.8	14				
3	13.9	989	7.47	2.5	15				
3.54	13.2	987	7.36	1.2	16				
5					17				
6					18				
7					19		•		
8					20				
9					21				
10					22				
11					23				

	FIELD DATASHEET
Date: <u>4/17/29</u> Location	(Circle): Lake Elsinore/Canyon Lake Station: 1-1-01
Time on Station: 1502 Ti	me off Station: 1510 Staff Initials: NJ/KP
Weather Conditions: clear; br	Wind (mph & direction): $6-8 mph SW$
Lat:	Long: <u>() ()</u>
Water Depth (m): S. 6 m	Secchi Depth (m):
Water Chemistry Sample?: Y	Chl-a Sample?: Y /N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	2017	2482	8.79	14,25	12				
1	19.0	2484	8.86	15.34	13			-	
2	18.5	2475	8,84	15.23	14				
3	18.1	2478	8,73	13.40	15				
4	17.9	2475	8170	12.73	16				
5	17,7	2477	8.57	10,70	17				
6	17,2	2477	8.42	8,92	18				
7	17.1	2477	8.30	8.45	19				
8	16.9	2477	8.30	7.39	20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring 2023-24

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FIELD DATASHEET

Date: <u>4//7/24</u> Location:	: Lake Elsinore + Station: $\angle EO2$
Time on Station: 08/5	Time off Station: 1020 Staff Initials: N/kP
Weather Conditions: Clearis	Wind (mph & direction): $1 - 2mph N$
Lat:0^	Long:
Water Depth (m): 10.1~	Secchi Depth (m): 1,70 m
Water Chemistry Sample Times:	<u>Chl-a Samples?</u> (Y) N <u>Algae Taxonomy Sample</u> ?(Y) N
Surface: 0845	Surface volume filtered (ml): 500
Surface DUP: 0920	Surface DUP volume filtered (ml): 500
Depth Int: 0855	Depth Int. volume filtered (ml): 500
Depth Int. DUP: 0935	Depth Int. DUP volume filtered (ml): 500
Bottom: 0905	Surface TMDL: volume filtered (ml): 500
Bottom DUP: 0940	**Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll
Surface TMDL: 1010	(~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

<u>Comments</u>: pre reakings

						1
Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	18.4	2477	8.76	12.93	88.1	- 2.54
0.5	18.4	2477	8.74	12.93	91.1	- 2.63
1	18.4	2476	8.73	12.90	93.7	- 2.65
2	18.1	2476	8.62	11.53	98.4	-2.95
3	17.8	2478	8.55	10.59	101.7	- 3.64
4	17,7	2479	8.53	10,13	104.2	- 3.54
5	17.6	2478	8.50	9.71	106.5	-3,29
6	17.5	2478	8.50	9.77	107.7	-3.55
7	17,1	2477	8,37	8,16	112.2	-3.54
8	16,4	2485	\$.01	4.13	117.6	-3.46
9.	16.2	2487	7.93	3.15	105.6	- 3.20
709.5	16.2	2488	7.93	3.08	99,1	-3.53
11						

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

	Date: <u>4//</u>	7/24	Location: Lake Els	sinore «	Station	1: LE02	
i	Time on S	tation: <u>0815</u>	- Time off	Station:	020	Staff Initials: _/	VJ/KA
			ar; sunny		Wind (mph & di		
	Lat:	<u>On</u>			Long:	on	•
	Water Dep	oth (m):O.			Secchi Depth (m): <u>1.70</u>	
	<u>Water Ch</u>	emistry Sample	<u>Times:</u> <u>Chl-a</u>	a Samples?	: Y(N) <u>Al</u>	gae Taxonomy	Sample?: Y(N)
	Surface:	· · · · · · · · · · · · · · · · · · ·	Surfa	ce volume	filtered (ml):	_	
	Surface D	UP:			lume filtered (m.		
· .	Depth Int:				e filtered (ml):_		-
	Depth Int.				volume filtered		<u> </u>
	Bottom:				volume filtered		
		JP:			7 PSI or 14 in. lume preferred).		
	Surface TN	<i>WIDL</i> :			50mL filter volu		
	X 4	1					
	Comments	: Ant	inalal			1 (J.)	
		- 1101	CACI	JAC			
	<u>Commona</u>	E post	readi	Igs		9	
	<u></u>		(EaOI,	Jg.5			
	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	рн	DO (mg/L)	ORP (mV)	Turbidity (NTU)
	Depth	V	Sp. Cond		DO (mg/L) / 3, 82	0RP (mV) 90, 8	
	Depth (m)	() Temp (°C)	Sp. Cond (µS/cm)	pH			(NTU)
	Depth (m) 0	() Temp (°C) /9.1	Sp. Cond (μS/cm) 2475	рН 8,82	13.82	90.8	(NTU) - ⁻ ⁻ ⁻ ⁻
	Depth (m) 0 0.5	U Temp (°C) 19.1 18.8	Sp. Cond (µS/cm) 2475 2478	pH 8.82 8.86 8.85 8.70	13.82 13.78	90.8 95.1	(NTU) - 3,2 1 - 1,86
	Depth (m) 0 0.5 1	U Temp (°C) 19.1 18.8 18.4 18.4 18.0 17.9	Sp. Cond (µS/cm) 2475 2478 2477	pH 8,82 8,86 8,85	/3.82 13.78 13.46	90.8 95.1 99.0	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31
	Depth (m) 0 0.5 1 2	U Temp (°C) 19.1 18.8 18.4 18.0	Sp. Cond (μS/cm) 2475 2475 24778 24778 2478 2478 2478 2478 2478 2478	pH 8.82 8.86 8.85 8.70 8.66 8.63	13.82 13.79 13.46 11.22	90,8 95.1 99.0 106.7	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31 - 3.31
	Depth (m) 0 0.5 1 2 3	U Temp (°C) 19.1 18.8 18.4 18.4 18.0 17.9	Sp. Cond (μS/cm) 2475 2475 2477 2477 2478 2478 2478	pH 8,82 8,82 8,85 8,85 8,70 8,66	/3.82 13.78 13.46 11.22 10.66 10.45 10.17	90.8 95.1 99.0 106.7 109.3	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31 - 3.31 - 3.40
	Depth (m) 0 0.5 1 2 3 4	U Temp (°C) 19.1 18.8 18.4 18.0 17.9 17.9 17.8	Sp. Cond (μS/cm) 2475 2475 24778 24778 2478 2478 2478 2478 2478 2478	pH 8.82 8.82 8.85 8.70 8.66 8.65 8.60 7.58	13.82 13.78 13.46 11,22 10.66 10.45	90.8 95.1 99.0 106.7 109.3 112.1	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31 - 3.31
	Depth (m) 0 0.5 1 2 3 4 5	U Temp (°C) 19.1 18.8 18.4 18.0 17.9 17.9 17.8 17.7	Sp. Cond (µS/cm) 2475 2478 2477 2478 2478 2478 2478 2478	pH 8,82 8,82 8,85 8,85 8,70 8,66 8,63 8,63 8,63 8,63 8,63 8,63 8,63	13.78 13.78 13.78 13.46 11,22 10.66 10.45 10.45 10.17 9.88 7.34	90.8 95.1 99.0 106.7 109.3 112.1 115.2	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31 - 3.31 - 3.40 - 3.60 - 3.81
	Depth (m) 0 0.5 1 2 3 4 5 6	U Temp (°C) 19.1 18.8 18.4 18.0 17.9 17.9 17.8 17.7 17.5	Sp. Cond (μS/cm) 2475 2475 2477 2477 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2479 2484 2485	pH 8.82 8.82 8.85 8.70 8.66 8.66 8.66 8.65 8.60 7.58 8.33 8.16	13.82 13.78 13.46 11,22 10.66 10.45 10.17 9.88 7.34 4.42	90.8 95.1 99.0 106.7 109.3 112.1 115.2 115.2 124.4 127.8	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31 - 3.31 - 3.40 - 3.60 - 3.81 - 3.12
	Depth (m) 0 0.5 1 2 3 4 5 6 7 8 9	U Temp (°C) 19.1 18.8 18.4 18.0 17.9 17.9 17.8 17.7 17.5 17.1	Sp. Cond (μS/cm) 2475 2475 2478 2477 2478 2485 2485 2488	pH 8.82 8.86 8.85 8.70 8.66 8.63 8.60 8.58 8.33 8.16 8.03	13.78 13.78 13.78 13.46 11,22 10.66 10.45 10.45 10.17 9.88 7.34	90.8 95.1 99.0 106.7 109.3 112.1 115.2 118.2 118.2 124.4 127.8 127.7	(NTU) -3.21 -1.86 -2.42 -3.35 -3.31 -3.31 -3.40 -3.60 -3.81 -3.12 -3.54
9,1	Depth (m) 0 0.5 1 2 3 4 5 6 7 8 9	U Temp (°C) 19,1 18.8 18.4 18.0 17.9 17.9 17.8 17.7 17.5 17.1 10.6	Sp. Cond (μS/cm) 2475 2475 2477 2477 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2478 2479 2484 2485	pH 8.82 8.82 8.85 8.70 8.66 8.66 8.66 8.65 8.60 7.58 8.33 8.16	13.82 13.78 13.46 11,22 10.66 10.45 10.17 9.88 7.34 4.42	90.8 95.1 99.0 106.7 109.3 112.1 115.2 118.2 124.4 127.8	(NTU) - 3.21 - 1.86 - 2.42 - 3.35 - 3.31 - 3.31 - 3.40 - 3.60 - 3.81 - 3.12

WSP USA E&I Inc.

J	FIELD DATASHEET	
Date: $\frac{4}{7}$ / $\frac{24}{24}$ Location (Ci	rcle). Lake Elsinore/Canyon	Lake Station: <u>LE03</u>
Time on Station: 0750 Time	off Station: 0810	Staff Initials: NJ/kP
Weather Conditions: Clear; Sun	✓ Wind (mph	& direction): 1-2mph N
Lat:	Long:	01
Water Depth (m): δ_{\wedge}	Secchi Dept	h (m):l.65~
Water Chemistry Sample?: Y (N) SAMPLE TIME:	Chl-a Sample?: Y N Surface volume filtered (mi	Plankton Sample?: Y
	Depth-Integrated volume fi	ltered (ml):
		in. Hg when filtering chlorophyll erred). Discard lower chamber when filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	18.2	2478	8.68	12.51	12				
1	18.0	2475	8,61	11,71	13				
2	17.9	2475	8.59	11,39	14				
3	17.8	2475	8.55	10.85	15				
4	17.6	2476	8,49	10.18	16				
5	17.1	72479	8.35	8.49	17				
6	16.9	2480	8.24	7.45	18				
7	16.6	2486	7.99	4.29	19				
\$7.5	16.5	2489	7.95	3.73	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: <u>4117124</u> Location ((Circle):(Lake Elsinore/Canyon Lake	Station: Grand Avenue
Time on Station: 1025 Time	ne off Station: 1035 Staff In	itials: NJ/KP
Weather Conditions: <u>Utar, Sur</u>	Wind (mph & direction	on): 1-2.mph. N
Lat:ON	Long:ΟΥ	
Water Depth (m): 9.5	Secchi Depth (m): N	И А
Water Chemistry Sample?: Y (N) SAMPLE TIME: <u>V(A</u>	Chl-a Sample?: Y / 🗭 Surface volume filtered (ml):	Plankton Sample?: Y /
	Depth-Integrated volume filtered (ml	l):
	*Do not exceed 7 PSI or 14 in. Hg wh (~500 mL fill volume preferred). Di	

full (after first 250 mL are filtered).

Comments:

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Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0.	19.1	2418	8.84	13.53	12				
1	18.6	2479	8.81	12.97	13				
2	18.2	2479	8.73	91.11	14				
3	17.8	2477	8.63	10.62	15				
4		2478			16				
5	17.5	2479	8-53	9.68	17				
6	17.3	2478	8.50	9.36	18				
7	17.0	2479	8.33	7.52	19				
8	16.5	2485	8.08	4.53	20		đ		
9	16.4	2488	8.01	3.71	21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/17/24 Location (Cir	e): Lake Elsinord/Canyon Lake Station: Lakeshove
Time on Station: 1040 Time	f Station: 1050 Staff Initials: NJ/4P
Weather Conditions: <u>Clarjsun</u>	4 Wind (mph & direction): $1-2$ mph N
Lat: On	Long: 0/
Water Depth (m): 0.5	Secchi Depth (m): N/A
Water Chemistry Sample?: Y 🔊	Chl-a Sample?: Y / D Plankton Sample?: Y / D
	Depth-Integrated volume filtered (ml):
	Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	19.5	2477	8.82	13,42	12				
1	18.9	2477	8.84	14.07	13				
2	18.6	2479	8-84	13,97	14				
3	18.4	2477	8.77	3.06	15				
4	18.2	2477	8.68	11.81	16				
5	17.6	2478	8.58	10.28	17				
6	17.5	2477	8.53	9.83	18				
7	17.0	2480	8.33	6.98	19				
8	16,5	24.84	8.08	4.49	20				
9	16.3	2487	7.97	3,33	21				
10	16.2	2487	7.95	3.15	22				
U					23				

FIELD DATASHEET

Date: 4/17/24 Location (Circle): Lake Elsinore/Canyon Lake Station: <u>LE-O</u>
Time on Station: 1055 Tim	ne off Station: 1105 Staff Initials: NJ/KP
Weather Conditions: Clar, Sun	Wind (mph & direction): <u>1-2 mph N</u>
Lat: Oh	Long:
Water Depth (m): <u>8.9</u>	Secchi Depth (m): 1.52
Water Chemistry Sample?: Y /	Chl-a Sample?: Y / Plankton Sample?: Y N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

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Comments:

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	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
	0	19.3	2477	8.76	12.87	12				
	1	19.1	2480	8.76	12.98	13				
	2	18.3	2477	8,77	13,33	14				
	3	18.0	2477	8,71	12.46	15				
	4	18.0	2477	8,70	12.20	16			-	
	5	17.9	2476	8.64	11.43	17				
	6	17.1	2476	8.44	8,72	18				
	7	17.0	2477	8.38	8.21	19				
	8	16.9	2477	<i>D.</i> 28	4.03	20				
Ø	51	16.4	2486	8.02	3,51	21				
	10					22				
	11					23				

		FIELD DATA	SHEET		
t i	Location (C	· · · · ·	/		
Time on Station:	1450 Time	off Station:	457	Staff Initials	: NJKP
Weather Conditions	: Clear: bruz	27	Wind (mph 8	direction):	6-8mph Str
Lat:	$\partial \cap$		Long:	Un	
Water Depth (m):			Secchi Depth		,
Water Chemistry Sa SAMPLE TIME:	ample?: Y	Chl-a Sample Surface volum	?: Y N ne filtered (ml)	Pla	ankton Sample?: Y/N
			ted volume fil		
					iltering chlorophyll I lower chamber when

full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	20.2	2489	8.84	14,51	12				
1	19.0	2486	8.91	15.64	13				
2	18.3	2482	8.83	14,98	14				
3	18.1	2482	8.68	12,60	15				
4	17.9	2477	8,59	11.12	16				
5	17,7	2479	8,53	10,22	17				
6	17.1	2478	8,39	8,52	18				
7	16,9	2479	8.27	7.13	19				
8	16.7	2481	8.15	5,72	20				
9	16,5	2485	8.05	4.45	21				
XQ9.5	16.5	2486	7.01	3,96	22				
11					23				

FIELD DAT	ASHEET
Date: $\frac{4}{7/24}$ Location (Circle): Lake Els	
Time on Station: <u>1430</u> Time off Station:	
Weather Conditions: <u>Clear j Sunny</u>	Wind (mph & direction): 4-5 mph Sw
Lat: (2 \	Long:
Water Depth (m): 70	Secchi Depth (m):
Water Chemistry Sample?: Y (N) Chl-a Sampl SAMPLE TIME: Surface volu	e?: Y N Plankton Sample?: Y N
Depth-Integ	rated volume filtered (ml):
(~500 mL f	ed 7 PSI or 14 in. Hg when filtering chlorophyll ill volume preferred). Discard lower chamber when rst 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	20,2	2495	8.95	14.13	12				
1	18.8	2482	8,89	14.85	13				
2	18.2	2480	8,84	14.56	14	:			
3	18.0	2475	8.71	12.46	15				
4	17.7	2475	8.60	10.91	16				
5	17.4	2476	7.51	9.92	17				
6	17,0	2480	8.33	8.71	18				
7	17.0	2480	8.27	F.77	19				-
87.5	17.3	2477	8.44	8.19	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: <u>4117</u> Location	(Circle): Lake Elsinore Canyon Lake Station: <u>CL07</u>	-
Time on Station: $10 (7)$ T	ne off Station: 1917 Staff Initials: HK/RV	_
Weather Conditions: <u>Cleav</u>	E SUNNY Wind (mph & direction): [Mph N/N	E
Lat: ON target	U	_
Water Depth (m): 5.8	Secchi Depth (m):	_
Water Chemistry Sample?: Y /N SAMPLE TIME: (020	Chl-a Sample?: Y (N) Plankton Sample?: Y / N Surface volume filtered (ml):	N
	Depth-Integrated volume filtered (ml): 500	
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll	

(~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	18.9	560	9.65	16.12	12	13.1	592	7.23	0.00
1	18.7	556	9.64	16.10	13 ·	13.1	591	7.21	0.00
2	10.0	55959	4-107	1549	r 14	13.0	590	7.21	0.00
3 16:	17.60	5500	नमुम	11.60	15	13.0	587	7.19	0.00
. 4	15.6	561	8.38	3.64	16155	12.9	592	6.89	0.0D
5	14.5	593	7.95	1.44	17	-			
6	14.2	593	7.46	1.03	18				
7	13,9	604	7,37	0.08	19				
8	13.6	605	7.32	0.01	20				
9	13,5	600	7.30	0.00	21				
10	13.3	Falle	7.27	0.00	22				
11	13.2	594	7.25	0.00	23				

WSP USA E&I Inc.

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FIELD DATASHEET

Date: <u>4/17/24</u> Location (Ci	rcle): Lake Elsinore/Canyon Lake Station:
Time on Station: 0929 Time	off Station: DD Staff Initials: HV KV
Weather Conditions: CICAV 3 SUMM	Wind (mph & direction): 1 Mph NINE
Lat:	Long: ON target
Water Depth (m): 9.6	Secchi Depth (m): 0, 5
Water Chemistry Sample?: Y / N SAMPLE TIME: 0950	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml): & J Depth-Integrated volume filtered (ml): KV 500
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	19.5	556	9.68	16.37	12				
1	190	555	9.68	1652	13				
2	17.4		9.34	12,49	14				
3	16.3	572	8.82	8.34	15				
4	15.5	680	8.03	4.872	16				
5	14.0	583	7.58	1.37	17				
6	14.2	594 e	107.41	0,95	• 18		· .	•	
7	14.0	Sau	7.33	0.21	19				
8	13.9	596	7.31	0.29	20				
9	13.7	602	7.29	0.00	21				
189.5	5 13.0	602	7.29	0.00	22				
11					23				\$

FIELD DATASHEET

Date: 4/17/211 Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: <u>CLD</u>
Time on Station: 0853 Time	off Station: <u>()915</u> Staff Initials: <u>HK/RV</u>
Weather Conditions: $Clear \notin S$	MNY Wind (mph & direction):Mph_N[NE
Lat: ON target	Long:
Water Depth (m): 8.4	Secchi Depth (m): 0.8
Water Chemistry Sample?: Y/N SAMPLE TIME: <u>Ø</u>	Chl-a Sample? (Y) N Plankton Sample?: Y (N) Surface volume filtered (ml): 500 W
· · · ·	Depth-Integrated volume filtered (ml): 500
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

<u>Comments:</u> Sulfuric Smell

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	18.7	705	9.32	13.10	12				
1	18.5	766	9.29	12.78	13				
2	18.1	758	91.100	11.45	14				
3	17.0	732	8.64	6.74	15				
4	15,6	818	7.72	1.12	16				
5	14.2	846	7.37	0.15	17				
6	13.3	830	7.29	0.05	18	-			
7	12.8	927	7.19	00.0	19				
8					20				
9					21		2.		
10					22				
11					23				

FIELD DATASHEET

Date: <u>4/17/2024</u> Location (Circle): Lake	Elsinore/Canyon Lake	Station: CL ID
Time on Station: 0813 Tim	ne off Station:	0847 Staff Ini	tials: <u>HK/RV</u>
Weather Conditions: <u>Clear 3 St</u>	inny	Wind (mph & direction	n): IMPH N/NE
Lat: On target	·	Long:	
Water Depth (m): <u>4.2</u>		Secchi Depth (m): 1	- m
Water Chemistry Sample? (V)/ N SAMPLE TIME: <u>0835</u>	Chl-a San Surface v	nple2: Y/N olume filtered (ml): 500	Plankton Sample?: Ý (Ň)
	Depth-Int	egrated volume filtered (ml)	500
	(~500 m	cceed 7 PSI or 14 in. Hg wh L fill volume preferred). Dis r first 250 mL are filtered).	

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	19.2	800	9.17	12.64	12				
1	19.2		9.10	12.15	13				
2	17.9	015	8 82	BAU	14				
3	16.6	848	-7.9g	2.19	15				
4	16.0	960	7.49	0.50	16				
5					17				
6	2 -				18				
7					19				
8			-	·	20				
9					21				
10					22				
11					23	¢.			

FIELD DATASHEET

Date: <u>4117</u> Location (Cir	rcle): Lake Elsinore/Canyon Lake Station: <u>CLO7</u>
•	off Station: 1455 Staff Initials: HKIRV
Weather Conditions: SUNNY & C	CHEAY Wind (mph & direction): 6 mph NE
Lat: ON HAVGET	Long:
Water Depth (m): 15.4	Secchi Depth (m): 0.7
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Depth-Integrated volume filtered (ml):
	*The west server 1 / TOCT on 1 / the TT. 1 (1/

*Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

PMWQR

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.0	564	9.68	17.29	12	13.1	593	7.26	0.00
1	19.5	56557	9.75	18.87	13	13.1	590	7.22	0.00
2	17.9	554		15.96	14	13.0	588	7.17	0.00
3	14:3	562	9.10	10.67	15	13.0	605	7.07	0,00
4	15,5	582	8.07	5.22	16				
5	14.5	588	7.77	1.96	17				
6	14.0	599	7.55	0.70	18				
7	13.8	605	7.45	0.24	19				
8	13.7	604	7.39	0.11	20				
9	13.5	6.01	7,35	0.06	21				·
10	13.3	5,94	7.31	0.03	22				
11	13.2	5.94	7.28	0.01	23				

WSP USA E&I Inc.

FIELD DATASHEET

Date: 4 17 24 Location (Circle): Lake	Elsinore/Canyon Lake Station: <u>CLDB</u>
Time on Station: 1423 Time off Station:	1437 Staff Initials: RVIHK
Weather Conditions: MEAN 3 SWNNY	Wind (mph & direction): 9 W
Lat:	Long: On target
Water Depth (m): $9, 7$	Secchi Depth (m): 0.8
9	ple?: Y / (1) Plankton Sample?: Y / (N)
Depth-Inte	egrated volume filtered (ml):
. (~500 mI	ceed 7 PSI or 14 in. Hg when filtering chlorophyll fill volume preferred). Discard lower chamber when first 250 mL are filtered).
Comments: PM WRR	

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	21.4	557	9.79	18:33	12				
1	19.3	55 Ce	9.76	18,38	13				
2	17.4	560	9.40	13,90	14				
3	16.3	568	8.89	9.21	15				
- 4	15.4	577	8.06	4.16	16				
5	14.Le	582	7.51	1.72	17				
6	14.3	588	7.37	0.62	18				
7	14.0	600	7.32	0.24	19				
8	13.8	599	7.29	0,00	20				
9	13.6	600	7.27	0,00	21				
9.510	13.6	100	7.25	0.00	22				
11					23				

FIELD DATASHEET

Date: $U[17]1U$ Location (C	Fircle): Lake Elsinore/Canyon Lake Station: <u>CL09</u>
Time on Station: <u>1405</u> Time	off Station: 1411 Staff Initials: RV1HK
Weather Conditions: <u>CLEAR 3508</u>	Wind (mph & direction): 9mph W
Lat:	Long: <u>ON</u> target
Water Depth (m): 8 · 1	Secchi Depth (m):
Water Chemistry Sample?: Y (N) SAMPLE TIME:	Chl-a Sample?: Y /N Plankton Sample?: Y /N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).
Comments: PM WQR	

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	21.0	770	9.44	15.30	12				
1	19.0	768	9.39	14.85	13				
2	18.4	155	9.24	12.78	14				
3	16.9	732	8.59	7.94	15				
4	15.1	818	7.79	0.47	16				
5	14.2	844	7.43	0,(9	17				
6	13.2	844	7.28	0.11	18				
7	13.0	925	7.19	F1.0	19				
7.5,8	12.7	947	7.12	0.04	20				
9					21				
10					22				
11					23	-			

FIELD DATASHEET

Date: 4/17/24 Location (Cir	cle): Lake Elsinore/Canyon Lake	e) Station: <u>CL10</u>
Time on Station: 1342 Time of	off Station: 1334 Sta	aff Initials: HK/FV
Weather Conditions: SUNNY &	CLEAY Wind (mph & di	rection): <u>5 mph SW</u>
Lat:ON target	Long:	
Water Depth (m): ^ , 9	Secchi Depth (m): <u>[].</u>].
Water Chemistry Sample?: Y / 🕅 SAMPLE TIME:	Chl-a Sample?: Y / 🕅 Surface volume filtered (ml):	Plankton Sample?: Y / N
	Depth-Integrated volume filtere	d (ml):
<u>Comments:</u> PM WQR	*Do not exceed 7 PSI or 14 in. E (~500 mL fill volume preferred full (after first 250 mL are filte	d). Discard lower chamber when

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	24.4	822	9.28	14.05	12				
1	20.2	816	9.32	14.28	13				
2	18.5	794	9.09	11.01	14				
3	17.3	808	8.22	4.72	15				
3.54	16.7	885	7.74.	2.25	16				
5					17				
6					18				
7					19				
8					20		-		
9					21	· · ·			
10					22				
11					23				

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]	FIELD DATAȘHEET
Date: $\frac{4/b/24}{b/24}$ Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: LEOI
Time on Station: 145D Time	off Station: 1455 Staff Initials: NS/KP
Weather Conditions: Clear = Aul	Wind (mph & direction): 4-5mph SU
Lat: ノヘ	Long:
Water Depth (m):	Secchi Depth (m):
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).
Comments: DM	

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	27.5	2567	9,18	17,10	12				
1	24.8	2.562	9,14	15.12	13	\cap			
2	23.7	2559	9.05	12.15	14				
3	23.5	2558	9.02	11.53	15				$\widehat{}$
4	23.3	2557	8,98	10.20	16				
5	23.0	2560	8,91	8,19	17				
6	23.0	2559	8.90	8,10	18				
7	23:0	2559	8,89	7.92	19		\times		
8	22.7	2559	8.79	6.04	20				
9					21				
10					22	/			
_11					23				

FIE	LD DATASHEET
Date: $\frac{b}{5}/24$ Location (Circle)): Lake Elsinore/Canyon Lake Station: <u>LE02</u>
Time on Station: 1440 Time off S	Station: 1445 Staff Initials: NJ/KP
Weather Conditions: Clear : hut	Wind (mph & direction): 4-5-yeh 54
Lat:UA	Long: Un
Water Depth (m): 9.5m	Secchi Depth (m):
	hl-a Sample?: Y /X Plankton Sample?: Y /X
De	epth-Integrated volume filtered (ml):
· · · · · · · · · · · · · · · · · · ·	o not exceed 7 PSI or 14 in. Hg when filtering chlorophyll -500 mL fill volume preferred). Discard lower chamber when all (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.4	2568	9.24	17.17	12				
1	24.3	2558	9.18	15,90	13	\mathbf{n}			
2	23.7	2528	9.03	11.74	14				
3	23.4	7560	8.91	8.72	15				\sum
4	23.1	2560	8.85	7.02	16				
5	22.8	2560	8.81	6.60	17				
6	22.8	2559	8.81	6,50	18				
7	22.6	2560	8.76	5.58	19				
8	22.5	2561	8.68	4.25	20				
9	22.4	2563	8.61	2,74	21				
10				\sum	22/				
11					23				

, FI	ELD DATASHEET
Date: $\frac{b}{5}$ Date: Location (Circ	le): Lake Elsinøre/Canyon Lake Station: <u>L=03</u>
	ff Station: 1435 Staff Initials: 1/14 P
Weather Conditions: Char jhot	Wind (mph & direction): 4-5 mph Str
Lat:/\	Long:
Water Depth (m): $7_{4}7_{5}$	Secchi Depth (m):
Water Chemistry Sample?: Y N SAMPLE TIME:	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
*	Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when

full (after first 250 mL are filtered).

Comments: Post

ph

Sp. Sp. pН DO DO Depth Temp Depth Temp pН Cond Cond (units) (°C) (mg/L)(mg/L)(m) (°C) (units) (m) (µS/cm) (µS/cm) 12 0 26.0 2564 9.37 19.86 13 1 9.24 14,74 24.3 2562 9,00 9,82 2562 14 23,7 2 15 8,59 3 22.7 2565 2.50 8.51 16 1.76 4 22.5 2562 17 1.15 8.47 5 22.4 2562 18 6 8,39 2563 0.30 22.3 19 7 22,2 8,32 0.25 2566 20 8` 21 9 2*2* 10 23 11

Lake Elsinore TNTP Offset Monitoring 2023-24

FIELD DATASHEET

Date: $\frac{b}{5}/24$ Location	n: <u>Lake Elsinore</u>	Sta	ation: $L = 02$	
Time on Station: 0820		1005	Staff Initials: J/ <u>// // /</u>	
Weather Conditions: <u>Chear</u> ;	SUMAY	Wind (mph &	& direction): 1 mpH W	-
Lat: Un target		Long:	Un target	_
Water Depth (m): 4.5	· · · · ·	Secchi Depth	n (m):0,85	_
Water Chemistry Sample Times:	Chl-a Sample	s?: Y / N	<u>Algae Taxonomy Sample</u> ?: Y /	N
Surface: Surface DUP: Depth Int: Depth Int. DUP: Bottom DUP: Surface TMDL: Comments: M	•	volume filtered me filtered (m P volume filter : volume filter ed 7 PSI or 14 volume preferr	(<i>ml</i>): red (ml): ed (ml): in. Hg when filtering chlorophyl ed). Discard lower chamber wher	

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	24.5	2571	4.18	14,47	119.9	5,74
0.5	24.2	2560	9.10	12.51	139.6	5.27
1	23.7	2528	9.05	11.95	144.6	4.59
2	23.7	2558	9,03	11.15	147.7	3,79
3	33.5	2560	8.94	9,36	151.8	3.76
4	23.3	2561	8,90	8.07	154.3	3.20
5	22.8	2582	8,78	6.11	159,2	2.54
6	22.7	9290	8,76	5.75	161. 3	2.45
7	22.5	2561	8,73	4.96	163.5	9.57
8	22.4	2561	8.68	4.23	164.4	3.48
9	22,4	2561	8.67	4.0a	162.2	3. 83
10				·		
11						

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6/5/24	FIELD DATASHEET	
Date: 10/4/20 Location	: Lake Elsinore	Station: LE-02
Time on Station: 0820	Time off Station: / 005	Staff Initials: NJ/YP
Weather Conditions: Clear \$	SUNNY Wind (n	nph & direction): / //////////////////////////////////
Lat: ON target	J Long:	on target
Water Depth (m): 9.5	Secchi I	Depth (m):85
Water Chemistry Sample Times:	<u>Chl-a Sample</u> s?(Y)/ N	<u>Algae Taxonomy Sample</u> ?: Y / N
Surface: 0840 Surface DUP: 0920 Depth Int: 0850 Depth Int. DUP: 0925 Bottom: 0905 Bottom DUP: 0955 Surface TMDL: 0955	Depth Int. volume filtere Depth Int. DUP volume Surface TMDL: volume **Do not exceed 7 PSI of	tered (ml): $425mL 325\chi$ d (ml): $425mL 325\chi$ filtered (ml): filtered (ml): for 14 in. Hg when filtering chlorophyll eferred). Discard lower chamber when

Comments: PPE

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Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	23.7	2555	899	11.39	98.9	3.91
0.5	23.6	2557	8.99	11.39	105.4	4.64
1	23.5	2558	8.98	10.98	(11. Z	4.56
2	23.5	2558	8.96	10,38	1163	4.47
3	23.5	2559	8,95	10.12	120.3	3.76
4	23.4	2559	8.92	9.11	127.4	3.56
5	23.2	2559	8.87	8.14	134.0	3.43
6	22.8	2561	8.74	5.79	140.5	2.62
7	22.6	2559	8.73	5.66	142.5	2.28
8	22.4	2560	8.70	4.93	144.7	2.90
9	22.4	2561	8.64	3.89	117.2	4.03
10	,			Part of Barrier		
11						

WSP USA E&I Inc.

FIELD DATASHEET

Date: $\sqrt{4}$ 24 Location (Ci	rcle): Lake Elsinore/Canyon Lake Station: 1703
Time on Station: 0805 Time	off Station: <u>B15</u> Staff Initials: <u>NJ/KP</u>
Weather Conditions: CLAW + SU	Mind (mph & direction): Mph out of wist
Lat: ON taget	Long: <u>on twget</u> Secchi Depth (m): 0, 75
Water Depth (m): 7.7	Secchi Depth (m): 0, 75
Water Chemistry Sample?: Y / 🕅 SAMPLE TIME:	Chl-a Sample?: Y (N) Plankton Sample?: Y (N) Surface volume filtered (ml): N/A
	Depth-Integrated volume filtered (ml): N/A
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: AM

Depth (m)	Temp (°C)_	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	(Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	24.2	1558	9.20	15.25	22				
1	24.2	2558	9.19	15,69	13			а. С	
2	24.1	2558	9.14	14.31	14		×.		
3	23.9	2557	9.11	13.46	15				
4	23.2	2561	8.77	6.06	16				
5	22.6	2568	8.43		17				
6	22.4	2562	8.40	0.76	18				
7	22.2	2564	8.38	0.29	19				
8					20				
9		A A STREET ADDRESS			21				
10					22				
11					23				

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FIELD DATASHEET

Date: $6/5/24$ Location (Cir	rcle) Lake Elsinord Canyon Lake Station: LE-01
Time on Station: 1045 Time	off Station: 1050 Staff Initials: NJ/KP
Weather Conditions: Clear \$ 500	Wind (mph & direction): Imphoutof WCSt
Lat: <u>ON tayget</u> Water Depth (m): 8.4	Long: On target
Water Depth (m): 38.4	Secchi Depth (m): 0.65
Water Chemistry Sample?: Y R SAMPLE TIME: N/A	Chl-a Sample?: Y / D Plankton Sample?: Y / D Surface volume filtered (ml): N A
	Depth-Integrated volume filtered (ml): N/A
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: AM

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	24.6	2563	9.08	2.48	12				
1	23.2	2558	8.98	9.77	13				
2	23.1	2558	8.91	9.80	14				
3	23.1	2558	8,89	8.58	15				
4	23.0	2558	8.88	8.44	16			•	
5	23.0	2558	8,88	8.46	17				
6	23.0	2559	8.89	8.53	18			\backslash	
7	22.9	2559	8.86	7.94	19				
8	22.7	2559	8.80	6.58	20				
9					21				\backslash
10					22				
11			-		23				

FIELD DATASHEET

Date: $6/5/24$ Location (C	ircle): Lake Elsino	Canyon Lake	station: Lake Shore
Time on Station: 1025 Time	off Station: 17	040 Staff Initi	als:_NJ/KP
Weather Conditions: Clar \$ 50	nny v	Wind (mph & direction	: I mph out of west
Lat: On target	L	ong: On tang	et
Water Depth (m): 9,9	S	Secchi Depth (m):	0,75
Water Chemistry Sample?: Y / 🕅 SAMPLE TIME: _N/A	Chl-a Sample?: ` Surface volume	Y N filtered (ml): N/A	Plankton Sample?: Y N
	Depth-Integrated	d volume filtered (ml):	NA
	*Do not exceed 7	PSI or 14 in. Hg whe	n filtering chlorophyll

Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

.

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	24.6	2561	9.21	14.5	12				
1	23.7	2559	9.05	11.40	13				
2	23.6	2559	9.01	10,44	14				
3	23.3	2560	8,93	8,81	15				
4	22.9	2561	8,83	6,64	16				
5	22.7	2560	8,79	6.05	17				
6	22.5	2560	8.75	5.25	18				
7	22.4	2562	8.69	4.12	19				
8	22.3	2562	8.64	3,31	20				
9	99.9	2563	8,55	1.82	21				
5,10	75.9	2564	8,54	1.74	22	•			
11					23				

FIELD DATASHEET

Date: $6/5/24$ Location (C	Sircle). Lake Elsinore/Canyon Lake	Station: Grand Avenue
Time on Station: 1015 Time	e off Station: 1026 Staff Ini	tials: NJ/KP
Weather Conditions: Clear & SV	Wind (mph & direction	n): Imphourofwest
Lat: on target	Long: on tar	rget
Water Depth (m): 38.9	Secchi Depth (m):	0.75
Water Chemistry Sample?: Y	Chl-a Sample?: Y	
	Depth-Integrated volume filtered (ml)): <u>N/A</u>
	*Do not exceed 7 PSI or 14 in. Hg wh (~500 mL fill volume preferred). Dis full (after first 250 mL are filtered).	

	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
	0	24.7	2558	1.24	15.03	12				
	1	24.0	2559	9.14	13.62	13				
	2	23.5	2561	9.04	10.27	14				
	3	23.Z	2540	8.96	8.12	15				
	4	22.9	2561	8.86	7.0Z	16				
	5	2.2.7	2560	8.82	6.73	17				
	6	22.6	2560	8.81	6.08	18				
	7	22.4	2563	8.65		19				
	8	22.4	2562	8.63	3.0b	20				
8.9	5 15	22.4	2562	8.60	2.72	21				\backslash
	10					22				
	11			/		23			- · · · ·	

FIELD	DA	TA	SHEE	T
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Date: 6/5/24 Location (C	rcle): Lake Elsinore/Canyon Lake Station: CL09
Time on Station: 1355 Time	off Station: 1415 Staff Initials: KS
Weather Conditions:	Wind (mph & direction): <u>5-10 NV</u>
Lat: On Target	Long:
Water Depth (m): 7.8	Secchi Depth (m):
Water Chemistry Sample?: Y (N) SAMPLE TIME:	Chl-a Sample?: Y / D Plankton Sample?: Y D Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in Hawhen filtering chlorophyll

^{*}Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
	0	26.9	823	9.10	11.13	12			-	1
· ·	1	25,4	860	9.14	11,78	13				
	2	24.6	833	9.14	11.50	14				
	3	24.1	873	3.73	7.36	15				
	4	23,3	909	7.97	0.64	16				
	5	17.6	957	7.27	0.12	17				
	6	15.0	945	7.22	0.05	18				
	7	14,2	960	7,15	0.0(19				
75	8	13.7	970	7.12	0	20				
, ··	9					21				
	10					22				
	11					23				

61512-1	FIELD DATASHEET
Date: Locati	on (Circle): Lake Elsinore/Canyon Lake Station:
Time on Station: 13 45	Time off Station: 1350 Staff Initials: 165
Weather Conditions: Orw	Wind (mph & direction): $5-10 NV$
Lat: On Target	Long:
Water Depth (m): 4	Secchi Depth (m):
Water Chemistry Sample?: Y / 🕅 SAMPLE TIME:	Chl-a Sample?: Y () Plankton Sample?: Y () Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when

full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	27.1	897	8,98	10,51	12				·
1	27.0	803	9.00	10.82	13				
2	25.2	909	9.01	10.97	14				
3	24.4	946	8,54	6.45	15				
4	23,7	477	7.66	0.46	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/5/24 Location (Circle): Lake Elsinore/Canyon Lake Station: CLO8
Time on Station: <u>(320</u> Tin	e off Station: 1340 Staff Initials: KS 14K
Weather Conditions:	Wind (mph & direction): 5 NV
Lat: On Target	Long:
Water Depth (m):	Secchi Depth (m): 1.5
Water Chemistry Sample?: Y / 🕅	Chl-a Sample?: Y / Ø Plankton Sample?: Y / Ø Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

(~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	27.0	656	9.18	10.52	12				
1 -	26.0	654	9.20	10.84	13				
2	24.6	660	9.21	9.63	14				
3	23,9	663	9.63	6.71	15				
4	22.1	666	8.07	1.52	16				
5	20,7	669	7.84	0.16	17			 	
6	17.8	613	7.61	0.05	18				
7	15.6	620	7.41	0	19				
8	14.7	(19	7.3]	0	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/5/2024 Location	n (Circle): Lake Elsinore/Canyon Lake Station: <u>CLO</u>
Time on Station: 1305	Time off Station: 1315 Staff Initials: 45, H/C
Weather Conditions:	Wind (mph & direction): $\int \sqrt{N} \sqrt{N}$
Lat: On Truge	Long:
Water Depth (m): 6.5	Secchi Depth (m):
Water Chemistry Sample?: Y	Chl-a Sample?: Y/N Plankton Sample?: Y/N Surface volume filtered (ml):
	Depth-Integrated volume filtered (ml):
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

⁴Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)
0	27.0	655	9.09	16,21	12	13.6	618	7.10	6
1	25.0	658	9.17	10.S3	13	13.5	615	7.09	0
2	24.6	651	9.19	10.74	14	13.5	614	7.08	6
3	24.0	650	9.11	907	15	13,4	618	7.06	0
4	21.9	676	8.14	0,90	16	13,4	631	6.22	\Diamond
5	19.5	670	7.80	0.24	17				
6	11.6	643	7.52	0.05	18				
7	15.7	629	7.42	6	19				
8	14.3	619	7.32	Ø	20				
9	13.8	617	7.24	0	21				
10	13,7	617	7.19	0	22				
11	13,6	619	7.IS	ð –	23				

FIELD DATASHEET

Date: 6151202 4 Location (Cir	cle): Lake Elsinore/Canyon Lake Station:O
Time on Station: 0750 Time of	off Station: <u>ALS</u> Staff Initials: <u>KS/HK</u>
Weather Conditions: Clear, Calm	Wind (mph & direction):
Lat: On forget	Long:
Water Depth (m): 4.2	Secchi Depth (m):/.
Water Chemistry Sample? (9 / N SAMPLE TIME:	Chl-a Sample?: \mathcal{O}/N Plankton Sample?: Y/ Surface volume filtered (ml): \mathcal{OOm}
0810	Depth-Integrated volume filtered (ml): 570mL
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.8	411	8.71	4.69	12			`	
1	24.9	901	8.76	9.65	13			•	
2	24.7	918	8.74	9.52	14				
3	24,2	955	8,01	4,12	15				
4	23.6	956	7,58	0,45	16				·
5					17				
6					18				
7					19				
8					20				1 A.
9					21				
10					22				
11					23				

FIELD DATASHEET

ł

Date: 6/5/2024 Location (Cir	cle): Lake Elsinore/Canyon Lake Station: <u>(09</u>
Time on Station: 08 25 Time of	off Station: 0900 Staff Initials: KS1HK
Weather Conditions: Clew, Culm	Wind (mph & direction):
Lat: CA Try	Long:
Water Depth (m): <u>8,5</u>	Secchi Depth (m):
Water Chemistry Sample?: Y / N SAMPLE TIME: 03 30	Chl-a Sample?: Y / N Plankton Sample?: Y / Surface volume filtered (ml):
0840	Depth-Integrated volume filtered (ml): 450 mL
0000,	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.6	848	8.99	10,49	12				
1	24.5	846	9,00	10.59	13				
2	24,4	847	8.97	10.38	14				
3	24.1	842	8,92	981	15				
4	23,3	899	7.48	1,25	16				
5	18.6	978	7.30	0.21	17	<i>a</i>			
6	15,1	952	7.18	0.16	18				
7	13.6	966	7.10	0.04	19				
8	13,3	97.4	1.98	0.02	20				
9				-	21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring 2023-24

FIELD DATASHEET

Date: 6/5/2024 Location (Circle): Lake H	Elsinore/Canyon Lake Station: CLOS
Time on Station: \underline{OQIO} Time off Station:	935 Staff Initials: KS1HK
Weather Conditions: Oew, Com	Wind (mph & direction):
Lat: On Torget	Long:
Water Depth (m): [0,4	Secchi Depth (m): 1,5
SAMPLE TIME: 0915 Surface vo	ple? Y N Plankton Sample?: Y N lume filtered (ml): 500 grated volume filtered (ml): 500
$\partial q \downarrow 5^{-}$ *Do not exc (~500 mL	eed 7 PSI or 14 in. Hg when filtering chlorophyll fill volume preferred). Discard lower chamber when first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25,1	654	9.20	10,28	12				
1	25,1	654	9.19	10,25	13				
2	24.6	655	9,17	9.87	14				
3	23.2	(61	8.93	7.32	15				
4	22.4	679	8.18	3.01	16				
5	20.6	665	7.75	0,10	17				
6	17.7	644	751	0.01	18				
7	15.3	630	7.30	0,00	19				
8	14.7	621	7.20	0,20	20				
9	13.8	619	7.16	0.00	21				
10	13,7	622	7.12	60,00	22				
11				0	23				

Lake Elsinore and Canyon Lake TMDL, Monitoring 2023-24

FIELD DATASHEET

Date: 6/5/2024 Location (C	Circle): Lake Elsinore/Canyon Lake Station: <u>CLO</u>
Time on Station: <u>0940</u> Time	e off Station: 1015 Staff Initials: 161416
Weather Conditions: Dear,	Cn/m Wind (mph & direction):
Lat: On Target	Long:
Water Depth (m): 16.0	Secchi Depth (m): 1,5
Water Chemistry Sample?: Y / N SAMPLE TIME: <u>0945</u>	Chl-a Sample? $9/N$ 000 Plankton Sample?: Y/N Surface volume filtered (ml): 500
	Depth-Integrated volume filtered (ml): <u>500</u>
	*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll

(~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (μS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.0	153	9.18	10.09	12	13.6	617	7.13	0.00
1	24.6	152	9.17	9,99	13	13,5	616	7.0	0.00
2	24,2	651	4.16	9.89	14	13.5	619	7.12	6,00
3	24.2	649	9.17	10,21	15	13,5	825	6.95	6,00
4	22.8	6.71	8.58	4.77	16	135	626	6.94	6,60
5	20,2	673	7.96	0.35	17				
6	17.2	650	7.47	0.08	18				
7	14.9	625	7.38	0,01	19				
8	14,7	621	7,29	6.00	20				
9	14.2	616	7.27	0.00	21				
10	13.7	617	7.18	6.00	22				
11	13.6	618	7.14	0.02	23				

WSP USA E&I Inc.

APPENDIX C

LAKE MONITORING ANALYTICAL REPORTS



FINAL REPORT

Work Orders:	3G10009	Report Date:	8/18/2023
		Received Date:	07/17/2023
Project:	2315100200.0004.WECK, LECL TMDL Monitoring	Turnaround Time:	Normal
rioject.		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	P.O. #:	C016900152
Client:	WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 7/17/23 with the Chain-of-Custody document. The samples were received in good condition, at 1.0 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

in In

Kim G. Tu Project Manager

3G10009





FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK, LECL TMDL Monitoring Project Manager: John Rudolph Reported: 08/18/2023 12:18

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02	Nicholas Jernack	3G10009-01	Water	07/17/23 09:00	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

 Project Number:
 2315100200.0004.WECK, LECL TMDL Monitoring

 Project Manager:
 John Rudolph

Reported: 08/18/2023 12:18

Sample Results

A. 1911	-							
Sample:	LE02					Sampled: 0	07/17/23 9:00 by Ni	cholas Jernack
	3G10009-01 (Water)							
Analyte		Resu	lt MDL	MRL	Units	Dil	Analyzed	Qualifie
onventional	Chemistry/Physical Parameter	s by APHA/EPA/ASTM Methods						
Method: EP	A 350.1			Instr: AA06				
Batch ID:	W3H0217	Preparation: _NONE (WETCHEM)		Prepared: 08/0	2/23 11:34		An	alyst: YMT/AEC
Ammonia	a as N	0.9	0 0.017	0.10	mg/l	1	08/07/23	
Method: EP	A 351.2			Instr: AA06				
Batch ID:	W3H0528	Preparation: _NONE (WETCHEM)		Prepared: 08/0	7/23 09:52			Analyst: YMT
TKN		4.	0 0.13	0.20	mg/l	1	08/08/23	M-02
Method: EP	A 353.2			Instr: AA01				
Batch ID:	W3G1339	Preparation: _NONE (WETCHEM)		Prepared: 07/1	8/23 15:07			Analyst: ism
Nitrate as	N	NI	0.040	0.20	mg/l	1	07/18/23 17:17	
Nitrite as	Ν	NI	0.042	0.10	mg/l	1	07/18/23 17:17	
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3G1320	Preparation: _NONE (WETCHEM)		Prepared: 07/1	8/23 12:09		Ar	halyst: UVVIS04
o-Phosph	nate as P	0.1	2 0.0071	0.010	mg/l	1	07/18/23 14:19	
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3G1688	Preparation: _NONE (WETCHEM)		Prepared: 07/2	1/23 18:05			Analyst: cpt
Phosphor	rus as P, Total	0.2	3 0.0067	0.010	mg/l	1	07/25/23	
Method: SM	/ 2540C			Instr: OVEN17				
Batch ID:	W3G1371	Preparation: _NONE (WETCHEM)		Prepared: 07/1	8/23 21:47			Analyst: be
Total Diss	solved Solids	180	0 4.0	10	mg/l	1	07/19/23	
Method: SM	1 4500S2-D			Instr: _ANALYS	т			
Batch ID:	W3G1593	Preparation: _NONE (WETCHEM)		Prepared: 07/2	1/23 18:00			Analyst: ymt
Sulfide, T	otal	1.	5 0.25	0.50	mg/l	5	07/21/23	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK, LECL TMDL Monitoring Project Manager: John Rudolph Reported: 08/18/2023 12:18

Quality Control Results

Conventional Chemistry/Physical Pa	arameters by APHA/EPA/ASTM Methods
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					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3G1320 - EPA 365.3											
					D						
Blank (W3G1320-BLK1) o-Phosphate as P	ND	0.0071	0.010	mg/l	Prepared & Ar	halyzed: 07/1	8/23				
	in B	0.0071	0.010	iiig/i							
LCS (W3G1320-BS1)					Prepared & Ar	nalyzed: 07/1	8/23				
o-Phosphate as P	0.215	0.0071	0.010	mg/l	0.200		108	88-111			
Matrix Spike (W3G1320-MS1) S	Source: 3	G17107-01			Prepared & Ar	nalvzed: 07/1	8/23				
o-Phosphate as P		0.0071	0.010	mg/l	0.200	0.00900	98	85-112			
Matrix Spike Dup (W3G1320-MSD1) S o-Phosphate as P		G17107-01 0.0071	0.010	ma/l	Prepared & Ar 0.200	nalyzed: 07/1 0.00900	8/23 105	85-112	6	20	
0-Filosphale as F	0.219	0.0071	0.010	mg/l	0.200	0.00900	105	00-112	0	20	
Batch: W3G1339 - EPA 353.2											
Blank (W3G1339-BLK1)					Prepared & Ar	nalvzed: 07/1	8/23				
Nitrate as N	n n ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
				5							
LCS (W3G1339-BS1) Nitrate as N	0.000	0.040	0.20	mc/	Prepared & An 1.00	nalyzed: 07/1		90-110			
		0.040	0.20	mg/l			99				
Nitrite as N	0.989	0.042	0.10	mg/l	1.00		99	90-110			
Matrix Spike (W3G1339-MS1) S	Source: 3	G07005-01			Prepared & Ar	nalyzed: 07/1	8/23				
Nitrate as N	- 2.03	0.040	0.20	mg/l	2.00	ND	102	90-110			
Nitrite as N	0.983	0.042	0.10	mg/l	1.00	ND	98	90-110			
				Ū							
Matrix Spike (W3G1339-MS2) S Nitrate as N		G07005-02 0.040	0.20	m a //	Prepared & An 2.00	nalyzed: 07/1 1.07	8/23 98	90-110			
				mg/l							
Nitrite as N	- 1.02	0.042	0.10	mg/l	1.00	ND	102	90-110			
Matrix Spike Dup (W3G1339-MSD1) S	Source: 3	G07005-01			Prepared & Ar	nalyzed: 07/1	8/23				
Nitrate as N	2.03	0.040	0.20	mg/l	2.00	ND	102	90-110	0	20	
Nitrite as N	0.987	0.042	0.10	mg/l	1.00	ND	99	90-110	0.4	20	
					D		0./22				
Matrix Spike Dup (W3G1339-MSD2) S Nitrate as N		G07005-02 0.040	0.20	mg/l	Prepared & An 2.00	nalyzed: 07/1 1.07	8/23 98	90-110	0	20	
Nitrite as N		0.042									
Nulle as N	- 1.02	0.042	0.10	mg/l	1.00	ND	102	90-110	0	20	
Batch: W3G1371 - SM 2540C											
Blank (W3G1371-BLK1)				Pre	pared: 07/18/2	3 Analyzed: (07/19/23	3			
Total Dissolved Solids	ND	4.0	10	mg/l	purcu. 07/10/2	5 Fillalyzeu.	<i>,</i> ,,	-			
				-							
LCS (W3G1371-BS1)	811	4.0	10		pared: 07/18/2 824	3 Analyzed: (
Total Dissolved Solids	011	4.0	10	mg/l	oZ4		98	97-103			
• •	Source: 3	G18146-04		Pre	pared: 07/18/2	3 Analyzed: (07/19/23	3			
Total Dissolved Solids	8100	4.0	10	mg/l		8100			0	10	
Duplicate (W3G1371-DUP2) S	Source: 3	G18146-05		Pro	pared: 07/18/2	3 Analyzed (07/19/2:	3			
Total Dissolved Solids	- 7960	4.0	10	mg/l	p	8110		-	2	10	
				5							
Batch: W3G1593 - SM 4500S2-D											
Blank (W3G1593-BLK1)					Prepared & An	nalyzed: 07/2	1/23				

3G10009



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123
 Project Number:
 2315100200.0004.WECK, LECL TMDL Monitoring

 Project Manager:
 John Rudolph

08/18/2023 12:18

Reported:

(Continued)

Quality Control Results

					Culler	6		OF DEC			
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifi
atch: W3G1593 - SM 4500S2-D (Continued)				•		ncount					
Blank (W3G1593-BLK1)					Prepared & Ar	nalvzed: 07/2	1/23				
Sulfide, Total		0.050	0.10	mg/l			,=0				
LCS (W3G1593-BS1)					Prepared & Ar	nalvzed: 07/2	1/23				
Sulfide, Total		0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W3G1593-DUP1)	Source: 3	G10009-01			Prepared & Ar	abuzad: 07/2	1/22				
Sulfide, Total		0.15	0.30	mg/l	riepareu & Ai	1.50	. 1/25		0	20	
Matrix Saila (W2C1E02 ME1)	Courses 2	G18010-01			Droparad 91 As	aburadu 07/2	1/22				
Matrix Spike (W3G1593-MS1) Sulfide, Total		0.050	0.10	mg/l	Prepared & An 0.200	ND	100	80-120			
		~~~~~~		-			4 (22				
Matrix Spike Dup (W3G1593-MSD1) Sulfide, Total		G18010-01 0.050	0.10	mg/l	Prepared & Ar 0.200	nalyzed: 07/2 ND	1/23	80-120	0	20	
atch: W3G1688 - EPA 365.3											
Blank (W3G1688-BLK1)	ND	0.0007	0.010		pared: 07/21/2	3 Analyzed:	07/25/23	3			
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W3G1688-BS1)					pared: 07/21/2	3 Analyzed:					
Phosphorus as P, Total	0.203	0.0067	0.010	mg/l	0.200		102	90-110			
Matrix Spike (W3G1688-MS1)		G07061-03		Pre	pared: 07/21/2	-					
Phosphorus as P, Total	0.241	0.0067	0.010	mg/l	0.200	0.0390	101	90-110			
Matrix Spike Dup (W3G1688-MSD1)		G07061-03		Pre	pared: 07/21/2	3 Analyzed:	07/25/23	3			
Phosphorus as P, Total	0.249	0.0067	0.010	mg/l	0.200	0.0390	105	90-110	3	20	
atch: W3H0217 - EPA 350.1											
Blank (W3H0217-BLK1)				Pre	pared: 08/02/2	3 Analyzed:	08/07/23	3			
Ammonia as N		0.017	0.10	mg/l		,					
Blank (W3H0217-BLK2)				Pre	pared: 08/02/2	3 Analyzed:	08/07/23	3			
Ammonia as N		0.017	0.10	mg/l		, <b>,</b>					
LCS (W3H0217-BS1)				Pro	pared: 08/02/2	3 Analyzed.	08/07/23				
Ammonia as N	0.253	0.017	0.10	mg/l	0.250	5 Analyzeu.	101	90-110			
LCS (W3H0217-BS2)				Bro	pared: 08/02/2	2 Analyzada	00/07/2	,			
Ammonia as N	0.247	0.017	0.10	mg/l	0.250	5 Analyzeu.	99	<b>9</b> 0-110			
M-4	C	C17122 07		Due	manada 00 (02 (2	2 Auchmed	00 /07 /27				
Matrix Spike (W3H0217-MS1) Ammonia as N		<b>G17123-07</b> 0.017	0.10	mg/l	pared: 08/02/2 0.250	0.0314	99	90-110			
				Ū							
Matrix Spike (W3H0217-MS2) Ammonia as N	Source: 3	<b>G18035-01</b> 0.017	0.10	Pre mg/l	pared: 08/02/2 0.250	3 Analyzed: ND	<b>08/07/2</b> 3 99	<b>3</b> 90-110			
			00	-							
Matrix Spike Dup (W3H0217-MSD1) Ammonia as N	Source: 3	<b>G17123-07</b> 0.017	0.10		pared: 08/02/2 0.250	3 Analyzed: 0.0314	08/07/23 100	<b>8</b> 90-110	1	15	
	0.201	0.017	0.10	mg/l	0.200	0.0014	100	30-110	I	10	
Matrix Spike Dup (W3H0217-MSD2)		G18035-01	0.10		pared: 08/02/2	-			0.0	15	
Ammonia as N	0.247	0.017	0.10	mg/l	0.250	ND	99	90-110	0.3	15	
atch: W3H0528 - EPA 351.2											

3G10009



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK, LECL TMDL Monitoring Project Manager: John Rudolph

08/18/2023 12:18

**Reported:** 

(Continued)

Quality Control Results

Conventional Chemistry/Physical Parameters by	APHA/EPA/AST	M Methods	(Continue	d)							
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3H0528 - EPA 351.2 (Continued)											
Blank (W3H0528-BLK1)				Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	ND	0.065	0.10	mg/l							
Blank (W3H0528-BLK2)				Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	ND	0.065	0.10	mg/l							
LCS (W3H0528-BS1)				Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
ТКМ	0.975	0.065	0.10	mg/l	1.00		97	90-110			
LCS (W3H0528-BS2)				Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	0.956	0.065	0.10	mg/l	1.00		96	90-110			
Matrix Spike (W3H0528-MS1)	Source: 30	518028-05		Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	1.25	0.065	0.10	mg/l	1.00	0.271	97	90-110			
Matrix Spike (W3H0528-MS2)	Source: 30	518028-06		Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	1.30	0.065	0.10	mg/l	1.00	0.296	100	90-110			
Matrix Spike Dup (W3H0528-MSD1)	Source: 30	518028-05		Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	1.27	0.065	0.10	mg/l	1.00	0.271	100	90-110	2	10	
Matrix Spike Dup (W3H0528-MSD2)	Source: 30	518028-06		Prep	ared: 08/07/2	3 Analyzed:	08/08/2	3			
TKN	1.43	0.065	0.10	mg/l	1.00	0.296	114	90-110	10	10	MS-01



## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK, LECL TMDL Monitoring Project Manager: John Rudolph

Reported: 08/18/2023 12:18

### Notes and Definitions

tem	Definition
/-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
/IS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
6REC	Percent Recovery
Dil	Dilution
1DL	Method Detection Limit
1RL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ID	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
ource	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

## Chain of Custody & Sample Information Record

36/009	-

Client: WSP USA E&I Inc	D	Contact	: John Rudolph			Phone No.	858-243-8158
Project Name:         LECL TM           Project Number:         2315100200.0           PO#:         C016900152           GL Code:         573000           Org#         3151	DL Monitoring	-	_{john.rudolph@w} ound Time: Approval:	<u>/sp.com</u> <u>Routine</u> By:	*3-5 Day *48 Hour Rush Rush	*24 Hour Rush Additional Charges May Apply	Additional Reporting Requests Include QC Data Package: Yes No FAX Results: Yes No Email Results: Yes No State EDT: Yes No (Include Source Number in Notes)
Sampler Inform		# o	of Containers Preservatives	Sample		Matrix	Notes
Name: <u>Micholas</u> Employer: <u>WSP USA E&amp;</u> Signature: <u>Macha</u>	Jenack il Inc.	SO4	NaCH NaCH NaCH/ZnAcetate NH4CI MCAA Frozen	Total # of Containers Routine Resample	TSS Nitrate - Nitrite (EPA 353.2) TDS (SM2540 C) TKN (EPA 351.2 Ammonia (EPA 350.1) Total Phosphorus (EPA 365.3) SRP/Ortho-P (EPA 365.3) SRP/Ortho-P (EPA 365.3) Total Sulfide (SM4500S) Total AL (EPA 200.7)	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid	Ortho-P is field filtered. please include all red codes on invoices
Sample ID	Date Time	H H H	Na( NA( NA( NA( Fro	PR Rc	TSS Nitrate TDS (SI Ammor Total PI SRP/Or SRP/Or Total SI	L = Liquid M = Miscellaneous	
LE02	7/17/23 0900	-			x x x x x x x		
-							
Retinquished By (sign)	Print Name / Con	ipany	Date / Time		Received By (Sign)		nt Name / Company
MAG-	NICK Junch/	LSA	7/17/23/12.	30 36	Jinf 7/17/30/23	1 1	
Maring	Dela		7/12/22 104	() J	Flith	CAM 13.	. 40

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(For Lab Use Only) Sa	mple Integrity L	Jpon Re	ceipt			Lab Notes		
Sample(s) Subm	itted on Ice?	Yes	No		Temperature		Lab No.	
Custody Se	eal(s) Intact?	Yes	No	N/A	)` ₀c		_	
Samp	ole(s) intact?	Yes	No		☐ Cooler Blank	mel		Page <u>1</u> of <u>1</u>



# Sample Receipt Checklist

	Weck WKO:       3G10009         VKO Logged by:       Lester Abad         les Checked by:       Lester Abad		Date/	Time Received: # of Samples: Delivered by:	07/17/23 @ 13:40 01 Client
	Task	Yes	No	N/A	Comments
ِ ب	COC present at receipt? COC properly completed? COC matches sample labels?			-	
COC	Project Manager notified about COC discrepancy?			- - -	
Receipt Information	Sample Temperature Samples received on ice? Ice Type (Blue/Wet) All samples intact? Samples in proper containers? Sufficient sample volume? Samples intact? Received within holding time?	1°C ₩ ₩61 ⊠ ⊠			
	Project Manager notified about receipt info?				· · · · · · · · · · · · · · · · · · ·
	Sample labels checked for correct preservation?	$\boxtimes$		· 🖸 🗕	
cation?	VOC Headspace: (No) none, If Yes (see comment) 524.2, 524.3, 624.1, 8260, 1666 P/T, LUFT			-	□<6mm/Pea Size?
eservation Verification?	pH verified upon receipt? Metals <2; H2SO4 pres tests <2; 522<4; TOC <2; 508.1, 525.2<2, 6710B<2, 608.3 5-9	$\boxtimes$			pH paper Lot#
	Free Chlorine Tested <0.1 (Organics Analyses)				Cl Test Strip Lot#
Sample Pi	O&G pH <2 verified? pH adjusted for O&G				pH paper Lot# pH Reading: Acid Lot# Amt added:
	Project Manager notified about sample preservation?			$\boxtimes$	
PM Cor	nments				

Sample Receipt Checklist Completed by:

Signature: Lester Abad

Date: 07/17/23



August 07, 2023

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Project Name: LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # Physis Project ID: Code 57300 Org # 3151

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 7/21/2023. A total of 2 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, Misty Mercier 714 602-5320 Extension 202 mistymercier@physislabs.com



## **PROJECT SAMPLE LIST**

### WSP USA

PHYSIS Project ID: 2302004-00

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479 Total Samples: 2

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
108503	LE02 - Int		7/17/2023	9:00	Biologic	Not Specified
108504	LE02 - Surf		7/17/2023	9:20	Biologic	Not Specified



## **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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## QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



## PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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PHYSIS Project ID: 2302004-009 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

## Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 108503-R1	LEo2 - Int		Matrix: Biolog	ic			Sampled:	17-Jul-23	9:00	Received:	21-Jul-23
Chlorophyll-a	SM 10200 H	mg/m3	104	1	1	2	NA		C-72131	03-Aug-23	03-Aug-23
Sample ID: 108504-R1	LE02 - Surf		Matrix: Biolog	ic			Sampled:	17-Jul-23	9:20	Received:	21-Jul-23
Chlorophyll-a	SM 10200 H	mg/m3	169	1	1	2	NA		C-72131	03-Aug-23	03-Aug-23

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

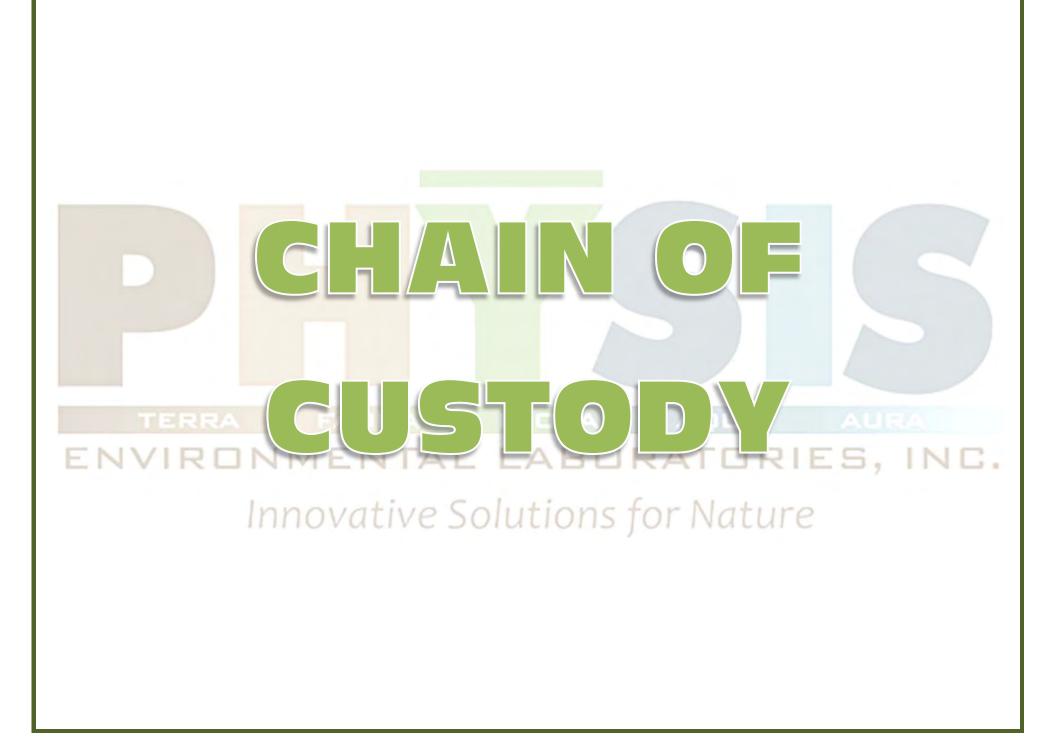


Conventionals

PHYSIS Project ID: 2302004-009 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

## **QUALITY CONTROL REPORT**

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	AC %	CURACY LIMITS	PR %	ECISION LIMITS	QA CODE
Chlorophyll	-a	Method:	SM 10200 H		Frac	tion: N	NA		Prepa	red: o	03-Aug-23	Analyz	zed: 03-Aug	-23
108502-B1	QAQC Procedural Blank	C-72131	ND	1	1	2	mg/m3							
108502-BS1	QAQC Procedural Blank	C-72131	37.4	1	1	2	mg/m3	44.3	0	84	70 - 130% PASS			
108502-BS2	QAQC Procedural Blank	C-72131	35.2	1	1	2	mg/m3	44.3	0	79	70 - 130% PASS	6	30 PASS	



## Chain of Custody & Sample Information Record

Client: WS	P USA E&I Inc		_	Co	onta	ct:	Joł	n F	Rude	olpl	h												Phone No.	858-243-8158
Project Name: Project Number: PO#: GL Code: Org#	LECL TMC 2315100200.0 C014105479 57300 3151	DL Monitoring 0004.PHYSIS	9	Tu		Aro		Tir	ne:		olph@w	<u>R</u> By:		tine	-		-5 C Ru:		•		Hour		*24 Hour Rush Iditional Charges May Apply	Additional Reporting Requests Include QC Data Package: Yes No FAX Results: Yes No Email Results: Yes No State EDT: Yes No (Include Source Number in Notes)
	ampler Inform	nation						ntai erva		-				amp Type		A	naly	sis	Re	que	estec	ł	Matrix	Notes
<ul> <li>Name:</li> <li>Employer:</li> <li>Signature:</li> </ul>	Nick 3 WSP USA E&	Senaek		Unpreserved	H2SO4	HNO3	Na2S203	NaOH NaOH/ZnAcetate	NH4CI	MCAA	Frozen	Total # of Containers	Routine	Resample	Special Total Sulfido	litrate - Nitrite	SUMA - ANNA	TKN	Ammonia	otal Phosphorus	SKP/Ortho-P Chlorophyll-a (SM10200 H		DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid	Chi-a samples on 0.7 um GFF
	mple ID 202 - Int	Date 7/17/23	Time			-	2.		2	2	-	1-	-					F	4		x		M = Miscellaneous	Filter Volume: 230mh
	02 - Surf	7/17/23	0420									-	1		1						x			Filter Volume: 215 mL
				H	+							-			+	+	+			+		Η		Filter Volume:
																								Filter Volume:
																								Filter Volume:
Relinquished	By (sign)	Print Nam			1	p	7				ime 160	0		K	Re	dei 0	vec	By	K	igity	)			rint Name / Company OM / PHYSIS
			-	-	-	-							(		-		0	1		-				7/21/23 043

	Lab Notes			eipt	Jpon Red	For Lab Use Only) Sample Integrity L
La		Temperature		No	Yes	Sample(s) Submitted on Ice?
		°C	N/A	No	Yes	Custody Seal(s) Intact?
Li		Temperature		No	Yes	Sample(s) Submitted on Ice?
		°C	N/A	No	Yes	Custody Seal(s) Intact?
		Cooler Blank		No	Yes	Sample(s) Intact?

Lab No.				
Lab No.				
	Page	1	of	1

		PHYS	
PHYSIS	Project Iteration ID:	Innovative Solutions for Nature	ES, INC.
TERRA PAUKA FLORA AGUA AURAS ENVIRONMENTAL LABORATORIES, INC.	Client Name:	WSP USA	
Innovative Solutions for Nature	Project Name:	LECL TMDL MO	onitoring Project # 04.PHYSIS PO #
Sample Receipt Summary			Code 57300 Org
Receiving Info	COC Page Number:		
1. Initials Received By:MN	Bottle Label Color:	NA	
2. Date Received: 12/23			
3. Time Received: 0430			
4. Client Name:WSP			
5. Courier Information: (Please circle)			
Client     UPS	Area	Fast	DRS
• FedEx • GSO/GLS	• Ontr	ac	PAMS
PHYSIS Driver:			
i. Start Time:		iii. Total Mile	age:
ii. End Time:			of Pickups:
6. Container Information: (Please put the # of e	containers or circle no		
Cooler     Styrofoam Coole		oxes	None
Carboy(s)     Carboy Trash Carboy		arboy Cap(s)	Other
Wet Ice     Blue Ice     B	• Dry Ice C): <u>-723</u> U	<ul> <li>Water</li> <li>sed I/R Thermony</li> </ul>	• None neter # <u>1-2</u>
1. Initials Inspected By: KGH			
Sample Integrity Upon Receipt:		-	
1. COC(s) included and completely filled out		Q 1	No
2. All sample containers arrived intact			No
3. All samples listed on COC(s) are present			No
4. Information on containers consistent with in	formation on COC(s).		No
5. Correct containers and volume for all analys	es indicated		No
6. All samples received within method holding	time	(Yes /	No
7. Correct preservation used for all analyses in		-	No
8. Name of sampler included on COC(s)		res //	No
See temp.	Notes:		
1			



FINAL REPORT

Work Orders:	3G25006	Report Date:	9/06/2023
		Received Date:	08/01/2023
Project:	LECL TMDL Monitoring	Turnaround Time:	Normal
i i ojecu		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	P.O. #:	C015101084
Client:	WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Billing Code:	

### DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 8/01/23 with the Chain-of-Custody document. The samples were received in good condition, at 2.0 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

in In

Kim G. Tu Project Manager

3G25006





# Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring

Reported: 09/06/2023 17:48

Project Manager: John Rudolph

### Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nicholas Jernack	3G25006-01	Water	08/01/23 11:00	
CL08	Nicholas Jernack	3G25006-02	Water	08/01/23 10:15	
CL09	Nicholas Jernack	3G25006-03	Water	08/01/23 09:15	
CL10	Nicholas Jernack	3G25006-04	Water	08/01/23 08:40	
LE02	Nicholas Jernack	3G25006-05	Water	08/01/23 10:18	



## **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

**Reported:** 09/06/2023 17:48

Project Manager: John Rudolph

Sample Results
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4.000	•						
Sample:	CL07				Sampled: (	08/01/23 11:00 by N	licholas Jernack
	3G25006-01 (Water)						
Analyte		Result	MDL	MRL U	nits Dil	Analyzed	Qualifier
Conventional	Chemistry/Physical Parameters	by APHA/EPA/ASTM Methods					
Method: EPA	350.1			Instr: AA06			
Batch ID: \	W3H1190	Preparation: _NONE (WETCHEM)		Prepared: 08/14/23 1	0:52	A	nalyst: YMT/AEC
Ammonia	as N	0.88	0.017	0.10 m	ng/l 1	08/15/23	
Method: EPA	351.2			Instr: AA06			
Batch ID: \	W3H1355	Preparation: _NONE (WETCHEM)		Prepared: 08/15/23 1	6:41	Ai	nalyst: YMT/AEC
TKN		1.5	0.065	0.10 m	ng/l 1	08/16/23	
Method: EPA	353.2			Instr: AA01			
Batch ID: \	W3H0280	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23 1	8:41		Analyst: ymt
Nitrate as	Ν	••••••••••••••••••••••••••••••••••••••	0.040	0.20 m	ng/l 1	08/02/23 21:02	
Nitrite as N	۱	ND	0.042	0.10 m	ng/l 1	08/02/23 21:02	
Method: EPA	A 365.3			Instr: UVVIS04			
Batch ID: \	W3H0265	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23 1	6:20		Analyst: ymt/jsg
o-Phosph	ate as P	0.13	0.0071	0.010 m	ng/l 1	08/02/23 18:09	
Method: EPA	A 365.3			Instr: UVVIS04			
Batch ID: \	W3H1727	Preparation: _NONE (WETCHEM)		Prepared: 08/18/23 1	2:56		Analyst: ymt
Phosphor	us as P, Total	0.16	0.0067	0.010 m	ng/l 1	08/28/23	
Method: SM	2540C			Instr: OVEN17			
Batch ID: \	W3H0363	Preparation: _NONE (WETCHEM)		Prepared: 08/03/23 1	3:59		Analyst: bel
Total Diss	olved Solids	500	4.0	10 m	ng/l 1	08/04/23	
Method: SM	2540D			Instr: OVEN15			
Batch ID: \	W3H0451	Preparation: _NONE (WETCHEM)		Prepared: 08/04/23 1	0:26		Analyst: rem
Total Susp	pended Solids			5 m	ng/l 1	08/07/23	J
Method: SM	4500S2-D			Instr: _ANALYST			
Batch ID: \	W3H0543	Preparation: _NONE (WETCHEM)		Prepared: 08/07/23 1	1:23		Analyst: ymt
Sulfide, To	otal	3.5	0.25	0.50 m	ng/l 5	08/07/23	
Metals by EPA	200 Series Methods						
Method: EPA	A 200.7			Instr: ICP03			
Batch ID: \	W3H0636	Preparation: EPA 200.2		Prepared: 08/08/23 1	0:42		Analyst: kvm
Aluminum	n, Dissolved	0.058	0.041	0.050 m	ng/l 1	08/15/23	
Aluminum	n, Total	0.068	0.022	0.050 m	ng/l 1	08/15/23	



# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

Project Manager: John Rudolph

09/06/2023 17:48

Reported:

(Continued)

Sample Results

Sample:	CL08				Sampled: (	08/01/23 10:15 by N	licholas Jernack
	3G25006-02 (Water)				·		
Analyte		Result	MDL	MRL Ur	nits Dil	Analyzed	Qualifier
Conventional (	Chemistry/Physical Parameters	by APHA/EPA/ASTM Methods					
Method: EPA	350.1			Instr: AA06			
Batch ID: V	W3H1190	Preparation: _NONE (WETCHEM)		Prepared: 08/14/23 10	):52	An	halyst: YMT/AEC
Ammonia	as N	0.043	0.017	0.10 m	ıg/l 1	08/15/23	J
Method: EPA	351.2			Instr: AA06			
Batch ID: V	W3H1355	Preparation: _NONE (WETCHEM)		Prepared: 08/15/23 16	5:41	An	halyst: YMT/AEC
<b>TKN</b>		0.76	0.065	0.10 m	ıg/l 1	08/16/23	
Method: EPA	353.2			Instr: AA01			
Batch ID: V	N3H0280	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23 18	3:41		Analyst: ymt
Nitrate as I		ND	0.040	0.20 m	ıg/l 1	08/02/23 20:55	
Nitrite as N	1		0.042	0.10 m	ıg/l 1	08/02/23 20:55	
Method: EPA	365.3			Instr: UVVIS04			
Batch ID: V	N3H0265	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23 16	5:20	Å	Analyst: ymt/jsg
o-Phospha	ate as P	0.025	0.0071	0.010 m	ıg/l 1	08/02/23 18:10	
Method: EPA	365.3			Instr: UVVIS04			
Batch ID: V	W3H1727	Preparation: _NONE (WETCHEM)		Prepared: 08/18/23 12	2:56		Analyst: ymt
Phosphore	us as P, Total	0.064	0.0067	0.010 m	ıg/l 1	08/28/23	
Method: SM	2540C			Instr: OVEN17			
Batch ID: V	N3H0363	Preparation: _NONE (WETCHEM)		Prepared: 08/03/23 13	3:59		Analyst: bel
Total Diss	olved Solids	500	4.0	10 m	ıg/l 1	08/04/23	
Method: SM	2540D			Instr: OVEN15			
Batch ID: V	W3H0451	Preparation: _NONE (WETCHEM)		Prepared: 08/04/23 10	):26		Analyst: rem
Total Susp	pended Solids	4		5 m	ıg/l 1	08/07/23	J
Method: SM	4500S2-D			Instr: _ANALYST			
Batch ID: V	W3H0543	Preparation: _NONE (WETCHEM)		Prepared: 08/07/23 11	1:23		Analyst: ymt
Sulfide, To	otal	0.30	0.050	0.10 m	ıg/l 1	08/07/23	
Metals by EPA	200 Series Methods						
Method: EPA	200.7			Instr: ICP03			
Batch ID: V	W3H0636	Preparation: EPA 200.2		Prepared: 08/08/23 10	):42		Analyst: kvm
Aluminum	, Dissolved	0.085	0.041	0.050 m	ıg/l 1	08/15/23	
Aluminum	ı, Total	0.097	0.022	0.050 m	ıg/l 1	08/15/23	



# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

Project Manager: John Rudolph

09/06/2023 17:48

Reported:

(Continued)

Sample Re	sults
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Sample:	CL09				S	Sampled: 0	8/01/23 9:15 by Ni	cholas Jernack
	3G25006-03 (Water)							
Analyte		Result	MDL	MRL U	Jnits	Dil	Analyzed	Qualifier
Conventional (	Chemistry/Physical Parameters	by APHA/EPA/ASTM Methods						
Method: EPA	350.1			Instr: AA06				
Batch ID: V	V3H1190	Preparation: _NONE (WETCHEM)		Prepared: 08/14/23 1	10:52		An	alyst: YMT/AEC
Ammonia	as N	0.72	0.017	0.10 r	mg/l	1	08/15/23	
Method: EPA	351.2			Instr: AA06				
Batch ID: V	V3H1355	Preparation: _NONE (WETCHEM)		Prepared: 08/15/23 1	16:41		An	alyst: YMT/AEC
TKN		1.5	0.065	0.10 r	mg/l	1	08/16/23	
Method: EPA	353.2			Instr: AA01				
Batch ID: V	V3H0280	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23 1	18:41			Analyst: ymt
Nitrate as	Ν	0.042	0.040	0.20 r	mg/l	1	08/02/23 20:50	J
Nitrite as N		ND	0.042	0.10 r	mg/l	1	08/02/23 20:50	
Method: EPA	365.3			Instr: UVVIS04				
Batch ID: V	V3H0265	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23 1	16:20		А	. <b>nalyst:</b> ymt/jsg
o-Phospha	ate as P	0.046	0.0071	0.010 r	mg/l	1	08/02/23 18:10	
Method: EPA	365.3			Instr: UVVIS04				
Batch ID: V	V3H1727	Preparation: _NONE (WETCHEM)		Prepared: 08/18/23 1	12:56			Analyst: ymt
Phosphore	us as P, Total	0.099	0.0067	0.010 r	mg/l	1	08/28/23	
Method: SM	2540C			Instr: OVEN17				
Batch ID: V	V3H0362	Preparation: _NONE (WETCHEM)		Prepared: 08/03/23 1	13:53			Analyst: bel
Total Disso	olved Solids	600	4.0	10 r	mg/l	1	08/04/23	
Method: SM	2540D			Instr: OVEN15				
Batch ID: V	V3H0451	Preparation: _NONE (WETCHEM)		Prepared: 08/04/23 1	10:26			Analyst: rem
Total Susp	ended Solids	6		5 r	mg/l	1	08/07/23	
Method: SM	4500S2-D			Instr: _ANALYST				
Batch ID: V	V3H0543	Preparation: _NONE (WETCHEM)		Prepared: 08/07/23 1	11:23			Analyst: ymt
Sulfide, To	tal	3.5	0.25	0.50 r	mg/l	5	08/07/23	
Metals by EPA	200 Series Methods							
Method: EPA	200.7			Instr: ICP03				
Batch ID: V	V3H0636	Preparation: EPA 200.2		Prepared: 08/08/23 1	10:42			Analyst: kvm
Aluminum	, Dissolved	0.071	0.041	0.050 r	mg/l	1	08/15/23	
Aluminum	, Total	0.092	0.022	0.050 r	mg/l	1	08/15/23	



# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

Project Manager: John Rudolph

09/06/2023 17:48

Reported:

(Continued)

Sample	e Results
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Sample:	CL10					Sampled: 08,	/01/23 8:40 by N	icholas Jernack
	3G25006-04 (Water)							
Analyte		Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional C	hemistry/Physical Parameters	by APHA/EPA/ASTM Methods						
Method: EPA	350.1			Instr: AA06				
Batch ID: W	/3H1190	Preparation: _NONE (WETCHEM)		Prepared: 08/14/23	3 10:52		An	alyst: YMT/AEC
Ammonia a	as N	0.022	0.017	0.10	mg/l	1	08/15/23	J
Method: EPA	351.2			Instr: AA06				
Batch ID: W	/3H1355	Preparation: _NONE (WETCHEM)		Prepared: 08/15/23	3 16:41		An	alyst: YMT/AEC
TKN		0.72	0.065	0.10	mg/l	1	08/16/23	
Method: EPA	353.2			Instr: AA01				
Batch ID: W	/3H0280	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23	3 18:41			Analyst: ymt
Nitrate as N	۱	0.11	0.040	0.20	mg/l	1	08/02/23 20:43	J
Nitrite as N		ND	0.042	0.10	mg/l	1	08/02/23 20:43	
Method: EPA	365.3			Instr: UVVIS04				
Batch ID: W	/3H0265	Preparation: _NONE (WETCHEM)		Prepared: 08/02/23	3 16:20		A	<b>nalyst:</b> ymt/jsg
o-Phosphat	te as P	ND	0.0071	0.010	mg/l	1	08/02/23 18:11	
Method: EPA	365.3			Instr: UVVIS04				
Batch ID: W	/3H1727	Preparation: _NONE (WETCHEM)		Prepared: 08/18/23	3 12:56			Analyst: ymt
Phosphoru	is as P, Total	0.034	0.0067	0.010	mg/l	1	08/28/23	
Method: SM 2	2540C			Instr: OVEN17				
Batch ID: W	/3H0362	Preparation: _NONE (WETCHEM)		Prepared: 08/03/23	3 13:53			Analyst: bel
Total Disso	olved Solids	540	4.0	10	mg/l	1	08/04/23	
Method: SM 2	2540D			Instr: OVEN15				
Batch ID: W	/3H0451	Preparation: _NONE (WETCHEM)		Prepared: 08/04/23	3 10:26			Analyst: rem
Total Susp	ended Solids			5	mg/l	1	08/07/23	J
Method: SM 4	4500S2-D			Instr: _ANALYST				
Batch ID: W	/3H0543	Preparation: _NONE (WETCHEM)		Prepared: 08/07/23	3 11:23			Analyst: ymt
Sulfide, Tota	al		0.050	0.10	mg/l	1	08/07/23	
Metals by EPA	200 Series Methods							
Method: EPA	200.7			Instr: ICP03				
Batch ID: W	/3H0636	Preparation: EPA 200.2		Prepared: 08/08/23	3 10:42			Analyst: kvm
Aluminum,	Dissolved	0.11	0.041	0.050	mg/l	1	08/15/23	
Aluminum,	Total	0.13	0.022	0.050	mg/l	1	08/15/23	



# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

**Reported:** 09/06/2023 17:48

Project Manager: John Rudolph

(Continued)

Sample Results

Sample:	LE02				S	ampled: 08	3/01/23 10:18 by Ni	cholas Jernack
	3G25006-05 (Water)							
Analyte		Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional	Chemistry/Physical Parameters	s by APHA/EPA/ASTM Methods						
Method: EP/	A 350.1			Instr: AA06				
Batch ID:	W3H1190	Preparation: _NONE (WETCHEM)		Prepared: 08/1	4/23 10:52		Ana	alyst: YMT/AEC
Ammonia	as N	0.69	0.017	0.10	mg/l	1	08/15/23	
Method: EP/	A 351.2			Instr: AA06				
Batch ID:	W3H1355	Preparation: _NONE (WETCHEM)		Prepared: 08/1	5/23 16:41		Ana	alyst: YMT/AEC
TKN		3.5	0.13	0.20	mg/l	1	08/16/23	M-02
Method: EP/	A 353.2			Instr: AA01				
Batch ID:	W3H0280	Preparation: _NONE (WETCHEM)		Prepared: 08/0	2/23 18:41			Analyst: ymt
Nitrate as	Ν	ND	0.040	0.20	mg/l	1	08/02/23 20:56	
Nitrite as	Ν	ND	0.042	0.10	mg/l	1	08/02/23 20:56	
Method: EP/	A 365.3			Instr: UVVIS04				
Batch ID:	W3H0265	Preparation: _NONE (WETCHEM)		Prepared: 08/0	2/23 16:20		A	<b>nalyst:</b> ymt/jsg
o-Phosph	nate as P	0.018	0.0071	0.010	mg/l	1	08/02/23 18:12	
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3H1727	Preparation: _NONE (WETCHEM)		Prepared: 08/1	8/23 12:56			Analyst: ymt
Phosphor	rus as P, Total	0.22	0.0067	0.010	mg/l	1	08/28/23	
Method: SM	1 2540C			Instr: OVEN17				
Batch ID:	W3H0363	Preparation: _NONE (WETCHEM)		<b>Prepared:</b> 08/0	3/23 13:59			Analyst: bel
Total Diss	solved Solids	1900	4.0	10	mg/l	1	08/04/23	
Method: SM	1 4500S2-D			Instr: _ANALYS	т			
Batch ID:	W3H0543	Preparation: _NONE (WETCHEM)		Prepared: 08/0	7/23 11:23			Analyst: ymt
Sulfide, T	otal	0.80	0.050	0.10	mg/l	1	08/07/23	



**FINAL REPORT** 

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported: 09/06/2023 17:48

Project Manager: John Rudolph

Quality	Control	Results
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Conventional Chemistry/Physical Parameters by APHA/	'EPA/AST	M Methods									
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifie
atch: W3H0265 - EPA 365.3											
Blank (W3H0265-BLK1)					Prepared & Ar	alyzed: 08/0	2/23				
o-Phosphate as P		0.0071	0.010	mg/l							
LCS (W3H0265-BS1)					Prepared & Ar	alyzed: 08/0	2/23				
o-Phosphate as P	0.204	0.0071	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W3H0265-MS1)	Source: 3	H01099-01			Prepared & Ar	alvzed: 08/0	2/23				
o-Phosphate as P			0.010	mg/l	0.200	0.0960	102	85-112			
Matrix Spike Dup (W3H0265-MSD1)	Sourco: 2	H01099-01			Prepared & Ar	aluzad: 09/0	2/22				
o-Phosphate as P		0.0071	0.010	mg/l	0.200	0.0960	98	85-112	2	20	
atch: W3H0280 - EPA 353.2											
Blank (W3H0280-BLK1) Nitrate as N	ND	0.040	0.20	mg/l	Prepared & Ar	alyzed: 08/0	2/23				
Nitrite as N		0.040	0.20	mg/l							
		0.042	0.10	mg/i							
LCS (W3H0280-BS1)	0.007	0.040	0.00		Prepared & An	alyzed: 08/0		00.440			
Nitrate as N		0.040	0.20	mg/l	1.00		100	90-110			
Nitrite as N	0.945	0.042	0.10	mg/l	1.00		94	90-110			
·······		G25006-04			Prepared & Ar	•					
Nitrate as N	2.13	0.040	0.20	mg/l	2.00	0.113	101	90-110			
Nitrite as N	0.969	0.042	0.10	mg/l	1.00	ND	97	90-110			
Matrix Spike (W3H0280-MS2)	Source: 3	G25006-01			Prepared & Ar	alyzed: 08/0	2/23				
Nitrate as N	2.08	0.040	0.20	mg/l	2.00	ND	104	90-110			
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	ND	101	90-110			
Matrix Spike Dup (W3H0280-MSD1)	Source: 3	G25006-04			Prepared & Ar	alyzed: 08/0	2/23				
Nitrate as N	- 2.11	0.040	0.20	mg/l	2.00	0.113	100	90-110	0.9	20	
Nitrite as N	0.971	0.042	0.10	mg/l	1.00	ND	97	90-110	0.2	20	
Matrix Spike Dup (W3H0280-MSD2)	Source: 3	G25006-01			Prepared & Ar	alyzed: 08/0	2/23				
Nitrate as N	2.07	0.040	0.20	mg/l	2.00	ND	104	90-110	0.5	20	
Nitrite as N	- 1.01	0.042	0.10	mg/l	1.00	ND	101	90-110	0	20	
ntch: W3H0362 - SM 2540C											
				Dre	marade 09/02/2	Analyzadı	00/04/23				
Blank (W3H0362-BLK1) Total Dissolved Solids	ND	4.0	10	mg/l	pared: 08/03/2	Analyzed:	00/04/2:				
ICS (W2H0262 BS1)				-	marada 00 (02 (2)	Analyzed	00/04/27				
LCS (W3H0362-BS1) Total Dissolved Solids	- 812	4.0	10	Pre mg/l	pared: 08/03/23 824	Analyzed:	08/04/23 99	<b>9</b> 7-103			
	<b>Source: 3</b> 110000	<b>G28003-01</b> 200	500	Pre mg/l	pared: 08/03/23	3 Analyzed: 109000	08/04/23	3	0.9	10	
			000	-					0.0	10	
Duplicate (W3H0362-DUP2) Total Dissolved Solids		<b>H02016-01</b> 4.0	10		pared: 08/03/2	<b>3 Analyzed:</b> 2670	08/04/23	3	0.1	10	
	- 2670	4.0	10	mg/l		2070			0.1	10	
atch: W3H0363 - SM 2540C											
Blank (W3H0363-BLK1)				Dre	pared: 08/03/2	Analyzed.	08/04/23	2			



FINAL REPORT

### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: LECL TMDL Monitoring

**Reported:** 09/06/2023 17:48

Project Manager: John Rudolph

(Continued)

### Quality Control Results

					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualif
tch: W3H0363 - SM 2540C (Continued)											
lank (W3H0363-BLK1)				Pre	oared: 08/03/2	3 Analyzed	08/04/23	;			
Total Dissolved Solids	ND	4.0	10	mg/l							
CS (W3H0363-BS1)				Pre	oared: 08/03/2	3 Analyzed	08/04/23	3			
Total Dissolved Solids	804	4.0	10	mg/l	824	,	98	97-103			
Duplicate (W3H0363-DUP1)	Source: 2	H01044-01		Dro	oared: 08/03/2	2 Analyzod	08/04/23	,			
Total Dissolved Solids	22200	4.0	10	mg/l	Jareu. 00/03/2	22800	00/04/23	•	3	10	
				-							
Duplicate (W3H0363-DUP2) Total Dissolved Solids	Source: 3 3350	<b>H02016-02</b> 4.0	10	Prej mg/l	oared: 08/03/2	3 Analyzed: 3270	08/04/23	8	2	10	
		4.0	10	mg/i		5270			2	10	
tch: W3H0451 - SM 2540D											
Blank (W3H0451-BLK1)				Pre	oared: 08/04/2	3 Analyzed	08/07/23	3			
Total Suspended Solids	ND		1	mg/l							
CS (W3H0451-BS1)				Prei	oared: 08/04/2	3 Analyzed	08/07/23	3			
Total Suspended Solids	68.0		1	mg/l	63.6	,, <b>,</b>	107	90-110			
	Source 3	C21072 02		Dree	oared: 08/04/2	2 Analyzad	00/07/2				
uplicate (W3H0451-DUP1) Total Suspended Solids		G31073-03	1	mg/l	Jareu: 00/04/2	95.0	06/07/2:	•	6	10	
uplicate (W3H0451-DUP2) Total Suspended Solids		G31079-02	1	-	oared: 08/04/2	3 Analyzed: 362	08/07/23	8	8	10	
			1	mg/l		302			0	10	
tch: W3H0543 - SM 4500S2-D											
lank (W3H0543-BLK1)					Prepared & A	nalyzed: 08/	07/23				
Sulfide, Total	ND	0.050	0.10	mg/l							
CS (W3H0543-BS1)					Prepared & A	nalvzed: 08/	07/23				
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100	,	100	90-110			
unlights (W2H0E42 DUD1)	Source 3	G07013-01			Droporod & A	nahunadı 09/	07/22				
uplicate (W3H0543-DUP1) Sulfide, Total		0.15	0.30	mg/l	Prepared & A	1.50	07/23		0	20	
Duplicate (W3H0543-DUP2)	Source: 30	<b>G07013-02</b> 0.15	0.30	ma/l	Prepared & A	nalyzed: 08/ 1.50	07/23		0	20	
Sulfide, Total	1.50	0.15	0.30	mg/l		1.50			0	20	
uplicate (W3H0543-DUP3)		H03105-01			Prepared & A		07/23				
Sulfide, Total	0.400	0.050	0.10	mg/l		0.400			0	20	
latrix Spike (W3H0543-MS1)	Source: 3	H03105-01			Prepared & A	nalyzed: 08/	07/23				
Sulfide, Total	0.600	0.050	0.10	mg/l	0.200	0.400	100	80-120			
latrix Spike Dup (W3H0543-MSD1)	Source: 2	H03105-01			Prepared & A	nalvzed• 08/	07/23				
Sulfide, Total	0.600	0.050	0.10	mg/l	0.200	0.400	100	80-120	0	20	
tch: W3H1190 - EPA 350.1											
lank (W3H1190-BLK1)		0.047	0.40	-	oared: 08/14/2	3 Analyzed	08/15/23	8			
Ammonia as N	ND	0.017	0.10	mg/l							
lank (W3H1190-BLK2)				Pre	oared: 08/14/2	3 Analyzed	08/15/23	3			
Ammonia as N	ND	0.017	0.10	mg/l							
							08/15/23				



FINAL REPORT

### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: LECL TMDL Monitoring

**Reported:** 09/06/2023 17:48

Project Manager: John Rudolph

(Continued)

Quality Control Results

Conventional Chemistry/Physical Parameters by API	HA/EPA/AS	TM Method	s (Continue	d)							
			·	,	Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifie
atch: W3H1190 - EPA 350.1 (Continued)											
LCS (W3H1190-BS2)				Prep	ared: 08/14/23	Analyzed:	08/15/23				
Ammonia as N	0.246	0.017	0.10	mg/l	0.250		98	90-110			
Matrix Spike (W2H1100 MS1)	Source: 7	3H03058-03		Bron	arad: 09/11/22	Applyzod	09/15/22				
Matrix Spike (W3H1190-MS1) Ammonia as N			0.50	mg/l	ared: 08/14/23 1.25	1.56	96	90-110			
				-							
Matrix Spike (W3H1190-MS2)		0.017	0.10	-	ared: 08/14/23	-					
Ammonia as N	0.290	0.017	0.10	mg/l	0.250	0.0397	103	90-110			
Matrix Spike Dup (W3H1190-MSD1)	Source: 3	BH03058-03		Prep	ared: 08/14/23	-	08/15/23				
Ammonia as N	2.77	0.085	0.50	mg/l	1.25	1.56	97	90-110	0.09	15	
Matrix Spike Dup (W3H1190-MSD2)	Source: 3	3H04055-07		Prep	ared: 08/14/23	Analyzed:	08/15/23				
Ammonia as N		0.017	0.10	mg/l	0.250	0.0397	102	90-110	0.9	15	
Patel W/2112EE EDA 2E1 2											
Batch: W3H1355 - EPA 351.2											
Blank (W3H1355-BLK1) TKN	ND	0.065	0.10	-	ared: 08/15/23	Analyzed:	08/16/23				
INN	ND	0.065	0.10	mg/l							
Blank (W3H1355-BLK2)				Prep	ared: 08/15/23	Analyzed:	08/16/23				
ТКЛ		0.065	0.10	mg/l							
LCS (W3H1355-BS1)				Prep	ared: 08/15/23	Analyzed:	08/16/23				
TKN	0.900	0.065	0.10	mg/l	1.00		90	90-110			
				Drom	anad: 09/15/22	Analyzada	09/16/22				
LCS (W3H1355-BS2) TKN	0.939	0.065	0.10	mg/l	ared: 08/15/23 1.00	Analyzeu:	94	90-110			
				Ū							
Matrix Spike (W3H1355-MS1) TKN		BH03106-01	0.10	-	ared: 08/15/23 1.00	Analyzed: 0.179		90-110			
INN	1.17	0.065	0.10	mg/l	1.00	0.179	99	90-110			
Matrix Spike (W3H1355-MS2)	Source: 3	3H03106-02		Prep	ared: 08/15/23	Analyzed:	08/16/23				
TKN	1.18	0.065	0.10	mg/l	1.00	0.202	98	90-110			
Matrix Spike Dup (W3H1355-MSD1)	Source: 3	3H03106-01		Prep	ared: 08/15/23	Analyzed:	08/16/23				
TKN			0.10	mg/l	1.00	0.179	100	90-110	0.9	10	
Matrix Sailes Dua (M/2H12EE MSD2)	Source: 7	3H03106-02		Dron	ared: 08/15/23	Analyzadi	09/16/22				
Matrix Spike Dup (W3H1355-MSD2) TKN		0.065	0.10	mg/l	1.00	0.202	101	90-110	3	10	
Batch: W3H1727 - EPA 365.3											
Blank (W3H1727-BLK1)				Prep	ared: 08/18/23	Analyzed:	08/28/23				
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W3H1727-BS1)				Prep	ared: 08/18/23	Analyzed:	08/28/23				
Phosphorus as P, Total	0.198	0.0067	0.010	mg/l	0.200		99	90-110			
Matrix Spike (W2H1727-MS1)	Source: 3	3G20007-01		Dron	ared: 08/18/23	Analyzad	08/28/22				
Matrix Spike (W3H1727-MS1) Phosphorus as P, Total	0.435	0.0067	0.010	mg/l	0.200	0.237	99	90-110			
				-							
Matrix Spike Dup (W3H1727-MSD1)		G20007-01	0.040	-	ared: 08/18/23	-			0	20	
Phosphorus as P, Total	0.443	0.0067	0.010	mg/l	0.200	0.237	103	90-110	2	20	



# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

Reported: 09/06/2023 17:48

Project Manager: John Rudolph

(Continued)

**Quality Control Results** 

Metals by EPA 200 Series Methods

					Spike	Source		%REC		RPD		
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier	
Batch: W3H0636 - EPA 200.7												
Blank (W3H0636-BLK1)				Prej	pared: 08/08/2	3 Analyzed:	08/15/23	5				
Aluminum, Dissolved		0.041	0.050	mg/l								
Aluminum, Total		0.022	0.050	mg/l								
LCS (W3H0636-BS1)	Prepared: 08/08/23 Analyzed: 08/15/23											
Aluminum, Dissolved	0.227	0.041	0.050	mg/l	0.200		113	85-115				
Aluminum, Total	0.227	0.022	0.050	mg/l	0.200		113	85-115				
Matrix Spike (W3H0636-MS1)	Source: 3G25006-02 Pre				epared: 08/08/23 Analyzed: 08/15/23							
Aluminum, Dissolved	0.333	0.041	0.050	mg/l	0.200	0.0850	124	70-130				
Aluminum, Total	0.333	0.022	0.050	mg/l	0.200	0.0970	118	70-130				
Matrix Spike (W3H0636-MS2)	Source: 3	H01084-01		Pre	pared: 08/08/23 Analyzed: 08/15/23							
Aluminum, Dissolved	0.238	0.041	0.050	mg/l	0.200	ND	119	70-130				
Aluminum, Total	0.238	0.022	0.050	mg/l	0.200	ND	119	70-130				
Matrix Spike Dup (W3H0636-MSD1)	Source: 3	G25006-02		Pre	repared: 08/08/23 Analyzed: 08/15/23							
Aluminum, Dissolved	0.339	0.041	0.050	mg/l	0.200	0.0850	127	70-130	2	30		
Aluminum, Total	0.339	0.022	0.050	mg/l	0.200	0.0970	121	70-130	2	30		
Matrix Spike Dup (W3H0636-MSD2)	Source: 3H01084-01 Pre				Prepared: 08/08/23 Analyzed: 08/15/23							
Aluminum, Dissolved	0.240	0.041	0.050	mg/l	0.200	ND	120	70-130	0.8	30		
Aluminum, Total	0.240	0.022	0.050	mg/l	0.200	ND	120	70-130	0.8	30		



WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

## **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

Reported: 09/06/2023 17:48

Project Manager: John Rudolph

#### Notes and Definitions

em	Definition
	Estimated conc. detected <mrl and="">MDL.</mrl>
-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
EC	Percent Recovery
	Dilution
DL	Method Detection Limit
-	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
D	Relative Percent Difference
urce	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

### Chain of Custody & Sample Information Record

### 3675006

Client: WSP USA E&I Inc.			Cont	act:	John	Ruo	lolph												Phone No.	858-243-8158
Project Name: LECL TMDL Project Number: 2315100200.0004	Monitorin	ig	Emai	il:	joh	n.rud	olph@	<u>)</u> woo	dplc.	.com					,					Additional Reporting Requests
PO#: C016900152			Turn	Arou	ind T	ime			Roi	utine	2	*3-	-5 D	ay	*4	48 H	lour		*24 Hour	FAX Results: <u> </u> γes Email Results: <u> </u> γes
GL Code: <u>573000</u> Org# <u>3151</u>			Lab T	'AT Ap	prov	al:		В	y:			F	Rusl	ו		Ru	ish	*A	Rush dditional Charges May Apply	State EDT: Yes Dimensional State EDT: State
Sampler Information	on			# of	Conta	ainer				Samp Type			nab	<i>iele</i>	Pa	<u>au</u>	ste		Matrix	
Name: MICK Jer				ĪT										/515	365.3)					Notes Ortho-P is field filtered (0.45 um)
Employer: WSP USA E&I /In	7	• .		1		ate			Containers			EPA 353.2)		350.1)	s (EPA 36	A 365.3)	14500S)	Dissolved AL (EPA 200.7)	DW = Drinking Water WW = Wastewater GW = Groundwater	Dissolved Al is field filtered (0.45 um)
Signature:	44	<u> </u>	Unpreserved H2SO4	HCI HNO3 H-75202	H SCO	H/ZnAcet	MCAA Frozen	1 4 Je	at # OL	Resample	cial	Nitrate - Nitrite (EPA	TDS (SM2540 C)	I KN (EPA 351.2 Ammonia (EPA 350.1)	Total Phosphorus (EPA	SRP/Ortho-P (EPA 365.3)	Total Sulfide (SM4500S)	olved AL	S = Soil SG = Sludge	
Sample ID	Date	Time	H2S(	HUO3 HNO3		NaOI NH4(	MCA Froze	Totol	Rou	Res	Spe TSS	Nitrate	TDS (	I KN (EPA 3 Ammonia (	Total	SRP/O	Total S	Disso	L = Liquid M ≃ Miscellaneous	
CL07	8/1/23	1100										x			-					
CL08		015										x								
CL09	C	5915		ŀ						Π		x			1		_			
CL10		1840										x								
LE02		1018		•									x							
																			· ·	n har
			·																	
·····											•									
																,				
Relinquished By (sign)	Print Name	/ Comp	any			Date	Time	Э			Re	ceiv	ved	By	(Siç	gn)			Pri	nt Name / Company
11hpth A	Vick Jen	<u>nack /</u>	ws	N	<u> 8/1/</u>	23	-154	5	*	2	30	1		-	ر د د				RMS	
SAM	RMS				<u>8[]</u>	1/2	3			80	Sci	rip	$\sim$	1					0%/01/23	17.70
				•			;					1			*					

For Lab Use Only) Sample Integrity	/ Upon Receipt		Lab Notes			
Sample(s) Submitted on Ice?	Yes No	Temperature		Lab No.		
Custody Seal(s) Intact?	Yes (No) N/A	C.0 ℃	TURI			
Sample(s) Intact?	Yes No	Cooler Blank		Pa	uge1of1	



1

## Sample Receipt Checklist

	Weck WKO: WKO Logged by: bles Checked by:	Lester Abad		Dat 	# of San	eived: 08/01/23 @ 17:20 nples: 05 ed by: Client
	Task		Yes	No	N/A	Comments
COC	COC present at re COC properly con COC matches san	npleted?	X X X			
	Project Manager	notified about COC discrepancy?			$\boxtimes$	
Receipt Information	Sample Temperat Samples received Ice Type (Blue/W All samples intact Samples in prope Sufficient sample Samples intact? Received within h	on ice? et) ? r containers? volume?	$\boxtimes$	°C		
•	Project Manager	notified about receipt info?				
	Sample labels che	cked for correct preservation?				
ication?	VOC Headspace: ( 524.2, 524.3, 624.	No) none, If Yes (see comment) 1, 8260, 1666 P/T, LUFT			$\boxtimes$	□<6mm/Pea Size?
Sample Preservation Verification?	pH verified upon i Metals <2; H2SO4 525.2<2, 6710B<2	pres tests <2; 522<4; TOC <2; 508.1	, 🛛			pH paper Lot#
reserv	Free Chlorine Test	ed <0.1 (Organics Analyses)			$\boxtimes$	Cl Test Strip Lot#
Sample F	O&G pH <2 verifie pH adjusted for O Project Manager r					pH paper Lot# pH Reading: Acid Lot# Amt added:
PM Cor	nments					

Sample Receipt Checklist Completed by:

Signature: Lester Abad

Date:

08/01/23



September 18, 2023

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Project Name:LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO #Physis Project ID:C3949034901 GL Code 57300 Org # 3151

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 8/3/2023. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, Misty Mercier 714 602-5320 Extension 202 mistymercier@physislabs.com



### **PROJECT SAMPLE LIST**

#### WSP USA

#### PHYSIS Project ID: 2302004-011

Total Samples: 10

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479

	0,				•	
PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
109229	CL07 - Int		8/1/2023	11:00	Biologic	Not Specified
109230	CL07 - Surf		8/1/2023	11:15	Biologic	Not Specified
109231	CL08 - Int		8/1/2023	10:15	Biologic	Not Specified
109232	CL08 - Surf		8/1/2023	10:30	Biologic	Not Specified
109233	CL09 - Int		8/1/2023	9:15	Biologic	Not Specified
109234	CL09 - Surf		8/1/2023	9:30	Biologic	Not Specified
109235	CL10 - Int		8/1/2023	8:40	Biologic	Not Specified
109236	CL10 - Surf		8/1/2023	8:45	Biologic	Not Specified
109237	LE02 - Int		8/1/2023	10:18	Biologic	Not Specified
109238	LE02 - Surf		8/1/2023	10:50	Biologic	Not Specified

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### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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Innovative Solutions for Nature

PHYSIS Project ID: 2302004-011 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

			Con	ven	tion	als				
ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE Batch ID	Date Processed	Date Analyzed
Sample ID: 109229-R1	CLo7 - Int		Matrix: Biolog	ic			Sampled:	01-Aug-23 11:00	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	25.1	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109230-R1	CL07 - Surf		Matrix: Biolog	ic			Sampled:	01-Aug-23 11:15	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	11.8	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109231-R1	CLo8 - Int		Matrix: Biolog	ic			Sampled:	01-Aug-23 10:15	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	33.8	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109232-R1	CLo8 - Surf		Matrix: Biolog	ic			Sampled:	01-Aug-23 10:30	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	14.4	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109233-R1	CLo9 - Int		Matrix: Biolog	ic			Sampled:	01-Aug-23 9:15	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	64.8	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109234-R1	CL09 - Surf		Matrix: Biolog	ic			Sampled:	01-Aug-23 9:30	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	10.6	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109235-R1	CL10 - Int		Matrix: Biolog	ic			Sampled:	01-Aug-23 8:40	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	9.61	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109236-R1	CL10 - Surf		Matrix: Biolog	ic			Sampled:	01-Aug-23 8:45	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	11.8	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109237-R1	LEo2 - Int		Matrix: Biolog	ic			Sampled:	01-Aug-23 10:18	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	91	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23
Sample ID: 109238-R1	LE02 - Surf		Matrix: Biolog	ic			Sampled:	01-Aug-23 10:50	Received:	03-Aug-23
Chlorophyll-a	SM 10200 H	mg/m3	125	1	1	2	NA	C-75006	29-Aug-23	29-Aug-23

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

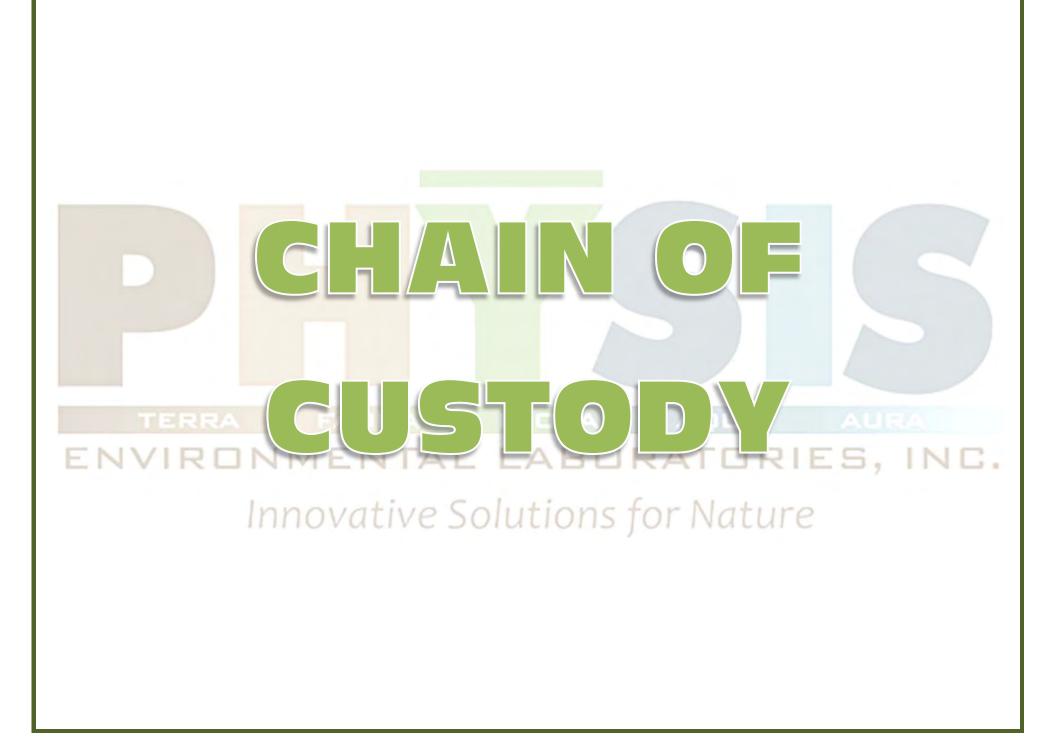


Conventionals

PHYSIS Project ID: 2302004-011 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

### **QUALITY CONTROL REPORT**

SAMPLE ID	)	BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	AC %	CURACY LIMITS	PF %	RECISION LIMITS	QA CODE
Chlorophyll-a		Method:	SM 10200 H		Fra	ction: N	NA		Prepa	red: z	29-Aug-23	Analy	zed: 29-Aug	-23
109228-B1	QAQC Procedural Blank	C-75006	ND	1	1	2	mg/m3							
109228-BS1	QAQC Procedural Blank	C-75006	37400	1	1	2	mg/m3	44200	0	85	70 - 130% PASS			
109228-BS2	QAQC Procedural Blank	C-75006	37400	1	1	2	mg/m3	44200	0	85	70 - 130% PASS	0	30 PASS	



### Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc.			Con	tact:	Joh	n R	udo	ph		_	-	-	_		_		-		Phone No.	858-243-8158 Additional Reporting Requests
Project Name:         LECL TMI           Project Number:         2315100200.000           PO#:         C014105479           GL Code:         57300           Org#         3151	OL Monitorir 4.PHYSIS	ng	1	n Arc	ound	Tim	ne:	dolph(		Rout	tine	_	*3-5 F	i Da	-		Hour Rush	r.	*24 Hour Rush dditional Charges May Apply	Include QC Data Package:s No FAX Results:s No Email Results:s No State EDT:s No (Include Source Number in Notes)
Sampler Informa	ion				of Cor Prese					1.1	amp Type		An	alys	is R	lequ	ested	ł	Matrix	Notes
Name: Nicholas						te			Containare								II		DW = Drinking Water WW = Wastewater GW = Groundwater	Chi-a samples on 0.7 um GFF
Signature:	h		Unpreserved H2SO4	HCI HNO3	Na2S203	NaOH/ZnAcetate	14CI	Frozen	Total # of C	Routine	esample	Special Total Sulfide	trate - Nitrite	S	Ammonia	Total Phosphorus	SRP/Ortho-P Chlorophyll-a (SM10200		S = Soil SG = Sludge L = Liquid	
Sample ID	Date	Time	5 1	ΞΞ	ZZ	Na	Ż	ž Ľ	F	2 4	R	S	ž	11	AL	Lo L		1	M = Miscellaneous	Filter Volume: 500 mL
CL07 - Int	8/1/23	1100		++	++	-	-			-		-	-	-	+	-	X	-		Filter Volume: 500 mL
CL07 - Surf	8/1/23	1115		+	-	-		-	-			-		-	-	-	X	1		Filter Volume: 450 mL
CL08 - Int						-	A.			-			-	-	+	-	X	-		Filter Volume: 500 mL
CL08 - Surf	8/1/23	1030			++	+		-	-	-		-		-	-	-	X	-		Filter Volume: 375 mL
CL09 - Int	8/1/23	915	$\vdash$		++-	+		-	-			1	-	-		-	X		· · · · · · · · · · · · · · · · · · ·	
CL09 - Surf	8/1/23	930				-				-		-	-	-	-	-	X	-		Filter Volume: 480 mL
CL10 - Int	8/1/23	840		$\square$	-					-		-	-	-	-	_	X	-		Filter Volume: 500 mL
CL10 - Surf	8/1/23	845			1	-			_				-		-		x			Filter Volume: 500 mL
LE02 - Int	8/1/23	1018							_	-					-		x			Filter Volume: 220 mL
LE02 - Surf	8/1/23	1050															x			Filter Volume: 255 mL
Relinquished By (sign)	Print Name Nick Jerna					1.00		<b>Tim</b> 3 - 16				Re	çeiy h	ed l	Z	Sigr	Y	_	Richard	
(For Lab Use Only) Sample Ir	tegrity Upon Re	ceipt									-		1	.ab	Note	es			]	8/9/23 920

_ Cooler Blank

Sample(s) Intact?

Yes

No

Page 1 of 1

PHYSICs Provide Solutions for Nature Sample Receipt Summary <u>Receiving Info</u> 1. Initials Received By: <u><u>KG4</u> 2. Date Received: <u><u>8/3/23</u></u></u>	Project Iteration ID: Client Name: Project Name: COC Page Number: Bottle Label Color:	WSP USA LECL TMDL Monit 2315100200.0004. C014105479 GL 0 # 3151 2 of 2	PHYSIS PO #
3. Time Received:         920           4. Client Name:         0	isp		
<ul> <li>5. Courier Information: (Please circle)</li> <li>Client</li> <li>UPS</li> <li>FedEx</li> <li>GSO/GLS</li> <li>PHYSIS Driver:</li> <li>i. Start Time:</li> </ul>	<ul><li>Area</li><li>Ontr</li></ul>	i Fast rac	DRS     PAMS e:
<ul><li>ii. End Time:</li><li>6. Container Information: (Please put the # of</li></ul>			ickups:
<ul> <li><u>1</u> Cooler</li> <li><u>Carboy(s)</u></li> <li><u>Carboy Trash Ca</u></li> <li>7. What type of ice was used: (Please circle an</li> <li>Wet Ice</li> <li>Blue Ice</li> <li>8. Randomly Selected Samples Temperature (*</li> <li><u>Inspection Info</u></li> <li>1. Initials Inspected By: <u>E</u></li> </ul>	in(s) •C iy that apply) • Dry Ice	arboy Cap(s) • Water	• Other er #2
Sample Integrity Upon Receipt:			
<ol> <li>COC(s) included and completely filled out</li> <li>All sample containers arrived intact</li></ol>	nformation on COC(s) ses indicated g time ndicated	2 / / / / / / / / / / / / / / / / / / /	No No No No No
	Notes:		
See temp			Page 1 of 1
P·\Sample Logistics (SL)\SRS			Page 1 of 1



FINAL REPORT

Work Orders:	3120082	Report Date:	10/09/2023
		Received Date:	09/20/2023
Project:	LECL TMDL Monitoring	Turnaround Time:	Normal
i lojeet.		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	P.O. #:	C016900152
Client:	WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Billing Code:	Prjct 2315100200.0004.WE CK,GL Code 573000,Org#3151

#### ELAP-CA #1132 • EPA-UCMR #CA00211 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 9/20/23 with the Chain-of-Custody document. The samples were received in good condition, at 3.3 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

in In

Kim G. Tu Project Manager

3I20082





FINAL REPORT

#### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: LECL TMDL Monitoring

### **Reported:** 10/09/2023 16:53

Project Manager: John Rudolph

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02	Nicholas Jernack	3120082-01	Water	09/20/23 08:55	



WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

## **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

**Reported:** 10/09/2023 16:53

Project Manager: John Rudolph

Sample Results	
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4.55	-							
Sample:	LE02					Sampled: 0	9/20/23 8:55 by N	icholas Jernack
	3I20082-01 (Water)							
Analyte		Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional	Chemistry/Physical Parameter	s by APHA/EPA/ASTM Methods						
Method: EP	A 350.1			Instr: AA06				
Batch ID:	W3I1830	Preparation: _NONE (WETCHEM)		Prepared: 09/2	2/23 10:24			Analyst: aec
Ammonia	as N	0.38	0.017	0.10	mg/l	1	09/28/23	
Method: EP	A 351.2			Instr: AA06				
Batch ID:	W3I2466	Preparation: _NONE (WETCHEM)		Prepared: 09/2	9/23 10:40			Analyst: AEC
TKN		4.3	0.065	0.10	mg/l	1	10/03/23	
Method: EP	A 353.2			Instr: AA01				
Batch ID:	W3I1712	Preparation: _NONE (WETCHEM)		Prepared: 09/2	1/23 11:00			Analyst: ISM
Nitrate as	Ν	ND	0.040	0.20	mg/l	1	09/21/23 12:45	
Nitrite as	Ν	0.054	0.042	0.10	mg/l	1	09/21/23 12:45	J
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3I1651	Preparation: _NONE (WETCHEM)		Prepared: 09/2	0/23 15:57			Analyst: JSG
o-Phosph	ate as P	0.011	0.0071	0.010	mg/l	1	09/20/23 17:01	
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3J0072	Preparation: _NONE (WETCHEM)		Prepared: 10/0	2/23 13:49			Analyst: JSG
Phospho	rus as P, Total	0.26	0.0067	0.010	mg/l	1	10/05/23	
Method: SM	1 2540C			Instr: _ANALYS1	г			
Batch ID:	W3I1660	Preparation: _NONE (WETCHEM)		Prepared: 09/2	0/23 18:06			Analyst: bel
Total Diss	solved Solids	1900	4.0	10	mg/l	1	09/21/23	
Method: SM	1 4500S2-D			Instr: _ANALYS1	г			
Batch ID:	W3I2114	Preparation: _NONE (WETCHEM)		Prepared: 09/2	6/23 14:59			Analyst: ymt
Sulfide, To	otal		0.050	0.10	mg/l	1	09/27/23	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: LECL TMDL Monitoring

**Reported:** 10/09/2023 16:53

Project Manager: John Rudolph

Quality	Control	Results
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Conventional Chemistry/Physical Parameters by APHA/EP	A/AST	M Methods	5								
, , , , , , , , , , , , , , , , , , ,					Spike	Source		%REC		RPD	
Analyte R	esult	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3I1651 - EPA 365.3											
Blank (W3I1651-BLK1)					Prepared & An	alyzed: 09/2	20/23				
o-Phosphate as P	ND	0.0071	0.010	mg/l							
LCS (W3I1651-BS1)					Prepared & An	alyzed: 09/2	20/23				
o-Phosphate as P 0	.193	0.0071	0.010	mg/l	0.200		96	88-111			
Matrix Spike (W3I1651-MS1) Sou	ırce: 3l	19077-01			Prepared & An	alyzed: 09/2	20/23				
o-Phosphate as P 0			0.010	mg/l	0.200	0.118	99	85-112			
Matrix Spike Dup (W3I1651-MSD1) Sou	urce: 31	19077-01			Prepared & An	alvzed: 09/2	20/23				
o-Phosphate as P 0		0.0071	0.010	mg/l	0.200	0.118	101	85-112	1	20	
Batch: W211660 SM 2540C											
Batch: W311660 - SM 2540C				_							
Blank (W3I1660-BLK1) Total Dissolved Solids	ND	4.0	10	Pre mg/l	pared: 09/20/23	Analyzed:	09/21/23	5			
			10	-							
LCS (W3I1660-BS1) Total Dissolved Solids	825	4.0	10		epared: 09/20/23 824	Analyzed:	<b>09/21/2</b> 3	<b>3</b> 97-103			
Total Dissolved Solids	020	4.0	10	mg/l	024		100	97-103			
		20115-04	10		epared: 09/20/23	-	09/21/23	3		1.0	
Total Dissolved Solids	6730	4.0	10	mg/l		6780			0.8	10	
		19124-01		Pre	pared: 09/20/23	Analyzed:	09/21/23	3			
Total Dissolved Solids	3530	4.0	10	mg/l		3450			2	10	
Batch: W3I1712 - EPA 353.2											
Blank (W3I1712-BLK1)					Prepared & An	alyzed: 09/2	21/23				
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W3I1712-BS1)					Prepared & An	alvzed: 09/2	21/23				
Nitrate as N 0	.937	0.040	0.20	mg/l	1.00	uiy2cu. 05/1	94	90-110			
Nitrite as N	1.07	0.042	0.10	mg/l	1.00		107	90-110			
		00004 01			Prepared & An	alumadu 00 (2	1/22				
	5.44	08004-01 0.040	0.20	mg/l	2.00	3.60	92	90-110			
		20020 04		2	B						
	<b>ırce: 3l</b> 5.07	<b>20029-01</b> 0.040	0.20	mg/l	Prepared & An 2.00	alyzed: 09/2 3.13	2 <b>1/23</b> 97	90-110			
Nitrite as N		0.042	0.10	mg/l	1.00	ND	100	90-110			
			0.10					00 110			
		08004-01	0.50	m g /l	Prepared & An	•		00 110			
Nitrite as N	4.04	0.21	0.50	mg/l	5.00	ND	97	90-110			
		08004-01		-	Prepared & An	•					
Nitrate as N	5.43	0.040	0.20	mg/l	2.00	3.60	92	90-110	0.2	20	
Matrix Spike Dup (W3I1712-MSD2) Sou	ırce: 3l	20029-01			Prepared & An	alyzed: 09/2	21/23				
	4.99	0.040	0.20	mg/l	2.00	3.13	93	90-110	2	20	
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	ND	101	90-110	1	20	
Matrix Spike Dup (W3I1712-MSD3) Sou	ırce: 3l	08004-01			Prepared & An	alyzed: 09/2	21/23				
Nitrite as N		0.21	0.50	mg/l	5.00	ND	97	90-110	0.1	20	

3I20082



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: LECL TMDL Monitoring

**Reported:** 10/09/2023 16:53

Project Manager: John Rudolph

(Continued)

Quality Control Results

Conventional Chemistry/Physical Parameters by APH	IA/EPA/AST	M Methods	(Continued)								
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3I1830 - EPA 350.1											
Blank (W3I1830-BLK1)	ND	0.047	0.40		Prepared: 09/22/23	Analyzed:	09/28/23				
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W3I1830-BLK2)					Prepared: 09/22/23	Analyzed:	09/28/23				
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W3I1830-BS1)					Prepared: 09/22/23	Analyzed:	09/28/23				
Ammonia as N	0.252	0.017	0.10	mg/l	0.250		101	90-110			
LCS (W3I1830-BS2)					Prepared: 09/22/23	Analyzed:	09/28/23				
Ammonia as N	0.246	0.017	0.10	mg/l	0.250	,	98	90-110			
Matrix Calles (W2)1020 MC1)	C	120093-01			December 1: 00 (22 (22	Amelumedu	00/20/22				
Matrix Spike (W3I1830-MS1) Ammonia as N	3.54	0.085	0.50	mg/l	Prepared: 09/22/23 1.25	2.35	95	90-110			
				U							
Matrix Spike (W3I1830-MS2) Ammonia as N		120093-02 0.085	0.50	mg/l	Prepared: 09/22/23 1.25	Analyzed: 2.28	<b>09/28/23</b> 95	90-110			
	5.40	0.005	0.50	mg/i	1.25	2.20	55	90-110			
Matrix Spike Dup (W3I1830-MSD1)		120093-01			Prepared: 09/22/23	•					
Ammonia as N	3.52	0.085	0.50	mg/l	1.25	2.35	94	90-110	0.5	15	
Matrix Spike Dup (W3I1830-MSD2)	Source: 3	120093-02			Prepared: 09/22/23	Analyzed:	09/28/23				
Ammonia as N	3.48	0.085	0.50	mg/l	1.25	2.28	96	90-110	0.4	15	
Batch: W3I2114 - SM 4500S2-D											
Blank (W3I2114-BLK1)					Prepared: 09/26/23	Analyzed:	09/27/23				
Sulfide, Total		0.050	0.10	mg/l							
LCS (W3I2114-BS1)					Prepared: 09/26/23	Analyzed:	09/27/23				
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W3I2114-DUP1)	Source: 3	120082-01			Prepared: 09/26/23	Analyzed:	09/27/23				
Sulfide, Total		0.050	0.10	mg/l		ND				20	
Matrix Spike (W3I2114-MS1)	Source: 3	121056-01			Prepared: 09/26/23	Analyzed:	09/27/23				
Sulfide, Total		0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W3I2114-MSD1) Sulfide, Total		0.050	0.10	mg/l	Prepared: 09/26/23 0.200	Analyzed: ND	100	80-120	0	20	
	0.200	0.000	0110		0.200			00 .20	Ū	20	
Batch: W3I2466 - EPA 351.2											
Blank (W3I2466-BLK1)					Prepared: 09/29/23	Analyzed:	10/03/23				
ТКМ		0.065	0.10	mg/l							
Blank (W3I2466-BLK2)					Prepared: 09/29/23	Analyzed:	10/03/23				
ТКМ		0.065	0.10	mg/l							
LCS (W3I2466-BS1)					Prepared: 09/29/23	Analyzed:	10/03/23				
ТКМ		0.065	0.10	mg/l	1.00	, <b>,</b>	100	90-110			
LCS (W3I2466-BS2)					Prepared: 09/29/23	Analyzad	10/02/22				
TKN	0.967	0.065	0.10	mg/l	1.00	Analyzed:	97	90-110			
				0.1							
Duplicate (W3I2466-DUP1) TKN	Source: 3	0.065	0.10	mg/l	Prepared: 09/29/23	Analyzed: ND	10/03/23			10	
		0.000	0.10	my/I		ND				10	

3I20082



FINAL REPORT

#### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: LECL TMDL Monitoring

**Reported:** 10/09/2023 16:53

Project Manager: John Rudolph

(Continued)

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Quality Control Results

Conventional Chemistry/Physical Parameters	by APHA/EPA/AST	M Method	s (Continue	d)							
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Quali
Batch: W3I2466 - EPA 351.2 (Continued)											
Matrix Spike (W3I2466-MS1)	Source: 3	20064-04		Pre	pared: 09/29/23	3 Analyzed:	10/03/23	3			
TKN	0.974	0.065	0.10	mg/l	1.00	0.0763	90	90-110			
Matrix Spike (W3I2466-MS2)	Source: 3	122083-01		Pre	pared: 09/29/2	3 Analyzed:	10/03/23	3			
TKN	1.98	0.065	0.10	mg/l	1.00	0.942	103	90-110			
Matrix Spike Dup (W3I2466-MSD1)	Source: 3	120064-04		Pre	pared: 09/29/2	3 Analyzed:	10/03/23	3			
TKN	0.998	0.065	0.10	mg/l	1.00	0.0763	92	90-110	3	10	
Matrix Spike Dup (W3I2466-MSD2)	Source: 3	122083-01		Pre	pared: 09/29/2	3 Analyzed:	10/03/23	3			
TKN	1.98	0.065	0.10	mg/l	1.00	0.942	104	90-110	0.2	10	
Batch: W3J0072 - EPA 365.3											
Blank (W3J0072-BLK1)				Pre	pared: 10/02/2	3 Analyzed:	10/05/23	3			
Phosphorus as P, Total	ND	0.0067	0.010	mg/l		-					
LCS (W3J0072-BS1)				Pre	pared: 10/02/2	3 Analyzed:	10/05/23	3			
Phosphorus as P, Total	0.201	0.0067	0.010	mg/l	0.200	-	100	90-110			
Matrix Spike (W3J0072-MS1)	Source: 3	120009-01		Pre	pared: 10/02/2	3 Analyzed:	10/05/23	3			
Phosphorus as P, Total	0.309	0.0067	0.010	mg/l	0.200	0.0990	105	90-110			
Matrix Spike Dup (W3J0072-MSD1)	Source: 3	120009-01		Pre	pared: 10/02/2	3 Analyzed:	10/05/23	3			
Phosphorus as P, Total	0.300	0.0067	0.010	mg/l	0.200	0.0990	100	90-110	3	20	



WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

## **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring

Reported: 10/09/2023 16:53

Project Manager: John Rudolph

#### Notes and Definitions

ltem	Definition
J	Estimated conc. detected <mrl and="">MDL.</mrl>
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

### Chain of Custody & Sample Information Record

3120082

Client: WSP USA E&I Inc.	Contact: John Rudolph Ph	none No. 858-243-8158
Project Name:         LECL TMDL Monitoring           Project Number:         2315100200.0004.WECK           PO#:         C016900152           GL Code:         573000           Org#         3151	Rush Rush	Additional Reporting Requests         Include QC Data Package:       No         FAX Results:       Yes       No         FAX Results:       Yes       No         State EDT:       Yes       No         Onal Charges May Apply       (Include Source Number in Notes)       No
Sampler Information	# of Containers & Preservatives	Matrix Notes
Name: <u>Nick Sernack</u> Employer: <u>WSP USA E&amp;I Inc.</u> Signature: <u>MA</u>	37Ved       33       13       13       14       17       19       19       11       11       11       12       13       14       15       16       17       16       17       16       17       16       17       17       18       19       10       11       11       11       12       13       14       15       16       17       17       18       19       10       10       11       11       11       11       11       12       13       14       14       15       16       17       17       18       18       19       10       10       10       10       10       10       10       10       10	W = Drinking Water       Ortho-P is field filtered.         W = Wastewater       please include all red codes on invoices         W = Groundwater       = Soil         G = Sludge
Sample ID Date Time	Unpress HRS204 HCI Na2S204 Na2S204 NN4CI NN4CI Frozen Resart Total AL Total AL Total AL Total AL	= Liquid = Miscellaneous
LE02 4/20/20 085		LEO2 bottles arrived labeled
		crossed out and lubeled as LEO2 follow COC as issued,
Relinquished By (sign) Print Name / Co	mpany Date / Time Received By (Sign)	Print Name / Company
Mh Mick Senack / L	15p 9/20/23 9/20/212:46	

(For Lab Use Only) Sample Integrity	Upon Re	eceipt	1		Lab Notes		
Sample(s) Submitted on Ice?	Yes	No	Wet	Temperature		Lab No.	
Custody Seal(s) Intact?	Yes	No	N/A	3.3 ℃			
Sample(s) Intact?	Yes	No		Cooler Blank T-07	52		Page <u>1</u> of <u>1</u>



## Sample Receipt Checklist

	Weck WKO: <b>3I20082</b> WKO Logged by:       Jaime Gomez         ples Checked by:       Jaime Gomez		Date	# of Samp	ved: 09/20/23 12:46 bles: 01 by: RMS
	Task	Yes	No	N/A	Comments
	COC present at receipt?				Conmiched
	COC properly completed?	$\boxtimes$			
COC	COC matches sample labels?	$\boxtimes$			·····
ŭ					
	Project Manager notified about COC discrepancy?			$\boxtimes$	
	Sample Temperature	3.3 °C			
~	Samples received on ice?				
tion	Ice Type (Blue/Wet)				
Receipt Information	All samples intact?	$\boxtimes$			
lor	Samples in proper containers?	$\boxtimes$			
it In	Sufficient sample volume?	$\boxtimes$			
čeip	Samples intact?	$\boxtimes$			
Rec	Received within holding time?				
	Project Manager notified about receipt info?			$\mathbf{X}$	
	Sample labels checked for correct preservation?			Protect	
	Sample labels checked for correct preservation?				
<u>~-</u>	VOC Headspace: (No) none, If Yes (see comment)				
ion	524.2, 524.3, 624.1, 8260, 1666 P/T, LUFT			$\boxtimes$	□<6mm/Pea Size?
cat					
erifi	pH verified upon receipt?				
٩	Metals <2; H2SO4 pres tests <2; 522<4; TOC <2; 508.1,	$\boxtimes$			pH paper Lot# 3082366
tior	525.2<2, 6710B<2, 608.3 5-9		_		
Sample Preservation Verification?					
ese.	Free Chlorine Tested <0.1 (Organics Analyses)		$\boxtimes$		Cl Test Strip Lot#
e Pr	O&G pH <2 verified?				
uple	Owe prike vermed?				pH paper Lot#
Sar	pH adjusted for O&G				pH Reading:
	pri adjusted foi O&G				Acid Lot#
	Project Manager notified about sample preservation?				Amt added:
	The second about sample preservation?				·
PM Co	mments				
Sample	e Receipt Checklist Completed by:				
	· ·				
SIRIIAL	ure: Laime Gomez			Dat	e: 09/20/23

. . . . . . . . . . . .



October 19, 2023

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Project Name:LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO #Physis Project ID:C3949054995GL 57300 Org # 3151

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 9/26/2023. A total of 2 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, miety mercier Misty Mercier 714 602-5320 Extension 202 mistymercier@physislabs.com



### **PROJECT SAMPLE LIST**

#### WSP USA

PHYSIS Project ID: 2302004-015

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479 Total Samples: 2

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
111456	LE02 - Int		9/20/2023	8:55	Biologic	Not Specified
111457	LE02 - Surf		9/20/2023	9:35	Biologic	Not Specified



### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

i - 3 of 6



### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

i - 4 of 6



the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

i - 6 of 6





PHYSIS Project ID: 2302004-015 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

### Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 111456-R1	LEo2 - Int		Matrix: Biolog			Sampled:	20-Sep-23	8:55	Received:	26-Sep-23	
Chlorophyll-a	SM 10200 H	mg/m3	147	1	1	2	NA		C-75075	11-Oct-23	11-Oct-23
Sample ID: 111457-R1	LE02 - Surf	Matrix: Biologic					Sampled:	20-Sep-23	9:35	Received:	26-Sep-23
Chlorophyll-a	SM 10200 H	mg/m3	141	1	1	2	NA		C-75075	11-Oct-23	11-Oct-23

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

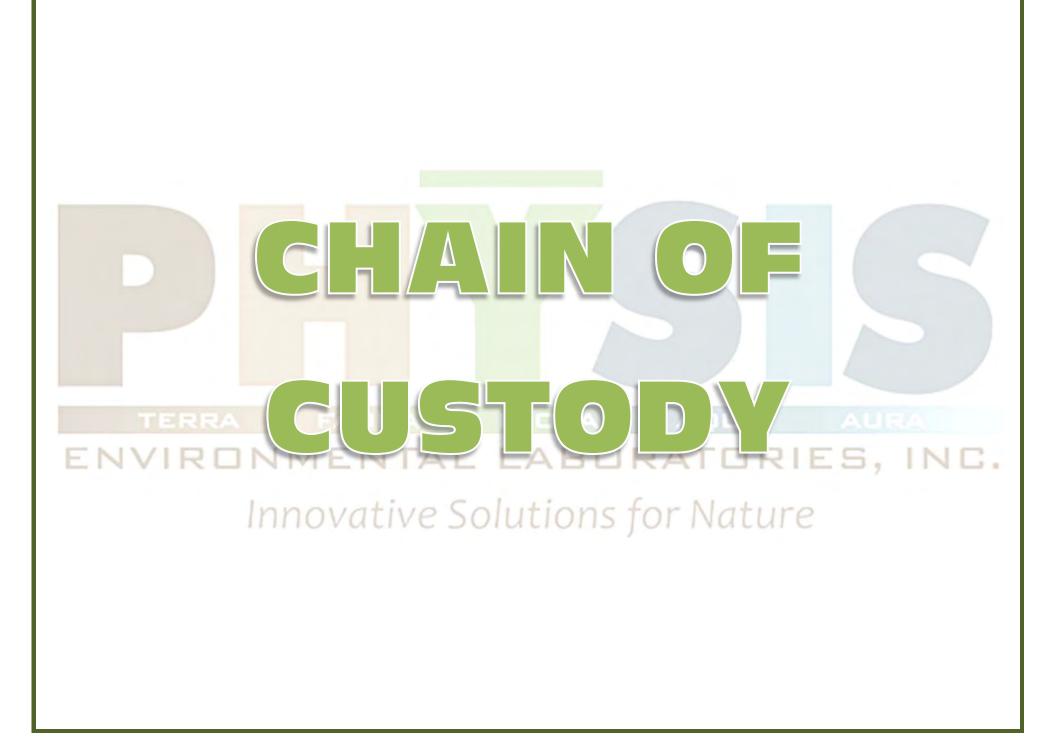


Conventionals

PHYSIS Project ID: 2302004-015 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

### **QUALITY CONTROL REPORT**

SAMPLE ID	)	BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	AC %	CURACY LIMITS	PI %	RECISION LIMITS	QA CODE
Chlorophyll-a		Method: SM 10200 H			Fraction: NA				Prepared: 11-Oct-23			Analy	zed: 11-Oct-2	23
111455-B1	QAQC Procedural Blank	C-75075	ND	1	1	2	mg/m3							
111455-BS1	QAQC Procedural Blank	C-75075	43800	1	1	2	mg/m3	43600	0	100	70 - 130% PASS			
111455-BS2	QAQC Procedural Blank	C-75075	41700	1	1	2	mg/m3	43600	0	96	70 - 130% PASS	4	30 PASS	



### Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc.		Contact: John Ru	ıdolph		Phone No.	858-243-8158
Project Name: LECL TMD	L Monitoring	Email:	john.rudolph@wsp.com			Additional Reporting Requests
Project Number:         2315100200.00           PO#:         C014105479           GL Code:         57300           Org#         3151	DU4.PHYSIS	Turn Around Tim	By:	Rush Rush	*24 Hour Rush Additional Charges May Apply	FAX Results: FAX Results: Fessil Results: Fessil No State EDT: Fessil No (Include Source Number in Notes)
Sampler Inform	ation	# of Contain & Preservati	ves Tv		Matrix	Notes
Name: <u>Nick Jer</u> Employer: <u>WSP USA E&amp;I</u> Signature: <u>MA</u> Sample ID		Lupreserved H2SO4 HCI HNO3 Na2S2O3 NaOH NaOH NaOHZnAcetate	Frozen Frozen Frozen Routine Recemicio	Special Total Suffide Nitrate - Nitrite TDS TKN Ammonia Ammonia Cotal Phosphorus SRP/Ortho-P Chlorophyll-a (SM10200 H	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid	Chi-a samples on 0.7 um GFF
LE02 - Int	9/20/20 0855				M = Miscellaneous	Filter Volume: 145~L
LE02 - Surf	1 0935					Filter Volume: 190mL
						Filter Volume:
						Filter Volume:
· · · · · · · · · · · · · · · · · · ·						Filter Volume:
						Filter Volume:
Relinquished By (sign)	Print Name / Cor		te / Time	Received By (Sign)	Pr	int Name / Company
MGGA-	Nick Jernach	/WSP 9/25/2.	3-1600	The th	Richard A	tanka Physis
1 1	· · · · · · · · · · · · · · · · · · ·	9/76/	23 1000			
	· · · · · · · · · · · · · · · · · · ·					

(For Lab Use Only) Sample Integrity	Jpon Red	ceipt			Lab Notes		
Sample(s) Submitted on Ice? Custody Seal(s) Intact?	Yes Yes	No No	N/A	Temperature °C		Lab No.	
Sample(s) Submitted on Ice?	Yes	No		Temperature		Lab No	
Custody Seal(s) Intact? Sample(s) Intact?	Yes Yes	No No	N/A	°C [] Cooler Blank			Page1of1_

PHYSIS		PHYS ENVIRONMENTAL LANGERT Interative Solutions for Na	JANCES, INC.
ENVIRONMENTAL LABORATORIES, INC.	Project Iteration ID:	2302004-015	
Innovative Solutions for Nature	Client Name:	WSP USA	
Sample Receipt Summary	Project Name:	2315100200.0	Nonitoring Project # 0004.PHYSIS PO # GL 57300 Org # 3151
Receiving Info	COC Page Number:	2 of 2	
1. Initials Received By:	Bottle Label Color:	NA	
2. Date Received: 9/26/23			
2 Time Possivadi incon			
4. Client Name: WSP	•		
5. Courier Information: (Please circle)			
Client     UPS	<ul> <li>Area Fa</li> </ul>		DRS
• (FedEx • GSO/GLS	<ul> <li>Ontrac</li> </ul>		<ul> <li>PAMS</li> </ul>
<ul> <li>PHYSIS Driver:</li> </ul>			
i. Start Time:	_	iii. Total Milea	age:
ii. End Time:		iv. Number of	Pickups:
6. Container Information: (Please put the # of co	ontainers or circle none	.)	
• Cooler • Styrofoam Cooler	• Box	es	None
<ul> <li>Carboy(s)</li> <li>Carboy Trash Can(</li> </ul>			Other
7. What type of ice was used: (Please circle any t			
Wet Ice     Blue Ice			<ul> <li>None</li> </ul>
8. Randomly Selected Samples Temperature (°C)	: 10.4 Use	d I/R Thermom	eter #
Inspection Info			
1. Initials Inspected By:			
Sample Integrity Upon Receipt:			
1. COC(s) included and completely filled out			No
2. All sample containers arrived intact		200	No
3. All samples listed on COC(s) are present			No
4. Information on containers consistent with info	ormation on COC(s)		No
5. Correct containers and volume for all analyses	s indicated		No
6. All samples received within method holding ti	me		No
7. Correct preservation used for all analyses indi			NO
8. Name of sampler included on COC(s)			No
	Notes:		
	NOLES.		
S. A. Land			
See temp.			
1			
:\Sample Logistics (SL)\SRS			Page 1of1



FINAL REPORT

Work Orders:	3126013	Report Date:	11/10/2023
		Received Date:	10/10/2023
Project:	2315100200.0004.WECK	Turnaround Time:	Normal
riojeci.		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	P.O. #:	C016900152
Client:	WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Billing Code:	

#### ELAP-CA #1132 • EPA-UCMR #CA00211 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 10/10/23 with the Chain-of-Custody document. The samples were received in good condition, at 1.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

in In

Kim G. Tu Project Manager

3I26013





FINAL REPORT

#### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Project Number: 2315100200.0004.WECK

Reported: 11/10/2023 12:01

Project Manager: John Rudolph

### Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	3126013-01	Water	10/10/23 10:40	
CL08	Nick Jernack	3126013-02	Water	10/10/23 09:50	
CL09	Nick Jernack	3126013-03	Water	10/10/23 09:15	
CL10	Nick Jernack	3126013-04	Water	10/10/23 08:35	
LE02	Nick Jernack	3126013-05	Water	10/10/23 09:00	



## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK

**Reported:** 11/10/2023 12:01

Project Manager: John Rudolph

Sample Results
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						_		
Sample:	CL07					Sampled	l: 10/10/23 10:40 k	y Nick Jernack
	3I26013-01 (Water)							
Analyte		Resu	t MDL	MRL	Units	Dil	Analyzed	Qualifier
onventional Ch	emistry/Physical Paramete	rs by APHA/EPA/ASTM Methods						
Method: EPA 3	50.1			Instr: AA06				
Batch ID: W3	J1335	Preparation: _NONE (WETCHEM)		Prepared: 10/16/	/23 12:52			Analyst: AEC
Ammonia as	Ν	1.	<b>7</b> 0.017	0.10	mg/l	1	10/18/23	
Method: EPA 3	51.2			Instr: AA06				
Batch ID: W3	J0954	Preparation: _NONE (WETCHEM)		Prepared: 10/11/	/23 09:38			Analyst: AEC
TKN			<b>3</b> 0.065	0.10	mg/l	1	10/12/23	
Method: EPA 3	53.2			Instr: AA01				
Batch ID: W3	J0911	Preparation: _NONE (WETCHEM)		Prepared: 10/10/	/23 19:50			Analyst: ISM
Nitrate as N		• • • • • • • • • • • • • • • • • • •	0.040	0.20	mg/l	1	10/10/23 20:47	
Nitrite as N		NI	0.042	0.10	mg/l	1	10/10/23 20:47	
Method: EPA 3	65.3			Instr: UVVIS04				
Batch ID: W3	J0958	Preparation: _NONE (WETCHEM)		Prepared: 10/11/	/23 09:49			Analyst: JSG
o-Phosphate	as P	0.1	<b>4</b> 0.0071	0.010	mg/l	1	10/11/23 15:03	
Method: EPA 3	65.3			Instr: UVVIS04				
Batch ID: W3	J2366	Preparation: _NONE (WETCHEM)		Prepared: 10/27/	/23 12:59		Α	nalyst: ymt/rob
Phosphorus	as P, Total	0.1	<b>7</b> 0.0067	0.010	mg/l	1	10/30/23	
Method: SM 25	40C			Instr: OVEN17				
Batch ID: W3	J1027	Preparation: _NONE (WETCHEM)		Prepared: 10/11/	/23 13:55			Analyst: bel
Total Dissolv	ved Solids		<b>0</b> 4.0	10	mg/l	1	10/12/23	
Method: SM 25	40D			Instr: OVEN15				
Batch ID: W3	J1124	Preparation: _NONE (WETCHEM)		Prepared: 10/12/	/23 10:27			Analyst: kac
Total Susper	nded Solids		4	5	mg/l	1	10/12/23	J
Method: SM 45	00S2-D			Instr: _ANALYST				
Batch ID: W3	J1148	Preparation: _NONE (WETCHEM)		Prepared: 10/12/	/23 13:41			Analyst: ymt
Sulfide, Tota	I		<b>0</b> 0.50	1.0	mg/l	10	10/13/23	
letals by EPA 20	00 Series Methods							
Method: EPA 2	00.7			Instr: ICP03				
Batch ID: W3	J1314	Preparation: EPA 200.2		Prepared: 10/16/	/23 11:07			Analyst: kvm
Aluminum, D	)issolved	0.05	<b>1</b> 0.041	0.050	mg/l	1	10/18/23	-
Aluminum, T			0.022	0.050	mg/l	1	10/18/23	



## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

11/10/2023 12:01

Reported:

(Continued)

Sample Results
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1.000								
Sample:	CL08					Sample	d: 10/10/23 9:50 b	y Nick Jernack
	3I26013-02 (Water)							
Analyte		Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional	Chemistry/Physical Parameters	s by APHA/EPA/ASTM Methods						
Method: EPA	350.1			Instr: AA06				
Batch ID: \	W3J1335	Preparation: _NONE (WETCHEM)		Prepared: 10/16/	/23 12:52			Analyst: AEC
Ammonia	as N	0.33	0.017	0.10	mg/l	1	10/18/23	
Method: EPA	351.2			Instr: AA06				
Batch ID: \	W3J0954	Preparation: _NONE (WETCHEM)		Prepared: 10/11/	/23 09:38			Analyst: AEC
<b>TKN</b>		0.89	0.065	0.10	mg/l	1	10/12/23	
Method: EPA	353.2			Instr: AA01				
Batch ID: \	W3J0911	Preparation: _NONE (WETCHEM)		Prepared: 10/10/	/23 19:50			Analyst: ISM
Nitrate as	Ν	0.052	0.040	0.20	mg/l	1	10/10/23 20:48	J
Nitrite as N	1	ND	0.042	0.10	mg/l	1	10/10/23 20:48	
Method: EPA	365.3			Instr: UVVIS04				
Batch ID: \	W3J0958	Preparation: _NONE (WETCHEM)		Prepared: 10/11/	/23 09:49			Analyst: JSG
o-Phosph	ate as P	0.025	0.0071	0.010	mg/l	1	10/11/23 15:04	
Method: EPA	365.3			Instr: UVVIS04				
Batch ID: \	W3J2366	Preparation: _NONE (WETCHEM)		Prepared: 10/27/	/23 12:59		A	nalyst: ymt/rob
Phosphor	us as P, Total	0.061	0.0067	0.010	mg/l	1	10/30/23	
Method: SM	2540C			Instr: OVEN17				
Batch ID: \	W3J1027	Preparation: _NONE (WETCHEM)		Prepared: 10/11/	/23 13:55			Analyst: bel
Total Diss	olved Solids	450	4.0	10	mg/l	1	10/12/23	
Method: SM	2540D			Instr: OVEN15				
Batch ID: \	W3J1124	Preparation: _NONE (WETCHEM)		Prepared: 10/12/	/23 10:27			Analyst: kac
Total Susp	pended Solids			5	mg/l	1	10/12/23	J
Method: SM	4500S2-D			Instr: _ANALYST				
Batch ID: \	W3J1148	Preparation: _NONE (WETCHEM)		Prepared: 10/12/	/23 13:41			Analyst: ymt
Sulfide, To	otal	2.5	0.25	0.50	mg/l	5	10/13/23	
Metals by EPA	200 Series Methods							
Method: EPA	200.7			Instr: ICP03				
Batch ID: \	W3J1314	Preparation: EPA 200.2		Prepared: 10/16/	/23 11:07			Analyst: kvm
Aluminum	, Dissolved	0.11	0.041	0.050	mg/l	1	10/18/23	
Aluminum	ı, Total	0.15	0.022	0.050	mg/l	1	10/18/23	



## **Certificate of Analysis**

**FINAL REPORT** 

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

11/10/2023 12:01

Reported:

Sample Results							(Continued)
Sample: CL09					Sample	ed: 10/10/23 9:15 b	y Nick Jernack
3I26013-03 (Water)							
Analyte	Re	esult MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Paramet	ters by APHA/EPA/ASTM Methods						
Method: EPA 350.1			Instr: AA06				
Batch ID: W3J1335	Preparation: _NONE (WETCHEM)		Prepared: 10	/16/23 12:52			Analyst: AEC
Ammonia as N		<b>1.8</b> 0.01	7 0.10	mg/l	1	10/18/23	
Method: EPA 351.2			Instr: AA06				
Batch ID: W3J0954	Preparation: _NONE (WETCHEM)		Prepared: 10	/11/23 09:38			Analyst: AEC
ТКМ		<b>2.6</b> 0.06	5 0.10	mg/l	1	10/12/23	
Method: EPA 353.2			Instr: AA01				
Batch ID: W3J0911	Preparation: _NONE (WETCHEM)		Prepared: 10	/10/23 19:50			Analyst: ISM
Nitrate as N	••••••••••••••••••••••••••••••••••••••	0.04	0.20	mg/l	1	10/10/23 20:49	J
Nitrite as N		ND 0.042	2 0.10	mg/l	1	10/10/23 20:49	
Method: EPA 365.3			Instr: UVVIS0	4			
Batch ID: W3J0958	Preparation: _NONE (WETCHEM)		Prepared: 10	/11/23 09:49			Analyst: JSG
o-Phosphate as P	(	<b>0.11</b> 0.007	1 0.010	mg/l	1	10/11/23 15:04	
Method: EPA 365.3			Instr: UVVIS0	4			
Batch ID: W3J2366	Preparation: _NONE (WETCHEM)		Prepared: 10	/27/23 12:59		Α	nalyst: ymt/rob
Phosphorus as P, Total	(	0.006	0.010	mg/l	1	10/30/23	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W3J1027	Preparation: _NONE (WETCHEM)		Prepared: 10	/11/23 13:55			Analyst: bel
Total Dissolved Solids		<b>550</b> 4.0	10	mg/l	1	10/12/23	
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W3J1124	Preparation: _NONE (WETCHEM)		Prepared: 10	/12/23 10:27			Analyst: kac
Total Suspended Solids		6	5	mg/l	1	10/12/23	
Method: SM 4500S2-D			Instr: _ANALY	/ST			
Batch ID: W3J1148	Preparation: _NONE (WETCHEM)		Prepared: 10	/12/23 13:41			Analyst: ymt
Sulfide, Total		<b>6.0</b> 0.50	1.0	mg/l	10	10/13/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W3J1314	Preparation: EPA 200.2		Prepared: 10	/16/23 11:07			Analyst: kvm
Aluminum, Dissolved		<b>0.14</b> 0.04	1 0.050	mg/l	1	10/18/23	
Aluminum, Total	(	<b>0.18</b> 0.02	2 0.050	mg/l	1	10/18/23	

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## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

11/10/2023 12:01

Reported:

(Continued)

Sample Results

Sample:	CL10					Sample	ed: 10/10/23 8:35 b	y Nick Jernack
	3l26013-04 (Water)							
Analyte		Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional	Chemistry/Physical Parameters	s by APHA/EPA/ASTM Methods						
Method: EPA	A 350.1			Instr: AA06				
Batch ID: \	W3J1335	Preparation: _NONE (WETCHEM)		Prepared: 10/16/2	23 12:52			Analyst: AEC
Ammonia	as N	0.023	0.017	0.10	mg/l	1	10/18/23	J
Method: EPA	A 351.2			Instr: AA06				
Batch ID: \	W3J0954	Preparation: _NONE (WETCHEM)		Prepared: 10/11/2	23 09:38			Analyst: AEC
TKN		0.81	0.065	0.10	mg/l	1	10/12/23	
Method: EPA	A 353.2			Instr: AA01				
Batch ID: \	W3J0911	Preparation: _NONE (WETCHEM)		Prepared: 10/10/2	23 19:50			Analyst: ISM
Nitrate as	Ν		0.040	0.20	mg/l	1	10/10/23 20:50	
Nitrite as N	۸	ND	0.042	0.10	mg/l	1	10/10/23 20:50	
Method: EPA	A 365.3			Instr: UVVIS04				
Batch ID: \	W3J0958	Preparation: _NONE (WETCHEM)		Prepared: 10/11/2	23 09:49			Analyst: JSG
o-Phospha	ate as P	0.0080	0.0071	0.010	mg/l	1	10/11/23 14:59	J
Method: EPA	A 365.3			Instr: UVVIS04				
Batch ID: \	W3J2366	Preparation: _NONE (WETCHEM)		Prepared: 10/27/2	23 12:59		Α	nalyst: ymt/rob
Phosphor	us as P, Total	0.051	0.0067	0.010	mg/l	1	10/30/23	
Method: SM	2540C			Instr: OVEN17				
Batch ID: \	W3J1027	Preparation: _NONE (WETCHEM)		Prepared: 10/11/2	23 13:55			Analyst: bel
Total Diss	olved Solids	580	4.0	10	mg/l	1	10/12/23	
Method: SM	2540D			Instr: OVEN15				
Batch ID: \	W3J1124	Preparation: _NONE (WETCHEM)		Prepared: 10/12/2	23 10:27			Analyst: kac
Total Susp	pended Solids			5	mg/l	1	10/12/23	
Method: SM	4500S2-D			Instr: _ANALYST				
Batch ID: \	W3J1148	Preparation: _NONE (WETCHEM)		Prepared: 10/12/2	23 13:41			Analyst: ymt
Sulfide, To	tal	ND	0.050	0.10	mg/l	1	10/13/23	
Metals by EPA	200 Series Methods							
Method: EPA	A 200.7			Instr: ICP03				
Batch ID: \	W3J1314	Preparation: EPA 200.2		Prepared: 10/16/2	23 11:07			Analyst: kvm
Aluminum	n, Dissolved	0.25	0.041	0.050	mg/l	1	10/18/23	
Aluminum	n, Total	0.30	0.022	0.050	mg/l	1	10/18/23	



## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

11/10/2023 12:01

Reported:

(Continued)

Sample Results

A. 1997	-							
Sample:	LE02					Sample	ed: 10/10/23 9:00 k	y Nick Jernack
	3I26013-05 (Water)							
Analyte		Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
onventional	Chemistry/Physical Parameter	s by APHA/EPA/ASTM Methods						
Method: EP	A 350.1			Instr: AA06				
Batch ID:	W3J1335	Preparation: _NONE (WETCHEM)		<b>Prepared:</b> 10/16	6/23 12:52			Analyst: AEC
Ammonia	as N	0.45	0.017	0.10	mg/l	1	10/18/23	
Method: EP	A 351.2			Instr: AA06				
Batch ID:	W3J0954	Preparation: _NONE (WETCHEM)		Prepared: 10/1	1/23 09:38			Analyst: AEC
TKN		4.2	0.065	0.10	mg/l	1	10/12/23	
Method: EP	A 353.2			Instr: AA01				
Batch ID:	W3J0911	Preparation: _NONE (WETCHEM)		<b>Prepared:</b> 10/10	0/23 19:50			Analyst: ISM
Nitrate as	N	0.043	0.040	0.20	mg/l	1	10/10/23 20:51	J
Nitrite as	Ν	0.056	0.042	0.10	mg/l	1	10/10/23 20:51	J
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3J0958	Preparation: _NONE (WETCHEM)		Prepared: 10/1	1/23 09:49			Analyst: JSG
o-Phosph	ate as P	0.015	0.0071	0.010	mg/l	1	10/11/23 15:05	
Method: EP	A 365.3			Instr: UVVIS04				
Batch ID:	W3J2366	Preparation: _NONE (WETCHEM)		Prepared: 10/2	7/23 12:59		А	nalyst: ymt/rob
Phospho	rus as P, Total	0.24	0.0067	0.010	mg/l	1	10/30/23	
Method: SM	1 2540C			Instr: OVEN17				
Batch ID:	W3J1027	Preparation: _NONE (WETCHEM)		Prepared: 10/1	1/23 13:55			Analyst: bel
Total Diss	solved Solids	1900	4.0	10	mg/l	1	10/12/23	
Method: SM	1 4500S2-D			Instr: _ANALYST	-			
Batch ID:	W3J1148	Preparation: _NONE (WETCHEM)		Prepared: 10/12	2/23 13:41			Analyst: ymt
Sulfide, T	otal	0.10	0.050	0.10	mg/l	1	10/13/23	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

Reported: 11/10/2023 12:01

Project Manager: John Rudolph

#### Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3J0911 - EPA 353.2											
Blank (W3J0911-BLK1)					Prepared & Anal	vzed: 10/1	0/23				
Nitrate as N		0.040	0.20	mg/l							
Nitrite as N		0.042	0.10	mg/l							
LCS (W3J0911-BS1)					Prepared & Anal	lyzed: 10/1	0/23				
Nitrate as N	1.02	0.040	0.20	mg/l	1.00	-	102	90-110			
Nitrite as N	- 1.02	0.042	0.10	mg/l	1.00		102	90-110			
Matrix Spike (W3J0911-MS1)	ource: 3J	10136-01			Prepared & Anal	lyzed: 10/1	0/23				
Nitrate as N	6.06	0.040	0.20	mg/l	2.00	4.01	102	90-110			
Nitrite as N	- 1.01	0.042	0.10	mg/l	1.00	ND	101	90-110			
Matrix Spike (W3J0911-MS2)	Source: 3J	10138-01			Prepared & Anal	lyzed: 10/1	0/23				
Nitrate as N	8.80	0.040	0.20	mg/l	2.00	6.83	99	90-110			
Nitrite as N	- 1.03	0.042	0.10	mg/l	1.00	ND	103	90-110			
Matrix Spike Dup (W3J0911-MSD1) S	ource: 3J	10136-01			Prepared & Anal	lyzed: 10/1	0/23				
Nitrate as N	6.05	0.040	0.20	mg/l	2.00	4.01	102	90-110	0.2	20	
Nitrite as N	- 1.02	0.042	0.10	mg/l	1.00	ND	102	90-110	1	20	
Matrix Spike Dup (W3J0911-MSD2) S	Source: 3J	10138-01			Prepared & Anal	lyzed: 10/1	0/23				
Nitrate as N	8.79	0.040	0.20	mg/l	2.00	6.83	98	90-110	0.1	20	
Nitrite as N	1.02	0.042	0.10	mg/l	1.00	ND	102	90-110	1	20	
Batch: W3J0954 - EPA 351.2											
Blank (W3J0954-BLK1)				Pi	epared: 10/11/23	Analyzed:	10/12/23				
ТКМ		0.065	0.10	mg/l							
Blank (W3J0954-BLK2)				Pi	epared: 10/11/23	Analyzed:	10/12/23				
ТКМ	<b>ND</b>	0.065	0.10	mg/l							
LCS (W3J0954-BS1)				Pi	epared: 10/11/23	Analyzed:	10/12/23				
ТКМ	0.995	0.065	0.10	mg/l	1.00		100	90-110			
LCS (W3J0954-BS2)				Pi	epared: 10/11/23	Analyzed:	10/12/23				
ТКМ	0.999	0.065	0.10	mg/l	1.00		100	90-110			
Duplicate (W3J0954-DUP1) S	Source: 3J	10139-03		Pi	epared: 10/11/23	Analyzed:	10/12/23				
ТКМ	0.529	0.065	0.10	mg/l		0.630			18	10	R-02
-		10132-01			epared: 10/11/23	-					
ΤΚΝ	- 1.17	0.065	0.10	mg/l	1.00	0.176	99	90-110			
Matrix Spike (W3J0954-MS2)	ource: 3J	10134-01		Pi	epared: 10/11/23	Analyzed:	10/12/23				
ТКМ	- 1.30	0.065	0.10	mg/l	1.00	0.274	102	90-110			
Matrix Spike Dup (W3J0954-MSD1) S	ource: 3J	10132-01		Р	epared: 10/11/23	Analyzed:	10/12/23				
TKN	- 1.13	0.065	0.10	mg/l	1.00	0.176	95	90-110	3	10	
Matrix Spike Dup (W3J0954-MSD2)	ource: 3J	10134-01		Pr	epared: 10/11/23	Analyzed:	10/12/23				
TKN	- 1.24	0.065	0.10	mg/l	1.00	0.274	97	90-110	4	10	

Batch: W3J0958 - EPA 365.3

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**FINAL REPORT** 

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

**Reported:** 11/10/2023 12:01

Project Manager: John Rudolph

(Continued)

Quality Control Results

Conventional Chemistry/Physical Parameters by Al	PHA/EPA/AST	M Method	s (Continued	(k							
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3J0958 - EPA 365.3 (Continued)											
Blank (W3J0958-BLK1) o-Phosphate as P	ND	0.0071	0.010	mg/l	Prepared & Ana	alyzed: 10/1	1/23				
LCS (W3J0958-BS1)					Prepared & Ana	alyzed: 10/1	1/23				
o-Phosphate as P	0.204	0.0071	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W3J0958-MS1)	Source: 3	126013-04			Prepared & Ana	alyzed: 10/1	1/23				
o-Phosphate as P	0.207	0.0071	0.010	mg/l	0.200	0.00800	100	85-112			
Matrix Spike Dup (W3J0958-MSD1) o-Phosphate as P		<b>126013-04</b> 0.0071	0.010	mg/l	Prepared & Ana 0.200	alyzed: 10/1 0.00800	<b>1/23</b> 100	85-112	0.5	20	
Batch: W3J1027 - SM 2540C											
Blank (W3J1027-BLK1)				Pr	epared: 10/11/23	Analyzed:	10/12/23				
Total Dissolved Solids	ND	4.0	10	mg/l	-	-					
LCS (W3J1027-BS1)				Pr	epared: 10/11/23	Analyzed:	10/12/23				
Total Dissolved Solids	823	4.0	10	mg/l	824	-	100	97-103			
Duplicate (W3J1027-DUP1)	Source: 3	J11028-06		Pr	epared: 10/11/23	Analyzed:	10/12/23				
Total Dissolved Solids	36000	4.0	10	mg/l		36600			2	10	
Duplicate (W3J1027-DUP2)	Source: 3	J11028-16		Pr	epared: 10/11/23	Analyzed:	10/12/23				
Total Dissolved Solids	32600	4.0	10	mg/l		31800			2	10	
Batch: W3J1124 - SM 2540D											
Blank (W3J1124-BLK1)					Prepared & Ana	alyzed: 10/1	2/23				
Total Suspended Solids			5	mg/l							
LCS (W3J1124-BS1)					Prepared & Ana	alyzed: 10/1	2/23				
Total Suspended Solids	47.8		5	mg/l	52.6		91	90-110			
Duplicate (W3J1124-DUP1)	Source: 3	129007-01			Prepared & Ana	alyzed: 10/1	2/23				
Total Suspended Solids	58.0		5	mg/l		63.0			8	10	
Duplicate (W3J1124-DUP2)	Source: 3	J10084-01			Prepared & Ana	alyzed: 10/1	2/23				
Total Suspended Solids	120		5	mg/l		128			7	10	
Batch: W3J1148 - SM 4500S2-D											
Blank (W3J1148-BLK1)				Pr	epared: 10/12/23	Analyzed:	10/13/23				
Sulfide, Total		0.050	0.10	mg/l							
LCS (W3J1148-BS1)				Pr	epared: 10/12/23	Analyzed:	10/13/23				
Sulfide, Total	0.100	0.050	0.10	mg/l	0.0999	,	100	90-110			
Duplicate (W3J1148-DUP1)	Source: 3	126013-01		Pr	epared: 10/12/23	Analyzed:	10/13/23				
Sulfide, Total	10.0	1.0	2.0	mg/l	•	10.0			0	20	
Duplicate (W3J1148-DUP2)	Source: 3	126013-03		Pr	epared: 10/12/23	Analvzed:	10/13/23				
Sulfide, Total	6.00	1.0	2.0	mg/l		6.00	,		0	20	
Matrix Spike (W3J1148-MS1)	Source: 3	J10017-01		Pr	epared: 10/12/23	Analyzed	10/13/23				
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W3J1148-MSD1)	Source: 3	J10017-01		Pr	epared: 10/12/23	Analyzed:	10/13/23				

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**FINAL REPORT** 

#### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: 2315100200.0004.WECK

Reported: 11/10/2023 12:01

Project Manager: John Rudolph

(Continued)

Quality Control Results

Conventional Chemistry/Physical Parameters by APH	A/EPA/AS	TM Methods	s (Continue	d)							
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
atch: W3J1148 - SM 4500S2-D (Continued)											
Matrix Spike Dup (W3J1148-MSD1)	Source: 3	3J10017-01		Pre	pared: 10/12/23	3 Analyzed:	10/13/23	3			
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	
atch: W3J1335 - EPA 350.1											
Blank (W3J1335-BLK1)				Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N		0.017	0.10	mg/l		-					
Blank (W3J1335-BLK2)				Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N		0.017	0.10	mg/l							
.CS (W3J1335-BS1)				Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N	0.243	0.017	0.10	mg/l	0.250		97	90-110			
.CS (W3J1335-BS2)				Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N	0.252	0.017	0.10	mg/l	0.250		101	90-110			
Aatrix Spike (W3J1335-MS1)	Source: 3	3J04002-01		Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N	0.469	0.017	0.10	mg/l	0.250	0.225	98	90-110			
Aatrix Spike (W3J1335-MS2)	Source: 3	3J10017-03		Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N	0.596	0.017	0.10	mg/l	0.250	0.345	100	90-110			
Matrix Spike Dup (W3J1335-MSD1)	Source: 3	3J04002-01		Pre	pared: 10/16/23	3 Analvzed:	10/18/23	3			
Ammonia as N			0.10	mg/l	0.250	0.225	99	90-110	0.5	15	
Matrix Spike Dup (W3J1335-MSD2)	Source: 3	3J10017-03		Pre	pared: 10/16/23	3 Analyzed:	10/18/23	3			
Ammonia as N		0.017	0.10	mg/l	0.250	0.345	100	90-110	0.2	15	
atch: W3J2366 - EPA 365.3											
Blank (W3J2366-BLK1)				Pre	pared: 10/27/23	3 Analyzed:	10/30/23	3			
Phosphorus as P, Total		0.0067	0.010	mg/l		, <b>,</b>		-			
LCS (W3J2366-BS1)				Pre	pared: 10/27/23	3 Analyzed:	10/30/23	3			
Phosphorus as P, Total	0.198	0.0067	0.010	mg/l	0.200	,	99	90-110			
Matrix Spike (W3J2366-MS1)	Source: 3	BJ17076-01		Pre	pared: 10/27/23	3 Analyzed:	10/30/23	3			
Phosphorus as P, Total	0.311	0.0067	0.010	mg/l	0.200	0.121	95	90-110			
Matrix Spike Dup (W3J2366-MSD1)	Source: 3	BJ17076-01		Pre	pared: 10/27/23	3 Analyzed:	10/30/23	3			
Phosphorus as P, Total	0.324	0.0067	0.010	mg/l	0.200	0.121	102	90-110	4	20	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

Reported: 11/10/2023 12:01

Project Manager: John Rudolph

(Continued)

### **Quality Control Results**

Metals by EPA 200 Series Methods

					Spike	Source		%REC		RPD	
Analyte R	esult	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3J1314 - EPA 200.7											
Blank (W3J1314-BLK1)				Prepare	ed: 10/16/23	Analyzed: 1	10/18/23				
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W3J1314-BS1)				Prepare	ed: 10/16/23	Analyzed: 1	10/18/23				
Aluminum, Dissolved 0	.219	0.041	0.050	mg/l	0.200		109	85-115			
Aluminum, Total 0	.219	0.022	0.050	mg/l	0.200		109	85-115			
Matrix Spike (W3J1314-MS1) Sou	urce: 31	26012-02		Prepare	ed: 10/16/23	Analyzed: 1	10/18/23				
Aluminum, Total 0	.297	0.022	0.050	mg/l	0.200	0.0252	136	70-130			MS-02
Matrix Spike (W3J1314-MS2) Sou	urce: 31	26013-01		Prepare	ed: 10/16/23	Analyzed: 1	10/18/23				
Aluminum, Total 0	.352	0.022	0.050	mg/l	0.200	0.107	123	70-130			
Matrix Spike Dup (W3J1314-MSD1) Sou	urce: 31	26012-02		Prepare	ed: 10/16/23	Analyzed: 1	10/18/23				
Aluminum, Total 0	.291	0.022	0.050	mg/l	0.200	0.0252	133	70-130	2	30	MS-02
Matrix Spike Dup (W3J1314-MSD2) Sou	urce: 31	26013-01		Prepare	ed: 10/16/23	Analyzed: 1	10/18/23				
Aluminum, Total 0	.359	0.022	0.050	mg/l	0.200	0.107	126	70-130	2	30	



## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK

Reported: 11/10/2023 12:01

Project Manager: John Rudolph

### Notes and Definitions

ltem	Definition
J	Estimated conc. detected <mrl and="">MDL.</mrl>
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
R-02	The RPD was outside of QC acceptance limits due to possible matrix interference.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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### Chain of Custody & Sample Information Record

### 3I26013

Client: WSP USA E&I In	IC.		Con	tact:	John	Ruc	lolpł	h												Phone No.	858-243-8158	
Project Name: LECL TM	1DL Monitori	na	Ema		. lab		alada	<u></u>												······		porting Requests
Project Number:         2315100200           PO#:         C016900152           GL Code:         573000           Org#         3151	.0004.WECK		Turr	n Arou TAT Ap	nd T oprov	al:		<u>@</u> w	•	lout	tine			5 Da Rush	-	*4	I8 H Ru			*24 Hour Rush iditional Charges May Apply	FA Ema	a Package:Yes No X Results:Yes No ail Results:Yes No State EDT:Yes No Number in Notes)
*Please include Marissa Cuevas (marissa.cu Sampler Infor	evas@wsp.com) on all inv mation	/oicing	·	# of ( & Pre							атр Гуре		А	naly	sis	Ree	anea	sted		Matrix	N	otes
Name: Nick 3		· .							Containers							A 365.3)	(f)		200.7)	DW = Drinking Water	Ortho-P is field filtered	
Employer: <u>WSP USA E.</u> Signature:			served 4	HCI HNO3 Na925073	8	NaOH/ZnAcetate NH4CI			Total # of Cont	tine	imple	Special TSS	Nitrate - Nitrite (EPA 353.2)	TDS (SM2540 C)	Ammonia (EPA 350.1)	Total Phosphorus (EPA 365.3)	tho-P (EPA 365.	Total Suinde (SM4500S) Total AL (EPA 200.7)	ved AL (EPA	WW = Wastewater GW = Groundwater S = Soil SG = Sludge	Dissolved AI is field fil	tered (0.45 um)
Sample ID	Date	Time	Unpre H2SO	HCI HNO3	NaOH	NaOH NH4C	MCAA	LIOZEU	Tota	Rout	Resa	Spec	litrate	DS (SI	/mmor	otal P	RP/Or	otal S otal A	Dissol	L = Liquid M = Miscelianeous		
CL07		1040							ľ					x >	+-				1 1	M - Miscenarieous		
CL08		0950												x >								
CL09		0915												x >								
CL10		0835								Γİ				xx								
LE02		0900												xx						···	<b>1</b>	
					_																	
							_,															
									· ·													
			1																_			
Relinquished By (sign)	Print Name	e / Com	pany		Ē	Date	/ Tin	ne				Re	ceiv	ved	By	(Sig	ın)			Prir	nt Name / Company	,
11/1	Nick JN	nade / C	NSP	10	<u>118[</u>	25.	13	340	2		7	91								SAM	RMS	
Jan .	SAM	RA	15	1	101	101	23	7			Ç		1		/					Weck	/0	110123 15:30
													-							•		1
									_/													
	e Integrity Upon R		·,			<b>T</b>					+		_La	ab N	ote	S						
Sample(s) Submitted Custody Seal(s	<u> </u>	No No	N/	Δ		Tem	٦١		°C			-	+.	()2	0	γ				Lab No.		
Sample(s	. 0	No	18/	<b>~</b>	C	_ Cod	1	0					ł	00	ν	ļ					Page 1	of 1
	· · · · · ·																					Page 13 of 14



## Sample Receipt Checklist

		Weck WKO: VKO Logged by:	Jaime Gomez			Date/T	# of Samples:	
	Samp	les Checked by:	Jaime Gomez				Delivered by:	RMS
		Task			Yes	No	N/A	Comments
		COC present at re	eceipt?		$\boxtimes$			
	-	COC properly cor	npleted?	* •	$\boxtimes$		_	
	COC	COC matches sar	nple labels?		$\boxtimes$		_	
	с С							· · · · · · · · · · · · · · · · · · ·
		Project Manager	notified about COC discrepance	xy?				
		l					-	
		Sample Tempera			1.6 °C	2	_	· · · · · · · · · · · · · · · · · · ·
	Ľ	Samples received			$\boxtimes$		_	
	atic	Ice Type (Blue/W				_	-	
	Ë	All samples intac			$\boxtimes$		-	
	nfo	Samples in prope			$\boxtimes$		_	· · · · · · · · · · · · · · · · · · ·
	ot li	Sufficient sample	e volume?		$\boxtimes$		_	
	Receipt Information	Samples intact?			$\boxtimes$		_	
	Re	Received within	holding time?		$\boxtimes$		_	·
				n an				
		Project Manager	notified about receipt info?			$\mathbf{X}$	L	
		Sample labels ch	ecked for correct preservation	, 2	$\boxtimes$			
				i 1979 - Sana Anala ang sang sang sang sang sang sang sang			LJ : _	
	ation?		(No) none, If Yes (see commen 1.1, 8260, 1666 P/T, LUFT	it)		$\boxtimes$		□<6mm/Pea Size?
	Sample Preservation Verification?	pH verified upon Metals <2; H2SO 525.2<2, 6710B<	4 pres tests <2; 522<4; TOC <2;	; 508.1,	$\boxtimes$			pH paper Lot# 3082367
	reserva	Free Chlorine Te	sted <0.1 (Organics Analyses)					Cl Test Strip Lot#
	Sample P	O&G pH <2 verifi pH adjusted for 0 Project Manager		ration?				pH paper Lot# pH Reading: Acid Lot# Amt added:
							-	
	PM Co	mments						
				· · · · · · · · · · · · · · · · · · ·				······································
_								
	Sample	Receint Check	list Completed by:					
Jac		ure: Jaime Gome					<b>D</b> _1	10/10/22
je 1	Signat	ure. Juime gome					Date:	10/10/23
Page 14 of 14								
)f 1,			<b>Ben fride hill de verse men en e</b>			**************************************	<b></b>	
4								

RCJJUNG



December 15, 2023

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Project Name:LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO #Physis Project ID:C3949054907GL # 57300 Org # 3151

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 10/12/2023. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, misty mercier

Misty Mercier 714 602-5320 Extension 202 mistymercier@physislabs.com



### **PROJECT SAMPLE LIST**

#### WSP USA

#### PHYSIS Project ID: 2302004-017

Total Samples: 10

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479

					-	
PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
111950	CL07 - Int		10/10/202	10:40	Biologic	Not Specified
111951	CL07 - Surf		10/10/202	10:50	Biologic	Not Specified
111952	CL08 - Int		2 10/10/202	10:00	Biologic	Not Specified
111953	CL08 - Surf		2 10/10/202	10:15	Biologic	Not Specified
111954	CL09 - Int		2 10/10/202	9:15	Biologic	Not Specified
111955	CL09 - Surf		2 10/10/202	9:25	Biologic	Not Specified
111956	CL10 - Int		2 10/10/202	8:35	Biologic	Not Specified
111957	CL10 - Surf		2 10/10/202	8:50	Biologic	Not Specified
111958	LE02 - Int		2 10/10/202	9:00	Biologic	Not Specified
111959	LE02 - Surf		2 10/10/202 2	9:20	Biologic	Not Specified

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### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
Μ	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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PHYSIS Project ID: 2302004-017 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

			Con	ven	tion	als				
ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE Batch ID	Date Processed	Date Analyzed
Sample ID: 111950-R1	CL07 - Int		Matrix: Biolog	ic			Sampled:	10-Oct-23 10:40	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	9.61	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111951-R1	CL07 - Surf		Matrix: Biolog	ic			Sampled:	10-Oct-23 10:50	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	5.34	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111952-R1	CLo8 - Int		Matrix: Biolog	ic			Sampled:	10-Oct-23 10:00	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	14.4	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111953-R1	CLo8 - Surf		Matrix: Biolog	ic			Sampled:	10-Oct-23 10:15	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	5.87	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111954-R1	CLo9 - Int		Matrix: Biolog	ic			Sampled:	10-Oct-23 9:15	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	23.7	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111955-R1	CL09 - Surf		Matrix: Biolog	ic			Sampled:	10-Oct-23 9:25	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	15	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111956-R1	CL10 - Int		Matrix: Biolog	ic			Sampled:	10-Oct-23 8:35	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	18.2	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111957-R1	CL10 - Surf		Matrix: Biolog	ic			Sampled:	10-Oct-23 8:50	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	8.01	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111958-R1	LEo2 - Int		Matrix: Biolog	ic			Sampled:	10-Oct-23 9:00	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	80.8	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23
Sample ID: 111959-R1	LE02 - Surf		Matrix: Biolog	ic			Sampled:	10-Oct-23 9:20	Received:	12-Oct-23
Chlorophyll-a	SM 10200 H	mg/m3	160	1	1	2	NA	C-75101	31-Oct-23	31-Oct-23

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

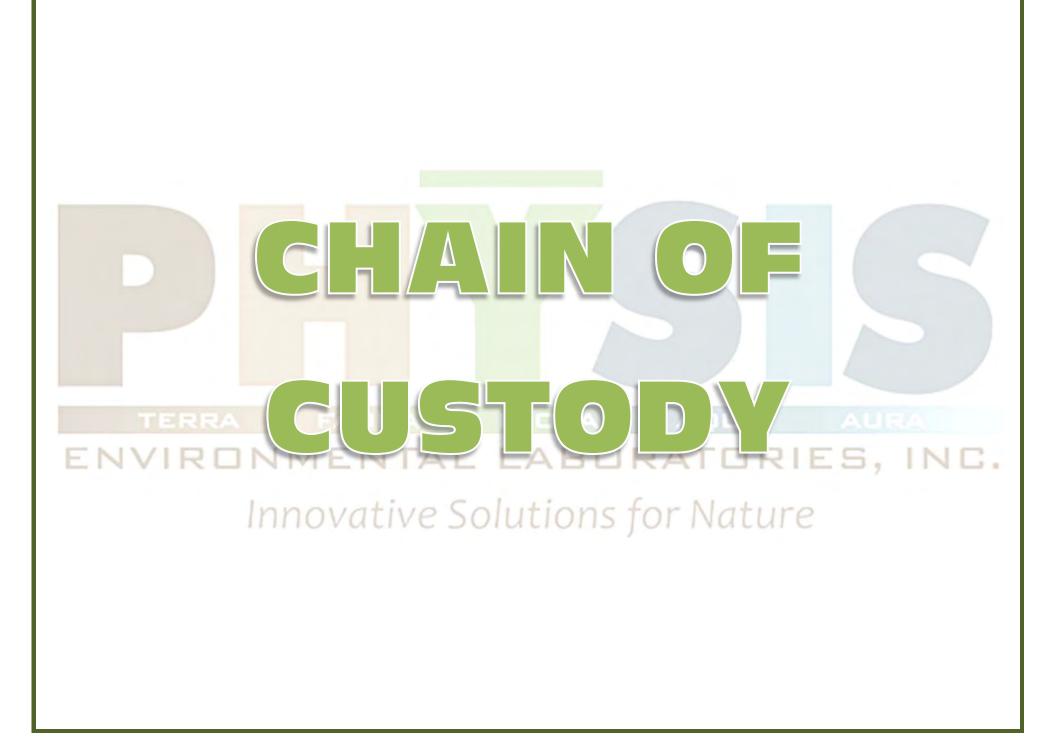


Conventionals

PHYSIS Project ID: 2302004-017 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

### **QUALITY CONTROL REPORT**

SAMPLE ID	)	BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	AC %	CURACY LIMITS	PF %	ECISION LIMITS	QA CODE
Chlorophyll	l-a	Method:	SM 10200 H		Frac	ction: I	NA		Prepa	red: 3	31-Oct-23	Analy	zed: 31-Oct-	23
111949-B1	QAQC Procedural Blank	C-75101	ND	1	1	2	mg/m3							
111949-BS1	QAQC Procedural Blank	C-75101	39500	1	1	2	mg/m3	43600	0	91	70 - 130% PASS			
111949-BS2	QAQC Procedural Blank	C-75101	41700	1	1	2	mg/m3	43600	0	96	70 - 130% PASS	5	30 PASS	



### Chain of Custody & Sample Information Record

Client: WS	P USA E&I Inc.			Con	Itac	t: Jo	hn F	Rudo	lph										Phone No.	858-243-8158
Project Name: LECL TMDL Monitoring Project Number: 2315100200.0004.PHYSIS				Ema	ail:	_		john	.rudolph@	wsp.com	1									Additional Reporting Requests Include QC Data Package:Ps No FAX Results:ys No
PO#: GL Code:	C014105479 57300 3151					round T App				By:	Routi	ine	. '		Day Jsh	*.	48 H Ri	ush	*24 Hour Rush Additional Charges May Apply	Email Results:ps N State EDT:ps N (Include Source Number in Notes)
	ampler Information					of Co Pres					I T	mple ype		Ana	lysis	Red	aues	sted	Matrix	Notes
Name: Employer: Signature:	Nick Junal WSPUSA	2	-	Unpreserved H2SO4			NaOH NaOH/ZnAcetate		MCAA Frozen	Total # of Containers			opecial Total Sulfide	0		Ammonia Total Bhootharia			DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid	Chl-a samples on 0.7 um GFF
	mple ID	Date		5 1	Ŧ	ΞŽ	ŽŽ	Z	ΣĒ	F	4		<u> </u>	ZI		Ā	0		M = Miscellaneous	Filter Volume: 500
	07 - Int	191925	1050			-	+	+	+	-		-	+		-		-	X		Filter Volume: 500
And the state of the	07 - Surf						-			-		-		-	+		-	X		Filter Volume: 500
	08 - Int 08 - Surf		1000				-			-		+			-		+	x		Filter Volume: 500
	09 - Int		0915							-			+				+	x		Filter Volume: 450
	9 - Surf		0925				-			1			T		+			x		Filter Volume: 500
	10 - Int		0835			•							1					x		Filter Volume: 500
CL1	0 - Surf		0850															x		Filter Volume: 500
LE	02 - Int		0900															x		Filter Volume: 195
LEC	2 - Surf	7	0920															x		Filter Volume: 155
Relingvished	By (sign) P	rint Nan	ne / Com	pany	,		D	ate /	Time				Rec	eive	d By	(Sig	gn)		P	rint Name / Company
MA	~ Nick	SUN	uck/	Lisi	4	10	111	23	-160	00	1	9	e	-	/		_	_	Mitch Wag	mer/Physis 10/12/2
																				an a

(For Lab Use Only) Sample Integrity L	pon Rec	eipt			Lab Notes	
Sample(s) Submitted on Ice?	Yes	No		Temperature		Lab No
Custody Seal(s) Intact?	Yes	No	N/A	°C		
Sample(s) Intact?	Yes	No		□ Cooler Blank		Page _ 1 _ of _ 1

		PHYS					
		ENVIRUMMENTAL LABORAT	DRIES, INC. Iture				
TERRA FAUNA PLORA AQUA ACRA	Project Iteration ID:	2302004-017					
Innovative Solutions for Nature	Client Name:	WSP USA					
Sample Receipt Summary	Project Name:	LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479 GL # 57300 Org #					
Receiving Info		3151					
1. Initials Received By: MW	COC Page Number:	2 of 2					
2 Date Received By: 10100	Bottle Label Color:	NA					
2. Date Received: 10/12/23							
4. Client Name: WSP							
5. Courier Information: (Please circle)							
		-					
	• Area		• DRS				
GSO/GLS	Ontra	ac	<ul> <li>PAMS</li> </ul>				
PHYSIS Driver:							
i. Start Time:	-		eage:				
ii. End Time:	-		of Pickups:				
<ol> <li>Container Information: (Please put the # of c</li> </ol>		ne)					
Cooler Styrofoam Coole		oxes	None				
<ul> <li>Carboy(s)</li> <li>Carboy Trash Car</li> </ul>	n(s) • Ca	rboy Cap(s)	Other				
Selected Samples Temperature (°C	C): <u>2.</u> Us	ed I/R Thermoi	meter # <u>1</u> 2				
1. Initials Inspected By. CG							
ample integrity Upon Receipt:							
1. COC(s) included and completely filled out		(Yes)	/ No				
2. All sample containers arrived intact			No				
3. All samples listed on COC(s) are present			No				
4. nformation on containers consistent with in	formation on COC(s)	@ /	No				
5. Correct containers and volume for all analyse	es indicated		No				
5. All samples received within method holding	time		No				
7. Correct preservation used for all analyses ind	dicated	Yes	No				
3. Jame or sampler included on COC(s)			No				
	Notes:	U					



FINAL REPORT

Work Orders:	3K28002

Project: Project No. 2315100200.0004.WECK

Attn: John Rudolph

Client: WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	1/09/2024
<b>Received Date:</b>	12/04/2023
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C016900152
Billing Code:	

#### ELAP-CA #1132 • EPA-UCMR #CA00211 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 12/04/23 with the Chain-of-Custody document. The samples were received in good condition, at 1.9 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

in In

Kim G. Tu Project Manager

3K28002



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### Sample Summary

## Certificate of Analysis

FINAL REPORT

Project Number: Project No. 2315100200.0004.WECK

Reported: 01/09/2024 10:37

Project Manager: John Rudolph

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	3K28002-01	Water	12/04/23 11:30	
CL08	Nick Jernack	3K28002-02	Water	12/04/23 10:40	
CL09	Nick Jernack	3K28002-03	Water	12/04/23 09:45	
CL10	Nick Jernack	3K28002-04	Water	12/04/23 08:55	
LE02	Nick Jernack	3K28002-05	Water	12/04/23 09:20	

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### Sample Results

Sample: CL07

## Certificate of Analysis

FINAL REPORT

Project Number: Project No. 2315100200.0004.WECK

Reported: 01/09/2024 10:37

Project Manager: John Rudolph

Sampled: 12/04/23 11:30 by Nick Jernack

3K28002-01 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM Me	thods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W3L0758	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/11/23 17	7:07		Analyst: AEC
Ammonia as N	0.74	0.017	0.10	mg/l	1	12/12/23	
Method: EPA 351.2			Instr: AA06				
Batch ID: W3L1094	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/14/23 1 ⁻	1:21		Analyst: YMT
ТКМ	1.3	0.065	0.10	mg/l	1	12/20/23	
Method: EPA 353.2			Instr: AA01				
Batch ID: W3L0280	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/05/23 12	2:55		Analyst: ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	12/05/23 16:40	)
Nitrite as N		0.042	0.10	mg/l	1	12/05/23 16:40	)
Method: EPA 365.3			Instr: UVVISC	)4			
Batch ID: W3L0264	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/05/23 1	1:32		Analyst: rob
o-Phosphate as P	0.016	0.0071	0.010	mg/l	1	12/05/23 13:26	3
Method: EPA 365.3			Instr: UVVISC	)5			
Batch ID: W3L0957	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/13/23 1	1:24	Anal	yst: UVVIS05
Phosphorus as P, Total	0.051	0.0067	0.010	mg/l	1	12/18/23	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W3L0260	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/05/23 1	1:19		Analyst: bel
Total Dissolved Solids	500	4.0	10	mg/l	1	12/05/23	
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W3L0266	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/05/23 14	4:48		Analyst: kac
Total Suspended Solids			5	mg/l	1	12/05/23	J
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W3L0396	Preparation: _NONE (WETCHEM)	1	Prepared: 12	/06/23 1	1:50		Analyst: ymt
Sulfide, Total	0.90	0.050	0.10	mg/l	1	12/07/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W3L0528	Preparation: EPA 200.2		Prepared: 12	/07/23 1	1:26		Analyst: kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	12/13/23	
Aluminum, Total	0.025	0.022	0.050	mg/l	1	12/13/23	J

Page 3 of 14



### Sam

## **Certificate of Analysis**

**FINAL REPORT** 

WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Project Number: Project Manager:	-		00.0004.WE	ECK	01/09	<b>Reported:</b> 9/2024 10:37
Sample Results	Project Manager.	John Ku	doipii			(0	Continued)
Sample: CL08				Sampled	: 12/04,	/23 10:40 by N	ick Jernack
3K28002-02 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Particular	rameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1		,	Instr: AA06	2/11/22 17	.07		
Batch ID: W3L0758 Ammonia as N	Preparation: _NONE (WETCHEM 0.42	) 0.017	<b>Prepared:</b> 1 0.10	2/11/23 17 mg/l	:07	AI 12/12/23	nalyst: AEC
	0.42	0.017	0.10	mg/i		12/12/23	
Method: EPA 351.2			Instr: AA06				
Batch ID: W3L1094	Preparation: _NONE (WETCHEM		Prepared: 1				alyst: YMT
TKN	1.0	0.065	0.10	mg/l	1	12/20/23	
Method: EPA 353.2			Instr: AA01				
Batch ID: W3L0280	Preparation: _NONE (WETCHEM)	)	Prepared: 1		:55		nalyst: ISM
Nitrate as N	0.048	0.040	0.20	mg/l	1	12/05/23 16:41	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/05/23 16:41	
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W3L0264	Preparation: _NONE (WETCHEM	)	Prepared: 1	2/05/23 11	:32	А	nalyst: rob
o-Phosphate as P	0.0090	0.0071	0.010	mg/l	1	12/05/23 13:27	J
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W3L0957	Preparation: _NONE (WETCHEM	)	Prepared: 1	2/13/23 11	:24	Analys	st: UVVIS05
Phosphorus as P, Total	0.044	0.0067	0.010	mg/l	1	12/18/23	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W3L0260	Preparation: _NONE (WETCHEM	)	Prepared: 1		:19	Δ	nalyst: bel
	490	, 4.0	10	mg/l	1	12/05/23	
Method: SM 2540D			Instr: OVEN	15			
Batch ID: W3L0266	Preparation: _NONE (WETCHEM	)	Prepared: 1		·18	Δ	nalyst: kac
Total Suspended Solids	4	)	5	mg/l	.40	12/05/23	J
Method: SM 4500S2-D Batch ID: W3L0396	Preparation: _NONE (WETCHEM	<b>`</b>	Instr: _ANAL Prepared: 1		.50	Δ.	nalvet: vmt
Sulfide, Total	ND	0.050	0.10	mg/l	.50	12/07/23	nalyst: ymt
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03		26		
Batch ID: W3L0528	Preparation: EPA 200.2	0.041	<b>Prepared:</b> 1 0.050		:26 1	Ai 12/13/23	nalyst: kvm
Aluminum, Dissolved		0.041		mg/l			
Aluminum, Total	0.044	0.022	0.050	mg/l	1	12/13/23	J



### Sam

## **Certificate of Analysis**

**FINAL REPORT** 

WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Project Number: Project Manager:	-		0.0004.WE	ECK	01/09	<b>Reported:</b> /2024 10:37
Sample Results		oonin raa	aoipii			(0	Continued)
Sample: CL09				Samplec	l: 12/04	/23 9:45 by Ni	ck Jernack
3K28002-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W3L0758	Preparation: _NONE (WETCHEM)	)	Prepared: 12	2/11/23 17	:07	Ar	alyst: AEC
Ammonia as N	0.36	0.017	0.10	mg/l	1	12/12/23	
Method: EPA 351.2			Instr: AA06				
Batch ID: W3L1094	Preparation: _NONE (WETCHEM)	)	Prepared: 12	2/14/23 11	:21	An	alyst: YMT
TKN	1.1	0.065	0.10	mg/l	1	12/20/23	-
Method: EPA 353.2			Instr: AA01				
Batch ID: W3L0280	Preparation: NONE (WETCHEM)	)	Prepared: 12	2/05/23 12	:55	Ar	nalyst: ISM
Nitrate as N	• • •	0.040	0.20	mg/l	1	12/05/23 16:42	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/05/23 16:42	
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W3L0264	Preparation: _NONE (WETCHEM)	)	Prepared: 12		:32	Α	nalyst: rob
o-Phosphate as P	0.011	0.0071	0.010	mg/l	1	12/05/23 13:27	
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W3L0957	Preparation: _NONE (WETCHEM)	)	Prepared: 12	2/13/23 11	:24	Analys	<b>t:</b> UVVIS05
Phosphorus as P, Total	0.052	0.0067	0.010	mg/l	1	12/18/23	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W3L0260	Preparation: _NONE (WETCHEM)	)	Prepared: 12		·19	Δ	nalyst: bel
	600	4.0	10	mg/l	1	12/05/23	
Method: SM 2540D			Instr: OVEN	15			
Batch ID: W3L0266	Preparation: _NONE (WETCHEM)	,	Prepared: 12		·18	Δ	nalyst: kac
Total Suspended Solids	6	)	5	mg/l	.40	12/05/23	naryst. Rac
Method: SM 4500S2-D			Instr: _ANAL	-			
Batch ID: W3L0396	Preparation: _NONE (WETCHEM)	N N	Prepared: 12		.50	۸.	nalyst: ymt
Sulfide, Total	ND	0.050	0.10	mg/l	.50	12/07/23	alyst. ynnt
Metals by EPA 200 Series Methods				5			
-							
Method: EPA 200.7 Batch ID: W3L0528	Preparation: EPA 200.2		Instr: ICP03 Prepared: 12	2/07/22 11	.26	۸	alyst: kvm
Aluminum, Dissolved	Preparation: EPA 200.2 ND	0.041	0.050	2/07/23 11 mg/l	.20	An 12/13/23	
	0.11	0.022	0.050	mg/l	1	12/13/23	
		0.022	0.000			12,10,20	

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## **Certificate of Analysis**

**FINAL REPORT** 

WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	Project Number: Project Manager:	-		).0004.WECI	ĸ	01/09/	<b>Reported:</b> 2024 10:37
Sample Results						(C	ontinued)
Sample: CL10				Sampled: 1	2/04	/23 8:55 by Nic	k Jernack
3K28002-04 (Water) Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par			WIKE	Units		Analyzeu	Quaimer
Method: EPA 350.1 Batch ID: W3L0758	Preparation: _NONE (WETCHEM)		Instr: AA06 Prepared: 12	/11/23 17:07	,	Δn	alyst: AEC
	0.21	0.017	0.10	mg/l	1	12/12/23	
Method: EPA 351.2 Batch ID: W3L1094 TKN	Preparation: _NONE (WETCHEM) 0.97	0.065	Instr: AA06 Prepared: 12 0.10	/14/23 11:21 mg/l	1	<b>Ana</b> 12/20/23	lyst: YMT
Method: EPA 353.2 Batch ID: W3L0280 Nitrate as N Nitrite as N		0.040 0.042	Instr: AA01 Prepared: 12 0.20 0.10	/05/23 12:55 mg/l mg/l	1	<b>An</b> 12/05/23 16:43 12/05/23 16:43	<b>alyst:</b> ISM J
Method: EPA 365.3 Batch ID: W3L0264 o-Phosphate as P	Preparation: _NONE (WETCHEM) 0.010	0.0071	Instr: UVVIS0 Prepared: 12 0.010		1	<b>An</b> 12/05/23 13:28	<b>alyst:</b> rob
Method: EPA 365.3 Batch ID: W3L0957 Phosphorus as P, Total	Preparation: _NONE (WETCHEM) 0.059	0.0067	Instr: UVVIS0 Prepared: 12 0.010		1	<b>Analyst</b> 12/18/23	UVVIS05
Method: SM 2540C Batch ID: W3L0260 Total Dissolved Solids	Preparation: _NONE (WETCHEM) 610	4.0	Instr: OVEN1 Prepared: 12 10		1	<b>Ar</b> 12/05/23	alyst: bel
Method: SM 2540D Batch ID: W3L0266 Total Suspended Solids	Preparation: _NONE (WETCHEM) 7		Instr: OVEN1 Prepared: 12 5		1	<b>A</b> n 12/05/23	<b>alyst:</b> kac
Method: SM 4500S2-D Batch ID: W3L0396 Sulfide, Total	Preparation: _NONE (WETCHEM)	0.050	Instr: _ANAL\ Prepared: 12 0.10		1	<b>An</b> 12/07/23	a <b>lyst:</b> ymt
Metals by EPA 200 Series Methods Method: EPA 200.7			Instr: ICP03				
Batch ID: W3L0528 Aluminum, Dissolved	Preparation: EPA 200.2	0.041	Prepared: 12 0.050	/07/23 11:26 mg/l	1	Ana 12/13/23	<b>alyst:</b> kvm
	0.16	0.041	0.050	mg/l	1	12/13/23	

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### Sample Results

Sample: LE02

## Certificate of Analysis

FINAL REPORT

Project Number: Project No. 2315100200.0004.WECK

### Reported: 01/09/2024 10:37

Project Manager: John Rudolph

(Continued)

Sampled: 12/04/23 9:20 by Nick Jernack

3K28002-05 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM M	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W3L0758	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/11/23 17	:07	Ar	nalyst: AEC
Ammonia as N	0.080	0.017	0.10	mg/l	1	12/12/23	J
Method: EPA 351.2			Instr: AA06				
Batch ID: W3L1094	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/14/23 11	:21	An	alyst: YMT
TKN	4.2	0.13	0.20	mg/l	1	12/20/23	M-02
Method: EPA 353.2			Instr: AA01				
Batch ID: W3L0280	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/05/23 12	:55	А	nalyst: ISM
Nitrate as N	0.14	0.040	0.20	mg/l	1	12/05/23 16:44	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/05/23 16:44	
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W3L0264	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/05/23 11	:32	Α	nalyst: rob
o-Phosphate as P	0.017	0.0071	0.010	mg/l	1	12/05/23 13:21	-
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W3L0957	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/13/23 11	:24	Analys	t: UVVIS05
Phosphorus as P, Total	0.28	0.0067	0.010	mg/l	1	12/18/23	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W3L0260	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/05/23 11	:19	А	nalyst: bel
Total Dissolved Solids	2000	4.0	10	mg/l	1	12/05/23	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W3L0396	Preparation: _NONE (WETCHEM	)	Prepared: 12	2/06/23 11	:50	А	nalyst: ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/07/23	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: Project No. 2315100200.0004.WECK

Reported: 01/09/2024 10:37

Project Manager: John Rudolph

Conventional Chemistry/Physical Param	neters by	APHA/E	PA/ASTN	A Method	s						
Aucha	De l'	MD	MPI	11	Spike	Source	9/ DEC	%REC	000	RPD	Our
Analyte Batch: W3L0260 - SM 2540C	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Blank (W3L0260-BLK1)				Dro	oared & An	alvzed• 1	2/05/2	3			
Total Dissolved Solids	ND	4.0	10	mg/l		aryzeu. n	2/03/2.	,			
LCS (W3L0260-BS1)				Pre	oared & An	alyzed: 1	2/05/23	3			
Total Dissolved Solids	813	4.0	10	mg/l	824	,		97-103			
Duplicate (W3L0260-DUP1)	Source	: 3K28002	2-04		oared & An	-	2/05/2	3			
Total Dissolved Solids	603	4.0	10	mg/l		614			2	10	
Duplicate (W3L0260-DUP2) Total Dissolved Solids		: 3K28002		-	oared & An		2/05/2	3	2	10	
	1970	4.0	10	mg/l		2000			2	10	
Batch: W3L0264 - EPA 365.3											
Blank (W3L0264-BLK1) o-Phosphate as P	ND	0.0071	0.010	Prej mg/l	oared & An	alyzed: 1	2/05/23	3			
		0.001	0.0.0	-	annad Qi An	alumada 1	2 /05 /2	2			
LCS (W3L0264-BS1) o-Phosphate as P	0.210	0.0071	0.010	mg/l	oared & An 0.200	alyzed: 1		<b>5</b> 88-111			
Matrix Spike (W3L0264-MS1)	Source	: 3K28002	2-05	Prei	oared & An	alvzed: 1	2/05/23	3			
o-Phosphate as P	0.214		0.010	mg/l	0.200	0.0170		85-112			
Matrix Spike Dup (W3L0264-MSD1)	Source	: 3K28002	2-05	Pre	oared & An	alyzed: 1	2/05/23	3			
o-Phosphate as P	0.220	0.0071	0.010	mg/l	0.200	0.0170		85-112	3	20	
Batch: W3L0266 - SM 2540D											
Blank (W3L0266-BLK1)				Pre	oared & An	alyzed: 1	2/05/23	3			
Total Suspended Solids	ND		5	mg/l							
LCS (W3L0266-BS1)	60.7		5		bared & An	alyzed: 1					
Total Suspended Solids			5	mg/l	55.7			90-110			
Duplicate (W3L0266-DUP1) Total Suspended Solids	Source	: 3L04146	5-01 5	Prej mg/l	pared & An	alyzed: 1 390	2/05/23	3	4	10	
				-	annad Qi An		2 /05 /2	2			
Duplicate (W3L0266-DUP2) Total Suspended Solids	<b>Source</b> 42.9	: 3L05025	5	mg/l	pared & An	40.0	2/05/2:	5	7	10	
Batch: W3L0280 - EPA 353.2											
Blank (W3L0280-BLK1)				Prei	oared & An	alvzed: 1	2/05/23	3			
Nitrate as N	ND	0.040	0.20	mg/l		aryzea	_,,	-			
Nitrite as N		0.042	0.10	mg/l							
LCS (W3L0280-BS1)				-	oared & An	alyzed: 1	2/05/2	3			
Nitrate as N		0.040	0.20	mg/l	1.00		97	90-110			
Nitrite as N		0.042	0.10	mg/l	1.00		99	90-110			
Matrix Spike (W3L0280-MS1) Nitrate as N		: 3L01002 0.040	2- <b>01</b> 0.20	Prej mg/l	<b>bared &amp; An</b> 2.00	alyzed: 1 7.56	<b>2/05/2</b> 3 98	<b>3</b> 90-110			
Nitrite as N		0.040	0.20	mg/l	2.00 1.00	7.50 ND		90-110 90-110			
				Ū							
Matrix Spike (W3L0280-MS2) Nitrate as N	<b>Source</b> 9.51	<b>3L01002</b> 0.040	0.20	mg/l	<b>bared &amp; An</b> 2.00	7.53	2/05/2: 99	<b>3</b> 90-110			
				5							

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FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: Project No. 2315100200.0004.WECK

Reported: 01/09/2024 10:37

Project Manager: John Rudolph

(Continued)

Quality Control Results

Conventional Chemistry/Physical Param	eters by	APHA/EP	A/ASTM	l Methods	(Continue	d)					
					Spike	Source	~~~~	%REC		RPD	- 11 <i>1</i>
Analyte Batch: W3L0280 - EPA 353.2 (Continued)	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Matrix Spike (W3L0280-MS2)	Sourco	3L01002-	.02	Drona	red & Ana	Juzadi 12	/05/23	2			
Nitrite as N			0.10	mg/l	1.00	ND		<b>9</b> 0-110			
Matrix Spike Dup (W3L0280-MSD1)		3L01002-	-		red & Ana						
Nitrate as N			0.20	mg/l	2.00	7.56	97	90-110	0.1	20	
Nitrite as N	0.998	0.042	0.10	mg/l	1.00	ND	100	90-110	0	20	
Matrix Spike Dup (W3L0280-MSD2) Nitrate as N		3L01002	- <b>02</b> 0.20	Prepa mg/l	2.00	192ed: 12 7.53	/05/23 99	<b>8</b> 90-110	0	20	
Nitrite as N			0.20	mg/l	1.00	ND	104	90-110	1	20	
		0.042	0.10	iiig/i	1.00	ND	104	50-110	•	20	
Batch: W3L0396 - SM 4500S2-D											
Blank (W3L0396-BLK1) Sulfide, Total	ND	0.050	0.10	Prepared: mg/l	12/06/23	Analyze	d: 12/0	7/23			
				Ū	12/06/22	Analyza	J. 12/0	CC/ T			
LCS (W3L0396-BS1) Sulfide, Total	0.100	0.050	0.10	Prepared: mg/l	0.0998	Analyze		90-110			
Duplicate (W3L0396-DUP1)	Source	3101016-	01	-	12/06/23	Analyzo	d• 12/0	7/23			
Sulfide, Total		0.35	0.70	mg/l	12/00/25	1.40	4. 12/0	1725	0	20	
Matrix Spike (W3L0396-MS1)	Source:	3101016-	05	Prepared:	12/06/23	Analyze	d: 12/0	7/23			
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND		80-120			
Matrix Spike Dup (W3L0396-MSD1)		3101016-	05	Prepared:	12/06/23	Analyze	d: 12/0	7/23			
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	
Batch: W3L0758 - EPA 350.1											
Blank (W3L0758-BLK1)					12/11/23	Analyze	d: 12/1	2/23			
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W3L0758-BLK2)		0.047	0.40		12/11/23	Analyze	d: 12/1	2/23			
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W3L0758-BS1) Ammonia as N	0.247	0.017	0.10	Prepared: mg/l	<b>12/11/23</b> 0.250	Analyze	d: 12/1 99				
	0.247	0.017	0.10	Ū							
LCS (W3L0758-BS2) Ammonia as N	0.252	0.017	0.10	Prepared: mg/l	<b>12/11/23</b> 0.250	Analyze		<b>2/23</b> 90-110			
		3K27011		Ū	12/11/23	Analyza	J. 17/1	2/22			
Matrix Spike (W3L0758-MS1) Ammonia as N		0.017	0.10	mg/l	0.250	0.295	-	<b>2725</b> 90-110			
Matrix Spike (W3L0758-MS2)	Source	3K27011	-04	Prenared	12/11/23	Analyze	d: 12/1	2/23			
Ammonia as N	0.514		0.10	mg/l	0.250	0.266	99	90-110			
Matrix Spike Dup (W3L0758-MSD1)	Source:	3K27011	-02	Prepared:	12/11/23	Analyze	d: 12/1	2/23			
Ammonia as N	0.533		0.10	mg/l	0.250	0.295	95	90-110	2	15	
Matrix Spike Dup (W3L0758-MSD2)		3K27011	-04		12/11/23	Analyze					
Ammonia as N	0.517	0.017	0.10	mg/l	0.250	0.266	100	90-110	0.6	15	
Batch: W3L0957 - EPA 365.3											

Blank (W3L0957-BLK1)

Prepared: 12/13/23 Analyzed: 12/18/23

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### **Certificate of Analysis**

FINAL REPORT

WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123		-		Project No. John Rudol		00.0004.V	VECK			01/09/2	<b>Reported:</b> 2024 10:37
Quality Control Results	-		J							(Co	ontinued)
Conventional Chemistry/Physical Parameter	s by	APHA/EP	A/ASTN	1 Methods (	(Continue	d)					
4		MDL	MRL	Units	Spike Level	Source Result	% DEC	%REC Limits		RPD Limit	Qualifian
Analyte Res Batch: W3L0957 - EPA 365.3 (Continued)	suit	MDL	WIKL	Units	Levei	Result	%REC	Limits	RPD	Limit	Qualifier
Blank (W3L0957-BLK1) Phosphorus as P, Total	ND	0.0067	0.010	Prepared: mg/l	12/13/23	Analyzeo	<b>d: 12/</b> 1	8/23			
LCS (W3L0957-BS1) Phosphorus as P, Total 0.	194	0.0067	0.010	Prepared: mg/l	<b>12/13/23</b> 0.200	Analyzeo		1 <b>8/23</b> 90-110			
Matrix Spike (W3L0957-MS1)SoPhosphorus as P, Total0.		<b>3L05069</b> - 0.0067	<b>02</b> 0.010	Prepared: mg/l	<b>12/13/23</b> 0.200	<b>Analyzed</b> 0.0500		1 <b>8/23</b> 90-110			MS-01
Matrix Spike Dup (W3L0957-MSD1)SoPhosphorus as P, Total0.1		<b>3L05069-</b> 0.0067	<b>02</b> 0.010	Prepared: mg/l	<b>12/13/23</b> 0.200	<b>Analyzeo</b> 0.0500		1 <b>8/23</b> 90-110	0	20	MS-01
Batch: W3L1094 - EPA 351.2											
Blank (W3L1094-BLK1) TKN	ND	0.065	0.10	Prepared: mg/l	12/14/23	Analyzeo	d: 12/2	20/23			
Blank (W3L1094-BLK2) TKN	ND	0.065	0.10	Prepared: mg/l	12/14/23	Analyzeo	d: 12/2	20/23			
LCS (W3L1094-BS1) TKN 0.	986	0.065	0.10	Prepared: mg/l	<b>12/14/23</b> 1.00	Analyzeo		2 <b>0/23</b> 90-110			
LCS (W3L1094-BS2) TKN 0.	955	0.065	0.10	Prepared: mg/l	<b>12/14/23</b> 1.00	Analyzeo		2 <b>0/23</b> 90-110			
Matrix Spike (W3L1094-MS1) So TKN 1		<b>3L07080</b> - 0.065	<b>01</b> 0.10	Prepared: mg/l	<b>12/14/23</b> 1.00	<b>Analyzed</b> 0.238		2 <b>0/23</b> 90-110			
Matrix Spike (W3L1094-MS2) So TKN 1		<b>3L07080</b> - 0.065	<b>02</b> 0.10	Prepared: mg/l	<b>12/14/23</b> 1.00	<b>Analyzed</b> 0.240	<b>d: 12/2</b> 97	2 <b>0/23</b> 90-110			
		<b>3L07080</b> - 0.065	<b>01</b> 0.10	Prepared: mg/l	<b>12/14/23</b> 1.00	<b>Analyzeo</b> 0.238	<b>d: 12/2</b> 98	2 <b>0/23</b> 90-110	0.7	10	
Matrix Spike Dup (W3L1094-MSD2)         So           TKN         1		<b>3L07080-</b> 0.065	<b>02</b> 0.10	Prepared: mg/l	<b>12/14/23</b> 1.00	<b>Analyzeo</b> 0.240		<b>20/23</b> 90-110	2	10	



# Certificate of Analysis

**FINAL REPORT** 

Project Number: Project No. 2315100200.0004.WECK

Reported: 01/09/2024 10:37

Project Manager: John Rudolph

(Continued)

Quality Control Results

Metals by EPA 200 Series Methods

					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W3L0528 - EPA 200.7											
Blank (W3L0528-BLK1)				Prepared:	12/07/23	Analyze	d: 12/1	3/23			
Aluminum, Dissolved	ND ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W3L0528-BS1)				Prepared:	12/07/23	Analyze	d: 12/1	3/23			
Aluminum, Dissolved	0.215	0.041	0.050	mg/l	0.200		108	85-115			
Aluminum, Total	0.215	0.022	0.050	mg/l	0.200		108	85-115			
Matrix Spike (W3L0528-MS1)	Source	: 3K28003	-03	Prepared:	12/07/23	Analyze	d: 12/1	3/23			
Aluminum, Total	0.506	0.022	0.050	mg/l	0.200	0.159	173	70-130			MS-02
Matrix Spike (W3L0528-MS2)	Source	: 3K28003	-05	Prepared:	12/07/23	Analyze	d: 12/1	3/23			
Aluminum, Total	0.462	0.022	0.050	mg/l	0.200	0.119	172	70-130			MS-02
Matrix Spike Dup (W3L0528-MSD1)	Source	: 3K28003	8-03	Prepared:	12/07/23	Analyze	d: 12/1	3/23			
Aluminum, Total	0.510	0.022	0.050	mg/l	0.200	0.159	175	70-130	0.8	30	MS-02
Matrix Spike Dup (W3L0528-MSD2)	Source	: 3K28003	8-05	Prepared:	12/07/23	Analyze	d: 12/1	3/23			
Aluminum, Total	0.478	0.022	0.050	mg/l	0.200	0.119	180	70-130	3	30	MS-02

3K28002

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# Certificate of Analysis

FINAL REPORT

Project Number: Project No. 2315100200.0004.WECK

Reported: 01/09/2024 10:37

Project Manager: John Rudolph

#### Notes and Definitions

Item Definition Estimated conc. detected <MRL and >MDL. J M-02 Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution. **MS-01** The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference. The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the **MS-02** sample %REC Percent Recovery Dil Dilution MDL Method Detection Limit MRL The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) ND NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL. RPD **Relative Percent Difference** Sample that was matrix spiked or duplicated. Source Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance. All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

3K28002

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### Chain of Custody & Sample Information Record

3428002

Client: WSP USA E&I Inc.		(	Con	tact	: Jo	hn I	Rud	lolp	bh													Phone No.	858-243-8158
Project Name: LECL TMD	DL Monitoring	g I	Ema	ul:		john	.rud	olp	h@v	wood	dplo	c.cor	m										Additional Reporting Requests Include QC Data Package:Yes No
Project Number:         2315100200.00           PO#:         C016900152           GL Code:         573000           Org#         3151				n Arc	Арр	rova	ıl:			By	y:	outin				5 Da ush	-		8 H Ru	our sh		*24 Hour Rush dditional Charges May Apply	FAX Results: <u>→</u> res □ № Email Results: <u>→</u> res □ № State EDT: <u>→</u> res □ № (Include Source Number in Notes)
*Please include Marissa Cuevas (marissa.cueva Sampler Informa	as@wsp.com) on all invoid ation	cing				ontai erva						Sarr Ty	-		An	alys	sis	Rec	ane	steo	ł	Matrix	Notes
Name: <u>Nick Jern</u> Employer: <u>WSP USA E&amp;</u>	ac K		_							Total # of Containare	Collialmers				T	TDS (SM2540 C) TKN (EPA 351.2	1	365.3)	365.3)		00.7)	DW = Drinking Water	Ortho-P is field filtered (0.45 um) Dissolved Ai is field filtered (0.45 um)
Signature:	(h-	-	so4	HCI HNO3	S203	DH DH/ZnAce	ID1	AA	zen	fo # let	(al # 01	Routine Resamule	ecial		ate - Nitrite	(SM2540 ( (EPA 351.	nonia (EP/	Total Phosphorus (EPA	SRP/Ortho-P (EPA	Total Sulfide (SM4500S)	Dissolved AL (EPA 2	S = Soil SG = Sludge L = Liquid	
Sample ID	Date	Time	H2S H2S	HN H	Na2	NaC	HN	MC	Frozen	Ϋ́	2	R R	s s	TSS	Nitra	TKN	Am	Tota	SRP	Tota	Dis	M = Miscellaneous	
CL07	12/4/23 1	130												1 1		x x		1	x	- 1			
CL08		040												x	x	x x	x	x	x	x 、	( x		
CL09	0	945-														x x							
CL10		2280								·						x x							
LE02	12/4/23 0	1920					_				_					x x							
										_	_					_					-		
Relinquished By (sign)	Print Name	/ Comp	any			D	ate	<u>/ T</u>	ime					Re	ceiv	yed I	Ву	(Sig	jn)			Pri	int Name / Company
	Nick Juna	ick/h	SP	<b>&gt;</b>	12	14/	25	. )	133	0		K	Ĺ	-	~)		( ¢	Ľ	-l	•			
Ven Mc		/			12	ĺυ	12	3	5	13	2				7	$\mathbf{r}$	<u>ð</u> u	100	5	17	F: 3		
T T		<u>.</u>					1-			_/	1					r ( '							
(For Lab Use Only) Sample	Integrity Upon Re	ceipt									$\overline{}$	$\rightarrow$			La	b N	ote	s					
Sample(s) Submitted c		No				•	Ten	npe	erat	ture	1	Ť.	ion	5								Lab No.	
Custody Seal(s)	Intact? Yes	No	N	/ <b>A</b>				ŀ	9	°C	;	,	-	'									
Sample(s) I	Intact? Yes	No				C	Co		r Bla														Page <u>1</u> of <u>1</u> Page 13 of 14
																							1 age 10 01 14



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# Sample Receipt Checklist

	Weck WKO: <b>3K28002</b> WKO Logged by:Jerico Bolotanooles Checked by:Jerico Bolotano		Date	Time Received/ # of Samples Delivered by	·····
	Task	Yes	No	N/A	Comments
	COC present at receipt?				
	COC properly completed?	$\boxtimes$		-	
COC	COC matches sample labels?	$\boxtimes$		-	
с С					
	Project Manager notified about COC discrepancy?			⊠ _	
	Sample Temperature	1.9'	°C		:
~	Samples received on ice?	⊠		-	
tior	Ice Type (Blue/Wet)	Wet	—	-	<u></u>
ma	All samples intact?	$\boxtimes$		-	·····
for	Samples in proper containers?	$\boxtimes$		-	· · · · · · · · · · · · · · · · · · ·
th	Sufficient sample volume?	$\boxtimes$		-	
eip	Samples intact?	$\boxtimes$		-	· · · · · · · · · · · · · · · · · · ·
Receipt Information	Received within holding time?	$\boxtimes$		_	
	Project Manager notified about receipt info?				1
	Sample labels checked for correct preservation?				
cation?	VOC Headspace: (No) none, If Yes (see comment) 524.2, 524.3, 624.1, 8260, 1666 P/T, LUFT			· -	□<6mm/Pea Size?
servation Verification?	pH verified upon receipt? Metals <2; H2SO4 pres tests <2; 522<4; TOC <2; 508.1, 525.2<2, 6710B<2, 608.3 5-9	$\boxtimes$			pH paper Lot# 3082367
reserva	Free Chlorine Tested <0.1 (Organics Analyses)				Cl Test Strip Lot#
Sample Pre	O&G pH <2 verified? pH adjusted for O&G Project Manager notified about sample preservation?				pH paper Lot# pH Reading: Acid Lot# Amt added:
PM Cor	mments				
	e Receipt Checklist Completed by: ure: Jerico Bolotano			Date:	12/05/23



January 25, 2024

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Project Name:LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO #Physis Project ID:Correction of the second seco

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 12/8/2023. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/mȝ) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, mitty mercier Misty Mercier 714 602-5320 Extension 202 mistymercier@physislabs.com



#### **PROJECT SAMPLE LIST**

#### WSP USA

#### PHYSIS Project ID: 2302004-022

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479 Total Samples: 10

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
113401	CL07 - Int		12/4/2023	11:30	Biologic	Not Specified
113402	CL07 - Surf		12/4/2023	11:40	Biologic	Not Specified
113403	CL08 - Int		12/4/2023	10:40	Biologic	Not Specified
113404	CL08 - Surf		12/4/2023	10:50	Biologic	Not Specified
113405	CL09 - Int		12/4/2023	9:45	Biologic	Not Specified
113406	CL09 - Surf		12/4/2023	9:55	Biologic	Not Specified
113407	CL10 - Int		12/4/2023	8:55	Biologic	Not Specified
113408	CL10 - Surf		12/4/2023	9:05	Biologic	Not Specified
113409	LE02 - Int		12/4/2023	9:20	Biologic	Not Specified
113410	LE02 - Surf		12/4/2023	9:50	Biologic	Not Specified

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#### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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#### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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PHYSIS Project ID: 2302004-022 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

			Con	ven	tion	als					
ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113401-R1	CLo7 - Int		Matrix: Biolog	ic			Sampled:	04-Dec-23	11:30	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	6.41	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113402-R1	CL07 - Surf		Matrix: Biolog	ic			Sampled:	04-Dec-23	11:40	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	6.05	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113403-R1	CLo8 - Int		Matrix: Biolog	ic			Sampled:	04-Dec-23	10:40	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	9.61	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113404-R1	CLo8 - Surf		Matrix: Biolog	ic			Sampled:	04-Dec-23	10:50	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	12.3	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113405-R1	CLo9 - Int		Matrix: Biolog	ic			Sampled:	04-Dec-23	9:45	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	13.6	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113406-R1	CL09 - Surf		Matrix: Biolog	ic			Sampled:	04-Dec-23	9:55	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	13.6	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113407-R1	CL10 - Int		Matrix: Biolog	ic			Sampled:	04-Dec-23	8:55	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	16	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113408-R1	CL10 - Surf		Matrix: Biolog	ic			Sampled:	04-Dec-23	9:05	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	13.9	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113409-R1	LEo2 - Int		Matrix: Biolog	ic			Sampled:	04-Dec-23	9:20	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	161	1	1	2	NA		C-75137	13-Dec-23	13-Dec-23
Sample ID: 113410-R1	LE02 - Surf		Matrix: Biolog	ic			Sampled:	04-Dec-23	9:50	Received:	08-Dec-23
Chlorophyll-a	SM 10200 H	mg/m3	159	1	1	2	NA	. ,	C-75137	13-Dec-23	13-Dec-23

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature



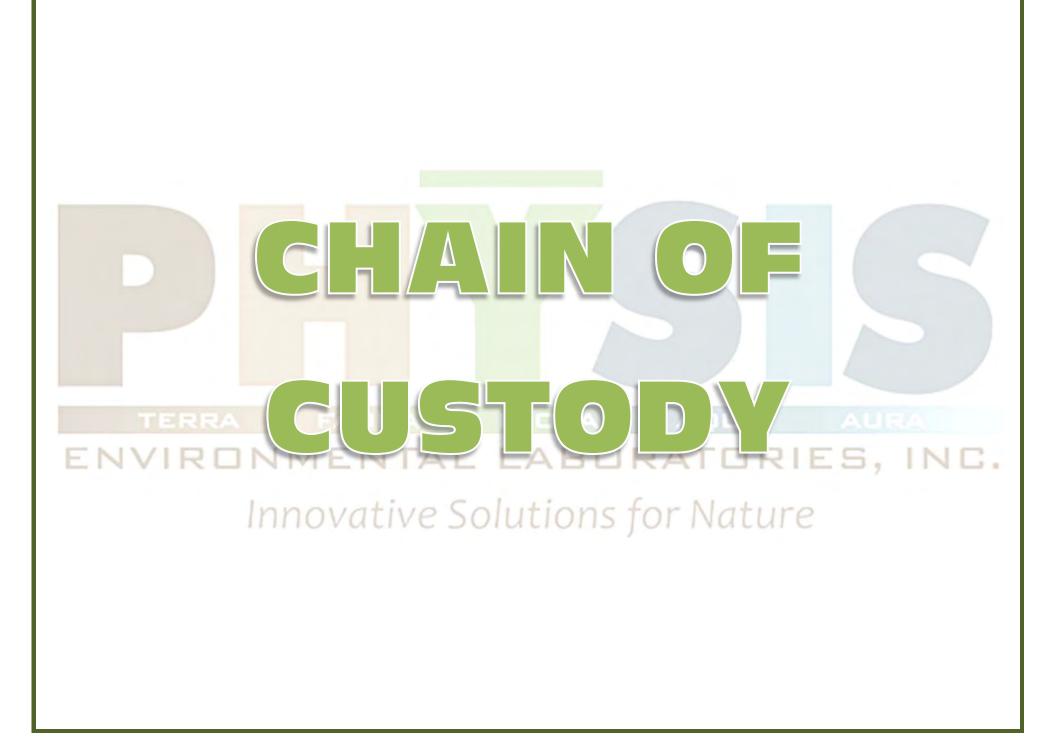
Conventionals

PHYSIS Project ID: 2302004-022 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

qca - 1 of 1

### **QUALITY CONTROL REPORT**

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	<b>AC</b> %	CURACY LIMITS	PF %	ECISION LIMITS	QA CODE
Chlorophyll	-a	Method:	SM 10200 H		Fraction: NA				Prepa	red: 1	3-Dec-23	Analy	zed: 13-Dec-	23
113400-B1	QAQC Procedural Blank	C-75137	ND	1	1	2	mg/m3							
113400-BS1	QAQC Procedural Blank	C-75137	51300	1	1	2	mg/m3	43600	0	118	70 - 130% PASS			
113400-BS2	QAQC Procedural Blank	C-75137	44900	1	1	2	mg/m3	43600	0	103	70 - 130% PASS	14	30 PASS	



### Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc.			0011	Luoi	: Jol		uuu	ipii		-	-	-	-	-	-	-	-	Phone No.	858-243-8158 Additional Reporting Requests	
Project Name:         LECL TMD           Project Number:         2315100200.0004           PO#:         C014105479           GL Code:         57300           Porg#         3151	L Monitor	ing		n Ar	ound ſ App		ne:	.rudolph(	@wsp.com R By:	out	ine			Day ush	'		Hour Rush *⁄	*24 Hour Rush Additional Charges May Apply	Include QC Data Package:ps FAX Results:ps Email Results:ps State EDT:ps (Include Source Number in Notes)	
Sampler Informati	on				of Co Pres						mple ype		Ana	lysi	s Re	equ	ested	Matrix	Notes	
Name: <u>Nick Jern</u> Employer: <u>WSP USA</u> Signature:			Unpreserved H2SO4	-	HNO3 Na2S2O3	aOH BOH/ZnAcetate	NH4CI	MCAA Frozen	Total # of Containers	Routine	Resample	Opecial Total Sulfide	Nitrate - Nitrite	TDS	nmonia	Total Phosphorus	SRP/Ortho-P Chlorophyll-a	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid	Chi-a samples on 0.7 um GFF	
Sample ID	Date	Time	5 12	ΡĊ	ΞŽ	ZZ	z	ž Ľ	F	4		2	ž	FF	Ā	F		M = Miscellaneous	Filter Volume: 250-L	
CL07 - Int	12/4/23			$\left  \right $		+		-			-	+	H	-	+		X		Filter Volume: 265-h	
CL07 - Surf		1140	+			-					-	-		+	-		x			
CL08 - Int		1040				-	-	-			-	+		-	-		x		Des mr.	
CL08 - Surf		1050		++	+			_		+	-			-	-	$\square$	X		SOO AF	
CL09 - Int		0945				-		-						-			x		Filter Volume: 255-L	
CL09 - Surf		0955				-		-	_		-	+		1			x		Filter Volume: 255mL	
CL10 - Int		0855				_	1	_			-	-					x		Filter Volume: 250 -L	
CL10 - Surf		0905															x		Filter Volume: 250mL	
LE02 - Int		0920															x		Filter Volume: 225 ~L	
LE02 - Surf	T	0950															x		Filter Volume: 250 mL	
Relinquished By (sign)	Print Nam		npany			D	Date	/ Tim	e			Rec	eive	ed B	y (S	Bign	)	Р	rint Name / Company	
Ma	Vick Jun	meh/L	SP		R	17/	23	-160	6		_		1	)						
•					1	2/8	123	10	:30		C	t	4					Ashley Gan	Falez / Physis	

(For Lab Use Only) Sample	Integrity U	pon Rec	ceipt			Lab Notes
Sample(s) Submitte	d on Ice?	Yes	No		Temperature	
Custody Seal(	s) Intact?	Yes	No	N/A	°C	
Sample(s	s) Intact?	Yes	No		- Cooler Blank	

Lab No.

Page 1 of 1

	PH	YSI AND
PHYSIC TERA PART FOR AGA A ENVIRONMENTAL LABORATORIES, INC. Innovative Solutions for Nature Sample Receipt Summary	Project Iteration ID: 230200 Client Name: USP L Project Name: LECL 23151 C014 3151	TMDL Monte, PHYSIS PO # 00200.0004.PHYSIS PO # 105479 GL # 57300 Org #
Receiving Info         1. Initials Received By:       Hg         2. Date Received:       12/8/23         3. Time Received:       10-30         4. Client Name:       WSP	COC Page Number: 2 of Bottle Label Color: NA	2
<ul> <li>5. Courier Information: (Please circle)</li> <li>Client</li> <li>UPS</li> <li>FedEx</li> <li>GSO/GLS</li> <li>PHYSIS Driver:</li> </ul>	<ul><li>Area Fast</li><li>Ontrac</li></ul>	<ul><li>DRS</li><li>PAMS</li></ul>
<ul> <li>i. Start Time:</li></ul>	iv. Numb ntainers or circle none) • Boxes ) • Carboy Cap(s) nat apply) Dry Ice • Water	• None
1. Initials Inspected By: RGH		
<ol> <li>Sample Integrity Upon Receipt:</li> <li>COC(s) included and completely filled out</li> <li>All sample containers arrived intact</li></ol>	rmation on COC(s)	
Sec temp	Notes:	

M:\Semple Logistics (SL)\S85



FINAL REPORT

Work Orders:	4B08005
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Project: LECL TMDL Monitoring 2315100200.0004.WECK

Attn: John Rudolph

Client: WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

<b>Report Date:</b>	3/26/2024
<b>Received Date:</b>	2/27/2024
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C016900152
Billing Code:	

#### DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. The report may include analytes that are not currently accreditable by some state agencies or accrediting bodies. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 2/27/24 with the Chain-of-Custody document. The samples were received in good condition, at 5.0 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

Kenneth C. Oda For Kim G. Tu Project Manager

4B08005





### Sample Summary

Certi	ficate	of	Ana	lys

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph Reported: 03/26/2024 08:24

03/	26/20	24 (	)8:24

-					
Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	4B08005-01	Water	02/27/24 11:50	
CL08	Nick Jernack	4B08005-02	Water	02/27/24 10:50	
CL09	Nick Jernack	4B08005-03	Water	02/27/24 09:50	
CL10	Nick Jernack	4B08005-04	Water	02/27/24 09:20	
LE02	Nick Jernack	4B08005-05	Water	02/27/24 08:55	



#### Sample Results

Sample: CL07

### **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph Reported: 03/26/2024 08:24

Sampled: 02/27/24 11:50 by Nick Jernack

4B08005-01 (Water)								
Analyte	Re	sult	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/AS	ГМ Ме	thods					
Method: EPA 350.1				Instr: AA06				
Batch ID: W4C1346	Preparation: _NONE (WET	,		Prepared: 03				Analyst: YMT
Ammonia as N		0.16	0.017	0.10	mg/l	1	03/19/24	
Method: EPA 351.2				Instr: AA06				
Batch ID: W4C1466	Preparation: _NONE (WET			Prepared: 03				Analyst: YMT
ΤΚΝ		1.1	0.065	0.10	mg/l	1	03/21/24	
Method: EPA 353.2				Instr: AA01				
Batch ID: W4B2383	Preparation: _NONE (WET			Prepared: 02				Analyst: ism
Nitrate as N		0.67	0.040	0.20	mg/l	1	02/28/24 18:2	
Nitrite as N		ND	0.042	0.10	mg/l	1	02/28/24 18:2	2
Method: EPA 365.3				Instr: UVVIS0	4			
Batch ID: W4B2379	Preparation: _NONE (WET			Prepared: 02				Analyst: rob
o-Phosphate as P		).25	0.0071	0.010	mg/l	1	02/28/24 16:5	7
Method: EPA 365.3				Instr: UVVIS0	5			
Batch ID: W4C1413	Preparation: _NONE (WET			Prepared: 03				Analyst: rob
Phosphorus as P, Total		0.29	0.0067	0.010	mg/l	1	03/21/24	
Method: SM 2540C				Instr: OVEN1	7			
Batch ID: W4B2320	Preparation: _NONE (WET			Prepared: 02				Analyst: bel
Total Dissolved Solids		270	4.0	10	mg/l	1	02/28/24	
Method: SM 2540D				Instr: OVEN1	5			
Batch ID: W4C0054	Preparation: _NONE (WET			Prepared: 03				Analyst: hhl
Total Suspended Solids		12		5	mg/l	1	03/01/24	
Method: SM 4500S2-D				Instr: _ANALY	/ST			
Batch ID: W4C0102	Preparation: _NONE (WET			Prepared: 03		3		Analyst: ymt
Sulfide, Total		ND	0.050	0.10	mg/l	1	03/01/24	
Metals by EPA 200 Series Methods								
Method: EPA 200.7				Instr: ICP03				
Batch ID: W4C0138	Preparation: EPA 200.2			Prepared: 03		2		Analyst: kvm
Aluminum, Dissolved	0.	071	0.041	0.050	mg/l	1	03/11/24	
Aluminum, Total		).77	0.022	0.050	mg/l	1	03/11/24	



#### Sample Results

Sample: CL08

# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph Reported: 03/26/2024 08:24

(Continued)

Sampled: 02/27/24 10:50 by Nick Jernack

4B08005-02 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Par</b>	ameters by APHA/EPA/ASTM M	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4C1346	Preparation: _NONE (WETCHEM	)	Prepared: 03	8/18/24 10	:44		Analyst: YMT
Ammonia as N	0.11	0.017	0.10	mg/l	1	03/19/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4C1466	Preparation: _NONE (WETCHEM	)	Prepared: 03	3/19/24 11:	:27		Analyst: YMT
ТКМ	0.82	0.065	0.10	mg/l	1	03/21/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B2383	Preparation: _NONE (WETCHEM	)	Prepared: 02	2/28/24 13	:55		Analyst: ism
Nitrate as N	0.69	0.040	0.20	mg/l	1	02/28/24 18:23	3
Nitrite as N	ND	0.042	0.10	mg/l	1	02/28/24 18:23	3
Method: EPA 365.3			Instr: UVVISC	)4			
Batch ID: W4B2379	Preparation: _NONE (WETCHEM	)	Prepared: 02	2/28/24 13	:42		Analyst: rob
o-Phosphate as P	0.24	0.0071	0.010	mg/l	1	02/28/24 16:57	7
Method: EPA 365.3			Instr: UVVISC	)5			
Batch ID: W4C1413	Preparation: _NONE (WETCHEM	)	Prepared: 03	3/18/24 18	:44		Analyst: rob
Phosphorus as P, Total	0.29	0.0067	0.010	mg/l	1	03/21/24	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4B2320	Preparation: _NONE (WETCHEM	)	Prepared: 02	2/28/24 10	:05		Analyst: bel
Total Dissolved Solids	260	4.0	10	mg/l	1	02/28/24	
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W4C0054	Preparation: _NONE (WETCHEM	)	Prepared: 03	3/01/24 10	:57		Analyst: hhl
Total Suspended Solids	13		5	mg/l	1	03/01/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4C0102	Preparation: _NONE (WETCHEM	)	Prepared: 03	3/01/24 18	:03		Analyst: ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	03/01/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4C0138	Preparation: EPA 200.2		Prepared: 03	3/04/24 10	:12		Analyst: kvm
Aluminum, Dissolved	0.099	0.041	0.050	mg/l	1	03/11/24	
Aluminum, Total	0.84	0.022	0.050	mg/l	1	03/11/24	



#### Sample Results

Sample: CL09

# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph Reported: 03/26/2024 08:24

(Continued)

Sampled: 02/27/24 9:50 by Nick Jernack

4B08005-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Par</b>	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4C1346	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/18/24 10	):44	4	Analyst: YMT
Ammonia as N	0.42	0.017	0.10	mg/l	1	03/19/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4C1466	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/19/24 11	:27	4	Analyst: YMT
ΤΚΝ	1.2	0.065	0.10	mg/l	1	03/21/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B2383	Preparation: _NONE (WETCHEM)	)	Prepared: 02	2/28/24 13	8:55		Analyst: ism
Nitrate as N	0.59	0.040	0.20	mg/l	1	02/28/24 18:28	5
Nitrite as N	ND	0.042	0.10	mg/l	1	02/28/24 18:25	5
Method: EPA 365.3			Instr: UVVIS	)4			
Batch ID: W4B2379	Preparation: _NONE (WETCHEM)	)	Prepared: 02	2/28/24 13	3:42		Analyst: rob
o-Phosphate as P	0.36	0.0071	0.010	mg/l	1	02/28/24 16:58	3
Method: EPA 365.3			Instr: UVVIS	)5			
Batch ID: W4C1413	Preparation: _NONE (WETCHEM)	)	Prepared: 03	3/18/24 18	3:44		Analyst: rob
Phosphorus as P, Total	0.39	0.0067	0.010	mg/l	1	03/21/24	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4B2320	Preparation: _NONE (WETCHEM)	)	Prepared: 02	2/28/24 10	):05		Analyst: bel
Total Dissolved Solids	480	4.0	10	mg/l	1	02/28/24	
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W4C0054	Preparation: _NONE (WETCHEM)	)	Prepared: 03	3/01/24 10	):57		Analyst: hhl
Total Suspended Solids			5	mg/l	1	03/01/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4C0102	Preparation: _NONE (WETCHEM)	)	Prepared: 03	3/01/24 18	8:03		Analyst: ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	03/01/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4C0138	Preparation: EPA 200.2		Prepared: 03	3/04/24 10	):12	1	Analyst: kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	03/11/24	
Aluminum, Total	0.22	0.022	0.050	mg/l	1	03/11/24	



#### Sample Results

Sample: CL10

# **Certificate of Analysis**

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph Reported: 03/26/2024 08:24

(Continued)

Sampled: 02/27/24 9:20 by Nick Jernack

4B08005-04 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Par</b>	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4C1346	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/18/24 10	):44	A	nalyst: YMT
Ammonia as N	0.31	0.017	0.10	mg/l	1	03/19/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4C1466	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/19/24 11	1:27	A	nalyst: YMT
TKN	1.2	0.065	0.10	mg/l	1	03/21/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B2383	Preparation: _NONE (WETCHEM)	)	Prepared: 02	2/28/24 13	3:55		Analyst: ism
Nitrate as N	0.66	0.040	0.20	mg/l	1	02/28/24 18:26	;
Nitrite as N	ND	0.042	0.10	mg/l	1	02/28/24 18:26	;
Method: EPA 365.3			Instr: UVVIS	)4			
Batch ID: W4B2379	Preparation: _NONE (WETCHEM)	)	Prepared: 02	2/28/24 13	3:42		Analyst: rob
o-Phosphate as P	0.34	0.0071	0.010	mg/l	1	02/28/24 16:58	5
Method: EPA 365.3			Instr: UVVISO	)5			
Batch ID: W4C1413	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/18/24 18	3:44		Analyst: rob
Phosphorus as P, Total	0.37	0.0067	0.010	mg/l	1	03/21/24	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4B2448	Preparation: _NONE (WETCHEM)	)	Prepared: 02	2/29/24 09	9:55		Analyst: bel
Total Dissolved Solids	540	4.0	10	mg/l	1	02/29/24	
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W4C0054	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/01/24 10	):57		Analyst: hhl
Total Suspended Solids	9		5	mg/l	1	03/01/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4C0102	Preparation: _NONE (WETCHEM)	)	Prepared: 03	8/01/24 18	3:03		Analyst: ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	03/01/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4C0138	Preparation: EPA 200.2		Prepared: 03	8/04/24 10	):12		Analyst: kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	03/11/24	
Aluminum, Total	0.31	0.022	0.050	mg/l	1	03/11/24	



#### Sample Results

Sample: LE02

# Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph Reported: 03/26/2024 08:24

(Continued)

Sampled: 02/27/24 8:55 by Nick Jernack

4B08005-05 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Par</b>	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4C1346	Preparation: _NONE (WETCHEM)	)	Prepared: 03,	/18/24 1	0:44	ŀ	Analyst: YMT
Ammonia as N	0.63	0.017	0.10	mg/l	1	03/19/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4C1466	Preparation: _NONE (WETCHEM	)	Prepared: 03,	/19/24 1	1:27	ŀ	Analyst: YMT
TKN	2.7	0.065	0.10	mg/l	1	03/21/24	_
Method: EPA 353.2			Instr: AA01				
Batch ID: W4B2383	Preparation: _NONE (WETCHEM	)	Prepared: 02	/28/24 1	3:55		Analyst: ism
Nitrate as N	0.32	0.040	0.20	mg/l	1	02/28/24 18:27	,
Nitrite as N	ND	0.042	0.10	mg/l	1	02/28/24 18:27	7
Method: EPA 365.3			Instr: UVVIS0	4			
Batch ID: W4B2379	Preparation: _NONE (WETCHEM	)	Prepared: 02,	/28/24 1	3:42		Analyst: rob
o-Phosphate as P	0.15	0.0071	0.010	mg/l	1	02/28/24 17:00	)
Method: EPA 365.3			Instr: UVVIS0	5			
Batch ID: W4C1413	Preparation: _NONE (WETCHEM	)	Prepared: 03,	/18/24 1	8:44		Analyst: rob
Phosphorus as P, Total	0.20	0.0067	0.010	mg/l	1	03/21/24	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4B2448	Preparation: _NONE (WETCHEM	)	Prepared: 02	/29/24 0	9:55		Analyst: bel
Total Dissolved Solids		4.0	10	mg/l	1	02/29/24	
Method: SM 4500S2-D			Instr: _ANALY	′ST			
Batch ID: W4C0102	Preparation: _NONE (WETCHEM	)	Prepared: 03,	/01/24 1	8:03		Analyst: ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	03/01/24	



**FINAL REPORT** 

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph

**Reported:** 03/26/2024 08:24

#### Quality Control Results

Conventional Chemistry/Physical Param	leters by	APHA/EP	A/ASTIN	liviethod							
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifie
atch: W4B2320 - SM 2540C											
Blank (W4B2320-BLK1)				Pre	oared & An	alyzed: 02	2/28/24	4			
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W4B2320-BS1)			10		bared & An	alyzed: 02					
Total Dissolved Solids	806	4.0	10	mg/l	824		98	97-103			
Duplicate (W4B2320-DUP1) Total Dissolved Solids		<b>4B28009</b> 4.0	- <b>04</b> 10	Prej mg/l	pared & An	alyzed: 02 1940	2/28/24	4	0.1	10	
				-					0.1	10	
Duplicate (W4B2320-DUP2) Total Dissolved Solids		<b>4B28009</b> 4.0	- <b>13</b> 10	Prej mg/l	bared & An	alyzed: 02 32000	2/28/24	4	0.4	10	
atch: W4B2379 - EPA 365.3											
Blank (W4B2379-BLK1)				Dro	oared & An	olyzod: 02	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	4			
o-Phosphate as P	ND	0.0071	0.010	mg/l	Jareu & Al	alyzeu. 02	20/24	+			
LCS (W4B2379-BS1)				Pre	oared & An	alyzed: 02	2/28/24	4			
o-Phosphate as P	0.209	0.0071	0.010	mg/l	0.200			88-111			
Matrix Spike (W4B2379-MS1)		: 4B27067	-02	Pre	oared & An						
o-Phosphate as P	0.347	0.0071	0.010	mg/l	0.200	0.144	102	85-112			
Matrix Spike Dup (W4B2379-MSD1)		4B27067		-	bared & An					00	
o-Phosphate as P	0.346	0.0071	0.010	mg/l	0.200	0.144	101	85-112	0.3	20	
atch: W4B2383 - EPA 353.2											
Blank (W4B2383-BLK1) Nitrate as N	ND	0.040	0.20	Prej mg/l	oared & An	alyzed: 02	2/28/24	4			
Nitrite as N			0.10	mg/l							
LCS (W4B2383-BS1)				-	oared & An	alvzod. 03	0/28/2	4			
Nitrate as N		0.040	0.20	mg/l	1.00	alyzeu. 02		<b>•</b> 90-110			
Nitrite as N	1.02	0.042	0.10	mg/l	1.00		102	90-110			
Matrix Spike (W4B2383-MS1)	Source:	: 4B20002	-07	Pre	oared & An	alyzed: 02	2/28/24	4			
Nitrate as N			0.20	mg/l	2.00	4.89		90-110			
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110			
Matrix Spike (W4B2383-MS2)					bared & An						
Nitrate as N Nitrite as N			0.20 0.10	mg/l mg/l	2.00 1.00	3.81 ND	98 107	90-110 90-110			
				Ū							
Matrix Spike Dup (W4B2383-MSD1) Nitrate as N		<b>4B20002</b> 0.040	- <b>07</b> 0.20	Prej mg/l	pared & An 2.00	alyzed: 02 4.89		<b>4</b> 90-110	0	20	
Nitrite as N		0.042	0.10	mg/l	1.00	ND		90-110	2	20	
Matrix Spike Dup (W4B2383-MSD2)	Source	: 4B23052	-01	Prei	pared & An	alvzed: 02	2/28/24	4			
Nitrate as N	5.77	0.040	0.20	mg/l	2.00	3.81	98	90-110	0	20	
Nitrite as N	1.07	0.042	0.10	mg/l	1.00	ND	107	90-110	0	20	
atch: W4B2448 - SM 2540C											

4B08005

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WECK LABORAT	ORIES, INC.

FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

4B08005

#### Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph

(Continued)

03/26/2024 08:24

**Reported:** 

#### Quality Control Results

Analyto	Result	MDL	MRL	Units	Spike Level	Source Result	%PEC	%REC Limits	PPD	RPD Limit	Qualifie
Analyte atch: W4B2448 - SM 2540C (Continue		MDL	WIKL	Units	Level	Result	%REC	LIMITS	RPD	Limit	Qualifi
Blank (W4B2448-BLK1)	u)			Dror	oared & Ar	alvzod· 0	2/20/2	1			
Total Dissolved Solids	ND ND	4.0	10	mg/l		aryzea. o	L/LJ/L-	•			
LCS (W4B2448-BS1)				Pre	pared & Ar	nalvzed: 0	2/29/24	4			
Total Dissolved Solids	813	4.0	10	mg/l	824			97-103			
Duplicate (W4B2448-DUP1)	Source:	4B2801	5-01	Prep	bared & Ar	nalyzed: 0	2/29/24	4			
Total Dissolved Solids		4.0	10	mg/l		61600			2	10	
Duplicate (W4B2448-DUP2)		4B28059		-	bared & Ar		2/29/24	4			
Total Dissolved Solids	5280	4.0	10	mg/l		5300			0.4	10	
atch: W4C0054 - SM 2540D											
Blank (W4C0054-BLK1)			_	-	bared & Ar	nalyzed: 0	3/01/24	4			
Total Suspended Solids	0.200		5	mg/l							
LCS (W4C0054-BS1) Total Suspended Solids	69.7		5	-	bared & Ar	nalyzed: 0		<b>4</b> 90-110			
				mg/l	62.7						
Duplicate (W4C0054-DUP1) Total Suspended Solids		4B27014	<b>4-01</b> 5	Prep mg/l	bared & Ar	nalyzed: 0 55.7	3/01/24	4	3	10	
		400707		Ū			2 /04 /2		Ū	10	
Duplicate (W4C0054-DUP2) Total Suspended Solids		4B27078	<b>8-01</b> 5	-	oared & Ar	-	3/01/24	4	7	10	
atch: W4C0102 - SM 4500S2-D				Ū							
Blank (W4C0102-BLK1)				Pror	oared & Ar	alvzod: 0	2/01/2	4			
Sulfide, Total		0.050	0.10	mg/l		ialyzeu. U	5/01/2.	•			
-CS (W4C0102-BS1)				Pres	pared & Ar	nalvzed: 0	3/01/24	4			
Sulfide, Total	0.100	0.050	0.10	mg/l			98	90-110			
Duplicate (W4C0102-DUP1)	Source:	4B0800	5-05	Prep	bared & Ar	nalyzed: 0	3/01/24	4			
Sulfide, Total		0.050	0.10	mg/l		ND				20	
Matrix Spike (W4C0102-MS1)		4B07002		-	bared & Ar						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.204	ND	98	80-120			
Matrix Spike Dup (W4C0102-MSD1)		4B07002			bared & Ar				0	20	
Sulfide, Total	0.200	0.050	0.10	mg/i	0.204	ND	98	80-120	0	20	
atch: W4C1346 - EPA 350.1											
Blank (W4C1346-BLK1) Ammonia as N		0.017	0.10	Prepared mg/l	d: 03/18/2	4 Analyze	ed: 03/1	9/24			
		0.017	0.10	-							
Blank (W4C1346-BLK2) Ammonia as N		0.017	0.10	Prepared mg/l	d: 03/18/2	4 Analyze	ed: 03/1	9/24			
	2			Ū	1. 02/10/2	1 An-h	d. 02/4	0/24			
LCS (W4C1346-BS1) Ammonia as N	0.250	0.017	0.10	mg/l	<b>1: 03/18/2</b> 0.250	+ Analyze	2 <b>a: 03/</b> 1 100				
LCS (W4C1346-BS2)				•	d: 03/18/2	4 Analyza	d. US \1	9/24			
Ammonia as N	0.261	0.017	0.10	mg/l	0.250		105	90-110			
Matrix Spike (W4C1346-MS1)	Comme	4B2808	0.01	Decrete	d: 03/18/2	1 Anali-	d. 02/1	0/24			



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph

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...

03/26/2024 08:24

**Reported:** 

(Continued)

#### Quality Control Results

Conventional Chemistry/Physical Parame	eters by	APHA/EP	PA/ASTM	Methods	(Continue	d)					
Analyte	Result	МПІ	MRL	Units	Spike Level	Source Result	%RFC	%REC Limits	חסס	RPD Limit	Qualifier
Batch: W4C1346 - EPA 350.1 (Continued)	Result	WDL	WIRL	Units	Levei	Result	JOILE	Linits	KF D	Linin	Quaimer
Matrix Spike (W4C1346-MS1) Ammonia as N		<b>4B28080</b> 0.017	<b>-01</b> 0.10	Prepared: mg/l	<b>03/18/24</b> 0.250	Analyzeo ND		<b>19/24</b> 90-110			
Matrix Spike (W4C1346-MS2) Ammonia as N		<b>4B28116</b> 0.017	- <b>01</b> 0.10	Prepared: mg/l	<b>03/18/24</b> 0.250	Analyzeo ND		<b>19/24</b> 90-110			
Matrix Spike Dup (W4C1346-MSD1) Ammonia as N		<b>4B28080</b> 0.017	<b>-01</b> 0.10	Prepared: mg/l	<b>03/18/24</b> 0.250	Analyzeo ND		<b>19/24</b> 90-110	0.6	15	
Matrix Spike Dup (W4C1346-MSD2) Ammonia as N		<b>4B28116</b> 0.017	<b>-01</b> 0.10	Prepared: mg/l	<b>03/18/24</b> 0.250	Analyzeo ND		<b>19/24</b> 90-110	0.1	15	
Batch: W4C1413 - EPA 365.3											
Blank (W4C1413-BLK1) Phosphorus as P, Total	ND	0.0067	0.010	Prepared: mg/l	03/18/24	Analyzeo	d: 03/2	21/24			
LCS (W4C1413-BS1) Phosphorus as P, Total	0.198	0.0067	0.010	Prepared: mg/l	<b>03/18/24</b> 0.200	Analyzeo	<b>d: 03/2</b> 99				
Matrix Spike (W4C1413-MS1) Phosphorus as P, Total		<b>4B06002</b> 0.0067	<b>-01</b> 0.010	Prepared: mg/l	<b>03/18/24</b> 0.200	<b>Analyze</b> 0.0650	<b>d: 03/2</b> 99	2 <b>1/24</b> 90-110			
Matrix Spike Dup (W4C1413-MSD1) Phosphorus as P, Total		<b>4B06002</b> 0.0067	<b>-01</b> 0.010	Prepared: mg/l	<b>03/18/24</b> 0.200			2 <b>1/24</b> 90-110	1	20	
Batch: W4C1466 - EPA 351.2											
Blank (W4C1466-BLK1) TKN	n na ND	0.065	0.10	Prepared: mg/l	03/19/24	Analyzeo	d: 03/2	21/24			
Blank (W4C1466-BLK2) TKN	ND	0.065	0.10	Prepared: mg/l	03/19/24	Analyzeo	d: 03/2	21/24			
<b>LCS (W4C1466-BS1)</b> TKN	1.04	0.065	0.10	Prepared: mg/l	<b>03/19/24</b> 1.00	Analyzeo		2 <b>1/24</b> 90-110			
<b>LCS (W4C1466-BS2)</b> TKN	1.03	0.065	0.10	Prepared: mg/l	<b>03/19/24</b> 1.00	Analyzeo		2 <b>1/24</b> 90-110			
Matrix Spike (W4C1466-MS1) TKN		<b>4B08005</b> 0.065	<b>-02</b> 0.10	Prepared: mg/l	<b>03/19/24</b> 1.00	<b>Analyzeo</b> 0.820		<b>21/24</b> 90-110			
Matrix Spike (W4C1466-MS2) TKN		<b>4C11101</b> 0.065	<b>-01</b> 0.10	Prepared: mg/l	<b>03/19/24</b> 1.00	<b>Analyzeo</b> 0.826		2 <b>1/24</b> 90-110			
Matrix Spike Dup (W4C1466-MSD1) TKN		<b>4B08005</b> 0.065	<b>-02</b> 0.10	Prepared: mg/l	<b>03/19/24</b> 1.00	<b>Analyzeo</b> 0.820		<b>21/24</b> 90-110	3	10	MS-01
Matrix Spike Dup (W4C1466-MSD2) TKN	<b>Source:</b> 1.91	<b>4C11101</b> 0.065	<b>-01</b> 0.10	Prepared: mg/l	<b>03/19/24</b> 1.00	<b>Analyzeo</b> 0.826	<b>d: 03/2</b> 109		3	10	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph

**Reported:** 03/26/2024 08:24

(Continued)

Quality Control Results

Metals by EPA 200 Series Methods

					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W4C0138 - EPA 200.7											
Blank (W4C0138-BLK1)				Prepared	03/04/24	Analyze	d: 03/1	1/24			
Aluminum, Dissolved	n an an an an ND	0.041	0.050	mg/l							
Aluminum, Total		0.022	0.050	mg/l							
LCS (W4C0138-BS1)				Prepared	03/04/24	Analyze	d: 03/1	1/24			
Aluminum, Dissolved	0.227	0.041	0.050	mg/l	0.200		114	85-115			
Aluminum, Total	0.227	0.022	0.050	mg/l	0.200		114	85-115			
Matrix Spike (W4C0138-MS1)	Source	: 4B08005	5-01	Prepared	03/04/24	Analyze	d: 03/1	1/24			
Aluminum, Total	1.69	0.022	0.050	mg/l	0.200	0.770	459	70-130			MS-02
Matrix Spike (W4C0138-MS2)	Source	: 4808006	5-03	Prepared	03/04/24	Analyze	d: 03/1	1/24			
Aluminum, Total	0.319	0.022	0.050	mg/l	0.200	0.0397	140	70-130			MS-02
Matrix Spike Dup (W4C0138-MSD1)	Source	: 4B08005	5-01	Prepared	03/04/24	Analyze	d: 03/1	1/24			
Aluminum, Total	1.68	0.022	0.050	mg/l	0.200	0.770	455	70-130	0.5	30	MS-02
Matrix Spike Dup (W4C0138-MSD2)	Source	: 4808006	5-03	Prepared	03/04/24	Analyze	d: 03/1	1/24			
Aluminum, Total	0.314	0.022	0.050	mg/l	0.200	0.0397	137	70-130	2	30	MS-02



Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring 2315100200.0004.WECK Project Manager: John Rudolph

**Reported:** 03/26/2024 08:24

Notes and Definitions

Item Definition Estimated conc. detected <MRL and >MDL. J

**MS-01** The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.

The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the **MS-02** sample.

%REC Percent Recovery

Dilution Dil

MDL Method Detection Limit

- MRL Method Reporting Limit (MRL) is the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
- NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or ND above the MDL.
- RPD **Relative Percent Difference**
- Sample that was matrix spiked or duplicated. Source

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

#### **Chain of Custody & Sample Information Record**

				·										:							4808005
Client:	WSP USA E&I Inc.			Con	itact:	Joł	nn Ri	udolı	bh											Phone No.	858-243-8158
Projec	t Name: LECL TMDL M t Number: 2315100200.0004.W	onitor	ing	Ema	ail:	j	ohn.r	udolp	h@v	oodp	olc.co	om									Additional Reporting Requests Include QC Data Package:Yes No
PO#: GL Co	C016900152	EUK		1	n Aro						Routi	<u>ine</u>	•		Day ush	, <b>1</b>	'48 ⊦ Rι	lour Jsh		*24 Hour Rush	FAX Results: <u></u> es □ № Email Results: <u></u> es □ № State EDT: <u></u> es □ №
Drg#	Sampler Information			Lab		f Co	ovai: ntain ervati	ers		By:	Sa	mple vpe	)	An	alvs	is Re	eque	este	d	dditional Charges May Apply Matrix	(Include Source Number in Notes)
	Name: Nick Jernack	$\langle$	<u>.</u>							iners						i i	(2.00.)		00.7	DW = Drinking Water	Ortho-P is field filtered (0.45 um)
	Employer: WSP USA E&I Inc.	2	_				tate			of Containers				(EPA 353		350.1)	us (EFA -	M4500S)	(EPA 2	WW = Wastewater GW = Groundwater	Dissolved AI is field filtered (0.45 um)
	Signature:		<u></u>	Unpreserved H2SO4	HCI HNO3	203	- 		u.	al # of (	Routine	Resample Special		Nitrate - Nitrite (EPA 353.2) The (embedd of)	TKN (EPA 351.2	onia (EPA	SRP/Ortho-P (EPA 365.3)	Sulfide (SI	olved AL	S = Soil SG = Sludge	
	Sample ID	Date	Time	Unpr H2SC	H H N H	Na2S		MCA MCA	Frozen	Total #	Rou	Res	TSS	Nitrat		Ammo	SRP/C	Total	Disso	L = Liquid M = Miscellaneous	
	CL07	2/27/20												x>			< x				
	CL08		1050										x	x	x x	x ,	< x	x	x x		
20 G ~ .	CL09		0950					÷					x	x	x x	x	< x	x	k x		· · · ·
	CL10		0920										x	x>	x x	x>	< x	x	k x		
	LE02		0855											x>	x x	x>	< x	x			
	·																				

Relinguished By (sign)	Print Name / Company	Date / Time	/) /∖ Received By (Sign)	Print Name / Company
	Artick Sunuch /LSP	2/27/24 - 1345	Jun 2001 2127124134	FISN DURAN
funder	1/isan Drom	2/27/24 1616		V
		2/27/24 1620	Qiail	Christopher Avila

(For Lab Use Only) Sample Integrity	Upon Re	eceipt		Lab Notes
Sample(s) Submitted on Ice?	Yes	No	Temperature	
Custody Seal(s) Intact?	Yes	No	N/A T-0281 5.0 °C	
Sample(s) Intact?	Yes	No	📋 Cooler Blank	

Lab No.

Page <u>1</u> of <u>1</u>



### Sample Receipt Checklist

	Weck WKO: VKO Logged by: les Checked by:	Lester Abad	•.	Date,	/Time Received: # of Samples: Delivered by:	
	Task		Yes	No	N/A	Comments
	COC present at re	eceipt?				
	COC properly cor	npleted?	$\boxtimes$		_	······································
COC	COC matches san	nple labels?	$\boxtimes$		-	
	Project Manager	notified about COC discrepancy?				
	Sample Tempera	ture	5°C			
_	Samples received	on ice?	$\boxtimes$			
tio	Ice Type (Blue/W	et)	Blue			
ma	All samples intact	?	$\boxtimes$			
for	Samples in prope	r containers?	$\boxtimes$			
th	Sufficient sample	volume?	$\boxtimes$		-	
eip	Samples intact?		$\boxtimes$		-	
Receipt Information	Received within h	olding time?	$\boxtimes$		_	
	Project Manager	notified about receipt info?		$\boxtimes$		
5no	Sample labels che	cked for correct preservation?	$\boxtimes$			
/erificati		No) none, If Yes (see comment) 1, 8260, 1666 P/T, LUFT				□<6mm/Pea Size?
e Preservation Verification?	pH verified upon Metals <2; H2SO4 525.2<2, 6710B<2	pres tests <2; 522<4; TOC <2; 508.1,	$\boxtimes$			pH paper Lot# 3082367
	Free Chlorine Tes	ted <0.1 (Organics Analyses)				Cl Test Strip Lot#
11032201Sampl	O&G pH <2 verifie	ed?				oH paper Lot#
0322(	pH adjusted for O	&G				oH Reading: Acid Lot#
11	Project Manager	notified about sample preservation?				Amt added:

**PM** Comments

Sample Receipt Checklist Completed by:

Signature: Lester Abad

Date: 02/27/24



April 18, 2024

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 3/13/2024. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, Rachel Hansen

Rachel Hansen 714 602-5320 Extension 203 rachelhansen@physislabs.com



#### **PROJECT SAMPLE LIST**

#### WSP USA

PHYSIS Project ID: 2302004-025

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479 Total Samples: 10

					-	
PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
116616	CL07 - Int		2/27/2024	11:50	Biologic	Not Specified
116617	CL07 - Surf		2/27/2024	12:05	Biologic	Not Specified
116618	CL08 - Int		2/27/2024	10:50	Biologic	Not Specified
116619	CL08 - Surf		2/27/2024	11:05	Biologic	Not Specified
116620	CL09 - Int		2/27/2024	9:50	Biologic	Not Specified
116621	CL09 - Surf		2/27/2024	10:00	Biologic	Not Specified
116622	CL10 - Int		2/27/2024	9:20	Biologic	Not Specified
116623	CL10 - Surf		2/27/2024	8:55	Biologic	Not Specified
116624	LE02 - Int		2/27/2024	8:55	Biologic	Not Specified
116625	LE02 - Surf		2/27/2024	9:15	Biologic	Not Specified

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### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

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SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples





Innovative Solutions for Nature

#### PHYSIS Project ID: 2302004-025 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

			Con	ven	tion	als					
ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 116616-R1	CL07 - Int		Matrix: Biolog	ic			Sampled:	27-Feb-24	11:50	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	21.4	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116617-R1	CL07 - Surf		Matrix: Biolog	ic			Sampled:	27-Feb-24	12:05	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	42.7	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116618-R1	CLo8 - Int		Matrix: Biolog	ic			Sampled:	27-Feb-24	10:50	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	20.8	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116619-R1	CLo8 - Surf		Matrix: Biolog	ic			Sampled:	27-Feb-24	11:05	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	57.9	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116620-R1	CL09 - Int		Matrix: Biolog	ic			Sampled:	27-Feb-24	9:50	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	11.2	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116621-R1	CL09 - Surf		Matrix: Biolog	ic			Sampled:	27-Feb-24	10:00	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	34.2	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116622-R1	CL10 - Int		Matrix: Biolog	ic			Sampled:	27-Feb-24	9:20	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	11.2	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116623-R1	CL10 - Surf		Matrix: Biolog	ic			Sampled:	27-Feb-24	8:55	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	27	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116624-R1	LEo2 - Int		Matrix: Biolog	ic			Sampled:	27-Feb-24	8:55	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	23.5	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24
Sample ID: 116625-R1	LEo2 - Surf		Matrix: Biolog	ic			Sampled:	27-Feb-24	9:15	Received:	13-Mar-24
Chlorophyll-a	SM 10200 H	mg/m3	39	1	1	2	NA		C-80088	22-Mar-24	22-Mar-24

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

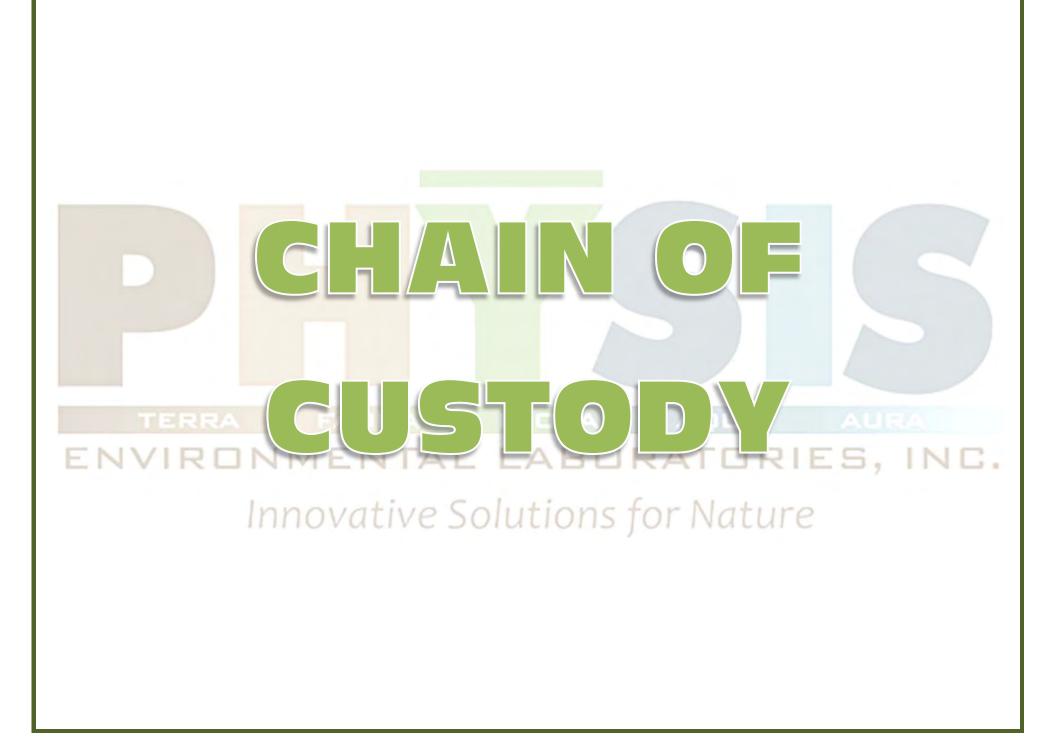


PHYSIS Project ID: 2302004-025 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

### Conventionals

### **QUALITY CONTROL REPORT**

SAMPLE ID	)	BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	AC %	CURACY LIMITS	PF %	RECISION LIMITS	QA CODE
Chlorophyll	l-a	Method:	SM 10200 H		Frac	tion: N	IA		Prepa	red: 2	2-Mar-24	Analyz	ed: 22-Mar-2	24
116615-B1	QAQC Procedural Blank	C-80088	ND	1	1	2	mg/m3							
116615-BS1	QAQC Procedural Blank	C-80088	40600	1	1	2	mg/m3	43600	0	93	70 - 130% PASS			
116615-BS2	QAQC Procedural Blank	C-80088	40600	1	1	2	mg/m3	43600	0	93	70 - 130% PASS	0	30 PASS	



### Chain of Custody & Sample Information Record

lient: WSP USA E&I Inc.		-	Con	laci	. 00		luur	npi i		-								-	Phone No.	858-243-8158 Additional Reporting Requests		
Project Name:         LECL TMDL Monitoring           Project Number:         2315100200.0004.PHYSIS           PO#:         C014105479           SL Code:         57300           Pog#         3151			Ema Turr *Lab	Ar TAT	ГАрр	rova	ne: I:		@wsp.com F By:	<u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush								Rush	Include QC Data Package: ۲۹۵ ۵ ۵ ۵ FAX Results: ۲۹۶ ۵ ۵ ۵ Email Results: ۴۹۶ ۵ ۵ State EDT: ۲۹۶ ۵ ۵ ۵ (Include Source Number in Notes)			
Sampler Informa	tion				of Co Pres						amp Type		An	naly	sis I	Req	uest	ed	Matrix	Notes		
Name: <u>Nick Ju</u> Employer: <u>WSP USA</u> Signature:		-	Unpreserved H2SO4	0	HNO3 Na2S2O3	NaOH NaOH/ZnAcetate	H4CI	MCAA Frozen	Total # of Containers	Routine	Resample	Special Total Sulfide	Nitrate - Nitrite	TDS	TKN	nmonia otal Phosphorus	SRP/Ortho-P	norophyli-a	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid	Chl-a samples on 0.7 um GFF		
Sample ID	Date	Time	5 2	Ŧ	ΙŽ	ŽŽ	Z	Σŭ	F	-	L.	S F	Ż	F	F	A F			M = Miscellaneous	Filter Volume: COD		
CL07 - Int	2/27/24							-				-	+		-	+		x		Filter Volume: 500		
CL07 - Surf		1205		$\vdash$		-	+	-				-	+	$\square$	-	+		x				
CL08 - Int		1050		$\vdash$	•	-	+	+			$\vdash$	+	+	$\square$	-	+		×		Filter Volume: SOU ML		
CL08 - Surf		1105					+	-			-	_	-		+	-		×		Filter Volume: 355		
CL09 - Int		0950										_			-	-		x		Filter Volume: 500		
CL09 - Surf		1000																x		Filter Volume: 500		
CL10 - Int		0920																x		Filter Volume: 500		
CL10 - Surf		0855																x		Filter Volume: 475		
LE02 - Int		0855		•														x		Filter Volume: 500		
LE02 - Surf		0915																x		Filter Volume: 500		
Relingetshed By (Sign)	Print Nan		1 1			0	ate	/ Tim	e		-	Re	cen	ved	By (	Sig	n)			rint Name / Company		
14/	Nick	Sernad	14/1	5	23	12/0	24	-16	00	1		9	10	1:0	3	3	13	3/2	Mitch h	Ingnier / Physis		
		-			-				1	1		-		-			-	-				

(For Lab Use Only) Sample Integrity I	Jpon Red	ceipt			Lab Notes	
Sample(s) Submitted on Ice?	Yes	No		Temperature		Lab
Custody Seal(s) Intact?	Yes	No	N/A	°C		
Sample(s) Intact?	Yes	No		- Cooler Blank		

ab	No.	

Page 1 of 1

		PHYS	
	Project Iteration ID:	Innovative Solutions for Natu 2302004_025	ure
ENVIRONMENTAL LABORATORIES, INC.	Client Name:	WSP USA	
Innovative Solutions for Nature	Project Name:		Ionitoring Project #
Sample Receipt Summary		2315100200.0	004.PHYSIS PO # GL Code 57300 Org
Receiving Info	COC Page Number:	2 of 2	
1. Initials Received By:	Bottle Label Color:	NA	
2. Date Received: 313/24			
3. Time Received: 10:03			
4. Client Name: WSF	2		
5. Courier Information: (Please circle)			
Client     UPS	Area F	ast	• DRS
FedEx     GSO/GLS	Ontrac		PAMS
PHYSIS Driver:			
i. Start Time:		iii. Total Milea	ge:
ii. End Time:		iv. Number of	
6. Container Information: (Please put the # of cor	ntainers or circle none		
Cooler     Styrofoam Cooler	• Box		None
Carboy(s)     Carboy Trash Can(s		boy Cap(s)	Other
<ol> <li>8. Randomly Selected Samples Temperature (°C):</li> <li>Inspection Info</li> <li>1. Initials Inspected By:</li> </ol>	<u>12.2</u> Use	ed I/R Thermome	eter # 1-2
Sample Integrity Upon Receipt:			
1. COC(s) included and completely filled out		Yes /	No
2. All sample containers arrived intact			No
3. All samples listed on COC(s) are present			No
4. Information on containers consistent with info	rmation on COC(s)		No
5. Correct containers and volume for all analyses	indicated		No
6. All samples received within method holding tin	ne		No
7. Correct preservation used for all analyses indic			No
8. Name of sampler included on COC(s)			No
	Notes:		



FINAL REPORT

Work Orders: 4D02004

Project: 2315100200.0004.WECK

Attn: John Rudolph

Client: WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	5/13/2024
<b>Received Date:</b>	4/17/2024
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
	C016900152, Project No. 2315100200.0004.WE
	СК

#### DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. The report may include analytes that are not currently accreditable by some state agencies or accrediting bodies. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 4/17/24 with the Chain-of-Custody document. The samples were received in good condition, at 11.3 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

Kenneth C. Oda For Kim G. Tu Project Manager

4D02004





WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

### Sample Summary

## Certificate of Analysis

FINAL REPORT

Project Number: 2315100200.0004.WECK

Reported: 05/13/2024 08:49

Project Manager: John Rudolph

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	4D02004-01	Water	04/17/24 10:30	
CL08	Nick Jernack	4D02004-02	Water	04/17/24 09:50	
CL09	Nick Jernack	4D02004-03	Water	04/17/24 09:10	
CL10	Nick Jernack	4D02004-04	Water	04/17/24 08:35	
LE02	Nick Jernack	4D02004-05	Water	04/17/24 09:35	

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL07

4D02004-01 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Anions by IC, EPA Method 300.0 Method: EPA 300.0 Batch ID: W4D1531 Nitrate as N	Preparation: _NONE (LC) 88 ND	22 29	Instr: LC15 Prepared: 04, 110 150	/17/24 13 ug/l ug/l	3:18 1 1	04/17/24 17:55 04/17/24 17:55	
			100	ugn	•	04/11/24 11:00	
Conventional Chemistry/Physical Para Method: EPA 350.1 Batch ID: W4D2191 Ammonia as N	Preparation: _NONE (WETCHEM)		<b>Instr:</b> AA06 <b>Prepared:</b> 04, 0.10	/29/24 13 mg/l	8:52	<b>4</b> 05/02/24	nalyst: YMT
Method: EPA 351.2 Batch ID: W4D2103 TKN	Preparation: _NONE (WETCHEM)	) 0.065	<b>Instr:</b> AA06 <b>Prepared:</b> 04, 0.10	/24/24 16 mg/l	5:46 1	<b>4</b> 04/25/24	analyst: YMT
Method: EPA 365.3 Batch ID: W4D1646 o-Phosphate as P	Preparation: _NONE (WETCHEM) 0.28	) 0.0071	<b>Instr:</b> UVVIS0 <b>Prepared:</b> 04, 0.010		2:08 1	04/18/24 13:25	Analyst: rob
Method: EPA 365.3 Batch ID: W4D2424 Phosphorus as P, Total	Preparation: _NONE (WETCHEM) 0.31	) 0.0067	Instr: UVVIS0 Prepared: 04, 0.010	-	):02 1	05/06/24	Analyst: rob
Method: SM 2540C Batch ID: W4D1611 Total Dissolved Solids	Preparation: _NONE (WETCHEM) 350	) 4.0	Instr: OVEN1 Prepared: 04, 10		):47 1	04/18/24	Analyst: bel
Method: SM 2540D Batch ID: W4D1645 Total Suspended Solids	Preparation: _NONE (WETCHEM)	) 5	Instr: OVEN1 Prepared: 04, 5		2:08 1	04/18/24	Analyst: dig
Method: SM 4500S2-D Batch ID: W4D1903 Sulfide, Total	Preparation: _NONE (WETCHEM) 0.10	) 0.050	Instr: _ANALY Prepared: 04, 0.10		):41 1	04/23/24	Analyst: mes
Metals by EPA 200 Series Methods							
Method: EPA 200.7 Batch ID: W4D1806 Aluminum, Dissolved	Preparation: EPA 200.2	0.041	Instr: ICP03 Prepared: 04, 0.050	/22/24 10 mg/l	):40 1	04/30/24	<b>Analyst:</b> kvm
,	0.041	0.041	0.050	mg/l	1	04/30/24	J

## Certificate of Analysis

Sampled: 04/17/24 10:30 by Nick Jernack

FINAL REPORT

Reported: 05/13/2024 08:49

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL08

4D02004-02 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Anions by IC, EPA Method 300.0 Method: EPA 300.0			Instr: LC15				
Batch ID: W4D1531	Preparation: _NONE (LC)		Prepared: 04	4/17/24 13	8:18	А	nalyst: cam
	1100	22	110	ug/l	1	04/17/24 18:13	,
Nitrite as N		29	150	ug/l	1	04/17/24 18:13	J
Conventional Chemistry/Physical Pa	arameters by APHA/EPA/ASTM M	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4D2191	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/29/24 13	8:52	Ar	nalyst: YMT
Ammonia as N	0.21	0.017	0.10	mg/l	1	05/02/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4D2103	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/24/24 16	5:46	Ar	nalyst: YMT
ТКМ	0.87	0.065	0.10	mg/l	1	04/25/24	
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W4D1646	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/18/24 12	2:08	A	<b>nalyst:</b> rob
o-Phosphate as P	0.19	0.0071	0.010	mg/l	1	04/18/24 13:25	**
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W4D2424	Preparation: _NONE (WETCHEM	-	Prepared: 04				<b>nalyst:</b> rob
Phosphorus as P, Total	0.25	0.0067	0.010	mg/l	1	05/06/24	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W4D1611	Preparation: _NONE (WETCHEM		Prepared: 04				Analyst: bel
Total Dissolved Solids	330	4.0	10	mg/l	1	04/18/24	
Method: SM 2540D			Instr: OVEN	-			
Batch ID: W4D1645	Preparation: _NONE (WETCHEM		Prepared: 04				<b>nalyst:</b> dig
Total Suspended Solids	6	5	5	mg/l	1	04/18/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4D1903	Preparation: _NONE (WETCHEM	-	Prepared: 04				nalyst: mes
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/23/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4D1806	Preparation: EPA 200.2		Prepared: 04	4/22/24 10	):40		nalyst: kvm
Aluminum, Dissolved		0.041	0.050	mg/l	1	04/30/24	

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

## Certificate of Analysis

Sampled: 04/17/24 9:50 by Nick Jernack

FINAL REPORT

Reported: 05/13/2024 08:49

(Continued)

Aluminum, Total

0.022

0.075

0.050

mg/l

1

04/30/24

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL09

4D02004-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Anions by IC, EPA Method 300.0							
Method: EPA 300.0			Instr: LC15				
Batch ID: W4D1531	Preparation: _NONE (LC)		Prepared: 04	/17/24 13	3:18		Analyst: cam
Nitrate as N	56	22	110	ug/l	1	04/17/24 19:06	J S
Nitrite as N	ND	29	150	ug/l	1	04/17/24 19:06	3
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM M	lethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4D2191	Preparation: _NONE (WETCHEN	/1)	Prepared: 04	/29/24 13	3:52	ŀ	Analyst: YMT
Ammonia as N	1.3	0.017	0.10	mg/l	1	05/02/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4D2103	Preparation: _NONE (WETCHEM	/)	Prepared: 04	/24/24 16	5:46	ŀ	Analyst: YMT
ΤΚΝ	2.1	0.065	0.10	mg/l	1	04/25/24	
Method: EPA 365.3			Instr: UVVISO	)4			
Batch ID: W4D1646	Preparation: _NONE (WETCHEN	/1)	Prepared: 04	/18/24 12	2:08		Analyst: rob
o-Phosphate as P	0.38	0.0071	0.010	mg/l	1	04/18/24 13:26	\$         **
Method: EPA 365.3			Instr: UVVISO	)5			
Batch ID: W4D2424	Preparation: _NONE (WETCHEN	/1)	Prepared: 04	/30/24 10	0:02		Analyst: rob
Phosphorus as P, Total	0.43	0.0067	0.010	mg/l	1	05/06/24	
Method: SM 2540C			Instr: OVEN1	7			
Batch ID: W4D1611	Preparation: _NONE (WETCHEN	/1)	Prepared: 04	/18/24 09	9:47		Analyst: bel
Total Dissolved Solids	500	4.0	10	mg/l	1	04/18/24	
Method: SM 2540D			Instr: OVEN1	5			
Batch ID: W4D1645	Preparation: _NONE (WETCHEN	/1)	Prepared: 04	/18/24 12	2:08		Analyst: dig
Total Suspended Solids	ND	5	5	mg/l	1	04/18/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4D1903	Preparation: _NONE (WETCHEN	/1)	Prepared: 04	/23/24 09	9:41		Analyst: mes
Sulfide, Total	2.0	0.50	1.0	mg/l	10	04/23/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4D1806	Preparation: EPA 200.2		Prepared: 04	/22/24 10	0:40		Analyst: kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	04/30/24	
Aluminum, Total	0.073	0.022	0.050	mg/l	1	04/30/24	

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

## Certificate of Analysis

Sampled: 04/17/24 9:10 by Nick Jernack

FINAL REPORT

Reported: 05/13/2024 08:49

(Continued)

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL10

4D02004-04 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Anions by IC, EPA Method 300.0							
Method: EPA 300.0			Instr: LC15				
Batch ID: W4D1531	Preparation: _NONE (LC)		Prepared: 04/	′17/24 1	3:18		Analyst: cam
Nitrate as N		22	110	ug/l	1	04/17/24 19:24	1 J
Nitrite as N	ND	29	150	ug/l	1	04/17/24 19:24	1
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4D2191	Preparation: _NONE (WETCHEM)	)	Prepared: 04/	′29/24 1	3:52	l l	Analyst: YMT
Ammonia as N	0.22	0.017	0.10	mg/l	1	05/02/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4D2103	Preparation: _NONE (WETCHEM)	)	Prepared: 04/	24/24 1	6:46	4	Analyst: YMT
TKN		0.065	0.10	mg/l	1	04/25/24	
Method: EPA 365.3			Instr: UVVIS04	4			
Batch ID: W4D1646	Preparation: _NONE (WETCHEM)	)	Prepared: 04/	18/24 1	2:08		Analyst: rob
o-Phosphate as P	0.24	0.0071	0.010	mg/l	1	04/18/24 13:20	6      **
Method: EPA 365.3			Instr: UVVIS0	5			
Batch ID: W4D2424	Preparation: _NONE (WETCHEM)		Prepared: 04/				Analyst: rob
Phosphorus as P, Total	0.33	0.0067	0.010	mg/l	1	05/06/24	
Method: SM 2540C			Instr: OVEN17	7			
Batch ID: W4D1611	Preparation: _NONE (WETCHEM)		Prepared: 04/				Analyst: bel
Total Dissolved Solids	510	4.0	10	mg/l	1	04/18/24	
Method: SM 2540D			Instr: OVEN15	5			
Batch ID: W4D1645	Preparation: _NONE (WETCHEM		Prepared: 04/		2:08		Analyst: dig
Total Suspended Solids	7	5	5	mg/l	1	04/18/24	
Method: SM 4500S2-D			Instr: _ANALY	ST			
Batch ID: W4D1903	Preparation: _NONE (WETCHEM		Prepared: 04/	-			Analyst: mes
Sulfide, Total	0.20	0.050	0.10	mg/l	1	04/23/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4D1806	Preparation: EPA 200.2		Prepared: 04/				<b>Analyst:</b> kvm
Aluminum, Dissolved	NB	0.041	0.050	mg/l	1	04/30/24	
Aluminum, Total	0.070	0.022	0.050	mg/l	1	04/30/24	

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

## Certificate of Analysis

Sampled: 04/17/24 8:35 by Nick Jernack

FINAL REPORT

Reported: 05/13/2024 08:49

(Continued)

4D02004

## **Certificate of Analysis**

**FINAL REPORT** 

WSP USA E&I Inc San Diego 9177 Sky Park Court, Ste A	Project Number:	2315100	0200.0004.WE	CK		05/1	<b>Reported:</b> 3/2024 08:49
San Diego, CA 92123	Project Manager:	John Ru	ıdolph			05/1	5/2024 00.49
Sample Results						(	Continued)
Sample: LE02				Sampleo	l: 04/17	7/24 9:35 by N	ick Jernack
4D02004-05 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Anions by IC, EPA Method 300.0	Kesuit		WIKE	Units		Analyzeu	Quanner
Method: EPA 300.0			Instr: LC15				
Batch ID: W4D1531	Preparation: _NONE (LC)		Prepared: 04	4/17/24 13	:18	Α	nalyst: cam
Nitrate as N	-	22	110	ug/l	1	04/17/24 20:17	,
Nitrite as N	ND	29	150	ug/l	1	04/17/24 20:17	
Conventional Chemistry/Physical Pa	rameters by APHA/EPA/ASTM M	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4D2191	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/29/24 13	:52	Ar	nalyst: YMT
Ammonia as N	0.85	0.017	0.10	mg/l	1	05/02/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4D2103	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/24/24 16	:46	Ar	nalyst: YMT
ТКМ	2.4	0.26	0.40	mg/l	1	04/25/24	M-02
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W4D1646	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/18/24 12	:08	A	nalyst: rob
o-Phosphate as P	0.17	0.0071	0.010	mg/l	1	04/18/24 13:27	
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W4D2424	Preparation: _NONE (WETCHEM	l)	Prepared: 04	4/30/24 10	:02	A	nalyst: rob
Phosphorus as P, Total	0.23	0.0067	0.010	mg/l	1	05/06/24	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W4D1611	Preparation: _NONE (WETCHEN	l)	Prepared: 04	4/18/24 09	:47	ŀ	Analyst: bel
Total Dissolved Solids	1500	4.0	10	mg/l	1	04/18/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4D1903	Preparation: _NONE (WETCHEN	l)	Prepared: 04	4/23/24 09	:41	Α	nalyst: mes
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/23/24	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

Reported: 05/13/2024 08:49

Project Manager: John Rudolph

### Quality Control Results

Anions by IC, EPA Method 300.0

					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W4D1531 - EPA 300.0											
Blank (W4D1531-BLK1)				Pre	pared & Ar	nalyzed: 0	4/17/2	4			
Nitrate as N	n n n n n ND	22	110	ug/l							
Nitrite as N		29	150	ug/l							
LCS (W4D1531-BS1)				Pre	pared & Ar	nalyzed: 0	4/17/2	4			
Nitrate as N		22	110	ug/l	2000	-	106	90-110			
Nitrite as N	2080	29	150	ug/l	2000		104	90-110			
Matrix Spike (W4D1531-MS1)	Source	: 4D1712	22-01	Pre	pared & Ar	nalyzed: 0	4/17/2	4			
Nitrate as N	-24200	220	1100	ug/l	20000	2780	107	84-115			
Nitrite as N	20800	290	1500	ug/l	20000	ND	104	87-108			
Matrix Spike (W4D1531-MS2)	Source	: 4D1712	22-02	Pre	pared & Ar	nalyzed: 0	4/17/2	4			
Nitrate as N	22100	220	1100	ug/l	20000	646	107	84-115			
Nitrite as N	a a 21200	290	1500	ug/l	20000	ND	106	87-108			
Matrix Spike Dup (W4D1531-MSD1)	Source	: 4D1712	22-01	Pre	pared & Ar	nalyzed: 0	4/17/2	4			
Nitrate as N	24200	220	1100	ug/l	20000	2780	107	84-115	0	20	
Nitrite as N		290	1500	ug/l	20000	ND	106	87-108	2	20	
Matrix Spike Dup (W4D1531-MSD2)	Source	: 4D1712	22-02	Pre	pared & Ar	nalyzed: 0	4/17/2	4			
Nitrate as N	22000	220	1100	ug/l	20000	646	107	84-115	0.4	20	
Nitrite as N	20900	290	1500	ug/l	20000	ND	105	87-108	1	20	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

### Reported: 05/13/2024 08:49

Project Manager: John Rudolph

(Continued)

#### Quality Control Results

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifie
Batch: W4D1611 - SM 2540C											
Blank (W4D1611-BLK1)					pared & Ai	nalyzed: 0	4/18/24	4			
Total Dissolved Solids		4.0	10	mg/l							
LCS (W4D1611-BS1) Total Dissolved Solids		4.0	10		pared & Ai 824	nalyzed: 0		<b>4</b> 97-103			
	001			mg/l							
Duplicate (W4D1611-DUP1) Total Dissolved Solids		4.0	<b>4-05</b> 10	Pre mg/l	pared & Ai	1470 nalyzed: 0	4/18/24	1	2	10	
Duplicate (W4D1611-DUP2)	Source	4D1705	8-01	•	pared & Ai	alvzed: 0	4/18/2	1			
Total Dissolved Solids	1520	4.0	10	mg/l		1460	-, 10, 2-	•	4	10	
atch: W4D1645 - SM 2540D											
Blank (W4D1645-BLK1)				Pre	pared & Ai	nalyzed: 0	4/18/24	4			
Total Suspended Solids		5	5	mg/l							
LCS (W4D1645-BS1)	64.0	E	F		pared & Ai	nalyzed: 0					
Total Suspended Solids		5	5	mg/l	64.7			90-110			
Duplicate (W4D1645-DUP1) Total Suspended Solids	<b>Source</b> : 740	5 <b>4D1703</b>	<b>2-01</b> 5	Prej mg/l	pared & Ai	nalyzed: 0 710	4/18/24	1	4	10	
Batch: W4D1646 - EPA 365.3				0							
Blank (W4D1646-BLK1)				Pre	pared & Ai	alvzed: 0	4/18/24	1			
o-Phosphate as P		0.0071	0.010	mg/l		aryzea. o	-, 10, 2-	•			
LCS (W4D1646-BS1)				Pre	pared & Ai	nalyzed: 0	4/18/24	4			
o-Phosphate as P	0.204	0.0071	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W4D1646-MS1)		4D0200			pared & Ai						
o-Phosphate as P			0.010	mg/l	0.200	0.135		85-112			
Matrix Spike Dup (W4D1646-MSD1) o-Phosphate as P		0 0071	<b>5-01</b> 0.010	Pre mg/l	pared & Ai 0.200	nalyzed: 0 0.135		<b>1</b> 85-112	0	20	
Batch: W4D1903 - SM 4500S2-D	0.001	0.001 1	0.010		0.200	01100		00 112	Ū	20	
Blank (W4D1903-BLK1)				Dro	pared & Ai	alvzad. O	112212	4			
Sulfide, Total		0.050	0.10	mg/l	pareu & Ai	lalyzeu. U	4/23/24	•			
LCS (W4D1903-BS1)				Pre	pared & Ai	nalyzed: 0	4/23/24	1			
Sulfide, Total	0.100	0.050	0.10	mg/l	0.0980	,		90-110			
Duplicate (W4D1903-DUP1)		4D0200		-	pared & Ai	_	4/23/24	4			
Sulfide, Total	0.100	0.050	0.10	mg/l		0.100			0	20	
Matrix Spike (W4D1903-MS1) Sulfide, Total	<b>Source</b> : 0.200	4C2002	<b>5-01</b> 0.10	Prej mg/l	pared & Ai 0.196	nalyzed: 0 ND		<b>4</b> 80-120			
				0							
Matrix Spike Dup (W4D1903-MSD1) Sulfide, Total	Source: 0.200	4C2002	<b>5-01</b> 0.10	mg/l	pared & Ai 0.196	nalyzed: 0 ND		<b>1</b> 80-120	0	20	
Batch: W4D2103 - EPA 351.2				-							
Blank (W4D2103-BLK1)				Prenare	d: 04/24/2	4 Analyza	d: 04/2	5/24			
TKN		0.065	0.10	mg/l							



**FINAL REPORT** 

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Project Number: 2315100200.0004.WECK

### Project Manager: John Rudolph

### (Continued)

Reported: 05/13/2024 08:49

### Quality Control Results

Conventional Chemistry/Physical Parame	eters by	APHA/EP	A/ASIN	1 Methods							
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4D2103 - EPA 351.2 (Continued)											
Blank (W4D2103-BLK2)				Prepared:	04/24/24	Analyze	d: 04/2	25/24			
TKN	ND	0.065	0.10	mg/l		-					
LCS (W4D2103-BS1)				Prepared:	04/24/24	Analyze	d: 04/2	25/24			
TKN	0.994	0.065	0.10		1.00			90-110			
LCS (W4D2103-BS2)				Prepared:	04/24/24	Analyze	d: 04/2	25/24			
TKN	0.940	0.065	0.10	mg/l				90-110			
Matrix Spike (W4D2103-MS1)	Source:	4D02004	-05	Prepared:	04/24/24	Analyze	d: 04/2	25/24			
TKN			0.40	mg/l	4.00	2.35		90-110			
Matrix Spike (W4D2103-MS2)	Source	4D17078	-04	Prenared	04/24/24	Analyze	d· 04/2	5/24			
TKN			0.10			0.0894		90-110			
Matrix Spike Dup (W4D2103-MSD1)	Source	4D02004	-05	Prenared	04/24/24	Analyzo	d· 04/2	5/24			
TKN			0.40	mg/l				90-110	1	10	
Matrix Spike Dup (W4D2103-MSD2)	Source	4D17078	-04	Prenared:	04/24/24	Analyzo	d· 04/2	5/24			
TKN			0.10		1.00			90-110	0.08	10	
Batch: W4D2191 - EPA 350.1											
				Duomonodo	04/20/24	A	J. OF //				
Blank (W4D2191-BLK1) Ammonia as N	ND	0.017	0.10	mg/l	04/29/24	Analyze	a: 05/(	02/24			
		01011	0110	Ū			1.05.00				
Blank (W4D2191-BLK2) Ammonia as N	ND	0.017	0.10	mg/l	04/29/24	Analyze	d: 05/(	02/24			
	11B	0.011	0.10	Ū							
LCS (W4D2191-BS1) Ammonia as N	0 251	0.017	0.10	Prepared: mg/l	<b>04/29/24</b> 0.250	Analyze		90-110			
	0.201	0.017	0.10	Ū							
LCS (W4D2191-BS2) Ammonia as N	0.245	0.017	0.10	Prepared: mg/l	<b>04/29/24</b> 0.250			<b>)2/24</b> 90-110			
				Ū							
Matrix Spike (W4D2191-MS1) Ammonia as N		4D09008	- <b>01</b> 0.10	Prepared: mg/l	04/29/24 0.250	Analyze 0.0670		<b>)2/24</b> 90-110			
				Ū							
Matrix Spike (W4D2191-MS2) Ammonia as N		4D17017	- <b>01</b> 0.10	Prepared: mg/l	04/29/24 0.250	<b>Analyze</b> 0.143					
	- 0.300	0.017	0.10	Ū							
Matrix Spike Dup (W4D2191-MSD1)		4D09008			04/29/24				0.0	15	
Ammonia as N	0.304	0.017	0.10	mg/l	0.250	0.0670	95	90-110	0.8	15	
Matrix Spike Dup (W4D2191-MSD2) Ammonia as N	Source: 0.384	4D17017			04/29/24	<b>Analyze</b> 0.143		<b>)2/24</b> 90-110	4	45	
	- 0.304	0.017	0.10	mg/l	0.250	0.143	97	90-110	1	15	
Batch: W4D2424 - EPA 365.3											
Blank (W4D2424-BLK1)		0.004-	0.0/5		04/30/24	Analyze	d: 05/0	6/24			
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W4D2424-BS1)					04/30/24	Analyze					
Phosphorus as P, Total	0.198	0.0067	0.010	mg/l	0.200		99	90-110			
Matrix Spike (W4D2424-MS1)		4D02005		-	04/30/24						
Phosphorus as P, Total	0.416	0.0067	0.010	mg/l	0.200	0.223	96	90-110			

<b>Certificate of Analysis</b>
FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

WECK LABORATORIES, INC.

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

### NAL REPORT

(Continued)

**Reported:** 05/13/2024 08:49

### **Quality Control Results**

					Cnika	Courses		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC		RPD	Limit	Qualifie
atch: W4D2424 - EPA 365.3 (Continued		MBL	WINE	Units	Level	Result	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Linits		2	Quante
Matrix Spike Dup (W4D2424-MSD1)		4D0200	5-01	Prepare	d: 04/30/24	Analyze	d: 05/0	06/24			
Phosphorus as P, Total	0.427		0.010	mg/l	0.200	0.223	-	90-110	3	20	
Quality Control Resu	ılts									(Co	ontinued
Metals by EPA 200 Series Methods											
					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifie
atch: W4D1806 - EPA 200.7											
Blank (W4D1806-BLK1)					d: 04/22/24	Analyze	ed: 04/3	30/24			
Aluminum, Dissolved		0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W4D1806-BS1)				Prepare	d: 04/22/24	Analyze	ed: 04/3	30/24			
Aluminum, Dissolved	0.226	0.041	0.050	mg/l	0.200		113	85-115			
Aluminum, Total	0.226	0.022	0.050	mg/l	0.200		113	85-115			
Matrix Spike (W4D1806-MS1)	Source	4D0200	4-02	Prepare	d: 04/22/24	Analyze	ed: 04/3	30/24			
Aluminum, Total	0.376	0.022	0.050	mg/l	0.200	0.0746	151	70-130			MS-0
Matrix Spike (W4D1806-MS2)	Source	4D0200	4-04	Prepare	d: 04/22/24	Analyze	ed: 04/3	30/24			
Aluminum, Total	0.437	0.022	0.050	mg/l	0.200	0.0699	184	70-130			MS-0
Matrix Spike Dup (W4D1806-MSD1)	Source	4D0200	4-02	Prepare	d: 04/22/24	Analyze	ed: 04/3	30/24			
Aluminum, Total	0.354	0.022	0.050	mg/l	0.200	0.0746	140	70-130	6	30	MS-0
Matrix Spike Dup (W4D1806-MSD2)	Source	4D0200	4-04	Prepare	d: 04/22/24	Analyze	ed: 04/3	30/24			
Aluminum, Total	0.357	0.022	0.050	mg/l	0.200	0.0699		70-130	20	30	MS-0



WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

## **Certificate of Analysis**

FINAL REPORT

Project Number: 2315100200.0004.WECK

Reported: 05/13/2024 08:49

Project Manager: John Rudolph

### Notes and Definitions

ltem	Definition
**	The recommended holding time for field filtering is only 15 minutes. The sample was filtered as soon as possible but it was filtered past holding time. However, the sample was analyzed within holding time.
J	Estimated conc. detected <mrl and="">MDL.</mrl>
M-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	Method Reporting Limit (MRL) is the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.
Any rem	aining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

### Chain of Custody & Sample Information Record

×.			-																							40	)020	204
Client: WS	P USA E&I Inc.			Co	onta	ct:	Johi	ו Ru	dolj	bh					•••							·	Phone No.		3-8158			
Project Name:	LECL TMDL 2315100200.0004.	Monitori	ng	En	nail:		jol	<u>n.ru</u>	dolp	h@v	/ood	plc.o	com	1				-								ata Pac	kage: 📩	Ƴes ∏ No
PO#: GL Code:	C016900152 573000	WEOK						Tim	9:			Rou	tine	2	*	8-5 E Rus	-	ł		Hou ush			24 Hour Rush		E	Email Re State	sults: EDT:	ýes □No ýes □No ýes □No
Org#S	3151 ampler Informatio	n		La	-	# of		val: taine vativ			By: Sample Type		Analysis Requested			*Add	ditional Charges May Apply	(Include Source Number in Notes) Notes		otes)								
Name:	Nick Jena	ck	-								Containers							10 100	(5.005		i oco	200.7)	DW = Drinking Water	Ortho-P i	is field filt			
Employer:	WSP USA/E&I Inc.		-					tate			Conta				(EDA 95	(117.00	8	350.1)	OFUS (EFA 3 (EPA 365.3)	SM4500S		- (EPA	WW = Wastewater GW = Groundwater	Dissolve	∃AI is fie	ld filtered	d (0.45 u	m)
Signature:				preservec	H2SO4 HCI	03	Na2S2O3 NaOH	NaOH/ZnAcetate	AA	zen	Total # of	outine	sample	Special	S NILLER	TDS (SM2540 C)	TKN (EPA 351.2	Ammonia (EPA 350.1)	SRP/Ortho-P (E	Total Sulfide (SM4500S)	Total AL (EPA 200.7)	Dissolved AL (EPA	S = Soil SG = Sludge L = Liquid					
Sa	mple ID	Date	Time	5	Ê P	Η̈́	Na.	Na		5 P		2	æ	Š			Ŧ	Ā Ā	SRF 00	Tot	Tot:	ä	M = Miscellaneous					
	CL07	4/17/24						<u>   </u>					_		<u>x  </u>	<u>x</u>	x	x	x x	x	x	x						
	CL08		0950		-						_				x	<u> </u>	x	x	x x	x	x	x						
	CL09		0910												x	< x	x	x	x x	x	x	x						
	CL10		0835								•				x	< x	x	$\mathbf{x}$	xx	x	x	x						
	LE02	$\vee$	0935								Τ					< x												
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JAN A		ick Jun	uck /l	×5	P	5	4/17	124	-	134	5	K	えん	J L	) V	R vo		$\leq$			/		Launa Gast	dur	<u>'</u>	NE	202	
- int	- C'II	aura		<u> </u>	N	//\	Im		1	1	<u>2</u>			17		<u>y</u>	<u></u>	$\subset$	<u>入</u>	~	_		CJA W	necu	<u></u>			
		·					<u>4</u>	ſl	2	<u>4 1</u>	55	0																

a	For Lab Use Only) Sample Integrity	Upon R	eceipt			Lab Notes			
	Sample(s) Submitted on Ice?	Yes	No	T0307	Temperature		Lab No.		
	Custody Seal(s) Intact?	Yes	No	N/A	[f3 °c			<u></u>	
	Sample(s) Intact?	Yes	No	н. Т	Cooler Blank			Page 1 of	_1



### Sample Receipt Checklist

	Weck WKO:       4D02004         VKO Logged by:       Lester Abad         les Checked by:       Lester Abad		Date,	Time Received: # of Samples: Delivered by:	
	Task	Yes	No	N/A	Comments
10000000000000000000000000000000000000	COC present at receipt?	$\boxtimes$			·
	COC properly completed?	×			
COC	COC matches sample labels?	$\boxtimes$			
	Project Manager notified about COC discrepancy?				
	Sample Temperature	11.	.3°C		
Ę	Samples received on ice?	$\boxtimes$			
Receipt Information	Ice Type (Blue/Wet)	WE	ΞT		
Ĩ.	All samples intact?	$\boxtimes$		_	
nfo	Samples in proper containers?	$\boxtimes$			
pt	Sufficient sample volume?	$\boxtimes$		_	
cei	Samples intact?	$\boxtimes$		_	
Re	Received within holding time?	$\boxtimes$		_	
	Project Manager notified about receipt info?				
	Sample labels checked for correct preservation?	$\boxtimes$		□ _	
	VOC Headspace: (No) none, If Yes (see comment) 524.2, 524.3, 624.1, 8260, 1666 P/T, LUFT			- 	□<6mm/Pea Size?
7	pH verified upon receipt? Metals <2; H2SO4 pres tests <2; 522<4; TOC <2; 508.1, 525.2<2, 6710B<2, 608.3 5-9	$\boxtimes$		-	pH paper Lot# 3101689
	Free Chlorine Tested <0.1 (Organics Analyses)				Cl Test Strip Lot#
	O&G pH <2 verified?			-	pH paper Lot# pH Reading:
	pH adjusted for O&G				Acid Lot# Amt added:
	Project Manager notified about sample preservation?			× •	

**PM** Comments

Sample Receipt Checklist Completed by: Signature: *Lester Abad* 

Date: 04/17/24



June 12, 2024

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Project Name:LECL TMDL Monitoring PO # C014105479Physis Project ID:2302004-029

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 5/15/2024. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, Rachel Hansen

Rachel Hansen 714 602-5320 Extension 203 rachelhansen@physislabs.com



### **PROJECT SAMPLE LIST**

#### WSP USA

#### PHYSIS Project ID: 2302004-029

LECL TMDL Mo	onitoring PO # Co14105	5479		Total Samples: 10					
PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type			
117839	CL07-Int		4/17/2024	10:30	Biologic	Not Specified			
117840	CL07-Surf		4/17/2024	12:52	Biologic	Not Specified			
117841	CL08-Int		4/17/2024	9:50	Biologic	Not Specified			
117842	CL08-Surf		4/17/2024	13:03	Biologic	Not Specified			
117843	CL09-Int		4/17/2024	9:10	Biologic	Not Specified			
117844	CL09-Surf		4/17/2024	13:30	Biologic	Not Specified			
117845	CL10-Int		4/17/2024	8:35	Biologic	Not Specified			
117846	CL10-Surf		4/17/2024	13:48	Biologic	Not Specified			
117847	LE02-Int		4/17/2024	9:35	Biologic	Not Specified			
117848	LE02-Surf		4/17/2024	10:10	Biologic	Not Specified			

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### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

i - 4 of 6



SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples





### Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE Batch ID	Date Processed	Date Analyzed
Sample ID: 117839-R1	CL07-Int		Matrix: Biolog	gic			Sampled:	17-Apr-24 10:30	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	8.01	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117840-R1	CL07-Surf		Matrix: Biolog	gic			Sampled:	017-Apr-24 12:52	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	23.4	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117841-R1	CLo8-Int		Matrix: Biolog	gic			Sampled:	17-Apr-24 9:50	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	8.01	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117842-R1	CLo8-Surf		Matrix: Biolog	gic			Sampled:	17-Apr-24 13:03	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	18.7	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117843-R1	CL09-Int		Matrix: Biolog	gic			Sampled:	17-Apr-24 9:10	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	2.67	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117844-R1	CL09-Surf		Matrix: Biolog	gic			Sampled:	17-Apr-24 13:30	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	9.08	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117845-R1	CL10-Int		Matrix: Biolog	gic			Sampled:	17-Apr-24 8:35	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	80.1	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117846-R1	CL10-Surf		Matrix: Biolog	gic			Sampled:	17-Apr-24 13:48	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	139	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117847-R1	LEo2-Int		Matrix: Biolog	gic			Sampled:	17-Apr-24 9:35	Received:	15-May-24
Chlorophyll-a	SM 10200 F	I mg/m3	26.7	1	1	2	NA	C-82015	30-May-24	30-May-24
Sample ID: 117848-R1	LE02-Surf		Matrix: Biolog	gic			Sampled:	17-Apr-24 10:10	Received:	15-May-24
Chlorophyll-a	SM 10200 F	l mg/m3	85.4	1	1	2	NA	C-82015	30-May-24	30-May-24

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

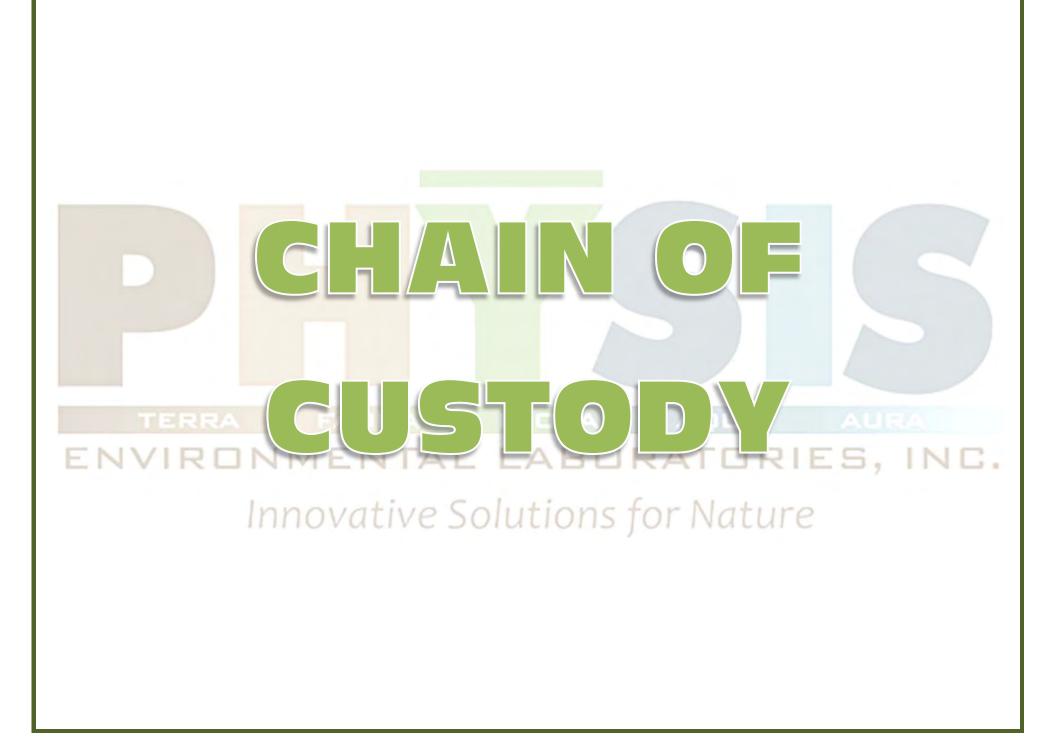


PHYSIS Project ID: 2302004-029 Client: WSP USA Project: LECL TMDL Monitoring PO # C014105479

### Conventionals

### **QUALITY CONTROL REPORT**

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	A %	CCURACY LIMITS	PR %	ECISION LIMITS	QA CODE
Chlorophyll-a		Method: SM 10200 H			Fraction: NA				Prepared: 30-May-24			Analyzed: 30-May-24		
117838-B1	QAQC Procedural Blank	C-82015	ND	1	1	2	mg/m3							
117838-BS1	QAQC Procedural Blank	C-82015	47000	1	1	2	mg/m3	51900	0	91	70 - 130% PASS			
117838-BS2	QAQC Procedural Blank	C-82015	52300	1	1	2	mg/m3	51900	0	101	70 - 130% PASS	10 3	0 PASS	



## Chain of Custody & Sample Information Record

	Contact: J	ohn Rudolph			Phone No.	959 242 8459
IDL Monitoring	Email:	poto condence	wsp.com		Phone No.	858-243-8158 Additional Reporting Requests Include QC Data Package:
	*Lab TAT Ap	proval:	Routine	Rush Rush	*24 Hour Rush *Additional Charges May Apply	FAX Results: Email Results: State EDT: (Include Source Number in Notes)
	# of C & Pres	ontainers ervatives	Sample Type	Analysis Requested	Matrix	Notes
2	eserved 14 203	ZnAcetate		- Nitrite - Nitrite hosphorus hosphorus ohyll-a	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge	Chl-a samples on 0.7 um GFF
Date Time	Unpr H2SC HCI HCI Ma2S:	AOH AOH AOH ACAA ACAA	otal	Numor SS SS SS SS SS SS SS SS SS SS SS SS SS	L = Liquid	
4/17/24 1030			FEES		M = Miscellaneous	J
				x		Filter Volume: 500
				x		Filter Volume: 400
				x		Filter Volume: 500
	++++			x		Filter Volume: 500
	++++			x		Filter Volume: 500
	+	+		x		Filter Volume: S00
	+++++			x		Filter Volume: 500
	++++			x		Filter Volume: 500
	++++			x		Filter Volume: 500
· 1010				x		Filter Volume: 500
11 T I	ip 5/8	× 1	Rec	eived By (Sign)		nt Name / Company
	4//7/24/1030         1252         0950         1303         0910         1330         0910         1330         13735         1348         0935         1010         Print Name / Compared	DL Monitoring       Email:         004.PHYSIS       Turn Aroun         *Lab TAT App         *Lab TAT App         ation       *Lab TAT App         # of Co         & Pres         Smack       # of Co         Date       Time         Date       Time         1       1252         0       0950         1       1252         0       0950         1       1303         0       0950         1       1348         0       1348         1       1348         1       1010         1       1010         1       1252         0       1303         0       1348         1       1348         1       1010         1010       1010	MDL Monitoring       Email:	MDL Monitoring       Email:       Description of the second         004.PHYSIS       Turn Around Time:       Routine         *Lab TAT Approval:       By:         *Lab TAT Approval:       By:         ation       & Preservatives       Sample         Type       # of Containers       By:         ation       & Preservatives       Sample         Swack       Image: Simple       By:         Image: Simple       Sample       Sample         Swack       Image: Simple       Sample         Image: Simple       Simple       Sample         Image: Simple       Sample       Sample         Image: Simple       Simple       Sample         Image: Simple       Simple       Sample         Image: S	Diametric Monitoring       Email:       Descriptions control         004.PHYSIS       Turn Around Time:       Routine       *3-5 Day       *48 Hour Rush         *Lab TAT Approval:       By:       *1       By:       *1       By:       *1         ation       & Preservatives       \$       \$       \$       \$       Sample       Analysis Requested         5       # of Containers       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$ <t< td=""><td>Dillion       Email:       Difference         004.PHYSIS       Turn Around Time:       Routine       *3-5 Day       *48 Hour       *24 Hour         *Lab TAT Approval:       By:       *Additional Charges May Apply         ation       # of Containers       Sample       Type       Analysis Requested       Matrix         Sumack       Image: Sign of the second seco</td></t<>	Dillion       Email:       Difference         004.PHYSIS       Turn Around Time:       Routine       *3-5 Day       *48 Hour       *24 Hour         *Lab TAT Approval:       By:       *Additional Charges May Apply         ation       # of Containers       Sample       Type       Analysis Requested       Matrix         Sumack       Image: Sign of the second seco

Sample Integrity L		ceipt			
Sample(s) Submitted on Ice?	Yes	No		Temperature	Lab Notes
Custody Seal(s) Intact?	Yes	No	N/A	°C	
Sample(s) Intact?	Yes	No	-14 -	Cooler Blank	

Lab No.

Page 1 of 1

DHVGIC		PHYSICs ENVIREMENTAL LABORATORICE, (HC. Internet-d Schlore) ice Manae
	Project Iteration ID:	2302004-029
ENVIRONMENTAL LABORATORIES, INC.	Client Name:	WSP USA
Innovative Solutions for Nature	Project Name:	LECL TMDL Monitoring PO #
Sample Receipt Summary		C014105479
o anipio neocipe bannary	COC Page Number:	2 of 2
Receiving Info	Bottle Label Color:	NA
1. Initials Received By:		
2. Date Received: 5/15/2024		
3. Time Received: 9:30		
4. Client Name: WSP		
5. Courier Information: (Please circle)		
Client UPS	<ul> <li>Area I</li> </ul>	ast o DPC
FedEx • GSO/GLS	<ul> <li>Ontra</li> </ul>	e BRS
PHYSIS Driver:	o Olitia	c • PAMS
i. Start Time:		
ii. End Time:	•.	iii. Total Mileage:
6. Container Information: (Please put the # of co	ntainars ar airsla nan	iv. Number of Pickups:
• <u> </u>	intamers or circle non	
•Carboy(s) •Carboy Trash Can(s		rboy Cap(s) <ul> <li>Other</li> </ul>
<ol><li>What type of ice was used: (Please circle any t With the second se second second sec</li></ol>		ର
	1-1 :	Water 🔗 None
<ol><li>Randomly Selected Samples Temperature (°C):</li></ol>	Use Use	ed I/R Thermometer #
Inspection Info		
1. Initials Inspected By: CR		
Sample Integrity Upon Descipto		
Sample Integrity Upon Receipt:		
1. COC(s) included and completely filled out		
2. All sample containers arrived intact		
<ol><li>All samples listed on COC(s) are present</li></ol>		
<ol><li>Information on containers consistent with info</li></ol>	rmation on COC(s)	
<ol><li>Correct containers and volume for all analyses</li></ol>	indicated	
<ol><li>All samples received within method holding time</li></ol>	ne	
<ol><li>Correct preservation used for all analyses indic</li></ol>	ated	
8. Name of sampler included on COC(s)		
	Notes:	

@.\Sample Logistics (SI)\SRS

Page 1of1

ALC: NO



FINAL REPORT

Work Orders: 4E22007

Project: 2315100200.0004.WECK

Attn: John Rudolph

Client: WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	6/26/2024
<b>Received Date:</b>	6/5/2024
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C016900152, Project
Billing Code:	No. 2315100200.0004.WE CK

#### DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. The report may include analytes that are not currently accreditable by some state agencies or accrediting bodies. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 6/05/24 with the Chain-of-Custody document. The samples were received in good condition, at 2.0 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

**Reviewed by:** 

Kenneth C. Oda For Kim G. Tu Project Manager

4E22007





#### WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Summary

# **Certificate of Analysis**

**FINAL REPORT** 

Project Number: 2315100200.0004.WECK

**Reported:** 

06/26/2024	09:01
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Project Manager:	John Rudolph
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Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	4E22007-01	Water	06/05/24 09:45	
CL08	Nick Jernack	4E22007-02	Water	06/05/24 09:15	
CL09	Nick Jernack	4E22007-03	Water	06/05/24 08:30	
CL10	Nick Jernack	4E22007-04	Water	06/05/24 08:00	
LE02	Nick Jernack	4E22007-05	Water	06/05/24 09:25	



WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL07

# Certificate of Analysis

Sampled: 06/05/24 9:45 by Nick Jernack

FINAL REPORT

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

**Reported:** 06/26/2024 09:01

00/20/2024 09.

4E22007-01 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Pa	rameters by APHA/EPA/ASTM M	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4F0645	Preparation: _NONE (WETCHEM		Prepared: 0				nalyst: YMT
Ammonia as N	1.3	0.017	0.10	mg/l	1	06/10/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4F1527	Preparation: _NONE (WETCHEM	-	Prepared: 0				nalyst: YMT
TKN	2.0	0.065	0.10	mg/l	1	06/20/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4F0473	Preparation: _NONE (WETCHEM	-	Prepared: 0	6/06/24 10:	:21		Analyst: kac
Nitrate as N		0.040	0.20	mg/l	1	06/06/24 16:09	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	06/06/24 16:15	FILT
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W4F0482	Preparation: _NONE (WETCHEM	)	Prepared: 0	6/06/24 11:			Analyst: rob
o-Phosphate as P	0.29	0.0071	0.010	mg/l	1	06/06/24 14:22	
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W4F0966	Preparation: _NONE (WETCHEM	)	Prepared: 0	6/12/24 13:	:47		Analyst: rob
Phosphorus as P, Total	0.32	0.0067	0.010	mg/l	1	06/17/24	
Method: SM 2540C			Instr: OVEN	17			
Batch ID: W4F0612	Preparation: _NONE (WETCHEM	)	Prepared: 0	6/07/24 12:	:21	l l	Analyst: bel
Total Dissolved Solids	370	4.0	10	mg/l	1	06/07/24	
Method: SM 2540D			Instr: OVEN	18			
Batch ID: W4F0585	Preparation: _NONE (WETCHEM	-	Prepared: 0		:28		Analyst: dig
Total Suspended Solids	ND	5	5	mg/l	1	06/07/24	
Method: SM 4500S2-D			Instr: _ANAI	YST			
Batch ID: W4F0510	Preparation: _NONE (WETCHEM	)	Prepared: 0	6/06/24 13:	:16	Α	nalyst: mes
Sulfide, Total	0.40	0.050	0.10	mg/l	1	06/06/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4F0686	Preparation: EPA 200.2		Prepared: 0	6/10/24 11:	:28	Α	nalyst: kvm
Aluminum, Dissolved	0.078	0.041	0.050	mg/l	1	06/13/24	
Aluminum, Total	0.077	0.022	0.050	mg/l	1	06/13/24	

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL08

4E22007-02 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Par	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1 Batch ID: W4F0645	Preparation: _NONE (WETCHEM)	)	Instr: AA06 Prepared: 06/	/09/24 11	:27	А	<b>nalyst:</b> YMT
Ammonia as N	0.72	0.017	0.10	mg/l	1	06/10/24	-
Method: EPA 351.2 Batch ID: W4F1527 TKN	Preparation: _NONE (WETCHEM)	) 0.065	<b>Instr:</b> AA06 <b>Prepared:</b> 06/ 0.10	/19/24 11 mg/l	:28 1	<b>A</b> 06/20/24	nalyst: YMT
Method: EPA 353.2 Batch ID: W4F0473 Nitrate as N Nitrite as N	Preparation: _NONE (WETCHEM ND ND	) 0.040 0.042	Instr: AA01 Prepared: 06/ 0.20 0.10	/06/24 10 mg/l mg/l	:21 1 1	06/06/24 16:16 06/06/24 16:16	
Method: EPA 365.3 Batch ID: W4F0482 o-Phosphate as P	Preparation: _NONE (WETCHEM) 0.21	) 0.0071	Instr: UVVIS0 Prepared: 06/ 0.010		:39 1	06/06/24 14:23	Analyst: rob
Method: EPA 365.3 Batch ID: W4F0966 Phosphorus as P, Total	Preparation: _NONE (WETCHEM) 0.25	) 0.0067	Instr: UVVIS0 Prepared: 06/ 0.010		:47 1	06/17/24	Analyst: rob
Method: SM 2540C Batch ID: W4F0612 Total Dissolved Solids	Preparation: _NONE (WETCHEM	) 4.0	Instr: OVEN17 Prepared: 06/ 10		:21 1	06/07/24	Analyst: bel
Method: SM 2540D Batch ID: W4F0585 Total Suspended Solids	Preparation: _NONE (WETCHEM)	)	Instr: OVEN18 Prepared: 06/ 5		:28	06/07/24	Analyst: dig
Method: SM 4500S2-D Batch ID: W4F0510 Sulfide, Total	Preparation: _NONE (WETCHEM) 0.40	-	Instr: _ANALY Prepared: 06/ 0.10	ST	·		<b>nalyst:</b> mes
Metals by EPA 200 Series Methods Method: EPA 200.7 Batch ID: W4F0686	Preparation: EPA 200.2		Instr: ICP03 Prepared: 06/	/10/24 11	:28	Д	<b>nalyst:</b> kvm
Aluminum, Dissolved Aluminum, Total	0.11 0.13	0.041 0.022	0.050 0.050	mg/l mg/l	1 1	06/13/24 06/13/24	

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

# Certificate of Analysis

Sampled: 06/05/24 9:15 by Nick Jernack

FINAL REPORT

**Reported:** 06/26/2024 09:01

(Continued)

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL09

4E22007-03 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Para	ameters by APHA/EPA/ASTM Me	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4F0645	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	09/24 11:2	27	An	alyst: YMT
Ammonia as N	1.6	0.017	0.10	mg/l	1	06/10/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4F1527	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	/19/24 11:2	28	An	alyst: YMT
TKN	2.5	0.065	0.10	mg/l	1	06/20/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4F0473	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	06/24 10:2	21	Α	nalyst: kac
Nitrate as N		0.040	0.20	mg/l	1	06/06/24 16:22	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	06/06/24 16:22	FILT
Method: EPA 365.3			Instr: UVVIS04	4			
Batch ID: W4F0482	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	06/24 11:3	39	Α	nalyst: rob
o-Phosphate as P	0.20	0.0071	0.010	mg/l	1	06/06/24 14:23	
Method: EPA 365.3			Instr: UVVIS0	5			
Batch ID: W4F0966	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	/12/24 13:4	17	Α	nalyst: rob
Phosphorus as P, Total	0.26	0.0067	0.010	mg/l	1	06/17/24	
Method: SM 2540C			Instr: OVEN17	,			
Batch ID: W4F0612	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	07/24 12:2	21	А	nalyst: bel
Total Dissolved Solids	530	4.0	10	mg/l	1	06/07/24	
Method: SM 2540D			Instr: OVEN18	3			
Batch ID: W4F0585	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	07/24 09:2	28	Α	nalyst: dig
Total Suspended Solids		5	5	mg/l	1	06/07/24	
Method: SM 4500S2-D			Instr: _ANALY	ST			
Batch ID: W4F0510	Preparation: _NONE (WETCHEM)	)	Prepared: 06/	06/24 13:1	16	Ar	nalyst: mes
Sulfide, Total	0.60	0.050	0.10	mg/l	1	06/06/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4F0686	Preparation: EPA 200.2		Prepared: 06/	10/24 11:2	28	Ar	nalyst: kvm
Aluminum, Dissolved	0.13	0.041	0.050	mg/l	1	06/13/24	
Aluminum, Total	0.15	0.022	0.050	mg/l	1	06/13/24	

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

# Certificate of Analysis

Sampled: 06/05/24 8:30 by Nick Jernack

FINAL REPORT

**Reported:** 06/26/2024 09:01

(Continued)

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: CL10

Certificate	of Ana	lysis

FINAL REPORT

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

06/26/2024 09:01

**Reported:** 

(Continued)

Sampled: 06/05/24 8:00 by Nick Jernack

4E22007-04 (Water)							
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Par</b>	rameters by APHA/EPA/ASTM Mo	ethods					
Method: EPA 350.1			Instr: AA06				
Batch ID: W4F0645	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/09/24 11	:27	Ana	alyst: YMT
Ammonia as N	ND	0.017	0.10	mg/l	1	06/10/24	
Method: EPA 351.2			Instr: AA06				
Batch ID: W4F1527	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/19/24 11	:28	Ana	alyst: YMT
TKN	0.87	0.065	0.10	mg/l	1	06/20/24	
Method: EPA 353.2			Instr: AA01				
Batch ID: W4F0473	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/06/24 10	):21	Ar	nalyst: kac
Nitrate as N	ND	0.040	0.20	mg/l	1	06/06/24 16:23	FILT
Nitrite as N		0.042	0.10	mg/l	1	06/06/24 16:23	FILT
Method: EPA 365.3			Instr: UVVIS	04			
Batch ID: W4F0482	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/06/24 11	:39	An	alyst: rob
o-Phosphate as P	0.0090	0.0071	0.010	mg/l	1	06/06/24 14:24	J
Method: EPA 365.3			Instr: UVVIS	05			
Batch ID: W4F0966	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/12/24 13	3:47	An	alyst: rob
Phosphorus as P, Total	0.064	0.0067	0.010	mg/l	1	06/17/24	
Method: SM 2540C			Instr: OVEN1	17			
Batch ID: W4F0612	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/07/24 12	2:21	Ar	nalyst: bel
Total Dissolved Solids	560	4.0	10	mg/l	1	06/07/24	
Method: SM 2540D			Instr: OVEN1	18			
Batch ID: W4F0508	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/06/24 12	2:46	Ar	nalyst: dig
Total Suspended Solids		5	5	mg/l	1	06/06/24	
Method: SM 4500S2-D			Instr: _ANAL	YST			
Batch ID: W4F0510	Preparation: _NONE (WETCHEM	)	Prepared: 06	5/06/24 13	8:16	Ana	alyst: mes
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/06/24	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			Instr: ICP03				
Batch ID: W4F0686	Preparation: EPA 200.2		Prepared: 06	5/10/24 11	:28	Ana	<b>alyst:</b> kvm
Aluminum, Dissolved	0.24	0.041	0.050	mg/l	1	06/13/24	
Aluminum, Total	0.24	0.022	0.050	mg/l	1	06/13/24	

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Sample Results

Sample: LE02

#### 4E22007-05 (Water)

#### Analyte Result MDL MRL Units Dil Analyzed Qualifier Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods Method: FPA 350.1 Instr: AA06 Batch ID: W4F0645 Preparation: _NONE (WETCHEM) Prepared: 06/09/24 11:27 Analyst: YMT Ammonia as N 0.10 0.017 06/10/24 0.26 mg/l 1 Method: EPA 351.2 Instr: AA06 Batch ID: W4F1527 Preparation: _NONE (WETCHEM) Prepared: 06/19/24 11:28 Analyst: YMT TKN 0.065 0.10 1 06/20/24 2.2 ma/l Method: EPA 353.2 Instr: AA01 Batch ID: W4F0473 Preparation: _NONE (WETCHEM) Prepared: 06/06/24 10:21 Analyst: kac Nitrate as N 0.057 0.040 0.20 mg/l 1 06/06/24 16:24 FILT, J Nitrite as N 0.050 0.042 0.10 06/06/24 16:24 FILT, J mg/l 1 Method: EPA 365.3 Instr: UVVIS04 Batch ID: W4F0482 Prepared: 06/06/24 11:39 Preparation: _NONE (WETCHEM) Analyst: rob o-Phosphate as P 0.094 0.0071 0.010 mg/l 1 06/06/24 14:24 Instr: UVVIS05 Method: EPA 365.3 Batch ID: W4F0966 Preparation: _NONE (WETCHEM) Prepared: 06/12/24 13:47 Analyst: rob 0.0067 0.010 06/17/24 Phosphorus as P. Total 0.19 mg/l 1 Method: SM 2540C Instr: OVEN17 Batch ID: W4F0612 Preparation: _NONE (WETCHEM) Prepared: 06/07/24 12:21 Analyst: bel **Total Dissolved Solids** 4.0 06/07/24 1500 10 mg/l 1 Method: SM 4500S2-D Instr: _ANALYST Batch ID: W4F0510 Preparation: _NONE (WETCHEM) Prepared: 06/06/24 13:16 Analyst: mes Sulfide, Total ND 0.050 0.10 mg/l 1 06/06/24

Certificate of Analysis

Sampled: 06/05/24 9:25 by Nick Jernack

Project Number: 2315100200.0004.WECK

Project Manager: John Rudolph

Reported:

06/26/2024 09:01

**FINAL REPORT** 

(Continued)



**FINAL REPORT** 

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Project Number: 2315100200.0004.WECK

#### **Reported:** 06/26/2024 09:01

Project Manager: John Rudolph

Quality	Control	Results
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				Spike	Source		%REC		RPD	
Analyte Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifie
atch: W4F0473 - EPA 353.2										
Blank (W4F0473-BLK1)			Pre	bared & An	alyzed: 0	6/06/24	4			
Nitrate as N ND	0.040	0.20	mg/l							
Nitrite as N ND	0.042	0.10	mg/l							
Blank (W4F0473-BLK2)			Pre	oared & An	alyzed: 0	6/06/24	4			
Nitrate as N ND	0.040	0.20	mg/l		-					
Nitrite as N ND	0.042	0.10	mg/l							
LCS (W4F0473-BS1)			Prei	oared & An	alvzed: 0	6/06/24	4			
Nitrate as N 0.990	0.040	0.20	mg/l	1.00	·	99	90-110			
Nitrite as N 0.927	0.042	0.10	mg/l	1.00		93	90-110			
LCS (W4F0473-BS2)			Prei	oared & An	alvzed: 0	6/06/24	4			
Nitrate as N 1.00	0.040	0.20	mg/l	1.00			90-110			
Nitrite as N	0.042	0.10	mg/l	1.00		101	90-110			
Matrix Spike (W4F0473-MS1) Source	: 4E22007	/-01	Prei	pared & An	alvzed: 0	6/06/24	4			
Nitrate as N 1.94	0.040	0.20	mg/l	2.00	ND	97	90-110			
Nitrite as N 1.02	0.042	0.10	mg/l	1.00	ND	102	90-110			
Matrix Spike (W4F0473-MS2) Source	: 4E22007	/-02	Prei	pared & An	alvzed: 0	6/06/24	4			
Nitrate as N 2.12		0.20	mg/l	2.00	ND		90-110			
Nitrite as N 1.03	0.042	0.10	mg/l	1.00	ND	103	90-110			
Matrix Spike Dup (W4F0473-MSD1) Source	: 4E22007	/-01	Pre	pared & An	alvzed: 0	6/06/24	4			
Nitrate as N 1.94	0.040	0.20	mg/l	2.00	ND	97	90-110	0	20	
Nitrite as N	0.042	0.10	mg/l	1.00	ND	101	90-110	1	20	
Matrix Spike Dup (W4F0473-MSD2) Source	: 4E22007	/-02	Prei	pared & An	alvzed: 0	6/06/24	4			
Nitrate as N 2.13		0.20	mg/l	2.00	ND		90-110	0.5	20	
Nitrite as N 1.04	0.042	0.10	mg/l	1.00	ND	104	90-110	1	20	
atch: W4F0482 - EPA 365.3										
Blank (W4F0482-BLK1)			Pro	oared & An	alvzed· 0	6/06/2/	1			
o-Phosphate as P ND	0.0071	0.010	mg/l		ulyzeu. o	0, 00, L-	T			
LCS (W4F0482-BS1)			Dros	oared & An	alvzod: 0	6/06/2	4			
· · ·	0.0071	0.010	mg/l	0.200	alyzeu. U	102				
		04	Dree	oared & An	alverade O	c /06 /2	4			
	: 4F05108 0.0071	0.010	mg/l	0.200	0.00800	102				
		04	-		alumadu O					
• • • •	: 4F05108 0.0071	0.010	mg/l	oared & An 0.200	0.00800		<b>4</b> 85-112	1	20	
			5							
atch: W4F0508 - SM 2540D			-							
Blank (W4F0508-BLK1) Total Suspended Solids ND	5	5	Prej mg/l	bared & An	alyzed: 0	6/06/24	4			
	v	÷	-							
LCS (W4F0508-BS1)	5	5	Pre	<b>58.3</b> bared & An	alyzed: 0		<b>4</b> 90-110			

4E22007



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

## **Reported:** 06/26/2024 09:01

Project Manager: John Rudolph

(Continued)

#### Quality Control Results

Conventional Chemistry/Physical Param	eters by	APHA/EI	PA/ASTN	1 Methods	s (Continu	ed)					
Analysis	Develt	MDI	MDI	11	Spike	Source	% <b>DEC</b>	%REC	000	RPD	Qualifian
Analyte Batch: W4F0508 - SM 2540D (Continued)	Result	MDL	MRL	Units	Level	Result	%REC	Limits	KPD	Limit	Qualifier
Duplicate (W4F0508-DUP1)	Sourco	4F05085	-01	Dror	oared & An	alvzod: 0	6/06/2	4			
Total Suspended Solids		5	5	mg/l		725	0/00/2.	•	3	10	
Batch: W4F0510 - SM 4500S2-D											
Blank (W4F0510-BLK1) Sulfide, Total		0.050	0.10	Prep mg/l	oared & An	alyzed: 0	6/06/24	4			
LCS (W4F0510-BS1) Sulfide, Total	0.100	0.050	0.10	Prep mg/l	oared & An 0.0998	alyzed: 0		<b>4</b> 90-110			
Duplicate (W4F0510-DUP1) Sulfide, Total		<b>4E22007</b> 0.050	<b>′-01</b> 0.10	Prep mg/l	oared & An	0.400	6/06/24	4	0	20	
Matrix Spike (W4F0510-MS1)	<b>Source:</b> 0.200	4E22007	<b>′-04</b> 0.10	Prep	oared & An 0.200	alyzed: 0		<b>4</b> 80-120			
				mg/l							
Matrix Spike Dup (W4F0510-MSD1) Sulfide, Total		<b>4E22007</b> 0.050	0.10	mg/l	0.200	ND		<b>4</b> 80-120	0	20	
Batch: W4F0585 - SM 2540D											
Blank (W4F0585-BLK1) Total Suspended Solids	ND	5	5	Prep mg/l	oared & An	alyzed: 0	6/07/24	4			
LCS (W4F0585-BS1)	HB	U	Ū	Ū	oared & An	alvzad: 0	6/07/2	4			
Total Suspended Solids	55.6	5	5	mg/l	54.2	alyzeu. U		<b>9</b> 0-110			
Duplicate (W4F0585-DUP1)		4F06042	2-03	Prep	oared & An	alyzed: 0	6/07/24	4			
Total Suspended Solids	276	5	5	mg/l		260			6	10	
Batch: W4F0612 - SM 2540C											
Blank (W4F0612-BLK1) Total Dissolved Solids	ND	4.0	10	Prep mg/l	oared & An	alyzed: 0	6/07/24	4			
LCS (W4F0612-BS1)	HB	1.0	10	•	oared & An	alvzod: 0	6/07/2	4			
Total Dissolved Solids	51.0	4.0	10	mg/l	50.0	alyzeu. U		<b>9</b> 7-103			
Duplicate (W4F0612-DUP1)	Source:	4E22007	-05	Prep	oared & An	alyzed: 0	6/07/24	4			
Total Dissolved Solids	1510	4.0	10	mg/l		1490			2	10	
Batch: W4F0645 - EPA 350.1											
Blank (W4F0645-BLK1) Ammonia as N	ND	0.017	0.10	Preparec mg/l	l: 06/09/24	1 Analyze	ed: 06/1	0/24			
	NB	0.017	0.10	•	. <u>06/00/2</u> /	1 Analyza	d. 06/1	0/24			
Blank (W4F0645-BLK2) Ammonia as N		0.017	0.10	mg/l	l: 06/09/24	+ Analyze	a: 06/1	0/24			
LCS (W4F0645-BS1) Ammonia as N	0.250	0.017	0.10	Prepared mg/l	<b>1: 06/09/2</b> 4 0.250	1 Analyze	ed: 06/1 100	1 <b>0/24</b> 90-110			
LCS (W4F0645-BS2) Ammonia as N	- 0.253	0.017	0.10	Prepared mg/l	<b>1: 06/09/2</b> 4 0.250	1 Analyze	ed: 06/1 101	<b>0/24</b> 90-110			
Matrix Spike (W4F0645-MS1)	Source:	4F06066	-02	Preparec	l: 06/09/24		ed: 06/1	0/24			
Ammonia as N	0.253	0.017	0.10	mg/l	0.250	0.0171	94	90-110			

4E22007



**FINAL REPORT** 

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123 Project Number: 2315100200.0004.WECK

## **Reported:** 06/26/2024 09:01

Project Manager: John Rudolph

(Continued)

Quality Control Results

Conventional Chemistry/Physical Paran	neters by	APHA/EF	A/ASTN	1 Methods	(Continue	d)					
Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W4F0645 - EPA 350.1 (Continued)	)										
Matrix Spike (W4F0645-MS2) Ammonia as N		<b>4F07068</b> 0.017	- <b>02</b> 0.10	Prepared: mg/l	<b>06/09/24</b> 0.250	<b>Analyze</b> 0.0982	<b>d: 06/</b> 1 97				
Matrix Spike Dup (W4F0645-MSD1) Ammonia as N		<b>4F06066</b> 0.017	- <b>02</b> 0.10	Prepared: mg/l	<b>06/09/24</b> 0.250	<b>Analyze</b> 0.0171	<b>d: 06/</b> 1 95	1 <b>0/24</b> 90-110	0.7	15	
Matrix Spike Dup (W4F0645-MSD2) Ammonia as N		<b>4F07068</b> 0.017	- <b>02</b> 0.10	Prepared: mg/l	<b>06/09/24</b> 0.250	<b>Analyze</b> 0.0982		1 <b>0/24</b> 90-110	0.4	15	
Batch: W4F0966 - EPA 365.3											
Blank (W4F0966-BLK1) Phosphorus as P, Total	ND	0.0067	0.010	Prepared: mg/l	06/12/24	Analyze	<b>d: 06/</b> 1	17/24			
LCS (W4F0966-BS1) Phosphorus as P, Total	0.188	0.0067	0.010	Prepared: mg/l	<b>06/12/24</b> 0.200	Analyze		1 <b>7/24</b> 90-110			
Matrix Spike (W4F0966-MS1) Phosphorus as P, Total		<b>4F04089</b> 0.0067	- <b>02</b> 0.010	Prepared: mg/l	<b>06/12/24</b> 0.200	<b>Analyze</b> 0.263		1 <b>7/24</b> 90-110			
Matrix Spike Dup (W4F0966-MSD1) Phosphorus as P, Total		<b>4F04089</b> 0.0067	- <b>02</b> 0.010	Prepared: mg/l	<b>06/12/24</b> 0.200	<b>Analyze</b> 0.263		1 <b>7/24</b> 90-110	0.9	20	
Batch: W4F1527 - EPA 351.2											
Blank (W4F1527-BLK1) TKN	ND	0.065	0.10	Prepared: mg/l	06/19/24	Analyze	d: 06/2	20/24			
Blank (W4F1527-BLK2) TKN	ND	0.065	0.10	Prepared: mg/l	06/19/24	Analyze	d: 06/2	20/24			
LCS (W4F1527-BS1) TKN	0.954	0.065	0.10	Prepared: mg/l	<b>06/19/24</b> 1.00	Analyze		2 <b>0/24</b> 90-110			
LCS (W4F1527-BS2) TKN	0.950	0.065	0.10	Prepared: mg/l	<b>06/19/24</b> 1.00	Analyze		2 <b>0/24</b> 90-110			
Duplicate (W4F1527-DUP1) TKN	<b>Source:</b> 0.133	<b>4F06048</b> 0.065	- <b>01</b> 0.10	Prepared: mg/l	06/19/24	<b>Analyze</b> 0.134	d: 06/2	20/24	0.5	10	
Matrix Spike (W4F1527-MS1) TKN		<b>4F05108</b> 0.065	- <b>04</b> 0.10	Prepared: mg/l	<b>06/19/24</b> 1.00	<b>Analyze</b> 0.164		2 <b>0/24</b> 90-110			
Matrix Spike (W4F1527-MS2) TKN	<b>Source:</b> 4.80	<b>4F12111</b> 0.13	- <b>01</b> 0.20	Prepared: mg/l	<b>06/19/24</b> 2.00	Analyzee 2.75		2 <b>0/24</b> 90-110			
Matrix Spike Dup (W4F1527-MSD1)	Source:	4F05108	-04	Prepared:	06/19/24	Analyze	d: 06/2	20/24			
ТКМ	1.07		0.10	mg/l	1.00	0.164	91	90-110	6	10	
Matrix Spike Dup (W4F1527-MSD2) TKN	<b>Source:</b> 4.67	<b>4F12111</b> 0.13	- <b>01</b> 0.20	Prepared: mg/l	<b>06/19/24</b> 2.00	<b>Analyze</b> 2.75	d: 06/2 96	2 <b>0/24</b> 90-110	3	10	



FINAL REPORT

WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

#### Project Number: 2315100200.0004.WECK

## **Reported:** 06/26/2024 09:01

Project Manager: John Rudolph

(Continued)

Quality Control Results

Metals by EPA 200 Series Methods

					Spike	Source		%REC		RPD	
Analyte	Result	MDL	MRL	Units	Level	Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W4F0686 - EPA 200.7											
Blank (W4F0686-BLK1)				Prepared:	06/10/24	Analyze	d: 06/1	3/24			
Aluminum, Dissolved		0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W4F0686-BS1)				Prepared:	06/10/24	Analyze	d: 06/1	3/24			
Aluminum, Dissolved	0.219	0.041	0.050	mg/l	0.200	-	109	85-115			
Aluminum, Total	0.219	0.022	0.050	mg/l	0.200		109	85-115			
Duplicate (W4F0686-DUP1)	Source	: 4F04064	4-01	Prepared:	06/10/24	Analyze	d: 06/1	3/24			
Aluminum, Dissolved	2.39	0.041	0.050	mg/l		2.36			2	30	
Aluminum, Total	2.39	0.022	0.050	mg/l		2.36			2	30	
Matrix Spike (W4F0686-MS1)	Source	: 4E22007	7-01	Prepared:	06/10/24	Analyze	d: 06/1	3/24			
Aluminum, Dissolved	0.312	0.041	0.050	mg/l	0.200	0.0779	117	70-130			
Aluminum, Total	0.312	0.022	0.050	mg/l	0.200	0.0768	118	70-130			
Matrix Spike Dup (W4F0686-MSD1)	Source	: 4E22007	7-01	Prepared:	06/10/24	Analyze	d: 06/1	3/24			
Aluminum, Dissolved	0.316	0.041	0.050	mg/l	0.200	0.0779	119	70-130	1	30	
Aluminum, Total	0.316	0.022	0.050	mg/l	0.200	0.0768	120	70-130	1	30	



WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: 2315100200.0004.WECK

Reported: 06/26/2024 09:01

Project Manager: John Rudolph

### Notes and Definitions

## Item Definition FILT The sample was filtered prior to analysis.

J Estimated conc. detected <MRL and >MDL.

- %REC Percent Recovery
- Dil Dilution

MDL Method Detection Limit

MRL Method Reporting Limit (MRL) is the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)

ND NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.

RPD Relative Percent Difference

Source Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

### Chain of Custody & Sample Information Record

•						:																		4	E2200-	1	
Client: WS	P USA E&I Inc.	•			Co	ntac	t: Jo	ohn F	Rudo	lph													Phone No.	858-243-	8158 ional Report	ing Poguos	tc
Project Name: Project Number: PO#:	C016900152	DL Mor 004.weg	nitori CK	ng	Em Tur	ail: n Ar	oun	john. d Ti		ph@	<u>)</u> woo		.coi utir		*	3-5				Ho		*	24 Hour		QC Data Pao FAX R Email R	ckage:yes esults:yes esults:yes	5 [] No 5 [] No 5 [] No
GL Code: Org#	573000 3151				l ab	тат	App	rova	le .		Ē	By:				Ru	sn		ŀ	Rush		*Ado	Rush ditional Charges May Apply	(Includ	State le Source Nui	e EDT: <u></u> es mber in Note	
	ampler Inform	ation	-		-	#	of C	ontai serva	ners				San Ty	•		Ana	alys	is R	equ	lest	ed		Matrix		Note		-
Name: Employer:		I Ine.	Nick	ernack			=	tate		-		Containers				(EPA 353.2)			us (EPA 365.3)	M4500S)	1 1	AL (EPA 200.7)	DW = Drinking Water WW = Wastewater GW = Groundwater		eld filtered (0. is field filtere	,	
Signature:	mple ID		Date	Time	Unpreserved	HCI	HNU3 Na2S2O3	NaOH NaOH/ZnAcetate	NH4CI	Frozen		Total # of (	Koutine Resample	Special	TSS	TDS (SM2540 C)	TKN (EPA 351.2	Ammonia (EPA 350.1)	Total Phosphorus (EPA 3	Total Sulfide (SM4500S)	Total AL (EPA 200.7)	Dissolved AL	S = Soil SG = Sludge L = Liquid M = Miscellaneous				
	CL07	l	5/5/24	0945													x	x	x	< x	x	x					
	CL08		1	0915																	x				· · · · · · · · · · · · · · · · · · ·	-	
	CL09			07830			-								x	x >	x	x	x	<u> </u>	x	x					
	CL10			0800											x	x x	x	x	x x	<u> x</u>	x	x					
	LE02			0925												x x	x	x	x x	<u> </u>							
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Relinguished	By (sign)	Priı	nt Nam	ne / Com	pany	/	_	D	ate /	Tin	ne					eiv							Pri	nt Name / C	ompany		
	n	Nick	Jerna	ck/v.	sp		6	ls/2	.4	-/_	34	5	<u>) (</u>	<i>bir</i>	a		1.	Ne	~~/	'p.w	1S		Carla Doming	uez li	uex/Rm	S	
C.Do-	- ~	Carla Di	inial	we/we	ск/р	mg	le	5/2	.4 -	Ц	209	2/		1		(	Jul	66	n	IV	685		J		-		
			v					•				V		)									- ··				
													A ROOM	/													

(For Lab Use Only) Sample Integrity Upon Receipt	Lab Notes
Sample(s) Submitted on Ice? (Yes) No Temper Custody Seal(s) Intact? Yes No N/A 2.0 Sample(s) Intact? Yes No □Cooler E	e c [7-029]

Lab No.

Page 1 of 1

Gluber



# Sample Receipt Checklist

	Weck WKO: VKO Logged by: les Checked by:	Jaime Gomez		Date	# of Sample	d: 06/05/24 16:05 s: 05 y: Matt Navarro
• 12	Task		Yes	No	N/A	Comments
COC	COC present at re COC properly cor COC matches san	npleted?	X X X			
	Project Manager	notified about COC discrepancy?			$\boxtimes$	
ion	Sample Tempera Samples receivec Ice Type (Blue/W	on ice?	2.0 °C ⊠			
Receipt Information	All samples intact Samples in prope Sufficient sample Samples intact? Received within h	r containers? volume?				
	Project Manager	notified about receipt info?		$\boxtimes$		
	Sample labels che	ecked for correct preservation?	$\boxtimes$			
ation?		(No) none, If Yes (see comment) .1, 8260, 1666 P/T, LUFT				□<6mm/Pea Size?
Sample Preservation Verification?	pH verified upon Metals <2; H2SO4 525.2<2, 67108<	1 pres tests <2; 522<4; TOC <2; 508.1	, 🛛			pH paper Lot# 310689
eserva	Free Chlorine Tes	ted <0.1 (Organics Analyses)		$\boxtimes$		Cl Test Strip Lot#
Sample Pi	O&G pH <2 verifi pH adjusted for C Project Manager					pH paper Lot# pH Reading: Acid Lot# Amt added:
PM Cor	nments					
Sample Signat	•	ist Completed by: nez			Date	: 06/06/24



July 08, 2024

John D. Rudolph WSP USA 9177 Sky Park Court San Diego, CA 92123-

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 6/7/2024. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards, *misty mercier* 714 602-5320 Extension 202 mistymercier@physislabs.com



#### **PROJECT SAMPLE LIST**

#### WSP USA

#### PHYSIS Project ID: 2302004-032

Total Samples: 10

LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
118794	CL07 - Int		6/5/2024	9:45	Biologic	Not Specified
118795	CL07 - Surf		6/5/2024	10:00	Biologic	Not Specified
118796	CL08 - Int		6/5/2024	9:15	Biologic	Not Specified
118797	CL08 - Surf		6/5/2024	9:25	Biologic	Not Specified
118798	CL09 - Int		6/5/2024	8:30	Biologic	Not Specified
118799	CL09 - Surf		6/5/2024	8:40	Biologic	Not Specified
118800	CL10 - Int		6/5/2024	8:00	Biologic	Not Specified
118801	CL10 - Surf		6/5/2024	8:10	Biologic	Not Specified
118802	LE02 - Int		6/5/2024	9:25	Biologic	Not Specified
118803	LE02 - Surf		6/5/2024	9:55	Biologic	Not Specified

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#### **ABBREVIATIONS and ACRONYMS**

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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#### QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.



### PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
В	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
Н	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
Ν	insufficient sample, analysis could not be performed
М	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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PHYSIS Project ID: 2302004-032 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

			Con	ven	tion	als					
ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 118794-R1	CL07 - Int		Matrix: Biologi	ic			Sampled:	05-Jun-24	9:45	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	17.1	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118795-R1	CL07 - Surf		Matrix: Biologi	ic			Sampled:	05-Jun-24	10:00	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	11.2	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118796-R1	CLo8 - Int		Matrix: Biologi	ic			Sampled:	05-Jun-24	9:15	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	17.1	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118797-R1	CLo8 - Surf		Matrix: Biologi	ic			Sampled:	05-Jun-24	9:25	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	13.9	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118798-R1	CLo9 - Int		Matrix: Biologi	ic			Sampled:	05-Jun-24	8:30	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	46.9	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118799-R1	CL09 - Surf		Matrix: Biologi	ic			Sampled:	05-Jun-24	8:40	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	15.5	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118800-R1	CL10 - Int		Matrix: Biologi	c			Sampled:	05-Jun-24	8:00	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	20.3	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118801-R1	CL10 - Surf		Matrix: Biologi	ic			Sampled:	05-Jun-24	8:10	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	18.2	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118802-R1	LEo2 - Int		Matrix: Biologi	c			Sampled:	05-Jun-24	9:25	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	27.6	1	1	2	NA		C-82070	21-Jun-24	21-Jun-24
Sample ID: 118803-R1	LE02 - Surf		Matrix: Biologi	ic			Sampled:	05-Jun-24	9:55	Received:	07-Jun-24
Chlorophyll-a	SM 10200 H	mg/m3	36.3	1	1	2	NA	<u> </u>	C-82070	21-Jun-24	21-Jun-24

# LITY CONTRO TRATORIES, INC. ATA ENVI Innovative Solutions for Nature

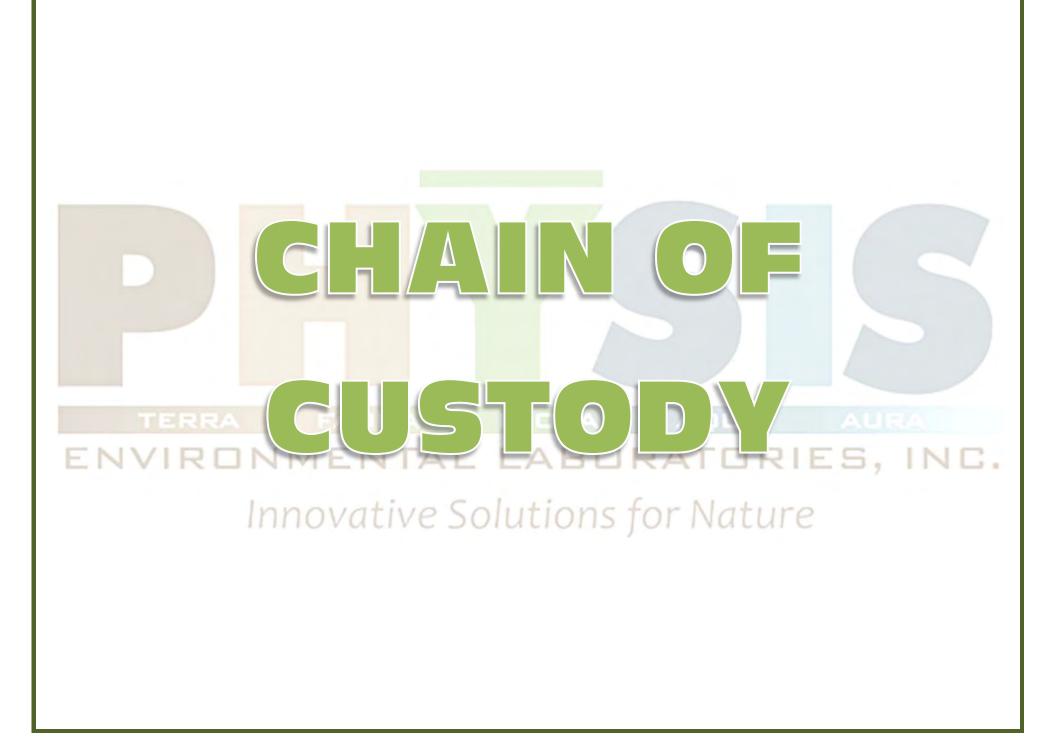


Conventionals

PHYSIS Project ID: 2302004-032 Client: WSP USA Project: LECL TMDL Monitoring Project # 2315100200.0004.PHY

### **QUALITY CONTROL REPORT**

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	AC %	CURACY LIMITS	PF %	ECISION LIMITS	QA CODE
Chlorophyll	-a	Method:	SM 10200 H		Fra	ction: I	NA		Prepa	ared: 2	1-Jun-24	Analy	zed: 21-Jun-	24
118793-B1	QAQC Procedural Blank	C-82070	ND	1	1	2	mg/m3							
118793-BS1	QAQC Procedural Blank	C-82070	54500	1	1	2	mg/m3	51900	0	105	70 - 130% PASS			
118793-BS2	QAQC Procedural Blank	C-82070	55500	1	1	2	mg/m3	51900	0	107	70 - 130% PASS	2	30 PASS	



## Chain of Custody & Sample Information Record

Client: WSP	USA E&I Inc.			Con	tact:	Joh	in Ri	udol	ph											P	hone No.	858-243-8158 Additional Reporting Requests
Project Name: Project Number: 2 PO#: GL Code:	LECL TMDL Mc 2315100200.0004.PHY C014105479 57300	onitori 'SIS	ng	Ema	Aro			ie:	rudolphó		Roi	utin	ne	*	3-5 [ Ru		*	48 H Ru	Jsh		*24 Hour Rush tional Charges May Apply	Include QC Data Package:Ps № FAX Results:Ps № Email Results:Ps № State EDT:Ps № (Include Source Number in Notes)
Org#	3151			"Lab	TAT . # o		ntain			٦		Sam	nple							Τ	Matrix	Notes
Name:	Nick Jernack	1					etate				f Containers	Ту						phorus P			Watrix DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil	Chl-a samples on 0.7 um GFF
Signature:	1/6/1	L		Unpreserved H2SO4	103	Na2S203	aOH aOH/ZnAc	NH4CI	MCAA Frozen		Total # of	Routine	Resample Special	otal Sulfid	itrate - Nit	TKN	Ammonia	Total Phosph SRP/Ortho-P	Chlorophyll-a		SG = Sludge L = Liquid M = Miscellaneous	
Sar	mple ID	Date	Time	5 2	ΞĪ	ž	ZZ	z	ΣĒ		-	-		F	Zŀ		A	- 00	x		M - Miscendieodo	Filter Volume: 500 mL
CL	07 - Int	6/5/24	945				-	+	-	+		-				-	H					Filter Volume: 500 mL
CLO	07 - Surf	6/5/24	1000		+		_			++		-	+		-	-			X			Filter Volume: 500 mL
CL	08 - Int	6/5/24	915		++		-		-	+				+			+	+	×			Filter Volume: 500 mL
CLC	)8 - Surf	6/5/24	925				_	+			-		-	-	$\left  \right $	-			x			Filter Volume: 450 mL
CL	09 - Int	6/5/24	830			-							_		-	-	-		x	-		Filter Volume: 500 mL
CLO	)9 - Surf	6/5/24	840								_			-	$\left  \right $	-	-		×	_		Filter Volume: 500 mL
CL	.10 - Int	6/5/24	800			1		-			_		-	-		-	-		x	_		Filter Volume: 500 mL
CL	10 - Surf	6/5/24	810					_					_	-		_	-		x	_		Filter Volume: 425 mL
LE	02 - Int	6/5/24	925											+			-		X			Filter Volume: 375 mL
LEC	02 - Surf	6/5/24	955																X			
Relinquished	野y (sign) F	Print Nar K Jenn	1			6,			+ / Tir / - /		0				_	ed E		Sign)			Nychne Cheng	rint Name / Company 1 Physis 6/2129 1055
											1				_	_				_		

(For Lab Use Only) Sample Integrity I	Jpon Red	ceipt			Lab Notes	-		
Sample(s) Submitted on Ice?		No		Temperature		Lab No.		
Custody Seal(s) Intact?		No	N/A	°C				
Sample(s) Intact?	Yes	No		🗅 Cooler Blank				

NO._____

Page_1_of_1_

		۰.
PHYSIS		PHYSIS ENVIRONMENTAL LABORATOMICS, INC. Intercurve Schoose Je-Nature
ENVIRONMENTAL LABORATORIES, INC.	Project Iteration ID:	
Innovative Solutions for Nature	Client Name:	WSP USA
Sample Receipt Summary	Project Name:	LECL TMDL Monitoring Project # 2315100200.0004.PHYSIS PO # C014105479 GL Code 57300 Org 3151
Receiving Info	COC Page Number:	
1. Initials Received By:	Bottle Label Color:	
2. Date Received: (クノオレン	bottle Luber color.	1923
3. Time Received: 1055		
4. Client Name: $WSP$		
5. Courier Information: (Please circle)		
Client     UPS	<ul> <li>Area Fa</li> </ul>	ast ⊚ DRS
• FedEx • GSO/GLS	<ul> <li>Ontrac</li> </ul>	Bilb
PHYSIS Driver:	e ontrac	e PAIVIS
i. Start Time:		
ii. End Time:		iii. Total Mileage:
<ol><li>Container Information: (Please put the # of cont</li></ol>		iv. Number of Pickups:
• _)_ Cooler • Styrofoam Cooler		
		ooy Cap(s) <ul> <li>Other</li> </ul>
7. What type of ice was used: (Please circle any the	at apply)	
	Dry Ice •	Water
<ol> <li>Randomly Selected Samples Temperature (°C):</li></ol>	<u>5.0</u> Used	d I/R Thermometer # <u>1-</u> 2
Inspection Info		*:
1. Initials Inspected By:		
Sample Integrity Upon Receipt:		
1. COC(s) included and completely filled out		(Yes) / No
2. All sample containers arrived intact		
3. All samples listed on COC(s) are present		
4. Information on containers consistent with inform	nation on COC(s)	west / No
5. Correct containers and volume for all analyses in	dicated.	
6. All samples received within method holding time	s	
<ol><li>Correct preservation used for all analyses indicated and the second sec</li></ol>	ted	
8. Name of sampler included on COC(s)		
	Notes:	(), , , , , , , , , , , , , , , , , , ,
	Notes.	0

**APPENDIX D** 

SATELLITE DATA REPORTS

**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-01-30 Version: 28

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14



#### CONTENT

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1.2 1.3	3. List of delivered files (one product example)	3
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	METHODOLOGY: MODULAR INVERSION AND PROCESSING SYSTEM (MIP)	
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4.	QUALITY CONTROL AND FLAGGING10	C
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#### 1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	Point of Contact
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-01-30
Version	28

#### 1.1. List of all delivered scenes

Sensor	Time of record
Landsat-9	2023-07-13 18:22:09 UTC

#### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

#### 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs27_20240130.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20230713_182209_LSAT9_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20230713_182209_LSAT9_m0030_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-	ASCII	Product text file, real values
california_040037_EOMAP_20230713_182209_LSAT9_m0030_32bit_wgs84.txt		
CHL_us-california_040037_EOMAP_20230713_182209_LSAT9_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EOMAP_20230713_182209_LSAT9_m0030.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20230713_182209_LSAT9_m0030_overview.pdf	PDF	Overview PDF, metadata and quicklook



#### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC
	time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

#### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC h

Minha Sultan



### 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

⁸ Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4



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⁵ Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

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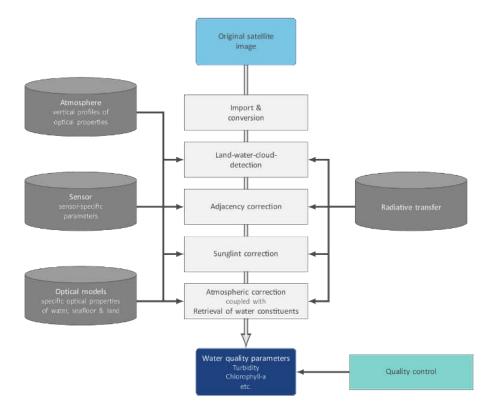


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.



## 3. Products

## 3.1. Turbidity (TUR)

**Turbidity** (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-07-13 is shown in Figure 2.

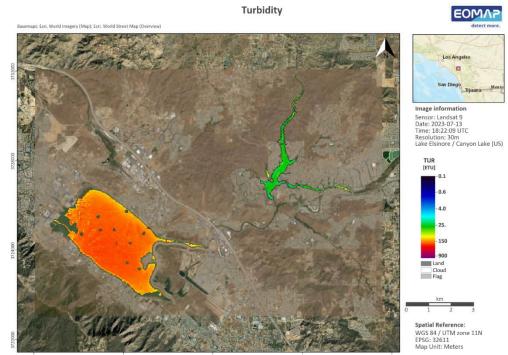


Figure 2: Turbidity product from 2023-07-13



#### 3.2. Chlorophyll-a (CHL)

**Chlorophyll-a** (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [ $\mu$ g/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu$ g/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995⁹). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu$ g/l, while for eutrophic lakes concentrations can reach 100  $\mu$ g/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015¹⁰), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2023-07-13 is shown in Figure 3.

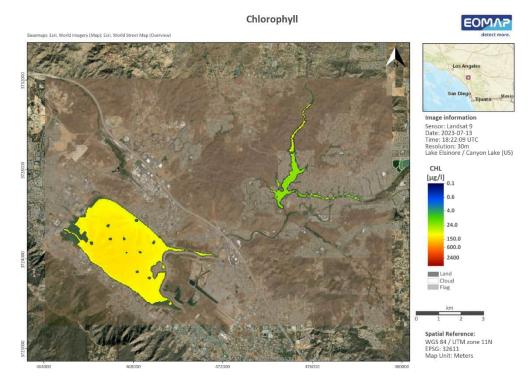


Figure 3: Chlorophyll-a product from 2023-07-13

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

## 3.3. Harmful Algae Bloom Indicator (HAB)

The Harmful Algae Bloom Indicator (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance (R_{modelled}) and satellite derived reflectance (R_{satellite}) occurs. The algorithm then compares the slope of R_{modelled} and R_{satellite} between the green and red band ( $\delta R = R_{green} - R_{red}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2023-07-13 is shown in Figure 4.

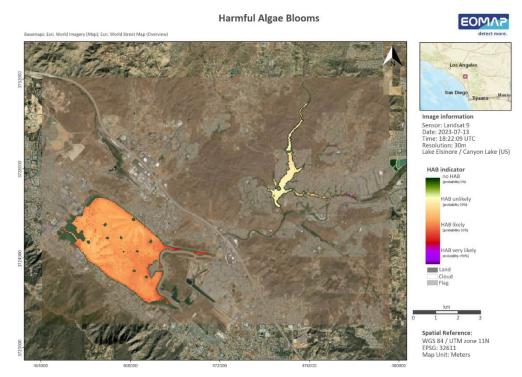


Figure 4: Harmful Algae Bloom Indicator product from 2023-07-13

#### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

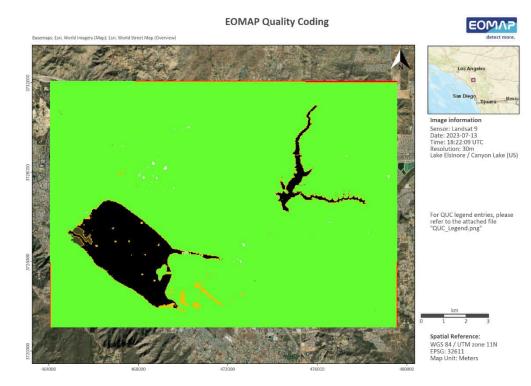
The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels excluding land, cloud or flagged pixels are represented in QUT indicator (Figure 5).
- QUC EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.



<section-header>

Figure 5: QUT product from 2023-07-13



11/14

Figure 6: QUC product from 2023-07-13



The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional v	version allo	ow combinatio	n of the two	most relevant flags:		
First number :	= most rele	vant flag				1
1-digit-numbe	er refer to s	second releva	nt flag, e.g. 1	for sunglint risk, 2 for large solar zenith angle		
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		1
	114	4 Critical flag	for sunglint, p	olus warning for aerosol above limits		
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
	20	20 - 29	Warning	large solar zenith angle	83 141 213	
	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
	40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
	50	50 - 59	Warning	Cloud Shadow	177 160 199	
	60	60 - 69	Warning	Shallow water risk	146 205 220	
	70	70 - 79	Warning	Mixed pixel risk	250 191 143	
	80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
	90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
	110	110 - 119	Critical	sunglint risk	73 69 41	
	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
	140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
	180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
	190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
	220	220	No value	Transition Zone	102 255 51	
	221	221	Unreliable	Shallow water automatically	146 205 220	
	222	222	Unreliable	Shallow water manually	60 159 186	
	223	223	Unreliable	Floating material	32 95 107	
	230	230	No water	Land	102 255 51	
	232	232	Unreliable	Invalid pixel manually	255 192 0	
	240	240	No water	Cloud	255 255 255	
	242	242	Unreliable	Cloud Shadow manually	96 73 122	
	244	244	Unreliable	Hill shadow	73 57 93	
	250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.



## 5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

## 6. Data Sources

EOMAP uses the following the AWS data hub (<u>https://registry.opendata.aws/index.html</u>) to access and download satellite raw data from different sensors.

- Landsat 8/9: <u>https://registry.opendata.aws/usgs-landsat/index.html</u>
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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#### EOMAP

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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-01-30 Version: 27

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14



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# 1. Service Provision Report

Contractor Details	Service Provider Details	
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG	
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany	
San Diego, CA 92123, USA		
Point of Contact	Point of Contact	
John D. Rudolph	Hendrik Bernert	
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114	

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-01-30
Version	27

#### 1.1. List of all delivered scenes

Sensor	Time of record
Landsat-8	2023-08-06 18:22:24 UTC

#### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

# 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs27_20240130.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20230806_182224_LSAT8_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20230806_182224_LSAT8_m0030_32bit.tif	GeoTIFF	Product raster file, 32 bit real values
CHL_us-	ASCII	Product text file, real values
california_040037_EOMAP_20230806_182224_LSAT8_m0030_32bit_wgs84.txt		
CHL_us-california_040037_EOMAP_20230806_182224_LSAT8_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EOMAP_20230806_182224_LSAT8_m0030.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20230806_182224_LSAT8_m0030_overview.pdf	PDF	Overview PDF, metadata and quicklook



#### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code] [Area]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSD (H= Hours, MM = Month, DD = Date) in Orc Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC
[mile of succince image rec.]	time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

#### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC 2

Minha Sultan



# 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

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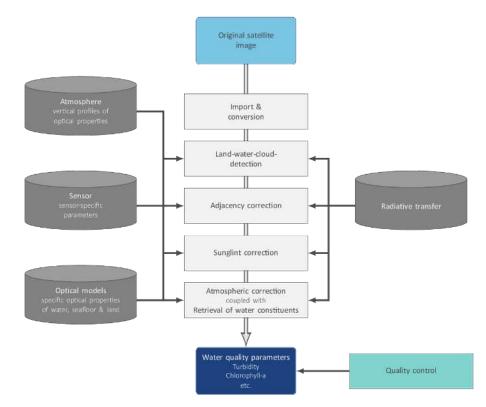


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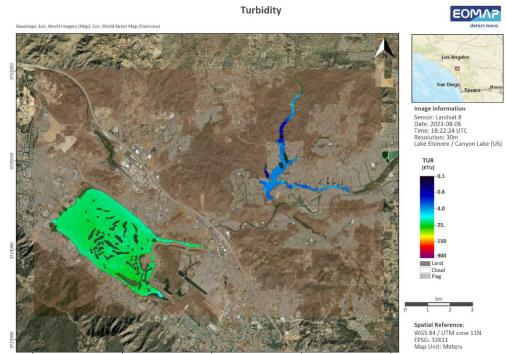


Figure 2: Turbidity product from 2023-08-06



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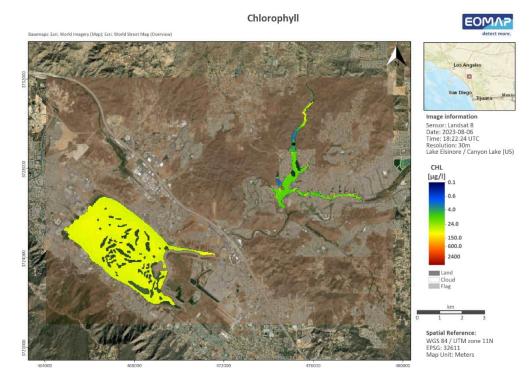


Figure 3: Chlorophyll-a product from 2023-08-06

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

## 3.3. Harmful Algae Bloom Indicator (HAB)

The Harmful Algae Bloom Indicator (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance (R_{modelled}) and satellite derived reflectance (R_{satellite}) occurs. The algorithm then compares the slope of R_{modelled} and R_{satellite} between the green and red band ( $\delta R = R_{green} - R_{red}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2023-08-06 is shown in Figure 4.

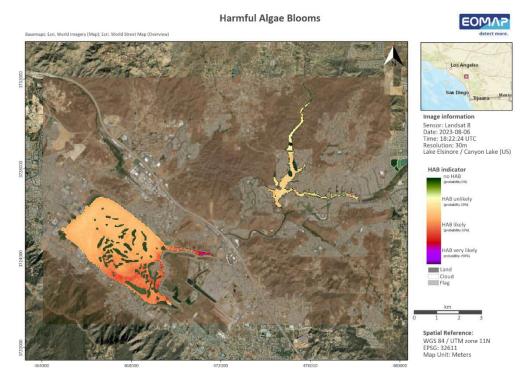


Figure 4: Harmful Algae Bloom Indicator product from 2023-08-06

#### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

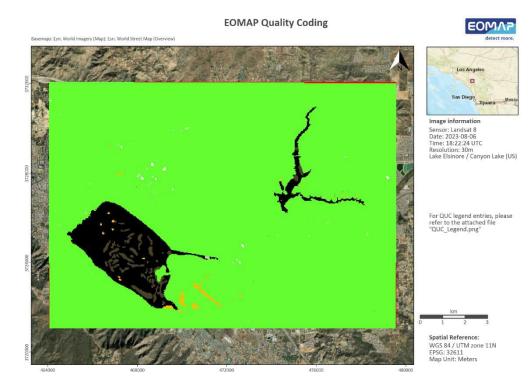
The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels excluding land, cloud or flagged pixels are represented in QUT indicator (Figure 5).
- QUC EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.



<section-header>

Figure 5: QUT product from 2023-08-06



11/14

Figure 6: QUC product from 2023-08-06



The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional v	version allo	w combinatio	n of the two	most relevant flags:		
First number :	= most rele	vant flag				
1-digit-numbe	er refer to s	second releva	nt flag, e.g. 1	for sunglint risk, 2 for large solar zenith angle		
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		
	11	4 Critical flag	for sunglint, p	olus warning for aerosol above limits		
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
	20	20 - 29	Warning	large solar zenith angle	83 141 213	
	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
	40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
	50	50 - 59	Warning	Cloud Shadow	177 160 199	
	60	60 - 69	Warning	Shallow water risk	146 205 220	
	70	70 - 79	Warning	Mixed pixel risk	250 191 143	
	80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
	90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
	110	110 - 119	Critical	sunglint risk	73 69 41	
	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
	140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
	180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
	190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
	220	220	No value	Transition Zone	102 255 51	
	221	221	Unreliable	Shallow water automatically	146 205 220	
	222	222	Unreliable	Shallow water manually	60 159 186	
	223	223	Unreliable	Floating material	32 95 107	
	230	230	No water	Land	102 255 51	
	232	232	Unreliable	Invalid pixel manually	255 192 0	
	240	240	No water	Cloud	255 255 255	
	242	242	Unreliable	Cloud Shadow manually	96 73 122	
	244	244	Unreliable	Hill shadow	73 57 93	
	250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.



### 5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

### 6. Data Sources

EOMAP uses the following the AWS data hub (<u>https://registry.opendata.aws/index.html</u>) to access and download satellite raw data from different sensors.

- Landsat 8/9: https://registry.opendata.aws/usgs-landsat/index.html
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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#### EOMAP

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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-02-01 Version: 31

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

Authors:	Email	Phone
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# 1. Service Provision Report

Contractor Details	Service Provider Details	
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG	
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany	
San Diego, CA 92123, USA		
Point of Contact	Point of Contact	
John D. Rudolph	Hendrik Bernert	
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114	

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-02-01
Version	31

#### 1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2023-09-20 18:45:01 UTC

#### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

### 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs31_20240201.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20230920_184501_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20230920_184501_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-	ASCII	Product text file, real values
california_11smt_EOMAP_20230920_184501_SENT2_m0010_32bit_wgs84.txt		
CHL_us-california_11smt_EOMAP_20230920_184501_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20230920_184501_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20230920_184501_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook



#### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC
	time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

#### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC h

Minha Sultan



# 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

⁸ Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4



¹ Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

² Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

³ Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

⁴ Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, <u>http://dx.doi.org/10.1016/j.rse.2014.07.025</u>

⁵ Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

⁶ EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): <u>www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf</u>

⁷ Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

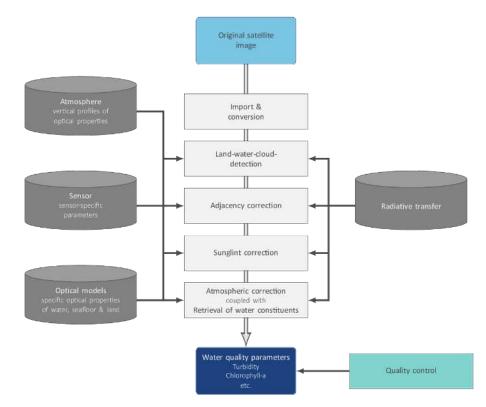


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.



## 3. Products

## 3.1. Turbidity (TUR)

**Turbidity** (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-09-20 is shown in Figure 2.

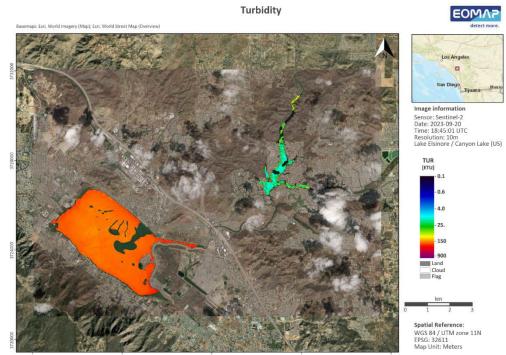


Figure 2: Turbidity product from 2023-09-20



#### 3.2. Chlorophyll-a (CHL)

**Chlorophyll-a** (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [ $\mu$ g/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu$ g/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995⁹). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu$ g/l, while for eutrophic lakes concentrations can reach 100  $\mu$ g/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015¹⁰), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2023-09-20 is shown in Figure 3.

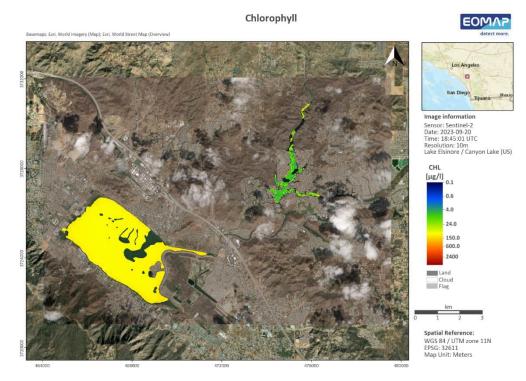


Figure 3: Chlorophyll-a product from 2023-09-20

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

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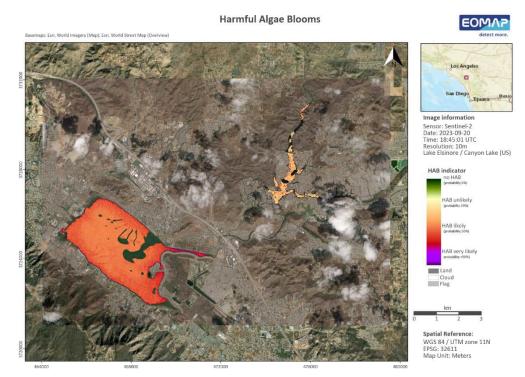


Figure 4: Harmful Algae Bloom Indicator product from 2023-09-20

#### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
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- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

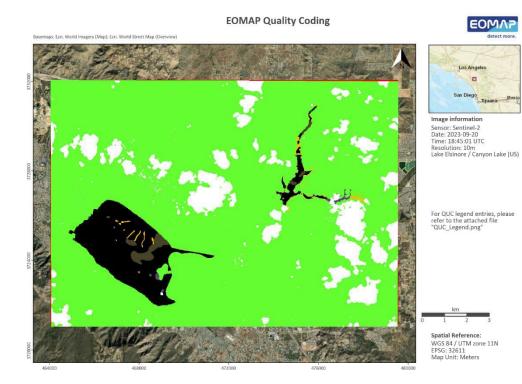
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Figure 5: QUT product from 2023-09-20



11/14

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Professional v	ersion allo	ow combinatio	n of the two	most relevant flags:		
First number =	most rele	vant flag				1
1-digit-numbe	er refer to	second releva	nt flag, e.g. 1	for sunglint risk, 2 for large solar zenith angle		
Examples:	amples: 25 Warning flag for large zenit solar angle and Whitecaps			1		
114 Critical flag for sunglint, plus warning for aerosol above limits						
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
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	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
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	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
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	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
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	221	221	Unreliable	Shallow water automatically	146 205 220	
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Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.



### 5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

## 6. Data Sources

EOMAP uses the following the AWS data hub (<u>https://registry.opendata.aws/index.html</u>) to access and download satellite raw data from different sensors.

- Landsat 8/9: <u>https://registry.opendata.aws/usgs-landsat/index.html</u>
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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#### EOMAP

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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-01-30 Version: 29

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

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# 1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
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Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-01-30
Version	29

#### 1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2023-10-10 18:44:58 UTC

#### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

# 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs29_20240130.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20231010_184458_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20231010_184458_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32 bit real values
CHL_us-	ASCII	Product text file, real values
california_11smt_EOMAP_20231010_184458_SENT2_m0010_32bit_wgs84.txt		
CHL_us-california_11smt_EOMAP_20231010_184458_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20231010_184458_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20231010_184458_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook



#### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code] [Area]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Month, SS = Seconds) in UTC
[Time of sutenite image ree.]	time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

#### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC 2

Minha Sultan



# 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

⁸ Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4



¹ Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

² Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

³ Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

⁴ Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, <u>http://dx.doi.org/10.1016/j.rse.2014.07.025</u>

⁵ Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

⁶ EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): <u>www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf</u>

⁷ Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

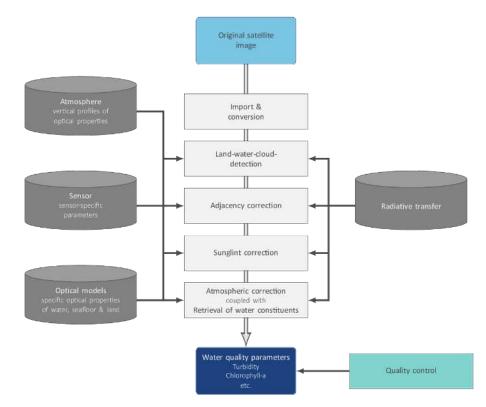


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.



# 3. Products

# 3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-10-10 is shown in Figure 2.

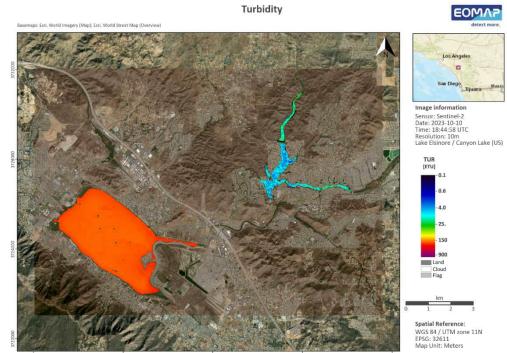


Figure 2: Turbidity product from 2023-10-10



#### 3.2. Chlorophyll-a (CHL)

**Chlorophyll-a** (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [ $\mu$ g/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu$ g/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995⁹). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu$ g/l, while for eutrophic lakes concentrations can reach 100  $\mu$ g/l and more. The chlorophyll products are typically reliable within a range of 10–50% in comparison to in situ measures (Broszeit 2015¹⁰), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2023-10-10 is shown in Figure 3.

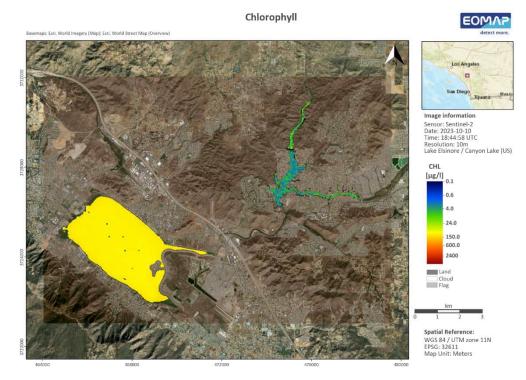


Figure 3: Chlorophyll-a product from 2023-10-10

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

# 3.3. Harmful Algae Bloom Indicator (HAB)

The Harmful Algae Bloom Indicator (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance (R_{modelled}) and satellite derived reflectance (R_{satellite}) occurs. The algorithm then compares the slope of R_{modelled} and R_{satellite} between the green and red band ( $\delta R = R_{green} - R_{red}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2023-10-10 is shown in Figure 4.

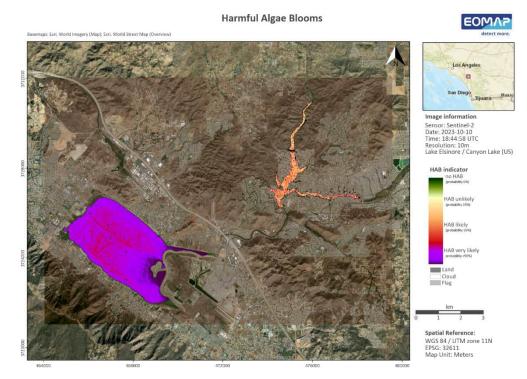


Figure 4: Harmful Algae Bloom Indicator product from 2023-10-10

#### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels excluding land, cloud or flagged pixels are represented in QUT indicator (Figure 5).
- QUC EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.



EOMAR Los Ange Image information Sensor: Sentinel-2 Date: 2023-10-10 Time: 18:44:58 UTC Resolution: 10m Lake Elsinore / Canyon Lake (US) Total Quality od Spatial Reference: WGS 84 / UTM zone 11N EPSG: 32611 Map Unit: Meters

EOMAP Total Quality

Figure 5: QUT product from 2023-10-10

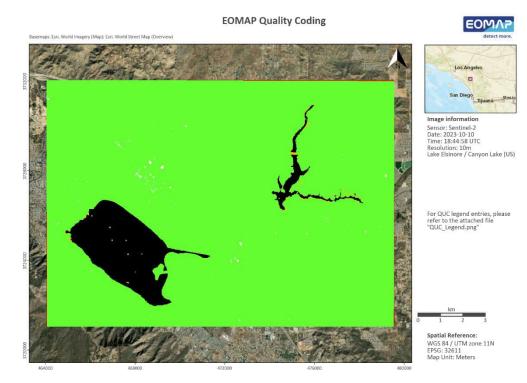


Figure 6: QUC product from 2023-10-10



11/14

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional v	version allo	w combinatio	n of the two	most relevant flags:		
First number :	= most rele	vant flag				
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle						
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		
	11	4 Critical flag	for sunglint, p	olus warning for aerosol above limits		
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
	20	20 - 29	Warning	large solar zenith angle	83 141 213	
	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
	40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
	50	50 - 59	Warning	Cloud Shadow	177 160 199	
	60	60 - 69	Warning	Shallow water risk	146 205 220	
	70	70 - 79	Warning	Mixed pixel risk	250 191 143	
	80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
	90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
	110	110 - 119	Critical	sunglint risk	73 69 41	
	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
	140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
	180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
	190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
	220	220	No value	Transition Zone	102 255 51	
	221	221	Unreliable	Shallow water automatically	146 205 220	
	222	222	Unreliable	Shallow water manually	60 159 186	
	223	223	Unreliable	Floating material	32 95 107	
	230	230	No water	Land	102 255 51	
	232	232	Unreliable	Invalid pixel manually	255 192 0	
	240	240	No water	Cloud	255 255 255	
	242	242	Unreliable	Cloud Shadow manually	96 73 122	
	244	244	Unreliable	Hill shadow	73 57 93	
	250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

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# 6. Data Sources

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- Landsat 8/9: https://registry.opendata.aws/usgs-landsat/index.html
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-01-30 Version: 30

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14



## CONTENT

1.	SER	VICE PROVISION REPORT	3
1 1 1	.1. .2. .3. .4. .5.	LIST OF ALL DELIVERED SCENES CONTENT LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE) FILE NAMING NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.)	.3 .3 .4
2.	MET	THODOLOGY: MODULAR INVERSION AND PROCESSING SYSTEM (MIP)	5
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3	.2. .3.	Turbidity (TUR) Chlorophyll-a (CHL) Harmful Algae Bloom Indicator (HAB) True color composite (RGB)	.8 .9
4.	QUA	ALITY CONTROL AND FLAGGING1	0
5.	DAT	A FORMAT1	3
6.	DAT	A SOURCES1	3



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9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	Point of Contact
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-01-30
Version	30

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Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

# 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs30_20240130.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20231209_184454_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20231209_184454_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32 bit real values
CHL_us-	ASCII	Product text file, real values
california_11smt_EOMAP_20231209_184454_SENT2_m0010_32bit_wgs84.txt		
CHL_us-california_11smt_EOMAP_20231209_184454_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20231209_184454_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20231209_184454_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook



#### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code] [Area]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
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#### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC 2

Minha Sultan



# 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

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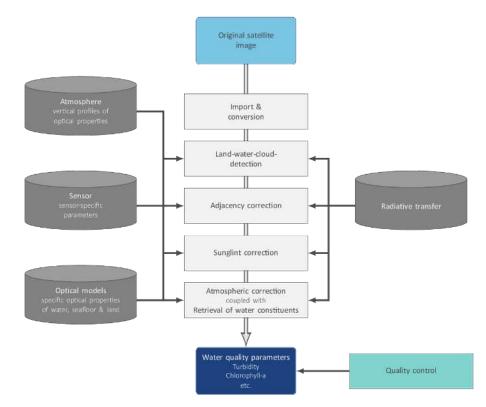


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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# 3. Products

# 3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-12-09 is shown in Figure 2.

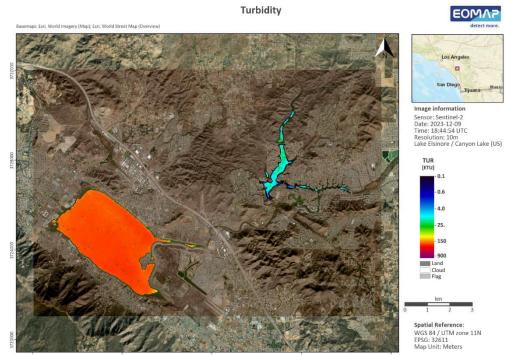


Figure 2: Turbidity product from 2023-12-09



#### 3.2. Chlorophyll-a (CHL)

**Chlorophyll-a** (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [ $\mu$ g/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu$ g/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995⁹). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu$ g/l, while for eutrophic lakes concentrations can reach 100  $\mu$ g/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015¹⁰), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2023-12-09 is shown in Figure 3.

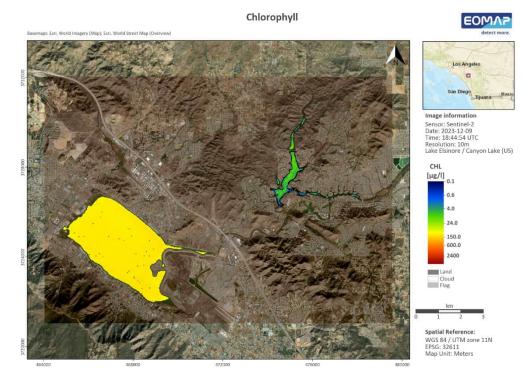


Figure 3: Chlorophyll-a product from 2023-12-09

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

## 3.3. Harmful Algae Bloom Indicator (HAB)

The Harmful Algae Bloom Indicator (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance (R_{modelled}) and satellite derived reflectance (R_{satellite}) occurs. The algorithm then compares the slope of R_{modelled} and R_{satellite} between the green and red band ( $\delta R = R_{green} - R_{red}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2023-12-09 is shown in Figure 4.

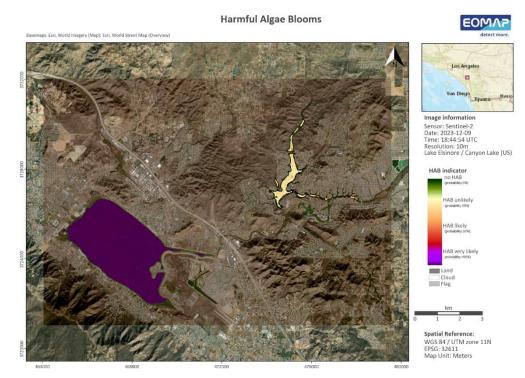


Figure 4: Harmful Algae Bloom Indicator product from 2023-12-09

#### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

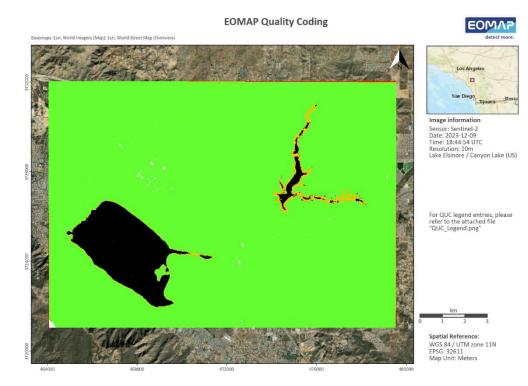
- QUT Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels excluding land, cloud or flagged pixels are represented in QUT indicator (Figure 5).
- QUC EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.



EOMAP Los Ange Image information Sensor: Sentinel-2 Date: 2023-12-09 Time: 18:44:54 UTC Resolution: 10m Lake Elsinore / Canyon Lake (US) Total Quality od Spatial Reference: WGS 84 / UTM zone 11N EPSG: 32611 Map Unit: Meters

EOMAP Total Quality

Figure 5: QUT product from 2023-12-09



11/14

Figure 6: QUC product from 2023-12-09



The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional v	version allo	w combinatio	n of the two	most relevant flags:		
First number =	= most rele	vant flag				
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle						
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		
	114	4 Critical flag	for sunglint, p	olus warning for aerosol above limits		
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
	20	20 - 29	Warning	large solar zenith angle	83 141 213	
	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
	40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
	50	50 - 59	Warning	Cloud Shadow	177 160 199	
	60	60 - 69	Warning	Shallow water risk	146 205 220	
	70	70 - 79	Warning	Mixed pixel risk	250 191 143	
	80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
	90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
	110	110 - 119	Critical	sunglint risk	73 69 41	
	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
	140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
	180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
	190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
	220	220	No value	Transition Zone	102 255 51	
	221	221	Unreliable	Shallow water automatically	146 205 220	
	222	222	Unreliable	Shallow water manually	60 159 186	
	223	223	Unreliable	Floating material	32 95 107	
	230	230	No water	Land	102 255 51	
	232	232	Unreliable	Invalid pixel manually	255 192 0	
	240	240	No water	Cloud	255 255 255	
	242	242	Unreliable	Cloud Shadow manually	96 73 122	
	244	244	Unreliable	Hill shadow	73 57 93	
	250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.



# 5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

# 6. Data Sources

EOMAP uses the following the AWS data hub (<u>https://registry.opendata.aws/index.html</u>) to access and download satellite raw data from different sensors.

- Landsat 8/9: https://registry.opendata.aws/usgs-landsat/index.html
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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#### EOMAP

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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-06-13 Version: 33

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

Authors:	Email	Phone
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# 1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	Point of Contact
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-06-13
Version	33

#### 1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2024-02-22 18:44:59 UTC

#### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

## 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs33_20240613.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20240222_184459_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20240222_184459_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-	ASCII	Product text file, real values
california_11smt_EOMAP_20240222_184459_SENT2_m0010_32bit_wgs84.txt		
CHL_us-california_11smt_EOMAP_20240222_184459_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20240222_184459_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20240222_184459_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook



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[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

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[Product abbreviation] [Country code] [Area]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards name of city/region or other relevant area characterization
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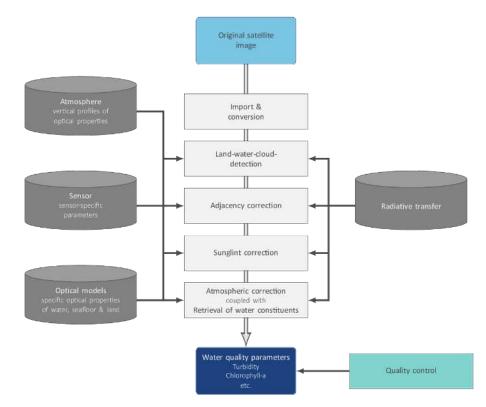


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# 3. Products

# 3.1. Turbidity (TUR)

**Turbidity** (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2024-02-22 is shown in Figure 2.

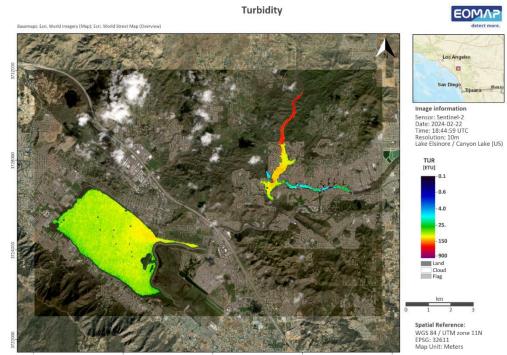


Figure 2: Turbidity product from 2024-02-22



#### 3.2. Chlorophyll-a (CHL)

**Chlorophyll-a** (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [ $\mu$ g/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu$ g/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995⁹). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu$ g/l, while for eutrophic lakes concentrations can reach 100  $\mu$ g/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015¹⁰), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2024-02-22 is shown in Figure 3.

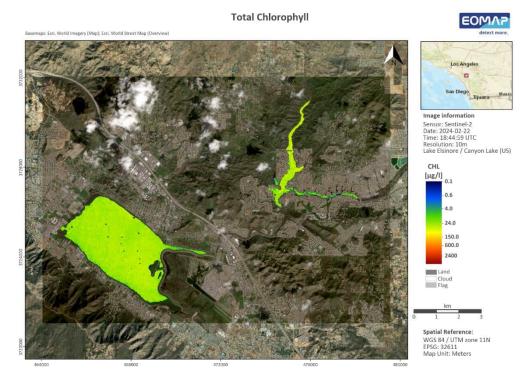


Figure 3: Chlorophyll-a product from 2024-02-22

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

### 3.3. Harmful Algae Bloom Indicator (HAB)

The Harmful Algae Bloom Indicator (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance (R_{modelled} and R_{satellite} between the green and red band ( $\delta R = R_{green} - R_{red}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2024-02-22 is shown in Figure 4.

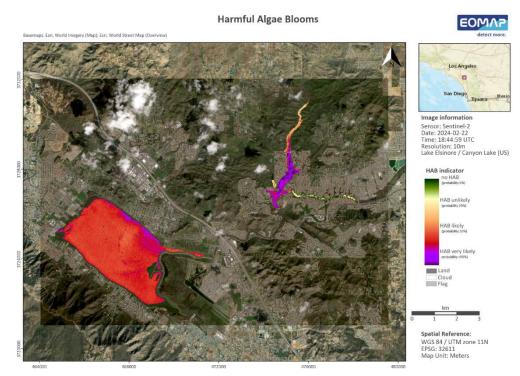


Figure 4: Harmful Algae Bloom Indicator product from 2024-02-22

### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
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Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

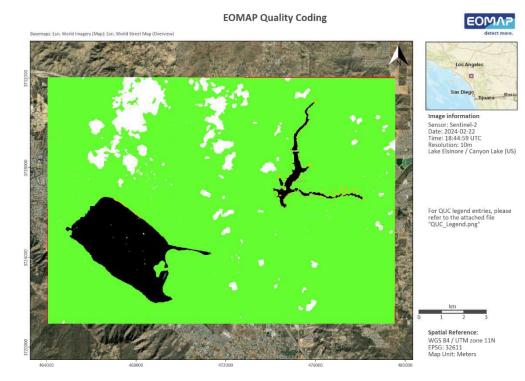
The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels excluding land, cloud or flagged pixels are represented in QUT indicator (Figure 5).
- QUC EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.



<section-header>

Figure 5: QUT product from 2024-02-22



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Figure 6: QUC product from 2024-02-22



The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional v	version allo	ow combinatio	n of the two	most relevant flags:		
First number :	= most rele	vant flag				1
1-digit-numbe	er refer to s	second releva	nt flag, e.g. 1	for sunglint risk, 2 for large solar zenith angle		
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		1
	114	4 Critical flag	for sunglint, p	olus warning for aerosol above limits		
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
	20	20 - 29	Warning	large solar zenith angle	83 141 213	
	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
	40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
	50	50 - 59	Warning	Cloud Shadow	177 160 199	
	60	60 - 69	Warning	Shallow water risk	146 205 220	
	70	70 - 79	Warning	Mixed pixel risk	250 191 143	
	80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
	90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
	110	110 - 119	Critical	sunglint risk	73 69 41	
	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
	140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
	180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
	190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
	220	220	No value	Transition Zone	102 255 51	
	221	221	Unreliable	Shallow water automatically	146 205 220	
	222	222	Unreliable	Shallow water manually	60 159 186	
	223	223	Unreliable	Floating material	32 95 107	
	230	230	No water	Land	102 255 51	
	232	232	Unreliable	Invalid pixel manually	255 192 0	
	240	240	No water	Cloud	255 255 255	
	242	242	Unreliable	Cloud Shadow manually	96 73 122	
	244	244	Unreliable	Hill shadow	73 57 93	
	250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.



### 5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

### 6. Data Sources

EOMAP uses the following the AWS data hub (<u>https://registry.opendata.aws/index.html</u>) to access and download satellite raw data from different sensors.

- Landsat 8/9: <u>https://registry.opendata.aws/usgs-landsat/index.html</u>
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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#### EOMAP

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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-06-13 Version: 32

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

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Minha Sultan	sultan@eomap.de	+49 8152 99861 14



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### 1. Service Provision Report

Contractor Details	Service Provider Details	
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG	
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany	
San Diego, CA 92123, USA		
Point of Contact	Point of Contact	
John D. Rudolph	Hendrik Bernert	
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114	

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-06-13
Version	32

### 1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2024-04-17 18:45:02 UTC

### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

### 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs32_20240613.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20240417_184502_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20240417_184502_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-	ASCII	Product text file, real values
california_11smt_EOMAP_20240417_184502_SENT2_m0010_32bit_wgs84.txt		
CHL_us-california_11smt_EOMAP_20240417_184502_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20240417_184502_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20240417_184502_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook



### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC
	time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC h

Minha Sultan



### 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

⁸ Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4



¹ Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

² Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

³ Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

⁴ Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, <u>http://dx.doi.org/10.1016/j.rse.2014.07.025</u>

⁵ Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

⁶ EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): <u>www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf</u>

⁷ Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

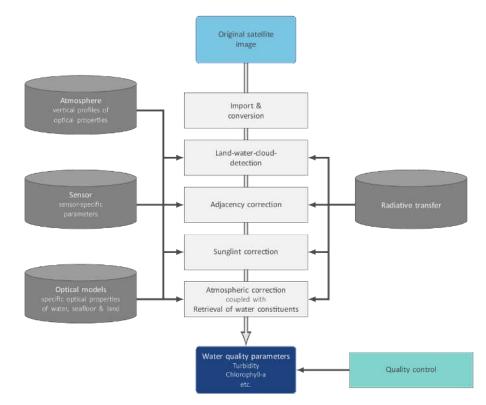


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.



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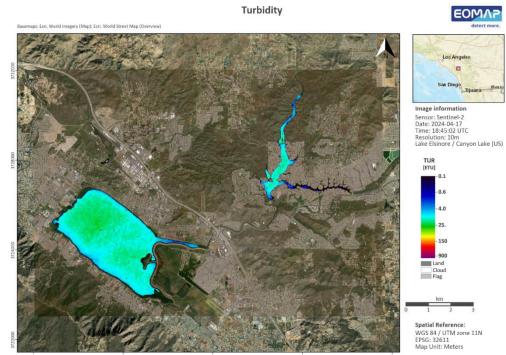


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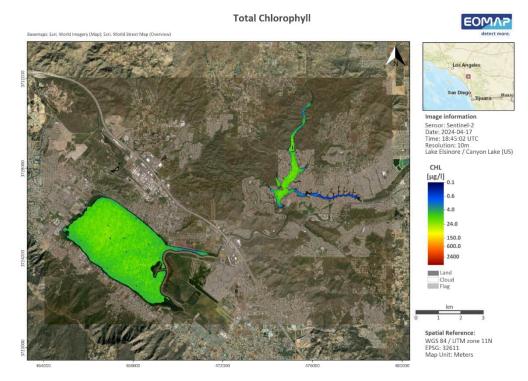


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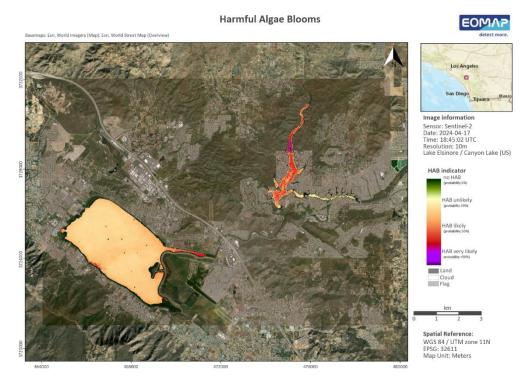


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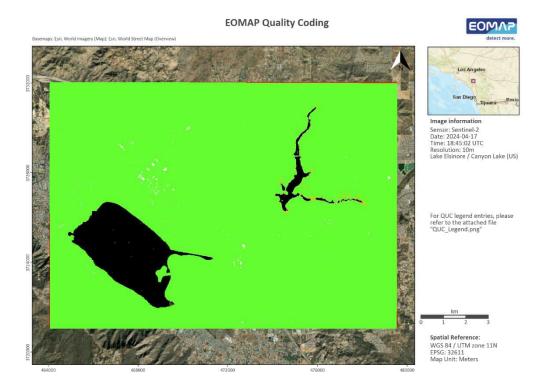
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Professional v	version allo	ow combinatio	n of the two	most relevant flags:		
First number :	= most rele	vant flag				1
1-digit-numbe	er refer to s	second releva	nt flag, e.g. 1	for sunglint risk, 2 for large solar zenith angle		
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		1
	114	4 Critical flag	for sunglint, p	olus warning for aerosol above limits		
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
	20	20 - 29	Warning	large solar zenith angle	83 141 213	
	30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
	40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
	50	50 - 59	Warning	Cloud Shadow	177 160 199	
	60	60 - 69	Warning	Shallow water risk	146 205 220	
	70	70 - 79	Warning	Mixed pixel risk	250 191 143	
	80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
	90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
	110	110 - 119	Critical	sunglint risk	73 69 41	
	120	120 - 129	Critical	large solar zenith angle	22 54 92	
	130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
	140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
	150	150 - 159	Critical	Cloud Shadow	96 73 122	
	160	160 - 169	Critical	Shallow water risk	49 134 155	
	170	170 - 179	Critical	Mixed pixel risk	226 107 10	
	180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
	190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
	220	220	No value	Transition Zone	102 255 51	
	221	221	Unreliable	Shallow water automatically	146 205 220	
	222	222	Unreliable	Shallow water manually	60 159 186	
	223	223	Unreliable	Floating material	32 95 107	
	230	230	No water	Land	102 255 51	
	232	232	Unreliable	Invalid pixel manually	255 192 0	
	240	240	No water	Cloud	255 255 255	
	242	242	Unreliable	Cloud Shadow manually	96 73 122	
	244	244	Unreliable	Hill shadow	73 57 93	
	250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product. As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.

Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.



### 5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

### 6. Data Sources

EOMAP uses the following the AWS data hub (<u>https://registry.opendata.aws/index.html</u>) to access and download satellite raw data from different sensors.

- Landsat 8/9: <u>https://registry.opendata.aws/usgs-landsat/index.html</u>
- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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#### EOMAP

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**Delivery report** 

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2024-06-13 Version: 34

Clients: Wood Plc. Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG, Schlosshof 4, 82229 Seefeld Germany

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Minha Sultan	sultan@eomap.de	+49 8152 99861 14



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### 1. Service Provision Report

Contractor Details	Service Provider Details	
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG	
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany	
San Diego, CA 92123, USA		
Point of Contact	Point of Contact	
John D. Rudolph	Hendrik Bernert	
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114	

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2024-06-13
Version	34

### 1.1. List of all delivered scenes

Sensor	Time of record
Landsat-8	2024-06-05 18:21:38 UTC

### 1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	
Aerosol Optical Thickness	AOT	
Yellow Substances	CDM	
Chlorophyll-a	CHL	$\boxtimes$
Ratio of Absorption and Scattering	DIV	
Harmful Algae Bloom Indicator	НАВ	$\boxtimes$
Diffuse Attenuation Coefficient	KDC	
Quality Coding	QUC	$\boxtimes$
Total Quality	QUT	$\boxtimes$
True Color/False Color Composite	RGB	$\boxtimes$
Remote Sensing Reflectance	RRS	
Secchi Disc Depth	SDD	
Sum of Inorganic Absorption	SIA	
Sum if Organic Absorption	SOA	
Surface Temperature	SST	
Turbidity	TUR	$\boxtimes$
Trophic State Index (Chlorophyll)	TSC	
Total Suspended Matter	TSM	
Light Penetration Depth	Z90	
Water Body Extent	WEX	

### 1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs34_20240613.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20240605_182138_LSAT8_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20240605_182138_LSAT8_m0030_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-	ASCII	Product text file, real values
california_040037_EOMAP_20240605_182138_LSAT8_m0030_32bit_wgs84.txt		
CHL_us-california_040037_EOMAP_20240605_182138_LSAT8_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EOMAP_20240605_182138_LSAT8_m0030.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20240605_182138_LSAT8_m0030_overview.pdf	PDF	Overview PDF, metadata and quicklook



### 1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

#### With

[Product abbreviation] [Country code] [Area]	see list of product abbreviations Country ID following ISO 3166 ALPHA-2 standards name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC
	time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

### 1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

• None

Data Analyst Hendik Berneit

Hendrik Bernert

QA/QC h

Minha Sultan



### 2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

- a. water, land, cloud identification
- b. estimation and correction of atmosphere and aerosol impacts^{1 2}
- c. correction altitude level impacts³
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)  $^{\!\!\!4}$
- e. correction⁵ or flagging⁶ of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures⁷
- g. accounting for varying spectral slopes of specific inherent optical properties⁸
- h. provision of uncertainty measures and flagging procedures
- i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
- j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

⁸ Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4



¹ Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

² Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

³ Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

⁴ Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, <u>http://dx.doi.org/10.1016/j.rse.2014.07.025</u>

⁵ Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

⁶ EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): <u>www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf</u>

⁷ Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

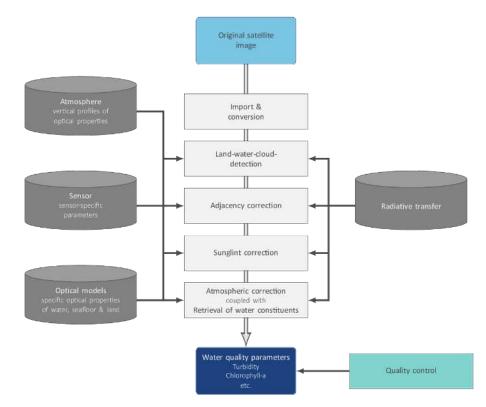


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.



### 3. Products

### 3.1. Turbidity (TUR)

**Turbidity** (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2024-06-05 is shown in Figure 2.

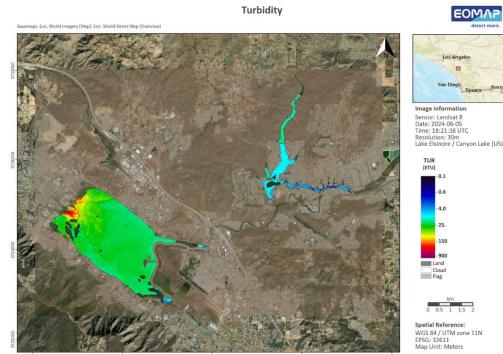


Figure 2: Turbidity product from 2024-06-05



### 3.2. Chlorophyll-a (CHL)

**Chlorophyll-a** (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [ $\mu$ g/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu$ g/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995⁹). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu$ g/l, while for eutrophic lakes concentrations can reach 100  $\mu$ g/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015¹⁰), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2024-06-05 is shown in Figure 3.

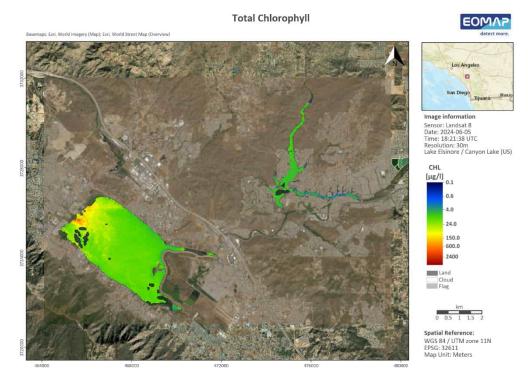


Figure 3: Chlorophyll-a product from 2024-06-05

¹⁰ Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p



⁹ Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,342

### 3.3. Harmful Algae Bloom Indicator (HAB)

The Harmful Algae Bloom Indicator (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance (R_{modelled}) and satellite derived reflectance (R_{satellite}) occurs. The algorithm then compares the slope of R_{modelled} and R_{satellite} between the green and red band ( $\delta R = R_{green} - R_{red}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2024-06-05 is shown in Figure 4.

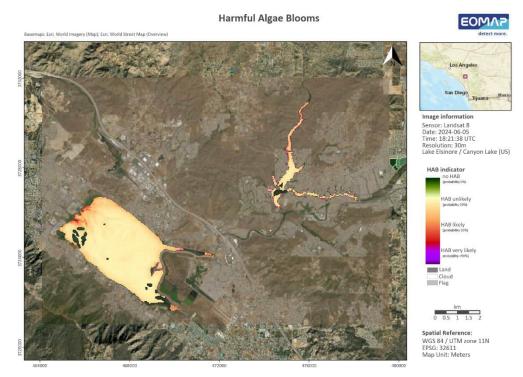


Figure 4: Harmful Algae Bloom Indicator product from 2024-06-05

### 3.4. True color composite (RGB)

**RGB** composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.



# 4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

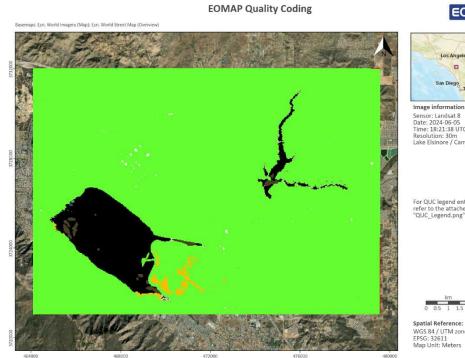
- QUT Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels excluding land, cloud or flagged pixels are represented in QUT indicator (Figure 5).
- QUC EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.



Los Ange Image information Sensor: Landsat 8 Date: 2024-06-05 Time: 18:21:38 UTC Resolution: 30m Lake Elsinore / Canyon Lake (US) Total Quality od Spatial Reference: WGS 84 / UTM zone 11N EPSG: 32611 Map Unit: Meters

EOMAP Total Quality

Figure 5: QUT product from 2024-06-05





Sensor: Landsat 8 Date: 2024-06-05 Time: 18:21:38 UTC Resolution: 30m Lake Elsinore / Canyon Lake (US)

For QUC legend entries, please refer to the attached file "QUC_Legend.png"

Spatial Reference: WGS 84 / UTM zone 11N EPSG: 32611 Map Unit: Meters

Figure 6: QUC product from 2024-06-05



# EOMAP

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional v	ersion allo	ow combinatio	n of the two	most relevant flags:		
First number =	most rele	vant flag				1
1-digit-numbe	er refer to	second releva	nt flag, e.g. 1	for sunglint risk, 2 for large solar zenith angle		
Examples:	2	5 Warning flag	g for large zer	nit solar angle and Whitecaps		1
114 Critical flag for sunglint, plus warning for aerosol above limits						
	GV	GV range	Flag status	Flag description	Color code	Color
	0	0	Water	No risk identified	000	
	10	10 - 19	Warning	sunglint risk	148 138 84	
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- Sentinel-2: <u>https://registry.opendata.aws/sentinel-2/</u>



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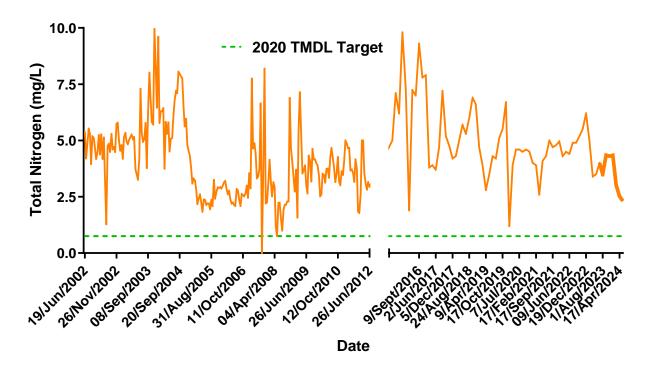
#### EOMAP

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APPENDIX E

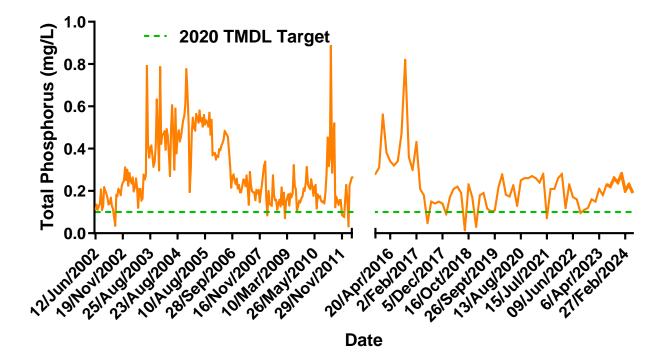
CURRENT DATA IN HISTORICAL CONTEXT



# Lake Elsinore – Historical Monitoring Results

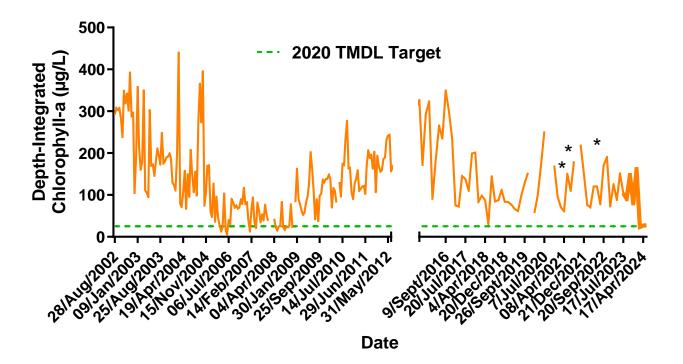
No data available from June 2012-July2015 TMDL target of 0.75 mg/L is annual average to be attained by 2020 Bold represents current monitoring year July 2023-June 2024

#### Lake Elsinore – Historical Monitoring Results (continued)



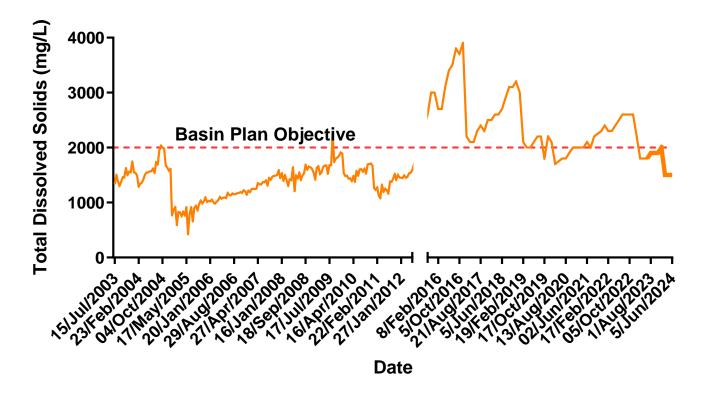
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### Lake Elsinore – Historical Monitoring Results (continued)

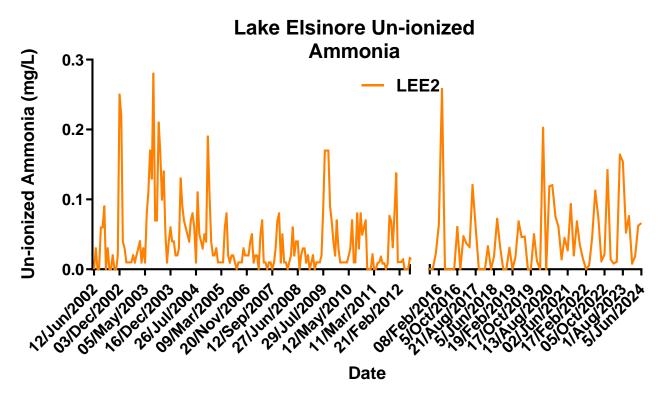


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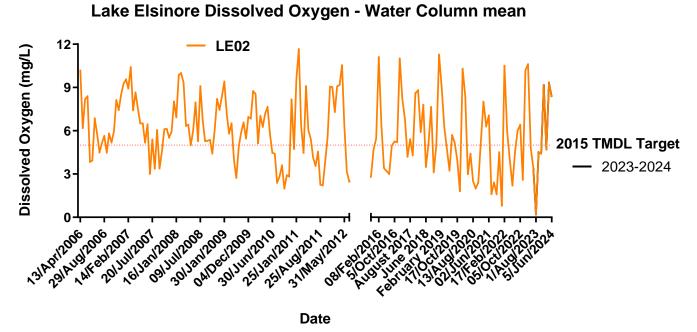
# Lake Elsinore – Historical Monitoring Results (continued)



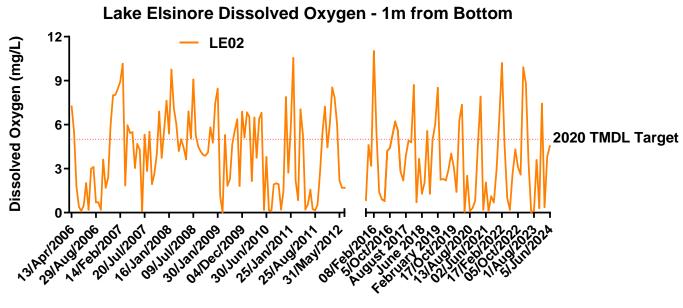
No data available from June 2012-July 2015 Bold represents current monitoring year July 2023-June 2024



No data available from June 2012-July2015

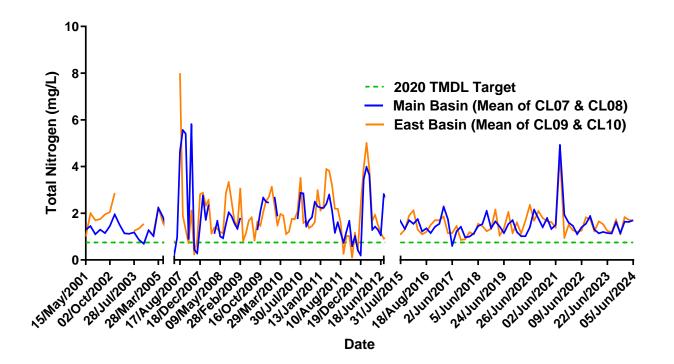


No data available from June 2012-July2015 TMDL target of 5 mg/L is depth average to be attained by 2015



Date

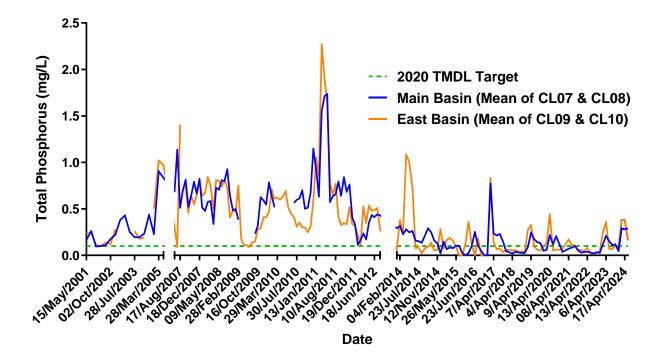
No data available from June 2012-July2015 TMDL target of 5 mg/L is 1m off lake bottom to be attained by 2020



## **Canyon Lake – Historical Monitoring Results**

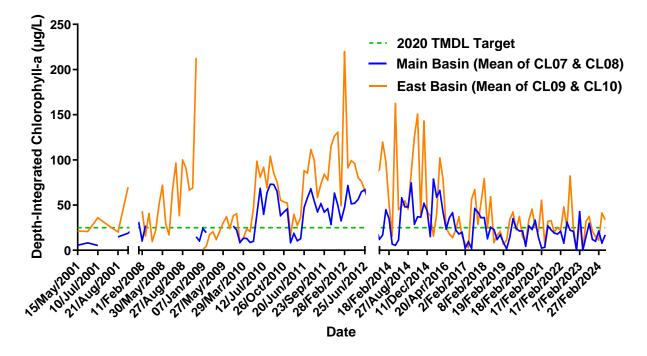
No data available from May 2005-July 2007; June 2012-July2015 TMDL target of 0.75 mg/L is annual average to be attained by 2020 Bold represents current monitoring year July 2023-June 2024

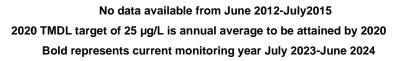
## **Canyon Lake – Historical Monitoring Results (continued)**

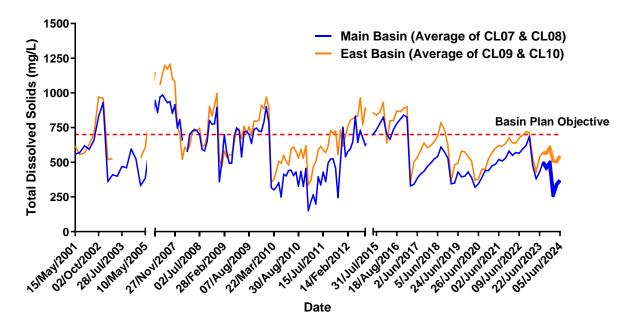


No data available from May 2005-July 2007; June 2012-Sept 2013 TMDL target of 0.1 mg/L is annual average to be attained by 2020 Bold represents current monitoring year July 2023-June 2024

### **Canyon Lake – Historical Monitoring Results (continued)**

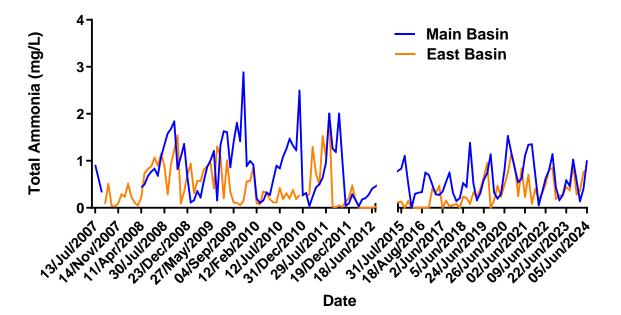




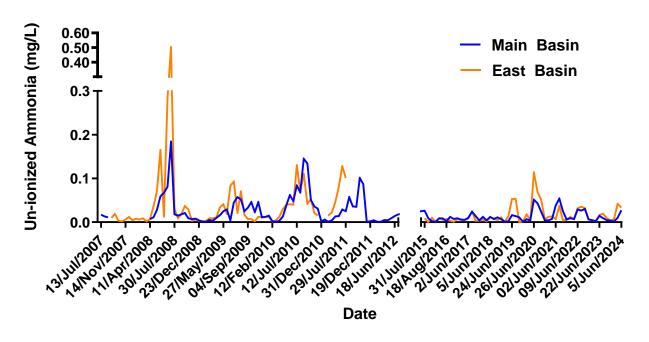


#### **Canyon Lake – Historical Monitoring Results (continued)**

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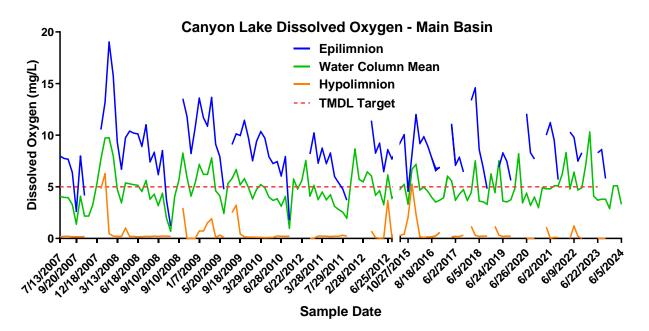


No data available from June 2012-July2015



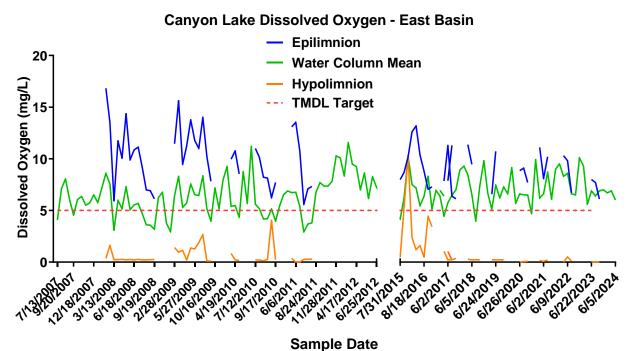
#### **Canyon Lake Un-ionized Ammonia**

No data available from June 2012-July2015



No data available from June 2012 - July 2015 Data represents average values of sites CL07 and CL08 TMDL 2015 target >5 mg/L in Epilimnion, 2020 target >5 mg/L in Hypolimnion

Lake Elsinore and Canyon Lake Annual TMDL Monitoring Report 2023-2024 Appendix E – Historical Monitoring Results



No data available from June 2012 - July 2015 Data represents average values of sites CL09 and CL10 TMDL 2015 target >5 mg/L in Epilimnion, 2020 target >5 mg/L in Hypolimnion APPENDIX F

CANYON LAKE FISH DIE-OFF INVESTIGATION TECHNICAL MEMO



#### **TECHNICAL MEMORANDUM**

TO: Rachel Gray & Rick Whetsel, SAWPA
FROM: John Rudolph & Chris Stransky, WSP USA
SUBJECT: April 2024 Canyon Lake Fish Die Off
DATE: June 8, 2024

This memo has been prepared in response to a minor fish die off that occurred on Wednesday, April 24, 2024, consisting exclusively of shad that was observed in Canyon Lake following the Spring 2024 alum application (April 22 to 24, 2024). To investigate a potential cause of the fish die off, WSP mobilized field staff to visit the lake at the request of Lake Elsinore and San Jacinto Watersheds Authority (LESJWA) staff. During this visit, visual observations and photos were taken, a series of water quality readings were performed (pH, temperature, conductivity, and dissolved oxygen (DO)), and samples of water were collected to scan for algae species. Observations, water quality profiles, and sample collections were performed at six locations around the lake as shown in **Figure 1** consisting of four locations in the main body of the lake and two in the eastern arm:

- Main Body:
  - Northern Causeway (near corner of Old Wrangler Drive and Vacation Drive)
  - o Sierra Park
  - o Holiday Harbor
  - o Moonstone Beach
- Eastern Arm:
  - o East Port Park
  - o Indian Beach

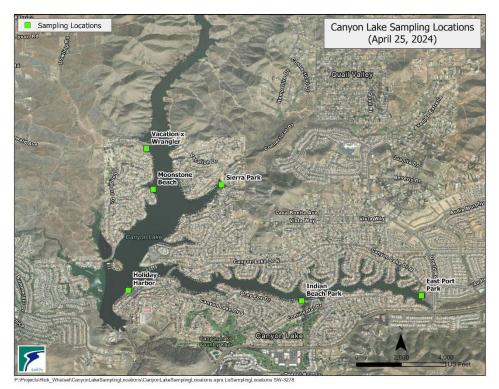
Water quality readings were recorded, and samples were collected at each site between 5:45 am and 8:17 am on April 25, 2024. At the time of the collection, the water column was turbid with a greenish brown tint suggesting an algal bloom was occurring in the lake. During the site visit a few dead shad were observed floating near Sierra Park in Bass Cove where previously reported.

Water quality readings, including pH, DO, temperature, and specific conductivity were recorded early in the morning to determine if there might have been an overnight decrease in DO below concentrations that can cause acute lethality to fish (approximately 2.0 milligrams per liter (mg/L) or less). When elevated concentrations of algae are present in the water column the lowest



concentrations of DO will typically occur just before dawn; once the sun rises the algae start to photosynthesize producing oxygen as a byproduct, while at night they utilize respiration which consumes oxygen in the water. Low concentrations of DO as a result of algae respiration at night resulting in fish kills are well documented in the literature (<u>https://en.wikipedia.org/wiki/Fish_kill</u>) and has been observed as a cause for fish die offs in local lakes in southern California including nearby Lake Elsinore (EIP Associates, 2005¹).

However, measured concentrations of DO in Canyon Lake on April 25th were all >7.0 mg/L within at least the top 2-meters among all 6 sites evaluated, which is well above the 2.0 mg/L threshold below which fish mortality may be observed. A fairly steep decline in DO was noted below a depth of 3-4 meters, in some cases dropping to near 0 mg/L. A comparison of DO water column profile concentrations from the previous two April monitoring events in 2022 and 2023 does appear to show depressed DO in April 2024 relative to these prior years. Because fish are mobile, they have the ability to find refuge in the top 2-meters of the water column where the DO was higher, suggesting that this parameter does not appear to be a primary cause based on the measurements taken several days after the fish kill. However, it is still possible that localized transient mixing of deeper low DO waters with surface waters prior to the follow up sampling may have resulted in brief periods of low DO throughout the water column to a degree that may have affected local fish at that time.



**Figure 1. Map of Sample Locations** 

¹ EIP Associates, 2005. Final Fisheries Management Plan for Lake Elsinore, Riverside County, California. Prepared for the Lake Elsinore & San Jacinto Watersheds Authority. Technical Report. August 2005.



Samples of water collected on April 25, 2024 were delivered to the WSP laboratory where a visual scan of algal species was performed on a microscope. Although the lake was turbid with a greenish brown tint, the concentration of algae species observed in the samples, along with a high diversity that included a number of diatoms, did not indicate a bloom condition typical of cyanobacteria often dominated by just one or two species. There were also no obvious signs of Golden Algae (*Prymnesium parvum*), another possible culprit that can cause sudden fish die-offs as a result of the potent neurotoxins this species can produce during a bloom condition². Furthermore, if Golden Algae was the cause, other species of dead fish would likely have been observed rather than exclusively shad.

The concentration of ammonia is another potential cause of fish die offs in lakes with elevated organic content and anoxic sediments where it may be produced. Ammonia also becomes increasingly toxic to fish at elevated pH values above 8.0 when present at high enough concentrations. However, measured concentrations of total ammonia in the six samples collected on April 25, 2024 were all <1.0 mg/L, well below a level of potential concern at approximately 10 mg/L or more.

Aluminum (Al) is the primary active ingredient in alum that binds to and precipitates out phosphorous from the water column, thereby limiting this key nutrient as a source of food for algae. Aluminum at high enough concentrations can also be toxic to aquatic life. To assess whether alum may have resulted in elevated aluminum above a toxic threshold for fish, water samples were collected for analysis of total and dissolved aluminum at four of the locations visited on April 25, 2024 (Northern Causeway, Sierra Park, Holiday Harbor and East Port Park). Total and dissolved phosphorus were also analyzed in these samples to evaluate their relationship to aluminum. These samples were delivered to Weck Analytical for quantification.

A summary of analytical results is provided in **Table 1** showing concentrations of total aluminum ranging from 980 to 1,000 micrograms per liter ( $\mu$ g/L). Dissolved concentrations of aluminum represented greater than 85% of the total for all locations except East Port Park with 110  $\mu$ g/L dissolved Al (just 11% of the total at this site). The surface pH of 7.7 was notably much lower at the East Pork Park location relative to the other sites ranging from 9.1 to 9.2. Aluminum is less soluble between pH values of approximately 6.0 and 8.0 which corroborates the low dissolved Al concentration at this site. The measured total concentrations were compared to the 2018 EPA water quality criteria for aluminum (which is site specific based on total aluminum concentration, and measured pH, dissolved organic carbon, and water hardness at the time of collection). None of the samples tested exceeded the acute criteria maximum concentration (CMC), but all exceeded the chronic criteria continuous concentration (CCC). The EPA acute threshold values are higher, and one would expect to see some survival impacts (i.e., fish die off) if these are exceeded. The EPA chronic threshold criteria is lower (more conservative), indicative of concentrations where impacts to survival or some other sublethal endpoint (e.g., reproduction, growth) might be observed if these concentrations are exceeded for an extended period of time. For toxicological

² <u>https://hab.whoi.edu/impacts/impacts-golden-algae/</u>



reference, the lowest genus mean acute value (GMAV) used for the derivation of the EPA acute water quality criterion for total Al is 3,880  $\mu$ g/L based on smallmouth bass *Micropterus dolomieu*. The lowest genus mean chronic value (GMCV) of 564  $\mu$ g/L total Al was derived from Atlantic Salmon, *Salmo salar*.³

Based on the measurements of aluminum in Canyon Lake on April 25, 2024, it is difficult to conclude whether the elevated concentrations related to the alum application may have been directly responsible for the fish die-off. The pre-alum water quality monitoring data collected on April 17, 2024 found total aluminum concentrations ranging from 41 to 75 ug/L across the four TMDL sites. So, while the total aluminum concentrations during the week of the fish die off were quite elevated relative to that typically observed during routine monitoring, this is not unexpected given that the samples were collected just one day after the alum was applied. The elevated pH of the lake (causing increased solubility of aluminum at values above 8.0), and calm conditions at the time of the alum application, may have also reduced the typical settling time. There have been prior samples collected in Canyon Lake with much higher aluminum concentrations (up to 6,300 ug/L) with no associated fish die off. However, these previous elevated concentrations were also observed soon after several large storm events, so likely the result of elemental aluminum associated with incoming sediment loads. While the aluminum concentrations measured following the recent fish die off were below the EPA acute CMC, 2 of the 3 samples were just slightly below it and were well above the CCC (Sierra Park and Northern Causeway). It is possible that at the time of application, the aluminum concentration could have exceeded the acute CMC for a short time in limited portions of the lake, resulting in a limited short-term fish die off.

Another key observation noted during the fish kill after alum application, and during the site visit performed thereafter, was the presence of floating scum/ mats in the eastern arm of the lake as shown in **Figure 2.** These mats were likely a result of the alum application reacting with suspended material in the water column from the numerous large storms during the recent prior wet season, elevated algal biomass, elevated pH, and high surface dissolved oxygen concentration in the water forming a flocculant organic material that rose to the surface. This did not have the appearance of a typical cyanobacterial surface scum. The flocculant was observed to dissipate within a few days following our site visit.

A subsequent visit to Canyon Lake was performed six days after the last alum application during the late afternoon on April 30, 2024. During this visit no dead shad were observed or surface scums. The dissolved oxygen was supersaturated at the surface on both the west and east side of the Canyon Lake Drive bridge. The water however was still turbid with a greenish brown tint at the time. What initially appeared to be a narrow white foam/scum in east Canyon Lake near the entrance of the San Jacinto River turned out to be a large gathering of willow seeds (**see Figure 3**). Algal species and densities in samples collected on April 30, 2024 looked similar to those collected on April 25, 2024 with no Golden Algae observed.

Finally, routine water quality monitoring of Canyon Lake in support of the TMDL was performed on June 5, 2024. No dead fish or other abnormal conditions were noted at the time of sampling.

 $^{^3}$  GMAV and GMCVs based on a pH of 7.0, hardness of 300 mg/L, and DOC of 1.0 mg/L.



Water quality profiles were also consistent with typical historical results showing a stratified lake with warmer temperatures and elevated DO near the surface. Analytical results for this event including aluminum are pending at the time of this technical memo.

Table 1. Aluminum Concentrations Observed in Canyon Lake Water Samples – April 25,
2024

Sites	Measured Total Aluminum (ug/L)	EPA Aluminum Acute (CMC) Threshold ug/L ^a	EPA Aluminum Chronic (CCC) Threshold ug/L ^a	Total Aluminum Exceeds CMC ?	Total Aluminum Exceeds CCC ?
East Port Park	980	1,700	730	NO	YES
Sierra Park	1000	1,100	680	NO	YES
Holiday Harbor	1000	1,900	920	NO	YES
Northern Causeway	1000	1,100	710	NO	YES

^a Site-specific calculation based on measured pH, conductivity, and hardness, and estimated dissolved organic carbon (DOC) of 1.0 mg/L as a default value.



Figure 2. Surface scum observed in an East Canyon Lake arm on April 24, 2024



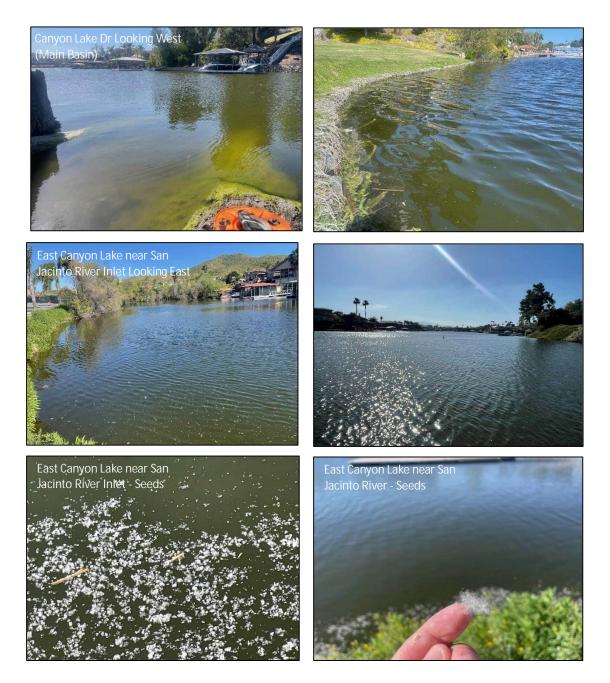


Figure 3. Photographs of Canyon Lake in the afternoon on April 30, 2024 (6 days after the last day of alum application)



#### Conclusion

Although a single definitive factor was not identified as a cause for the limited die off of shad observed in late April 2024, the coinciding timing shortly after the application of alum, observation of elevated pH and total aluminum, the rather abnormal observation of flocculent scum at some locations associated with dead fish, and the transient nature of the die off for just this one species, suggests that this alum application might be one of several possible causes. Additionally, surface concentrations of DO were elevated at the surface during the morning after the alum application, the low DO in the deeper waters may have also been a responsible factor, or co-factor, if this water might have mixed temporarily through the water column at some locations.

Thank you for your time and consideration. If you have questions, please contact John Rudolph (john.rudolph@wsp.com) or Chris Stransky (chris.stransky@wsp.com).

Sincerely,

Shahm

John Rudolph Senior Aquatic Scientist WSP USA, San Diego