



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 1 of 8  
 Project Name: Stormwater  
 Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
 Received on Ice (Y/N): Yes Temp: 4 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

**Sample Identification**

<u>Lab Sample #</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>By</u>	<u>Date Submitted</u>	<u>By</u>
C1A3323-01	S-03-012921 ---ROUTINE---	Liquid	01/29/21 3:30	Garth Engelhorn	01/29/21 11:31	Garth Engelhorn
C1A3323-02	S-03-012921-DUP ---ROUTINE-- -	Liquid	01/29/21 3:30	Garth Engelhorn	01/29/21 11:31	Garth Engelhorn
C1A3323-03	S-03-012921-FB ---ROUTINE---	Liquid	01/29/21 3:50	Garth Engelhorn	01/29/21 11:31	Garth Engelhorn
C1A3323-04	S-04-012921 ---ROUTINE---	Liquid	01/29/21 5:30	Garth Engelhorn	01/29/21 11:31	Garth Engelhorn



**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 2 of 8  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
Received on Ice (Y/N): Yes Temp: 4 °C

Laboratory Reference Number

**C1A3323-01**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-03-012921	Liquid	01/29/21 03:30	01/29/21 11:31

<b>Analyte(s)</b>	<b>Result</b>	<b>RDL</b>	<b>MDL</b>	<b>Units</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Flag</b>
Aggregate Organic Compounds								
Biochemical Oxygen Demand	ND	10	10	mg/L	SM 5210B	01/29/21 21:12	DFL	N-BOD1, N-BOD2
Chemical Oxygen Demand	37	10	7.4	mg/L	SM5220D	02/05/21 14:50	SLL	



**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 3 of 8  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
Received on Ice (Y/N): Yes Temp: 4 °C

Laboratory Reference Number

**C1A3323-02**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-03-012921-DUP	Liquid	01/29/21 03:30	01/29/21 11:31

<b>Analyte(s)</b>	<b>Result</b>	<b>RDL</b>	<b>MDL</b>	<b>Units</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Flag</b>
Aggregate Organic Compounds								
Biochemical Oxygen Demand	ND	10	10	mg/L	SM 5210B	01/29/21 21:16	DFL	N-BOD1, N-BOD2
Chemical Oxygen Demand	44	10	7.4	mg/L	SM5220D	02/05/21 14:50	SLL	

*mailing*  
P.O Box 432  
Riverside, CA 92502-0432

*location*  
6100 Quail Valley Court  
Riverside, CA 92507-0704

P 951 653 3351  
F 951 653 1662  
www.babcocklabs.com

CA ELAP No. 2698  
EPA No. CA00102  
NELAP No. OR4035  
LACSD No. 10119



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 4 of 8  
 Project Name: Stormwater  
 Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
 Received on Ice (Y/N): Yes Temp: 4 °C

Laboratory Reference Number

**C1A3323-03**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-03-012921-FB	Liquid	01/29/21 03:50	01/29/21 11:31

<b>Analyte(s)</b>	<b>Result</b>	<b>RDL</b>	<b>MDL</b>	<b>Units</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Flag</b>
Aggregate Organic Compounds								
Biochemical Oxygen Demand	ND	5.0	5.0	mg/L	SM 5210B	01/29/21 21:19	DFL	N-BOD1, N-BOD2
Chemical Oxygen Demand	ND	10	7.4	mg/L	SM5220D	02/05/21 14:50	SLL	



**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 5 of 8  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
Received on Ice (Y/N): Yes Temp: 4 °C

Laboratory Reference Number

**C1A3323-04**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-04-012921	Liquid	01/29/21 05:30	01/29/21 11:31

<b>Analyte(s)</b>	<b>Result</b>	<b>RDL</b>	<b>MDL</b>	<b>Units</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Flag</b>
Aggregate Organic Compounds								
Biochemical Oxygen Demand	ND	10	10	mg/L	SM 5210B	01/29/21 21:24	DFL	N-BOD1, N-BOD2
Chemical Oxygen Demand	160	10	7.4	mg/L	SM5220D	02/05/21 14:50	SLL	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 6 of 8  
 Project Name: Stormwater  
 Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
 Received on Ice (Y/N): Yes Temp: 4 °C

**Aggregate Organic Compounds - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1A29072 - Analyzed as received</b>										
<b>Blank (1A29072-BLK1)</b>					Prepared & Analyzed: 01/29/21					
Biochemical Oxygen Demand	ND	1.0	1.0	mg/L						
<b>LCS (1A29072-BS1)</b>					Prepared & Analyzed: 01/29/21					
Biochemical Oxygen Demand	236	50	50	mg/L	198	119	85-115			Q-BOD2
<b>Duplicate (1A29072-DUP1)</b>					Source: C1A3311-01 Prepared & Analyzed: 01/29/21					
Biochemical Oxygen Demand	ND	20	20	mg/L	ND				20	
<b>Batch 1B05054 - Acid Digest</b>										
<b>Blank (1B05054-BLK1)</b>					Prepared & Analyzed: 02/05/21					
Chemical Oxygen Demand	ND	10	6.3	mg/L						
<b>LCS (1B05054-BS1)</b>					Prepared & Analyzed: 02/05/21					
Chemical Oxygen Demand	509	10	6.3	mg/L	500	102	95-105			
<b>Matrix Spike (1B05054-MS1)</b>					Source: C1B0396-01 Prepared & Analyzed: 02/05/21					
Chemical Oxygen Demand	502	13	8.4	mg/L	333	157	104	80-120		
<b>Matrix Spike Dup (1B05054-MSD1)</b>					Source: C1B0396-01 Prepared & Analyzed: 02/05/21					
Chemical Oxygen Demand	487	13	8.4	mg/L	333	157	99	80-120	3	20



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 7 of 8  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
Received on Ice (Y/N): Yes Temp: 4 °C

**Notes and Definitions**

- N-BOD1 Dilution water blank exceeds 0.20 mg/L. As per method, data is reportable as qualified.
- N-BOD2 The LCS is outside method acceptance limits. As per method, data is reportable as qualified.
- Q-BOD2 This LCS is outside method acceptance limits. As per method, data is reportable as qualified.
- ND: Analyte NOT DETECTED at or above the Method Detection Limit (**if MDL is reported**), otherwise at or above the Reportable Detection Limit (RDL)
- NR: Not Reported
- RDL: Reportable Detection Limit
- MDL: Method Detection Limit

\* / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

**Approval**

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

**Alexis Nicole Harold For Cindy A. Waddell**

cc:

e-Standard\_No Alias.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

*mailing*  
P.O Box 432  
Riverside, CA 92502-0432

*location*  
6100 Quail Valley Court  
Riverside, CA 92507-0704

P 951 653 3351  
F 951 653 1662  
www.babcocklabs.com

CA ELAP No. 2698  
EPA No. CA00102  
NELAP No. OR4035  
LACSD No. 10119



**BABCOCK Laboratories, Inc.**  
The Standard of Excellence for Over 100 Years

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 8 of 8  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3323**  
Received on Ice (Y/N): Yes Temp: 4 °C

**Babcock Laboratories, Inc.**  
(951)653-3351 FAX (951) 653-1662  
www.babcocklabs.com

**Chain of Custody Sample Information Record**

Client: Wood PLC		Contact: Garth Engelhorn		Phone No. (760) 644-0167	
FAX No.		Email: garth.engelhorn@altaenviron.com		Additional Reporting Requests	
Project Name: Lake Elsinore Project		Turn Around Time: Routine *3-5 Day *48 Hour *24 Hour Rush Rush Rush		Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Project Location: Salt Creek/San Jacinto/Canyon Lake		*Lab TAT Approval: By: _____		FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)	
Sampler Information		# of Containers & Preservatives		Matrix	
Name: <u>Garth Engelhorn</u>		Unpreserved		DW = Drinking Water	
Employer: <u>NVS</u>		H2SO4		GW = Groundwater	
Signature: <u>[Signature]</u>		HCl		WW = Wastewater	
Sample ID		HNO3		S = Source	
Date	Time	Na2S2O3		SG = Sludge	
		NaOH		L = Liquid	
		NaOH/ZnAcetate		M = Miscellaneous	
		NH4Cl			
		MCAA			
		Total # of Containers			
		Routine			
		Resample			
		Special			
		COD SM5220D			
		BOD SM5210B			
<u>S-03-012921</u>	<u>1/29/21 0330</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>X</u>
<u>S-03-012921-Dup</u>	<u>1/29/21 0330</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>X</u>
<u>S-03-012921-FB</u>	<u>1/29/21 0330</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>X</u>
<u>S-04-012921</u>	<u>1/29/21 0530</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>X</u>
Relinquished By (sign)		Print Name / Company		Date / Time	
<u>[Signature]</u>		<u>Garth Engelhorn/NVS</u>		<u>01/29/21 11:31</u>	
Received By (Sign)		Print Name / Company			
<u>[Signature]</u>		<u>B. Aococh</u>			
(For Lab Use Only) Sample Integrity Upon Receipt/Acceptance Criteria <u>TG#60</u>					
Sample(s) Submitted on Ice? <u>Yes</u> No		Sample Meets Laboratory Acceptance Criteria? <u>Yes</u> No			
Custody Seal(s) Intact? <u>Yes</u> No <u>N/A</u>		Permission to continue: <u>Yes</u> No			
Sample(s) Intact? <u>4</u> Yes No		Deviation/Notes: _____			
Temperature: _____ °C <input type="checkbox"/> Cooler: Blank		Signature/Date: _____			

**C1A3323**  
Rc'd: 01/29/2021 11:31  
JLH





**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 1 of 5  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3462**  
Received on Ice (Y/N): Yes Temp: 2 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

**Sample Identification**

<u>Lab Sample #</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>By</u>	<u>Date Submitted</u>	<u>By</u>
C1A3462-01	CLS-013021 ---ROUTINE---	Liquid	01/30/21 12:20	Garth Engelhorn	01/30/21 13:50	Jake D.



**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 2 of 5  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3462**  
Received on Ice (Y/N): Yes Temp: 2 °C

Laboratory Reference Number

**C1A3462-01**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
CLS-013021	Liquid	01/30/21 12:20	01/30/21 13:50

<b>Analyte(s)</b>	<b>Result</b>	<b>RDL</b>	<b>MDL</b>	<b>Units</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Flag</b>
Aggregate Organic Compounds								
Biochemical Oxygen Demand	ND	5.0	5.0	mg/L	SM 5210B	01/30/21 17:30	DSS	N-BOD1, N-BOD2
Chemical Oxygen Demand	37	10	7.4	mg/L	SM5220D	02/06/21 14:40	SLL	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 3 of 5  
 Project Name: Stormwater  
 Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3462**  
 Received on Ice (Y/N): Yes Temp: 2 °C

**Aggregate Organic Compounds - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1A30021 - Analyzed as received</b>										
<b>Blank (1A30021-BLK1)</b>					Prepared & Analyzed: 01/30/21					
Biochemical Oxygen Demand	ND	1.0	1.0	mg/L						
<b>LCS (1A30021-BS1)</b>					Prepared & Analyzed: 01/30/21					
Biochemical Oxygen Demand	251	50	50	mg/L	198	127	85-115			Q-BOD2
<b>Duplicate (1A30021-DUP1)</b>					<b>Source: C1A3408-05</b> Prepared & Analyzed: 01/30/21					
Biochemical Oxygen Demand	13.9	5.0	5.0	mg/L	14.0			0.9	20	
<b>Batch 1B06017 - Acid Digest</b>										
<b>Blank (1B06017-BLK1)</b>					Prepared & Analyzed: 02/06/21					
Chemical Oxygen Demand	ND	10	7.4	mg/L						
<b>LCS (1B06017-BS1)</b>					Prepared & Analyzed: 02/06/21					
Chemical Oxygen Demand	507	10	7.4	mg/L	500	101	95-105			
<b>Matrix Spike (1B06017-MS1)</b>					<b>Source: C1B0194-02</b> Prepared & Analyzed: 02/06/21					
Chemical Oxygen Demand	377	13	9.9	mg/L	333	36.9	102	80-120		
<b>Matrix Spike Dup (1B06017-MSD1)</b>					<b>Source: C1B0194-02</b> Prepared & Analyzed: 02/06/21					
Chemical Oxygen Demand	368	13	9.9	mg/L	333	36.9	99	80-120	2	20



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 4 of 5  
Project Name: Stormwater  
Project Number: Stormwater

Report Date: 24-Feb-2021

**Work Order Number: C1A3462**  
Received on Ice (Y/N): Yes Temp: 2 °C

**Notes and Definitions**

- N-BOD1 Dilution water blank exceeds 0.20 mg/L. As per method, data is reportable as qualified.
- N-BOD2 The LCS is outside method acceptance limits. As per method, data is reportable as qualified.
- Q-BOD2 This LCS is outside method acceptance limits. As per method, data is reportable as qualified.
- ND: Analyte NOT DETECTED at or above the Method Detection Limit (**if MDL is reported**), otherwise at or above the Reportable Detection Limit (RDL)
- NR: Not Reported
- RDL: Reportable Detection Limit
- MDL: Method Detection Limit

\* / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

**Approval**

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

**Alexis Nicole Harold For Cindy A. Waddell**

cc:

e-Standard\_No Alias.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

*mailing*  
P.O Box 432  
Riverside, CA 92502-0432

*location*  
6100 Quail Valley Court  
Riverside, CA 92507-0704

P 951 653 3351  
F 951 653 1662  
www.babcocklabs.com

CA ELAP No. 2698  
EPA No. CA00102  
NELAP No. OR4035  
LACSD No. 10119





# BABCOCK Laboratories, Inc.

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 1 of 17  
Project Name: Stormwater  
Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
Received on Ice (Y/N): Yes Temp: 3 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

### Sample Identification

<u>Lab Sample #</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>By</u>	<u>Date Submitted</u>	<u>By</u>
C1B0159-01	S-03-013121	Liquid	01/31/21 16:50	Austin Kay	02/01/21 13:25	Jake D.
C1B0159-02	S-03-013121-DUP	Liquid	01/31/21 16:50	Austin Kay	02/01/21 13:25	Jake D.
C1B0159-03	S-03-020121-FB	Liquid	02/1/21 10:35	Austin Kay	02/01/21 13:25	Jake D.
C1B0159-04	S-04-013121	Liquid	01/31/21 15:49	Austin Kay	02/01/21 13:25	Jake D.
C1B0159-05	CLS-020121	Liquid	02/1/21 10:27	Austin Kay	02/01/21 13:25	Jake D.



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 2 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

Laboratory Reference Number

**C1B0159-01**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-03-013121	Liquid	01/31/21 16:50	02/01/21 13:25

<u>Analyte(s)</u>	<u>Result</u>	<u>RDL</u>	<u>MDL</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date</u>	<u>Analyst</u>	<u>Flag</u>
<b>Cations</b>								
Total Hardness	170	3.0	3.0	mg/L	SM 2340B/EPA 200.7	02/09/21 19:23	AZP	
Calcium	43	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:23	AZP	
Magnesium	15	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:23	AZP	
<b>Anions</b>								
Nitrate as N	0.57	0.20	0.16	mg/L	EPA 300.0	02/01/21 23:27	KJN	
Nitrite as N	ND	0.1	0.09	mg/L	EPA 300.0	02/01/21 23:27	KJN	
<b>Solids</b>								
Total Dissolved Solids	440	10	10	mg/L	SM 2540C	02/03/21 09:22	YVD	
Total Suspended Solids	65	0.5	0.5	mg/L	SM 2540D	02/04/21 08:47	KJN	
<b>Aggregate Organic Compounds</b>								
Biochemical Oxygen Demand	ND	10	10	mg/L	SM 5210B	02/01/21 20:52	KL	
Chemical Oxygen Demand	51	10	7.4	mg/L	SM5220D	02/08/21 13:30	SLL	
<b>Nutrients</b>								
Ammonia-Nitrogen	0.2	0.1	0.04	mg/L	SM4500NH3H G	02/05/21 13:17	SLL	
Kjeldahl Nitrogen	1.8	0.1	0.09	mg/L	EPA 351.2	02/06/21 11:50	SLL	
Organic Nitrogen	1.6	0.10		mg/L	Calculation			
Total Nitrogen	2.4	0.40		mg/L	Calculation			
Ortho Phosphate Phosphorus	0.21	0.050	0.030	mg/L	EPA 300.0	02/01/21 23:27	KJN	
Total Phosphorus	0.53	0.05	0.02	mg/L	SM 4500P B E	02/08/21 18:30	DSS	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 3 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

Laboratory Reference Number

**C1B0159-02**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-03-013121-DUP	Liquid	01/31/21 16:50	02/01/21 13:25

<u>Analyte(s)</u>	<u>Result</u>	<u>RDL</u>	<u>MDL</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date</u>	<u>Analyst</u>	<u>Flag</u>
<b>Cations</b>								
Total Hardness	170	3.0	3.0	mg/L	SM 2340B/EPA 200.7	02/09/21 19:29	AZP	
Calcium	41	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:29	AZP	
Magnesium	15	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:29	AZP	
<b>Anions</b>								
Nitrate as N	0.57	0.20	0.16	mg/L	EPA 300.0	02/01/21 23:39	KJN	
Nitrite as N	ND	0.1	0.09	mg/L	EPA 300.0	02/01/21 23:39	KJN	
<b>Solids</b>								
Total Dissolved Solids	440	10	10	mg/L	SM 2540C	02/03/21 09:22	YVD	
Total Suspended Solids	67	0.5	0.5	mg/L	SM 2540D	02/04/21 08:47	KJN	
<b>Aggregate Organic Compounds</b>								
Biochemical Oxygen Demand	ND	10	10	mg/L	SM 5210B	02/01/21 20:57	KL	
Chemical Oxygen Demand	51	10	7.4	mg/L	SM5220D	02/08/21 13:30	SLL	
<b>Nutrients</b>								
Ammonia-Nitrogen	0.2	0.1	0.04	mg/L	SM4500NH3H G	02/05/21 13:19	SLL	
Kjeldahl Nitrogen	2.1	0.1	0.09	mg/L	EPA 351.2	02/06/21 11:51	SLL	
Organic Nitrogen	1.9	0.10		mg/L	Calculation			
Total Nitrogen	2.6	0.40		mg/L	Calculation			
Ortho Phosphate Phosphorus	0.21	0.050	0.030	mg/L	EPA 300.0	02/01/21 23:39	KJN	
Total Phosphorus	0.46	0.05	0.02	mg/L	SM 4500P B E	02/04/21 19:25	DSS	





# BABCOCK Laboratories, Inc.

The Standard of Excellence for Over 100 Years

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 4 of 17  
Project Name: Stormwater  
Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

Work Order Number: **C1B0159**  
Received on Ice (Y/N): Yes Temp: 3 °C

### Laboratory Reference Number

## C1B0159-03

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
S-03-020121-FB	Liquid	02/01/21 10:35	02/01/21 13:25

Analyte(s)	Result	RDL	MDL	Units	Method	Analysis Date	Analyst	Flag
<b>Cations</b>								
Total Hardness	ND	3.0	3.0	mg/L	SM 2340B/EPA 200.7	02/09/21 19:31	AZP	
Calcium	ND	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:31	AZP	
Magnesium	ND	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:31	AZP	
<b>Anions</b>								
Nitrate as N	ND	0.20	0.16	mg/L	EPA 300.0	02/01/21 23:51	KJN	
Nitrite as N	ND	0.1	0.09	mg/L	EPA 300.0	02/01/21 23:51	KJN	
<b>Solids</b>								
Total Dissolved Solids	ND	10	10	mg/L	SM 2540C	02/04/21 14:09	AMB	
Total Suspended Solids	ND	2	2	mg/L	SM 2540D	02/04/21 11:52	KJN	
<b>Aggregate Organic Compounds</b>								
Biochemical Oxygen Demand	ND	5.0	5.0	mg/L	SM 5210B	02/01/21 21:00	KL	
Chemical Oxygen Demand	ND	10	7.4	mg/L	SM5220D	02/08/21 13:30	SLL	
<b>Nutrients</b>								
Ammonia-Nitrogen	ND	0.1	0.04	mg/L	SM4500NH3H G	02/05/21 13:20	SLL	
Kjeldahl Nitrogen	ND	0.1	0.09	mg/L	EPA 351.2	02/06/21 11:53	SLL	
Organic Nitrogen	ND	0.10		mg/L	Calculation			
Total Nitrogen	ND	0.40		mg/L	Calculation			
Ortho Phosphate Phosphorus	ND	0.050	0.030	mg/L	EPA 300.0	02/01/21 23:51	KJN	
Total Phosphorus	ND	0.05	0.02	mg/L	SM 4500P B E	02/04/21 19:25	DSS	



**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 5 of 17  
Project Name: Stormwater  
Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
Received on Ice (Y/N): Yes Temp: 3 °C

Laboratory Reference Number

**C1B0159-04**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
S-04-013121	Liquid	01/31/21 15:49	02/01/21 13:25

<u>Analyte(s)</u>	<u>Result</u>	<u>RDL</u>	<u>MDL</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date</u>	<u>Analyst</u>	<u>Flag</u>
<b>Cations</b>								
Total Hardness	85	3.0	3.0	mg/L	SM 2340B/EPA 200.7	02/11/21 13:13	AZP	
Calcium	22	1.0	0.40	mg/L	EPA 200.7	02/11/21 13:13	AZP	
Magnesium	7.0	1.0	0.40	mg/L	EPA 200.7	02/11/21 13:13	AZP	
<b>Anions</b>								
Nitrate as N	0.60	0.20	0.16	mg/L	EPA 300.0	02/02/21 00:04	KJN	
Nitrite as N	ND	0.1	0.09	mg/L	EPA 300.0	02/02/21 00:04	KJN	
<b>Solids</b>								
Total Dissolved Solids	120	10	10	mg/L	SM 2540C	02/04/21 14:09	AMB	
Total Suspended Solids	170	0.5	0.5	mg/L	SM 2540D	02/04/21 08:47	KJN	
<b>Aggregate Organic Compounds</b>								
Biochemical Oxygen Demand	ND	10	10	mg/L	SM 5210B	02/01/21 21:06	KL	
Chemical Oxygen Demand	53	10	7.4	mg/L	SM5220D	02/06/21 14:40	SLL	
<b>Nutrients</b>								
Ammonia-Nitrogen	0.08	0.1	0.04	mg/L	SM4500NH3H G	02/05/21 13:26	SLL	J
Kjeldahl Nitrogen	1.4	0.1	0.09	mg/L	EPA 351.2	02/06/21 11:54	SLL	
Organic Nitrogen	1.3	0.10		mg/L	Calculation			
Total Nitrogen	2.0	0.40		mg/L	Calculation			
Ortho Phosphate Phosphorus	0.17	0.050	0.030	mg/L	EPA 300.0	02/02/21 00:04	KJN	
Total Phosphorus	0.56	0.05	0.02	mg/L	SM 4500P B E	02/04/21 19:25	DSS	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 6 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

Laboratory Reference Number

**C1B0159-05**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
CLS-020121	Liquid	02/01/21 10:27	02/01/21 13:25

<u>Analyte(s)</u>	<u>Result</u>	<u>RDL</u>	<u>MDL</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date</u>	<u>Analyst</u>	<u>Flag</u>
<b>Cations</b>								
Total Hardness	230	3.0	3.0	mg/L	SM 2340B/EPA 200.7	02/09/21 19:35	AZP	
Calcium	62	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:35	AZP	
Magnesium	18	1.0	0.40	mg/L	EPA 200.7	02/09/21 19:35	AZP	
<b>Anions</b>								
Nitrate as N	0.41	0.20	0.16	mg/L	EPA 300.0	02/02/21 00:16	KJN	
Nitrite as N	ND	0.1	0.09	mg/L	EPA 300.0	02/02/21 00:16	KJN	
<b>Solids</b>								
Total Dissolved Solids	430	10	10	mg/L	SM 2540C	02/04/21 14:09	AMB	
Total Suspended Solids	2	2	2	mg/L	SM 2540D	02/04/21 11:52	KJN	
<b>Aggregate Organic Compounds</b>								
Biochemical Oxygen Demand	ND	5.0	5.0	mg/L	SM 5210B	02/01/21 21:09	KL	
Chemical Oxygen Demand	21	10	7.4	mg/L	SM5220D	02/06/21 14:40	SLL	
<b>Nutrients</b>								
Ammonia-Nitrogen	0.5	0.1	0.04	mg/L	SM4500NH3H G	02/05/21 13:28	SLL	
Kjeldahl Nitrogen	1.7	0.1	0.09	mg/L	EPA 351.2	02/06/21 11:58	SLL	
Organic Nitrogen	1.2	0.10		mg/L	Calculation			
Total Nitrogen	2.1	0.40		mg/L	Calculation			
Ortho Phosphate Phosphorus	ND	0.050	0.030	mg/L	EPA 300.0	02/02/21 00:16	KJN	
Total Phosphorus	0.07	0.05	0.02	mg/L	SM 4500P B E	02/04/21 19:25	DSS	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 7 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Cations - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B05066 - EPA 200.2</b>										
<b>Blank (1B05066-BLK1)</b> Prepared: 02/05/21 Analyzed: 02/09/21										
Calcium	ND	1.0	0.20	mg/L						
Magnesium	ND	1.0	0.20	mg/L						
<b>LCS (1B05066-BS1)</b> Prepared: 02/05/21 Analyzed: 02/09/21										
Calcium	17.4	1.0	0.20	mg/L	17.0	102	85-115			
Magnesium	16.4	1.0	0.20	mg/L	17.0	96	85-115			
<b>Matrix Spike (1B05066-MS1)</b> Source: C1B0082-02 Prepared: 02/05/21 Analyzed: 02/09/21										
Calcium	23.8	1.0	0.40	mg/L	17.0	3.15	121	70-130		
Magnesium	17.1	1.0	0.40	mg/L	17.0	ND	101	70-130		
<b>Matrix Spike Dup (1B05066-MSD1)</b> Source: C1B0082-02 Prepared: 02/05/21 Analyzed: 02/09/21										
Calcium	23.8	1.0	0.40	mg/L	17.0	3.15	121	70-130	0.1	20
Magnesium	17.2	1.0	0.40	mg/L	17.0	ND	101	70-130	0.8	20
<b>Batch 1B10111 - EPA 200.2</b>										
<b>Blank (1B10111-BLK1)</b> Prepared: 02/05/21 Analyzed: 02/11/21										
Calcium	ND	1.0	0.20	mg/L						
Magnesium	ND	1.0	0.20	mg/L						
<b>LCS (1B10111-BS1)</b> Prepared: 02/05/21 Analyzed: 02/11/21										
Calcium	18.4	1.0	0.20	mg/L	17.0	109	85-115			
Magnesium	18.1	1.0	0.20	mg/L	17.0	106	85-115			



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 8 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Anions - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B01137 - Analyzed as Received IC</b>										
<b>Blank (1B01137-BLK1)</b>				Prepared & Analyzed: 02/01/21						
Nitrite as N	ND	0.1	0.09	mg/L						
Nitrate as N	ND	0.20	0.16	mg/L						
<b>LCS (1B01137-BS1)</b>				Prepared & Analyzed: 02/01/21						
Nitrite as N	2.48	0.1	0.09	mg/L	2.50	99	90-110			
Nitrate as N	5.43	0.20	0.16	mg/L	5.65	96	90-110			
<b>Matrix Spike (1B01137-MS1)</b>				<b>Source: C1B0032-02</b>		Prepared & Analyzed: 02/01/21				
Nitrite as N	2.39	0.1	0.09	mg/L	2.50	ND	96	80-120		
Nitrate as N	6.60	0.20	0.16	mg/L	5.65	0.781	103	75-131		
<b>Matrix Spike (1B01137-MS2)</b>				<b>Source: C1B0042-01</b>		Prepared & Analyzed: 02/01/21				
Nitrite as N	2.55	0.1	0.09	mg/L	2.50	ND	102	80-120		
Nitrate as N	5.75	0.20	0.16	mg/L	5.65	0.191	98	75-131		
<b>Matrix Spike Dup (1B01137-MSD1)</b>				<b>Source: C1B0032-02</b>		Prepared & Analyzed: 02/01/21				
Nitrite as N	2.42	0.1	0.09	mg/L	2.50	ND	97	80-120	1	20
Nitrate as N	6.68	0.20	0.16	mg/L	5.65	0.781	104	75-131	1	20



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 9 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Solids - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B03073 - Analyzed as received</b>										
<b>Blank (1B03073-BLK1)</b> Prepared & Analyzed: 02/03/21										
Total Dissolved Solids	ND	10	10	mg/L						
<b>Duplicate (1B03073-DUP1)</b> Source: C1A3408-07 Prepared & Analyzed: 02/03/21										
Total Dissolved Solids	126	10	10	mg/L	124			2	20	
<b>Duplicate (1B03073-DUP2)</b> Source: C1B0159-02 Prepared & Analyzed: 02/03/21										
Total Dissolved Solids	443	10	10	mg/L	441			0.5	20	
<b>Batch 1B04069 - Analyzed as received</b>										
<b>Blank (1B04069-BLK1)</b> Prepared & Analyzed: 02/04/21										
Total Dissolved Solids	ND	10	10	mg/L						
<b>Duplicate (1B04069-DUP1)</b> Source: C1B0084-03 Prepared & Analyzed: 02/04/21										
Total Dissolved Solids	398	10	10	mg/L	418			5	20	
<b>Duplicate (1B04069-DUP2)</b> Source: C1B0104-01 Prepared & Analyzed: 02/04/21										
Total Dissolved Solids	619	10	10	mg/L	586			5	20	
<b>Batch 1B04073 - Analyzed as received</b>										
<b>Blank (1B04073-BLK1)</b> Prepared & Analyzed: 02/04/21										
Total Suspended Solids	ND	0.5	0.5	mg/L						
<b>Duplicate (1B04073-DUP1)</b> Source: C1B0014-01 Prepared & Analyzed: 02/04/21										
Total Suspended Solids	164	0.5	0.5	mg/L	160			2	25	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 10 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Solids - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B04073 - Analyzed as received</b>										
<b>Duplicate (1B04073-DUP2)</b>		<b>Source: C1B0036-01</b>			Prepared & Analyzed: 02/04/21					
Total Suspended Solids	228	0.5	0.5	mg/L	228			0	25	
<b>Batch 1B04074 - Analyzed as received</b>										
<b>Blank (1B04074-BLK1)</b>		Prepared & Analyzed: 02/04/21								
Total Suspended Solids	ND	0.5	0.5	mg/L						
<b>Duplicate (1B04074-DUP1)</b>		<b>Source: C1B0049-02</b>			Prepared & Analyzed: 02/04/21					
Total Suspended Solids	420	20	20	mg/L	412			2	25	
<b>Duplicate (1B04074-DUP2)</b>		<b>Source: C1B0166-01</b>			Prepared & Analyzed: 02/04/21					
Total Suspended Solids	ND	5	5	mg/L	ND				25	



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 11 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Aggregate Organic Compounds - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B01147 - Analyzed as received</b>										
<b>Blank (1B01147-BLK1)</b> Prepared & Analyzed: 02/01/21										
Biochemical Oxygen Demand	ND	1.0	1.0	mg/L						
<b>LCS (1B01147-BS1)</b> Prepared & Analyzed: 02/01/21										
Biochemical Oxygen Demand	218	50	50	mg/L	198	110	85-115			
<b>Duplicate (1B01147-DUP1)</b> Source: C1B0159-01 Prepared & Analyzed: 02/01/21										
Biochemical Oxygen Demand	ND	10	10	mg/L	ND				20	
<b>Batch 1B06017 - Acid Digest</b>										
<b>Blank (1B06017-BLK1)</b> Prepared & Analyzed: 02/06/21										
Chemical Oxygen Demand	ND	10	7.4	mg/L						
<b>LCS (1B06017-BS1)</b> Prepared & Analyzed: 02/06/21										
Chemical Oxygen Demand	507	10	7.4	mg/L	500	101	95-105			
<b>Matrix Spike (1B06017-MS1)</b> Source: C1B0194-02 Prepared & Analyzed: 02/06/21										
Chemical Oxygen Demand	377	13	9.9	mg/L	333	36.9	102	80-120		
<b>Matrix Spike Dup (1B06017-MSD1)</b> Source: C1B0194-02 Prepared & Analyzed: 02/06/21										
Chemical Oxygen Demand	368	13	9.9	mg/L	333	36.9	99	80-120	2	20
<b>Batch 1B08111 - Acid Digest</b>										
<b>Blank (1B08111-BLK1)</b> Prepared & Analyzed: 02/08/21										
Chemical Oxygen Demand	ND	10	7.4	mg/L						





**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 12 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Aggregate Organic Compounds - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B08111 - Acid Digest</b>										
<b>LCS (1B08111-BS1)</b>										
Prepared & Analyzed: 02/08/21										
Chemical Oxygen Demand	500	10	7.4	mg/L	500	100	95-105			
<b>Matrix Spike (1B08111-MS1)</b>										
<b>Source: C1B0159-03</b> Prepared & Analyzed: 02/08/21										
Chemical Oxygen Demand	325	13	9.9	mg/L	333	ND	97	80-120		
<b>Matrix Spike Dup (1B08111-MSD1)</b>										
<b>Source: C1B0159-03</b> Prepared & Analyzed: 02/08/21										
Chemical Oxygen Demand	328	13	9.9	mg/L	333	ND	98	80-120	0.9	20



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 13 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Nutrients - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B01137 - Analyzed as Received IC</b>										
<b>Blank (1B01137-BLK1)</b> Prepared & Analyzed: 02/01/21										
Ortho Phosphate Phosphorus	ND	0.050	0.030	mg/L						
<b>LCS (1B01137-BS1)</b> Prepared & Analyzed: 02/01/21										
Ortho Phosphate Phosphorus	1.13	0.050	0.030	mg/L	1.25	91	90-110			
<b>Matrix Spike (1B01137-MS1)</b> Source: C1B0032-02 Prepared & Analyzed: 02/01/21										
Ortho Phosphate Phosphorus	3.03	0.050	0.030	mg/L	1.25	1.54	119	80-120		
<b>Matrix Spike (1B01137-MS2)</b> Source: C1B0042-01 Prepared & Analyzed: 02/01/21										
Ortho Phosphate Phosphorus	1.39	0.050	0.030	mg/L	1.25	0.219	94	80-120		
<b>Matrix Spike Dup (1B01137-MSD1)</b> Source: C1B0032-02 Prepared & Analyzed: 02/01/21										
Ortho Phosphate Phosphorus	3.05	0.050	0.030	mg/L	1.25	1.54	121	80-120	0.5	20 QMS(D)
<b>Batch 1B04123 - Acid Digest</b>										
<b>LCS (1B04123-BS1)</b> Prepared & Analyzed: 02/04/21										
Total Phosphorus	0.548	0.05	0.02	mg/L	0.500		110	85-115		
<b>Matrix Spike (1B04123-MS1)</b> Source: C1A3318-02 Prepared & Analyzed: 02/04/21										
Total Phosphorus	0.582	0.05	0.02	mg/L	0.500	0.0948	98	80-120		
<b>Matrix Spike Dup (1B04123-MSD1)</b> Source: C1A3318-02 Prepared & Analyzed: 02/04/21										
Total Phosphorus	0.565	0.05	0.02	mg/L	0.500	0.0948	94	80-120	3	20
<b>Batch 1B05029 - Analyzed as received</b>										
<b>Blank (1B05029-BLK1)</b> Prepared & Analyzed: 02/05/21										
Ammonia-Nitrogen	ND	0.05	0.03	mg/L						



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
 Contact: John Rudolph  
 Address: 9210 Sky Park Court #200  
 San Diego, CA 92123

Analytical Report: Page 14 of 17  
 Project Name: Stormwater  
 Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
 Received on Ice (Y/N): Yes Temp: 3 °C

**Nutrients - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B05029 - Analyzed as received</b>										
<b>LCS (1B05029-BS1)</b>				Prepared & Analyzed: 02/05/21						
Ammonia-Nitrogen	1.03	0.05	0.03	mg/L	1.00	103	90-110			
<b>Matrix Spike (1B05029-MS1)</b>				Source: C1A3328-01 Prepared & Analyzed: 02/05/21						
Ammonia-Nitrogen	1.18	0.05	0.03	mg/L	1.00	0.167	102	80-120		
<b>Matrix Spike Dup (1B05029-MSD1)</b>				Source: C1A3328-01 Prepared & Analyzed: 02/05/21						
Ammonia-Nitrogen	1.21	0.05	0.03	mg/L	1.00	0.167	104	80-120	2	20
<b>Batch 1B05081 - Acid Digest</b>										
<b>Blank (1B05081-BLK1)</b>				Prepared & Analyzed: 02/06/21						
Kjeldahl Nitrogen	ND	0.1	0.09	mg/L						
<b>LCS (1B05081-BS1)</b>				Prepared & Analyzed: 02/06/21						
Kjeldahl Nitrogen	1.11	0.1	0.09	mg/L	1.00	111	80-120			
<b>Matrix Spike (1B05081-MS1)</b>				Source: C1B0455-02 Prepared & Analyzed: 02/06/21						
Kjeldahl Nitrogen	7.86	0.4	0.4	mg/L	4.00	4.27	90	42-154		
<b>Matrix Spike Dup (1B05081-MSD1)</b>				Source: C1B0455-02 Prepared & Analyzed: 02/06/21						
Kjeldahl Nitrogen	7.60	0.4	0.4	mg/L	4.00	4.27	83	42-154	3	25
<b>Batch 1B08130 - Acid Digest</b>										
<b>LCS (1B08130-BS1)</b>				Prepared & Analyzed: 02/08/21						
Total Phosphorus	0.542	0.05	0.02	mg/L	0.500	108	85-115			



**BABCOCK Laboratories, Inc.**

*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 15 of 17  
Project Name: Stormwater  
Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
Received on Ice (Y/N): Yes Temp: 3 °C

**Nutrients - Batch Quality Control**

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 1B08130 - Acid Digest</b>										
<b>Matrix Spike (1B08130-MS1)</b>				<b>Source: C1A3456-01</b>		Prepared & Analyzed: 02/08/21				
Total Phosphorus	0.783	0.05	0.02	mg/L	0.500	0.224	112	80-120		
<b>Matrix Spike Dup (1B08130-MSD1)</b>				<b>Source: C1A3456-01</b>		Prepared & Analyzed: 02/08/21				
Total Phosphorus	0.769	0.05	0.02	mg/L	0.500	0.224	109	80-120	2	20



**BABCOCK Laboratories, Inc.**  
*The Standard of Excellence for Over 100 Years*

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123

Analytical Report: Page 16 of 17  
Project Name: Stormwater  
Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
Received on Ice (Y/N): Yes Temp: 3 °C

**Notes and Definitions**

J Estimated value

QMS(D) Matrix spike recovery was out of acceptance criteria. Precision and accuracy demonstrated by remaining matrix spike results.

ND: Analyte NOT DETECTED at or above the Method Detection Limit (**if MDL is reported**), otherwise at or above the Reportable Detection Limit (RDL)

NR: Not Reported

RDL: Reportable Detection Limit

MDL: Method Detection Limit

\* / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

---

**Approval**

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

**Cindy A. Waddell**

cc:

e-Standard\_No Alias.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

*mailing*  
P.O Box 432  
Riverside, CA 92502-0432

*location*  
6100 Quail Valley Court  
Riverside, CA 92507-0704

P 951 653 3351  
F 951 653 1662  
www.babcocklabs.com

CA ELAP No. 2698  
EPA No. CA00102  
NELAP No. OR4035  
LACSD No. 10119



**BABCOCK Laboratories, Inc.**  
The Standard of Excellence for Over 100 Years

Client Name: Wood Environment&Infrastructure Solutions, In  
Contact: John Rudolph  
Address: 9210 Sky Park Court #200  
San Diego, CA 92123


Analytical Report: Page 17 of 17  
Project Name: Stormwater  
Project Number: Lake Elsinore Project

Report Date: 02-Mar-2021

**Work Order Number: C1B0159**  
Received on Ice (Y/N): Yes Temp: 3 °C

**Babcock Laboratories, Inc.**  
(951)653-3351 FAX (951) 653-1662  
www.babcocklabs.com

**Chain of Custody Sample Information Record**

Client: Wood PLC		Contact: Garth Engelhorn		Phone No. (760) 644-0167											
FAX No.		Email: garth.engelhorn@altaenviron.com		Additional Reporting Requests Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)											
Project Name: Lake Elsinore Project		Turn Around Time: Routine *3-5 Day *48 Hour *24 Hour Rush Rush Rush													
Project Location: Salt Creek/San Jacinto/Canyon Lake		*Lab TAT Approval: By: _____		*Additional Charges May Apply											
Sampler Information			# of Containers & Preservatives			Sample Type	Analysis Requested	Matrix	Notes						
Sample ID	Date	Time	Unpreserved	H2SO4	HCl					HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA
Name: <u>Austin Kay</u>						Total # of Containers	Routine	Resample	Special	See attached list	DW = Drinking Water		*BOD, COD, TN, Nitrogen-Organic, Hardness, Phos Ortho, Total Phos, TDS, TSS *analysis per PMA per client JLH 2/1/2021		
Employer: <u>NV5</u>															
Signature: <u>[Signature]</u>														WW = Wastewater	
														S = Source	
S-03-013121			1/21/21 16:30			3	X	X						SG = Sludge	
S-03-013121-DUP			1/31/21 16:50			3	X	X						L = Liquid	
S-03-020121-FB			2/1/21 10:35			3	X	X						M = Miscellaneous	
S-04-013121			1/31/21 15:49			3	X	X							
CL5-020121			2/1/21 10:27			3	X	X							
Relinquished By (sign)		Print Name / Company		Date / Time		Received By (Sign)		Print Name / Company							
<u>[Signature]</u>		Austin Kay / NV5		2/1/21 12:25		<u>[Signature]</u>		Garth Engelhorn							
<u>[Signature]</u>		JACK DAVIS / NV5		2/1/21 13:25		<u>[Signature]</u>		Garth Engelhorn							
(For Lab Use Only) Sample Integrity Upon Receipt/Acceptance Criteria												<div style="border: 1px solid black; padding: 5px;"> <p><b>C1B0159</b></p> <p>Rc'd: 02/01/2021 13:25</p> <p>JLH</p>  </div>			
Sample(s) Submitted on Ice? <input checked="" type="radio"/> Yes <input type="radio"/> No			Sample Meets Laboratory Acceptance Criteria? <input checked="" type="radio"/> Yes <input type="radio"/> No												
Custody Seal(s) Intact? <input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A			Permission to continue: <input type="radio"/> Yes <input type="radio"/> No												
Sample(s) Intact? <input checked="" type="radio"/> Yes <input type="radio"/> No			Deviation/Notes: _____												
Temperature: <u>3</u> °C <input type="checkbox"/> Color Blank			Signature/Date: _____												

Work Orders: 1C11057

Project: Lake Elsinore and Canyon Lake Nutrient TMDL

Attn: John Rudolph

Client: Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

Report Date: 3/25/2021

Received Date: 3/11/2021

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 278-5300

P.O. #: C015101084

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 3/11/21 with the Chain-of-Custody document. The samples were received in good condition, at 3.6 °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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** Lake Elsinore and Canyon Lake Nutrient  
TMDL

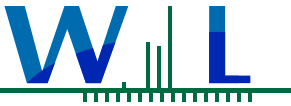
**Reported:**  
03/25/2021 08:38

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-031021	Austin Kay	1C11057-01	Water	03/10/21 17:00	
S-04-031121	Austin Kay	1C11057-02	Water	03/11/21 05:40	
CLS-031121	Austin Kay	1C11057-03	Water	03/11/21 10:07	





WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/25/2021 08:38

## Sample Results

Sample: S-03-031021  
1C11057-01 (Water) Sampled: 03/10/21 17:00 by Austin Kay

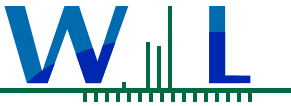
Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 410.4				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1C0900		<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/15/21 11:07		<b>Analyst:</b> ssi	
<b>Chemical Oxygen Demand</b>	45	2.9	5.0	mg/l	1	03/16/21	
<b>Method:</b> SM 5210B				<b>Instr:</b> PH13			
<b>Batch ID:</b> W1C0737		<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/11/21 11:56		<b>Analyst:</b> SSI/LHN	
<b>Biochemical Oxygen Demand</b>	6.3	2.0	2.0	mg/l	1	03/16/21	

Sample: S-04-031121  
1C11057-02 (Water) Sampled: 03/11/21 5:40 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 410.4				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1C0900		<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/15/21 11:07		<b>Analyst:</b> ssi	
<b>Chemical Oxygen Demand</b>	40	2.9	5.0	mg/l	1	03/16/21	
<b>Method:</b> SM 5210B				<b>Instr:</b> PH13			
<b>Batch ID:</b> W1C0737		<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/11/21 11:56		<b>Analyst:</b> SSI/LHN	
<b>Biochemical Oxygen Demand</b>	7.9	2.0	2.0	mg/l	1	03/16/21	

Sample: CLS-031121  
1C11057-03 (Water) Sampled: 03/11/21 10:07 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 410.4				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1C0900		<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/15/21 11:07		<b>Analyst:</b> ssi	
<b>Chemical Oxygen Demand</b>	19	2.9	5.0	mg/l	1	03/16/21	
<b>Method:</b> SM 5210B				<b>Instr:</b> PH13			
<b>Batch ID:</b> W1C0737		<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/11/21 11:56		<b>Analyst:</b> SSI/LHN	
<b>Biochemical Oxygen Demand</b>	3.2	2.0	2.0	mg/l	1	03/16/21	



WECK LABORATORIES, INC.

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL

**Reported:**  
 03/25/2021 08:38

**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	Limits	RPD	Limit	Qualifier
<b>Batch: W1C0737 - SM 5210B</b>											
<b>Blank (W1C0737-BLK1)</b> Prepared: 03/11/21 Analyzed: 03/16/21											
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
<b>Blank (W1C0737-BLK2)</b> Prepared: 03/11/21 Analyzed: 03/16/21											
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
<b>LCS (W1C0737-BS1)</b> Prepared: 03/11/21 Analyzed: 03/16/21											
Biochemical Oxygen Demand	170	2.0	2.0	mg/l	198		86	85-115			
<b>Duplicate (W1C0737-DUP1)</b> Source: 1C10130-02 Prepared: 03/11/21 Analyzed: 03/16/21											
Biochemical Oxygen Demand	3.40	2.0	2.0	mg/l		3.23			5	20	
<b>Batch: W1C0900 - EPA 410.4</b>											
<b>Blank (W1C0900-BLK1)</b> Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	ND	2.9	5.0	mg/l							
<b>LCS (W1C0900-BS1)</b> Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	943	2.9	5.0	mg/l	1000		94	90-110			
<b>Duplicate (W1C0900-DUP1)</b> Source: 1C09008-01 Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	9140	57	100	mg/l		9010			1	15	
<b>Matrix Spike (W1C0900-MS1)</b> Source: 0I04002-02 Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	217	11	20	mg/l	200	14.2	101	90-110			
<b>Matrix Spike (W1C0900-MS2)</b> Source: 1C12047-01 Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	2310	11	20	mg/l	2000	246	103	90-110			
<b>Matrix Spike Dup (W1C0900-MSD1)</b> Source: 0I04002-02 Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	214	11	20	mg/l	200	14.2	100	90-110	1	15	
<b>Matrix Spike Dup (W1C0900-MSD2)</b> Source: 1C12047-01 Prepared: 03/15/21 Analyzed: 03/16/21											
Chemical Oxygen Demand	2310	11	20	mg/l	2000	246	103	90-110	0	15	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient  
TMDL  
**Project Manager:** John Rudolph

**Reported:**  
03/25/2021 08:38



## Notes and Definitions

Item	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.

**Work Orders:** 1C12072

**Report Date:** 4/05/2021

**Project:** Lake Elsinore and Canyon Lake Nutrient TMDL

**Received Date:** 3/12/2021

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 278-5300

**P.O. #:** C015101084

**Attn:** John Rudolph

**Billing Code:**

**Client:** Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 3/12/21 with the Chain-of-Custody document. The samples were received in good condition, at 2.7 °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:**



Chris Samatmanakit  
Project Manager





# Certificate of Analysis

FINAL REPORT

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient  
TMDL

**Reported:**  
04/05/2021 12:19

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-04-031221	Austin Kay	1C12072-01	Water	03/12/21 09:45	
S-03-031221	Austin Kay	1C12072-02	Water	03/12/21 10:45	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:19

## Sample Results

Sample: S-04-031221  
1C12072-01 (Water) Sampled: 03/12/21 9:45 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Anions by IC, EPA Method 300.0</b>							
<b>Method:</b> EPA 300.0			<b>Instr:</b> LC12				
<b>Batch ID:</b> W1C0798	<b>Preparation:</b> _NONE (LC)		<b>Prepared:</b> 03/12/21 11:01		<b>Analyst:</b> jan		
Nitrate as N	900	8.3	110	ug/l	1	03/13/21 03:33	
Nitrite as N	39	12	150	ug/l	1	03/13/21 03:33	J

### Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

<b>Method:</b> [CALC]			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]	<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT		
Nitrogen, Total	1.8		0.20	mg/l	1	03/25/21	
<b>Method:</b> _Various			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]	<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/25/21 16:14		<b>Analyst:</b> YMT		
Organic Nitrogen, Total	0.72		0.10	mg/l	1	03/26/21	
<b>Method:</b> EPA 350.1			<b>Instr:</b> AA06				
<b>Batch ID:</b> W1C1624	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/25/21 16:14		<b>Analyst:</b> YMT		
Ammonia as N	0.20	0.047	0.10	mg/l	1	03/26/21	
<b>Method:</b> EPA 351.2			<b>Instr:</b> AA06				
<b>Batch ID:</b> W1C1455	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT		
TKN	0.93	0.13	0.20	mg/l	1	03/25/21	M-02
<b>Method:</b> EPA 353.2			<b>Instr:</b> AA01				
<b>Batch ID:</b> W1C0989	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/16/21 09:56		<b>Analyst:</b> ymt		
NO2+NO3 as N	870	36	200	ug/l	1	03/17/21	
<b>Method:</b> EPA 365.3			<b>Instr:</b> UVVIS04				
<b>Batch ID:</b> W1C0856	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/12/21 17:21		<b>Analyst:</b> sbn		
o-Phosphate as P	0.22	0.0030	0.010	mg/l	1	03/12/21 17:28	
<b>Method:</b> EPA 365.3			<b>Instr:</b> UVVIS04				
<b>Batch ID:</b> W1C1212	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/18/21 15:33		<b>Analyst:</b> sbn		
Phosphorus as P, Total	0.40	0.0067	0.010	mg/l	1	03/23/21	
<b>Method:</b> SM 2540C			<b>Instr:</b> OVEN01				
<b>Batch ID:</b> W1C1182	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/18/21 10:15		<b>Analyst:</b> blg		
Total Dissolved Solids	170	4.0	10	mg/l	1	03/19/21	
<b>Method:</b> SM 2540D			<b>Instr:</b> OVEN15				
<b>Batch ID:</b> W1C1115	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/17/21 12:40		<b>Analyst:</b> ism		
Total Suspended Solids	72		5	mg/l	1	03/17/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7			<b>Instr:</b> ICP03				
<b>Batch ID:</b> W1C1080	<b>Preparation:</b> EPA 200.2		<b>Prepared:</b> 03/17/21 09:51		<b>Analyst:</b> kvm		
Calcium, Total	20.6	0.160	0.500	mg/l	1	03/20/21	
Magnesium, Total	5.57	0.0390	0.500	mg/l	1	03/20/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

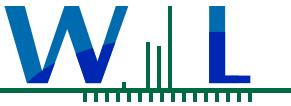
**Reported:**  
04/05/2021 12:19

## Sample Results

(Continued)

Sample: S-04-031221  
1C12072-01 (Water) Sampled: 03/12/21 9:45 by Austin Kay  
(Continued)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Metals by EPA 200 Series Methods (Continued)</b>							
<b>Method:</b> SM 2340B			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]		<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/17/21 09:51		<b>Analyst:</b> kvm	
Hardness as CaCO3, Total	74.3		3.31	mg/l	1	03/20/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/05/2021 12:19

## Sample Results

(Continued)

Sample: S-03-031221  
1C12072-02 (Water) Sampled: 03/12/21 10:45 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Anions by IC, EPA Method 300.0</b>							
<b>Method:</b> EPA 300.0			<b>Instr:</b> LC12				
<b>Batch ID:</b> W1C0798	<b>Preparation:</b> _NONE (LC)		<b>Prepared:</b> 03/12/21 11:01		<b>Analyst:</b> jan		
Nitrate as N	500	8.3	110	ug/l	1	03/13/21 03:51	
Nitrite as N	19	12	150	ug/l	1	03/13/21 03:51	J

<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> [CALC]			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]	<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT		
Nitrogen, Total	1.4		0.10	mg/l	1	03/25/21	
<b>Method:</b> _Various			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]	<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/25/21 16:14		<b>Analyst:</b> YMT		
Organic Nitrogen, Total	0.76		0.10	mg/l	1	03/26/21	
<b>Method:</b> EPA 350.1			<b>Instr:</b> AA06				
<b>Batch ID:</b> W1C1624	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/25/21 16:14		<b>Analyst:</b> YMT		
Ammonia as N	0.17	0.047	0.10	mg/l	1	03/26/21	
<b>Method:</b> EPA 351.2			<b>Instr:</b> AA06				
<b>Batch ID:</b> W1C1455	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT		
TKN	0.92	0.065	0.10	mg/l	1	03/25/21	
<b>Method:</b> EPA 353.2			<b>Instr:</b> AA01				
<b>Batch ID:</b> W1C0989	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/16/21 09:56		<b>Analyst:</b> ymt		
NO2+NO3 as N	500	36	200	ug/l	1	03/17/21	
<b>Method:</b> EPA 365.3			<b>Instr:</b> UVVIS04				
<b>Batch ID:</b> W1C0856	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/12/21 17:21		<b>Analyst:</b> sbn		
o-Phosphate as P	0.16	0.0030	0.010	mg/l	1	03/12/21 17:25	
<b>Method:</b> EPA 365.3			<b>Instr:</b> UVVIS04				
<b>Batch ID:</b> W1C1212	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/18/21 15:33		<b>Analyst:</b> sbn		
Phosphorus as P, Total	0.25	0.0067	0.010	mg/l	1	03/23/21	
<b>Method:</b> SM 2540C			<b>Instr:</b> OVEN01				
<b>Batch ID:</b> W1C1182	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/18/21 10:15		<b>Analyst:</b> blg		
Total Dissolved Solids	240	4.0	10	mg/l	1	03/19/21	
<b>Method:</b> SM 2540D			<b>Instr:</b> OVEN15				
<b>Batch ID:</b> W1C1115	<b>Preparation:</b> _NONE (WETCHEM)		<b>Prepared:</b> 03/17/21 12:40		<b>Analyst:</b> ism		
Total Suspended Solids	32		5	mg/l	1	03/17/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7			<b>Instr:</b> ICP03				
<b>Batch ID:</b> W1C1080	<b>Preparation:</b> EPA 200.2		<b>Prepared:</b> 03/17/21 09:51		<b>Analyst:</b> kvm		
Calcium, Total	24.1	0.160	0.500	mg/l	1	03/20/21	
Magnesium, Total	7.09	0.0390	0.500	mg/l	1	03/20/21	



Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
 04/05/2021 12:19

## Sample Results

(Continued)

Sample: S-03-031221  
 1C12072-02 (Water) Sampled: 03/12/21 10:45 by Austin Kay  
(Continued)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Metals by EPA 200 Series Methods (Continued)</b>							
<b>Method:</b> SM 2340B			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]		<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/17/21 09:51		<b>Analyst:</b> kvm	
Hardness as CaCO <sub>3</sub> , Total	89.5		3.31	mg/l	1	03/20/21	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
 04/05/2021 12:19

## Quality Control Results

Anions by IC, EPA Method 300.0

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C0798 - EPA 300.0</b>											
<b>Blank (W1C0798-BLK1)</b>					<b>Prepared &amp; Analyzed: 03/12/21</b>						
Nitrate as N	ND	8.3	110	ug/l							
Nitrite as N	ND	12	150	ug/l							
<b>LCS (W1C0798-BS1)</b>					<b>Prepared &amp; Analyzed: 03/12/21</b>						
Nitrate as N	2100	8.3	110	ug/l	2000		105	90-110			
Nitrite as N	2010	12	150	ug/l	2000		101	90-110			
<b>Matrix Spike (W1C0798-MS1)</b>					<b>Source: 1B05007-02</b>		<b>Prepared: 03/12/21 Analyzed: 03/13/21</b>				
Nitrate as N	19700	83	1100	ug/l	20000	ND	98	84-115			
Nitrite as N	19200	120	1500	ug/l	20000	ND	96	87-108			
<b>Matrix Spike (W1C0798-MS2)</b>					<b>Source: 1C09102-01</b>		<b>Prepared: 03/12/21 Analyzed: 03/13/21</b>				
Nitrate as N	20700	83	1100	ug/l	20000	470	101	84-115			
Nitrite as N	19600	120	1500	ug/l	20000	135	97	87-108			
<b>Matrix Spike Dup (W1C0798-MSD1)</b>					<b>Source: 1B05007-02</b>		<b>Prepared: 03/12/21 Analyzed: 03/13/21</b>				
Nitrate as N	19600	83	1100	ug/l	20000	ND	98	84-115	0.3	20	
Nitrite as N	19200	120	1500	ug/l	20000	ND	96	87-108	0.05	20	
<b>Matrix Spike Dup (W1C0798-MSD2)</b>					<b>Source: 1C09102-01</b>		<b>Prepared: 03/12/21 Analyzed: 03/13/21</b>				
Nitrate as N	20700	83	1100	ug/l	20000	470	101	84-115	0.1	20	
Nitrite as N	19600	120	1500	ug/l	20000	135	97	87-108	0.2	20	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:19

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C0856 - EPA 365.3</b>											
<b>Blank (W1C0856-BLK1)</b>					<b>Prepared &amp; Analyzed: 03/12/21</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W1C0856-BS1)</b>					<b>Prepared &amp; Analyzed: 03/12/21</b>						
o-Phosphate as P	0.209	0.0030	0.010	mg/l	0.200		104	88-111			
<b>Matrix Spike (W1C0856-MS1)</b>					<b>Prepared &amp; Analyzed: 03/12/21</b>						
o-Phosphate as P	0.363	0.0030	0.010	mg/l	0.200	0.163	100	85-112			
<b>Matrix Spike Dup (W1C0856-MSD1)</b>					<b>Prepared &amp; Analyzed: 03/12/21</b>						
o-Phosphate as P	0.366	0.0030	0.010	mg/l	0.200	0.163	102	85-112	0.8	20	
<b>Batch: W1C0989 - EPA 353.2</b>											
<b>Blank (W1C0989-BLK1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	ND	36	200	ug/l							
<b>LCS (W1C0989-BS1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	1010	36	200	ug/l	1000		101	90-110			
<b>Matrix Spike (W1C0989-MS1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	2000	36	200	ug/l	2000	ND	100	90-110			
<b>Matrix Spike (W1C0989-MS2)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	3120	36	200	ug/l	2000	1110	100	90-110			
<b>Matrix Spike Dup (W1C0989-MSD1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	1990	36	200	ug/l	2000	ND	100	90-110	0.5	20	
<b>Matrix Spike Dup (W1C0989-MSD2)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	3120	36	200	ug/l	2000	1110	100	90-110	0	20	
<b>Batch: W1C1115 - SM 2540D</b>											
<b>Blank (W1C1115-BLK1)</b>					<b>Prepared &amp; Analyzed: 03/17/21</b>						
Total Suspended Solids	0.100		5	mg/l							J
<b>LCS (W1C1115-BS1)</b>					<b>Prepared &amp; Analyzed: 03/17/21</b>						
Total Suspended Solids	54.5		5	mg/l	51.2		106	90-110			
<b>Duplicate (W1C1115-DUP1)</b>					<b>Prepared &amp; Analyzed: 03/17/21</b>						
Total Suspended Solids	11.6		5	mg/l		12.0			3	20	
<b>Duplicate (W1C1115-DUP2)</b>					<b>Prepared &amp; Analyzed: 03/17/21</b>						
Total Suspended Solids	32.4		5	mg/l		29.8			8	20	
<b>Batch: W1C1182 - SM 2540C</b>											
<b>Blank (W1C1182-BLK1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W1C1182-BS1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	839	4.0	10	mg/l	824		102	96-102			
<b>Duplicate (W1C1182-DUP1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	494	4.0	10	mg/l		493			0.2	10	
<b>Duplicate (W1C1182-DUP2)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:19

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C1182 - SM 2540C (Continued)</b>											
<b>Duplicate (W1C1182-DUP2)</b> Source: 1C19026-01 Prepared: 03/18/21 Analyzed: 03/19/21											
Total Dissolved Solids	1140	4.0	10	mg/l		1120			2	10	
<b>Batch: W1C1212 - EPA 365.3</b>											
<b>Blank (W1C1212-BLK1)</b> Prepared: 03/18/21 Analyzed: 03/23/21											
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
<b>LCS (W1C1212-BS1)</b> Prepared: 03/18/21 Analyzed: 03/23/21											
Phosphorus as P, Total	0.208	0.0067	0.010	mg/l	0.200		104	90-110			
<b>Matrix Spike (W1C1212-MS1)</b> Source: 1C16041-01 Prepared: 03/18/21 Analyzed: 03/23/21											
Phosphorus as P, Total	0.328	0.0067	0.010	mg/l	0.200	0.118	105	90-110			
<b>Matrix Spike Dup (W1C1212-MSD1)</b> Source: 1C16041-01 Prepared: 03/18/21 Analyzed: 03/23/21											
Phosphorus as P, Total	0.328	0.0067	0.010	mg/l	0.200	0.118	105	90-110	0	20	
<b>Batch: W1C1455 - EPA 351.2</b>											
<b>Blank (W1C1455-BLK1)</b> Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	ND	0.065	0.10	mg/l							
<b>Blank (W1C1455-BLK2)</b> Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	ND	0.065	0.10	mg/l							
<b>LCS (W1C1455-BS1)</b> Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	0.998	0.065	0.10	mg/l	1.00		100	90-110			
<b>LCS (W1C1455-BS2)</b> Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	0.946	0.065	0.10	mg/l	1.00		95	90-110			
<b>Matrix Spike (W1C1455-MS1)</b> Source: 1C17064-01 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.28	0.065	0.10	mg/l	1.00	0.265	102	90-110			
<b>Matrix Spike (W1C1455-MS2)</b> Source: 1C17064-02 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.20	0.065	0.10	mg/l	1.00	0.277	93	90-110			
<b>Matrix Spike Dup (W1C1455-MSD1)</b> Source: 1C17064-01 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.25	0.065	0.10	mg/l	1.00	0.265	99	90-110	3	10	
<b>Matrix Spike Dup (W1C1455-MSD2)</b> Source: 1C17064-02 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.20	0.065	0.10	mg/l	1.00	0.277	92	90-110	0.6	10	
<b>Batch: W1C1624 - EPA 350.1</b>											
<b>Blank (W1C1624-BLK1)</b> Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	ND	0.047	0.10	mg/l							
<b>Blank (W1C1624-BLK2)</b> Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	ND	0.047	0.10	mg/l							
<b>LCS (W1C1624-BS1)</b> Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	0.243	0.047	0.10	mg/l	0.250		97	90-110			
<b>LCS (W1C1624-BS2)</b> Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	0.242	0.047	0.10	mg/l	0.250		97	90-110			
<b>Matrix Spike (W1C1624-MS1)</b> Source: 1B05006-02 Prepared: 03/25/21 Analyzed: 03/26/21											

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:19

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C1624 - EPA 350.1 (Continued)</b>											
<b>Matrix Spike (W1C1624-MS1)</b> Source: 1B05006-02 Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	2.66	0.047	0.10	mg/l	0.250	2.44	86	90-110			MS-02
<b>Matrix Spike (W1C1624-MS2)</b> Source: 1B05006-03 Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	2.52	0.047	0.10	mg/l	0.250	2.29	91	90-110			
<b>Matrix Spike Dup (W1C1624-MSD1)</b> Source: 1B05006-02 Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	2.65	0.047	0.10	mg/l	0.250	2.44	82	90-110	0.4	15	MS-02
<b>Matrix Spike Dup (W1C1624-MSD2)</b> Source: 1B05006-03 Prepared: 03/25/21 Analyzed: 03/26/21											
Ammonia as N	2.51	0.047	0.10	mg/l	0.250	2.29	84	90-110	0.7	15	MS-02

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C1080 - EPA 200.7</b>											
<b>Blank (W1C1080-BLK1)</b> Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	ND	0.160	0.500	mg/l							
Magnesium, Total	ND	0.0390	0.500	mg/l							
<b>LCS (W1C1080-BS1)</b> Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	48.9	0.160	0.500	mg/l	50.0		98	85-115			
Magnesium, Total	50.8	0.0390	0.500	mg/l	50.0		102	85-115			
<b>Matrix Spike (W1C1080-MS1)</b> Source: 1C12072-01 Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	67.8	0.160	0.500	mg/l	50.0	20.6	94	70-130			
Magnesium, Total	55.8	0.0390	0.500	mg/l	50.0	5.57	100	70-130			
<b>Matrix Spike Dup (W1C1080-MSD1)</b> Source: 1C12072-01 Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	69.6	0.160	0.500	mg/l	50.0	20.6	98	70-130	3	30	
Magnesium, Total	57.2	0.0390	0.500	mg/l	50.0	5.57	103	70-130	3	30	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
 04/05/2021 12:19



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
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	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.

**Work Orders:** 1C15045

**Report Date:** 4/05/2021

**Project:** Lake Elsinore and Canyon Lake Nutrient TMDL

**Received Date:** 3/15/2021

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 278-5300

**Attn:** John Rudolph

**P.O. #:**

**Client:** Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Billing Code:**

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 3/15/21 with the Chain-of-Custody document. The samples were received in good condition, at 5.1 °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:**



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** Lake Elsinore and Canyon Lake Nutrient  
TMDL

**Reported:**  
04/05/2021 12:35

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CLS- 031521	Austin Kay	1C15045-01	Water	03/15/21 09:30	



Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:35

## Sample Results

Sample: CLS- 031521 Sampled: 03/15/21 9:30 by Austin Kay  
1C15045-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Anions by IC, EPA Method 300.0</b>							
<b>Method:</b> EPA 300.0				<b>Instr:</b> LC12			
<b>Batch ID:</b> W1C0910	<b>Preparation:</b> _NONE (LC)			<b>Prepared:</b> 03/15/21 11:41		<b>Analyst:</b> jan	
Nitrate as N	380	8.3	110	ug/l	1	03/15/21 20:19	
Nitrite as N	23	12	150	ug/l	1	03/15/21 20:19	J

### Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

<b>Method:</b> [CALC]				<b>Instr:</b> [CALC]			
<b>Batch ID:</b> [CALC]	<b>Preparation:</b> [CALC]			<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT	
Nitrogen, Total	1.3		0.10	mg/l	1	03/25/21	
<b>Method:</b> _Various				<b>Instr:</b> [CALC]			
<b>Batch ID:</b> [CALC]	<b>Preparation:</b> [CALC]			<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT	
Organic Nitrogen, Total	0.62		0.10	mg/l	1	03/25/21	
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1C1352	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/22/21 11:34		<b>Analyst:</b> YMT	
Ammonia as N	0.28	0.047	0.10	mg/l	1	03/23/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1C1455	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/23/21 13:39		<b>Analyst:</b> YMT	
TKN	0.90	0.065	0.10	mg/l	1	03/25/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1C0989	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/16/21 09:56		<b>Analyst:</b> ymt	
NO2+NO3 as N	400	36	200	ug/l	1	03/17/21	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1C1057	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/16/21 17:27		<b>Analyst:</b> UVVIS04	
o-Phosphate as P	0.018	0.0030	0.010	mg/l	1	03/16/21 18:01	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1C1212	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/18/21 15:33		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.036	0.0067	0.010	mg/l	1	03/23/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1C1182	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/18/21 10:15		<b>Analyst:</b> blg	
Total Dissolved Solids	490	4.0	10	mg/l	1	03/19/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1C1304	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 03/19/21 17:00		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	03/22/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1C1080	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 03/17/21 09:51		<b>Analyst:</b> kvm	
Calcium, Total	61.8	0.160	0.500	mg/l	1	03/20/21	
Magnesium, Total	19.2	0.0390	0.500	mg/l	1	03/20/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/05/2021 12:35

## Sample Results

(Continued)

Sample: CLS- 031521  
1C15045-01 (Water) Sampled: 03/15/21 9:30 by Austin Kay  
(Continued)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Metals by EPA 200 Series Methods (Continued)</b>							
<b>Method:</b> SM 2340B			<b>Instr:</b> [CALC]				
<b>Batch ID:</b> [CALC]		<b>Preparation:</b> [CALC]		<b>Prepared:</b> 03/17/21 09:51		<b>Analyst:</b> kvm	
Hardness as CaCO3, Total	233		3.31	mg/l	1	03/20/21	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
 04/05/2021 12:35

## Quality Control Results

Anions by IC, EPA Method 300.0

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	Limit	Qualifier
<b>Batch: W1C0910 - EPA 300.0</b>											
<b>Blank (W1C0910-BLK1)</b>					<b>Prepared &amp; Analyzed: 03/15/21</b>						
Nitrate as N	ND	8.3	110	ug/l							
Nitrite as N	ND	12	150	ug/l							
<b>LCS (W1C0910-BS1)</b>					<b>Prepared &amp; Analyzed: 03/15/21</b>						
Nitrate as N	2080	8.3	110	ug/l	2000		104	90-110			
Nitrite as N	1960	12	150	ug/l	2000		98	90-110			
<b>Matrix Spike (W1C0910-MS1)</b>					<b>Source: 0L17007-01</b>						
					<b>Prepared &amp; Analyzed: 03/15/21</b>						
Nitrate as N	19200	83	1100	ug/l	20000	ND	96	84-115			
Nitrite as N	19900	120	1500	ug/l	20000	ND	99	87-108			
<b>Matrix Spike (W1C0910-MS2)</b>					<b>Source: 0L17007-02</b>						
					<b>Prepared &amp; Analyzed: 03/15/21</b>						
Nitrate as N	19700	83	1100	ug/l	20000	ND	98	84-115			
Nitrite as N	18600	120	1500	ug/l	20000	ND	93	87-108			
<b>Matrix Spike Dup (W1C0910-MSD1)</b>					<b>Source: 0L17007-01</b>						
					<b>Prepared &amp; Analyzed: 03/15/21</b>						
Nitrate as N	19100	83	1100	ug/l	20000	ND	96	84-115	0.5	20	
Nitrite as N	19400	120	1500	ug/l	20000	ND	97	87-108	2	20	
<b>Matrix Spike Dup (W1C0910-MSD2)</b>					<b>Source: 0L17007-02</b>						
					<b>Prepared &amp; Analyzed: 03/15/21</b>						
Nitrate as N	19700	83	1100	ug/l	20000	ND	98	84-115	0.05	20	
Nitrite as N	18600	120	1500	ug/l	20000	ND	93	87-108	0.05	20	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:35

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C0989 - EPA 353.2</b>											
<b>Blank (W1C0989-BLK1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	ND	36	200	ug/l							
<b>LCS (W1C0989-BS1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	1010	36	200	ug/l	1000		101	90-110			
<b>Matrix Spike (W1C0989-MS1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	2000	36	200	ug/l	2000	ND	100	90-110			
<b>Matrix Spike (W1C0989-MS2)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	3120	36	200	ug/l	2000	1110	100	90-110			
<b>Matrix Spike Dup (W1C0989-MSD1)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	1990	36	200	ug/l	2000	ND	100	90-110	0.5	20	
<b>Matrix Spike Dup (W1C0989-MSD2)</b>					<b>Prepared: 03/16/21 Analyzed: 03/17/21</b>						
NO2+NO3 as N	3120	36	200	ug/l	2000	1110	100	90-110	0	20	
<b>Batch: W1C1057 - EPA 365.3</b>											
<b>Blank (W1C1057-BLK1)</b>					<b>Prepared &amp; Analyzed: 03/16/21</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W1C1057-BS1)</b>					<b>Prepared &amp; Analyzed: 03/16/21</b>						
o-Phosphate as P	0.203	0.0030	0.010	mg/l	0.200		102	88-111			
<b>Matrix Spike (W1C1057-MS1)</b>					<b>Prepared &amp; Analyzed: 03/16/21</b>						
o-Phosphate as P	0.275	0.0030	0.010	mg/l	0.200	0.0780	98	85-112			
<b>Matrix Spike Dup (W1C1057-MSD1)</b>					<b>Prepared &amp; Analyzed: 03/16/21</b>						
o-Phosphate as P	0.275	0.0030	0.010	mg/l	0.200	0.0780	98	85-112	0	20	
<b>Batch: W1C1182 - SM 2540C</b>											
<b>Blank (W1C1182-BLK1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W1C1182-BS1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	839	4.0	10	mg/l	824		102	96-102			
<b>Duplicate (W1C1182-DUP1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	494	4.0	10	mg/l		493			0.2	10	
<b>Duplicate (W1C1182-DUP2)</b>					<b>Prepared: 03/18/21 Analyzed: 03/19/21</b>						
Total Dissolved Solids	1140	4.0	10	mg/l		1120			2	10	
<b>Batch: W1C1212 - EPA 365.3</b>											
<b>Blank (W1C1212-BLK1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/23/21</b>						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
<b>LCS (W1C1212-BS1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/23/21</b>						
Phosphorus as P, Total	0.208	0.0067	0.010	mg/l	0.200		104	90-110			
<b>Matrix Spike (W1C1212-MS1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/23/21</b>						
Phosphorus as P, Total	0.328	0.0067	0.010	mg/l	0.200	0.118	105	90-110			
<b>Matrix Spike Dup (W1C1212-MSD1)</b>					<b>Prepared: 03/18/21 Analyzed: 03/23/21</b>						

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:35

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C1212 - EPA 365.3 (Continued)</b>											
<b>Matrix Spike Dup (W1C1212-MSD1)</b>	<b>Source: 1C16041-01</b>				<b>Prepared: 03/18/21</b>		<b>Analyzed: 03/23/21</b>				
Phosphorus as P, Total	0.328	0.0067	0.010	mg/l	0.200	0.118	105	90-110	0	20	
<b>Batch: W1C1304 - SM 2540D</b>											
<b>Blank (W1C1304-BLK1)</b>					<b>Prepared: 03/19/21</b>		<b>Analyzed: 03/22/21</b>				
Total Suspended Solids	ND		5	mg/l							
<b>LCS (W1C1304-BS1)</b>					<b>Prepared: 03/19/21</b>		<b>Analyzed: 03/22/21</b>				
Total Suspended Solids	58.2		5	mg/l	62.2		94	90-110			
<b>Duplicate (W1C1304-DUP1)</b>	<b>Source: 1C15021-02</b>				<b>Prepared: 03/19/21</b>		<b>Analyzed: 03/22/21</b>				
Total Suspended Solids	123		5	mg/l		120			3	20	
<b>Duplicate (W1C1304-DUP2)</b>	<b>Source: 1C19051-02</b>				<b>Prepared: 03/19/21</b>		<b>Analyzed: 03/22/21</b>				
Total Suspended Solids	112		5	mg/l		112			0	20	
<b>Batch: W1C1352 - EPA 350.1</b>											
<b>Blank (W1C1352-BLK1)</b>					<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	ND	0.047	0.10	mg/l							
<b>Blank (W1C1352-BLK2)</b>					<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	ND	0.047	0.10	mg/l							
<b>LCS (W1C1352-BS1)</b>					<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	0.242	0.047	0.10	mg/l	0.250		97	90-110			
<b>LCS (W1C1352-BS2)</b>					<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	0.242	0.047	0.10	mg/l	0.250		97	90-110			
<b>Matrix Spike (W1C1352-MS1)</b>	<b>Source: 1C09002-02</b>				<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	0.247	0.047	0.10	mg/l	0.250	ND	99	90-110			
<b>Matrix Spike (W1C1352-MS2)</b>	<b>Source: 1C15045-01</b>				<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	0.521	0.047	0.10	mg/l	0.250	0.280	97	90-110			
<b>Matrix Spike Dup (W1C1352-MSD1)</b>	<b>Source: 1C09002-02</b>				<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	0.246	0.047	0.10	mg/l	0.250	ND	98	90-110	0.3	15	
<b>Matrix Spike Dup (W1C1352-MSD2)</b>	<b>Source: 1C15045-01</b>				<b>Prepared: 03/22/21</b>		<b>Analyzed: 03/23/21</b>				
Ammonia as N	0.522	0.047	0.10	mg/l	0.250	0.280	97	90-110	0.1	15	
<b>Batch: W1C1455 - EPA 351.2</b>											
<b>Blank (W1C1455-BLK1)</b>					<b>Prepared: 03/23/21</b>		<b>Analyzed: 03/25/21</b>				
TKN	ND	0.065	0.10	mg/l							
<b>Blank (W1C1455-BLK2)</b>					<b>Prepared: 03/23/21</b>		<b>Analyzed: 03/25/21</b>				
TKN	ND	0.065	0.10	mg/l							
<b>LCS (W1C1455-BS1)</b>					<b>Prepared: 03/23/21</b>		<b>Analyzed: 03/25/21</b>				
TKN	0.998	0.065	0.10	mg/l	1.00		100	90-110			
<b>LCS (W1C1455-BS2)</b>					<b>Prepared: 03/23/21</b>		<b>Analyzed: 03/25/21</b>				
TKN	0.946	0.065	0.10	mg/l	1.00		95	90-110			
<b>Matrix Spike (W1C1455-MS1)</b>	<b>Source: 1C17064-01</b>				<b>Prepared: 03/23/21</b>		<b>Analyzed: 03/25/21</b>				

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient TMDL  
**Project Manager:** John Rudolph

**Reported:**  
04/05/2021 12:35

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C1455 - EPA 351.2 (Continued)</b>											
<b>Matrix Spike (W1C1455-MS1)</b> Source: 1C17064-01 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.28	0.065	0.10	mg/l	1.00	0.265	102	90-110			
<b>Matrix Spike (W1C1455-MS2)</b> Source: 1C17064-02 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.20	0.065	0.10	mg/l	1.00	0.277	93	90-110			
<b>Matrix Spike Dup (W1C1455-MSD1)</b> Source: 1C17064-01 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.25	0.065	0.10	mg/l	1.00	0.265	99	90-110	3	10	
<b>Matrix Spike Dup (W1C1455-MSD2)</b> Source: 1C17064-02 Prepared: 03/23/21 Analyzed: 03/25/21											
TKN	1.20	0.065	0.10	mg/l	1.00	0.277	92	90-110	0.6	10	

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1C1080 - EPA 200.7</b>											
<b>Blank (W1C1080-BLK1)</b> Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	ND	0.160	0.500	mg/l							
Magnesium, Total	ND	0.0390	0.500	mg/l							
<b>LCS (W1C1080-BS1)</b> Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	48.9	0.160	0.500	mg/l	50.0		98	85-115			
Magnesium, Total	50.8	0.0390	0.500	mg/l	50.0		102	85-115			
<b>Matrix Spike (W1C1080-MS1)</b> Source: 1C12072-01 Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	67.8	0.160	0.500	mg/l	50.0	20.6	94	70-130			
Magnesium, Total	55.8	0.0390	0.500	mg/l	50.0	5.57	100	70-130			
<b>Matrix Spike Dup (W1C1080-MSD1)</b> Source: 1C12072-01 Prepared: 03/17/21 Analyzed: 03/20/21											
Calcium, Total	69.6	0.160	0.500	mg/l	50.0	20.6	98	70-130	3	30	
Magnesium, Total	57.2	0.0390	0.500	mg/l	50.0	5.57	103	70-130	3	30	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** Lake Elsinore and Canyon Lake Nutrient  
TMDL  
**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/05/2021 12:35



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
%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.

## Lake Elsinore July 28, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	Water Column Mean
LE01	11:12	Temp (°C)	27.5	26.4	26.3	26.3	26.2	26.1	26.0	--	--	26.4
		Sp. Cond (µS/cm)	3143	3142	3142	3141	3142	3143	3143	--	--	3142
		pH	9.37	9.16	9.11	9.12	9.11	9.07	9.01	--	--	9.14
		DO (mg/L)	13.0	4.5	3.3	3.7	3.7	2.0	0.9	--	--	4.4
	13:38	Temp (°C)	29.0	27.5	26.5	26.4	26.3	26.2	26.2	--	--	26.9
		Sp. Cond (µS/cm)	3147	3147	3143	3143	3143	3142	3143	--	--	3144
pH		9.53	9.27	9.18	9.13	9.08	9.08	9.08	--	--	9.19	
DO (mg/L)	15.6	8.95	5.4	2.7	2.2	2.3	2.5	--	--	5.6		
LE02 <sup>a</sup>	8:20	Temp (°C)	26.6	26.6	26.6	26.5	26.4	26.3	26.3	26.3	26.2	26.4
		Sp. Cond (µS/cm)	3145	3146	3146	3146	3146	3145	3145	3145	3145	3145
		pH	9.32	9.26	9.24	9.21	9.20	9.17	9.17	9.15	9.14	9.21
		DO (mg/L)	6.8	5.4	4.6	4.0	3.9	3.4	3.2	2.8	2.7	4.1
	13:30	Temp (°C)	28.8	26.7	26.6	26.5	26.4	26.4	26.3	26.3	--	26.8
		Sp. Cond (µS/cm)	3157	3145	3143	3142	3143	3143	3143	3143	--	3145
		pH	9.58	9.20	9.11	9.09	9.09	9.08	9.08	9.06	--	9.16
		DO (mg/L)	16.4	4.6	3.1	3.2	3.2	2.6	2.3	2.4	--	4.7
LE03 <sup>b</sup>	07:38	Temp (°C)	26.8	26.8	26.5	26.4	26.2	26.1	26.0	--	--	26.4
		Sp. Cond (µS/cm)	3136	3139	3147	3147	3148	3148	3148	--	--	3145
		pH	9.32	9.30	9.17	9.13	9.09	9.06	9.04	--	--	9.16
		DO (mg/L)	6.5	5.7	2.1	1.5	0.6	0.2	0.1	--	--	2.4
	13:20	Temp (°C)	31.6	27.4	26.5	26.3	26.2	26.2	26.1	--	--	27.2
		Sp. Cond (µS/cm)	3152	3144	3145	3144	3144	3143	3145	--	--	3145
		pH	9.53	9.27	9.02	8.97	8.96	8.95	8.94	--	--	9.09
		DO (mg/L)	16.7	3.19	1.8	0.6	0.2	0.1	0.1	--	--	3.2
Lakeshore Sonde	10:48	Temp (°C)	28.6	26.9	26.6	26.4	26.3	26.3	26.3	26.3	--	26.7
		Sp. Cond (µS/cm)	3154	3144	3145	3144	3143	3144	3143	3142	--	3145
		pH	9.41	9.25	9.09	9.06	9.05	9.05	9.04	9.04	--	9.12
		DO (mg/L)	13.2	6.1	3.8	3.2	2.9	2.7	2.6	2.6	--	4.6
Grand Ave Sonde <sup>c</sup>	10:55	Temp (°C)	27.4	26.9	26.8	26.5	26.4	26.3	26.3	25.7	--	26.5
		Sp. Cond (µS/cm)	3142	3141	3142	3142	3142	3142	3142	3144	--	3142
		pH	9.3	9.25	9.18	9.08	9.06	9.06	9.07	8.96	--	9.12
		DO (mg/L)	10.2	8.6	3.9	2.7	2.5	2.8	2.7	0.1	--	4.2

a- Bottom measurement taken at 7.5 meters during morning profile readings.

b- Bottom measurement taken at 5.5 meters.

c- Bottom measurement taken at 6.5 meters.



### Lake Elsinore August 13, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	Water Column Mean
LE01	10:45	Temp (°C)	27.9	27.2	27.1	26.9	26.7	26.5	26.4	--	--	27.0
		Sp. Cond (µS/cm)	3198	3198	3198	3198	3196	3194	3193	--	--	3196
		pH	9.06	8.82	8.78	8.74	8.72	8.70	8.69	--	--	8.79
		DO (mg/L)	7.8	2.4	1.5	0.5	0.1	0.1	0.1	--	--	1.8
	15:05	Temp (°C)	28.0	28.1	27.9	27.1	27.1	27.1	26.9	--	--	27.5
		Sp. Cond (µS/cm)	3199	3200	3198	3200	3197	3197	3197	--	--	3198
pH		9.00	9.01	8.99	8.81	8.8	8.75	8.72	--	--	8.87	
LE02	07:55	Temp (°C)	27.3	27.3	27.3	27.2	26.9	26.5	26.4	26.2	--	26.9
		Sp. Cond (µS/cm)	3199	3199	3199	3199	3196	3193	3194	3193	--	3197
		pH	8.88	8.88	8.87	8.86	8.77	8.77	8.77	8.75	--	8.82
		DO (mg/L)	2.6	2.6	2.5	2.3	0.1	0.0	0.0	0.0	--	1.3
	14:50	Temp (°C)	28.8	28.7	27.3	27.2	27.0	27.1	27.0	26.7	--	27.5
		Sp. Cond (µS/cm)	3199	3201	3203	3199	3197	3196	3196	3193	--	3198
pH		9.11	9.20	8.93	8.78	8.72	8.72	8.70	8.68	--	8.86	
LE03	07:40	Temp (°C)	27.2	27.2	27.2	26.8	26.5	26.4	--	--	--	26.9
		Sp. Cond (µS/cm)	3201	3201	3201	3198	3197	3196	--	--	--	3199
		pH	8.79	8.80	8.80	8.78	8.75	8.73	--	--	--	8.78
		DO (mg/L)	0.9	0.9	0.9	0.1	0.1	0.1	--	--	--	0.5
	14:45	Temp (°C)	29.4	29.0	28.1	27.4	27.0	26.4	--	--	--	27.9
		Sp. Cond (µS/cm)	3203	3201	3199	3197	3196	3193	--	--	--	3198
pH		8.98	8.96	8.82	8.73	8.71	8.17	--	--	--	8.73	
Lakeshore Sonde	10:00	DO (mg/L)	8.4	6.9	1.0	0.7	0.1	0.1	--	--	--	2.9
		Temp (°C)	27.5	27.4	27.3	27.2	26.7	26.4	26.4	26.2	26.2	26.8
		Sp. Cond (µS/cm)	3198	3199	3198	3198	3194	3192	3194	3191	3192	3195
		pH	8.93	8.88	8.80	8.77	8.73	8.71	8.71	8.69	8.68	8.77
Grand Ave Sonde <sup>a</sup>	09:30	DO (mg/L)	7.0	2.6	1.84	1.25	0.19	0.0	0.0	0.0	0.0	1.4
		Temp (°C)	27.8	27.1	27.1	27.0	26.7	26.6	26.3	26.2	--	26.9
		Sp. Cond (µS/cm)	3197	3197	3197	3197	3195	3192	3192	3192	--	3195
		pH	9.00	8.82	8.80	8.75	8.72	8.72	8.70	8.69	--	8.78
		DO (mg/L)	8.0	2.6	1.5	0.6	0.1	0.0	0.0	0.0	--	1.6

a- Bottom measurement taken at 6.5 meters.

## Lake Elsinore September 14, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	Water Column Mean		
LE01	07:39	Temp (°C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	--	--	25.0		
		Sp. Cond (µS/cm)	3315	3316	3315	3315	3315	3315	3315	3315	--	--	3315	
		pH	8.49	8.49	8.49	8.49	8.48	8.48	8.48	8.47	--	--	8.48	
		DO (mg/L)	0.6	0.5	0.4	0.3	0.4	0.4	0.4	0.3	--	--	0.4	
	13:40	Temp (°C)	27.6	25.5	25.2	25.1	25.1	25.1	25.1	25.0	--	--	25.5	
		Sp. Cond (µS/cm)	3320	3311	3314	3314	3315	3315	3315	3316	--	--	3315	
pH		8.87	8.78	8.58	8.55	8.53	8.52	8.52	8.47	--	--	8.61		
LE02	08:05	Temp (°C)	25.4	25.4	25.4	25.3	25.3	25.2	25.2	25.1	--	--	25.3	
		Sp. Cond (µS/cm)	3313	3313	3313	3314	3315	3314	3314	3314	--	--	3314	
		pH	8.64	8.63	8.63	8.60	8.57	8.52	8.50	8.49	--	--	8.57	
	13:30	DO (mg/L)	3.6	3.4	3.3	2.8	1.7	0.8	0.3	0.1	--	--	2.0	
		Temp (°C)	27.2	25.6	25.3	25.2	25.2	25.2	25.1	25.1	--	--	25.5	
		Sp. Cond (µS/cm)	3332	3311	3312	3314	3314	3315	3315	3315	--	--	3313	
LE03	07:55	pH	9.14	8.73	8.59	8.49	8.47	8.45	8.44	8.44	--	--	8.55	
		DO (mg/L)	19.1	6.7	2.6	1.1	0.5	0.5	0.3	0.1	--	--	1.9	
		Temp (°C)	25.3	25.3	25.3	25.3	25.3	25.3	--	--	--	--	25.3	
		Sp. Cond (µS/cm)	3312	3313	3313	3313	3313	3313	--	--	--	--	3313	
	13:15	pH	8.53	8.54	8.55	8.56	8.56	8.56	--	--	--	--	8.55	
		DO (mg/L)	2.3	2.1	2.0	2.0	2.0	1.0	--	--	--	--	1.9	
Lakeshore Sonde <sup>a</sup>	10:15	Temp (°C)	26.7	25.5	25.4	25.3	25.3	25.2	--	--	--	--	25.6	
		Sp. Cond (µS/cm)	3314	3314	3313	3314	3314	3314	--	--	--	--	3314	
		pH	8.97	8.76	8.53	8.51	8.49	8.46	--	--	--	--	8.62	
		DO (mg/L)	15.5	5.0	2.6	2.0	1.3	1.0	--	--	--	--	4.6	
Grand Ave Sonde <sup>b</sup>	09:50	Temp (°C)	25.7	25.4	25.4	25.3	25.2	25.2	25.1	25.1	25.1	--	25.3	
		Sp. Cond (µS/cm)	3312	3314	3314	3314	3314	3314	3314	3314	3314	3314	--	3314
		pH	8.74	8.63	8.61	8.58	8.55	8.53	8.52	8.51	8.51	--	8.58	
		DO (mg/L)	7.3	3.1	2.4	1.9	1.4	0.9	0.8	0.6	0.6	--	2.1	
Grand Ave Sonde <sup>b</sup>	09:50	Temp (°C)	25.5	25.4	25.4	25.3	25.3	25.2	25.2	25.1	--	--	25.3	
		Sp. Cond (µS/cm)	3311	3313	3312	3313	3314	3314	3313	3313	--	--	3313	
		pH	8.77	8.72	8.65	8.62	8.55	8.52	8.54	8.52	--	--	8.61	
		DO (mg/L)	7.9	4.7	3.7	2.2	0.4	1.0	1.0	0.9	--	--	2.7	

a- Bottom measurement taken at 7.5 meters.

b- Bottom measurement taken at 6.5 meters.

## Lake Elsinore October 5, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	Water Column Mean
LE01	08:15	Temp (°C)	24.5	24.4	24.4	24.4	24.4	24.4	24.4	--	--	24.4
		Sp. Cond (µS/cm)	3356	3357	3357	3357	3357	3357	3357	--	--	3357
		pH	8.76	8.76	8.76	8.75	8.75	8.75	8.75	--	--	8.75
		DO (mg/L)	2.0	1.8	1.7	1.6	1.6	1.6	1.5	--	--	1.7
	16:25	Temp (°C)	26.4	26.4	25.3	25.0	24.6	24.5	24.5	--	--	25.2
		Sp. Cond (µS/cm)	3367	3364	3362	3360	3359	3359	3360	--	--	3362
		pH	9.08	9.07	8.98	8.87	8.79	8.72	8.73	--	--	8.89
		DO (mg/L)	11.6	9.6	6.0	3.9	1.3	1.1	1.5	--	--	5.0
LE02	08:30	Temp (°C)	24.7	24.7	24.7	24.7	24.7	24.6	24.6	24.6	--	24.7
		Sp. Cond (µS/cm)	3356	3357	3357	3357	3357	3357	3357	3358	--	3357
		pH	8.82	8.80	8.80	8.78	8.77	8.75	8.74	8.73	--	8.77
		DO (mg/L)	3.3	2.9	2.9	2.3	2.0	1.7	1.2	1.1	--	2.2
	15:40	Temp (°C)	25.3	25.2	24.8	24.7	24.7	24.6	24.5	24.3	--	24.8
		Sp. Cond (µS/cm)	3358	3357	3359	3358	3358	3359	3359	3359	--	3358
		pH	8.90	8.90	8.75	8.71	8.70	8.68	8.66	8.65	--	8.74
		DO (mg/L)	7.3	7.0	2.1	1.4	1.3	0.7	0.3	0.2	--	2.5
LE03	08:00	Temp (°C)	24.8	24.8	24.8	24.8	24.8	24.8	--	--	--	24.8
		Sp. Cond (µS/cm)	3356	3356	3357	3357	3357	3357	--	--	--	3357
		pH	8.77	8.77	8.76	8.76	8.77	8.76	--	--	--	8.77
		DO (mg/L)	2.5	2.3	2.0	2.1	2.3	1.8	--	--	--	2.2
	14:45	Temp (°C)	27.0	25.3	24.9	24.8	24.8	24.7	--	--	--	25.3
		Sp. Cond (µS/cm)	3349	3359	3358	3358	3358	3359	--	--	--	3357
		pH	9.16	8.98	8.78	8.73	8.71	8.69	--	--	--	8.84
		DO (mg/L)	15.8	5.3	2.8	2.0	1.7	1.0	--	--	--	4.8
Lakeshore Sonde <sup>a</sup>	15:50	Temp (°C)	26.0	26.0	25.0	24.7	24.7	24.7	24.6	24.5	24.3	24.9
		Sp. Cond (µS/cm)	3356	3356	3366	3360	3359	3358	3359	3359	3359	3359
		pH	9.11	9.10	8.82	8.73	8.71	8.70	8.69	8.67	8.67	8.80
		DO (mg/L)	12.9	12.3	2.3	1.5	0.8	0.9	0.8	0.3	0.3	3.5
Grand Ave Sonde <sup>b</sup>	14:55	Temp (°C)	26.3	25.6	24.8	24.7	24.7	24.7	24.5	24.4	--	25.0
		Sp. Cond (µS/cm)	3355	3362	3361	3359	3359	3359	3360	3359	--	3359
		pH	9.17	9.06	8.79	8.72	8.70	8.70	8.67	8.67	--	8.81
		DO (mg/L)	13.7	9.9	2.1	1.3	1.1	1.2	0.2	0.1	--	3.7

a- Bottom measurement taken at 7.5 meters

b- Bottom measurement taken at 6.5 meters

### Lake Elsinore December 9, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	Water Column Mean
LE01	07:30	Temp (°C)	12.9	12.9	12.9	12.9	12.8	12.8	12.8	--	--	12.9
		Sp. Cond (µS/cm)	3374	3413	3443	3447	3450	3455	3456	--	--	3434
		pH	8.59	8.60	8.62	8.62	8.60	8.57	8.52	--	--	8.59
		DO (mg/L)	6.0	5.8	5.8	5.7	5.6	4.4	3.5	--	--	5.2
	15:30	Temp (°C)	13.7	13.6	13.5	13.3	12.9	12.9	12.8	--	--	13.2
		Sp. Cond (µS/cm)	3489	3495	3498	3500	3502	3501	3502	--	--	3498
pH		8.83	8.82	8.81	8.77	8.70	8.69	8.58	--	--	8.74	
LE02	08:25	Temp (°C)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	--	13.0
		Sp. Cond (µS/cm)	3459	3466	3469	3470	3471	3471	3471	3471	--	3469
		pH	8.71	8.70	8.70	8.69	8.69	8.69	8.68	8.68	--	8.69
		DO (mg/L)	5.3	5.1	5.0	5.0	4.9	4.9	4.8	4.7	--	5.0
	15:18	Temp (°C)	13.7	13.6	13.1	13.1	13.0	13.0	13.0	13.0	--	13.2
		Sp. Cond (µS/cm)	3494	3496	3502	3498	3499	3499	3500	3500	--	3499
pH		8.81	8.78	8.70	8.66	8.65	8.65	8.65	8.65	--	8.69	
LE03	08:05	Temp (°C)	13.1	13.1	13.1	13.2	13.2	13.1	--	--	--	13.1
		Sp. Cond (µS/cm)	3448	3452	3457	3456	3457	3458	--	--	--	3455
		pH	8.72	8.72	8.73	8.73	8.74	8.73	--	--	--	8.73
		DO (mg/L)	5.8	5.7	5.6	5.6	5.6	5.5	--	--	--	5.6
	15:00	Temp (°C)	14.2	14.1	13.2	13.2	13.2	13.1	--	--	--	13.5
		Sp. Cond (µS/cm)	3492	3497	3484	3485	3485	3485	--	--	--	3488
pH		8.87	8.86	8.71	8.70	8.69	8.69	--	--	--	8.75	
Lakeshore Sonde <sup>a</sup>	11:20	DO (mg/L)	9.3	8.6	5.6	5.4	5.3	5.2	--	--	--	6.6
		Temp (°C)	13.2	13.1	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.5
		Sp. Cond (µS/cm)	3486	3483	3485	3485	3485	3486	3486	3486	3486	3404
		pH	8.70	8.68	8.65	8.65	8.65	8.65	8.65	8.65	8.65	7.09
Grand Ave Sonde <sup>b</sup>	10:55	DO (mg/L)	5.4	5.3	4.8	4.7	4.6	4.6	4.5	4.5	0.2	4.3
		Temp (°C)	13.8	13.3	13.1	13.0	13.0	13.0	13.0	13.3	--	13.2
		Sp. Cond (µS/cm)	3494	3483	3483	3483	3484	3484	3484	3438	--	3479
		pH	8.75	8.77	8.69	8.67	8.66	8.65	8.65	7.67	--	8.56
Grand Ave Sonde <sup>b</sup>	10:55	DO (mg/L)	6.4	6.6	5.3	5.0	4.7	4.6	4.5	0.3	--	4.7

a- Bottom measurement taken at 7.5 meters

b- Bottom measurement taken at 6.5 meters

## Lake Elsinore February 17, 2021 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	Water Column Mean	
LE01	07:30	Temp (°C)	13.4	13.4	13.3	13.2	13.1	13.1	13.1	--	13.2	
		Sp. Cond (µS/cm)	3321	3318	3318	3318	3318	3318	3318	3319	--	3319
		pH	8.81	8.79	8.73	8.62	8.66	8.65	8.64	--	--	8.70
		DO (mg/L)	9.6	9.6	9.4	9.0	8.7	8.6	8.3	--	--	9.0
LE02	07:50	Temp (°C)	12.9	12.9	13.0	12.9	12.9	12.9	12.9	12.9	12.9	12.9
		Sp. Cond (µS/cm)	3317	3322	3322	3322	3322	3323	3324	3323	--	3322
		pH	8.63	8.62	8.60	8.59	8.58	8.58	8.57	8.56	--	8.59
		DO (mg/L)	8.4	8.2	8.1	8.1	8.0	8.0	7.9	7.7	--	8.0
LE03	10:15	Temp (°C)	13.5	13.3	13.1	13.0	13.0	13.0	13.0	--	--	13.1
		Sp. Cond (µS/cm)	3321	3321	3322	3322	3323	3324	3324	--	--	3322
		pH	8.74	8.70	8.62	8.61	8.60	8.59	8.58	--	--	8.63
		DO (mg/L)	11.1	9.7	8.4	8.0	7.9	7.8	6.2	--	--	8.4

**Notes:**

Water column measurements were not recorded in the afternoon, or at the Lakeshore and Grand Avenue sonde locations, due to high winds and unsafe conditions on the lake (see text for details).

## Lake Elsinore April 8, 2021 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	Water Column Mean
LE01	07:48	Temp (°C)	18.7	18.7	18.7	18.7	18.7	18.0	16.1	--	18.2
		Sp. Cond (µS/cm)	3307	3307	3306	3306	3309	3308	3315	--	3308
		pH	9.02	9.01	9.00	9.00	8.98	8.89	8.64	--	8.93
		DO (mg/L)	9.8	9.7	9.5	9.5	8.6	6.5	0.4	--	7.7
LE02	08:20	Temp (°C)	19.0	19.0	19.0	19.1	18.1	16.5	15.9	15.8	17.8
		Sp. Cond (µS/cm)	3297	3296	3297	3297	3317	3323	3300	3300	3303
		pH	9.04	9.03	9.03	9.02	8.91	8.71	8.61	8.6	8.87
		DO (mg/L)	10.8	10.4	10.3	10.1	6.7	1.8	0.2	0.2	6.3
LE03	08:10	Temp (°C)	19.1	19.1	19.0	18.0	17.4	16.3	--	--	18.2
		Sp. Cond (µS/cm)	3301	3301	3301	3300	3303	3297	--	--	3301
		pH	9.03	9.03	9.00	8.85	8.78	8.62	--	--	8.89
		DO (mg/L)	10.5	10.3	9.7	5.2	3.2	0.4	--	--	6.6

**Notes:**

Water column measurements were not recorded in the afternoon, or at the Lakeshore and Grand Avenue sonde locations, due to high winds and unsafe conditions on the lake.

## Lake Elsinore June 2, 2021 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	Water Column Mean
LE01 <sup>a</sup>	07:50	Temp (°C)	23.0	23.5	23.5	23.5	23.4	23.0	22.9	--	23.3
		Sp. Cond (µS/cm)	3446	3466	3468	3470	3468	3469	3465	--	3465
		pH	8.97	8.97	8.97	8.96	8.93	8.86	8.82	--	8.93
		DO (mg/L)	10.1	9.3	9.2	8.7	7.6	5.7	4.3	--	7.8
	14:40	Temp (°C)	27.4	25	23.5	23.1	22.8	22.2	22	--	23.7
		Sp. Cond (µS/cm)	3469	3462	3455	3455	3457	3457	3456	--	3459
DO (mg/L)		9.13	9.07	8.92	8.87	8.78	8.71	8.67	--	8.88	
LE02 <sup>b</sup>	08:25	Temp (°C)	23.9	23.8	23.7	23.5	22.8	22.4	22.1	22.0	23.0
		Sp. Cond (µS/cm)	3465	3464	3461	3464	3458	3457	3466	3461	3462
		pH	9.06	9.04	9.00	8.97	8.86	8.81	8.75	8.73	8.90
		DO (mg/L)	11.9	10.9	9.8	8.7	5.0	3.9	1.3	1.2	6.6
	14:50	Temp (°C)	30.8	24.9	23.6	23.5	23.2	22.5	22.3	22.1	24.1
		Sp. Cond (µS/cm)	3488	3471	3456	3453	3457	3452	3451	3456	3461
DO (mg/L)		19.9	10.1	8.9	7.8	6.0	4.0	2.8	1.0	7.5	
LE03 <sup>c</sup>	08:10	Temp (°C)	23.2	23.2	23.2	23.0	22.7	21.9	--	--	22.9
		Sp. Cond (µS/cm)	3459	3458	3460	3465	3460	3463	--	--	3461
		pH	8.98	8.99	8.96	8.91	8.87	8.72	--	--	8.91
		DO (mg/L)	9.5	10.0	7.4	6.9	4.4	0.2	--	--	6.4
	15:05	Temp (°C)	30.3	24.4	23.0	22.7	22.6	22.1	--	--	24.2
		Sp. Cond (µS/cm)	3483	3445	3439	3453	3452	3455	--	--	3455
DO (mg/L)		19.7	24.3	7.7	6.2	5.3	0.8	--	--	10.7	
Lakeshore Sonde	15:40	Temp (°C)	27.2	24.3	23.7	23.4	23.1	22.7	22.2	21.7	23.5
		Sp. Cond (µS/cm)	3468	3472	3454	3452	3452	3454	3454	3457	3458
		pH	9.10	8.94	8.92	8.88	8.84	8.77	8.71	8.65	8.85
		DO (mg/L)	15.7	9.2	8.6	7.3	5.8	3.7	1.1	0.2	6.4
Grand Ave Sonde	15:20	Temp (°C)	28.2	24.8	23.6	23.2	23.1	22.8	22.0	--	24.0
		Sp. Cond (µS/cm)	3470	3479	3452	3451	3452	3456	3459	--	3460
		pH	9.22	9.1	8.95	8.89	8.85	8.78	8.68	--	8.92
		DO (mg/L)	22.0	14.5	9.2	7.7	5.9	4.0	0.3	--	9.1

- a- Bottom measurement taken at 5.5 feet.
- b- Bottom measurement taken at 6.5 feet.
- c- Bottom measurement taken at 4.7 feet.

### Canyon Lake August 13, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	13 m	14 m	15 m	Water Column Mean - All	Water Column Mean - Epilimnion	Water Column Mean - Hypolimnion
CL07 <sup>a</sup>	10:30	Temp (°C)	28.6	28.2	28.0	27.9	27.6	26.5	21.8	18.8	16.6	15.5	15.0	14.8	14.7	14.6	14.5	14.5	20.5	28.1	14.7
		Sp. Cond (µS/cm)	653	654	655	655	659	667	679	680	683	683	688	689	694	702	716	742	681	655	705
		pH	9.16	9.20	9.17	9.15	8.97	7.90	7.16	7.10	7.11	7.11	7.06	7.05	7.02	6.98	6.90	6.81	7.74	9.13	6.97
	DO (mg/L)	8.7	8.8	8.6	8.4	6.9	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	8.3	0.0
	15:05	Temp (°C)	29.7	29.1	28.3	28.0	27.9	26.2	21.8	18.8	17.1	15.5	15.1	14.9	14.7	14.6	14.6	14.5	20.7	28.6	14.7
		Sp. Cond (µS/cm)	660	656	658	657	657	667	680	681	680	682	684	691	697	704	710	718	680	658	701
pH		9.24	9.32	9.25	9.24	9.14	8.00	7.27	7.13	7.10	7.09	7.08	7.02	6.99	6.95	6.91	6.87	7.79	9.24	6.97	
DO (mg/L)	9.6	9.9	9.4	9.2	8.1	0.5	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	9.2	0.0	
CL08 <sup>b</sup>	09:45	Temp (°C)	28.6	28.4	28.2	28.1	27.2	26.0	21.9	18.5	16.1	15.5	15.3	--	--	--	--	--	23.1	28.1	15.4
		Sp. Cond (µS/cm)	656	658	657	669	666	665	678	681	690	698	702	--	--	--	--	--	675	661	700
		pH	9.12	9.13	9.11	9.05	8.35	7.65	7.12	7.08	7.04	7.00	7.00	--	--	--	--	--	7.97	8.95	7.00
	DO (mg/L)	8.4	8.5	8.4	7.4	4.1	0.2	0.1	0.1	0.0	0.0	0.0	--	--	--	--	--	3.4	7.3	0.0	
	14:50	Temp (°C)	29.5	29.2	28.5	27.9	27.5	26.0	25.6	22.5	16.7	15.6	15.4	--	--	--	--	--	24.0	28.5	15.5
		Sp. Cond (µS/cm)	641	657	658	658	659	667	684	674	684	692	695	--	--	--	--	--	670	655	694
pH		9.14	9.15	9.16	9.02	8.70	7.91	7.47	7.14	7.01	6.98	6.97	--	--	--	--	--	8.06	9.03	6.98	
DO (mg/L)	9.3	9.3	9.4	7.7	6.0	0.4	0.4	0.1	0.1	0.0	0.0	--	--	--	--	--	3.9	8.3	0.0		
CL09	09:00	Temp (°C)	27.9	27.9	27.8	27.8	27.3	22.1	17.7	15.9	--	--	--	--	--	--	--	--	24.3	27.9	15.9
		Sp. Cond (µS/cm)	738	740	739	739	763	901	984	1056	--	--	--	--	--	--	--	--	833	739	1056
		pH	9.25	9.25	9.23	9.18	8.44	7.05	6.97	6.88	--	--	--	--	--	--	--	--	8.28	9.23	6.88
	DO (mg/L)	9.2	9.2	8.6	8.1	2.4	0.2	0.1	0.1	--	--	--	--	--	--	--	--	4.7	8.8	0.1	
	14:30	Temp (°C)	29.9	28.7	28.0	27.7	27.2	22.6	17.7	15.3	--	--	--	--	--	--	--	--	24.6	28.6	15.3
		Sp. Cond (µS/cm)	738	738	736	745	768	897	990	1054	--	--	--	--	--	--	--	--	833	739	1054
pH		9.19	9.28	9.23	8.97	8.13	6.96	6.83	6.80	--	--	--	--	--	--	--	--	8.17	9.17	6.80	
DO (mg/L)	9.8	10.6	9.8	7.5	1.9	0.2	0.1	0.1	--	--	--	--	--	--	--	--	5.0	9.4	0.1		
CL10 <sup>c</sup>	08:00	Temp (°C)	27.9	27.9	27.9	27.8	27.6	--	--	--	--	--	--	--	--	--	--	--	27.8	--	--
		Sp. Cond (µS/cm)	774	766	766	772	803	--	--	--	--	--	--	--	--	--	--	--	776	--	--
		pH	9.18	9.19	9.17	8.88	8.42	--	--	--	--	--	--	--	--	--	--	--	8.97	--	--
	DO (mg/L)	9.9	9.9	9.8	6.3	3.6	--	--	--	--	--	--	--	--	--	--	--	7.9	--	--	
	14:15	Temp (°C)	30.2	29.2	28.0	27.8	27.6	--	--	--	--	--	--	--	--	--	--	--	28.6	--	--
		Sp. Cond (µS/cm)	759	756	759	794	803	--	--	--	--	--	--	--	--	--	--	--	774	--	--
pH		9.15	9.28	9.09	8.69	8.11	--	--	--	--	--	--	--	--	--	--	--	8.86	--	--	
DO (mg/L)	11.9	12.3	10.1	6.0	2.4	--	--	--	--	--	--	--	--	--	--	--	8.5	--	--		

Hypolimnion  
 Epilimnion  
 Thermocline

No shading indicates no observed thermocline; lake well mixed

- a- Bottom measurement taken at 14.5 meters.
- b- Bottom measurement taken at 9.5 meters.
- c- Bottom measurement taken at 3.5 meters.



### Canyon Lake October 5, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	13 m	14 m	15 m	Water Column Mean - All	Water Column Mean - Epilimnion	Water Column Mean - Hypolimnion
CL07 <sup>a</sup>	10:27	Temp (°C)	25.2	25.1	25.0	24.9	24.9	24.8	23.7	20.2	17.7	16.4	15.6	15.2	15.0	14.9	14.7	14.7	19.9	25.0	15.0
		Sp. Cond (µS/cm)	739	739	741	741	742	742	736	710	715	714	723	726	738	747	758	781	737	741	746
		pH	8.55	8.56	8.54	8.50	8.49	8.20	7.34	7.11	7.13	7.16	7.15	7.12	7.09	7.06	6.98	6.90	7.62	8.47	7.05
		DO (mg/L)	8.0	7.9	7.8	7.6	7.4	5.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	7.4	0.0
	15:05	Temp (°C)	27.5	25.9	25.2	25.0	25.0	24.7	24.3	20.8	17.9	16.6	15.8	15.4	15.0	14.8	14.8	14.7	20.2	25.6	15.1
		Sp. Cond (µS/cm)	750	743	743	745	746	749	750	714	714	717	717	723	741	746	749	780	739	746	743
pH		8.65	8.94	8.71	8.56	8.47	8.38	7.67	7.10	7.13	7.14	7.14	7.14	7.06	7.03	7.00	6.78	7.68	8.62	7.03	
		DO (mg/L)	8.9	10.9	8.7	8.1	7.5	7.1	1.6	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	3.3	8.5	0.0	
CL08	09:48	Temp (°C)	25.3	25.2	25.1	25.0	25.0	24.8	23.7	20.9	17.9	--	--	--	--	--	--	--	23.7	25.1	17.9
		Sp. Cond (µS/cm)	742	741	742	742	743	746	736	715	725	--	--	--	--	--	--	--	737	743	725
		pH	8.52	8.51	8.49	8.45	8.42	7.85	7.22	7.05	7.07	--	--	--	--	--	--	--	7.95	8.37	7.07
		DO (mg/L)	7.8	7.7	7.6	7.4	7.2	2.8	0.1	0.1	0.0	--	--	--	--	--	--	--	4.5	6.8	0.0
	14:50	Temp (°C)	26.7	26.1	25.2	25.1	25.0	24.8	24.2	21.0	17.8	--	--	--	--	--	--	--	24.0	25.5	17.8
		Sp. Cond (µS/cm)	741	741	742	742	743	717	742	715	721	--	--	--	--	--	--	--	734	738	721
		pH	8.72	8.75	8.58	8.51	8.47	8.00	7.50	7.04	7.06	--	--	--	--	--	--	8.07	8.51	7.06	
		DO (mg/L)	9.4	9.5	8.3	7.9	7.7	4.5	0.2	0.1	0.1	--	--	--	--	--	--	5.3	7.9	0.1	
CL09 <sup>b</sup>	08:55	Temp (°C)	25.0	25.0	24.9	24.9	24.9	23.8	19.1	17.1	--	--	--	--	--	--	--	--	23.1	24.9	17.1
		Sp. Cond (µS/cm)	864	865	864	863	864	883	1087	1113	--	--	--	--	--	--	--	--	925	864	1113
		pH	8.52	8.57	8.52	8.55	8.55	7.19	6.96	6.96	--	--	--	--	--	--	--	--	7.98	8.54	6.96
		DO (mg/L)	7.2	7.4	6.8	7.0	6.7	0.2	0.1	0.1	--	--	--	--	--	--	--	--	4.4	7.0	0.1
	14:25	Temp (°C)	27.7	25.6	25.1	25.0	24.9	24.0	18.9	18.4	--	--	--	--	--	--	--	--	23.7	25.7	18.4
		Sp. Cond (µS/cm)	867	862	858	859	862	881	1072	1084	--	--	--	--	--	--	--	--	918	862	1084
		pH	8.79	8.85	8.71	8.58	8.36	7.22	6.93	6.81	--	--	--	--	--	--	--	8.03	8.66	6.81	
		DO (mg/L)	9.9	10.0	8.7	7.2	6.2	0.3	0.2	0.1	--	--	--	--	--	--	--	5.3	8.4	0.1	
CL10	08:08	Temp (°C)	25.0	25.0	25.0	25.0	--	--	--	--	--	--	--	--	--	--	--	--	25.0	--	--
		Sp. Cond (µS/cm)	896	896	898	899	--	--	--	--	--	--	--	--	--	--	--	--	897	--	--
		pH	8.53	8.54	8.59	8.63	--	--	--	--	--	--	--	--	--	--	--	--	8.57	--	--
		DO (mg/L)	6.8	6.8	7.3	7.5	--	--	--	--	--	--	--	--	--	--	--	--	7.1	--	--
	14:08	Temp (°C)	27.8	25.6	25.2	25.0	--	--	--	--	--	--	--	--	--	--	--	--	25.9	--	--
		Sp. Cond (µS/cm)	901	896	897	898	--	--	--	--	--	--	--	--	--	--	--	--	898	--	--
		pH	8.87	8.83	8.53	8.45	--	--	--	--	--	--	--	--	--	--	--	8.67	--	--	
		DO (mg/L)	11.0	10.5	7.6	6.9	--	--	--	--	--	--	--	--	--	--	--	9.0	--	--	

Hypolimnion  
 Epilimnion  
 Thermocline  
 No shading indicates no observed thermocline; lake well mixed

a- Bottom measurement taken at 14.5 meters.  
 b- Bottom measurement taken at 6.5 meters.

### Canyon Lake December 9, 2020 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	13 m	14 m	Water Column Mean - All	Water Column Mean - Epilimnion	Water Column Mean - Hypolimnion	
CL07	10:35	Temp (°C)	14.0	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	--	--	
		Sp. Cond (µS/cm)	725	724	724	724	724	725	725	725	725	725	725	725	726	732	744	747	728	--	--
		pH	7.45	7.33	7.30	7.28	7.28	7.27	7.27	7.27	7.27	7.27	7.27	7.27	7.27	7.26	7.23	7.22	7.28	--	--
		DO (mg/L)	3.0	2.6	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.3	2.4	2.6	2.6	2.1	1.6	1.4	2.3	--	--
	15:20	Temp (°C)	14.4	14.1	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.9	--	--
		Sp. Cond (µS/cm)	725	725	724	724	725	725	725	725	725	726	726	726	729	737	742	746	729	--	--
DO (mg/L)		3.9	3.4	2.7	2.6	2.3	2.4	2.5	2.6	2.7	2.8	2.6	2.6	2.2	1.8	1.4	1.4	2.5	--	--	
CL08 <sup>a</sup>	09:50	Temp (°C)	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	--	--	--	--	--	--	13.7	--	--
		Sp. Cond (µS/cm)	722	722	722	722	722	722	722	722	722	722	--	--	--	--	--	--	722	--	--
		pH	7.38	7.37	7.36	7.35	7.35	7.35	7.33	7.32	7.31	7.31	--	--	--	--	--	--	7.34	--	--
		DO (mg/L)	3.9	3.8	3.6	3.6	3.6	3.6	3.5	3.5	3.5	3.5	--	--	--	--	--	--	3.6	--	--
	15:05	Temp (°C)	14.4	14.2	13.8	13.7	13.7	13.7	13.7	13.7	13.7	13.7	--	--	--	--	--	--	13.8	--	--
		Sp. Cond (µS/cm)	724	724	723	722	722	723	724	723	722	722	--	--	--	--	--	--	723	--	--
DO (mg/L)		5.1	4.9	3.9	3.7	3.6	2.9	2.8	3.0	3.3	3.2	--	--	--	--	--	--	7.37	--	--	
CL09 <sup>b</sup>	08:50	Temp (°C)	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	--	--	--	--	--	--	--	--	12.8	--	--
		Sp. Cond (µS/cm)	843	843	843	843	846	851	861	862	--	--	--	--	--	--	--	--	849	--	--
		pH	7.39	7.39	7.39	7.42	7.43	7.47	7.52	7.52	--	--	--	--	--	--	--	--	7.44	--	--
		DO (mg/L)	2.8	2.8	2.8	3.0	3.1	3.5	4.3	4.4	--	--	--	--	--	--	--	--	3.3	--	--
	14:35	Temp (°C)	13.9	13.2	13.0	12.9	12.8	12.8	12.8	12.8	--	--	--	--	--	--	--	--	13.0	--	--
		Sp. Cond (µS/cm)	840	838	837	839	843	849	855	855	--	--	--	--	--	--	--	--	845	--	--
DO (mg/L)		3.7	3.0	2.8	2.8	3.0	3.3	3.4	3.4	--	--	--	--	--	--	--	--	3.2	--	--	
CL10	07:55	Temp (°C)	12.6	12.6	12.6	12.6	--	--	--	--	--	--	--	--	--	--	--	--	12.6	--	--
		Sp. Cond (µS/cm)	856	857	859	872	--	--	--	--	--	--	--	--	--	--	--	--	861	--	--
		pH	7.67	7.63	7.61	7.64	--	--	--	--	--	--	--	--	--	--	--	--	7.64	--	--
		DO (mg/L)	5.4	5.2	5.4	5.7	--	--	--	--	--	--	--	--	--	--	--	--	5.4	--	--
	14:20	Temp (°C)	14.0	13.3	12.7	12.6	--	--	--	--	--	--	--	--	--	--	--	--	13.2	--	--
		Sp. Cond (µS/cm)	850	848	847	861	--	--	--	--	--	--	--	--	--	--	--	--	852	--	--
DO (mg/L)		7.0	7.0	6.3	6.4	--	--	--	--	--	--	--	--	--	--	--	--	6.7	--	--	

Hypolimnion  
 Epilimnion  
 Thermocline  
 No shading indicates no observed thermocline; lake well mixed

a- Bottom measurement taken at 8.5 meters.  
 b- Bottom measurement taken at 6.5 meters.

## Canyon Lake February 17, 2021 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	13 m	14 m	Water Column Mean - All	
CL07	10:40	Temp (°C)	13.5	13.4	13.1	13.0	13.0	12.9	12.9	12.7	12.2	11.8	11.7	11.7	11.7	11.7	11.7	12.5	
		Sp. Cond (µS/cm)	767	766	766	766	765	765	765	765	781	793	804	819	822	822	823	825	790
		pH	7.68	7.67	7.66	7.65	7.65	7.64	7.63	7.52	7.43	7.39	7.35	7.33	7.32	7.32	7.30	7.29	7.50
		DO (mg/L)	7.2	7.2	7.1	7.1	7.0	7.0	6.9	4.2	3.6	2.7	1.9	1.6	1.5	1.2	0.7		4.5
CL08 <sup>a</sup>	09:45	Temp (°C)	13.6	13.5	13.4	13.3	13.2	12.6	12.2	12.0	11.9	--	--	--	--	--	--	--	12.9
		Sp. Cond (µS/cm)	756	757	759	759	760	765	780	778	785	--	--	--	--	--	--	--	767
		pH	7.82	7.71	7.70	7.68	7.67	7.49	7.44	7.37	7.33	--	--	--	--	--	--	--	7.58
		DO (mg/L)	7.4	7.3	7.2	7.1	7.1	4.3	2.7	2.0	1.5	--	--	--	--	--	--	--	5.2
CL09 <sup>b</sup>	08:45	Temp (°C)	13.2	13.3	13.2	13.2	12.9	12.4	11.8	11.7	--	--	--	--	--	--	--	--	12.7
		Sp. Cond (µS/cm)	847	847	845	868	911	964	989	1000	--	--	--	--	--	--	--	--	909
		pH	8.89	8.87	8.83	8.63	8.07	7.66	7.49	7.47	--	--	--	--	--	--	--	--	8.24
		DO (mg/L)	14.8	14.8	14.1	11.5	6.2	0.6	0.2	0.1	--	--	--	--	--	--	--	--	7.8
CL10	07:50	Temp (°C)	13.4	13.4	13.4	13.3	13.0	--	--	--	--	--	--	--	--	--	--	--	13.3
		Sp. Cond (µS/cm)	888	888	889	904	932	--	--	--	--	--	--	--	--	--	--	--	900
		pH	8.84	8.86	8.84	8.56	7.95	--	--	--	--	--	--	--	--	--	--	--	8.61
		DO (mg/L)	13.9	13.9	13.7	11.8	6.3	--	--	--	--	--	--	--	--	--	--	--	11.9

**Notes:**

- Hypolimnion
- Epilimnion
- Thermocline

No shading indicates no observed thermocline; lake well mixed

Water column measurements were not recorded in the afternoon due to high winds and unsafe conditions on the lake (see text for details).

a- Bottom measurement taken at 7.5 meters.

b- Bottom measurement taken at 6.9 meters.

### Canyon Lake April 8, 2021 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	13 m	14 m	15 m	16 m	Water Column Mean - All	Water Column Mean - Epilimnion	Water Column Mean - Hypolimnion	
CL07 <sup>a</sup>	10:45	Temp (°C)	19.9	19.7	19.6	19.5	17.9	16.1	15.1	14.3	13.9	13.6	13.4	13.3	13.3	13.2	13.2	13.1	13.1	15.4	19.7	13.4	
		Sp. Cond (µS/cm)	778	778	778	778	791	784	782	792	797	799	801	802	803	802	803	807	808	808	793	778	801
		pH	8.19	8.17	8.15	8.14	7.90	7.70	7.58	7.46	7.39	7.35	7.30	7.28	7.26	7.25	7.24	7.21	7.17	7.17	7.57	8.16	7.29
		DO (mg/L)	10.0	10.0	9.9	9.8	8.3	6.6	4.8	2.8	1.9	1.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	3.8	9.9	0.6
	15:10	Temp (°C)	21.6	20.2	19.9	19.5	17.0	15.3	14.7	14.4	13.8	13.6	13.5	13.4	13.3	13.3	13.2	13.2	13.1	13.1	15.5	20.3	13.5
		Sp. Cond (µS/cm)	781	779	778	778	783	783	789	794	798	798	801	802	802	802	802	804	808	808	793	779	801
		pH	8.23	8.23	8.22	8.17	7.97	7.62	7.56	7.53	7.44	7.40	7.36	7.32	7.31	7.30	7.29	7.27	7.23	7.23	7.61	8.21	7.35
		DO (mg/L)	10.0	10.2	10.1	9.8	8.2	4.9	3.8	2.3	1.4	1.1	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	3.7	10.0	0.6
CL08 <sup>b</sup>	10:00	Temp (°C)	20.6	20.3	20.1	18.5	16.9	15.6	14.8	14.4	14.0	13.7	--	--	--	--	--	--	--	--	16.9	20.3	14.2
		Sp. Cond (µS/cm)	775	774	775	787	778	785	785	790	796	803	--	--	--	--	--	--	--	--	785	775	794
		pH	8.13	8.14	8.14	7.96	7.76	7.64	7.47	7.34	7.30	7.26	--	--	--	--	--	--	--	--	7.71	8.14	7.34
		DO (mg/L)	9.8	9.9	10.0	8.4	7.2	5.3	3.0	1.4	0.2	0.1	--	--	--	--	--	--	--	--	5.5	9.9	1.2
	14:55	Temp (°C)	21.7	21.1	20.1	19.8	17.6	15.8	15.1	14.6	14.2	14.2	--	--	--	--	--	--	--	--	17.4	21.0	14.5
		Sp. Cond (µS/cm)	776	776	775	780	782	781	783	788	793	794	--	--	--	--	--	--	--	--	783	776	790
		pH	8.24	8.22	8.21	8.13	7.82	7.68	7.53	7.45	7.39	7.35	--	--	--	--	--	--	--	--	7.80	8.22	7.43
		DO (mg/L)	10.1	10.3	10.2	9.5	7.7	5.8	4.0	2.5	1.0	0.5	--	--	--	--	4.0	--	--	--	6.2	10.2	2.0
CL09 <sup>c</sup>	9:05	Temp (°C)	20.2	20.2	20.1	18.8	17.2	15.4	13.9	12.9	12.5	--	--	--	--	--	--	--	--	--	16.8	20.2	12.7
		Sp. Cond (µS/cm)	912	912	910	984	959	958	981	1020	1028	--	--	--	--	--	--	--	--	--	963	911	1024
		pH	8.35	8.36	8.30	7.63	7.51	7.38	7.23	7.05	7.02	--	--	--	--	--	--	--	--	--	7.65	8.34	7.04
		DO (mg/L)	10.7	10.7	10.4	3.5	2.1	0.2	0.1	0.1	0.1	--	--	--	--	--	--	--	--	--	4.2	10.6	0.1
	14:30	Temp (°C)	22.1	20.8	20.4	19.4	17.1	15.7	13.9	13.8	--	--	--	--	--	--	--	--	--	--	17.9	21.1	13.9
		Sp. Cond (µS/cm)	911	905	910	960	950	957	972	980	--	--	--	--	--	--	--	--	--	--	943	909	976
		pH	8.50	8.50	8.44	7.74	7.50	7.42	7.29	7.23	--	--	--	--	--	--	--	--	--	--	7.83	8.48	7.26
		DO (mg/L)	11.5	12.0	11.1	5.8	1.9	0.5	0.2	0.1	--	--	--	--	--	--	--	--	--	--	5.4	11.5	0.2
CL10 <sup>d</sup>	8:15	Temp (°C)	20.1	20.3	20.3	19.3	19.0	--	--	--	--	--	--	--	--	--	--	--	--	--	19.8	--	--
		Sp. Cond (µS/cm)	974	971	968	1026	1031	--	--	--	--	--	--	--	--	--	--	--	--	--	994	--	--
		pH	8.05	8.04	8.06	7.54	7.36	--	--	--	--	--	--	--	--	--	--	--	--	--	7.81	--	--
		DO (mg/L)	9.6	9.6	9.7	2.3	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--	6.5	--	--
	14:10	Temp (°C)	22.8	21.1	20.5	20.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21.1	--	--
		Sp. Cond (µS/cm)	959	958	959	1015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	973	--	--
		pH	8.37	8.35	8.28	7.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.20	--	--
		DO (mg/L)	10.5	10.4	10.0	3.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.6	--	--

**Notes:**

- Hypolimnion
- Epilimnion
- Thermocline

No shading indicates no observed thermocline; lake well mixed

- a- Bottom measurement taken at 15.3 meters in the morning and 15.5 meters in the afternoon.
- b- Bottom measurement taken at 8.5 meters.
- c- Bottom measurement taken at 7.5 meters.
- d- Bottom measurement taken at 3.4 meters in the morning and 3 meters in the afternoon.

### Canyon Lake June 2, 2021 Water Column Profiles

Site	Time	Measure	Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	13 m	14 m	15 m	Water Column Mean - All	Water Column Mean - Epilimnion	Water Column Mean - Hypolimnion	
CL07 <sup>a</sup>	10:50	Temp (°C)	26.1	25.4	25.1	24.7	24.3	22.4	20.6	18.6	16.5	15.2	14.5	14.1	14.0	13.9	13.8	13.8	18.9	25.3	14.2	
		Sp. Cond (µS/cm)	876	876	875	874	875	875	872	863	860	859	861	860	865	865	865	868	868	868	875	863
		pH	8.57	8.59	8.59	8.56	8.44	7.96	7.60	7.40	7.31	7.25	7.20	7.20	7.20	7.17	7.17	7.16	7.11	7.71	8.58	7.18
		DO (mg/L)	10.6	10.6	10.5	10.2	8.8	3.7	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	10.5	0.0
	15:25	Temp (°C)	27.0	25.6	25.3	24.6	24.0	22.2	20.7	18.6	16.0	14.6	14.3	14.1	14.0	14.0	13.9	13.8	18.9	25.6	14.1	
		Sp. Cond (µS/cm)	875	870	868	870	870	875	868	858	856	858	862	862	863	863	862	864	865	871	862	
		pH	8.72	8.75	8.75	8.66	8.47	7.89	7.61	7.48	7.43	7.35	7.28	7.26	7.24	7.23	7.24	7.20	7.79	8.72	7.26	
		DO (mg/L)	11.6	11.7	11.7	10.2	8.1	3.1	0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	3.6	11.3	0.0	
		Temp (°C)	26.0	25.1	25.0	24.4	24.0	22.7	20.4	18.3	16.0	15.3	--	--	--	--	--	--	--	21.7	25.1	15.3
CL08 <sup>b</sup>	09:55	Sp. Cond (µS/cm)	873	870	871	876	880	876	874	866	866	867	--	--	--	--	--	--	872	873	867	
		pH	8.57	8.74	8.72	8.60	8.44	8.18	7.60	7.40	7.29	7.25	--	--	--	--	--	--	8.08	8.66	7.25	
		DO (mg/L)	11.3	11.4	11.1	9.5	8.0	5.5	0.2	0.1	0.0	0.0	--	--	--	--	--	--	5.7	10.8	0.0	
		Temp (°C)	27.5	26.0	25.2	24.7	24.2	22.8	20.7	17.8	16.5	15.9	--	--	--	--	--	--	--	22.1	25.9	15.9
	15:05	Sp. Cond (µS/cm)	865	864	867	869	870	872	868	860	859	861	--	--	--	--	--	--	--	866	866	861
		pH	8.69	8.80	8.78	8.73	8.42	8.15	7.62	7.50	7.40	7.30	--	--	--	--	--	--	--	8.14	8.75	7.30
		DO (mg/L)	12.5	13.3	12.6	10.9	8.3	5.0	0.3	0.2	0.1	0.1	--	--	--	--	--	--	--	6.3	12.3	0.1
		Temp (°C)	25.3	25.1	25.0	24.6	23.8	21.8	17.4	15.1	--	--	--	--	--	--	--	--	--	22.3	25.0	15.1
		Sp. Cond (µS/cm)	1031	1031	1030	1033	1077	1025	1057	1092	--	--	--	--	--	--	--	--	--	1047	1031	1092
CL09	09:00	pH	8.25	8.27	8.26	8.16	7.81	7.63	7.23	7.13	--	--	--	--	--	--	--	--	7.84	8.24	7.13	
		DO (mg/L)	8.0	8.1	7.9	7.0	2.9	0.2	0.1	0.0	--	--	--	--	--	--	--	--	4.3	7.7	0.0	
		Temp (°C)	27.9	26.0	25.4	24.7	24.0	21.5	17.7	15.0	--	--	--	--	--	--	--	--	--	22.8	26.0	15.0
		Sp. Cond (µS/cm)	1006	1026	1029	1026	1072	1021	1054	1107	--	--	--	--	--	--	--	--	--	1043	1022	1107
	14:40	pH	8.27	8.28	8.30	8.22	8.00	7.67	7.24	7.06	--	--	--	--	--	--	--	--	--	7.88	8.27	7.06
		DO (mg/L)	8.6	8.8	8.9	7.9	4.6	0.4	0.2	0.1	--	--	--	--	--	--	--	--	--	4.9	8.5	0.1
		Temp (°C)	25.2	25.2	25.1	25.0	--	--	--	--	--	--	--	--	--	--	--	--	--	25.1	--	--
		Sp. Cond (µS/cm)	1059	1060	1065	1067	--	--	--	--	--	--	--	--	--	--	--	--	--	1063	--	--
		pH	8.14	8.14	8.14	8.14	--	--	--	--	--	--	--	--	--	--	--	--	--	8.14	--	--
CL10 <sup>c</sup>	08:05	DO (mg/L)	8.3	8.2	7.8	7.2	--	--	--	--	--	--	--	--	--	--	--	--	7.9	--	--	
		Temp (°C)	28.0	26.0	25.5	25.2	--	--	--	--	--	--	--	--	--	--	--	--	--	26.2	--	--
		Sp. Cond (µS/cm)	1062	1052	1037	1055	--	--	--	--	--	--	--	--	--	--	--	--	--	1052	--	--
		pH	8.36	8.39	8.36	8.30	--	--	--	--	--	--	--	--	--	--	--	--	--	8.35	--	--
	14:20	DO (mg/L)	9.5	9.6	9.0	8.2	--	--	--	--	--	--	--	--	--	--	--	--	--	9.1	--	--
		Temp (°C)	28.0	26.0	25.5	25.2	--	--	--	--	--	--	--	--	--	--	--	--	--	26.2	--	--

Notes:  
 Hypolimnion  
 Epilimnion  
 Thermocline  
 No shading indicates no observed thermocline; lake well mixed

a- Bottom measurement taken at 14.5 feet in the afternoon.  
 b- Bottom measurement taken at 8.5 feet.  
 c- Bottom measurement taken at 2.5 feet.

**Work Orders:** 0G28110

**Project:** LE TMDL Monitoring

**Attn:** John Rudolph

**Client:** Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Report Date:** 8/31/2020

**Received Date:** 7/28/2020

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 300-4301

**P.O. #:**

**Billing Code:**

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015 • 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 John Rudolph,

Enclosed are the results of analyses for samples received 7/28/20 with the Chain-of-Custody document. The samples were received in good condition, at 4.1 °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:**



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LE TMDL Monitoring

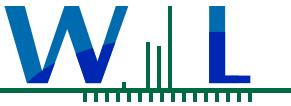
**Reported:**

08/31/2020 12:32

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02	John Rudolph	0G28110-01	Water	07/28/20 08:30	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LE TMDL Monitoring

Reported:

08/31/2020 12:32

Project Manager: John Rudolph

## Sample Results

Sample: LE02

Sampled: 07/28/20 8:30 by John Rudolph

OG28110-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0G1601	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/30/20 10:48		<b>Analyst:</b> YMT	
Ammonia as N	ND	0.012	0.10	mg/l	1	08/03/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0G1513	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/29/20 09:40		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	07/29/20 11:21	
Nitrite as N	ND	42	100	ug/l	1	07/29/20 11:21	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0G1523	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/29/20 10:29		<b>Analyst:</b> sbn	
o-Phosphate as P	0.0030	0.0030	0.010	mg/l	1	07/29/20 16:01	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0G1630	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/30/20 16:09		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.13	0.00083	0.010	mg/l	1	08/04/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0G1659	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/31/20 11:31		<b>Analyst:</b> ism	
Total Dissolved Solids	1800	4.0	10	mg/l	1	07/31/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0G1623	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/30/20 15:10		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	07/30/20	

Sample: LE02

Sampled: 07/28/20 8:30 by John Rudolph

OG28110-01RE2 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0G1676	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 07/31/20 16:03		<b>Analyst:</b> YMT	
TKN	4.6	0.036	0.20	mg/l	2	08/04/20	



Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

Project Number: LE TMDL Monitoring

Reported:  
 08/31/2020 12:32

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	Limits	RPD	Limit	Qualifier
<b>Batch: W0G1513 - EPA 353.2</b>											
<b>Blank (W0G1513-BLK1)</b>					<b>Prepared &amp; Analyzed: 07/29/20</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	42	100	ug/l							
<b>LCS (W0G1513-BS1)</b>					<b>Prepared &amp; Analyzed: 07/29/20</b>						
Nitrate as N	1.02	0.040	0.20	mg/l	1.00		102	90-110			
Nitrite as N	981	42	100	ug/l	1000		98	90-110			
<b>Matrix Spike (W0G1513-MS1)</b>					<b>Source: 0G23003-01</b>						
					<b>Prepared &amp; Analyzed: 07/29/20</b>						
Nitrate as N	2.48	0.040	0.20	mg/l	2.00	0.399	104	90-110			
Nitrite as N	1030	42	100	ug/l	1000	ND	103	90-110			
<b>Matrix Spike (W0G1513-MS2)</b>					<b>Source: 0G23003-03</b>						
					<b>Prepared &amp; Analyzed: 07/29/20</b>						
Nitrate as N	2.37	0.040	0.20	mg/l	2.00	0.319	103	90-110			
Nitrite as N	1000	42	100	ug/l	1000	ND	100	90-110			
<b>Matrix Spike Dup (W0G1513-MSD1)</b>					<b>Source: 0G23003-01</b>						
					<b>Prepared &amp; Analyzed: 07/29/20</b>						
Nitrate as N	2.48	0.040	0.20	mg/l	2.00	0.399	104	90-110	0	20	
Nitrite as N	1030	42	100	ug/l	1000	ND	103	90-110	0	20	
<b>Matrix Spike Dup (W0G1513-MSD2)</b>					<b>Source: 0G23003-03</b>						
					<b>Prepared &amp; Analyzed: 07/29/20</b>						
Nitrate as N	2.37	0.040	0.20	mg/l	2.00	0.319	103	90-110	0	20	
Nitrite as N	1000	42	100	ug/l	1000	ND	100	90-110	0	20	
<b>Batch: W0G1523 - EPA 365.3</b>											
<b>Blank (W0G1523-BLK1)</b>					<b>Prepared &amp; Analyzed: 07/29/20</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W0G1523-BS1)</b>					<b>Prepared &amp; Analyzed: 07/29/20</b>						
o-Phosphate as P	0.191	0.0030	0.010	mg/l	0.200		96	88-111			
<b>Matrix Spike (W0G1523-MS1)</b>					<b>Source: 0G28048-01</b>						
					<b>Prepared &amp; Analyzed: 07/29/20</b>						
o-Phosphate as P	0.304	0.0030	0.010	mg/l	0.200	0.104	100	85-112			
<b>Matrix Spike Dup (W0G1523-MSD1)</b>					<b>Source: 0G28048-01</b>						
					<b>Prepared &amp; Analyzed: 07/29/20</b>						
o-Phosphate as P	0.302	0.0030	0.010	mg/l	0.200	0.104	99	85-112	0.7	20	
<b>Batch: W0G1601 - EPA 350.1</b>											
<b>Blank (W0G1601-BLK1)</b>					<b>Prepared: 07/30/20 Analyzed: 08/03/20</b>						
Ammonia as N	ND	0.012	0.10	mg/l							
<b>Blank (W0G1601-BLK2)</b>					<b>Prepared: 07/30/20 Analyzed: 08/03/20</b>						
Ammonia as N	0.0402	0.012	0.10	mg/l							J
<b>LCS (W0G1601-BS1)</b>					<b>Prepared: 07/30/20 Analyzed: 08/03/20</b>						
Ammonia as N	0.245	0.012	0.10	mg/l	0.250		98	90-110			
<b>LCS (W0G1601-BS2)</b>					<b>Prepared: 07/30/20 Analyzed: 08/03/20</b>						
Ammonia as N	0.254	0.012	0.10	mg/l	0.250		102	90-110			
<b>Matrix Spike (W0G1601-MS1)</b>					<b>Source: 0G27068-01RE1</b>						
					<b>Prepared: 07/30/20 Analyzed: 08/03/20</b>						
Ammonia as N	0.270	0.012	0.10	mg/l	0.250	0.0151	102	90-110			

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

Project Number: LE TMDL Monitoring

Reported:  
 08/31/2020 12:32

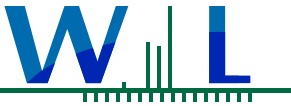
Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0G1601 - EPA 350.1 (Continued)</b>											
<b>Matrix Spike (W0G1601-MS2) Source: 0G27068-03 Prepared: 07/30/20 Analyzed: 08/03/20</b>											
Ammonia as N	0.276	0.012	0.10	mg/l	0.250	ND	110	90-110			
<b>Matrix Spike Dup (W0G1601-MSD1) Source: 0G27068-01RE1 Prepared: 07/30/20 Analyzed: 08/03/20</b>											
Ammonia as N	0.269	0.012	0.10	mg/l	0.250	0.0151	102	90-110	0.5	15	
<b>Matrix Spike Dup (W0G1601-MSD2) Source: 0G27068-03 Prepared: 07/30/20 Analyzed: 08/03/20</b>											
Ammonia as N	0.276	0.012	0.10	mg/l	0.250	ND	111	90-110	0.3	15	MS-01
<b>Batch: W0G1623 - SM 4500S2-D</b>											
<b>Blank (W0G1623-BLK1) Prepared &amp; Analyzed: 07/30/20</b>											
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W0G1623-BS1) Prepared &amp; Analyzed: 07/30/20</b>											
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	95-105			
<b>Duplicate (W0G1623-DUP1) Source: 0G29052-09 Prepared &amp; Analyzed: 07/30/20</b>											
Sulfide, Total	1.20	0.10	0.20	mg/l		1.20			0	20	
<b>Batch: W0G1630 - EPA 365.3</b>											
<b>Blank (W0G1630-BLK1) Prepared: 07/30/20 Analyzed: 08/04/20</b>											
Phosphorus as P, Total	ND	0.00083	0.010	mg/l							
<b>LCS (W0G1630-BS1) Prepared: 07/30/20 Analyzed: 08/04/20</b>											
Phosphorus as P, Total	0.205	0.00083	0.010	mg/l	0.200		102	90-110			
<b>Matrix Spike (W0G1630-MS1) Source: 0G28048-01 Prepared: 07/30/20 Analyzed: 08/04/20</b>											
Phosphorus as P, Total	0.358	0.00083	0.010	mg/l	0.200	0.161	98	90-110			
<b>Matrix Spike Dup (W0G1630-MSD1) Source: 0G28048-01 Prepared: 07/30/20 Analyzed: 08/04/20</b>											
Phosphorus as P, Total	0.359	0.00083	0.010	mg/l	0.200	0.161	99	90-110	0.3	20	
<b>Batch: W0G1659 - SM 2540C</b>											
<b>Blank (W0G1659-BLK1) Prepared &amp; Analyzed: 07/31/20</b>											
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W0G1659-BS1) Prepared &amp; Analyzed: 07/31/20</b>											
Total Dissolved Solids	804	4.0	10	mg/l	824		98	96-102			
<b>Duplicate (W0G1659-DUP1) Source: 0G28101-05 Prepared &amp; Analyzed: 07/31/20</b>											
Total Dissolved Solids	2190	4.0	10	mg/l		2160			1	10	
<b>Duplicate (W0G1659-DUP2) Source: 0G28110-01 Prepared &amp; Analyzed: 07/31/20</b>											
Total Dissolved Solids	1710	4.0	10	mg/l		1760			3	10	
<b>Batch: W0G1676 - EPA 351.2</b>											
<b>Blank (W0G1676-BLK1) Prepared: 07/31/20 Analyzed: 08/04/20</b>											
TKN	ND	0.018	0.10	mg/l							
<b>Blank (W0G1676-BLK2) Prepared: 07/31/20 Analyzed: 08/04/20</b>											
TKN	ND	0.018	0.10	mg/l							
<b>LCS (W0G1676-BS1) Prepared: 07/31/20 Analyzed: 08/04/20</b>											
TKN	0.926	0.018	0.10	mg/l	1.00		93	90-110			



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LE TMDL Monitoring

Reported:

08/31/2020 12:32

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0G1676 - EPA 351.2 (Continued)</b>											
<b>LCS (W0G1676-BS2)</b>											
TKN	0.911	0.018	0.10	mg/l	1.00		91	90-110			
<b>Matrix Spike (W0G1676-MS1)</b>											
			<b>Source: 0G27075-01</b>			<b>Prepared: 07/31/20 Analyzed: 08/04/20</b>					
TKN	1.24	0.018	0.10	mg/l	1.00	0.246	99	90-110			
<b>Matrix Spike (W0G1676-MS2)</b>											
			<b>Source: 0G27075-02</b>			<b>Prepared: 07/31/20 Analyzed: 08/04/20</b>					
TKN	1.26	0.018	0.10	mg/l	1.00	0.269	99	90-110			
<b>Matrix Spike Dup (W0G1676-MSD1)</b>											
			<b>Source: 0G27075-01</b>			<b>Prepared: 07/31/20 Analyzed: 08/04/20</b>					
TKN	1.24	0.018	0.10	mg/l	1.00	0.246	99	90-110	0.08	10	
<b>Matrix Spike Dup (W0G1676-MSD2)</b>											
			<b>Source: 0G27075-02</b>			<b>Prepared: 07/31/20 Analyzed: 08/04/20</b>					
TKN	1.33	0.018	0.10	mg/l	1.00	0.269	106	90-110	5	10	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LE TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
08/31/2020 12:32



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
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	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.

Work Orders: 0G28112

Project: 1915100403 LECL TMLD Monitoring

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 8/31/2020

Received Date: 7/28/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #:

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015 • 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 John Rudolph,

Enclosed are the results of analyses for samples received 7/28/20 with the Chain-of-Custody document. The samples were received in good condition, at 4.1 °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:



Chris Samatmanakit  
Project Manager





# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

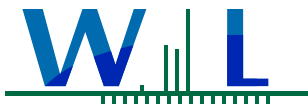
**Project Number:** 1915100403 LECL TMLD Monitoring

**Reported:**  
08/31/2020 12:39

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02 - Int	John Rudolph	0G28112-01	Water	07/28/20 08:30	
LE02 - Surf	John Rudolph	0G28112-02	Water	07/28/20 09:45	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMLD Monitoring

**Reported:**

08/31/2020 12:39

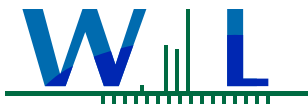
**Project Manager:** John Rudolph

## Sample Results ALS Truesdail

Sample: LE02 - Int  
OG28112-01 (Water)

Sampled: 07/28/20 8:30 by John Rudolph

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2007606	<b>Prepared:</b> 07/28/20 10:00				<b>Analyst:</b> GDG
<b>Chlorophyll a</b>	252	1.00	ug/L	1	08/24/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMLD Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
08/31/2020 12:39

## Sample Results ALS Truesdail

(Continued)

Sample: LE02 - Surf  
OG28112-02 (Water)

Sampled: 07/28/20 9:45 by John Rudolph

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2007606	<b>Prepared:</b> 07/28/20 10:00				<b>Analyst:</b> GDG
<b>Chlorophyll a</b>	188	1.00	ug/L	1	08/24/20	



Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** 1915100403 LECL TMLD Monitoring

**Reported:**  
 08/31/2020 12:39

**Project Manager:** John Rudolph

## Quality Control Results

### Microbiology

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
<b>Batch: 2007606 - EPA 10200 H</b>										
<b>Blank (2007606-BLK1)</b>										
Chlorophyll a	<1.00	1.00	ug/L							

Prepared: 07/31/20 Analyzed: 08/24/20

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMLD Monitoring

**Reported:**  
08/31/2020 12:39

**Project Manager:** John Rudolph



## Notes and Definitions

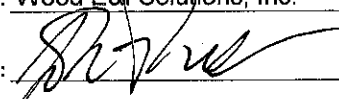
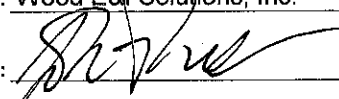
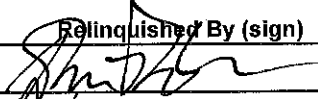
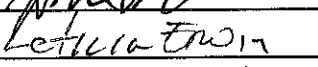
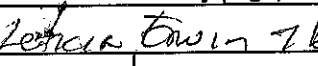
Item	Definition
%REC	Percent Recovery
Dil	Dilution
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
RPD	Relative Percent Difference

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.

0628110

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158	
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)	
Project Name: LE TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush *Additional Charges May Apply			
Project Number: 1915100403		Lab TAT Approval: By:			
<b>Sampler Information</b>		<b># of Containers &amp; Preservatives</b>		<b>Analysis Requested</b>	
Name: <u>John Rudolph</u>		Unpreserved H2SO4 HCl HNO3 Na2S2O3 NaOH NaOH/ZnAcetate NH4Cl MCAA Frozen		Matrix DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	
Employer: <u>Wood E&amp;I Solutions, Inc.</u>					
Signature: 		Total # of Containers Routine Resample Special 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) Total Sulfide (SM4500S) Total AL (EPA 200.7) Total AL (EPA 200.7)		No lab filtration required for Ortho-P (field filtered). Total Phosphorus - Sub to Eurofins Calcscience	
Signature: 					
Sample ID	Date	Time			
LE02	7/28/20	0830			
Relinquished By (sign)		Print Name / Company		Date / Time	
		John Rudolph/Wood		7/28/20 12:57	
		Leticia Ewin		7/28/20 2:16	
				Received By (Sign)	
					
				Print Name / Company	
				Leticia Ewin 7/28/20 12:57	
				7/28/20 Mike 4:10	

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>			<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	Yes	No	Temperature	
Custody Seal(s) Intact?	Yes	No	°C	
Sample(s) Intact?	Yes	No	<input type="checkbox"/> Cooler Blank	

0628112

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158																
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)																
Project Name: LECL TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush																		
Project Number: 1915100403		*Lab TAT Approval: By: _____ *Additional Charges May Apply																		
<b>Sampler Information</b>		<b># of Containers &amp; Preservatives</b>		<b>Analysis Requested</b>																
Name: <u>John Rudolph</u>		Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type	<b>Matrix</b>						<b>Notes</b>
Employer: <u>Wood E&amp;I Solutions, Inc.</u>																				
Signature: <u>[Signature]</u>																				
Sample ID	Date	Time																		
LE02 - Int	7/28/20	0830														Filter Volume: 280 ml				
LE02 - Surf	↓	0945														Filter Volume: 200 ml				
																Filter Volume:				
																Filter Volume:				
																Filter Volume:				
																Filter Volume:				
<b>Relinquished By (sign)</b>		<b>Print Name / Company</b>		<b>Date / Time</b>		<b>Received By (Sign)</b>		<b>Print Name / Company</b>												
<u>[Signature]</u>		John Rudolph / Wood		7/28/20 12:57		<u>[Signature]</u>		Leticia Brown 7/28/20 12:57												
<u>[Signature]</u>		Leticia Brown		7/28/20 2:16		<u>[Signature]</u>		Leticia Brown 7/28/20 1416 4.16 70239												

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>				<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	Yes	No		Temperature _____ °C <input type="checkbox"/> Cooler Blank	
Custody Seal(s) Intact?	Yes	No	N/A		
Sample(s) Intact?	Yes	No			

Lab No. \_\_\_\_\_  
Page 1 of 1

**Work Orders:** 0H07050

**Project:** 1915100403 LECL TMDL Monitoring

**Attn:** John Rudolph

**Client:** Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Report Date:** 9/28/2020

**Received Date:** 8/13/2020

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 300-4301

**P.O. #:**

**Billing Code:**

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015 • 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 John Rudolph,

Enclosed are the results of analyses for samples received 8/13/20 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:**



Chris Samatmanakit  
Project Manager





# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
09/28/2020 17:22

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Kate Buckley	0H07050-01	Water	08/13/20 10:55	
CL08	Kate Buckley	0H07050-02	Water	08/13/20 10:05	
CL09	Kate Buckley	0H07050-03	Water	08/13/20 09:15	
CL10	Kate Buckley	0H07050-04	Water	08/13/20 08:15	
LE02	Kate Buckley	0H07050-05	Water	08/13/20 08:45	

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
09/28/2020 17:22

**Project Manager:** John Rudolph

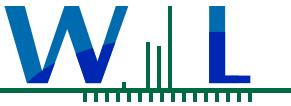
## Sample Results

Sample: CL07

Sampled: 08/13/20 10:55 by Kate Buckley

0H07050-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H0909	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/19/20 10:48		<b>Analyst:</b> YMT	
Ammonia as N	2.1	0.012	0.10	mg/l	1	08/19/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H1244	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 17:05		<b>Analyst:</b> ymt	
TKN	2.6	0.018	0.10	mg/l	1	08/24/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0H0781	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/13/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	08/14/20 15:54	
Nitrite as N	ND	42	100	ug/l	1	08/14/20 15:54	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H0816	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/14/20 11:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.23	0.0030	0.010	mg/l	1	08/14/20 12:38	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H1238	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 15:22		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.27	0.00083	0.010	mg/l	1	08/26/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0H0962	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/17/20 16:30		<b>Analyst:</b> ism	
Total Dissolved Solids	390	4.0	10	mg/l	1	08/18/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0H1006	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/18/20 11:57		<b>Analyst:</b> mfh	
Total Suspended Solids	4		5	mg/l	1	08/18/20	J
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0H0850	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/15/20 08:13		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/15/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0H1072	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 08/19/20 10:10		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.026	0.0014	0.020	mg/l	1	08/26/20	
Aluminum, Total	0.035	0.0014	0.020	mg/l	1	08/26/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Project Number: 1915100403 LECL TMDL Monitoring

Project Manager: John Rudolph

# Certificate of Analysis

FINAL REPORT

Reported:

09/28/2020 17:22

## Sample Results

(Continued)

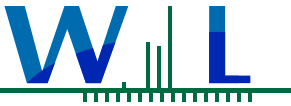
Sample: CL08

Sampled: 08/13/20 10:05 by Kate Buckley

0H07050-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H0909	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/19/20 10:48		<b>Analyst:</b> YMT	
Ammonia as N	0.95	0.012	0.10	mg/l	1	08/19/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H1244	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 17:05		<b>Analyst:</b> ymt	
TKN	1.7	0.018	0.10	mg/l	1	08/24/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0H0781	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/13/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	08/14/20 15:55	
Nitrite as N	ND	42	100	ug/l	1	08/14/20 15:55	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H0816	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/14/20 11:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.089	0.0030	0.010	mg/l	1	08/14/20 12:38	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H1238	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 15:22		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.14	0.00083	0.010	mg/l	1	08/26/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0H0962	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/17/20 16:30		<b>Analyst:</b> ism	
Total Dissolved Solids	390	4.0	10	mg/l	1	08/18/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0H1006	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/18/20 11:57		<b>Analyst:</b> mfh	
Total Suspended Solids	4		5	mg/l	1	08/18/20	J
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0H0850	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/15/20 08:13		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/15/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0H1072	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 08/19/20 10:10		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.034	0.0014	0.020	mg/l	1	08/26/20	
Aluminum, Total	0.039	0.0014	0.020	mg/l	1	08/26/20	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Project Number: 1915100403 LECL TMDL Monitoring

Project Manager: John Rudolph

# Certificate of Analysis

FINAL REPORT

Reported:

09/28/2020 17:22

## Sample Results

(Continued)

Sample: CL09

Sampled: 08/13/20 9:15 by Kate Buckley

0H07050-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H0909	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/19/20 10:48		<b>Analyst:</b> YMT	
Ammonia as N	1.5	0.012	0.10	mg/l	1	08/19/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H1244	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 17:05		<b>Analyst:</b> ymt	
TKN	2.4	0.018	0.10	mg/l	1	08/24/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0H0781	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/13/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	08/14/20 15:56	
Nitrite as N	ND	42	100	ug/l	1	08/14/20 15:56	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H0816	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/14/20 11:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.012	0.0030	0.010	mg/l	1	08/14/20 12:39	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H1238	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 15:22		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.077	0.00083	0.010	mg/l	1	08/26/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0H0962	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/17/20 16:30		<b>Analyst:</b> ism	
Total Dissolved Solids	460	4.0	10	mg/l	1	08/18/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0H1006	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/18/20 11:57		<b>Analyst:</b> mfh	
Total Suspended Solids	6		5	mg/l	1	08/18/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0H0850	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/15/20 08:13		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/15/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0H1072	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 08/19/20 10:10		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.071	0.0014	0.020	mg/l	1	08/26/20	
Aluminum, Total	0.10	0.0014	0.020	mg/l	1	08/26/20	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
 09/28/2020 17:22

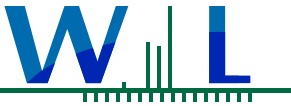
**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL10 Sampled: 08/13/20 8:15 by Kate Buckley  
 0H07050-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H0909	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/19/20 10:48		<b>Analyst:</b> YMT	
Ammonia as N	ND	0.012	0.10	mg/l	1	08/19/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H1244	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 17:05		<b>Analyst:</b> ymt	
TKN	0.97	0.018	0.10	mg/l	1	08/24/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0H0781	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/13/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	08/14/20 15:57	
Nitrite as N	ND	42	100	ug/l	1	08/14/20 15:57	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H0816	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/14/20 11:38		<b>Analyst:</b> sbn	
o-Phosphate as P	ND	0.0030	0.010	mg/l	1	08/14/20 12:40	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H1238	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 15:22		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.046	0.00083	0.010	mg/l	1	08/26/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0H0962	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/17/20 16:30		<b>Analyst:</b> ism	
Total Dissolved Solids	440	4.0	10	mg/l	1	08/18/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0H1006	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/18/20 11:57		<b>Analyst:</b> mfh	
Total Suspended Solids	9		5	mg/l	1	08/18/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0H0850	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/15/20 08:13		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/15/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0H1072	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 08/19/20 10:10		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.093	0.0014	0.020	mg/l	1	08/26/20	
Aluminum, Total	0.13	0.0014	0.020	mg/l	1	08/26/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: 1915100403 LECL TMDL Monitoring

Reported:

09/28/2020 17:22

Project Manager: John Rudolph

## Sample Results

(Continued)

Sample: LE02

Sampled: 08/13/20 8:45 by Kate Buckley

0H07050-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H0909	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/19/20 10:48		<b>Analyst:</b> YMT	
Ammonia as N	0.40	0.012	0.10	mg/l	1	08/19/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0H1244	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 17:05		<b>Analyst:</b> ymt	
TKN	4.5	0.018	0.10	mg/l	1	08/24/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0H0781	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/13/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	08/14/20 16:05	
Nitrite as N	ND	42	100	ug/l	1	08/14/20 16:05	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H0816	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/14/20 11:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.0070	0.0030	0.010	mg/l	1	08/14/20 12:41	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0H1238	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/21/20 15:22		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.25	0.00083	0.010	mg/l	1	08/26/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0H0962	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/17/20 16:30		<b>Analyst:</b> ism	
Total Dissolved Solids	1800	4.0	10	mg/l	1	08/18/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0H0850	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 08/15/20 08:13		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/15/20	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

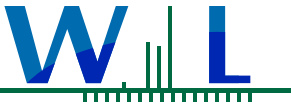
**Reported:**  
 09/28/2020 17:22

**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	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0H0781 - EPA 353.2</b>											
<b>Blank (W0H0781-BLK1)</b>					<b>Prepared: 08/13/20 Analyzed: 08/14/20</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	42	100	ug/l							
<b>LCS (W0H0781-BS1)</b>					<b>Prepared: 08/13/20 Analyzed: 08/14/20</b>						
Nitrate as N	0.992	0.040	0.20	mg/l	1.00		99	90-110			
Nitrite as N	1040	42	100	ug/l	1000		104	90-110			
<b>Matrix Spike (W0H0781-MS1)</b>					<b>Source: 0H03022-01</b>		<b>Prepared: 08/13/20 Analyzed: 08/14/20</b>				
Nitrate as N	4.61	0.040	0.20	mg/l	2.00	2.60	100	90-110			
Nitrite as N	1930	84	200	ug/l	2000	ND	97	90-110			
<b>Matrix Spike (W0H0781-MS2)</b>					<b>Source: 0H07049-05</b>		<b>Prepared: 08/13/20 Analyzed: 08/14/20</b>				
Nitrate as N	2.06	0.040	0.20	mg/l	2.00	ND	103	90-110			
Nitrite as N	1070	42	100	ug/l	1000	ND	107	90-110			
<b>Matrix Spike Dup (W0H0781-MSD1)</b>					<b>Source: 0H03022-01</b>		<b>Prepared: 08/13/20 Analyzed: 08/14/20</b>				
Nitrate as N	4.61	0.040	0.20	mg/l	2.00	2.60	100	90-110	0	20	
Nitrite as N	1930	84	200	ug/l	2000	ND	96	90-110	0.2	20	
<b>Matrix Spike Dup (W0H0781-MSD2)</b>					<b>Source: 0H07049-05</b>		<b>Prepared: 08/13/20 Analyzed: 08/14/20</b>				
Nitrate as N	2.06	0.040	0.20	mg/l	2.00	ND	103	90-110	0	20	
Nitrite as N	1070	42	100	ug/l	1000	ND	107	90-110	0	20	
<b>Batch: W0H0816 - EPA 365.3</b>											
<b>Blank (W0H0816-BLK1)</b>					<b>Prepared &amp; Analyzed: 08/14/20</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W0H0816-BS1)</b>					<b>Prepared &amp; Analyzed: 08/14/20</b>						
o-Phosphate as P	0.204	0.0030	0.010	mg/l	0.200		102	88-111			
<b>Matrix Spike (W0H0816-MS1)</b>					<b>Source: 0H07049-01</b>		<b>Prepared &amp; Analyzed: 08/14/20</b>				
o-Phosphate as P	0.206	0.0030	0.010	mg/l	0.200	0.00600	100	85-112			
<b>Matrix Spike Dup (W0H0816-MSD1)</b>					<b>Source: 0H07049-01</b>		<b>Prepared &amp; Analyzed: 08/14/20</b>				
o-Phosphate as P	0.206	0.0030	0.010	mg/l	0.200	0.00600	100	85-112	0	20	
<b>Batch: W0H0850 - SM 4500S2-D</b>											
<b>Blank (W0H0850-BLK1)</b>					<b>Prepared &amp; Analyzed: 08/15/20</b>						
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W0H0850-BS1)</b>					<b>Prepared &amp; Analyzed: 08/15/20</b>						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	95-105			
<b>Duplicate (W0H0850-DUP1)</b>					<b>Source: 0H07050-01</b>		<b>Prepared &amp; Analyzed: 08/15/20</b>				
Sulfide, Total	ND	0.050	0.10	mg/l		ND				20	
<b>Batch: W0H0909 - EPA 350.1</b>											
<b>Blank (W0H0909-BLK1)</b>					<b>Prepared &amp; Analyzed: 08/19/20</b>						
Ammonia as N	ND	0.012	0.10	mg/l							
<b>Blank (W0H0909-BLK2)</b>					<b>Prepared &amp; Analyzed: 08/19/20</b>						



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: 1915100403 LECL TMDL Monitoring

Reported:

09/28/2020 17:22

Project Manager: John Rudolph

## Quality Control Results

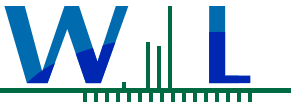
(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0H0909 - EPA 350.1 (Continued)</b>											
<b>Blank (W0H0909-BLK2)</b>					<b>Prepared &amp; Analyzed: 08/19/20</b>						
Ammonia as N	ND	0.012	0.10	mg/l							
<b>LCS (W0H0909-BS1)</b>					<b>Prepared &amp; Analyzed: 08/19/20</b>						
Ammonia as N	0.256	0.012	0.10	mg/l	0.250		103	90-110			
<b>LCS (W0H0909-BS2)</b>					<b>Prepared &amp; Analyzed: 08/19/20</b>						
Ammonia as N	0.252	0.012	0.10	mg/l	0.250		101	90-110			
<b>Matrix Spike (W0H0909-MS1)</b>					<b>Source: 0H07008-01</b>						
Ammonia as N	0.513	0.012	0.10	mg/l	0.250	0.255	103	90-110			
<b>Matrix Spike (W0H0909-MS2)</b>					<b>Source: 0H18097-03</b>						
Ammonia as N	0.251	0.012	0.10	mg/l	0.250	ND	100	90-110			
<b>Matrix Spike Dup (W0H0909-MSD1)</b>					<b>Source: 0H07008-01</b>						
Ammonia as N	0.517	0.012	0.10	mg/l	0.250	0.255	105	90-110	0.9	15	
<b>Matrix Spike Dup (W0H0909-MSD2)</b>					<b>Source: 0H18097-03</b>						
Ammonia as N	0.252	0.012	0.10	mg/l	0.250	ND	101	90-110	0.4	15	
<b>Batch: W0H0962 - SM 2540C</b>											
<b>Blank (W0H0962-BLK1)</b>					<b>Prepared: 08/17/20 Analyzed: 08/18/20</b>						
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W0H0962-BS1)</b>					<b>Prepared: 08/17/20 Analyzed: 08/18/20</b>						
Total Dissolved Solids	831	4.0	10	mg/l	824		101	96-102			
<b>Duplicate (W0H0962-DUP1)</b>					<b>Source: 0H07050-03</b>						
Total Dissolved Solids	459	4.0	10	mg/l		462			0.7	10	
<b>Duplicate (W0H0962-DUP2)</b>					<b>Source: 0H07050-05</b>						
Total Dissolved Solids	1810	4.0	10	mg/l		1820			0.2	10	
<b>Batch: W0H1006 - SM 2540D</b>											
<b>Blank (W0H1006-BLK1)</b>					<b>Prepared &amp; Analyzed: 08/18/20</b>						
Total Suspended Solids	ND		5	mg/l							
<b>LCS (W0H1006-BS1)</b>					<b>Prepared &amp; Analyzed: 08/18/20</b>						
Total Suspended Solids	218		5	mg/l	242		90	90-110			
<b>Duplicate (W0H1006-DUP1)</b>					<b>Source: 0H14041-01</b>						
Total Suspended Solids	56.0		5	mg/l		60.0			7	20	
<b>Duplicate (W0H1006-DUP2)</b>					<b>Source: 0H17017-01</b>						
Total Suspended Solids	1090		5	mg/l		1070			2	20	
<b>Batch: W0H1238 - EPA 365.3</b>											
<b>Blank (W0H1238-BLK1)</b>					<b>Prepared: 08/21/20 Analyzed: 08/26/20</b>						
Phosphorus as P, Total	0.00100	0.00083	0.010	mg/l							J
<b>LCS (W0H1238-BS1)</b>					<b>Prepared: 08/21/20 Analyzed: 08/26/20</b>						
Phosphorus as P, Total	0.206	0.00083	0.010	mg/l	0.200		103	90-110			
<b>Matrix Spike (W0H1238-MS1)</b>					<b>Source: 0H07049-01</b>						

0H07050

Page 9 of 12



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: 1915100403 LECL TMDL Monitoring

Reported:

09/28/2020 17:22

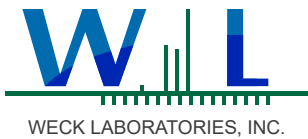
Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	Limit	Qualifier
<b>Batch: W0H1238 - EPA 365.3 (Continued)</b>											
<b>Matrix Spike (W0H1238-MS1)</b>			<b>Source: 0H07049-01</b>			<b>Prepared: 08/21/20 Analyzed: 08/26/20</b>					
Phosphorus as P, Total	0.477	0.00083	0.010	mg/l	0.200	0.280	98	90-110			
<b>Matrix Spike Dup (W0H1238-MSD1)</b>			<b>Source: 0H07049-01</b>			<b>Prepared: 08/21/20 Analyzed: 08/26/20</b>					
Phosphorus as P, Total	0.469	0.00083	0.010	mg/l	0.200	0.280	94	90-110	2	20	
<b>Batch: W0H1244 - EPA 351.2</b>											
<b>Blank (W0H1244-BLK1)</b>						<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	ND	0.018	0.10	mg/l							
<b>Blank (W0H1244-BLK2)</b>						<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	ND	0.018	0.10	mg/l							
<b>LCS (W0H1244-BS1)</b>						<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	0.916	0.018	0.10	mg/l	1.00		92	90-110			
<b>LCS (W0H1244-BS2)</b>						<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	0.926	0.018	0.10	mg/l	1.00		93	90-110			
<b>Matrix Spike (W0H1244-MS1)</b>			<b>Source: 0H17092-05</b>			<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	1.23	0.018	0.10	mg/l	1.00	0.198	103	90-110			
<b>Matrix Spike (W0H1244-MS2)</b>			<b>Source: 0H17092-06</b>			<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	1.14	0.018	0.10	mg/l	1.00	0.155	98	90-110			
<b>Matrix Spike Dup (W0H1244-MSD1)</b>			<b>Source: 0H17092-05</b>			<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	1.15	0.018	0.10	mg/l	1.00	0.198	96	90-110	6	10	
<b>Matrix Spike Dup (W0H1244-MSD2)</b>			<b>Source: 0H17092-06</b>			<b>Prepared: 08/21/20 Analyzed: 08/24/20</b>					
TKN	1.22	0.018	0.10	mg/l	1.00	0.155	107	90-110	7	10	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
 09/28/2020 17:22

**Project Manager:** John Rudolph

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0H1072 - EPA 200.7</b>											
<b>Blank (W0H1072-BLK1)</b>					<b>Prepared: 08/19/20 Analyzed: 08/26/20</b>						
Aluminum, Dissolved	ND	0.0014	0.020	mg/l							
Aluminum, Total	ND	0.0014	0.020	mg/l							
<b>LCS (W0H1072-BS1)</b>					<b>Prepared: 08/19/20 Analyzed: 08/26/20</b>						
Aluminum, Dissolved	0.208	0.0014	0.020	mg/l	0.200		104	85-115			
Aluminum, Total	0.208	0.0014	0.020	mg/l	0.200		104	85-115			
<b>Matrix Spike (W0H1072-MS1)</b>					<b>Source: 0H07049-01</b>		<b>Prepared: 08/19/20 Analyzed: 08/26/20</b>				
Aluminum, Total	0.250	0.0014	0.020	mg/l	0.200	0.0221	114	70-130			
<b>Matrix Spike (W0H1072-MS2)</b>					<b>Source: 0H07050-01</b>		<b>Prepared: 08/19/20 Analyzed: 08/26/20</b>				
Aluminum, Total	0.252	0.0014	0.020	mg/l	0.200	0.0351	109	70-130			
<b>Matrix Spike Dup (W0H1072-MSD1)</b>					<b>Source: 0H07049-01</b>		<b>Prepared: 08/19/20 Analyzed: 08/26/20</b>				
Aluminum, Total	0.251	0.0014	0.020	mg/l	0.200	0.0221	114	70-130	0.4	30	
<b>Matrix Spike Dup (W0H1072-MSD2)</b>					<b>Source: 0H07050-01</b>		<b>Prepared: 08/19/20 Analyzed: 08/26/20</b>				
Aluminum, Total	0.255	0.0014	0.020	mg/l	0.200	0.0351	110	70-130	1	30	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
09/28/2020 17:22



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
%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.



Work Orders: 0H13067

Project: 1915100403 LECL TMDL Monitoring

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 10/14/2020

Received Date: 8/13/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #:

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015 • 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 John Rudolph,

Enclosed are the results of analyses for samples received 8/13/20 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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

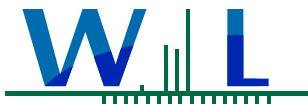
**Project Manager:** John Rudolph

## Case Narrative

Samples CL10-Surf and LE02-Int were compromised during analysis. Sample filters were initially not analyzed properly and were contaminated before possible re-analysis.

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07-Int	Marisa Swiderski	0H13067-01	Water	08/13/20 10:55	
CL07-Surf	Marisa Swiderski	0H13067-02	Water	08/13/20 11:00	
CL08-Int	Marisa Swiderski	0H13067-03	Water	08/13/20 10:05	
CL08-Surf	Marisa Swiderski	0H13067-04	Water	08/13/20 10:10	
CL09-Int	Marisa Swiderski	0H13067-05	Water	08/13/20 09:15	
CL09-Surf	Marisa Swiderski	0H13067-06	Water	08/13/20 09:20	
CL10-Int	Marisa Swiderski	0H13067-07	Water	08/13/20 08:15	
LE02-Surf	Marisa Swiderski	0H13067-10	Water	08/13/20 09:00	
LE02-Surf (0.5m) TNTP	Marisa Swiderski	0H13067-11	Water	08/13/20 08:15	
LE02-Depth Integrated TNTP	Marisa Swiderski	0H13067-12	Water	08/13/20 08:30	
LE02-Surf (0.5m) TNTP DUP	Marisa Swiderski	0H13067-13	Water	08/13/20 08:55	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

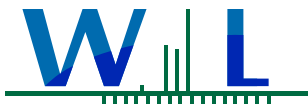
**Project Manager:** John Rudolph

## Sample Results ALS Truesdail

Sample: CL07-Int  
0H13067-01 (Water)

Sampled: 08/13/20 10:55 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
<b>Chlorophyll a</b>	18.1	1.00	ug/L	1	09/22/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

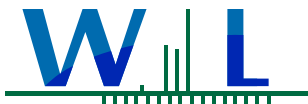
**Reported:**  
10/14/2020 13:07

## Sample Results ALS Truesdail

(Continued)

Sample: CL07-Surf  
0H13067-02 (Water) Sampled: 08/13/20 11:00 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
<b>Chlorophyll a</b>	<b>9.46</b>	1.00	ug/L	1	09/22/20	<b>O-04</b>



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
10/14/2020 13:07

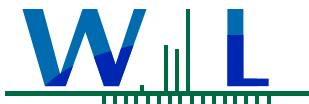
## Sample Results ALS Truesdail

(Continued)

Sample: CL08-Int  
0H13067-03 (Water)

Sampled: 08/13/20 10:05 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
<b>Chlorophyll a</b>	27.8	1.00	ug/L	1	09/22/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

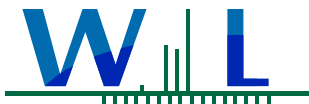
**Project Manager:** John Rudolph

## Sample Results ALS Truesdail

(Continued)

Sample: CL08-Surf  
0H13067-04 (Water) Sampled: 08/13/20 10:10 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
Chlorophyll a	11.0	1.00	ug/L	1	09/22/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

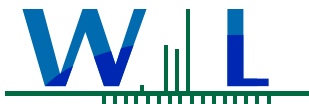
**Project Manager:** John Rudolph

## Sample Results ALS Truesdail

(Continued)

Sample: CL09-Int  
0H13067-05 (Water) Sampled: 08/13/20 9:15 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
<b>Chlorophyll a</b>	67.5	1.00	ug/L	1	09/22/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

**Project Manager:** John Rudolph

## Sample Results ALS Truesdail

(Continued)

Sample: CL09-Surf  
0H13067-06 (Water) Sampled: 08/13/20 9:20 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
<b>Chlorophyll a</b>	<b>16.5</b>	1.00	ug/L	1	09/22/20	<b>O-04</b>





# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
10/14/2020 13:07

**Project Manager:** John Rudolph

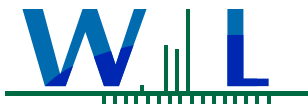
## Sample Results ALS Truesdail

(Continued)

Sample: CL10-Int  
0H13067-07 (Water)

Sampled: 08/13/20 8:15 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2008541	<b>Prepared:</b> 09/22/20 18:55				<b>Analyst:</b> AJF
<b>Chlorophyll a</b>	23.2	1.00	ug/L	1	09/22/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
10/14/2020 13:07

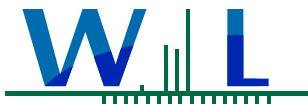
## Sample Results ALS Truesdail

(Continued)

Sample: LE02-Surf  
0H13067-10 (Water)

Sampled: 08/13/20 9:00 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2009467	<b>Prepared:</b> 09/24/20 15:06				<b>Analyst:</b> RRR
<b>Chlorophyll a</b>	200	1.00	ug/L	1	09/25/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
10/14/2020 13:07

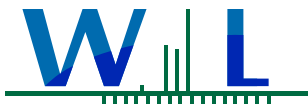
## Sample Results ALS Truesdail

(Continued)

Sample: LE02-Surf (0.5m) TNTP  
0H13067-11 (Water)

Sampled: 08/13/20 8:15 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2009467	<b>Prepared:</b> 09/24/20 15:06				<b>Analyst:</b> RRR
<b>Chlorophyll a</b>	184	1.00	ug/L	1	09/25/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

**Project Manager:** John Rudolph

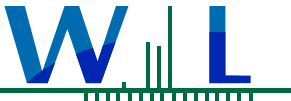
## Sample Results ALS Truesdail

(Continued)

Sample: LE02-Depth Integrated TNTP  
0H13067-12 (Water)

Sampled: 08/13/20 8:30 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2009467	<b>Prepared:</b> 09/24/20 15:06				<b>Analyst:</b> RRR
<b>Chlorophyll a</b>	156	1.00	ug/L	1	09/25/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

FINAL REPORT

**Reported:**  
10/14/2020 13:07

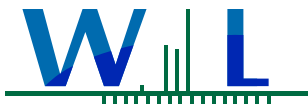
## Sample Results ALS Truesdail

(Continued)

Sample: LE02-Surf (0.5m) TNTP DUP  
0H13067-13 (Water)

Sampled: 08/13/20 8:55 by Marisa Swiderski

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Microbiology</b>						
<b>Method:</b> EPA 10200 H	<b>Batch ID:</b> 2009467	<b>Prepared:</b> 09/24/20 15:06				<b>Analyst:</b> RRR
<b>Chlorophyll a</b>	166	1.00	ug/L	1	09/25/20	O-04



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

10/14/2020 13:07

**Project Manager:** John Rudolph

## Quality Control Results

### Microbiology

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
<b>Batch: 2008541 - EPA 10200 H</b>										
<b>Blank (2008541-BLK1)</b>										
Chlorophyll a	<1.00	1.00	ug/L							
<b>Prepared: 08/27/20 Analyzed: 09/22/20</b>										
<b>Batch: 2009467 - EPA 10200 H</b>										
<b>Blank (2009467-BLK1)</b>										
Chlorophyll a	<1.00	1.00	ug/L							
<b>Prepared: 09/24/20 Analyzed: 09/25/20</b>										

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
10/14/2020 13:07

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
O-04	The sample was analyzed outside of the analyte's hold time.
%REC	Percent Recovery
Dil	Dilution
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)
RPD	Relative Percent Difference

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.

OH07050

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158	
FAX No.		Email: john.rudolph@woodpic.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)	
Project Name: LECL TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush			
Project Number: 1915100403		Lab TAT Approval: By: *Additional Charges May Apply			
<b>Sampler Information</b> Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>Kate Buckley</u>		<b># of Containers &amp; Preservatives</b> Unpreserved H2SO4 HCl HNO3 Na2S2O3 NaOH NaOH/ZnAcetate NH4Cl MCAA Frozen		<b>Analysis Requested</b> Total # of Containers Routine Resample Special 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) Total Sulfide (SM4500S) Total AL (EPA 200.7) Dissolved AL (EPA 200.7)	
<b>Matrix</b> DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous		<b>Notes</b> Ortho-P is field filtered (0.45 um) <del>Dissolved Al is not field filtered - KB</del> Dissolved Al is field filtered (0.45um).			
Sample ID	Date	Time			
CL07	8/13/20	1055			X X X X X X X X X X
CL08	8/13/20	1005			X X X X X X X X X X
CL09	8/13/20	0915			X X X X X X X X X X
CL10		0815			X X X X X X X X X X
LE02		0845			X X X X X X X
Relinquished By (sign)		Print Name / Company		Date / Time	
<u>Kate Buckley</u>		<u>Kate Buckley, wood</u>		<u>8/13/20 1400</u>	
<u>[Signature]</u>		<u>Hector Sanchez</u>		<u>8/13/20/1500</u>	
				Received By (Sign)	
				<u>Hector Sanchez</u>	
				<u>[Signature]</u> 8/13/20	
				Print Name / Company	
				<u>Hector Sanchez</u>	
				<u>C. Abad / week</u> 15:02	

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>		<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Temperature	
Custody Seal(s) Intact?	<input checked="" type="radio"/> Yes <input type="radio"/> No N/A	5 °C	
Sample(s) Intact?	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="checkbox"/> Cooler Blank	



OH13067

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158																				
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)																				
Project Name: LE TNTP Offset		Turn Around Time: Routine *3-5 Day *48 Hour *24 Hour Rush Rush Rush																						
Project Location:		*Lab TAT Approval: By: *Additional Charges May Apply																						
Sampler Information			# of Containers & Preservatives				Total # of Containers	Analysis Requested							Matrix	Notes								
Name: <u>Kate Buckley</u>	Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH		NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Routine	Resample	Special	Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a (SM10200 H)	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	Chi-a samples on 0.7 um GFF
Employer: Wood E&I Solutions, Inc.																								
Signature: <u>Kate Buckley</u>																								
Sample ID	Date	Time																						
LE02 - Surf (0.5m) TNTP	08/13/20	0815																					Filter Volume: <u>300ml</u> <sup>KB</sup> 270ML	
LE02 - Depth Integrated TNTP	↓	0830																					Filter Volume: <u>300ml</u>	
LE02 - Surf (0.5m) TNTP DUP	↓	0855																					Filter Volume: <u>250ML</u>	
																							Filter Volume:	
																							Filter Volume:	
																							Filter Volume:	
																							Filter Volume:	
																							Filter Volume:	
																							Filter Volume:	
																							Filter Volume:	
Relinquished By (sign)	Print Name / Company		Date / Time		Received By (Sign)		Print Name / Company																	
<u>Kate Buckley</u>	<u>Kate Buckley, wood</u>		<u>8/13/20 1400</u>		<u>Hector Sanchez</u>		<u>Hector Sanchez</u>																	
<u>Hector Sanchez</u>	<u>Hector / Wood</u>		<u>8-13-20/1500</u>		<u>J. B. W</u>		<u>J. B. W</u>																	

<b>(For Lab Use Only)</b>		<b>Sample Integrity Upon Receipt</b>		<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <u>Upr</u>	Temperature			
Custody Seal(s) Intact?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <u>N/A</u>	5 °C			
Sample(s) Intact?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<input type="checkbox"/> Cooler Blank			

Work Orders: 0114069

Project: LE TMDL Monitoring

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 9/29/2020

Received Date: 9/14/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #: C015101084

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015 • 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 John Rudolph,

Enclosed are the results of analyses for samples received 9/14/20 with the Chain-of-Custody document. The samples were received in good condition, at 10.6 °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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LE TMDL Monitoring

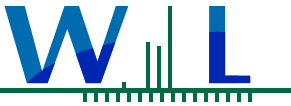
**Reported:**

09/29/2020 17:51

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02	Kate Buckley	0114069-01	Water	09/14/20 08:45	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LE TMDL Monitoring

Reported:

09/29/2020 17:51

Project Manager: John Rudolph

## Sample Results

Sample: LE02

Sampled: 09/14/20 8:45 by Kate Buckley

0114069-01 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06		
<b>Batch ID:</b> W010659	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/15/20 13:46		<b>Analyst:</b> YMT		
Ammonia as N	0.69	0.10	mg/l	1	09/16/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01		
<b>Batch ID:</b> W010779	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/15/20 09:03		<b>Analyst:</b> SAR		
Nitrate as N	ND	0.20	mg/l	1	09/15/20 12:04	
Nitrite as N	ND	100	ug/l	1	09/15/20 12:04	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04		
<b>Batch ID:</b> W010788	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/15/20 10:06		<b>Analyst:</b> sbn		
o-Phosphate as P	ND	0.010	mg/l	1	09/15/20 11:27	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04		
<b>Batch ID:</b> W010981	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/17/20 15:55		<b>Analyst:</b> sbn		
Phosphorus as P, Total	0.26	0.010	mg/l	1	09/22/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01		
<b>Batch ID:</b> W010887	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/16/20 13:35		<b>Analyst:</b> ism		
Total Dissolved Solids	1900	10	mg/l	1	09/16/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST		
<b>Batch ID:</b> W011037	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/19/20 10:15		<b>Analyst:</b> mfh		
Sulfide, Total	ND	0.10	mg/l	1	09/19/20	

Sample: LE02

Sampled: 09/14/20 8:45 by Kate Buckley

0114069-01RE2 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06		
<b>Batch ID:</b> W011034	<b>Preparation:</b> _NONE (WETCHEM)	<b>Prepared:</b> 09/18/20 17:33		<b>Analyst:</b> YMT		
TKN	4.6	0.40	mg/l	4	09/22/20	



WECK LABORATORIES, INC.

# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Project Number: LE TMDL Monitoring

Reported:  
09/29/2020 17:51

Project Manager: John Rudolph

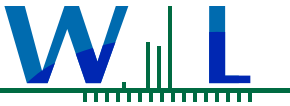
## Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W010659 - EPA 350.1</b>										
<b>Blank (W010659-BLK1)</b> Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	ND	0.10	mg/l							
<b>Blank (W010659-BLK2)</b> Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	ND	0.10	mg/l							
<b>LCS (W010659-BS1)</b> Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	0.255	0.10	mg/l	0.250		102	90-110			
<b>LCS (W010659-BS2)</b> Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	0.256	0.10	mg/l	0.250		103	90-110			
<b>Duplicate (W010659-DUP1)</b> Source: 0114115-01 Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	ND	0.10	mg/l		ND				15	
<b>Matrix Spike (W010659-MS1)</b> Source: 0110075-05 Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	0.322	0.10	mg/l	0.250	0.0577	106	90-110			
<b>Matrix Spike (W010659-MS2)</b> Source: 0110075-16 Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	0.254	0.10	mg/l	0.250	ND	102	90-110			
<b>Matrix Spike Dup (W010659-MSD1)</b> Source: 0110075-05 Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	0.317	0.10	mg/l	0.250	0.0577	104	90-110	2	15	
<b>Matrix Spike Dup (W010659-MSD2)</b> Source: 0110075-16 Prepared: 09/15/20 Analyzed: 09/16/20										
Ammonia as N	0.256	0.10	mg/l	0.250	ND	102	90-110	0.7	15	
<b>Batch: W010779 - EPA 353.2</b>										
<b>Blank (W010779-BLK1)</b> Prepared & Analyzed: 09/15/20										
Nitrate as N	ND	0.15	mg/l							
Nitrite as N	ND	100	ug/l							
<b>LCS (W010779-BS1)</b> Prepared & Analyzed: 09/15/20										
Nitrate as N	1.02	0.15	mg/l	1.00		102	90-110			
Nitrite as N	1080	100	ug/l	1000		108	90-110			
<b>Duplicate (W010779-DUP1)</b> Source: 0114115-01 Prepared & Analyzed: 09/15/20										
Nitrate as N	0.921	0.15	mg/l		0.933			1	20	
Nitrite as N	ND	100	ug/l		ND				20	
<b>Matrix Spike (W010779-MS1)</b> Source: 0114055-01 Prepared & Analyzed: 09/15/20										
Nitrate as N	7.65	0.15	mg/l	2.00	5.54	106	90-110			
Nitrite as N	1050	100	ug/l	1000	ND	105	90-110			
<b>Matrix Spike (W010779-MS2)</b> Source: 0114104-05 Prepared & Analyzed: 09/15/20										
Nitrate as N	6.09	0.15	mg/l	2.00	3.95	107	90-110			
Nitrite as N	5050	500	ug/l	5000	ND	101	90-110			
<b>Matrix Spike Dup (W010779-MSD1)</b> Source: 0114055-01 Prepared & Analyzed: 09/15/20										
Nitrate as N	7.65	0.15	mg/l	2.00	5.54	106	90-110	0	20	
Nitrite as N	1070	100	ug/l	1000	ND	107	90-110	2	20	
<b>Matrix Spike Dup (W010779-MSD2)</b> Source: 0114104-05 Prepared & Analyzed: 09/15/20										
Nitrate as N	6.10	0.15	mg/l	2.00	3.95	108	90-110	0.2	20	

O114069

Page 4 of 7



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LE TMDL Monitoring

Reported:

09/29/2020 17:51

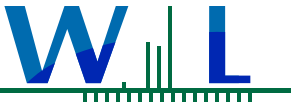
Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W010779 - EPA 353.2 (Continued)</b>										
<b>Matrix Spike Dup (W010779-MSD2)</b> Source: 0114104-05 Prepared & Analyzed: 09/15/20										
Nitrite as N	4830	500	ug/l	5000	ND	97	90-110	4	20	
<b>Batch: W010788 - EPA 365.3</b>										
<b>Blank (W010788-BLK1)</b> Prepared & Analyzed: 09/15/20										
o-Phosphate as P	ND	0.010	mg/l							
<b>LCS (W010788-BS1)</b> Prepared & Analyzed: 09/15/20										
o-Phosphate as P	0.206	0.010	mg/l	0.200		103	88-111			
<b>Matrix Spike (W010788-MS1)</b> Source: 0103007-01 Prepared & Analyzed: 09/15/20										
o-Phosphate as P	0.194	0.010	mg/l	0.200	ND	97	85-112			
<b>Matrix Spike Dup (W010788-MSD1)</b> Source: 0103007-01 Prepared & Analyzed: 09/15/20										
o-Phosphate as P	0.196	0.010	mg/l	0.200	ND	98	85-112	1	20	
<b>Batch: W010887 - SM 2540C</b>										
<b>Blank (W010887-BLK1)</b> Prepared & Analyzed: 09/16/20										
Total Dissolved Solids	ND	10	mg/l							
<b>LCS (W010887-BS1)</b> Prepared & Analyzed: 09/16/20										
Total Dissolved Solids	834	10	mg/l	824		101	96-102			
<b>Duplicate (W010887-DUP1)</b> Source: 0115077-04 Prepared & Analyzed: 09/16/20										
Total Dissolved Solids	6230	10	mg/l		6300			1	10	
<b>Duplicate (W010887-DUP2)</b> Source: 0111045-01 Prepared & Analyzed: 09/16/20										
Total Dissolved Solids	62700	100	mg/l		62800			0.2	10	
<b>Batch: W010981 - EPA 365.3</b>										
<b>Blank (W010981-BLK1)</b> Prepared: 09/17/20 Analyzed: 09/22/20										
Phosphorus as P, Total	ND	0.010	mg/l							
<b>LCS (W010981-BS1)</b> Prepared: 09/17/20 Analyzed: 09/22/20										
Phosphorus as P, Total	0.202	0.010	mg/l	0.200		101	90-110			
<b>Matrix Spike (W010981-MS1)</b> Source: 0103007-01 Prepared: 09/17/20 Analyzed: 09/22/20										
Phosphorus as P, Total	0.457	0.010	mg/l	0.200	0.253	102	90-110			
<b>Matrix Spike Dup (W010981-MSD1)</b> Source: 0103007-01 Prepared: 09/17/20 Analyzed: 09/22/20										
Phosphorus as P, Total	0.457	0.010	mg/l	0.200	0.253	102	90-110	0	20	
<b>Batch: W011034 - EPA 351.2</b>										
<b>Blank (W011034-BLK1)</b> Prepared: 09/18/20 Analyzed: 09/22/20										
TKN	ND	0.10	mg/l							
<b>LCS (W011034-BS1)</b> Prepared: 09/18/20 Analyzed: 09/22/20										
TKN	1.08	0.10	mg/l	1.00		108	90-110			
<b>Matrix Spike (W011034-MS1)</b> Source: 0114114-04 Prepared: 09/18/20 Analyzed: 09/22/20										
TKN	1.17	0.10	mg/l	1.00	0.172	100	90-110			
<b>Matrix Spike Dup (W011034-MSD1)</b> Source: 0114114-04 Prepared: 09/18/20 Analyzed: 09/22/20										
TKN	1.16	0.10	mg/l	1.00	0.172	99	90-110	0.7	10	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Project Number: LE TMDL Monitoring

Project Manager: John Rudolph

# Certificate of Analysis

FINAL REPORT

Reported:  
09/29/2020 17:51

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W011037 - SM 4500S2-D</b>										
<b>Blank (W011037-BLK1)</b>										
Sulfide, Total	ND	0.10	mg/l							
<b>Prepared &amp; Analyzed: 09/19/20</b>										
<b>LCS (W011037-BS1)</b>										
Sulfide, Total	0.100	0.10	mg/l	0.100		100	95-105			
<b>Prepared &amp; Analyzed: 09/19/20</b>										
<b>Duplicate (W011037-DUP1)</b>										
<b>Source: 0116119-03</b>										
Sulfide, Total	0.400	0.10	mg/l		0.400			0	20	
<b>Prepared &amp; Analyzed: 09/19/20</b>										
<b>Duplicate (W011037-DUP2)</b>										
<b>Source: 0117048-01</b>										
Sulfide, Total	44.0	4.0	mg/l		44.0			0	20	
<b>Prepared &amp; Analyzed: 09/19/20</b>										



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LE TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
09/29/2020 17:51



## Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
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.



OI14069

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158														
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)														
Project Name: LE TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day *48 Hour *24 Hour																
Project Number: 1915100403		Lab TAT Approval: By: Rush Rush *Additional Charges May Apply																
<b>Sampler Information</b> Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>Kate Buckley</u>		<b># of Containers &amp; Preservatives</b> Unpreserved H2SO4 HCl HNO3 Na2S2O3 NaOH NaOH/ZnAcetate NH4Cl MCAA Frozen		<b>Analysis Requested</b> 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) Total Sulfide (SM4500S) Total Al (EPA 200.7) Total Al (EPA 200.7)		<b>Matrix</b> DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	<b>Notes</b> No lab filtration required for Ortho-P (field filtered).											
Sample ID	Date	Time	Total # of Containers	Routine	Resample	Special	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)	Total Sulfide (SM4500S)	Total Al (EPA 200.7)	Total Al (EPA 200.7)		
LE02	9/14/20	0845						X	X	X	X	X	X	X				
Relinquished By (sign)		Print Name / Company		Date / Time		Received By (Sign)		Print Name / Company										
<u>Kate Buckley</u>		<u>Kate Buckley / Wood</u>		<u>9/14/20 12:06</u>		<u>John</u>		<u>Wood Lab.</u>										
<u>John</u>		<u>John</u>		<u>9/14/20 1:07</u>		<u>John</u>		<u>JAME GOMEZ / woodlabs</u>										

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>			<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Temperature		
Custody Seal(s) Intact?	Yes <input checked="" type="radio"/> No <input type="radio"/> N/A	10.6 °C		
Sample(s) Intact?	Yes <input checked="" type="radio"/> No <input type="radio"/>	<input type="checkbox"/> Cooler Blank		

Lab No. \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

0114071

<b>Client:</b> Wood E&I Solutions, Inc.		<b>Contact:</b> John Rudolph		<b>Phone No.</b> 858-243-8158											
<b>FAX No.</b>		<b>Email:</b> john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number In Notes)											
<b>Project Name:</b> LECL TMDL Monitoring		<b>Turn Around Time:</b> <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush													
<b>Project Number:</b> 1915100403		<b>*Lab TAT Approval:</b> By: _____ *Additional Charges May Apply													
<b>Sampler Information</b>		<b># of Containers &amp; Preservatives</b>		<b>Sample Type</b>		<b>Analysis Requested</b>		<b>Matrix</b>		<b>Notes</b>					
Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>Kate Buckley</u>		Unpreserved H2SO4 HCl HNO3 Na2S2O3 NaOH NaOH/ZnAcetate NH4Cl MCAA Frozen		<b>Total # of Containers</b>		Routine Resample Special		Total Sulfide Nitrate - Nitrite TDS TKN Ammonia Total Phosphorus SRP/Ortho-P Chlorophyll-a (SM10200 H)		DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous		Chi-a samples on 0.7 um GFF			
<b>Sample ID</b>		<b>Date</b>				<b>Time</b>									
LE02 - Int		9/14/20				0845								Filter Volume: <u>350mL</u>	
LE02 - Surf		↓				0910								Filter Volume: <u>350mL</u>	
														Filter Volume:	
														Filter Volume:	
														Filter Volume:	
<b>Relinquished By (sign)</b>		<b>Print Name / Company</b>		<b>Date / Time</b>		<b>Received By (Sign)</b>		<b>Print Name / Company</b>							
<u>Kate Buckley</u>		<u>Kate Buckley / wood</u>		<u>9/14/20</u> 12:06		<u>Jayme Gomez</u>		<u>JAYME GOMEZ / woodlabs</u>							
<u>[Signature]</u>		<u>[Signature]</u>		<u>9/14/20</u> 1:07		<u>[Signature]</u>									

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>			<b>Lab Notes</b>		
Sample(s) Submitted on Ice?	<input checked="" type="radio"/> Yes <input type="radio"/> No		Temperature		
Custody Seal(s) Intact?	Yes <input checked="" type="radio"/> No <input type="radio"/> N/A		10.6 °C		
Sample(s) Intact?	<input checked="" type="radio"/> Yes <input type="radio"/> No		<input type="checkbox"/> Cooler Blank		

Lab No. \_\_\_\_\_  
 Page \_\_\_\_ of \_\_\_\_

Work Orders: 0125011

Project: <ECL TMDL Monitoring 1915100403

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 10/19/2020

Received Date: 10/5/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #: C015101084

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015 • 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 John Rudolph,

Enclosed are the results of analyses for samples received 10/05/20 with the Chain-of-Custody document. The samples were received in good condition, at 4.3 °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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** <ECL TMDL Monitoring 1915100403

**Reported:**  
10/19/2020 13:41

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Kate Buckley	0I25011-01	Water	10/05/20 10:45	
CL08	Kate Buckley	0I25011-02	Water	10/05/20 10:00	
CL09	Kate Buckley	0I25011-03	Water	10/05/20 09:10	
CL10	Kate Buckley	0I25011-04	Water	10/05/20 08:20	
LE02	Kate Buckley	0I25011-05	Water	10/05/20 08:35	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** <ECL TMDL Monitoring 1915100403

**Reported:**  
 10/19/2020 13:41

**Project Manager:** John Rudolph

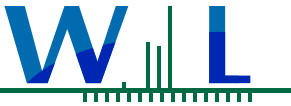
## Sample Results

Sample: CL07

Sampled: 10/05/20 10:45 by Kate Buckley

0125011-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0391	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/09/20 09:44		<b>Analyst:</b> YMT	
<b>Ammonia as N</b>	1.9	0.012	0.10	mg/l	1	10/09/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0684	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/13/20 10:07		<b>Analyst:</b> YMT	
<b>TKN</b>	2.4	0.018	0.10	mg/l	1	10/14/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0J0241	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 09:05		<b>Analyst:</b> SAR	
<b>Nitrate as N</b>	0.041	0.040	0.20	mg/l	1	10/06/20 12:48	J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/20 12:48	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0309	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 15:47		<b>Analyst:</b> sbn	
<b>o-Phosphate as P</b>	0.16	0.0030	0.010	mg/l	1	10/06/20 16:36	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0498	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:26		<b>Analyst:</b> sbn	
<b>Phosphorus as P, Total</b>	0.20	0.00083	0.010	mg/l	1	10/13/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0J0322	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 17:23		<b>Analyst:</b> ism	
<b>Total Dissolved Solids</b>	490	4.0	10	mg/l	1	10/07/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0J0469	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 11:58		<b>Analyst:</b> mfh	
<b>Total Suspended Solids</b>	ND		5	mg/l	1	10/08/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0J0500	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:42		<b>Analyst:</b> mfh	
<b>Sulfide, Total</b>	8.0	0.20	0.40	mg/l	4	10/09/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0J0590	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 10/11/20 15:03		<b>Analyst:</b> kvm	
<b>Aluminum, Dissolved</b>	0.027	0.0014	0.020	mg/l	1	10/17/20	
<b>Aluminum, Total</b>	0.036	0.0014	0.020	mg/l	1	10/17/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: <ECL TMDL Monitoring 1915100403

Reported:

10/19/2020 13:41

Project Manager: John Rudolph

## Sample Results

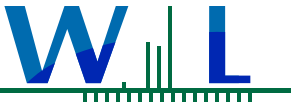
(Continued)

Sample: CL08

Sampled: 10/05/20 10:00 by Kate Buckley

0I25011-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0391	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/09/20 09:44		<b>Analyst:</b> YMT	
Ammonia as N	0.45	0.012	0.10	mg/l	1	10/09/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0684	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/13/20 10:07		<b>Analyst:</b> YMT	
TKN	1.1	0.018	0.10	mg/l	1	10/14/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0J0241	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 09:05		<b>Analyst:</b> SAR	
Nitrate as N	ND	0.040	0.20	mg/l	1	10/06/20 12:49	
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/20 12:49	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0309	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 15:47		<b>Analyst:</b> sbn	
o-Phosphate as P	0.0070	0.0030	0.010	mg/l	1	10/06/20 16:39	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0498	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:26		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.052	0.00083	0.010	mg/l	1	10/13/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0J0322	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 17:23		<b>Analyst:</b> ism	
Total Dissolved Solids	390	4.0	10	mg/l	1	10/07/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0J0469	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 11:58		<b>Analyst:</b> mfh	
Total Suspended Solids	ND		5	mg/l	1	10/08/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0J0500	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:42		<b>Analyst:</b> mfh	
Sulfide, Total	4.8	0.20	0.40	mg/l	4	10/09/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0J0590	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 10/11/20 15:03		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.032	0.0014	0.020	mg/l	1	10/17/20	
Aluminum, Total	0.040	0.0014	0.020	mg/l	1	10/17/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: <ECL TMDL Monitoring 1915100403

Reported:

10/19/2020 13:41

Project Manager: John Rudolph

## Sample Results

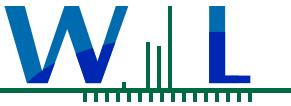
(Continued)

Sample: CL09

Sampled: 10/05/20 9:10 by Kate Buckley

0125011-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0391	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/09/20 09:44		<b>Analyst:</b> YMT	
<b>Ammonia as N</b>	2.3	0.012	0.10	mg/l	1	10/09/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0684	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/13/20 10:07		<b>Analyst:</b> YMT	
<b>TKN</b>	3.1	0.018	0.10	mg/l	1	10/14/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0J0241	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 09:05		<b>Analyst:</b> SAR	
<b>Nitrate as N</b>	0.056	0.040	0.20	mg/l	1	10/06/20 12:50	J
<b>Nitrite as N</b>	ND	0.042	0.10	mg/l	1	10/06/20 12:50	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0309	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 15:47		<b>Analyst:</b> sbn	
<b>o-Phosphate as P</b>	0.0070	0.0030	0.010	mg/l	1	10/06/20 16:40	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0498	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:26		<b>Analyst:</b> sbn	
<b>Phosphorus as P, Total</b>	0.061	0.00083	0.010	mg/l	1	10/13/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0J0322	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 17:23		<b>Analyst:</b> ism	
<b>Total Dissolved Solids</b>	400	4.0	10	mg/l	1	10/07/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0J0469	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 11:58		<b>Analyst:</b> mfh	
<b>Total Suspended Solids</b>	6		5	mg/l	1	10/08/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0J0500	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:42		<b>Analyst:</b> mfh	
<b>Sulfide, Total</b>	8.8	0.20	0.40	mg/l	4	10/09/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0J0590	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 10/11/20 15:03		<b>Analyst:</b> kvm	
<b>Aluminum, Dissolved</b>	0.053	0.0014	0.020	mg/l	1	10/17/20	
<b>Aluminum, Total</b>	0.070	0.0014	0.020	mg/l	1	10/17/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: <ECL TMDL Monitoring 1915100403

Reported:  
10/19/2020 13:41

Project Manager: John Rudolph

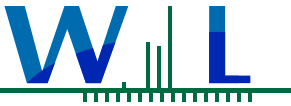
## Sample Results

(Continued)

Sample: CL10  
0I25011-04 (Water) Sampled: 10/05/20 8:20 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0391	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/09/20 09:44		<b>Analyst:</b> YMT	
Ammonia as N	ND	0.012	0.10	mg/l	1	10/09/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0684	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/13/20 10:07		<b>Analyst:</b> YMT	
TKN	0.98	0.018	0.10	mg/l	1	10/14/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0J0241	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 09:05		<b>Analyst:</b> SAR	
Nitrate as N	0.044	0.040	0.20	mg/l	1	10/06/20 12:51	J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/20 12:51	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0309	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 15:47		<b>Analyst:</b> sbn	
o-Phosphate as P	0.0050	0.0030	0.010	mg/l	1	10/06/20 16:41	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0498	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:26		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.061	0.00083	0.010	mg/l	1	10/13/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0J0322	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 17:23		<b>Analyst:</b> ism	
Total Dissolved Solids	500	4.0	10	mg/l	1	10/07/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN11			
<b>Batch ID:</b> W0J0469	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 11:58		<b>Analyst:</b> mfh	
Total Suspended Solids	8		5	mg/l	1	10/08/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0J0500	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:42		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	10/09/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0J0590	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 10/11/20 15:03		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.069	0.0014	0.020	mg/l	1	10/17/20	
Aluminum, Total	0.16	0.0014	0.020	mg/l	1	10/17/20	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: <ECL TMDL Monitoring 1915100403

Reported:

10/19/2020 13:41

Project Manager: John Rudolph

## Sample Results

(Continued)

Sample: LE02

Sampled: 10/05/20 8:35 by Kate Buckley

0125011-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0391	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/09/20 09:44		<b>Analyst:</b> YMT	
Ammonia as N	0.31	0.012	0.10	mg/l	1	10/09/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0J0684	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/13/20 10:07		<b>Analyst:</b> YMT	
TKN	4.4	0.018	0.10	mg/l	1	10/14/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0J0241	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 09:05		<b>Analyst:</b> SAR	
Nitrate as N	ND	0.040	0.20	mg/l	1	10/06/20 12:58	
Nitrite as N	0.11	0.042	0.10	mg/l	1	10/06/20 12:58	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0309	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 15:47		<b>Analyst:</b> sbn	
o-Phosphate as P	0.0090	0.0030	0.010	mg/l	1	10/06/20 16:42	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0J0498	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:26		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.26	0.00083	0.010	mg/l	1	10/13/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0J0322	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/06/20 17:23		<b>Analyst:</b> ism	
Total Dissolved Solids	2000	4.0	10	mg/l	1	10/07/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0J0500	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 10/08/20 17:42		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	10/09/20	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** <ECL TMDL Monitoring 1915100403

**Reported:**  
 10/19/2020 13:41

**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	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0J0241 - EPA 353.2</b>											
<b>Blank (W0J0241-BLK1)</b>					<b>Prepared &amp; Analyzed: 10/06/20</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
<b>LCS (W0J0241-BS1)</b>					<b>Prepared &amp; Analyzed: 10/06/20</b>						
Nitrate as N	1.01	0.040	0.20	mg/l	1.00		101	90-110			
Nitrite as N	1.05	0.042	0.10	mg/l	1.00		105	90-110			
<b>Matrix Spike (W0J0241-MS1)</b>					<b>Source: 0J05091-01</b>						
					<b>Prepared &amp; Analyzed: 10/06/20</b>						
Nitrate as N	2.09	0.040	0.20	mg/l	2.00	ND	104	90-110			
Nitrite as N	1.10	0.042	0.10	mg/l	1.00	ND	110	90-110			
<b>Matrix Spike (W0J0241-MS2)</b>					<b>Source: 0J05091-02</b>						
					<b>Prepared &amp; Analyzed: 10/06/20</b>						
Nitrate as N	2.12	0.040	0.20	mg/l	2.00	ND	106	90-110			
Nitrite as N	0.963	0.042	0.10	mg/l	1.00	ND	96	90-110			
<b>Matrix Spike Dup (W0J0241-MSD1)</b>					<b>Source: 0J05091-01</b>						
					<b>Prepared &amp; Analyzed: 10/06/20</b>						
Nitrate as N	2.10	0.040	0.20	mg/l	2.00	ND	105	90-110	0.5	20	
Nitrite as N	1.13	0.042	0.10	mg/l	1.00	ND	113	90-110	3	20	MS-01
<b>Matrix Spike Dup (W0J0241-MSD2)</b>					<b>Source: 0J05091-02</b>						
					<b>Prepared &amp; Analyzed: 10/06/20</b>						
Nitrate as N	2.12	0.040	0.20	mg/l	2.00	ND	106	90-110	0	20	
Nitrite as N	0.961	0.042	0.10	mg/l	1.00	ND	96	90-110	0.2	20	
<b>Batch: W0J0309 - EPA 365.3</b>											
<b>Blank (W0J0309-BLK1)</b>					<b>Prepared &amp; Analyzed: 10/06/20</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W0J0309-BS1)</b>					<b>Prepared &amp; Analyzed: 10/06/20</b>						
o-Phosphate as P	0.201	0.0030	0.010	mg/l	0.200		100	88-111			
<b>Matrix Spike (W0J0309-MS1)</b>					<b>Source: 0I25011-01</b>						
					<b>Prepared &amp; Analyzed: 10/06/20</b>						
o-Phosphate as P	0.361	0.0030	0.010	mg/l	0.200	0.162	100	85-112			
<b>Matrix Spike Dup (W0J0309-MSD1)</b>					<b>Source: 0I25011-01</b>						
					<b>Prepared &amp; Analyzed: 10/06/20</b>						
o-Phosphate as P	0.358	0.0030	0.010	mg/l	0.200	0.162	98	85-112	0.8	20	
<b>Batch: W0J0322 - SM 2540C</b>											
<b>Blank (W0J0322-BLK1)</b>					<b>Prepared: 10/06/20 Analyzed: 10/07/20</b>						
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W0J0322-BS1)</b>					<b>Prepared: 10/06/20 Analyzed: 10/07/20</b>						
Total Dissolved Solids	839	4.0	10	mg/l	824		102	96-102			
<b>Duplicate (W0J0322-DUP1)</b>					<b>Source: 0I25011-05</b>						
					<b>Prepared: 10/06/20 Analyzed: 10/07/20</b>						
Total Dissolved Solids	1970	4.0	10	mg/l		1960			0.5	10	
<b>Batch: W0J0391 - EPA 350.1</b>											
<b>Blank (W0J0391-BLK1)</b>					<b>Prepared &amp; Analyzed: 10/09/20</b>						
Ammonia as N	ND	0.012	0.10	mg/l							
<b>Blank (W0J0391-BLK2)</b>					<b>Prepared &amp; Analyzed: 10/09/20</b>						

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** <ECL TMDL Monitoring 1915100403

**Reported:**  
10/19/2020 13:41

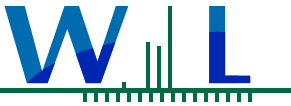
**Project Manager:** John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	Limit	Qualifier
<b>Batch: W0J0391 - EPA 350.1 (Continued)</b>											
<b>Blank (W0J0391-BLK2)</b>					<b>Prepared &amp; Analyzed: 10/09/20</b>						
Ammonia as N	ND	0.012	0.10	mg/l							
<b>LCS (W0J0391-BS1)</b>					<b>Prepared &amp; Analyzed: 10/09/20</b>						
Ammonia as N	0.246	0.012	0.10	mg/l	0.250		98	90-110			
<b>LCS (W0J0391-BS2)</b>					<b>Prepared &amp; Analyzed: 10/09/20</b>						
Ammonia as N	0.242	0.012	0.10	mg/l	0.250		97	90-110			
<b>Matrix Spike (W0J0391-MS1)</b>					<b>Source: 0J06086-01</b>						
Ammonia as N	0.239	0.012	0.10	mg/l	0.250	ND	95	90-110			
<b>Matrix Spike (W0J0391-MS2)</b>					<b>Source: 0J06086-02</b>						
Ammonia as N	0.235	0.012	0.10	mg/l	0.250	ND	94	90-110			
<b>Matrix Spike Dup (W0J0391-MSD1)</b>					<b>Source: 0J06086-01</b>						
Ammonia as N	0.240	0.012	0.10	mg/l	0.250	ND	96	90-110	0.6	15	
<b>Matrix Spike Dup (W0J0391-MSD2)</b>					<b>Source: 0J06086-02</b>						
Ammonia as N	0.234	0.012	0.10	mg/l	0.250	ND	94	90-110	0.2	15	
<b>Batch: W0J0469 - SM 2540D</b>											
<b>Blank (W0J0469-BLK1)</b>					<b>Prepared &amp; Analyzed: 10/08/20</b>						
Total Suspended Solids	ND		5	mg/l							
<b>LCS (W0J0469-BS1)</b>					<b>Prepared &amp; Analyzed: 10/08/20</b>						
Total Suspended Solids	54.3		5	mg/l	50.5		108	90-110			
<b>Duplicate (W0J0469-DUP1)</b>					<b>Source: 0J05091-02</b>						
Total Suspended Solids	62.0		5	mg/l		59.2			5	20	
<b>Duplicate (W0J0469-DUP2)</b>					<b>Source: 0J05083-01</b>						
Total Suspended Solids	206		5	mg/l		214			4	20	
<b>Batch: W0J0498 - EPA 365.3</b>											
<b>Blank (W0J0498-BLK1)</b>					<b>Prepared: 10/08/20 Analyzed: 10/13/20</b>						
Phosphorus as P, Total	ND	0.00083	0.010	mg/l							
<b>LCS (W0J0498-BS1)</b>					<b>Prepared: 10/08/20 Analyzed: 10/13/20</b>						
Phosphorus as P, Total	0.202	0.00083	0.010	mg/l	0.200		101	90-110			
<b>Matrix Spike (W0J0498-MS1)</b>					<b>Source: 0I25011-01</b>						
Phosphorus as P, Total	0.404	0.00083	0.010	mg/l	0.200	0.203	100	90-110			
<b>Matrix Spike Dup (W0J0498-MSD1)</b>					<b>Source: 0I25011-01</b>						
Phosphorus as P, Total	0.403	0.00083	0.010	mg/l	0.200	0.203	100	90-110	0.2	20	
<b>Batch: W0J0500 - SM 4500S2-D</b>											
<b>Blank (W0J0500-BLK1)</b>					<b>Prepared: 10/08/20 Analyzed: 10/09/20</b>						
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W0J0500-BS1)</b>					<b>Prepared: 10/08/20 Analyzed: 10/09/20</b>						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	95-105			
<b>Duplicate (W0J0500-DUP1)</b>					<b>Source: 0I25011-01</b>						



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: <ECL TMDL Monitoring 1915100403

Reported:

10/19/2020 13:41

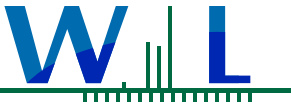
Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0J0500 - SM 4500S2-D (Continued)</b>											
<b>Duplicate (W0J0500-DUP1)</b>											
Source: 0I25011-01 Prepared: 10/08/20 Analyzed: 10/09/20											
Sulfide, Total	8.00	0.20	0.40	mg/l		8.00			0	20	
<b>Batch: W0J0684 - EPA 351.2</b>											
<b>Blank (W0J0684-BLK1)</b>											
Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	ND	0.018	0.10	mg/l							
<b>Blank (W0J0684-BLK2)</b>											
Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	ND	0.018	0.10	mg/l							
<b>LCS (W0J0684-BS1)</b>											
Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	0.953	0.018	0.10	mg/l	1.00		95	90-110			
<b>LCS (W0J0684-BS2)</b>											
Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	0.933	0.018	0.10	mg/l	1.00		93	90-110			
<b>Matrix Spike (W0J0684-MS1)</b>											
Source: 0J06098-03 Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	1.20	0.018	0.10	mg/l	1.00	0.230	97	90-110			
<b>Matrix Spike (W0J0684-MS2)</b>											
Source: 0J06098-04 Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	1.34	0.018	0.10	mg/l	1.00	0.449	89	90-110			MS-01
<b>Matrix Spike Dup (W0J0684-MSD1)</b>											
Source: 0J06098-03 Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	1.13	0.018	0.10	mg/l	1.00	0.230	90	90-110	6	10	
<b>Matrix Spike Dup (W0J0684-MSD2)</b>											
Source: 0J06098-04 Prepared: 10/13/20 Analyzed: 10/14/20											
TKN	1.36	0.018	0.10	mg/l	1.00	0.449	91	90-110	2	10	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: <ECL TMDL Monitoring 1915100403

Reported:

10/19/2020 13:41

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0J0590 - EPA 200.7</b>											
<b>Blank (W0J0590-BLK1)</b>											
					Prepared: 10/11/20 Analyzed: 10/17/20						
Aluminum, Dissolved	0.00515	0.0014	0.020	mg/l							J
Aluminum, Total	0.00515	0.0014	0.020	mg/l							J
<b>LCS (W0J0590-BS1)</b>											
					Prepared: 10/11/20 Analyzed: 10/17/20						
Aluminum, Dissolved	0.214	0.0014	0.020	mg/l	0.200		107	85-115			
Aluminum, Total	0.214	0.0014	0.020	mg/l	0.200		107	85-115			
<b>Matrix Spike (W0J0590-MS1)</b>											
					Source: 0I25011-01		Prepared: 10/11/20 Analyzed: 10/17/20				
Aluminum, Dissolved	0.246	0.0014	0.020	mg/l	0.200	0.0267	110	70-130			
Aluminum, Total	0.246	0.0014	0.020	mg/l	0.200	0.0359	105	70-130			
<b>Matrix Spike (W0J0590-MS2)</b>											
					Source: 0I25012-01		Prepared: 10/11/20 Analyzed: 10/17/20				
Aluminum, Dissolved	0.233	0.0014	0.020	mg/l	0.200	0.00865	112	70-130			
Aluminum, Total	0.233	0.0014	0.020	mg/l	0.200	0.0219	106	70-130			
<b>Matrix Spike Dup (W0J0590-MSD1)</b>											
					Source: 0I25011-01		Prepared: 10/11/20 Analyzed: 10/17/20				
Aluminum, Dissolved	0.243	0.0014	0.020	mg/l	0.200	0.0267	108	70-130	1	30	
Aluminum, Total	0.243	0.0014	0.020	mg/l	0.200	0.0359	104	70-130	1	30	
<b>Matrix Spike Dup (W0J0590-MSD2)</b>											
					Source: 0I25012-01		Prepared: 10/11/20 Analyzed: 10/17/20				
Aluminum, Dissolved	0.232	0.0014	0.020	mg/l	0.200	0.00865	112	70-130	0.5	30	
Aluminum, Total	0.232	0.0014	0.020	mg/l	0.200	0.0219	105	70-130	0.5	30	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** <ECL TMDL Monitoring 1915100403

**Reported:**

10/19/2020 13:41

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
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	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.

Work Orders: 0J05079

Project: LECL TMDL Monitoring 1915100403

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 11/13/2020

Received Date: 10/5/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #:

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015

*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 10/05/20 with the Chain-of-Custody document. The samples were received in good condition, at 4.3 °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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**

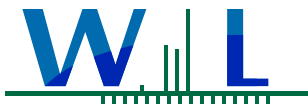
11/13/2020 16:49

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07 - Int	Kate Buckley	OJ05079-01	Water	10/05/20 10:45	
CL07 - Surf	Kate Buckley	OJ05079-02	Water	10/05/20 10:55	
CL08 - Int	Kate Buckley	OJ05079-03	Water	10/05/20 10:00	
CL08 - Surf	Kate Buckley	OJ05079-04	Water	10/05/20 10:15	
CL09 - Int	Kate Buckley	OJ05079-05	Water	10/05/20 09:10	
CL09 - Surf	Kate Buckley	OJ05079-06	Water	10/05/20 09:25	
CL10 - Int	Kate Buckley	OJ05079-07	Water	10/05/20 08:20	
CL10 - Surf	Kate Buckley	OJ05079-08	Water	10/05/20 08:40	
LE02 - Int	Kate Buckley	OJ05079-09	Water	10/05/20 08:35	
LE02 - Surf	Kate Buckley	OJ05079-10	Water	10/05/20 08:50	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**

11/13/2020 16:49

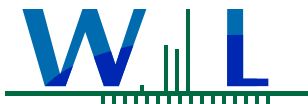
**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

Sample: CL07 - Int  
0J05079-01 (Water)

Sampled: 10/05/20 10:45 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	<b>36</b>	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL07 - Surf  
0J05079-02 (Water)

Sampled: 10/05/20 10:55 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	30	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08 - Int  
0J05079-03 (Water)

Sampled: 10/05/20 10:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	30	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

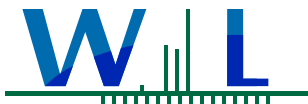
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08 - Surf  
0J05079-04 (Water)

Sampled: 10/05/20 10:15 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	30	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09 - Int  
0J05079-05 (Water)

Sampled: 10/05/20 9:10 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	26	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

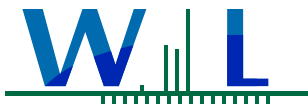
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09 - Surf  
0J05079-06 (Water)

Sampled: 10/05/20 9:25 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	24	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

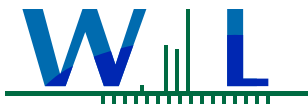
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10 - Int  
0J05079-07 (Water)

Sampled: 10/05/20 8:20 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
Chlorophyll-a	25	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49

## Sample Results Enthalpy Analytical

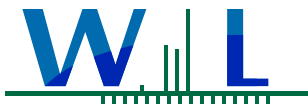
(Continued)

Sample: CL10 - Surf  
0J05079-08 (Water)

Sampled: 10/05/20 8:40 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	25	1	mg/M3	1	10/22/20	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
11/13/2020 16:49

**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02 - Int  
0J05079-09 (Water)

Sampled: 10/05/20 8:35 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
Chlorophyll-a	170	1	mg/M3	1	10/22/20	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
11/13/2020 16:49

**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02 - Surf  
OJ05079-10 (Water)

Sampled: 10/05/20 8:50 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 254939	<b>Prepared:</b> 10/09/20 17:26				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	160	1	mg/M3	1	10/22/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
11/13/2020 16:49



## Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
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)

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.

012501

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158										
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)										
Project Name: LECL TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush *Additional Charges May Apply												
Project Number: 1915100403		Lab TAT Approval: By:												
<b>Sampler Information</b> Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>Kate Buckley</u>		<b># of Containers &amp; Preservatives</b> Unpreserved H2SO4 HCl HNO3 Na2S2O3 NaOH NaOH/ZnAcetate NH4Cl MCAA Frozen		<b>Sample Type</b> Routine Resample Special		<b>Analysis Requested</b> 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) Total Sulfide (SM4500S) Total AL (EPA 200.7) Dissolved AL (EPA 200.7)		<b>Matrix</b> DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous		<b>Notes</b> Ortho-P is field filtered (0.45 um) Dissolved Al is <sup>KB</sup> not field filtered Diss Al is field filtered				
												<b>Total # of Containers</b>		
Sample ID	Date	Time												
CL07	10/5/20	1045						X	X	X	X	X	X	
CL08	10/5/20	1000						X	X	X	X	X	X	
CL09	10/5/20	0910						X	X	X	X	X	X	
CL10	10/5/20	0820						X	X	X	X	X	X	
LE02	10/5/20	0835						X	X	X	X	X		
Relinquished By (sign)		Print Name / Company		Date / Time		Received By (Sign)		Print Name / Company						
<u>Marisa Swiderski</u>		<u>Marisa Swiderski (Wood)</u>		<u>10/05/2020 1340</u>		<u>[Signature]</u>		<u>10/5/20</u>						
<u>[Signature]</u>				<u>10/5/20 15:24</u>		<u>[Signature]</u>		<u>JAIMEGOMEZ / wood labs</u>						

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>			<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	Yes	No	Temperature	
Custody Seal(s) Intact?	Yes	No	4.3 °C	
Sample(s) Intact?	Yes	No	10/23/20 <input type="checkbox"/> Cooler Blank	

Lab No. \_\_\_\_\_  
 Page \_\_\_\_ of \_\_\_\_

E.S. Babcock & Sons, Inc. Environmental Laboratories

(951) 653-3351 FAX (951) 653-1662

www.babcocklabs.com

Chain of Custody & Sample Information Record

0305079

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158	
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)	
Project Name: LECL TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day Rush *48 Hour Rush *24 Hour Rush			
Project Number: 1915100403		*Lab TAT Approval: By: _____ *Additional Charges May Apply			
<b>Sampler Information</b> Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>Kate Buckley</u>		<b># of Containers &amp; Preservatives</b> Unpreserved <input type="checkbox"/> H2SO4 <input type="checkbox"/> HCl <input type="checkbox"/> HNO3 <input type="checkbox"/> Na2S2O3 <input type="checkbox"/> NaOH <input type="checkbox"/> NaOH/ZnAcetate <input type="checkbox"/> NH4Cl <input type="checkbox"/> MCAA <input type="checkbox"/> Frozen <input type="checkbox"/>		<b>Matrix</b> DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	
		<b>Total # of Containers</b> Routine <input type="checkbox"/> Resample <input type="checkbox"/> Special <input type="checkbox"/>		<b>Notes</b> Chl-a samples on 0.7 um GFF	
				<b>Analysis Requested</b> Total Sulfide <input type="checkbox"/> Nitrate - Nitrite <input type="checkbox"/> TDS <input type="checkbox"/> TKN <input type="checkbox"/> Ammonia <input type="checkbox"/> Total Phosphorus <input type="checkbox"/> SRP/Ortho-P <input type="checkbox"/> Chlorophyll-a <input type="checkbox"/>	
Sample ID	Date	Time			Filter Volume:
CL07 - Int	10/5/20	1045			500mL
CL07 - Surf	10/5/20	1055			500mL
CL08 - Int	10/5/20	1000			370mL
CL08 - Surf	10/5/20	1015			500mL
CL09 - Int	10/5/20	0910			265mL
CL09 - Surf	10/5/20	0925			320 mL
CL10 - Int	10/5/20	0820			340mL
CL10 - Surf	10/5/20	0840			285mL
LE02 - Int	10/5/20	0835			250mL
LE02 - Surf	10/5/20	0850			250mL
<b>Relinquished By (sign)</b>		<b>Print Name / Company</b>		<b>Received By (Sign)</b>	
<u>Marisa Swiderski</u>		Marisa Swiderski (Wood)		<u>[Signature]</u> 10/5/20	
<u>[Signature]</u>				<u>[Signature]</u>	
		Date / Time		Print Name / Company	
		10/05/2020 1340		JAIME GOMEZ / wood labs	
		10/5/20 15:24			

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>			<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	Yes	No	Temperature	
Custody Seal(s) Intact?	Yes	No	4.3 °C	
Sample(s) Intact?	Yes	No	10220	
			<input type="checkbox"/> Cooler Blank	

Lab No. \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

Work Orders: OK30022

Project: LECL TMDL Monitoring 1915100403

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 1/12/2021

Received Date: 12/9/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #: C015101084

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015

*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,

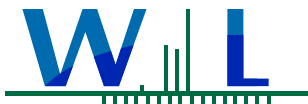
Enclosed are the results of analyses for samples received 12/09/20 with the Chain-of-Custody document. The samples were received in good condition, at 3.3 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**

01/12/2021 12:51

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Kate Buckley	OK30022-01	Water	12/09/20 11:00	
CL08	Kate Buckley	OK30022-02	Water	12/09/20 10:00	
CL09	Kate Buckley	OK30022-03	Water	12/09/20 09:00	
CL10	Kate Buckley	OK30022-04	Water	12/09/20 08:15	
LE02	Kate Buckley	OK30022-05	Water	12/09/20 09:30	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
 01/12/2021 12:51

**Project Manager:** John Rudolph

## Sample Results

Sample: CL07

Sampled: 12/09/20 11:00 by Kate Buckley

OK30022-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0951	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/17/20 12:33		<b>Analyst:</b> YMT	
Ammonia as N	0.87	0.047	0.10	mg/l	1	12/18/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0765	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/15/20 09:41		<b>Analyst:</b> YMT	
TKN	1.4	0.065	0.10	mg/l	1	12/16/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0L0549	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/09/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	12/10/20 11:37	
Nitrite as N	ND	0.042	0.10	mg/l	1	12/10/20 11:37	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0593	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 15:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.022	0.0030	0.010	mg/l	1	12/10/20 17:10	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0997	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/18/20 09:16		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.039	0.00083	0.010	mg/l	1	12/23/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0L0739	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/14/20 15:13		<b>Analyst:</b> blg	
Total Dissolved Solids	440	4.0	10	mg/l	1	12/14/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W0L0633	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/11/20 10:50		<b>Analyst:</b> mfh	
Total Suspended Solids	ND		5	mg/l	1	12/11/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0L0583	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 11:44		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/10/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0L0609	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 12/10/20 16:54		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.013	0.0014	0.020	mg/l	1	12/29/20	J
Aluminum, Total	0.041	0.0014	0.020	mg/l	1	12/29/20	



Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
 01/12/2021 12:51

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL08 Sampled: 12/09/20 10:00 by Kate Buckley  
 OK30022-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0951	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/17/20 12:33		<b>Analyst:</b> YMT	
Ammonia as N	0.80	0.047	0.10	mg/l	1	12/18/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0765	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/15/20 09:41		<b>Analyst:</b> YMT	
TKN	1.3	0.065	0.10	mg/l	1	12/16/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0L0549	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/09/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	12/10/20 11:38	
Nitrite as N	ND	0.042	0.10	mg/l	1	12/10/20 11:38	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0593	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 15:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.069	0.0030	0.010	mg/l	1	12/10/20 17:11	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0997	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/18/20 09:16		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.036	0.00083	0.010	mg/l	1	12/23/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0L0739	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/14/20 15:13		<b>Analyst:</b> blg	
Total Dissolved Solids	440	4.0	10	mg/l	1	12/14/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W0L0633	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/11/20 10:50		<b>Analyst:</b> mfh	
Total Suspended Solids	ND		5	mg/l	1	12/11/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0L0583	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 11:44		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/10/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0L0609	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 12/10/20 16:54		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.016	0.0014	0.020	mg/l	1	12/29/20	J
Aluminum, Total	0.064	0.0014	0.020	mg/l	1	12/29/20	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
 01/12/2021 12:51

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL09 Sampled: 12/09/20 9:00 by Kate Buckley  
 OK30022-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0951	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/17/20 12:33		<b>Analyst:</b> YMT	
Ammonia as N	0.95	0.047	0.10	mg/l	1	12/18/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0765	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/15/20 09:41		<b>Analyst:</b> YMT	
TKN	1.7	0.065	0.10	mg/l	1	12/16/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0L0549	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/09/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	0.052	0.040	0.20	mg/l	1	12/10/20 11:39	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/10/20 11:39	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0593	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 15:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.058	0.0030	0.010	mg/l	1	12/10/20 17:11	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0997	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/18/20 09:16		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.066	0.00083	0.010	mg/l	1	12/23/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0L0739	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/14/20 15:13		<b>Analyst:</b> blg	
Total Dissolved Solids	520	4.0	10	mg/l	1	12/14/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W0L0633	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/11/20 10:50		<b>Analyst:</b> mfh	
Total Suspended Solids	6		5	mg/l	1	12/11/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0L0583	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 11:44		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/10/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0L0609	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 12/10/20 16:54		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.019	0.0014	0.020	mg/l	1	12/29/20	J
Aluminum, Total	0.14	0.0014	0.020	mg/l	1	12/29/20	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
 01/12/2021 12:51

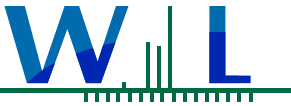
**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL10  
 OK30022-04 (Water) Sampled: 12/09/20 8:15 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0951	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/17/20 12:33		<b>Analyst:</b> YMT	
Ammonia as N	0.82	0.047	0.10	mg/l	1	12/18/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0765	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/15/20 09:41		<b>Analyst:</b> YMT	
TKN	1.6	0.065	0.10	mg/l	1	12/16/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0L0549	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/09/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	0.071	0.040	0.20	mg/l	1	12/10/20 11:45	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/10/20 11:45	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0593	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 15:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.026	0.0030	0.010	mg/l	1	12/10/20 17:12	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0997	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/18/20 09:16		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.072	0.00083	0.010	mg/l	1	12/23/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0L0739	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/14/20 15:13		<b>Analyst:</b> blg	
Total Dissolved Solids	530	4.0	10	mg/l	1	12/14/20	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W0L0633	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/11/20 10:50		<b>Analyst:</b> mfh	
Total Suspended Solids	8		5	mg/l	1	12/11/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0L0583	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 11:44		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/10/20	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W0L0609	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 12/10/20 16:54		<b>Analyst:</b> kvm	
Aluminum, Dissolved	0.021	0.0014	0.020	mg/l	1	12/29/20	
Aluminum, Total	0.27	0.0014	0.020	mg/l	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**

01/12/2021 12:51

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: LE02

Sampled: 12/09/20 9:30 by Kate Buckley

OK30022-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0951	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/17/20 12:33		<b>Analyst:</b> YMT	
Ammonia as N	0.61	0.047	0.10	mg/l	1	12/18/20	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W0L0765	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/15/20 09:41		<b>Analyst:</b> YMT	
TKN	3.8	0.065	0.10	mg/l	1	12/16/20	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W0L0549	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/09/20 16:59		<b>Analyst:</b> sar	
Nitrate as N	0.23	0.040	0.20	mg/l	1	12/10/20 11:46	
Nitrite as N	ND	0.042	0.10	mg/l	1	12/10/20 11:46	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0593	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 15:38		<b>Analyst:</b> sbn	
o-Phosphate as P	0.052	0.0030	0.010	mg/l	1	12/10/20 17:13	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W0L0997	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/18/20 09:16		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.27	0.00083	0.010	mg/l	1	12/23/20	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W0L0739	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/14/20 15:13		<b>Analyst:</b> blg	
Total Dissolved Solids	2000	4.0	10	mg/l	1	12/14/20	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W0L0583	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 12/10/20 11:44		<b>Analyst:</b> mfh	
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/10/20	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
01/12/2021 12:51

**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	Limits	RPD	Limit	Qualifier
<b>Batch: W0L0549 - EPA 353.2</b>											
<b>Blank (W0L0549-BLK1)</b>					<b>Prepared: 12/09/20 Analyzed: 12/10/20</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
<b>LCS (W0L0549-BS1)</b>					<b>Prepared: 12/09/20 Analyzed: 12/10/20</b>						
Nitrate as N	0.999	0.040	0.20	mg/l	1.00		100	90-110			
Nitrite as N	1.06	0.042	0.10	mg/l	1.00		106	90-110			
<b>Matrix Spike (W0L0549-MS1)</b>					<b>Source: 0L09067-01 Prepared: 12/09/20 Analyzed: 12/10/20</b>						
Nitrate as N	2.18	0.040	0.20	mg/l	2.00	0.165	101	90-110			
Nitrite as N	1.10	0.042	0.10	mg/l	1.00	ND	110	90-110			
<b>Matrix Spike (W0L0549-MS2)</b>					<b>Source: 0L09068-01 Prepared: 12/09/20 Analyzed: 12/10/20</b>						
Nitrate as N	2.78	0.040	0.20	mg/l	2.00	0.789	100	90-110			
Nitrite as N	1.07	0.042	0.10	mg/l	1.00	ND	107	90-110			
<b>Matrix Spike Dup (W0L0549-MSD1)</b>					<b>Source: 0L09067-01 Prepared: 12/09/20 Analyzed: 12/10/20</b>						
Nitrate as N	2.17	0.040	0.20	mg/l	2.00	0.165	100	90-110	0.5	20	
Nitrite as N	1.10	0.042	0.10	mg/l	1.00	ND	110	90-110	0	20	
<b>Matrix Spike Dup (W0L0549-MSD2)</b>					<b>Source: 0L09068-01 Prepared: 12/09/20 Analyzed: 12/10/20</b>						
Nitrate as N	2.77	0.040	0.20	mg/l	2.00	0.789	99	90-110	0.4	20	
Nitrite as N	1.08	0.042	0.10	mg/l	1.00	ND	108	90-110	0.9	20	
<b>Batch: W0L0583 - SM 4500S2-D</b>											
<b>Blank (W0L0583-BLK1)</b>					<b>Prepared &amp; Analyzed: 12/10/20</b>						
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W0L0583-BS1)</b>					<b>Prepared &amp; Analyzed: 12/10/20</b>						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	95-105			
<b>Duplicate (W0L0583-DUP1)</b>					<b>Source: 0K30022-01 Prepared &amp; Analyzed: 12/10/20</b>						
Sulfide, Total	ND	0.050	0.10	mg/l		ND				20	
<b>Batch: W0L0593 - EPA 365.3</b>											
<b>Blank (W0L0593-BLK1)</b>					<b>Prepared &amp; Analyzed: 12/10/20</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W0L0593-BS1)</b>					<b>Prepared &amp; Analyzed: 12/10/20</b>						
o-Phosphate as P	0.208	0.0030	0.010	mg/l	0.200		104	88-111			
<b>Matrix Spike (W0L0593-MS1)</b>					<b>Source: 0K30021-01 Prepared &amp; Analyzed: 12/10/20</b>						
o-Phosphate as P	0.272	0.0030	0.010	mg/l	0.200	0.0800	96	85-112			
<b>Matrix Spike Dup (W0L0593-MSD1)</b>					<b>Source: 0K30021-01 Prepared &amp; Analyzed: 12/10/20</b>						
o-Phosphate as P	0.268	0.0030	0.010	mg/l	0.200	0.0800	94	85-112	1	20	
<b>Batch: W0L0633 - SM 2540D</b>											
<b>Blank (W0L0633-BLK1)</b>					<b>Prepared &amp; Analyzed: 12/11/20</b>						
Total Suspended Solids	ND		5	mg/l							
<b>LCS (W0L0633-BS1)</b>					<b>Prepared &amp; Analyzed: 12/11/20</b>						



# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
 01/12/2021 12:51

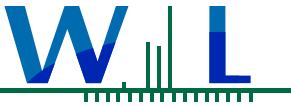
**Project Manager:** John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0L0633 - SM 2540D (Continued)</b>										
<b>LCS (W0L0633-BS1)</b>										
Total Suspended Solids	61.9	5	mg/l	60.8		102	90-110			
<b>Duplicate (W0L0633-DUP1) Source: 0K30022-01 Prepared &amp; Analyzed: 12/11/20</b>										
Total Suspended Solids	2.80	5	mg/l		3.20			13	20	
<b>Duplicate (W0L0633-DUP2) Source: 0L08012-01 Prepared &amp; Analyzed: 12/11/20</b>										
Total Suspended Solids	48.0	5	mg/l		48.0			0	20	
<b>Batch: W0L0739 - SM 2540C</b>										
<b>Blank (W0L0739-BLK1) Prepared &amp; Analyzed: 12/14/20</b>										
Total Dissolved Solids	ND	4.0	10	mg/l						
<b>LCS (W0L0739-BS1) Prepared &amp; Analyzed: 12/14/20</b>										
Total Dissolved Solids	828	4.0	10	mg/l	824	100	96-102			
<b>Duplicate (W0L0739-DUP1) Source: 0L10016-01 Prepared &amp; Analyzed: 12/14/20</b>										
Total Dissolved Solids	27400	4.0	10	mg/l	27300			0.6	10	
<b>Duplicate (W0L0739-DUP2) Source: 0L11010-01 Prepared &amp; Analyzed: 12/14/20</b>										
Total Dissolved Solids	20200	4.0	10	mg/l	19500			3	10	
<b>Batch: W0L0765 - EPA 351.2</b>										
<b>Blank (W0L0765-BLK1) Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	ND	0.065	0.10	mg/l						
<b>Blank (W0L0765-BLK2) Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	ND	0.065	0.10	mg/l						
<b>LCS (W0L0765-BS1) Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	1.04	0.065	0.10	mg/l	1.00	104	90-110			
<b>LCS (W0L0765-BS2) Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	1.04	0.065	0.10	mg/l	1.00	104	90-110			
<b>Matrix Spike (W0L0765-MS1) Source: 0L09061-01 Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	ND	0.065	0.10	mg/l	1.00	ND	90-110			MS-01
<b>Matrix Spike (W0L0765-MS2) Source: 0L09062-01 Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	1.17	0.065	0.10	mg/l	1.00	0.131	104	90-110		
<b>Matrix Spike Dup (W0L0765-MSD1) Source: 0L09061-01 Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	ND	0.065	0.10	mg/l	1.00	ND	90-110		10	MS-01
<b>Matrix Spike Dup (W0L0765-MSD2) Source: 0L09062-01 Prepared: 12/15/20 Analyzed: 12/16/20</b>										
TKN	1.22	0.065	0.10	mg/l	1.00	0.131	109	90-110	4	10
<b>Batch: W0L0951 - EPA 350.1</b>										
<b>Blank (W0L0951-BLK1) Prepared: 12/17/20 Analyzed: 12/18/20</b>										
Ammonia as N	ND	0.047	0.10	mg/l						
<b>Blank (W0L0951-BLK2) Prepared: 12/17/20 Analyzed: 12/18/20</b>										
Ammonia as N	ND	0.047	0.10	mg/l						
<b>LCS (W0L0951-BS1) Prepared: 12/17/20 Analyzed: 12/18/20</b>										



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring 1915100403

Reported:

01/12/2021 12:51

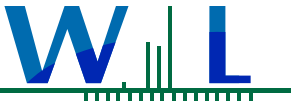
Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0L0951 - EPA 350.1 (Continued)</b>											
<b>LCS (W0L0951-BS1)</b> Prepared: 12/17/20 Analyzed: 12/18/20											
Ammonia as N	0.247	0.047	0.10	mg/l	0.250		99	90-110			
<b>LCS (W0L0951-BS2)</b> Prepared: 12/17/20 Analyzed: 12/18/20											
Ammonia as N	0.252	0.047	0.10	mg/l	0.250		101	90-110			
<b>Matrix Spike (W0L0951-MS1)</b> Source: 0L14091-01 Prepared: 12/17/20 Analyzed: 12/18/20											
Ammonia as N	0.592	0.047	0.10	mg/l	0.250	0.342	100	90-110			
<b>Matrix Spike (W0L0951-MS2)</b> Source: 0L16050-01 Prepared: 12/17/20 Analyzed: 12/18/20											
Ammonia as N	0.268	0.047	0.10	mg/l	0.250	ND	107	90-110			
<b>Matrix Spike Dup (W0L0951-MSD1)</b> Source: 0L14091-01 Prepared: 12/17/20 Analyzed: 12/18/20											
Ammonia as N	0.590	0.047	0.10	mg/l	0.250	0.342	99	90-110	0.5	15	
<b>Matrix Spike Dup (W0L0951-MSD2)</b> Source: 0L16050-01 Prepared: 12/17/20 Analyzed: 12/18/20											
Ammonia as N	0.269	0.047	0.10	mg/l	0.250	ND	107	90-110	0.3	15	
<b>Batch: W0L0997 - EPA 365.3</b>											
<b>Blank (W0L0997-BLK1)</b> Prepared: 12/18/20 Analyzed: 12/23/20											
Phosphorus as P, Total	ND	0.00083	0.010	mg/l							
<b>LCS (W0L0997-BS1)</b> Prepared: 12/18/20 Analyzed: 12/23/20											
Phosphorus as P, Total	0.207	0.00083	0.010	mg/l	0.200		104	90-110			
<b>Matrix Spike (W0L0997-MS1)</b> Source: 0K30021-01 Prepared: 12/18/20 Analyzed: 12/23/20											
Phosphorus as P, Total	0.472	0.00083	0.010	mg/l	0.200	0.268	102	90-110			
<b>Matrix Spike Dup (W0L0997-MSD1)</b> Source: 0K30021-01 Prepared: 12/18/20 Analyzed: 12/23/20											
Phosphorus as P, Total	0.472	0.00083	0.010	mg/l	0.200	0.268	102	90-110	0	20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring 1915100403

Reported:

01/12/2021 12:51

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W0L0609 - EPA 200.7</b>											
<b>Blank (W0L0609-BLK1)</b>											
					Prepared: 12/10/20 Analyzed: 12/29/20						
Aluminum, Dissolved	0.00600	0.0014	0.020	mg/l							J
Aluminum, Total	0.00600	0.0014	0.020	mg/l							J
<b>LCS (W0L0609-BS1)</b>											
					Prepared: 12/10/20 Analyzed: 12/29/20						
Aluminum, Dissolved	0.210	0.0014	0.020	mg/l	0.200		105	85-115			
Aluminum, Total	0.210	0.0014	0.020	mg/l	0.200		105	85-115			
<b>Matrix Spike (W0L0609-MS1)</b>											
			Source: 0K30021-01			Prepared: 12/10/20 Analyzed: 12/29/20					
Aluminum, Total	0.302	0.0014	0.020	mg/l	0.200	0.0549	124	70-130			
<b>Matrix Spike (W0L0609-MS2)</b>											
			Source: 0K30022-01			Prepared: 12/10/20 Analyzed: 12/29/20					
Aluminum, Total	0.270	0.0014	0.020	mg/l	0.200	0.0413	114	70-130			
<b>Matrix Spike Dup (W0L0609-MSD1)</b>											
			Source: 0K30021-01			Prepared: 12/10/20 Analyzed: 12/29/20					
Aluminum, Total	0.304	0.0014	0.020	mg/l	0.200	0.0549	125	70-130	0.6	30	
<b>Matrix Spike Dup (W0L0609-MSD2)</b>											
			Source: 0K30022-01			Prepared: 12/10/20 Analyzed: 12/29/20					
Aluminum, Total	0.275	0.0014	0.020	mg/l	0.200	0.0413	117	70-130	2	30	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/12/2021 12:51



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
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	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.

Work Orders: 0L09065

Project: LECL TMDL Monitoring 1915100403

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 1/13/2021

Received Date: 12/9/2020

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #: C015101084

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 •  
NELAP-OR #4047 • NJ-DEP #CA015

*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 12/09/20 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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

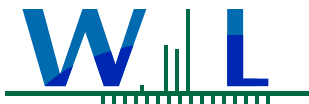
**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
01/13/2021 13:17

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07 - Int	Kate Buckley	0L09065-01	Water	12/09/20 11:00	
CL07 - Surf	Kate Buckley	0L09065-02	Water	12/09/20 11:00	
CL08 - Int	Kate Buckley	0L09065-03	Water	12/09/20 10:00	
CL08 - Surf	Kate Buckley	0L09065-04	Water	12/09/20 10:00	
CL09 - Int	Kate Buckley	0L09065-05	Water	12/09/20 09:00	
CL09 - Surf	Kate Buckley	0L09065-06	Water	12/09/20 09:00	
CL10 - Int	Kate Buckley	0L09065-07	Water	12/09/20 08:15	
CL10 - Surf	Kate Buckley	0L09065-08	Water	12/09/20 08:15	
LE02 - Int	Kate Buckley	0L09065-09	Water	12/09/20 09:30	
LE02 - Surf	Kate Buckley	0L09065-10	Water	12/09/20 10:00	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**

01/13/2021 13:17

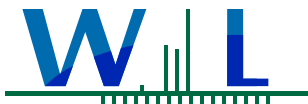
**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

Sample: CL07 - Int  
0L09065-01 (Water)

Sampled: 12/09/20 11:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 11:00				<b>Analyst:</b> _SUB
Chlorophyll-a	11	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/13/2021 13:17

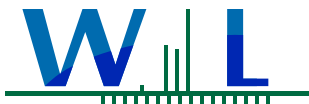
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL07 - Surf  
0L09065-02 (Water)

Sampled: 12/09/20 11:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 11:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	12	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/13/2021 13:17

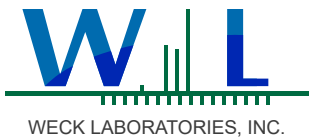
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08 - Int  
0L09065-03 (Water)

Sampled: 12/09/20 10:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 10:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	18	1	mg/M3	1	12/29/20	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
01/13/2021 13:17

**Project Manager:** John Rudolph

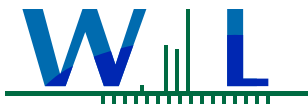
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08 - Surf  
0L09065-04 (Water)

Sampled: 12/09/20 10:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 10:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	19	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
01/13/2021 13:17

**Project Manager:** John Rudolph

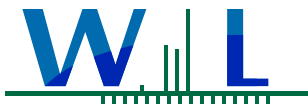
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09 - Int  
0L09065-05 (Water) Sampled: 12/09/20 9:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 09:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	25	1	mg/M3	1	12/29/20	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/13/2021 13:17

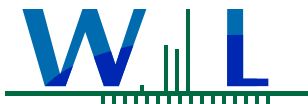
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09 - Surf  
0L09065-06 (Water)

Sampled: 12/09/20 9:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 09:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	25	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/13/2021 13:17

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10 - Int  
0L09065-07 (Water)

Sampled: 12/09/20 8:15 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 08:15				<b>Analyst:</b> _SUB
Chlorophyll-a	17	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/13/2021 13:17

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10 - Surf  
0L09065-08 (Water)

Sampled: 12/09/20 8:15 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 08:15				<b>Analyst:</b> _SUB
Chlorophyll-a	35	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

FINAL REPORT

**Reported:**  
01/13/2021 13:17

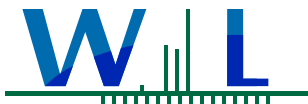
## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02 - Int  
0L09065-09 (Water)

Sampled: 12/09/20 9:30 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 09:30				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	96	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
01/13/2021 13:17

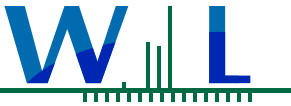
## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02 - Surf  
0L09065-10 (Water)

Sampled: 12/09/20 10:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 258613	<b>Prepared:</b> 12/09/20 10:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	96	1	mg/M3	1	12/29/20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**

01/13/2021 13:17

**Project Manager:** John Rudolph

## Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
<b>Batch: 258613 - SM 10200H</b>										
<b>BLK (BATCH-BLK1 (Water))</b>	<b>Source: TRUE</b>				<b>Prepared &amp; Analyzed: 12/29/20</b>					
Chlorophyll-a	ND	1	mg/M3		TRUE		0-0		0	

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
01/13/2021 13:17

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
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

0109065

**Client:** Wood E&I Solutions, Inc.      **Contact:** John Rudolph      **Phone No.:** 858-243-8158

**FAX No.:**      **Email:** john.rudolph@woodplc.com

**Project Name:** LECL TMDL Monitoring      **Turn Around Time:** Routine      \*3-5 Day Rush      \*48 Hour Rush      \*24 Hour Rush

**Project Number:** 1915100403      \*Lab TAT Approval: By:      \*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 Information			# of Containers & Preservatives									Total # of Containers	Sample Type			Analysis Requested							Matrix	Notes	
Name:	Date	Time	Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA		Frozen	Routine	Resample	Special	Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a	
<u>Kate Buckley</u>																								DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	Chl-a samples on 0.7 um GFF
<b>Employer:</b> Wood E&I Solutions, Inc.																									
<b>Signature:</b> <u>Kate Buckley</u>																									
<b>Sample ID</b>																									
CL07 - Int	12/9/20	1100																							Filter Volume: 250mL
CL07 - Surf		1100																							Filter Volume:
CL08 - Int		1000																							Filter Volume:
CL08 - Surf		1000																							Filter Volume:
CL09 - Int		0900																							Filter Volume:
CL09 - Surf		0900																							Filter Volume:
CL10 - Int		0815																							Filter Volume:
CL10 - Surf		0815																							Filter Volume:
LE02 - Int		0930																							Filter Volume: 260mL
LE02 - Surf		1000																							Filter Volume: 260mL

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
<u>Kate Buckley</u>	Kate Buckley/Wood	12/9/20 1400	<u>[Signature]</u>	Heather Sanchez / WOOD E&I SOLUTIONS
<u>Heather Sanchez</u>	Heather Sanchez	12-9-20/1500	<u>[Signature]</u>	Algebraiel H/ WOOD

<b>(For Lab Use Only)</b>	<b>Sample Integrity Upon Receipt</b>
Sample(s) Submitted on Ice? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Temperature: 3.3 °C
Custody Seal(s) Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No      N/A	<input type="checkbox"/> Cooler Blank
Sample(s) Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Lab No. \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

Work Orders: 1A21010

Project: LECL TMDL Monitoring

Attn: John Rudolph

Client: Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Report Date: 3/08/2021

Received Date: 2/17/2021

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 300-4301

P.O. #: C015101084

Billing Code:

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 2/17/21 with the Chain-of-Custody document. The samples were received in good condition, at 6.6 °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:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring

**Reported:**

03/08/2021 18:17

**Project Manager:** John Rudolph

## Case Narrative

Final Report: 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 NELAC unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Kate Buckley	1A21010-01	Water	02/17/21 11:00	
CL08	Kate Buckley	1A21010-02	Water	02/17/21 10:05	
CL09	Kate Buckley	1A21010-03	Water	02/17/21 09:05	
CL10	Kate Buckley	1A21010-04	Water	02/17/21 08:00	
LE02	Kate Buckley	1A21010-05	Water	02/17/21 09:00	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

03/08/2021 18:17

**Project Manager:** John Rudolph

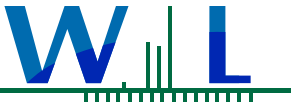
## Sample Results

Sample: CL07

Sampled: 02/17/21 11:00 by Kate Buckley

1A21010-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1130	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:03		<b>Analyst:</b> SBN	
Ammonia as N	0.58	0.047	0.10	mg/l	1	02/22/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1316	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/23/21 13:43		<b>Analyst:</b> YMT	
TKN	1.5	0.065	0.10	mg/l	1	02/25/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1B1049	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 11:08		<b>Analyst:</b> YMT	
Nitrate as N	0.38	0.040	0.20	mg/l	1	02/18/21 17:46	
Nitrite as N	ND	0.042	0.10	mg/l	1	02/18/21 17:46	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1074	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:28		<b>Analyst:</b> sbn	
o-Phosphate as P	0.15	0.0030	0.010	mg/l	1	02/18/21 16:23	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1077	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:54		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.051	0.0067	0.010	mg/l	1	02/22/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1B1189	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/22/21 13:16		<b>Analyst:</b> blg	
Total Dissolved Solids	480	4.0	10	mg/l	1	02/24/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1B1119	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 11:41		<b>Analyst:</b> ism	
Total Suspended Solids	0.5		5	mg/l	1	02/19/21	J
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1B1133	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:11		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/19/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1B1131	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 02/19/21 13:06		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.0014	0.020	mg/l	1	02/20/21	
Aluminum, Total	0.053	0.041	0.050	mg/l	1	02/20/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring

Reported:

03/08/2021 18:17

Project Manager: John Rudolph

## Sample Results

(Continued)

Sample: CL08

Sampled: 02/17/21 10:05 by Kate Buckley

1A21010-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1130	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:03			<b>Analyst:</b> SBN
<b>Ammonia as N</b>	0.51	0.047	0.10	mg/l	1	02/22/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1316	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/23/21 13:43			<b>Analyst:</b> YMT
<b>TKN</b>	1.3	0.065	0.10	mg/l	1	02/25/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1B1049	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 11:08			<b>Analyst:</b> YMT
<b>Nitrate as N</b>	0.40	0.040	0.20	mg/l	1	02/18/21 17:48	
Nitrite as N	ND	0.042	0.10	mg/l	1	02/18/21 17:48	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1074	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:28			<b>Analyst:</b> sbn
<b>o-Phosphate as P</b>	0.032	0.0030	0.010	mg/l	1	02/18/21 16:24	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1077	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:54			<b>Analyst:</b> sbn
<b>Phosphorus as P, Total</b>	0.056	0.0067	0.010	mg/l	1	02/22/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1B1189	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/22/21 13:16			<b>Analyst:</b> blg
<b>Total Dissolved Solids</b>	470	4.0	10	mg/l	1	02/24/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1B1119	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 11:41			<b>Analyst:</b> ism
<b>Total Suspended Solids</b>	0.1		5	mg/l	1	02/19/21	J
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1B1133	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:11			<b>Analyst:</b> ymt
<b>Sulfide, Total</b>	ND	0.050	0.10	mg/l	1	02/19/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1B1131	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 02/19/21 13:06			<b>Analyst:</b> kvm
<b>Aluminum, Dissolved</b>	0.0028	0.0014	0.020	mg/l	1	02/20/21	J
<b>Aluminum, Total</b>	0.052	0.041	0.050	mg/l	1	02/20/21	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

03/08/2021 18:17

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL09

Sampled: 02/17/21 9:05 by Kate Buckley

1A21010-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1130	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:03		<b>Analyst:</b> SBN	
Ammonia as N	0.40	0.047	0.10	mg/l	1	02/22/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1316	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/23/21 13:43		<b>Analyst:</b> YMT	
TKN	1.6	0.065	0.10	mg/l	1	02/25/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1B1049	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 11:08		<b>Analyst:</b> YMT	
Nitrate as N	0.12	0.040	0.20	mg/l	1	02/18/21 17:49	J
Nitrite as N	ND	0.042	0.10	mg/l	1	02/18/21 17:49	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1074	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:28		<b>Analyst:</b> sbn	
o-Phosphate as P	0.034	0.0030	0.010	mg/l	1	02/18/21 16:24	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1077	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:54		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.12	0.0067	0.010	mg/l	1	02/22/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1B1189	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/22/21 13:16		<b>Analyst:</b> blg	
Total Dissolved Solids	580	4.0	10	mg/l	1	02/24/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1B1119	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 11:41		<b>Analyst:</b> ism	
Total Suspended Solids	10		5	mg/l	1	02/19/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1B1133	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:11		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/19/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1B1131	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 02/19/21 13:06		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.0014	0.020	mg/l	1	02/20/21	
Aluminum, Total	0.18	0.041	0.050	mg/l	1	02/20/21	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 03/08/2021 18:17

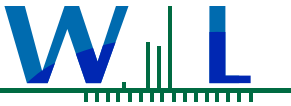
**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL10  
 1A21010-04 (Water) Sampled: 02/17/21 8:00 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1130	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:03			<b>Analyst:</b> SBN
Ammonia as N	0.11	0.047	0.10	mg/l	1	02/22/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1316	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/23/21 13:43			<b>Analyst:</b> YMT
TKN	1.5	0.065	0.10	mg/l	1	02/25/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1B1049	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 11:08			<b>Analyst:</b> YMT
Nitrate as N	0.088	0.040	0.20	mg/l	1	02/18/21 17:53	J
Nitrite as N	ND	0.042	0.10	mg/l	1	02/18/21 17:53	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1074	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:28			<b>Analyst:</b> sbn
o-Phosphate as P	0.0040	0.0030	0.010	mg/l	1	02/18/21 16:25	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1077	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:54			<b>Analyst:</b> sbn
Phosphorus as P, Total	0.12	0.0067	0.010	mg/l	1	02/22/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1B1189	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/22/21 13:16			<b>Analyst:</b> blg
Total Dissolved Solids	560	4.0	10	mg/l	1	02/24/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1B1119	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 11:41			<b>Analyst:</b> ism
Total Suspended Solids	14		5	mg/l	1	02/19/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1B1133	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:11			<b>Analyst:</b> ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/19/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1B1131	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 02/19/21 13:06			<b>Analyst:</b> kvm
Aluminum, Dissolved	0.0034	0.0014	0.020	mg/l	1	02/20/21	J
Aluminum, Total	0.21	0.041	0.050	mg/l	1	02/20/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

Project Number: LECL TMDL Monitoring

Reported:

03/08/2021 18:17

Project Manager: John Rudolph

## Sample Results

(Continued)

Sample: LE02

Sampled: 02/17/21 9:00 by Kate Buckley

1A21010-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1130	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:03		<b>Analyst:</b> SBN	
Ammonia as N	0.18	0.047	0.10	mg/l	1	02/22/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1B1316	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/23/21 13:43		<b>Analyst:</b> YMT	
TKN	3.7	0.065	0.10	mg/l	1	02/25/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1B1049	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 11:08		<b>Analyst:</b> YMT	
Nitrate as N	0.085	0.040	0.20	mg/l	1	02/18/21 17:54	J
Nitrite as N	0.11	0.042	0.10	mg/l	1	02/18/21 17:54	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1074	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:28		<b>Analyst:</b> sbn	
o-Phosphate as P	0.028	0.0030	0.010	mg/l	1	02/18/21 16:25	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1B1077	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/18/21 15:54		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.26	0.0067	0.010	mg/l	1	02/22/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1B1189	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/22/21 13:16		<b>Analyst:</b> blg	
Total Dissolved Solids	2000	4.0	10	mg/l	1	02/24/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1B1133	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 02/19/21 13:11		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/19/21	





WECK LABORATORIES, INC.

# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
03/08/2021 18:17

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	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1B1049 - EPA 353.2</b>											
<b>Blank (W1B1049-BLK1)</b>					<b>Prepared &amp; Analyzed: 02/18/21</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
<b>LCS (W1B1049-BS1)</b>					<b>Prepared &amp; Analyzed: 02/18/21</b>						
Nitrate as N	1.04	0.040	0.20	mg/l	1.00		104	90-110			
Nitrite as N	1.02	0.042	0.10	mg/l	1.00		102	90-110			
<b>Matrix Spike (W1B1049-MS1)</b>					<b>Source: 1A29010-02</b>						
					<b>Prepared &amp; Analyzed: 02/18/21</b>						
Nitrate as N	10.6	0.040	0.20	mg/l	2.00	8.68	96	90-110			
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	ND	101	90-110			
<b>Matrix Spike (W1B1049-MS2)</b>					<b>Source: 1A29010-03</b>						
					<b>Prepared &amp; Analyzed: 02/18/21</b>						
Nitrate as N	5.88	0.040	0.20	mg/l	2.00	3.79	104	90-110			
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	ND	101	90-110			
<b>Matrix Spike Dup (W1B1049-MSD1)</b>					<b>Source: 1A29010-02</b>						
					<b>Prepared &amp; Analyzed: 02/18/21</b>						
Nitrate as N	10.6	0.040	0.20	mg/l	2.00	8.68	96	90-110	0	20	
Nitrite as N	0.991	0.042	0.10	mg/l	1.00	ND	99	90-110	2	20	
<b>Matrix Spike Dup (W1B1049-MSD2)</b>					<b>Source: 1A29010-03</b>						
					<b>Prepared &amp; Analyzed: 02/18/21</b>						
Nitrate as N	5.88	0.040	0.20	mg/l	2.00	3.79	104	90-110	0	20	
Nitrite as N	0.996	0.042	0.10	mg/l	1.00	ND	100	90-110	1	20	
<b>Batch: W1B1074 - EPA 365.3</b>											
<b>Blank (W1B1074-BLK1)</b>					<b>Prepared &amp; Analyzed: 02/18/21</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W1B1074-BS1)</b>					<b>Prepared &amp; Analyzed: 02/18/21</b>						
o-Phosphate as P	0.196	0.0030	0.010	mg/l	0.200		98	88-111			
<b>Matrix Spike (W1B1074-MS1)</b>					<b>Source: 1A21009-01</b>						
					<b>Prepared &amp; Analyzed: 02/18/21</b>						
o-Phosphate as P	0.220	0.0030	0.010	mg/l	0.200	0.0270	96	85-112			
<b>Matrix Spike Dup (W1B1074-MSD1)</b>					<b>Source: 1A21009-01</b>						
					<b>Prepared &amp; Analyzed: 02/18/21</b>						
o-Phosphate as P	0.219	0.0030	0.010	mg/l	0.200	0.0270	96	85-112	0.5	20	
<b>Batch: W1B1077 - EPA 365.3</b>											
<b>Blank (W1B1077-BLK1)</b>					<b>Prepared: 02/18/21 Analyzed: 02/22/21</b>						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
<b>LCS (W1B1077-BS1)</b>					<b>Prepared: 02/18/21 Analyzed: 02/22/21</b>						
Phosphorus as P, Total	0.204	0.0067	0.010	mg/l	0.200		102	90-110			
<b>Matrix Spike (W1B1077-MS1)</b>					<b>Source: 1A21009-01</b>						
					<b>Prepared: 02/18/21 Analyzed: 02/22/21</b>						
Phosphorus as P, Total	0.460	0.0067	0.010	mg/l	0.200	0.247	106	90-110			
<b>Matrix Spike Dup (W1B1077-MSD1)</b>					<b>Source: 1A21009-01</b>						
					<b>Prepared: 02/18/21 Analyzed: 02/22/21</b>						
Phosphorus as P, Total	0.459	0.0067	0.010	mg/l	0.200	0.247	106	90-110	0.2	20	
<b>Batch: W1B1119 - SM 2540D</b>											
<b>Blank (W1B1119-BLK1)</b>					<b>Prepared &amp; Analyzed: 02/19/21</b>						



# Certificate of Analysis

FINAL REPORT

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
 03/08/2021 18:17

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1B1119 - SM 2540D (Continued)</b>											
<b>Blank (W1B1119-BLK1)</b> Prepared & Analyzed: 02/19/21											
Total Suspended Solids	ND		5	mg/l							
<b>LCS (W1B1119-BS1)</b> Prepared & Analyzed: 02/19/21											
Total Suspended Solids	63.9		5	mg/l	62.2		103	90-110			
<b>Duplicate (W1B1119-DUP1)</b> Source: 1B17002-01 Prepared & Analyzed: 02/19/21											
Total Suspended Solids	38.0		5	mg/l		37.0			3	20	
<b>Duplicate (W1B1119-DUP2)</b> Source: 1B17060-01 Prepared & Analyzed: 02/19/21											
Total Suspended Solids	175		5	mg/l		182			4	20	
<b>Batch: W1B1130 - EPA 350.1</b>											
<b>Blank (W1B1130-BLK1)</b> Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	ND	0.047	0.10	mg/l							
<b>Blank (W1B1130-BLK2)</b> Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	ND	0.047	0.10	mg/l							
<b>LCS (W1B1130-BS1)</b> Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	0.254	0.047	0.10	mg/l	0.250		102	90-110			
<b>LCS (W1B1130-BS2)</b> Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	0.254	0.047	0.10	mg/l	0.250		101	90-110			
<b>Matrix Spike (W1B1130-MS1)</b> Source: 1A21009-01 Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	0.423	0.047	0.10	mg/l	0.250	0.178	98	90-110			
<b>Matrix Spike (W1B1130-MS2)</b> Source: 1A21010-01 Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	0.861	0.047	0.10	mg/l	0.250	0.583	111	90-110			MS-02
<b>Matrix Spike Dup (W1B1130-MSD1)</b> Source: 1A21009-01 Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	0.422	0.047	0.10	mg/l	0.250	0.178	98	90-110	0.1	15	
<b>Matrix Spike Dup (W1B1130-MSD2)</b> Source: 1A21010-01 Prepared: 02/19/21 Analyzed: 02/22/21											
Ammonia as N	0.836	0.047	0.10	mg/l	0.250	0.583	101	90-110	3	15	
<b>Batch: W1B1133 - SM 4500S2-D</b>											
<b>Blank (W1B1133-BLK1)</b> Prepared & Analyzed: 02/19/21											
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W1B1133-BS1)</b> Prepared & Analyzed: 02/19/21											
Sulfide, Total	0.100	0.050	0.10	mg/l	0.0995		101	95-105			
<b>Duplicate (W1B1133-DUP1)</b> Source: 1A21010-01 Prepared & Analyzed: 02/19/21											
Sulfide, Total	ND	0.050	0.10	mg/l		ND				20	
<b>Batch: W1B1189 - SM 2540C</b>											
<b>Blank (W1B1189-BLK1)</b> Prepared: 02/22/21 Analyzed: 02/24/21											
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W1B1189-BS1)</b> Prepared: 02/22/21 Analyzed: 02/24/21											
Total Dissolved Solids	840	4.0	10	mg/l	824		102	96-102			
<b>Duplicate (W1B1189-DUP1)</b> Source: 1A29010-04 Prepared: 02/22/21 Analyzed: 02/24/21											

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
03/08/2021 18:17

Project Manager: John Rudolph

## Quality Control Results

(Continued)

### Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1B1189 - SM 2540C (Continued)</b>											
<b>Duplicate (W1B1189-DUP1)</b> Source: 1A29010-04 Prepared: 02/22/21 Analyzed: 02/24/21											
Total Dissolved Solids	11000	4.0	10	mg/l		11000			0.5	10	
<b>Duplicate (W1B1189-DUP2)</b> Source: 1B19092-02 Prepared: 02/22/21 Analyzed: 02/24/21											
Total Dissolved Solids	1880	4.0	10	mg/l		1950			3	10	
<b>Batch: W1B1316 - EPA 351.2</b>											
<b>Blank (W1B1316-BLK1)</b> Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	ND	0.065	0.10	mg/l							
<b>Blank (W1B1316-BLK2)</b> Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	ND	0.065	0.10	mg/l							
<b>LCS (W1B1316-BS1)</b> Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	1.06	0.065	0.10	mg/l	1.00		106	90-110			
<b>LCS (W1B1316-BS2)</b> Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	1.03	0.065	0.10	mg/l	1.00		103	90-110			
<b>Matrix Spike (W1B1316-MS1)</b> Source: 1B09095-06 Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	1.22	0.065	0.10	mg/l	1.00	0.204	101	90-110			
<b>Matrix Spike (W1B1316-MS2)</b> Source: 1B09095-07 Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	1.27	0.065	0.10	mg/l	1.00	0.197	107	90-110			
<b>Matrix Spike Dup (W1B1316-MSD1)</b> Source: 1B09095-06 Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	1.23	0.065	0.10	mg/l	1.00	0.204	103	90-110	1	10	
<b>Matrix Spike Dup (W1B1316-MSD2)</b> Source: 1B09095-07 Prepared: 02/23/21 Analyzed: 02/25/21											
TKN	1.20	0.065	0.10	mg/l	1.00	0.197	100	90-110	5	10	

## Quality Control Results

(Continued)

### Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1B1131 - EPA 200.7</b>											
<b>Blank (W1B1131-BLK1)</b> Prepared: 02/19/21 Analyzed: 02/20/21											
Aluminum, Dissolved	ND	0.0014	0.020	mg/l							
Aluminum, Total	ND	0.041	0.050	mg/l							
<b>LCS (W1B1131-BS1)</b> Prepared: 02/19/21 Analyzed: 02/20/21											
Aluminum, Dissolved	0.210	0.0014	0.020	mg/l	0.200		105	85-115			
Aluminum, Total	0.210	0.041	0.050	mg/l	0.200		105	85-115			
<b>Matrix Spike (W1B1131-MS1)</b> Source: 1A21010-01 Prepared: 02/19/21 Analyzed: 02/20/21											
Aluminum, Total	0.279	0.041	0.050	mg/l	0.200	0.0529	113	70-130			
<b>Matrix Spike Dup (W1B1131-MSD1)</b> Source: 1A21010-01 Prepared: 02/19/21 Analyzed: 02/20/21											
Aluminum, Total	0.280	0.041	0.050	mg/l	0.200	0.0529	113	70-130	0.1	30	

Wood - San Diego 2  
 9210 Sky Park Court, Suite 200  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 03/08/2021 18:17

**Project Manager:** John Rudolph

## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
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	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.

**Work Orders:** 1B17088

**Project:** LECL TMDL Monitoring 1915100403

**Attn:** John Rudolph

**Client:** Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Report Date:** 3/15/2021

**Received Date:** 2/17/2021

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 300-4301

**P.O. #:** C015101084

**Billing Code:**

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 2/17/21 with the Chain-of-Custody document. The samples were received in good condition, at 6.6 °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:**



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

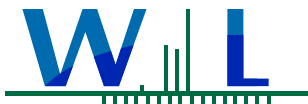
**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
03/15/2021 16:15

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07 - Int	Kate Buckley	1B17088-01	Water	02/17/21 11:00	
CL07 - Surf	Kate Buckley	1B17088-02	Water	02/17/21 11:05	
CL08 - Int	Kate Buckley	1B17088-03	Water	02/17/21 10:05	
CL08 - Surf	Kate Buckley	1B17088-04	Water	02/17/21 10:10	
CL09 - Int	Kate Buckley	1B17088-05	Water	02/17/21 09:05	
CL09 - Surf	Kate Buckley	1B17088-06	Water	02/17/21 09:10	
CL10 - Int	Kate Buckley	1B17088-07	Water	02/17/21 08:00	
CL10 - Surf	Kate Buckley	1B17088-08	Water	02/17/21 08:05	
LE02 - Int	Kate Buckley	1B17088-09	Water	02/17/21 09:00	
LE02 - Surf	Kate Buckley	1B17088-10	Water	02/17/21 09:20	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

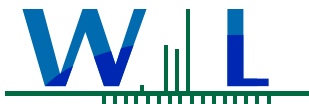
**Reported:**  
03/15/2021 16:15

## Sample Results Enthalpy Analytical

Sample: CL07 - Int  
1B17088-01 (Water)

Sampled: 02/17/21 11:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 11:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	1.6	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

## Sample Results Enthalpy Analytical

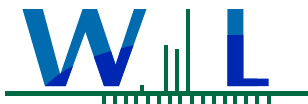
(Continued)

Sample: CL07 - Surf  
1B17088-02 (Water)

Sampled: 02/17/21 11:05 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 11:05				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	<b>3.2</b>	1	mg/M3	1	02/25/21	





WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

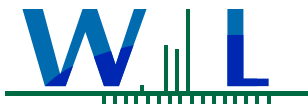
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08 - Int  
1B17088-03 (Water)

Sampled: 02/17/21 10:05 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 10:05				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	<b>3.2</b>	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

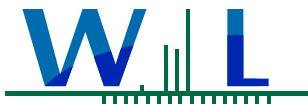
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08 - Surf  
1B17088-04 (Water)

Sampled: 02/17/21 10:10 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 10:10				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	3.7	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

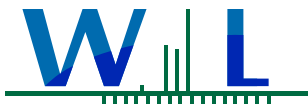
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09 - Int  
1B17088-05 (Water)

Sampled: 02/17/21 9:05 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 09:05				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	43	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09 - Surf  
1B17088-06 (Water)

Sampled: 02/17/21 9:10 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 09:10				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	40	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

FINAL REPORT

**Reported:**  
03/15/2021 16:15

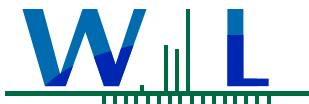
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10 - Int  
1B17088-07 (Water)

Sampled: 02/17/21 8:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 08:00				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	67	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

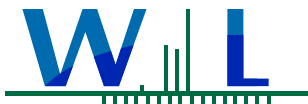
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10 - Surf  
1B17088-08 (Water)

Sampled: 02/17/21 8:05 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 08:05				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	70	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

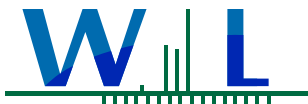
## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02 - Int  
1B17088-09 (Water)

Sampled: 02/17/21 9:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 09:00				<b>Analyst:</b> _SUB
Chlorophyll-a	70	1	mg/M3	1	02/25/21	



WECK LABORATORIES, INC.

Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
03/15/2021 16:15

## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02 - Surf  
1B17088-10 (Water)

Sampled: 02/17/21 9:20 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>						
<b>Method:</b> SM 10200H	<b>Batch ID:</b> 262124	<b>Prepared:</b> 02/17/21 09:20				<b>Analyst:</b> _SUB
<b>Chlorophyll-a</b>	55	1	mg/M3	1	02/25/21	



Wood - San Diego 2  
9210 Sky Park Court, Suite 200  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring 1915100403

**Reported:**  
03/15/2021 16:15

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
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)

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

1A21010

Client: Wood E&I Solutions, Inc.		Contact: John Rudolph		Phone No. 858-243-8158																							
FAX No.		Email: john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)																							
Project Name: LECL TMDL Monitoring		Turn Around Time: <u>Routine</u> *3-5 Day *48 Hour *24 Hour																									
Project Number: 1915100403		Lab TAT Approval: By: _____ Rush Rush *Additional Charges May Apply																									
Sampler Information			# of Containers & Preservatives				Total # of Containers	Sample Type		Analysis Requested										Matrix		Notes					
Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>Kate Buckley</u>			Unpreserved	H2SO4	HCl	HNO3		Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Routine	Resample	Special	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)	Total Sulfide (SM4500S)	Total AL (EPA 200.7)	Dissolved AL (EPA 200.7)
Sample ID	Date	Time																									
CL07	2/17/21	11:00														X	X	X	X	X	X	X	X	X	X		
CL08	2/17/21	10:05														X	X	X	X	X	X	X	X	X	X		
CL09	2/17/21	09:05														X	X	X	X	X	X	X	X	X	X		
CL10	2/17/21	08:00														X	X	X	X	X	X	X	X	X	X		
LE02	2/17/21	09:00															X	X	X	X	X	X	X				
Relinquished By (sign)			Print Name / Company				Date / Time		Received By (Sign)				Print Name / Company														
<u>Kate Buckley</u>			<u>Kate Buckley / Wood</u>				<u>2/17/21 1338</u>		<u>[Signature]</u>				<u>[Signature]</u>														
<u>[Signature]</u>			<u>[Signature]</u>				<u>2/17/21 1138</u>		<u>[Signature]</u>				<u>[Signature]</u>														
<u>[Signature]</u>			<u>[Signature]</u>				<u>2-17-21 15:34</u>		<u>[Signature]</u>				<u>[Signature]</u>														

(For Lab Use Only) Sample Integrity Upon Receipt	Lab Notes
Sample(s) Submitted on Ice? <input checked="" type="radio"/> Yes <input type="radio"/> No Custody Seal(s) Intact? <input checked="" type="radio"/> Yes <input type="radio"/> No    N/A Sample(s) Intact? <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="checkbox"/> Cooler Blank	Temperature <u>6.6</u> °C

Lab No. \_\_\_\_\_  
Page \_\_\_\_ of \_\_\_\_

# Chain of Custody & Sample Information Record

1317088

<b>Client:</b> Wood E&I Solutions, Inc.		<b>Contact:</b> John Rudolph		<b>Phone No.:</b> 858-243-8158																					
<b>FAX No.:</b>		<b>Email:</b> john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)																					
<b>Project Name:</b> LECL TMDL Monitoring		<b>Turn Around Time:</b> <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush																							
<b>Project Number:</b> 1915100403		<b>*Lab TAT Approval:</b> By: _____ *Additional Charges May Apply																							
Sampler Information			# of Containers & Preservatives				Total # of Containers	Sample Type			Analysis Requested					Matrix	Notes								
Name: <u>Kate Buckley</u> Employer: Wood E&I Solutions, Inc. Signature: <u>Kate Buckley</u>			Unpreserved	H2SO4	HCl	HNO3		Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Routine	Resample	Special	Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous
Sample ID	Date	Time																							
CL07 - Int	2/17/21	11:00																					X		
CL07 - Surf		11:05																					X		
CL08 - Int		10:05																					X		
CL08 - Surf		10:10																					X		
CL09 - Int		09:05																					X		
CL09 - Surf		09:10																					X		
CL10 - Int		08:00																					X		
CL10 - Surf		08:05																					X		
LE02 - Int		09:00																					X		
LE02 - Surf		09:20																					X		
<b>Relinquished By (sign)</b>		<b>Print Name / Company</b>		<b>Date / Time</b>		<b>Received By (Sign)</b>		<b>Print Name / Company</b>																	
<u>Kate Buckley</u>		Kate Buckley / wood		2/17/21 1330		<u>RMS</u>																			
<u>[Signature]</u>		<u>[Signature]</u>		2/17/21 1:38		<u>[Signature]</u>																			
<u>[Signature]</u>		<u>[Signature]</u>		2-17-21 15:34		<u>[Signature]</u>		L. D. [Signature]																	

<b>(For Lab Use Only) Sample Integrity Upon Receipt</b>			<b>Lab Notes</b>	
Sample(s) Submitted on Ice?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Temperature		
Custody Seal(s) Intact?	<input checked="" type="radio"/> Yes <input type="radio"/> No N/A	6-6 °C		
Sample(s) Intact?	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="checkbox"/> Cooler Blank		

Lab No. \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

086 2/18/21

**Work Orders:** 1C10006

**Project:** LECL TMDL Monitoring

**Attn:** John Rudolph

**Client:** Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Report Date:** 4/29/2021

**Received Date:** 4/8/2021

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 278-5300

**P.O. #:** C015101084

**Billing Code:**

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 4/08/21 with the Chain-of-Custody document. The samples were received in good condition, at 6.1 °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:**



Chris Samatmanakit  
Project Manager



Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

04/29/2021 12:58

**Project Manager:** John Rudolph

## Case Narrative

Final Report: 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 NELAC unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Kate Buckley	1C10006-01	Water	04/08/21 11:00	
CL08	Kate Buckley	1C10006-02	Water	04/08/21 10:15	
CL10	Kate Buckley	1C10006-03	Water	04/08/21 08:25	
CL09	Kate Buckley	1C10006-04	Water	04/08/21 09:20	
LE02	Kate Buckley	1C10006-05	Water	04/08/21 09:45	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

04/29/2021 12:58

**Project Manager:** John Rudolph

## Sample Results

Sample: CL07

Sampled: 04/08/21 11:00 by Kate Buckley

1C10006-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0603	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:22		<b>Analyst:</b> SBN	
Ammonia as N	0.76	0.047	0.10	mg/l	1	04/13/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0516	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 16:22		<b>Analyst:</b> SBN	
TKN	1.2	0.065	0.10	mg/l	1	04/16/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1D0443	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/08/21 15:28		<b>Analyst:</b> YMT	
Nitrate as N	0.21	0.040	0.20	mg/l	1	04/08/21 18:14	
Nitrite as N	ND	0.042	0.10	mg/l	1	04/08/21 18:14	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0491	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 11:10		<b>Analyst:</b> ssi	
o-Phosphate as P	0.051	0.0030	0.010	mg/l	1	04/09/21 11:44	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0604	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:36		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.072	0.0067	0.010	mg/l	1	04/14/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1D0585	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 14:49		<b>Analyst:</b> blg	
Total Dissolved Solids	490	4.0	10	mg/l	1	04/12/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1D0670	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 13:39		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	04/14/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1D0694	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 16:42		<b>Analyst:</b> ssi	
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/13/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1D0514	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 04/09/21 16:11		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	04/14/21	
Aluminum, Total	0.050	0.041	0.050	mg/l	1	04/14/21	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

04/29/2021 12:58

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL08

Sampled: 04/08/21 10:15 by Kate Buckley

1C10006-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0603	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:22		<b>Analyst:</b> SBN	
Ammonia as N	0.48	0.047	0.10	mg/l	1	04/13/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0516	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 16:22		<b>Analyst:</b> SBN	
TKN	1.0	0.065	0.10	mg/l	1	04/16/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1D0443	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/08/21 15:28		<b>Analyst:</b> YMT	
Nitrate as N	0.24	0.040	0.20	mg/l	1	04/08/21 18:16	
Nitrite as N	ND	0.042	0.10	mg/l	1	04/08/21 18:16	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0491	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 11:10		<b>Analyst:</b> ssi	
o-Phosphate as P	0.039	0.0030	0.010	mg/l	1	04/09/21 11:46	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0604	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:36		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.070	0.0067	0.010	mg/l	1	04/14/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1D0585	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 14:49		<b>Analyst:</b> blg	
Total Dissolved Solids	480	4.0	10	mg/l	1	04/12/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1D0670	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 13:39		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	04/14/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1D0694	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 16:42		<b>Analyst:</b> ssi	
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/13/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1D0514	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 04/09/21 16:11		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	04/14/21	
Aluminum, Total	0.052	0.041	0.050	mg/l	1	04/14/21	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

04/29/2021 12:58

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL10

Sampled: 04/08/21 8:25 by Kate Buckley

1C10006-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0603	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:22		<b>Analyst:</b> SBN	
Ammonia as N	0.27	0.047	0.10	mg/l	1	04/13/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0516	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 16:22		<b>Analyst:</b> SBN	
TKN	0.91	0.065	0.10	mg/l	1	04/16/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1D0443	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/08/21 15:28		<b>Analyst:</b> YMT	
Nitrate as N	0.20	0.040	0.20	mg/l	1	04/08/21 18:17	
Nitrite as N	ND	0.042	0.10	mg/l	1	04/08/21 18:17	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0491	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 11:10		<b>Analyst:</b> ssi	
o-Phosphate as P	0.064	0.0030	0.010	mg/l	1	04/09/21 11:46	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0604	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:36		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.099	0.0067	0.010	mg/l	1	04/14/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1D0585	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 14:49		<b>Analyst:</b> blg	
Total Dissolved Solids	600	4.0	10	mg/l	1	04/12/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1D0670	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 13:39		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	04/14/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1D0694	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 16:42		<b>Analyst:</b> ssi	
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/13/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1D0514	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 04/09/21 16:11		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	04/14/21	
Aluminum, Total	0.065	0.041	0.050	mg/l	1	04/14/21	



Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

04/29/2021 12:58

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL09 Sampled: 04/08/21 9:20 by Kate Buckley  
 1C10006-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0603	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:22		<b>Analyst:</b> SBN	
Ammonia as N	1.4	0.047	0.10	mg/l	1	04/13/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0516	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 16:22		<b>Analyst:</b> SBN	
TKN	2.0	0.065	0.10	mg/l	1	04/16/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1D0443	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/08/21 15:28		<b>Analyst:</b> YMT	
Nitrate as N	0.12	0.040	0.20	mg/l	1	04/08/21 18:18	J
Nitrite as N	ND	0.042	0.10	mg/l	1	04/08/21 18:18	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0491	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 11:10		<b>Analyst:</b> ssi	
o-Phosphate as P	0.19	0.0030	0.010	mg/l	1	04/09/21 11:47	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0604	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:36		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.24	0.0067	0.010	mg/l	1	04/14/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1D0585	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 14:49		<b>Analyst:</b> blg	
Total Dissolved Solids	600	4.0	10	mg/l	1	04/12/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1D0670	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 13:39		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	04/14/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1D0694	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 16:42		<b>Analyst:</b> ssi	
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/13/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1D0514	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 04/09/21 16:11		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	04/14/21	
Aluminum, Total	0.063	0.041	0.050	mg/l	1	04/14/21	



WECK LABORATORIES, INC.

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring

**Reported:**

04/29/2021 12:58

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: LE02  
 1C10006-05 (Water) Sampled: 04/08/21 9:45 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0603	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:22		<b>Analyst:</b> SBN	
Ammonia as N	0.23	0.047	0.10	mg/l	1	04/13/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1D0516	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 16:22		<b>Analyst:</b> SBN	
TKN	2.6	0.065	0.10	mg/l	1	04/16/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1D0443	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/08/21 15:28		<b>Analyst:</b> YMT	
Nitrate as N	ND	0.040	0.20	mg/l	1	04/08/21 18:23	
Nitrite as N	ND	0.042	0.10	mg/l	1	04/08/21 18:23	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0491	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/09/21 11:10		<b>Analyst:</b> ssi	
o-Phosphate as P	0.039	0.0030	0.010	mg/l	1	04/09/21 11:48	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1D0604	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 17:36		<b>Analyst:</b> sbn	
Phosphorus as P, Total	0.24	0.0067	0.010	mg/l	1	04/14/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1D0585	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/12/21 14:49		<b>Analyst:</b> blg	
Total Dissolved Solids	2000	4.0	10	mg/l	1	04/12/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1D0694	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 04/13/21 16:42		<b>Analyst:</b> ssi	
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/13/21	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:

04/29/2021 12:58

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	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1D0443 - EPA 353.2</b>											
<b>Blank (W1D0443-BLK1)</b>					<b>Prepared &amp; Analyzed: 04/08/21</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
<b>LCS (W1D0443-BS1)</b>					<b>Prepared &amp; Analyzed: 04/08/21</b>						
Nitrate as N	1.02	0.040	0.20	mg/l	1.00		102	90-110			
Nitrite as N	1.08	0.042	0.10	mg/l	1.00		108	90-110			
<b>Matrix Spike (W1D0443-MS1)</b>					<b>Source: 1D08057-02 Prepared &amp; Analyzed: 04/08/21</b>						
Nitrate as N	2.26	0.040	0.20	mg/l	2.00	0.314	97	90-110			
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110			
<b>Matrix Spike (W1D0443-MS2)</b>					<b>Source: 1D08059-02 Prepared &amp; Analyzed: 04/08/21</b>						
Nitrate as N	2.24	0.040	0.20	mg/l	2.00	0.323	96	90-110			
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110			
<b>Matrix Spike Dup (W1D0443-MSD1)</b>					<b>Source: 1D08057-02 Prepared &amp; Analyzed: 04/08/21</b>						
Nitrate as N	2.26	0.040	0.20	mg/l	2.00	0.314	97	90-110	0	20	
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110	0	20	
<b>Matrix Spike Dup (W1D0443-MSD2)</b>					<b>Source: 1D08059-02 Prepared &amp; Analyzed: 04/08/21</b>						
Nitrate as N	1.71	0.040	0.20	mg/l	2.00	0.323	69	90-110	27	20	MS-01
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110	0	20	
<b>Batch: W1D0491 - EPA 365.3</b>											
<b>Blank (W1D0491-BLK1)</b>					<b>Prepared &amp; Analyzed: 04/09/21</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W1D0491-BS1)</b>					<b>Prepared &amp; Analyzed: 04/09/21</b>						
o-Phosphate as P	0.200	0.0030	0.010	mg/l	0.200		100	88-111			
<b>Matrix Spike (W1D0491-MS1)</b>					<b>Source: 1C10006-01 Prepared &amp; Analyzed: 04/09/21</b>						
o-Phosphate as P	0.258	0.0030	0.010	mg/l	0.200	0.0510	104	85-112			
<b>Matrix Spike Dup (W1D0491-MSD1)</b>					<b>Source: 1C10006-01 Prepared &amp; Analyzed: 04/09/21</b>						
o-Phosphate as P	0.252	0.0030	0.010	mg/l	0.200	0.0510	100	85-112	2	20	
<b>Batch: W1D0516 - EPA 351.2</b>											
<b>Blank (W1D0516-BLK1)</b>					<b>Prepared: 04/09/21 Analyzed: 04/16/21</b>						
TKN	ND	0.065	0.10	mg/l							
<b>Blank (W1D0516-BLK2)</b>					<b>Prepared: 04/09/21 Analyzed: 04/16/21</b>						
TKN	ND	0.065	0.10	mg/l							
<b>Blank (W1D0516-BLK3)</b>					<b>Prepared: 04/09/21 Analyzed: 04/21/21</b>						
TKN	ND	0.065	0.10	mg/l							
<b>LCS (W1D0516-BS1)</b>					<b>Prepared: 04/09/21 Analyzed: 04/16/21</b>						
TKN	1.02	0.065	0.10	mg/l	1.00		102	90-110			
<b>LCS (W1D0516-BS2)</b>					<b>Prepared: 04/09/21 Analyzed: 04/16/21</b>						
TKN	0.994	0.065	0.10	mg/l	1.00		99	90-110			

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
04/29/2021 12:58

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1D0516 - EPA 351.2 (Continued)</b>											
<b>LCS (W1D0516-BS3)</b>											
TKN	1.04	0.065	0.10	mg/l	1.00		104	90-110			
						<b>Prepared: 04/09/21 Analyzed: 04/21/21</b>					
<b>Matrix Spike (W1D0516-MS1)</b>											
TKN	1.15	0.065	0.10	mg/l	1.00	0.253	89	90-110			MS-01
						<b>Source: 1D06112-01 Prepared: 04/09/21 Analyzed: 04/16/21</b>					
<b>Matrix Spike (W1D0516-MS2)</b>											
TKN	1.24	0.065	0.10	mg/l	1.00	0.206	104	90-110			
						<b>Source: 1D06112-02 Prepared: 04/09/21 Analyzed: 04/16/21</b>					
<b>Matrix Spike (W1D0516-MS3)</b>											
TKN	1.15	0.065	0.10	mg/l	1.00	0.265	88	90-110			MS-03
						<b>Source: 1D06112-01RE1 Prepared: 04/09/21 Analyzed: 04/21/21</b>					
<b>Matrix Spike Dup (W1D0516-MSD1)</b>											
TKN	1.13	0.065	0.10	mg/l	1.00	0.253	88	90-110	1	10	MS-01
						<b>Source: 1D06112-01 Prepared: 04/09/21 Analyzed: 04/16/21</b>					
<b>Matrix Spike Dup (W1D0516-MSD2)</b>											
TKN	1.23	0.065	0.10	mg/l	1.00	0.206	103	90-110	0.7	10	
						<b>Source: 1D06112-02 Prepared: 04/09/21 Analyzed: 04/16/21</b>					
<b>Matrix Spike Dup (W1D0516-MSD3)</b>											
TKN	0.960	0.065	0.10	mg/l	1.00	0.265	70	90-110	18	10	MS-03
						<b>Source: 1D06112-01RE1 Prepared: 04/09/21 Analyzed: 04/21/21</b>					
<b>Batch: W1D0585 - SM 2540C</b>											
<b>Blank (W1D0585-BLK1)</b>											
Total Dissolved Solids	ND	4.0	10	mg/l							
						<b>Prepared &amp; Analyzed: 04/12/21</b>					
<b>LCS (W1D0585-BS1)</b>											
Total Dissolved Solids	836	4.0	10	mg/l		824	101	96-102			
						<b>Prepared &amp; Analyzed: 04/12/21</b>					
<b>Duplicate (W1D0585-DUP1)</b>											
Total Dissolved Solids	1980	4.0	10	mg/l		1960			0.9	10	
						<b>Source: 1C10006-05 Prepared: 04/12/21 Analyzed: 04/12/21</b>					
<b>Duplicate (W1D0585-DUP2)</b>											
Total Dissolved Solids	39700	4.0	10	mg/l		38900			2	10	
						<b>Source: 1D07086-01 Prepared: 04/12/21 Analyzed: 04/12/21</b>					
<b>Batch: W1D0603 - EPA 350.1</b>											
<b>Blank (W1D0603-BLK1)</b>											
Ammonia as N	ND	0.047	0.10	mg/l							
						<b>Prepared: 04/12/21 Analyzed: 04/13/21</b>					
<b>Blank (W1D0603-BLK2)</b>											
Ammonia as N	ND	0.047	0.10	mg/l							
						<b>Prepared: 04/12/21 Analyzed: 04/13/21</b>					
<b>LCS (W1D0603-BS1)</b>											
Ammonia as N	0.253	0.047	0.10	mg/l	0.250		101	90-110			
						<b>Prepared: 04/12/21 Analyzed: 04/13/21</b>					
<b>LCS (W1D0603-BS2)</b>											
Ammonia as N	0.251	0.047	0.10	mg/l	0.250		101	90-110			
						<b>Prepared: 04/12/21 Analyzed: 04/13/21</b>					
<b>Matrix Spike (W1D0603-MS1)</b>											
Ammonia as N	0.253	0.047	0.10	mg/l	0.250	ND	101	90-110			
						<b>Source: 1D12089-01 Prepared: 04/12/21 Analyzed: 04/13/21</b>					
<b>Matrix Spike (W1D0603-MS2)</b>											
Ammonia as N	0.254	0.047	0.10	mg/l	0.250	ND	101	90-110			
						<b>Source: 1D12089-02 Prepared: 04/12/21 Analyzed: 04/13/21</b>					
<b>Matrix Spike Dup (W1D0603-MSD1)</b>											
Ammonia as N	0.254	0.047	0.10	mg/l	0.250	ND	101	90-110	0.2	15	
						<b>Source: 1D12089-01 Prepared: 04/12/21 Analyzed: 04/13/21</b>					

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
 04/29/2021 12:58

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1D0603 - EPA 350.1 (Continued)</b>											
<b>Matrix Spike Dup (W1D0603-MSD2)</b> Source: 1D12089-02 Prepared: 04/12/21 Analyzed: 04/13/21											
Ammonia as N	0.254	0.047	0.10	mg/l	0.250	ND	102	90-110	0.02	15	
<b>Batch: W1D0604 - EPA 365.3</b>											
<b>Blank (W1D0604-BLK1)</b> Prepared: 04/12/21 Analyzed: 04/14/21											
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
<b>LCS (W1D0604-BS1)</b> Prepared: 04/12/21 Analyzed: 04/14/21											
Phosphorus as P, Total	0.208	0.0067	0.010	mg/l	0.200		104	90-110			
<b>Matrix Spike (W1D0604-MS1)</b> Source: 1C10006-01 Prepared: 04/12/21 Analyzed: 04/14/21											
Phosphorus as P, Total	0.278	0.0067	0.010	mg/l	0.200	0.0720	103	90-110			
<b>Matrix Spike Dup (W1D0604-MSD1)</b> Source: 1C10006-01 Prepared: 04/12/21 Analyzed: 04/14/21											
Phosphorus as P, Total	0.278	0.0067	0.010	mg/l	0.200	0.0720	103	90-110	0	20	
<b>Batch: W1D0670 - SM 2540D</b>											
<b>Blank (W1D0670-BLK1)</b> Prepared: 04/13/21 Analyzed: 04/14/21											
Total Suspended Solids	ND		5	mg/l							
<b>LCS (W1D0670-BS1)</b> Prepared: 04/13/21 Analyzed: 04/14/21											
Total Suspended Solids	57.8		5	mg/l	54.9		105	90-110			
<b>Duplicate (W1D0670-DUP1)</b> Source: 1D09060-01 Prepared: 04/13/21 Analyzed: 04/14/21											
Total Suspended Solids	66.0		5	mg/l		70.0			6	20	
<b>Duplicate (W1D0670-DUP2)</b> Source: 1D12053-01 Prepared: 04/13/21 Analyzed: 04/14/21											
Total Suspended Solids	14.0		5	mg/l		13.5			4	20	
<b>Batch: W1D0694 - SM 4500S2-D</b>											
<b>Blank (W1D0694-BLK1)</b> Prepared & Analyzed: 04/13/21											
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W1D0694-BS1)</b> Prepared & Analyzed: 04/13/21											
Sulfide, Total	0.100	0.050	0.10	mg/l	0.101		99	95-105			
<b>Duplicate (W1D0694-DUP1)</b> Source: 1D13029-02 Prepared & Analyzed: 04/13/21											
Sulfide, Total	0.800	0.10	0.20	mg/l		0.800			0	20	
<b>Duplicate (W1D0694-DUP2)</b> Source: 1D13029-04 Prepared & Analyzed: 04/13/21											
Sulfide, Total	0.100	0.050	0.10	mg/l		0.100			0	20	
<b>Duplicate (W1D0694-DUP3)</b> Source: 1D13029-01 Prepared & Analyzed: 04/13/21											
Sulfide, Total	ND	0.10	0.20	mg/l		ND				20	
<b>Duplicate (W1D0694-DUP4)</b> Source: 1C10006-04 Prepared & Analyzed: 04/13/21											
Sulfide, Total	ND	0.10	0.20	mg/l		ND				20	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 04/29/2021 12:58

**Project Manager:** John Rudolph

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1D0514 - EPA 200.7</b>											
<b>Blank (W1D0514-BLK1)</b>					<b>Prepared: 04/09/21 Analyzed: 04/14/21</b>						
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.041	0.050	mg/l							
<b>LCS (W1D0514-BS1)</b>					<b>Prepared: 04/09/21 Analyzed: 04/14/21</b>						
Aluminum, Dissolved	0.217	0.041	0.050	mg/l	0.200		109	85-115			
Aluminum, Total	0.217	0.041	0.050	mg/l	0.200		109	85-115			
<b>Matrix Spike (W1D0514-MS1)</b>					<b>Source: 1D08078-01 Prepared: 04/09/21 Analyzed: 04/14/21</b>						
Aluminum, Total	0.290	0.041	0.050	mg/l	0.200	0.0659	112	70-130			
<b>Matrix Spike Dup (W1D0514-MSD1)</b>					<b>Source: 1D08078-01 Prepared: 04/09/21 Analyzed: 04/14/21</b>						
Aluminum, Total	0.291	0.041	0.050	mg/l	0.200	0.0659	113	70-130	0.5	30	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 04/29/2021 12:58

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-03	Multiple analyses indicate the percent recovery is out of acceptance limits due to a possible matrix effect.
%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.

**Work Orders:** 1D08088

**Project:** 1915100403 LECL TMDL Monitoring

**Attn:** John Rudolph

**Client:** Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Report Date:** 4/26/2021

**Received Date:** 4/8/2021

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 278-5300

**P.O. #:** C015101084

**Billing Code:**

DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NJ-DEP #CA015

*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 4/08/21 with the Chain-of-Custody document. The samples were received in good condition, at 6.1 °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:**



Chris Samatmanakit  
Project Manager







WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

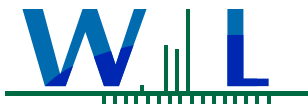
**Reported:**

04/26/2021 16:40

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07- Int	Kate Buckley	1D08088-01	Water	04/08/21 11:00	
CL07- Surf	Kate Buckley	1D08088-02	Water	04/08/21 11:10	
CL08- Int	Kate Buckley	1D08088-03	Water	04/08/21 10:15	
CL08- Surf	Kate Buckley	1D08088-04	Water	04/08/21 10:25	
CL09- Int	Kate Buckley	1D08088-05	Water	04/08/21 09:20	
CL09- Surf	Kate Buckley	1D08088-06	Water	04/08/21 09:30	
CL10- Int	Kate Buckley	1D08088-07	Water	04/08/21 08:25	
CL10- Surf	Kate Buckley	1D08088-08	Water	04/08/21 08:40	
LE02- Int	Kate Buckley	1D08088-09	Water	04/08/21 09:45	
LE02- Surf	Kate Buckley	1D08088-10	Water	04/08/21 10:15	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

04/26/2021 16:40

**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

Sample: CL07- Int  
1D08088-01 (Water)

Sampled: 04/08/21 11:00 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>3.2</b>	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/26/2021 16:40

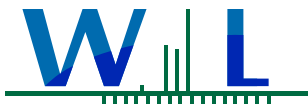
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL07- Surf  
1D08088-02 (Water)

Sampled: 04/08/21 11:10 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	4.3	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

FINAL REPORT

**Reported:**  
04/26/2021 16:40

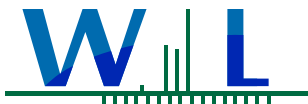
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08- Int  
1D08088-03 (Water)

Sampled: 04/08/21 10:15 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>3.4</b>	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/26/2021 16:40

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL08- Surf  
1D08088-04 (Water)

Sampled: 04/08/21 10:25 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>4.8</b>	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/26/2021 16:40

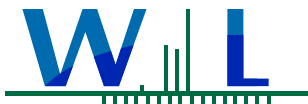
## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09- Int  
1D08088-05 (Water)

Sampled: 04/08/21 9:20 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>7.5</b>	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

FINAL REPORT

**Reported:**  
04/26/2021 16:40

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL09- Surf  
1D08088-06 (Water)

Sampled: 04/08/21 9:30 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>10</b>	1.0	mg/M3	1	04/13/21	



# Certificate of Analysis

FINAL REPORT

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
04/26/2021 16:40

**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10- Int  
1D08088-07 (Water)

Sampled: 04/08/21 8:25 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>5.8</b>	1.0	mg/M3	1	04/13/21	





WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/26/2021 16:40

## Sample Results Enthalpy Analytical

(Continued)

Sample: CL10- Surf  
1D08088-08 (Water)

Sampled: 04/08/21 8:40 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>5.9</b>	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
04/26/2021 16:40

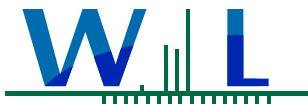
## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02- Int  
1D08088-09 (Water)

Sampled: 04/08/21 9:45 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>61</b>	1.0	mg/M3	1	04/13/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**

04/26/2021 16:40

**Project Manager:** John Rudolph

## Sample Results Enthalpy Analytical

(Continued)

Sample: LE02- Surf  
1D08088-10 (Water)

Sampled: 04/08/21 10:15 by Kate Buckley

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H - Chlorophyll a</b>						
<b>Method:</b> SM 10200-H - Chlorophyll a	<b>Batch ID:</b> 265654	<b>Prepared:</b> 04/13/21 00:00				<b>Analyst:</b> ATP
<b>Chlorophyll a</b>	<b>56</b>	1.0	mg/M3	1	04/13/21	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
04/26/2021 16:40

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
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)

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

1210006

<b>Client:</b> Wood E&I Solutions, Inc.		<b>Contact:</b> John Rudolph		<b>Phone No.</b> 858-243-8158																								
<b>FAX No.</b>		<b>Email:</b> john.rudolph@woodplc.com		<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)																								
<b>Project Name:</b> LECL TMDL Monitoring		<b>Turn Around Time:</b> <u>Routine</u> *3-5 Day *48 Hour *24 Hour Rush Rush Rush																										
<b>Project Number:</b> 1915100403		<b>Lab TAT Approval:</b> By: _____ *Additional Charges May Apply																										
Sampler Information			# of Containers & Preservatives							Sample Type	Analysis Requested							Matrix	Notes									
Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>[Signature]</u>			Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Routine	Resample	Special	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)	Total Sulfide (SM4500S)	Total AL (EPA 200.7)	Dissolved AL (EPA 200.7)	DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	Ortho-P is field filtered (0.45 um)  Dissolved Al is field filtered  **ASAP on TP results for CL07, CL08, CL09, CL10 (5 day TAT) ★ Refer to sample IDs ★ changed on CL09, CL10
Sample ID	Date	Time																										
CL07	4/8/21	1100															X	X	X	X	X	X	X	X	X			
CL08	↓	1015															X	X	X	X	X	X	X	X	X			
CL09		0920															X	X	X	X	X	X	X	X	X			
CL10		0825															X	X	X	X	X	X	X	X	X			
LE02		0945															X	X	X	X	X	X	X	X	X			
<b>Relinquished By (sign)</b>		<b>Print Name / Company</b>		<b>Date / Time</b>		<b>Received By (Sign)</b>		<b>Print Name / Company</b>																				
<u>[Signature]</u>		<u>Marisa Swiderski (Wood)</u>		<u>4/8/21 1350</u>		<u>[Signature]</u>		<u>Heather Sanchez / Wood</u>																				
<u>[Signature]</u>		<u>Heather Sanchez</u>		<u>4-8-21/1520</u>		<u>[Signature]</u>		<u>Algebraff 4/8/21 1520</u>																				

(For Lab Use Only) Sample Integrity Upon Receipt				Lab Notes
Sample(s) Submitted on Ice?	Yes	No	Temperature	
Custody Seal(s) Intact?	Yes	No	6.1 °C	
Sample(s) Intact?	Yes	No	-0.30 °C <input type="checkbox"/> Cooler Blank	



Work Orders: 1F02086

Project: LECL TMDL Monitoring

Attn: John Rudolph

Client: Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

Report Date: 6/22/2021

Received Date: 6/2/2021

Turnaround Time: Normal

Phones: (858) 514-6465

Fax: (858) 278-5300

P.O. #: C015101084

Billing Code:

DoD-ELAP ANAB #L2457 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH # • 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 John Rudolph,

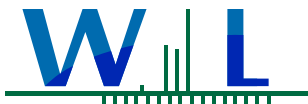
Enclosed are the results of analyses for samples received 6/02/21 with the Chain-of-Custody document. The samples were received in good condition, at 9.1 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Chris Samatmanakit  
Project Manager





WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

# Certificate of Analysis

FINAL REPORT

**Project Number:** LECL TMDL Monitoring

**Reported:**

06/22/2021 12:43

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Kate Buckley	1F02086-01	Water	06/02/21 11:05	
CL08	Kate Buckley	1F02086-02	Water	06/02/21 10:15	
CL09	Kate Buckley	1F02086-03	Water	06/02/21 09:15	
CL10	Kate Buckley	1F02086-04	Water	06/02/21 08:20	
LE02	Kate Buckley	1F02086-05	Water	06/02/21 09:25	



Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

06/22/2021 12:43

**Project Manager:** John Rudolph

## Sample Results

Sample: CL07

Sampled: 06/02/21 11:05 by Kate Buckley

1F02086-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0412	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:49		<b>Analyst:</b> YMT	
Ammonia as N	1.1	0.047	0.10	mg/l	1	06/08/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0433	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 16:38		<b>Analyst:</b> ymt	
TKN	1.8	0.065	0.10	mg/l	1	06/11/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1F0193	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 08:25		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	06/03/21 11:15	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/03/21 11:15	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0220	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 11:49		<b>Analyst:</b> ssi	
o-Phosphate as P	0.075	0.0030	0.010	mg/l	1	06/03/21 12:36	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0255	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 16:50		<b>Analyst:</b> ssi	
Phosphorus as P, Total	0.11	0.0067	0.010	mg/l	1	06/07/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1F0394	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 12:36		<b>Analyst:</b> blg	
Total Dissolved Solids	520	4.0	10	mg/l	1	06/08/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1F0410	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:32		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	06/08/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1F0381	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 11:04		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/07/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1F0528	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 06/08/21 16:39		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	06/10/21	
Aluminum, Total	0.045	0.041	0.050	mg/l	1	06/10/21	J

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
06/22/2021 12:43

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL08

Sampled: 06/02/21 10:15 by Kate Buckley

1F02086-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0412	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:49		<b>Analyst:</b> YMT	
Ammonia as N	1.1	0.047	0.10	mg/l	1	06/08/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0433	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 16:38		<b>Analyst:</b> ymt	
TKN	1.2	0.065	0.10	mg/l	1	06/11/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1F0193	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 08:25		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	06/03/21 11:16	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/03/21 11:16	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0220	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 11:49		<b>Analyst:</b> ssi	
o-Phosphate as P	0.019	0.0030	0.010	mg/l	1	06/03/21 12:37	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0255	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 16:50		<b>Analyst:</b> ssi	
Phosphorus as P, Total	0.056	0.0067	0.010	mg/l	1	06/07/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1F0394	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 12:36		<b>Analyst:</b> blg	
Total Dissolved Solids	520	4.0	10	mg/l	1	06/08/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1F0410	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:32		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	06/08/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1F0381	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 11:04		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/07/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1F0528	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 06/08/21 16:39		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	06/10/21	
Aluminum, Total	0.045	0.041	0.050	mg/l	1	06/10/21	J

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 06/22/2021 12:43

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL09 Sampled: 06/02/21 9:15 by Kate Buckley  
 1F02086-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0412	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:49		<b>Analyst:</b> YMT	
Ammonia as N	0.47	0.047	0.10	mg/l	1	06/08/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0433	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 16:38		<b>Analyst:</b> ymt	
TKN	2.0	0.065	0.10	mg/l	1	06/11/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1F0193	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 08:25		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	06/03/21 11:17	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/03/21 11:45	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0220	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 11:49		<b>Analyst:</b> ssi	
o-Phosphate as P	0.10	0.0030	0.010	mg/l	1	06/03/21 12:37	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0255	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 16:50		<b>Analyst:</b> ssi	
Phosphorus as P, Total	0.17	0.0067	0.010	mg/l	1	06/07/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1F0394	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 12:36		<b>Analyst:</b> blg	
Total Dissolved Solids	620	4.0	10	mg/l	1	06/08/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1F0410	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:32		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	06/08/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1F0381	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 11:04		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/07/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1F0528	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 06/08/21 16:39		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	06/10/21	
Aluminum, Total	0.068	0.041	0.050	mg/l	1	06/10/21	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 06/22/2021 12:43

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: CL10  
 1F02086-04 (Water) Sampled: 06/02/21 8:20 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0412	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:49		<b>Analyst:</b> YMT	
Ammonia as N	ND	0.047	0.10	mg/l	1	06/08/21	
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0433	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 16:38		<b>Analyst:</b> ymt	
TKN	0.77	0.065	0.10	mg/l	1	06/11/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1F0193	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 08:25		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	06/03/21 11:18	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/03/21 11:18	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0220	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 11:49		<b>Analyst:</b> ssi	
o-Phosphate as P	0.0030	0.0030	0.010	mg/l	1	06/03/21 12:38	J
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0255	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 16:50		<b>Analyst:</b> ssi	
Phosphorus as P, Total	0.054	0.0067	0.010	mg/l	1	06/07/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1F0394	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 12:36		<b>Analyst:</b> blg	
Total Dissolved Solids	620	4.0	10	mg/l	1	06/08/21	
<b>Method:</b> SM 2540D				<b>Instr:</b> OVEN15			
<b>Batch ID:</b> W1F0410	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:32		<b>Analyst:</b> ism	
Total Suspended Solids	ND		5	mg/l	1	06/08/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1F0381	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 11:04		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/07/21	
<b>Metals by EPA 200 Series Methods</b>							
<b>Method:</b> EPA 200.7				<b>Instr:</b> ICP03			
<b>Batch ID:</b> W1F0528	<b>Preparation:</b> EPA 200.2			<b>Prepared:</b> 06/08/21 16:39		<b>Analyst:</b> kvm	
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	06/10/21	
Aluminum, Total	0.10	0.041	0.050	mg/l	1	06/10/21	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 06/22/2021 12:43

**Project Manager:** John Rudolph

## Sample Results

(Continued)

Sample: LE02  
 1F02086-05 (Water) Sampled: 06/02/21 9:25 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods</b>							
<b>Method:</b> EPA 350.1				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0412	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 14:49		<b>Analyst:</b> YMT	
Ammonia as N	0.099	0.047	0.10	mg/l	1	06/08/21	J
<b>Method:</b> EPA 351.2				<b>Instr:</b> AA06			
<b>Batch ID:</b> W1F0433	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 16:38		<b>Analyst:</b> ymt	
TKN	4.1	0.065	0.10	mg/l	1	06/11/21	
<b>Method:</b> EPA 353.2				<b>Instr:</b> AA01			
<b>Batch ID:</b> W1F0193	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 08:25		<b>Analyst:</b> sar	
Nitrate as N	ND	0.040	0.20	mg/l	1	06/03/21 11:19	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/03/21 11:19	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0220	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 11:49		<b>Analyst:</b> ssi	
o-Phosphate as P	0.012	0.0030	0.010	mg/l	1	06/03/21 12:38	
<b>Method:</b> EPA 365.3				<b>Instr:</b> UVVIS04			
<b>Batch ID:</b> W1F0255	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/03/21 16:50		<b>Analyst:</b> ssi	
Phosphorus as P, Total	0.28	0.0067	0.010	mg/l	1	06/07/21	
<b>Method:</b> SM 2540C				<b>Instr:</b> OVEN01			
<b>Batch ID:</b> W1F0394	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 12:36		<b>Analyst:</b> blg	
Total Dissolved Solids	2100	4.0	10	mg/l	1	06/08/21	
<b>Method:</b> SM 4500S2-D				<b>Instr:</b> _ANALYST			
<b>Batch ID:</b> W1F0381	<b>Preparation:</b> _NONE (WETCHEM)			<b>Prepared:</b> 06/07/21 11:04		<b>Analyst:</b> ymt	
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/07/21	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
06/22/2021 12:43

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	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1F0193 - EPA 353.2</b>											
<b>Blank (W1F0193-BLK1)</b>					<b>Prepared &amp; Analyzed: 06/03/21</b>						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
<b>LCS (W1F0193-BS1)</b>					<b>Prepared &amp; Analyzed: 06/03/21</b>						
Nitrate as N	1.04	0.040	0.20	mg/l	1.00		104	90-110			
Nitrite as N	1.04	0.042	0.10	mg/l	1.00		104	90-110			
<b>Matrix Spike (W1F0193-MS1)</b>					<b>Source: 1C30068-01</b>						
					<b>Prepared &amp; Analyzed: 06/03/21</b>						
Nitrate as N	14.2	0.080	0.40	mg/l	4.00	9.93	107	90-110			
Nitrite as N	1.06	0.042	0.10	mg/l	1.00	ND	106	90-110			
<b>Matrix Spike (W1F0193-MS2)</b>					<b>Source: 1E24014-05</b>						
					<b>Prepared &amp; Analyzed: 06/03/21</b>						
Nitrate as N	4.77	0.040	0.20	mg/l	2.00	2.65	106	90-110			
Nitrite as N	1.02	0.042	0.10	mg/l	1.00	ND	102	90-110			
<b>Matrix Spike Dup (W1F0193-MSD1)</b>					<b>Source: 1C30068-01</b>						
					<b>Prepared &amp; Analyzed: 06/03/21</b>						
Nitrate as N	14.2	0.080	0.40	mg/l	4.00	9.93	106	90-110	0.1	20	
Nitrite as N	1.05	0.042	0.10	mg/l	1.00	ND	105	90-110	0.9	20	
<b>Matrix Spike Dup (W1F0193-MSD2)</b>					<b>Source: 1E24014-05</b>						
					<b>Prepared &amp; Analyzed: 06/03/21</b>						
Nitrate as N	4.77	0.040	0.20	mg/l	2.00	2.65	106	90-110	0	20	
Nitrite as N	1.07	0.042	0.10	mg/l	1.00	ND	107	90-110	5	20	
<b>Batch: W1F0220 - EPA 365.3</b>											
<b>Blank (W1F0220-BLK1)</b>					<b>Prepared &amp; Analyzed: 06/03/21</b>						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
<b>LCS (W1F0220-BS1)</b>					<b>Prepared &amp; Analyzed: 06/03/21</b>						
o-Phosphate as P	0.206	0.0030	0.010	mg/l	0.200		103	88-111			
<b>Matrix Spike (W1F0220-MS1)</b>					<b>Source: 1F02056-01</b>						
					<b>Prepared &amp; Analyzed: 06/03/21</b>						
o-Phosphate as P	0.303	0.0030	0.010	mg/l	0.200	0.0990	102	85-112			
<b>Matrix Spike Dup (W1F0220-MSD1)</b>					<b>Source: 1F02056-01</b>						
					<b>Prepared &amp; Analyzed: 06/03/21</b>						
o-Phosphate as P	0.304	0.0030	0.010	mg/l	0.200	0.0990	102	85-112	0.3	20	
<b>Batch: W1F0255 - EPA 365.3</b>											
<b>Blank (W1F0255-BLK1)</b>					<b>Prepared: 06/03/21 Analyzed: 06/07/21</b>						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
<b>LCS (W1F0255-BS1)</b>					<b>Prepared: 06/03/21 Analyzed: 06/07/21</b>						
Phosphorus as P, Total	0.207	0.0067	0.010	mg/l	0.200		104	90-110			
<b>Matrix Spike (W1F0255-MS1)</b>					<b>Source: 1F02056-01</b>						
					<b>Prepared: 06/03/21 Analyzed: 06/07/21</b>						
Phosphorus as P, Total	0.371	0.0067	0.010	mg/l	0.200	0.170	100	90-110			
<b>Matrix Spike Dup (W1F0255-MSD1)</b>					<b>Source: 1F02056-01</b>						
					<b>Prepared: 06/03/21 Analyzed: 06/07/21</b>						
Phosphorus as P, Total	0.369	0.0067	0.010	mg/l	0.200	0.170	99	90-110	0.5	20	
<b>Batch: W1F0381 - SM 4500S2-D</b>											
<b>Blank (W1F0381-BLK1)</b>					<b>Prepared &amp; Analyzed: 06/07/21</b>						



# Certificate of Analysis

FINAL REPORT

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

Project Number: LECL TMDL Monitoring

Reported:  
06/22/2021 12:43

Project Manager: John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1F0381 - SM 4500S2-D (Continued)</b>											
<b>Blank (W1F0381-BLK1)</b> Prepared & Analyzed: 06/07/21											
Sulfide, Total	ND	0.050	0.10	mg/l							
<b>LCS (W1F0381-BS1)</b> Prepared & Analyzed: 06/07/21											
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	95-105			
<b>Duplicate (W1F0381-DUP1)</b> Source: 1C29078-01 Prepared & Analyzed: 06/07/21											
Sulfide, Total	ND	0.050	0.10	mg/l		ND				20	
<b>Batch: W1F0394 - SM 2540C</b>											
<b>Blank (W1F0394-BLK1)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Total Dissolved Solids	ND	4.0	10	mg/l							
<b>LCS (W1F0394-BS1)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Total Dissolved Solids	828	4.0	10	mg/l	824		100	96-102			
<b>Duplicate (W1F0394-DUP1)</b> Source: 1F02064-05 Prepared: 06/07/21 Analyzed: 06/08/21											
Total Dissolved Solids	3780	4.0	10	mg/l		3760			0.6	10	
<b>Duplicate (W1F0394-DUP2)</b> Source: 1F04022-01 Prepared: 06/07/21 Analyzed: 06/08/21											
Total Dissolved Solids	61000	4.0	10	mg/l		61700			1	10	
<b>Batch: W1F0410 - SM 2540D</b>											
<b>Blank (W1F0410-BLK1)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Total Suspended Solids	ND		1	mg/l							
<b>LCS (W1F0410-BS1)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Total Suspended Solids	65.2		1	mg/l	61.4		106	90-110			
<b>Duplicate (W1F0410-DUP1)</b> Source: 1F02051-01 Prepared: 06/07/21 Analyzed: 06/08/21											
Total Suspended Solids	172		1	mg/l		170			1	10	
<b>Duplicate (W1F0410-DUP2)</b> Source: 1F04025-01 Prepared: 06/07/21 Analyzed: 06/08/21											
Total Suspended Solids	55.3		1	mg/l		55.0			0.5	10	
<b>Batch: W1F0412 - EPA 350.1</b>											
<b>Blank (W1F0412-BLK1)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Ammonia as N	ND	0.047	0.10	mg/l							
<b>Blank (W1F0412-BLK2)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Ammonia as N	ND	0.047	0.10	mg/l							
<b>LCS (W1F0412-BS1)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Ammonia as N	0.255	0.047	0.10	mg/l	0.250		102	90-110			
<b>LCS (W1F0412-BS2)</b> Prepared: 06/07/21 Analyzed: 06/08/21											
Ammonia as N	0.262	0.047	0.10	mg/l	0.250		105	90-110			
<b>Duplicate (W1F0412-DUP1)</b> Source: 1F02010-01 Prepared: 06/07/21 Analyzed: 06/08/21											
Ammonia as N	ND	0.047	0.10	mg/l		ND				15	
<b>Matrix Spike (W1F0412-MS1)</b> Source: 1F02010-01 Prepared: 06/07/21 Analyzed: 06/08/21											
Ammonia as N	0.251	0.047	0.10	mg/l	0.250	ND	100	90-110			
<b>Matrix Spike (W1F0412-MS2)</b> Source: 1F02062-01 Prepared: 06/07/21 Analyzed: 06/08/21											

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**

06/22/2021 12:43

**Project Manager:** John Rudolph

## Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1F0412 - EPA 350.1 (Continued)</b>											
<b>Matrix Spike (W1F0412-MS2)</b>	<b>Source: 1F02062-01</b>					<b>Prepared: 06/07/21 Analyzed: 06/08/21</b>					
Ammonia as N	0.498	0.047	0.10	mg/l	0.250	0.251	99	90-110			
<b>Matrix Spike Dup (W1F0412-MSD1)</b>	<b>Source: 1F02010-01</b>					<b>Prepared: 06/07/21 Analyzed: 06/08/21</b>					
Ammonia as N	0.251	0.047	0.10	mg/l	0.250	ND	100	90-110	0.1	15	
<b>Matrix Spike Dup (W1F0412-MSD2)</b>	<b>Source: 1F02062-01</b>					<b>Prepared: 06/07/21 Analyzed: 06/08/21</b>					
Ammonia as N	0.495	0.047	0.10	mg/l	0.250	0.251	98	90-110	0.5	15	
<b>Batch: W1F0433 - EPA 351.2</b>											
<b>Blank (W1F0433-BLK1)</b>						<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	ND	0.065	0.10	mg/l							
<b>Blank (W1F0433-BLK2)</b>						<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	ND	0.065	0.10	mg/l							
<b>LCS (W1F0433-BS1)</b>						<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	0.968	0.065	0.10	mg/l	1.00		97	90-110			
<b>LCS (W1F0433-BS2)</b>						<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	0.997	0.065	0.10	mg/l	1.00		100	90-110			
<b>Duplicate (W1F0433-DUP1)</b>	<b>Source: 1E28026-02</b>					<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	ND	0.065	0.10	mg/l		ND				10	
<b>Matrix Spike (W1F0433-MS1)</b>	<b>Source: 1E28026-01</b>					<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	1.23	0.065	0.10	mg/l	1.00	0.226	100	90-110			
<b>Matrix Spike (W1F0433-MS2)</b>	<b>Source: 1F02054-03</b>					<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	1.28	0.065	0.10	mg/l	1.00	0.288	99	90-110			
<b>Matrix Spike Dup (W1F0433-MSD1)</b>	<b>Source: 1E28026-01</b>					<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	1.23	0.065	0.10	mg/l	1.00	0.226	101	90-110	0.4	10	
<b>Matrix Spike Dup (W1F0433-MSD2)</b>	<b>Source: 1F02054-03</b>					<b>Prepared: 06/07/21 Analyzed: 06/11/21</b>					
TKN	1.34	0.065	0.10	mg/l	1.00	0.288	105	90-110	4	10	





# Certificate of Analysis

FINAL REPORT

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 06/22/2021 12:43

**Project Manager:** John Rudolph

## Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
<b>Batch: W1F0528 - EPA 200.7</b>											
<b>Blank (W1F0528-BLK1)</b>											
					<b>Prepared: 06/08/21 Analyzed: 06/10/21</b>						
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.041	0.050	mg/l							
<b>LCS (W1F0528-BS1)</b>											
					<b>Prepared: 06/08/21 Analyzed: 06/10/21</b>						
Aluminum, Dissolved	0.230	0.041	0.050	mg/l	0.200		115	85-115			
Aluminum, Total	0.230	0.041	0.050	mg/l	0.200		115	85-115			
<b>Matrix Spike (W1F0528-MS1)</b>											
					<b>Source: 1F02086-01</b>		<b>Prepared: 06/08/21 Analyzed: 06/10/21</b>				
Aluminum, Total	0.262	0.041	0.050	mg/l	0.200	0.0446	109	70-130			
<b>Matrix Spike (W1F0528-MS2)</b>											
					<b>Source: 1F02087-03</b>		<b>Prepared: 06/08/21 Analyzed: 06/10/21</b>				
Aluminum, Total	0.435	0.041	0.050	mg/l	0.200	0.179	128	70-130			
<b>Matrix Spike Dup (W1F0528-MSD1)</b>											
					<b>Source: 1F02086-01</b>		<b>Prepared: 06/08/21 Analyzed: 06/10/21</b>				
Aluminum, Total	0.264	0.041	0.050	mg/l	0.200	0.0446	110	70-130	1	30	
<b>Matrix Spike Dup (W1F0528-MSD2)</b>											
					<b>Source: 1F02087-03</b>		<b>Prepared: 06/08/21 Analyzed: 06/10/21</b>				
Aluminum, Total	0.430	0.041	0.050	mg/l	0.200	0.179	126	70-130	1	30	

Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** LECL TMDL Monitoring

**Reported:**  
 06/22/2021 12:43

**Project Manager:** John Rudolph



## Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
%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.

**Work Orders:** 1F02089

**Project:** 1915100403 LECL TMDL Monitoring

**Attn:** John Rudolph

**Client:** Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Report Date:** 6/21/2021

**Received Date:** 6/2/2021

**Turnaround Time:** Normal

**Phones:** (858) 514-6465

**Fax:** (858) 278-5300

**P.O. #:** C015101084

**Billing Code:**

DoD-ELAP ANAB #L2457 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH # • 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 John Rudolph,

Enclosed are the results of analyses for samples received 6/02/21 with the Chain-of-Custody document. The samples were received in good condition, at 9.1 °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:**



Chris Samatmanakit  
Project Manager



Wood - San Diego  
 9177 Sky Park Court, Ste A  
 San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
 06/21/2021 13:27

**Project Manager:** John Rudolph

## Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07- Int	Kate Buckley	1F02089-01	Water	06/02/21 11:05	
CL07- Surf	Kate Buckley	1F02089-02	Water	06/02/21 11:30	
CL08- Int	Kate Buckley	1F02089-03	Water	06/02/21 10:15	
CL08- Surf	Kate Buckley	1F02089-04	Water	06/02/21 10:30	
CL09- Int	Kate Buckley	1F02089-05	Water	06/02/21 09:15	
CL09- Surf	Kate Buckley	1F02089-06	Water	06/02/21 09:30	
CL10- Int	Kate Buckley	1F02089-07	Water	06/02/21 08:20	
CL10- Surf	Kate Buckley	1F02089-08	Water	06/02/21 08:30	
LE02- Int	Kate Buckley	1F02089-09	Water	06/02/21 09:25	
LE02- Surf	Kate Buckley	1F02089-10	Water	06/02/21 10:25	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

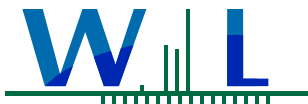
**Reported:**  
06/21/2021 13:27

## Sample Results Enthalpy Orange

Sample: CL07- Int  
1F02089-01 (Water)

Sampled: 06/02/21 11:05 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	<b>26</b>	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

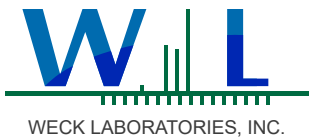
## Sample Results Enthalpy Orange

(Continued)

Sample: CL07- Surf  
1F02089-02 (Water)

Sampled: 06/02/21 11:30 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	6.7	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

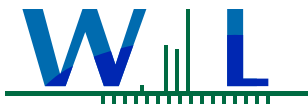
## Sample Results Enthalpy Orange

(Continued)

Sample: CL08- Int  
1F02089-03 (Water)

Sampled: 06/02/21 10:15 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	<b>28</b>	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

## Sample Results Enthalpy Orange

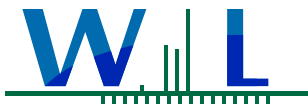
(Continued)

Sample: CL08- Surf  
1F02089-04 (Water)

Sampled: 06/02/21 10:30 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	15	1.0	1.0	mg/M3	1	06/17/21	





WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

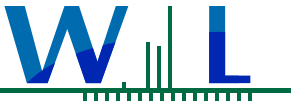
## Sample Results Enthalpy Orange

(Continued)

Sample: CL09- Int  
1F02089-05 (Water)

Sampled: 06/02/21 9:15 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	<b>54</b>	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

FINAL REPORT

**Reported:**  
06/21/2021 13:27

## Sample Results Enthalpy Orange

(Continued)

Sample: CL09- Surf  
1F02089-06 (Water)

Sampled: 06/02/21 9:30 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	<b>6.9</b>	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

## Sample Results Enthalpy Orange

(Continued)

Sample: CL10- Int  
1F02089-07 (Water)

Sampled: 06/02/21 8:20 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	<b>9.9</b>	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

## Sample Results Enthalpy Orange

(Continued)

Sample: CL10- Surf  
1F02089-08 (Water)

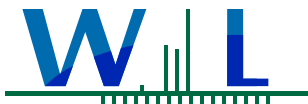
Sampled: 06/02/21 8:30 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll							
<b>Chlorophyll a</b>	<b>9.6</b>	1.0	1.0	mg/M3	1	06/17/21	

**Batch ID:** 269011

**Prepared:** 06/02/21 00:00

**Analyst:** MMP



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

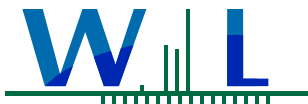
## Sample Results Enthalpy Orange

(Continued)

Sample: LE02- Int  
1F02089-09 (Water)

Sampled: 06/02/21 9:25 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	150	1.0	1.0	mg/M3	1	06/17/21	



WECK LABORATORIES, INC.

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Project Manager:** John Rudolph

# Certificate of Analysis

FINAL REPORT

**Reported:**  
06/21/2021 13:27

## Sample Results Enthalpy Orange

(Continued)

Sample: LE02- Surf  
1F02089-10 (Water)

Sampled: 06/02/21 10:25 by Kate Buckley

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
<b>SM 10200-H</b>							
<b>Method:</b> Chlorophyll	<b>Batch ID:</b> 269011		<b>Prepared:</b> 06/02/21 00:00				<b>Analyst:</b> MMP
<b>Chlorophyll a</b>	<b>180</b>	1.0	1.0	mg/M3	1	06/17/21	

Wood - San Diego  
9177 Sky Park Court, Ste A  
San Diego, CA 92123

**Project Number:** 1915100403 LECL TMDL Monitoring

**Reported:**  
06/21/2021 13:27

**Project Manager:** John Rudolph



## Notes and Definitions

Item	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)

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

IF 02089

<b>Client:</b> Wood E&I Solutions, Inc. <b>FAX No.:</b>	<b>Contact:</b> John Rudolph <b>Email:</b> john.rudolph@woodpic.com	<b>Phone No.:</b> 858-243-8158	<b>Additional Reporting Requests</b> Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No (Include Source Number in Notes)
<b>Project Name:</b> LECL TMDL Monitoring <b>Project Number:</b> 1915100403	<b>Turn Around Time:</b> <u>Routine</u> *3-5 Day Rush *48 Hour Rush *24 Hour Rush *Additional Charges May Apply		
<b>*Lab TAT Approval:</b> By: _____			
<b>Sampler Information</b> Name: <u>Kate Buckley</u> Employer: <u>Wood E&amp;I Solutions, Inc.</u> Signature: <u>[Signature]</u>		<b>Analysis Requested</b> Chlorophyll-a <input type="checkbox"/> SRP/Ortho-P <input type="checkbox"/> Total Phosphorus <input type="checkbox"/> Ammonia <input type="checkbox"/> TKN <input type="checkbox"/> TDS <input type="checkbox"/> Nitrate - Nitrite <input type="checkbox"/> Total Sulfide <input type="checkbox"/> Special <input type="checkbox"/> Resample <input type="checkbox"/> Routine <input type="checkbox"/>	
<b># of Containers &amp; Preservatives</b> Unpreserved <input type="checkbox"/> H2SO4 <input type="checkbox"/> HCl <input type="checkbox"/> HNO3 <input type="checkbox"/> Na2S2O3 <input type="checkbox"/> NaOH <input type="checkbox"/> NaOH/ZnAcetate <input type="checkbox"/> NH4Cl <input type="checkbox"/> MCAA <input type="checkbox"/> Frozen <input type="checkbox"/>		<b>Matrix</b> DW = Drinking Water WW = Wastewater GW = Groundwater S = Soil SG = Sludge L = Liquid M = Miscellaneous	
<b>Total # of Containers</b>		<b>Notes</b> Chi-a samples on 0.7 um GFF	
<b>Sample ID</b> CL07 - Int CL07 - Surf CL08 - Int CL08 - Surf CL09 - Int CL09 - Surf CL10 - Int CL10 - Surf LE02 - Int LE02 - Surf	<b>Date</b> 10/2/21 11/30 10/15 10/30 09/15 09/30 08/20 08/30 09/25 10/25	<b>Time</b> 1105 1130 1015 1030 0915 0930 0820 0830 0925 1025	<b>Filter Volume:</b> 500mL 500 mL 500 mL 500 mL 500 mL 500 mL 500 mL 249mL 150 mL
<b>Relinquished By (sign)</b> <u>[Signature]</u> Leticia A. Brown		<b>Received By (Sign)</b> <u>[Signature]</u> Leticia A. Brown	
<b>Print Name / Company</b> Catherine Raywin Wood 02121 B53 Leticia A. Brown 462624 3.00		<b>Date / Time</b> 10/2/21 1353 10/2/21 3.00	

<b>(For Lab Use Only)</b>		<b>Sample Integrity Upon Receipt</b>	<b>Lab Notes</b>
<b>Sample(s) Submitted on Ice?</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>	<b>Temperature</b> 4.1 °C T-0234 <input type="checkbox"/> Cooler Blank	
<b>Custody Seal(s) Intact?</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>	N/A	
<b>Sample(s) Intact?</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>		

Delivery Report

# Water Quality Monitoring Lake Elsinore & Canyon Lake

Date: 2020-08-07

Client: Wood Plc

Delivery no.: 2370\_Delivery\_EOMAP2WoodPlc\_Vs1\_20200807

---

**Authors:**

Philip Klinger  
Karin Schenk

---

**Mail:**

klinger@eomap.de  
schenk@eomap.de

---

**Telephone:**

+49 8152 9986 115  
+49 8152 9986 112

# CONTENT

<b>1. SERVICE PROVISION REPORT</b> .....	<b>3</b>
LIST OF ALL DELIVERED SCENES.....	3
CONTENT.....	3
LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
FILE NAMING .....	4
NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.).....	4
<b>2. METHODOLOGY AND PRODUCTS</b> .....	<b>5</b>
2.1 MODULAR INVERSION AND PROCESSING SYSTEM (MIP) .....	5
2.2 PRODUCTS .....	7
2.3 QUALITY CONTROL AND FLAGGING .....	10
2.4 DATA FORMAT.....	12
2.5 DATA SOURCES .....	12
<b>CONTACT</b> .....	<b>13</b>

## 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2020-08-07
Version	1

### List of all delivered scenes

Sensor	Time of record
Landsat-8	2020-07-28 18:22:29 UTC

### Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

### List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs1_20200807.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20200728_182229_LSAT8_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20200728_182229_LSAT8_m0030_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_040037_EO-MAP_20200728_182229_LSAT8_m0030_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_040037_EOMAP_20200728_182229_LSAT8_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EO-MAP_20200728_182229_LSAT8_m0030_metadata.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20200728_182229_LSAT8_m0030_overview.pdf	PDF	Overview PDF, metadata and quicklook

---

## File naming

[Product abbreviation]\_[Country code]-[Area]\_EOMAP\_[Date of satellite image recording]\_[Time of satellite image recording]\_[sensor code]\_[spatial resolution]\_[optional]

### With

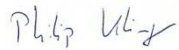
[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYYYMMDD (YY= Year, MM = Month, DD = 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 be used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

---

## Notes (e.g. technical issues, exceptional conditions, etc.)

---

Data Analyst



Philip Klinger

QA/QC



Karin Schenk

## 2. Methodology and Products

### 2.1 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

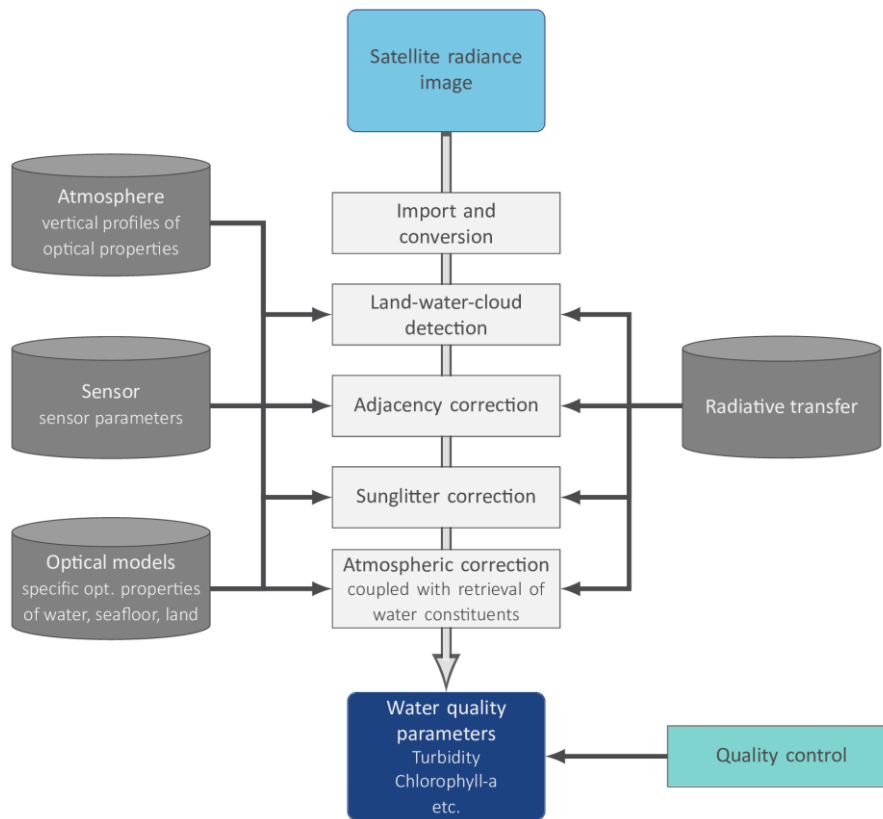


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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.

## 2.2 Products

**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  $1 \text{ NTU} = 0.0118 \text{ 1/m backward scattering at } 550\text{nm}$ , or  $1 \text{ NTU} = 0.619 \text{ 1/m total scattering at } 550\text{nm}$  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  $90^\circ$  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 2020-07-28 is shown in Figure 2.

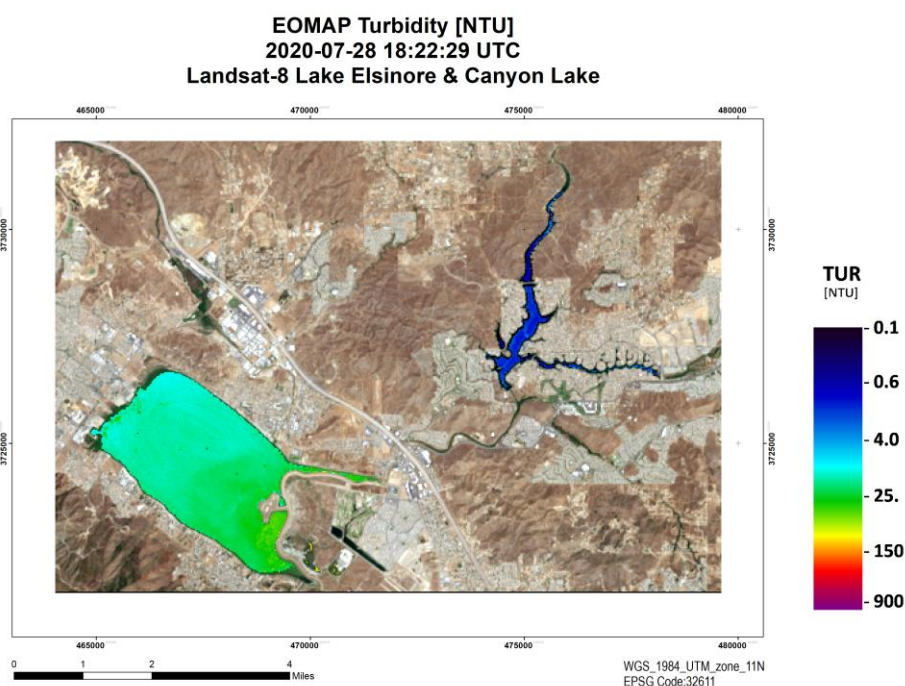


Figure 2: Turbidity product from 2020-07-28

**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  $[\mu\text{g/l}]$ , is provided as a measure linearly related to the pigment-specific absorption at 440nm, with  $1 \mu\text{g/l Chl}$  equal to  $0.035 \text{ 1/m pigment absorption}$ . 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 condi-



tions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2020-07-28 is shown in Figure 3.

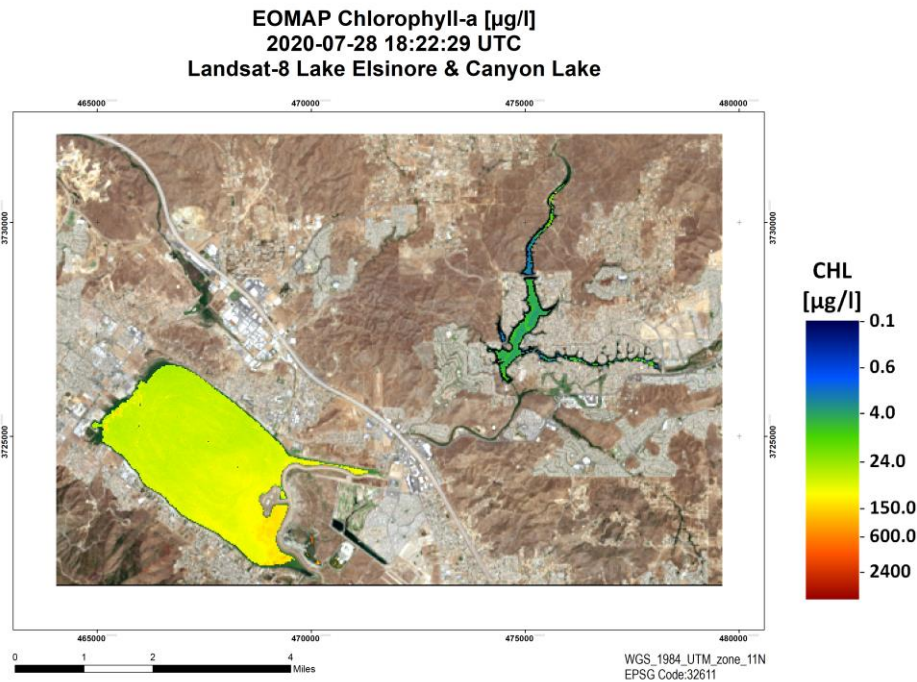


Figure 3: Chlorophyll-a product from 2020-07-28

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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2020-07-28 is shown in Figure 4.

<sup>9</sup> 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  
<sup>10</sup> 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

**EOMAP Harmful Algae Bloom Indicator  
2020-07-28 18:22:29 UTC  
Landsat-8 Lake Elsinore & Canyon Lake**

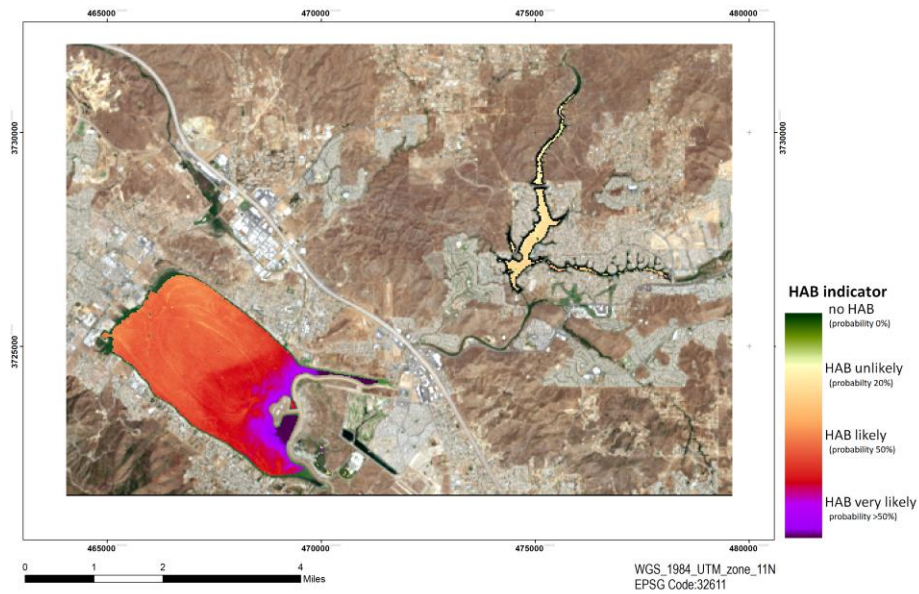


Figure 4: Harmful Algae Bloom Indicator product from 2020-07-28

RGB composite images represent the area of interest in true colour or false colour modes by combining pre-defined bands, depending on the sensor in use.

## 2.3 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 radiances and subsurface reflectances,
- 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 Geo-TIFFs:

- 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.

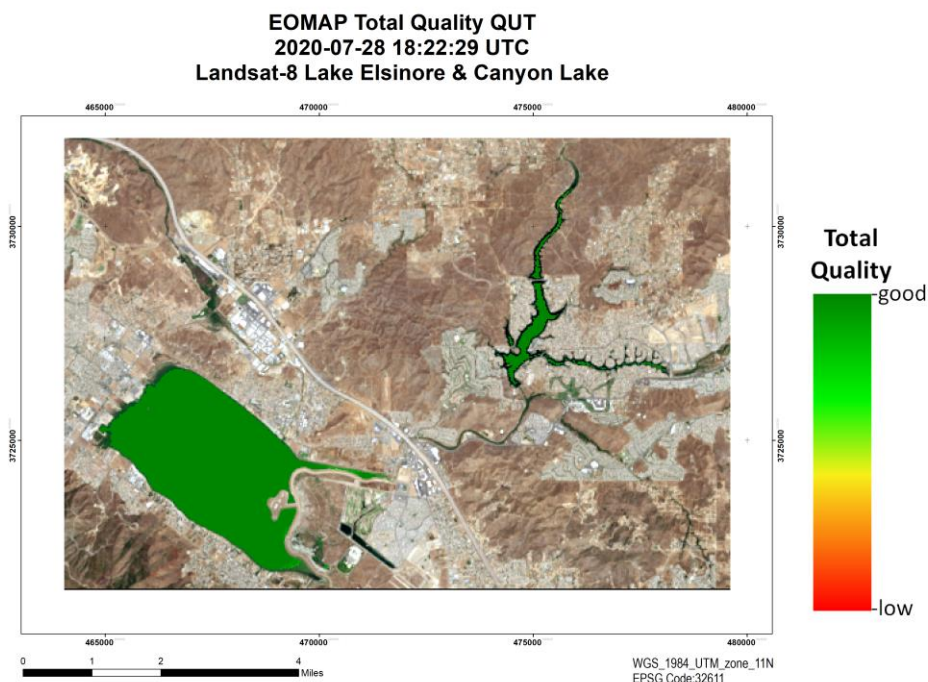


Figure 5: QUT product from 2020-07-28

**EOMAP Quality Coding QUC**  
**2020-07-28 18:22:29 UTC**  
**Landsat-8 Lake Elsinore & Canyon Lake**

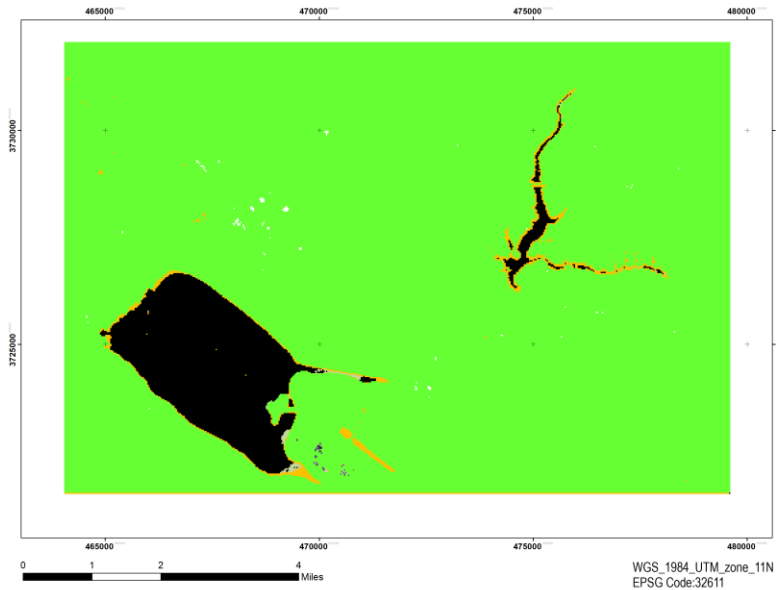


Figure 6: QUC product from 2020-07-28

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples:            25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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.

## **2.4 Data Format**

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, metadata is stored in the .xml and the metadata .pdf files.

## **2.5 Data Sources**

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

## Contact

<b>Head Office</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Postal Address</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Phone</b>	+49 (0)8152 99861 10
<b>Fax</b>	+49 (0)8152 99861 29
<b>Email</b>	<a href="mailto:info@eomap.com">info@eomap.com</a>
<b>Website</b>	<a href="http://www.eomap.com">www.eomap.com</a>

© EOMAP GmbH & Co. KG August 2020

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

Delivery Report

# Water Quality Monitoring Lake Elsinore & Canyon Lake

Date: 2020-08-18

Client: Wood Plc

Delivery no.: 2370\_Delivery\_EOMAP2WoodPlc\_Vs2\_20200818

---

**Authors:**

Philip Klinger  
Karin Schenk

---

**Mail:**

klinger@eomap.de  
schenk@eomap.de

---

**Telephone:**

+49 8152 9986 115  
+49 8152 9986 112



# CONTENT

<b>1. SERVICE PROVISION REPORT .....</b>	<b>3</b>
LIST OF ALL DELIVERED SCENES.....	3
CONTENT.....	3
LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
FILE NAMING .....	4
NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.).....	4
<b>2. METHODOLOGY AND PRODUCTS.....</b>	<b>5</b>
2.1 MODULAR INVERSION AND PROCESSING SYSTEM (MIP) .....	5
2.2 PRODUCTS .....	7
2.3 QUALITY CONTROL AND FLAGGING .....	10
2.4 DATA FORMAT.....	12
2.5 DATA SOURCES.....	12
<b>CONTACT.....</b>	<b>13</b>



# 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2020-08-18
Version	2

## List of all delivered scenes

Sensor	Time of record
Sentinel-2B	2020-08-11 18:45:02 UTC

## Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

## List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs2_20200818.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20200811_184502_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20200811_184502_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EO-MAP_20200811_184502_SENT2_m0010_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20200811_184502_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20200811_184502_SENT2_m0010_metadata.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20200811_184502_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

---

## 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]	see list of product abbreviations
[Country code]	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 YYYYMMDD (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 be used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

---

## Notes (e.g. technical issues, exceptional conditions, etc.)

- Sunglint on both lakes was flagged locally and might have an impact on retrieved results

---

### Data Analyst



Philip Klinger

### QA/QC



Karin Schenk

## 2. Methodology and Products

### 2.1 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

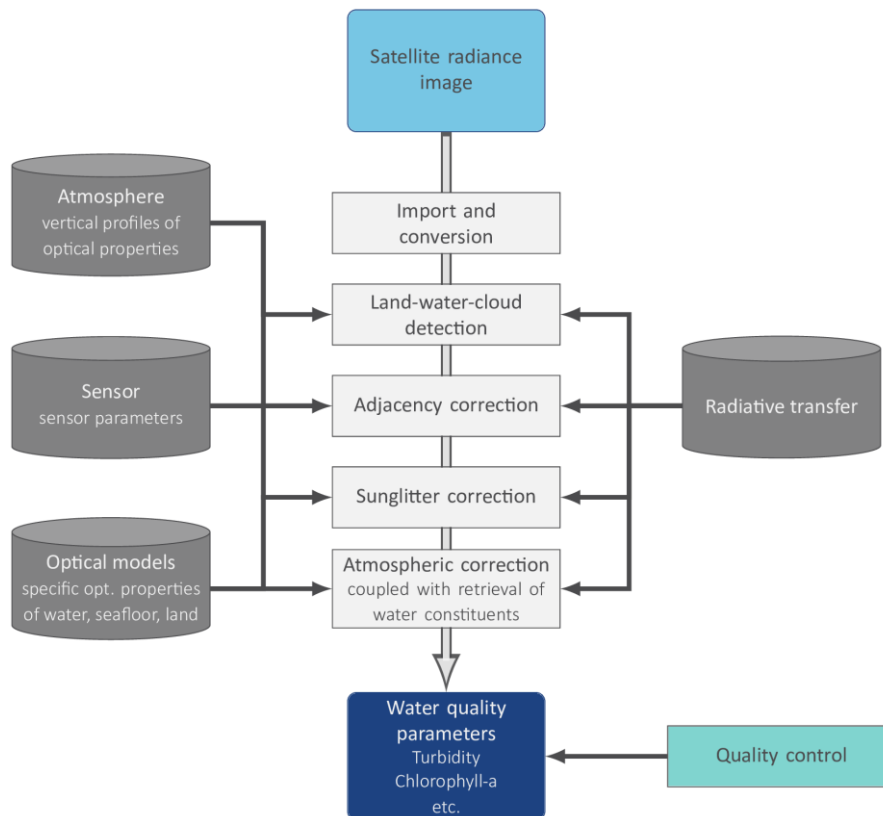


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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.

## 2.2 Products

**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  $1 \text{ NTU} = 0.0118 \text{ 1/m backward scattering at } 550\text{nm}$ , or  $1 \text{ NTU} = 0.619 \text{ 1/m total scattering at } 550\text{nm}$  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  $90^\circ$  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 2020-08-11 is shown in Figure 2.

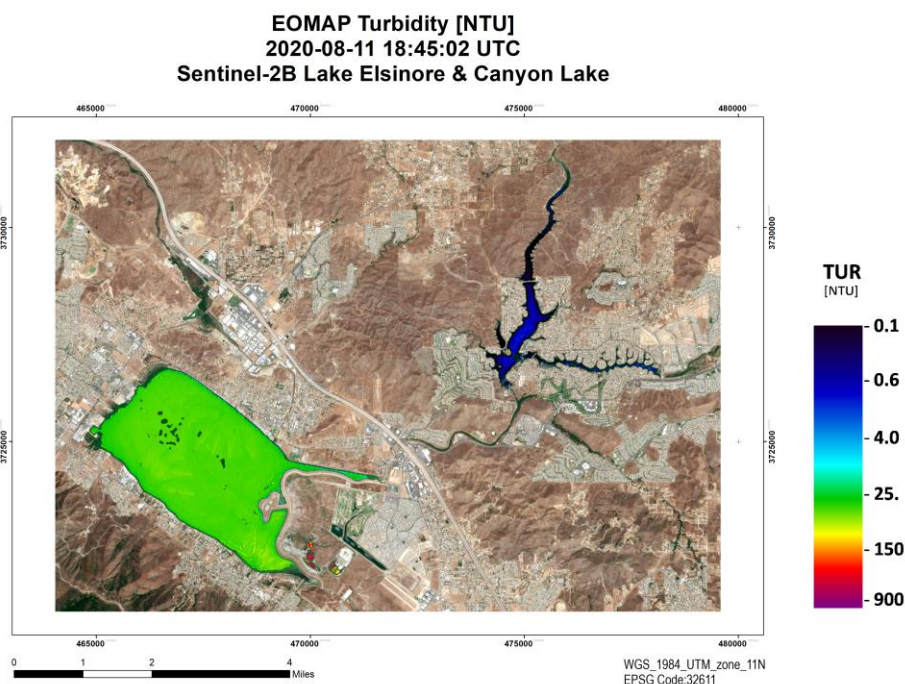


Figure 2: Turbidity product from 2020-08-11

**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  $[\mu\text{g/l}]$ , is provided as a measure linearly related to the pigment-specific absorption at 440nm, with  $1 \mu\text{g/l Chl}$  equal to  $0.035 \text{ 1/m pigment absorption}$ . 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 condi-

tions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2020-08-11 is shown in Figure 3.

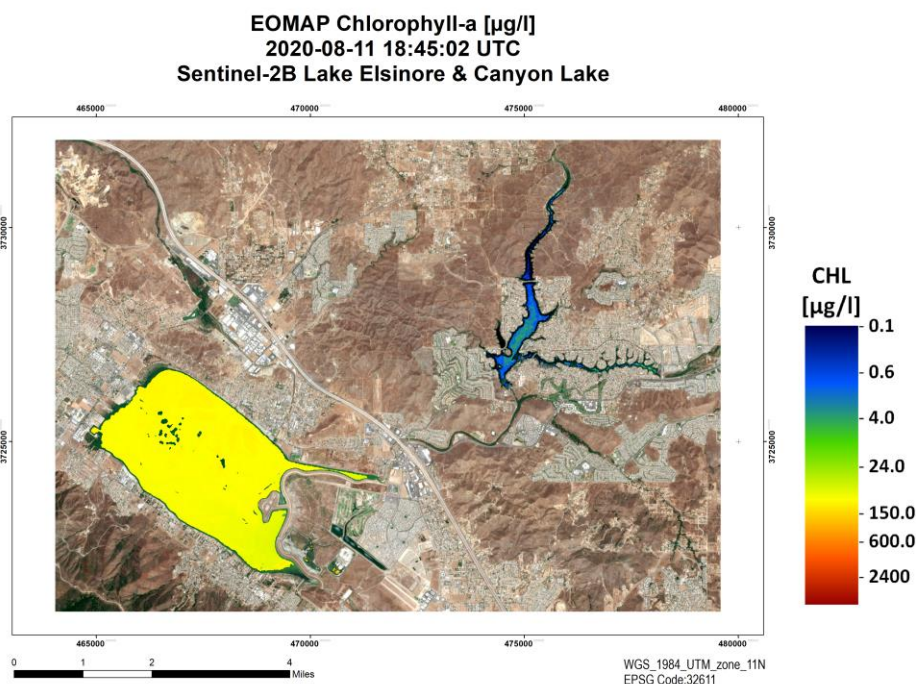


Figure 3: Chlorophyll-a product from 2020-08-11

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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2020-08-11 is shown in Figure 4.

<sup>9</sup> 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

<sup>10</sup> 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

**EOMAP Harmful Algae Bloom Indicator  
2020-08-11 18:45:02 UTC  
Sentinel-2B Lake Elsinore & Canyon Lake**

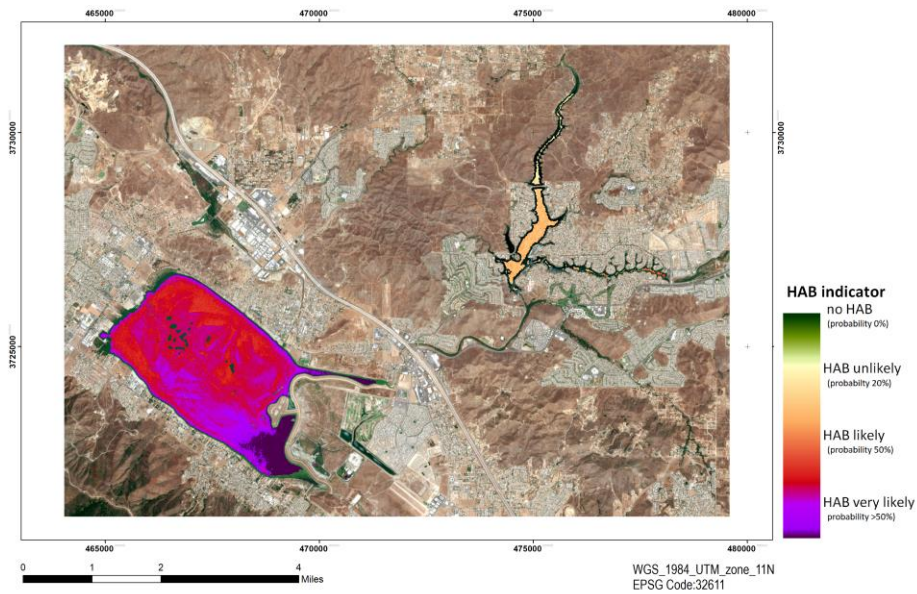


Figure 4: Harmful Algae Bloom Indicator product from 2020-08-11

RGB composite images represent the area of interest in true colour or false colour modes by combining pre-defined bands, depending on the sensor in use.

## 2.3 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 radiances and subsurface reflectances,
- 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 Geo-TIFFs:

- 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.

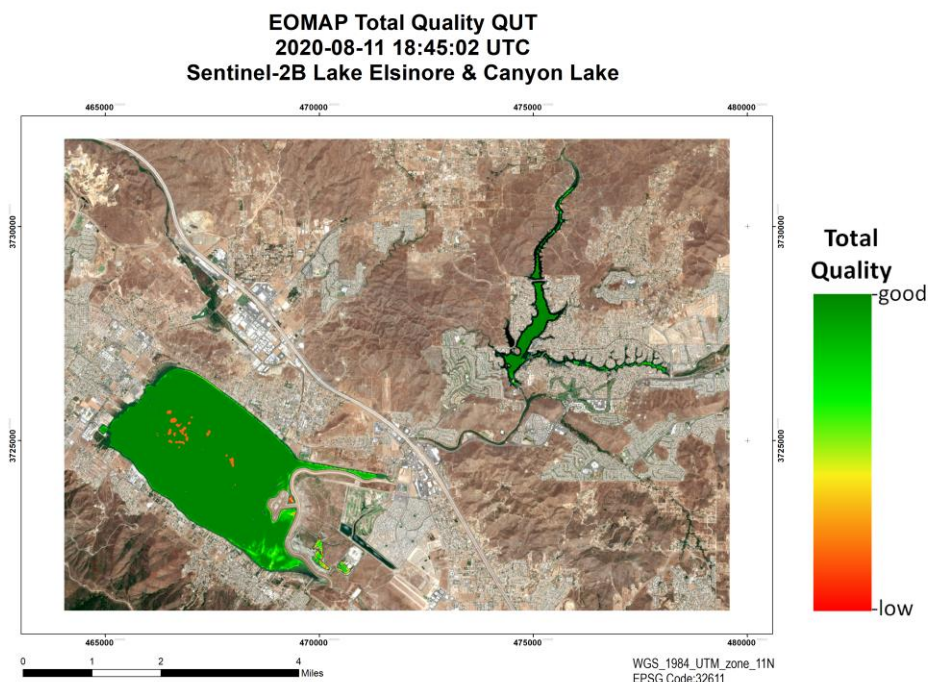


Figure 5: QUT product from 2020-08-11



**EOMAP Quality Coding QUC**  
**2020-08-11 18:45:02 UTC**  
**Sentinel-2B Lake Elsinore & Canyon Lake**

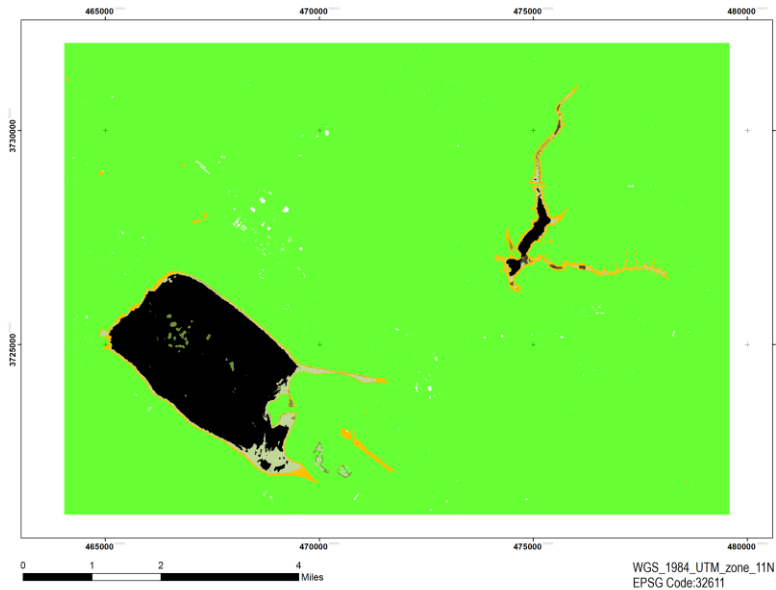


Figure 6: QUC product from 2020-08-11

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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.

## **2.4 Data Format**

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, metadata is stored in the .xml and the metadata .pdf files.

## **2.5 Data Sources**

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

## Contact

<b>Head Office</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Postal Address</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Phone</b>	+49 (0)8152 99861 10
<b>Fax</b>	+49 (0)8152 99861 29
<b>Email</b>	<a href="mailto:info@eomap.com">info@eomap.com</a>
<b>Website</b>	<a href="http://www.eomap.com">www.eomap.com</a>

© EOMAP GmbH & Co. KG August 2020

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

Delivery Report

# Water Quality Monitoring Lake Elsinore & Canyon Lake

Date: 2020-09-22

Client: Wood Plc

Delivery no.: 2370\_Delivery\_EOMAP2WoodPlc\_Vs3\_20200922

**Authors:**

---

Philip Klinger  
Karin Schenk

**Mail:**

---

klinger@eomap.de  
schenk@eomap.de

**Telephone:**

---

+49 8152 9986 115  
+49 8152 9986 112

# CONTENT

<b>1. SERVICE PROVISION REPORT .....</b>	<b>3</b>
LIST OF ALL DELIVERED SCENES.....	3
CONTENT.....	3
LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
FILE NAMING .....	4
NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.).....	4
<b>2. METHODOLOGY AND PRODUCTS.....</b>	<b>5</b>
2.1 MODULAR INVERSION AND PROCESSING SYSTEM (MIP) .....	5
2.2 PRODUCTS .....	7
2.3 QUALITY CONTROL AND FLAGGING .....	10
2.4 DATA FORMAT.....	12
2.5 DATA SOURCES.....	12
<b>CONTACT.....</b>	<b>13</b>

# 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2020-09-22
Version	3

## List of all delivered scenes

Sensor	Time of record
Sentinel-2B	2020-09-20 18:45:01 UTC

## Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

## List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs3_20200922.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20200920_184501_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20200920_184501_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EO-MAP_20200920_184501_SENT2_m0010_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20200920_184501_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20200920_184501_SENT2_m0010_metadata.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20200920_184501_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

---

## File naming

[Product abbreviation]\_[Country code]-[Area]\_EOMAP\_[Date of satellite image recording]\_[Time of satellite image recording]\_[sensor code]\_[spatial resolution]\_[optional]

### With

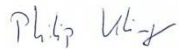
[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYYYMMDD (YY= Year, MM = Month, DD = 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 be used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

---

## Notes (e.g. technical issues, exceptional conditions, etc.)

---

Data Analyst



Philip Klinger

QA/QC



Karin Schenk

## 2. Methodology and Products

### 2.1 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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



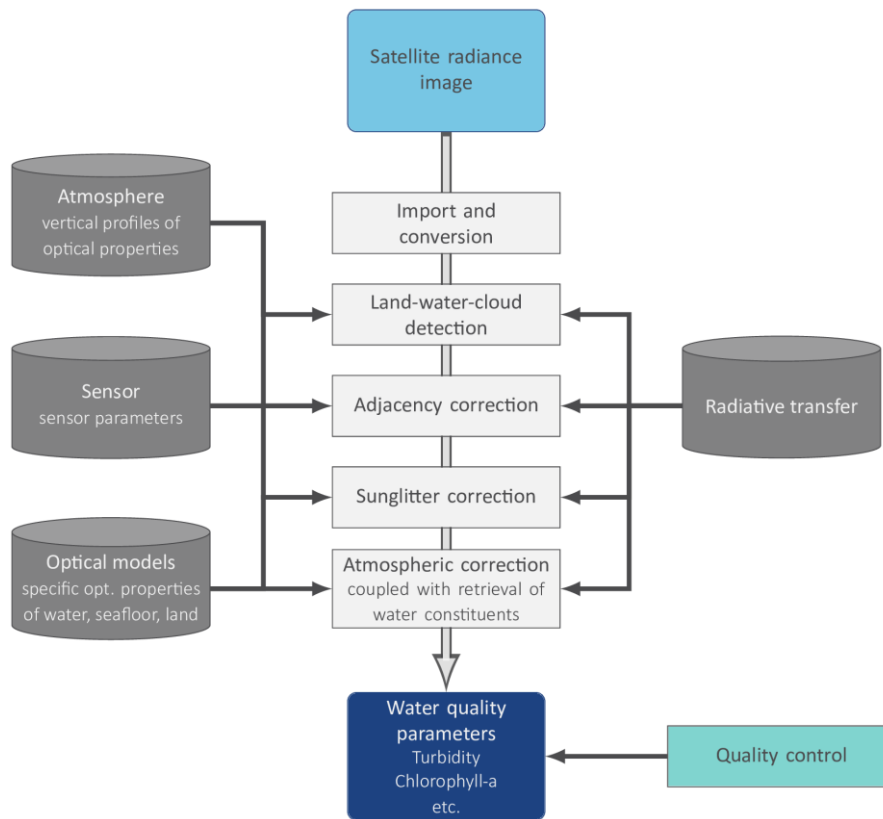


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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.

## 2.2 Products

**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  $1 \text{ NTU} = 0.0118 \text{ 1/m backward scattering at } 550\text{nm}$ , or  $1 \text{ NTU} = 0.619 \text{ 1/m total scattering at } 550\text{nm}$  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  $90^\circ$  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 2020-09-20 is shown in Figure 2.

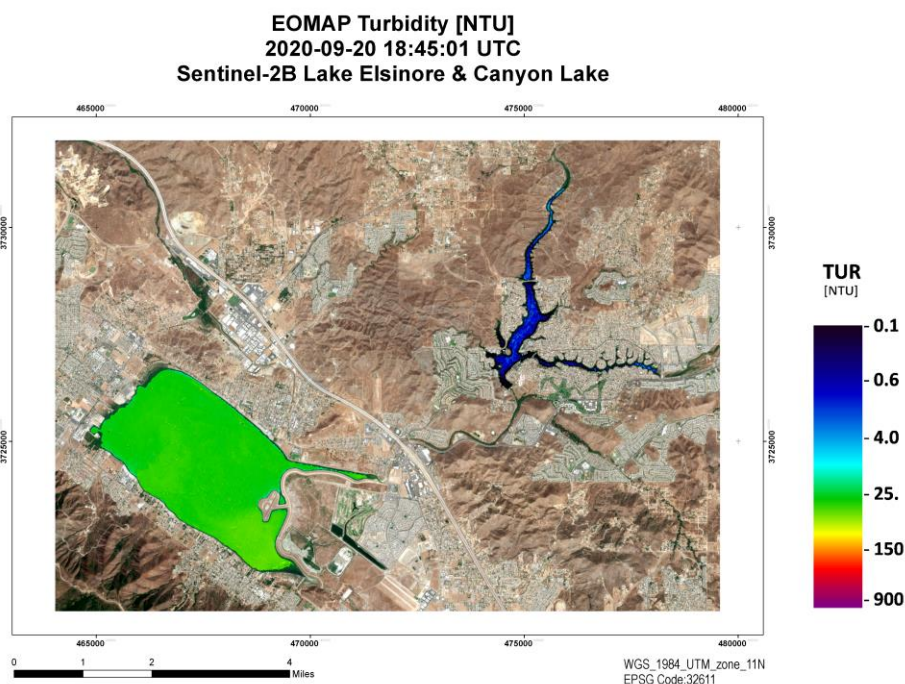


Figure 2: Turbidity product from 2020-09-20

**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  $[\mu\text{g/l}]$ , is provided as a measure linearly related to the pigment-specific absorption at 440nm, with  $1 \mu\text{g/l Chl}$  equal to  $0.035 \text{ 1/m pigment absorption}$ . 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 condi-

tions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2020-09-20 is shown in Figure 3.

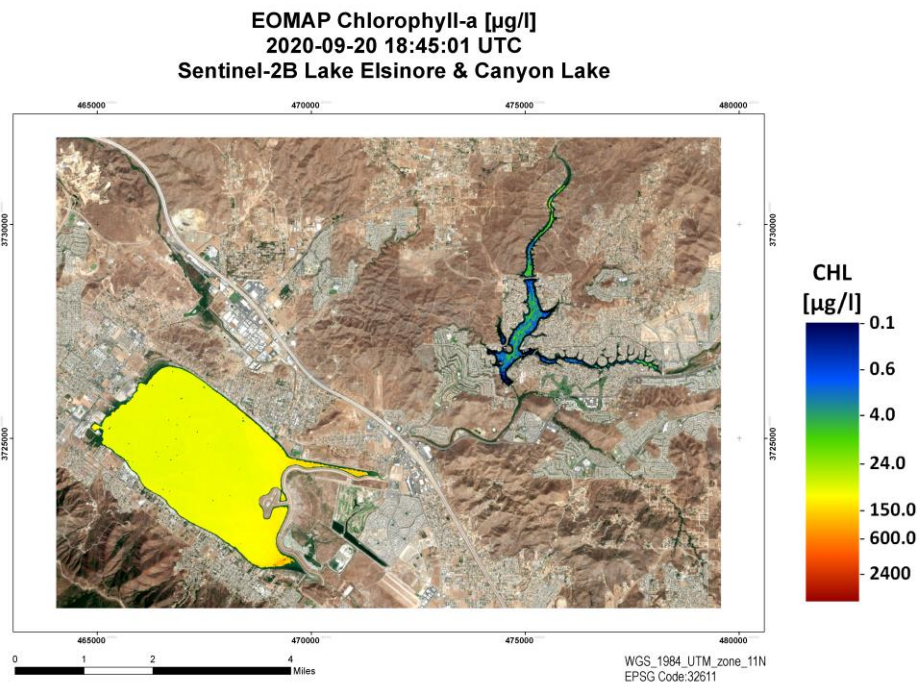


Figure 3: Chlorophyll-a product from 2020-09-20

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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2020-08-11 is shown in Figure 4.

<sup>9</sup> 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

<sup>10</sup> 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

**EOMAP Harmful Algae Bloom Indicator  
2020-09-20 18:45:01 UTC  
Sentinel-2B Lake Elsinore & Canyon Lake**

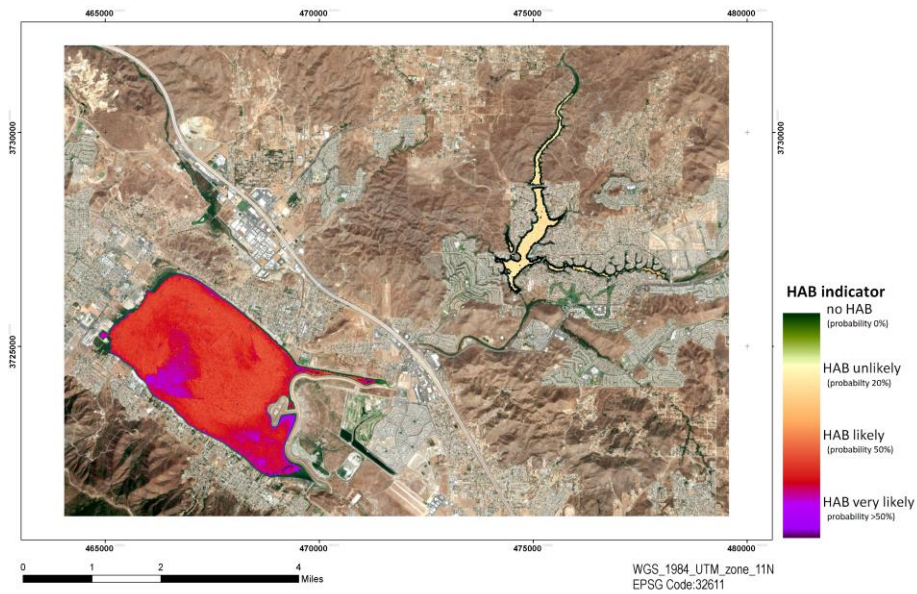


Figure 4: Harmful Algae Bloom Indicator product from 2020-09-20

RGB composite images represent the area of interest in true colour or false colour modes by combining pre-defined bands, depending on the sensor in use.

## 2.3 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 radiances and subsurface reflectances,
- 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 Geo-TIFFs:

- 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.

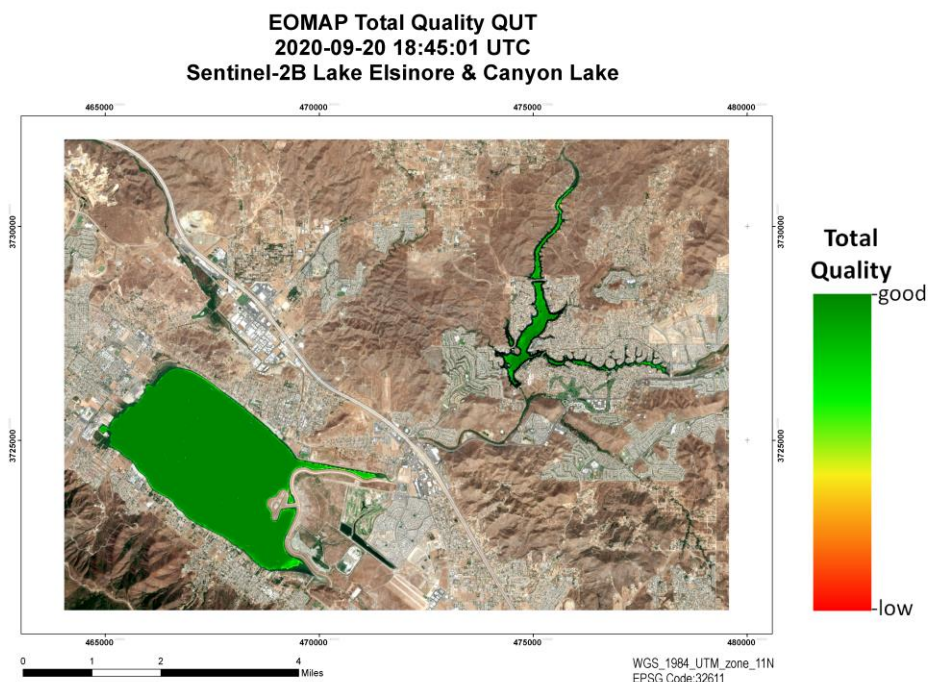


Figure 5: QUT product from 2020-09-20

**EOMAP Quality Coding QUC**  
**2020-09-20 18:45:01 UTC**  
**Sentinel-2B Lake Elsinore & Canyon Lake**

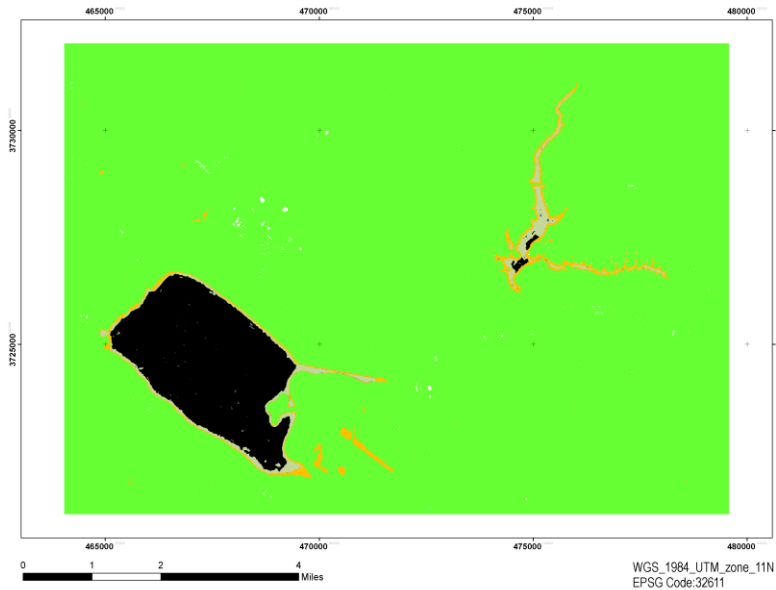


Figure 6: QUC product from 2020-09-20

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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.

## **2.4 Data Format**

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, metadata is stored in the .xml and the metadata .pdf files.

## **2.5 Data Sources**

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

## Contact

<b>Head Office</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Postal Address</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Phone</b>	+49 (0)8152 99861 10
<b>Fax</b>	+49 (0)8152 99861 29
<b>Email</b>	<a href="mailto:info@eomap.com">info@eomap.com</a>
<b>Website</b>	<a href="http://www.eomap.com">www.eomap.com</a>

© EOMAP GmbH & Co. KG September 2020

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.



Delivery Report

# Water Quality Monitoring Lake Elsinore & Canyon Lake

Date: 2020-11-0

Client: Wood Plc

Delivery no.: 2370\_Delivery\_EOMAP2WoodPlc\_Vs5\_20201105

---

**Authors:**

Philip Klinger  
Karin Schenk

---

**Mail:**

klinger@eomap.de  
schenk@eomap.de

---

**Telephone:**

+49 8152 9986 115  
+49 8152 9986 112



# CONTENT

<b>1. SERVICE PROVISION REPORT .....</b>	<b>3</b>
LIST OF ALL DELIVERED SCENES.....	3
CONTENT.....	3
LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
FILE NAMING .....	4
NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.).....	4
<b>2. METHODOLOGY AND PRODUCTS.....</b>	<b>5</b>
2.1 MODULAR INVERSION AND PROCESSING SYSTEM (MIP) .....	5
2.2 PRODUCTS .....	7
2.3 QUALITY CONTROL AND FLAGGING .....	10
2.4 DATA FORMAT.....	12
2.5 DATA SOURCES .....	12
<b>CONTACT.....</b>	<b>13</b>

# 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

<b>Contractor PO / Reference number</b>	
<b>Contractor project title</b>	
<b>Service Provider reference number</b>	2370
<b>Date of delivery</b>	2020-11-05
<b>Version</b>	4

## List of all delivered scenes

Sensor	Time of record
Sentinel-2B	2020-10-10 18:45:03 UTC

## Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

## List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs3_20200922.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20201010_184503_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20201010_184503_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EO-MAP_20201010_184503_SENT2_m0010_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20201010_184503_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20201010_184503_SENT2_m0010_metadata.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20201010_184503_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

---

## File naming

[Product abbreviation]\_[Country code]-[Area]\_EOMAP\_[Date of satellite image recording]\_[Time of satellite image recording]\_[sensor code]\_[spatial resolution]\_[optional]

### With

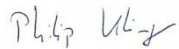
[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYYYMMDD (YY= Year, MM = Month, DD = 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 be used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

---

## Notes (e.g. technical issues, exceptional conditions, etc.)

---

Data Analyst



Philip Klinger

QA/QC



Karin Schenk

## 2. Methodology and Products

### 2.1 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

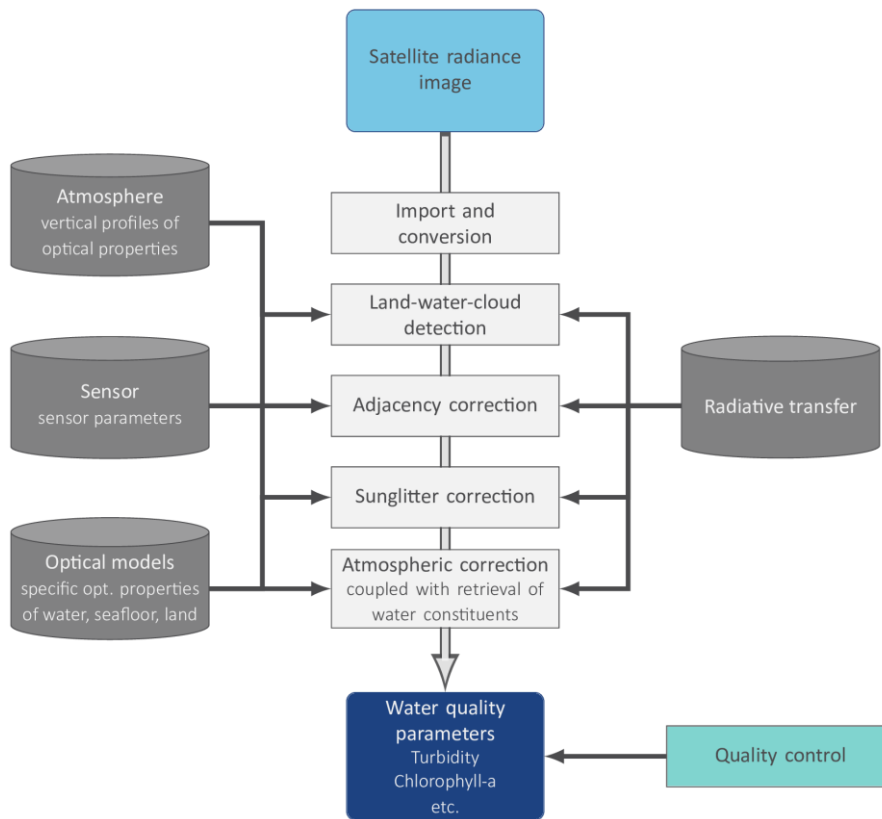


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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.

## 2.2 Products

**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  $1 \text{ NTU} = 0.0118 \text{ 1/m backward scattering at } 550\text{nm}$ , or  $1 \text{ NTU} = 0.619 \text{ 1/m total scattering at } 550\text{nm}$  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  $90^\circ$  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 2020-10-10 is shown in Figure 2.

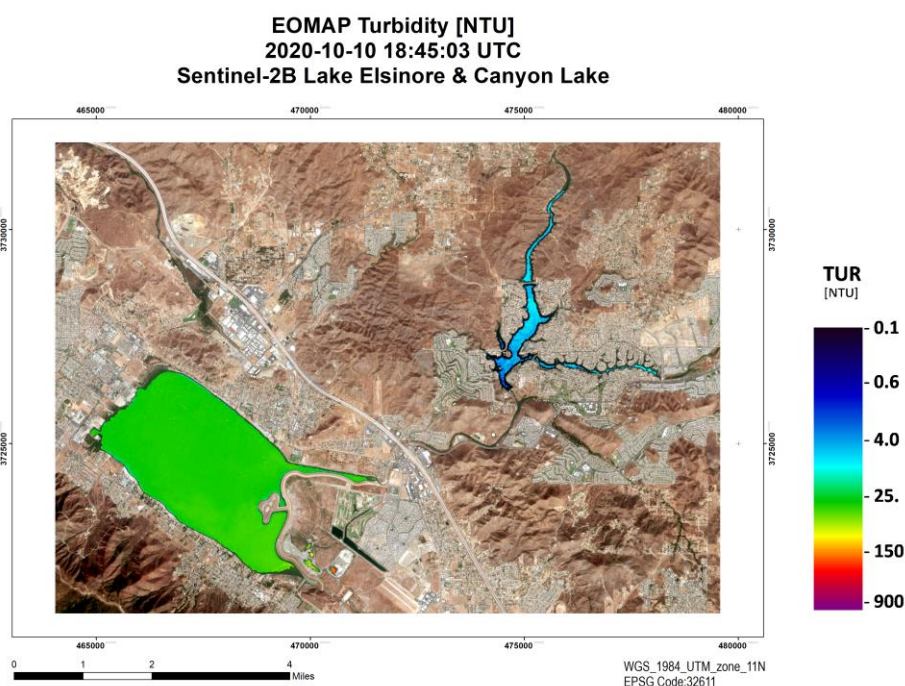


Figure 2: Turbidity product from 2020-10-10

**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  $[\mu\text{g/l}]$ , is provided as a measure linearly related to the pigment-specific absorption at 440nm, with  $1 \mu\text{g/l Chl}$  equal to  $0.035 \text{ 1/m pigment absorption}$ . 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 condi-

tions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2020-10-10 is shown in Figure 3.

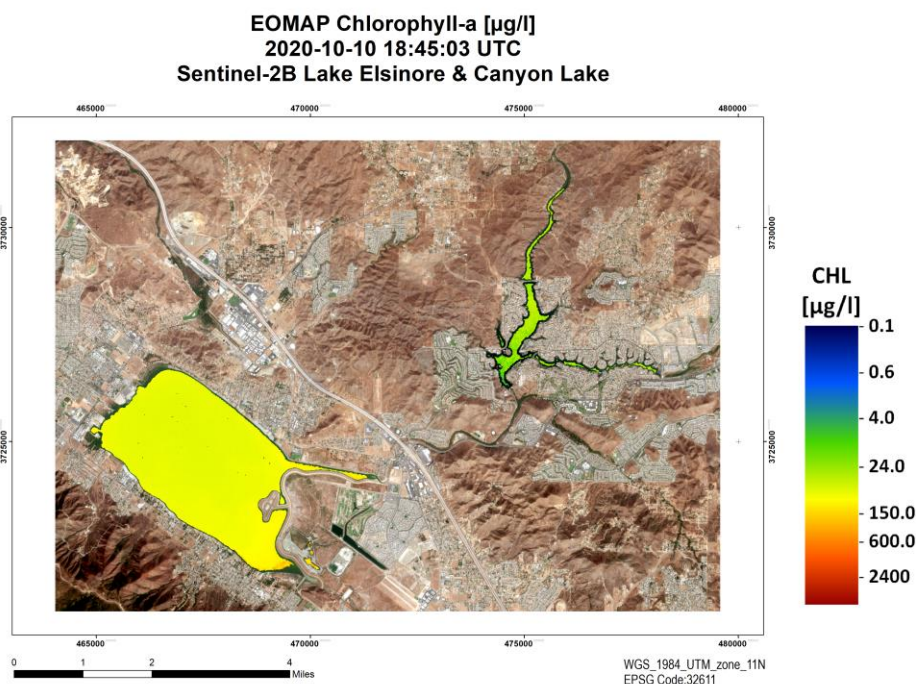


Figure 3: Chlorophyll-a product from 2020-10-10

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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2020-10-10 is shown in Figure 4.

<sup>9</sup> 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

<sup>10</sup> 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



**EOMAP Harmful Algae Bloom Indicator  
2020-10-10 18:45:03 UTC  
Sentinel-2B Lake Elsinore & Canyon Lake**

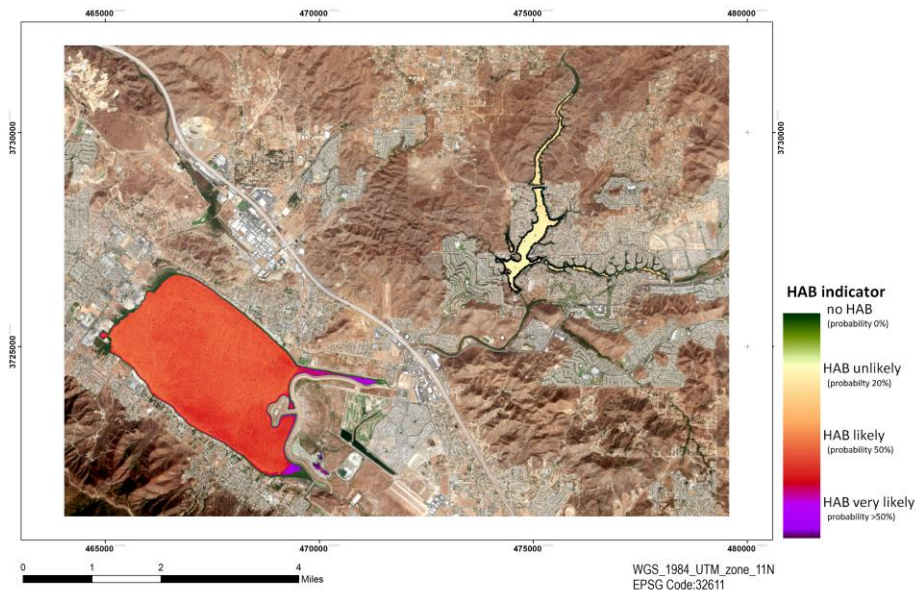


Figure 4: Harmful Algae Bloom Indicator product from 2020-10-10

**RGB** composite images represent the area of interest in true colour or false colour modes by combining pre-defined bands, depending on the sensor in use.

## 2.3 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 radiances and subsurface reflectances,
- 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 Geo-TIFFs:

- 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.

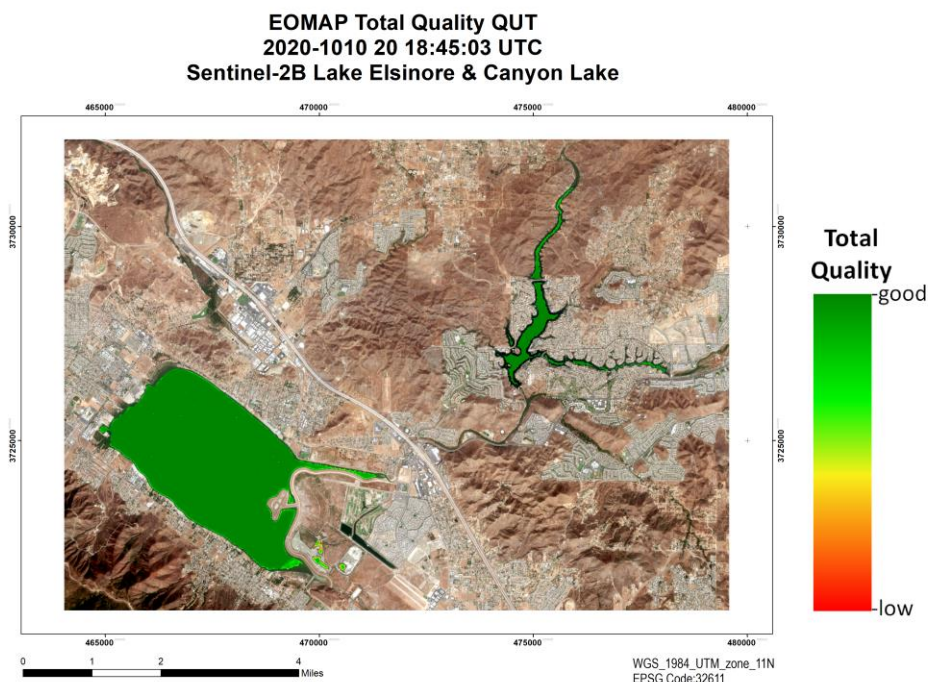


Figure 5: QUT product from 2020-10-10

**EOMAP Quality Coding QUC**  
**2020-10-10 18:45:03 UTC**  
**Sentinel-2B Lake Elsinore & Canyon Lake**

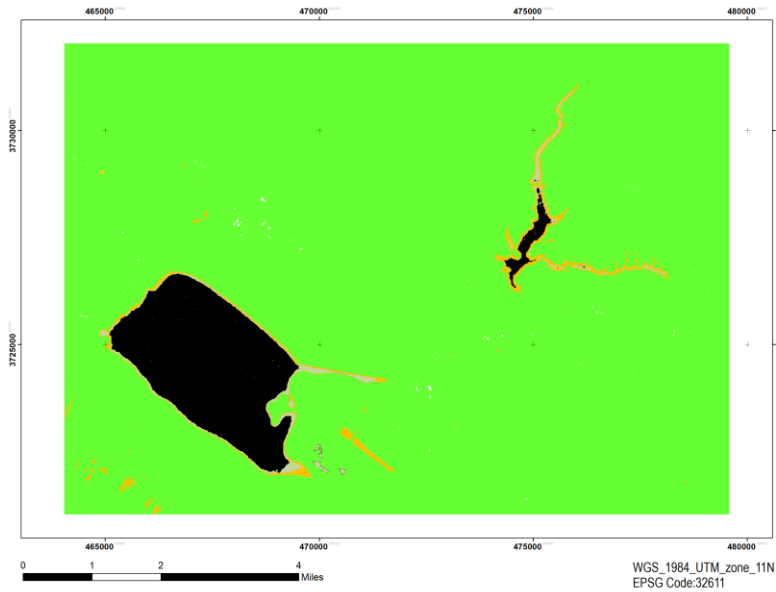


Figure 6: QUC product from 2020-10-10

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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.

## **2.4 Data Format**

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, metadata is stored in the .xml and the metadata .pdf files.

## **2.5 Data Sources**

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

## Contact

<b>Head Office</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Postal Address</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Phone</b>	+49 (0)8152 99861 10
<b>Fax</b>	+49 (0)8152 99861 29
<b>Email</b>	<a href="mailto:info@eomap.com">info@eomap.com</a>
<b>Website</b>	<a href="http://www.eomap.com">www.eomap.com</a>

© EOMAP GmbH & Co. KG November 2020

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

Delivery Report

# Water Quality Monitoring Lake Elsinore & Canyon Lake

Date: 2020-12-14

Client: Wood Plc

Delivery no.: 2370\_Delivery\_EOMAP2WoodPlc\_Vs5\_20201214

**Authors:**

---

Philip Klinger  
Karin Schenk

**Mail:**

---

klinger@eomap.de  
schenk@eomap.de

**Telephone:**

---

+49 8152 9986 115  
+49 8152 9986 112



# CONTENT

<b>1. SERVICE PROVISION REPORT .....</b>	<b>3</b>
LIST OF ALL DELIVERED SCENES.....	3
CONTENT.....	3
LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
FILE NAMING .....	4
NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.).....	4
<b>2. METHODOLOGY AND PRODUCTS.....</b>	<b>5</b>
2.1 MODULAR INVERSION AND PROCESSING SYSTEM (MIP) .....	5
2.2 PRODUCTS .....	7
2.3 QUALITY CONTROL AND FLAGGING .....	10
2.4 DATA FORMAT.....	12
2.5 DATA SOURCES.....	12
<b>CONTACT.....</b>	<b>13</b>

# 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2020-12-14
Version	5

## List of all delivered scenes

Sensor	Time of record
Sentinel-2B	2020-12-09 18:44:57 UTC

## Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

## List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs5_20201214.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20201209_184457_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20201209_184457_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EO-MAP_20201209_184457_SENT2_m0010_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20201209_184457_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20201209_184457_SENT2_m0010_metadata.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20201209_184457_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook



---

## 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]	see list of product abbreviations
[Country code]	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 YYYYMMDD (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 be used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

---

## Notes (e.g. technical issues, exceptional conditions, etc.)

---

Data Analyst



Philip Klinger

QA/QC



Karin Schenk

## 2. Methodology and Products

### 2.1 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

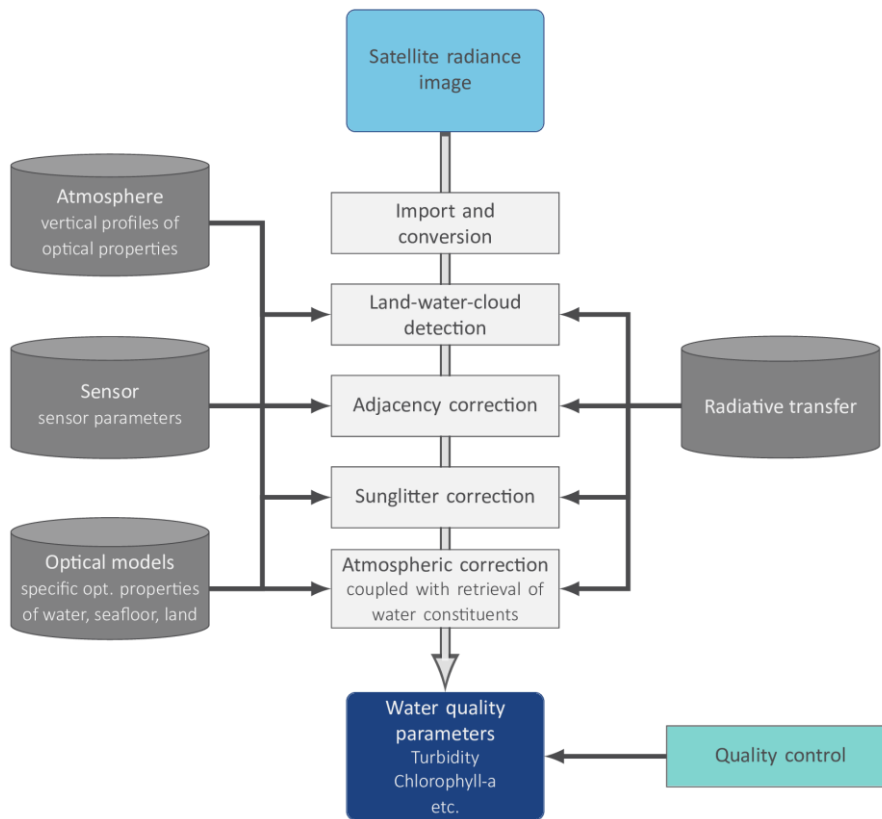


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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.

## 2.2 Products

**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  $1 \text{ NTU} = 0.0118 \text{ 1/m backward scattering at } 550\text{nm}$ , or  $1 \text{ NTU} = 0.619 \text{ 1/m total scattering at } 550\text{nm}$  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  $90^\circ$  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 2020-12-09 is shown in Figure 2.

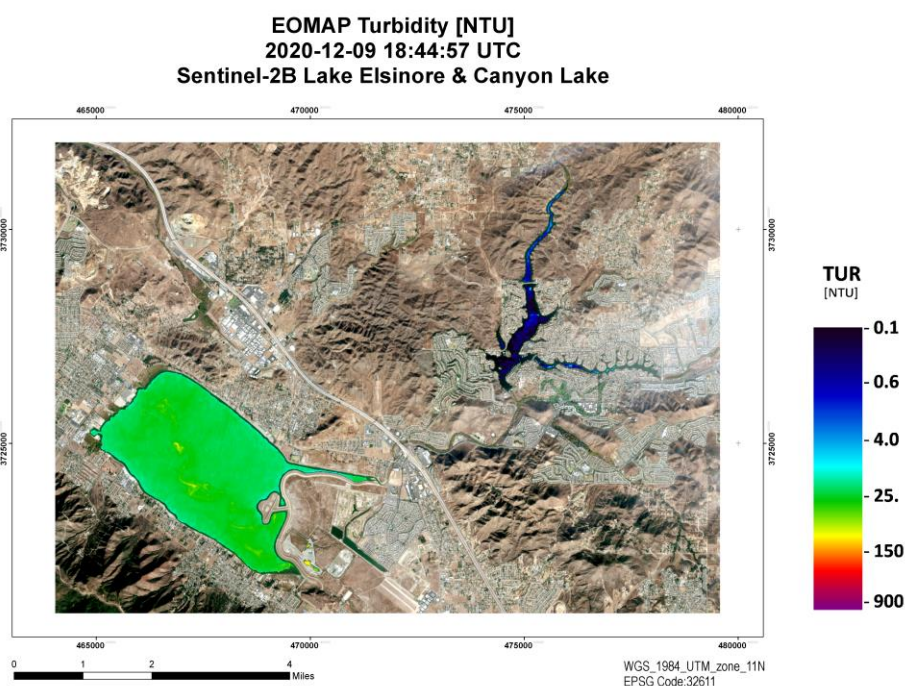


Figure 2: Turbidity product from 2020-12-09

**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  $[\mu\text{g/l}]$ , is provided as a measure linearly related to the pigment-specific absorption at 440nm, with  $1 \mu\text{g/l Chl}$  equal to  $0.035 \text{ 1/m pigment absorption}$ . 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 condi-

tions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2020-12-09 is shown in Figure 3.

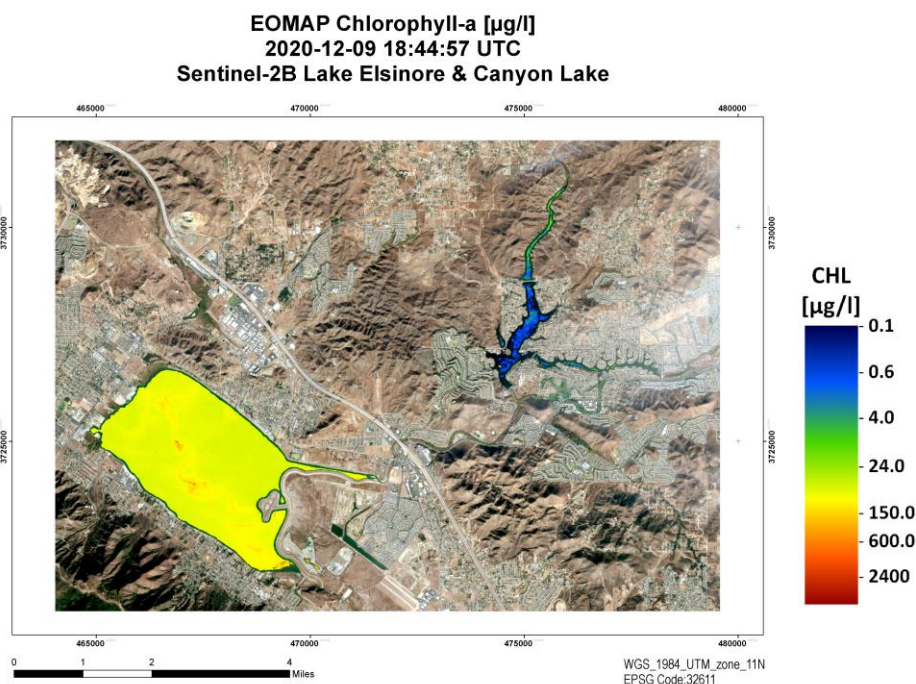


Figure 3: Chlorophyll-a product from 2020-12-09

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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ( $R_{\text{modelled}}$ ) and satellite derived reflectance ( $R_{\text{satellite}}$ ) occurs. The algorithm then compares the slope of  $R_{\text{modelled}}$  and  $R_{\text{satellite}}$  between the green and red band ( $\delta R = R_{\text{green}} - R_{\text{red}}$ ) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2020-12-09 is shown in Figure 4.

<sup>9</sup> 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

<sup>10</sup> 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

**EOMAP Harmful Algae Bloom Indicator  
2020-12-09 18:44:57 UTC  
Sentinel-2B Lake Elsinore & Canyon Lake**

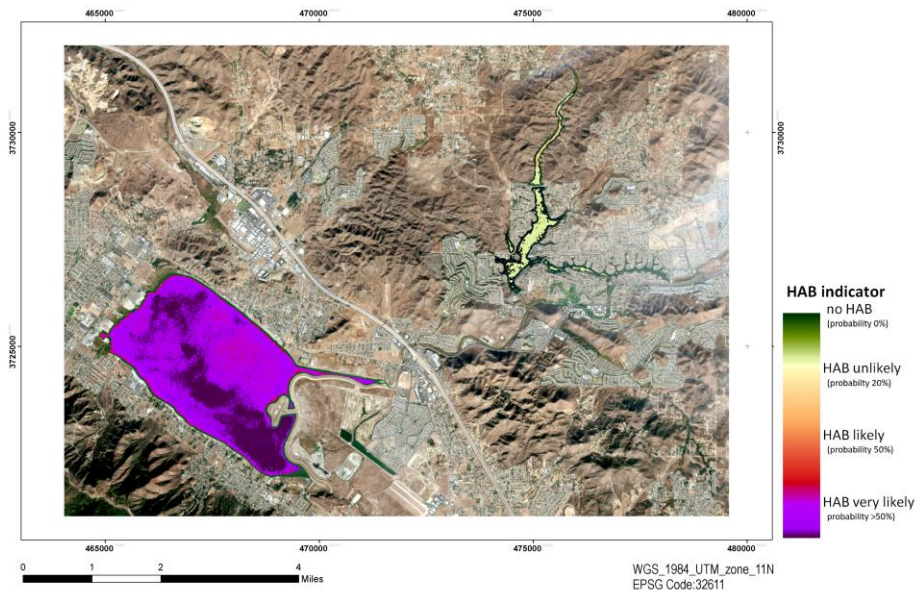


Figure 4: Harmful Algae Bloom Indicator product from 2020-12-09

RGB composite images represent the area of interest in true colour or false colour modes by combining pre-defined bands, depending on the sensor in use.

## 2.3 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 radiances and subsurface reflectances,
- 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 Geo-TIFFs:

- 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.

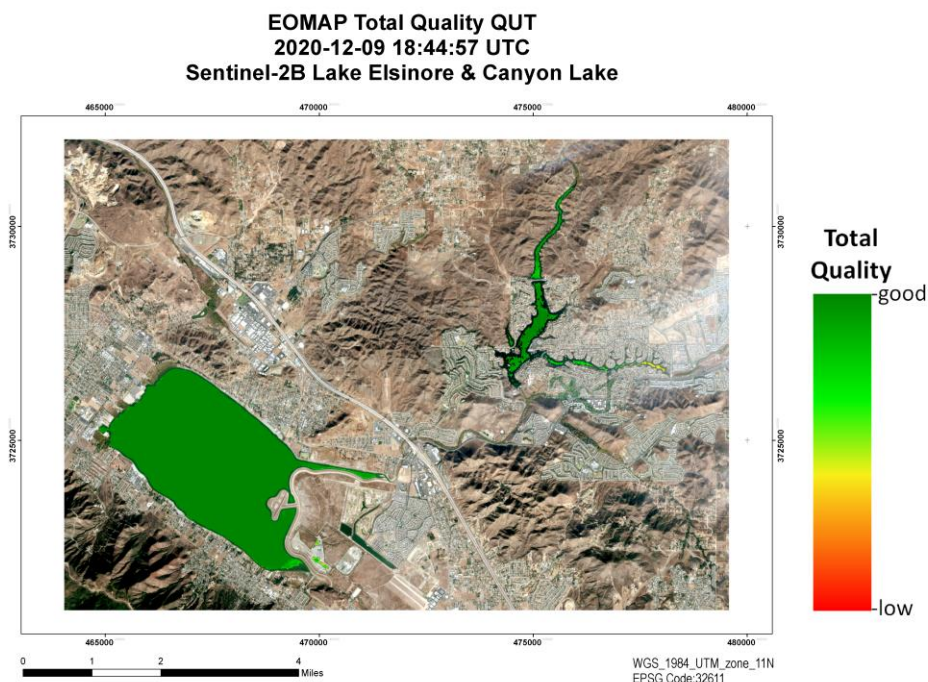


Figure 5: QUT product from 2020-12-09

**EOMAP Quality Coding QUC**  
**2020-12-09 18:44:57 UTC**  
**Sentinel-2B Lake Elsinore & Canyon Lake**

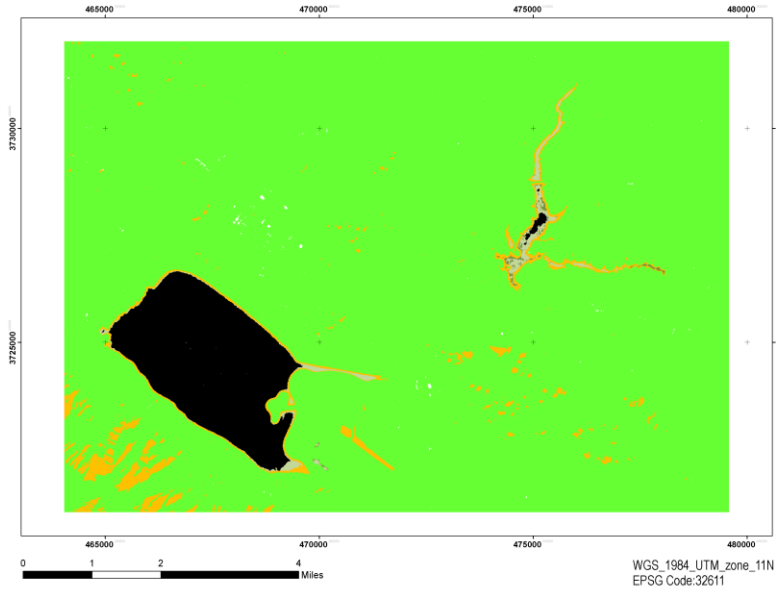


Figure 6: QUC product from 2020-12-09

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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.

## **2.4 Data Format**

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, metadata is stored in the .xml and the metadata .pdf files.

## **2.5 Data Sources**

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

## Contact

<b>Head Office</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Postal Address</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Phone</b>	+49 (0)8152 99861 10
<b>Fax</b>	+49 (0)8152 99861 29
<b>Email</b>	<a href="mailto:info@eomap.com">info@eomap.com</a>
<b>Website</b>	<a href="http://www.eomap.com">www.eomap.com</a>

© EOMAP GmbH & Co. KG December 2020

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

Delivery Report

# Water Quality Monitoring Lake Elsinore & Canyon Lake

Date: 2021-03-03

Client: Wood Plc

Delivery no.: 2370\_Delivery\_EOMAP2WoodPlc\_Vs6\_20210303

---

**Authors:**

Philip Klinger  
Karin Schenk

---

**Mail:**

klinger@eomap.de  
schenk@eomap.de

---

**Telephone:**

+49 8152 9986 115  
+49 8152 9986 112

# CONTENT

<b>1. SERVICE PROVISION REPORT .....</b>	<b>3</b>
LIST OF ALL DELIVERED SCENES.....	3
CONTENT.....	3
LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
FILE NAMING .....	4
NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.).....	4
<b>2. METHODOLOGY AND PRODUCTS.....</b>	<b>5</b>
2.1 MODULAR INVERSION AND PROCESSING SYSTEM (MIP) .....	5
2.2 PRODUCTS .....	7
2.3 QUALITY CONTROL AND FLAGGING .....	10
2.4 DATA FORMAT.....	12
2.5 DATA SOURCES.....	12
<b>CONTACT.....</b>	<b>13</b>

## 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2021-03-03
Version	6

### List of all delivered scenes

Sensor	Time of record
Sentinel-2B	2021-02-17 18:44:57 UTC

### Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

### List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs6_20210303.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20210217_184457_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20210217_184457_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EO-MAP_20210217_184457_SENT2_m0010_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20210217_184457_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20210217_184457_SENT2_m0010_metadata.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20210217_184457_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

---

## File naming

[Product abbreviation]\_[Country code]-[Area]\_EOMAP\_[Date of satellite image recording]\_[Time of satellite image recording]\_[sensor code]\_[spatial resolution]\_[optional]

### With

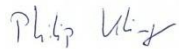
[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYYYMMDD (YY= Year, MM = Month, DD = 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 be used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

---

## Notes (e.g. technical issues, exceptional conditions, etc.)

---

Data Analyst



Philip Klinger

QA/QC



Karin Schenk

## 2. Methodology and Products

### 2.1 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

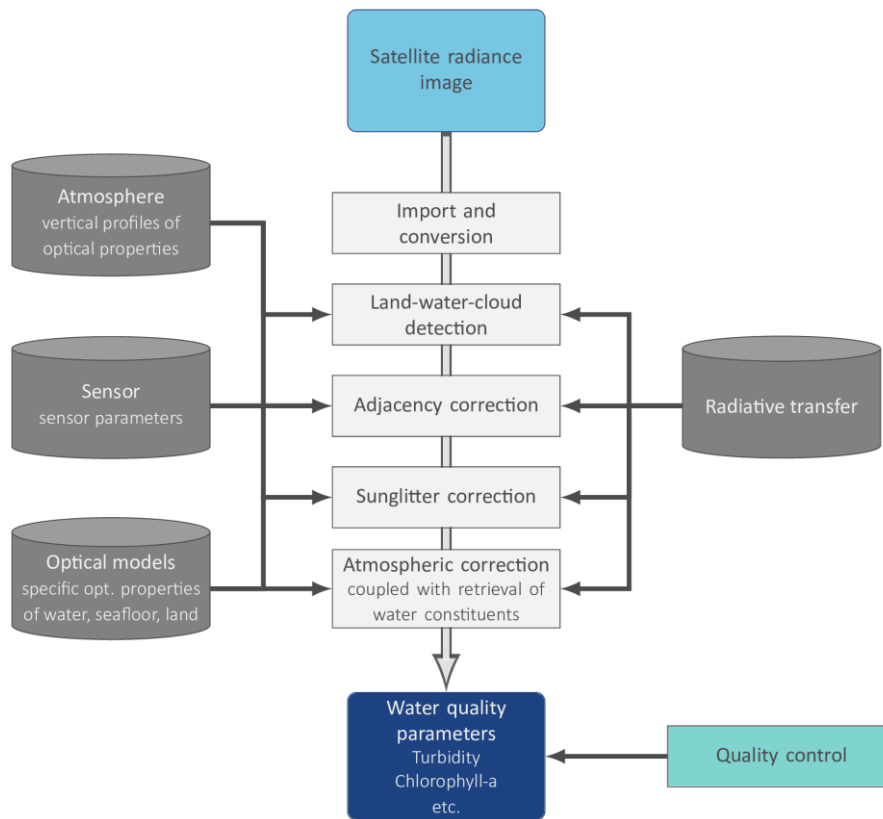


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

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.



## 2.2 Products

**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  $1 \text{ NTU} = 0.0118 \text{ 1/m backward scattering at } 550\text{nm}$ , or  $1 \text{ NTU} = 0.619 \text{ 1/m total scattering at } 550\text{nm}$  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  $90^\circ$  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 2021-02-17 is shown in Figure 2.

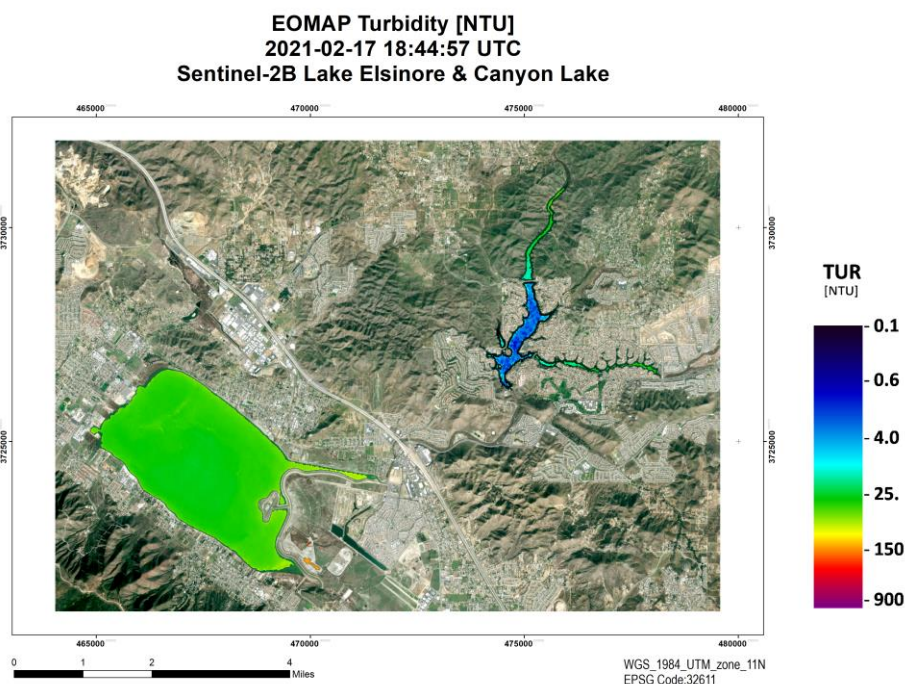


Figure 2: Turbidity product from 2021-02-17

**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  $[\mu\text{g/l}]$ , is provided as a measure linearly related to the pigment-specific absorption at 440nm, with  $1 \mu\text{g/l Chl}$  equal to  $0.035 \text{ 1/m pigment absorption}$ . 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 condi-

tions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2021-02-17 is shown in Figure 3.

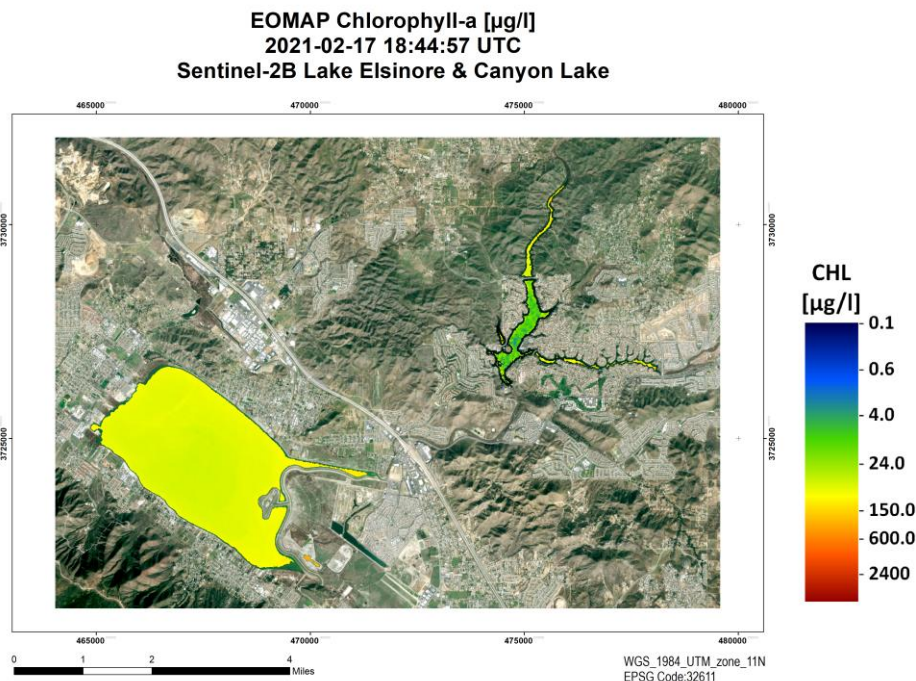


Figure 3: Chlorophyll-a product from 2021-02-17

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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2021-02-17 is shown in Figure 4.

<sup>9</sup> 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

<sup>10</sup> 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

**EOMAP Harmful Algae Bloom Indicator  
2021-02-17 18:44:57 UTC  
Sentinel-2B Lake Elsinore & Canyon Lake**

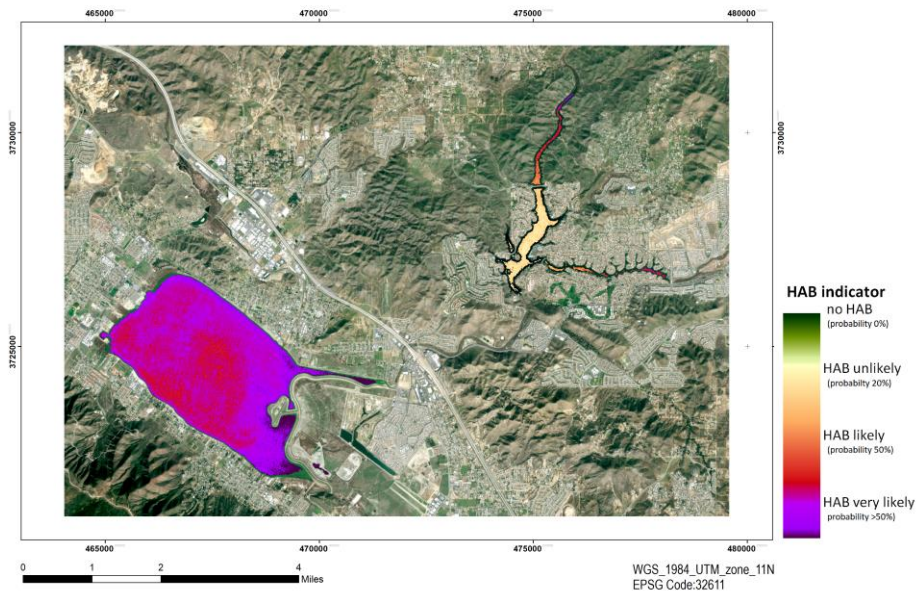


Figure 4: Harmful Algae Bloom Indicator product from 2021-02-17

RGB composite images represent the area of interest in true colour or false colour modes by combining pre-defined bands, depending on the sensor in use.

## 2.3 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 radiances and subsurface reflectances,
- 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 Geo-TIFFs:

- 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.

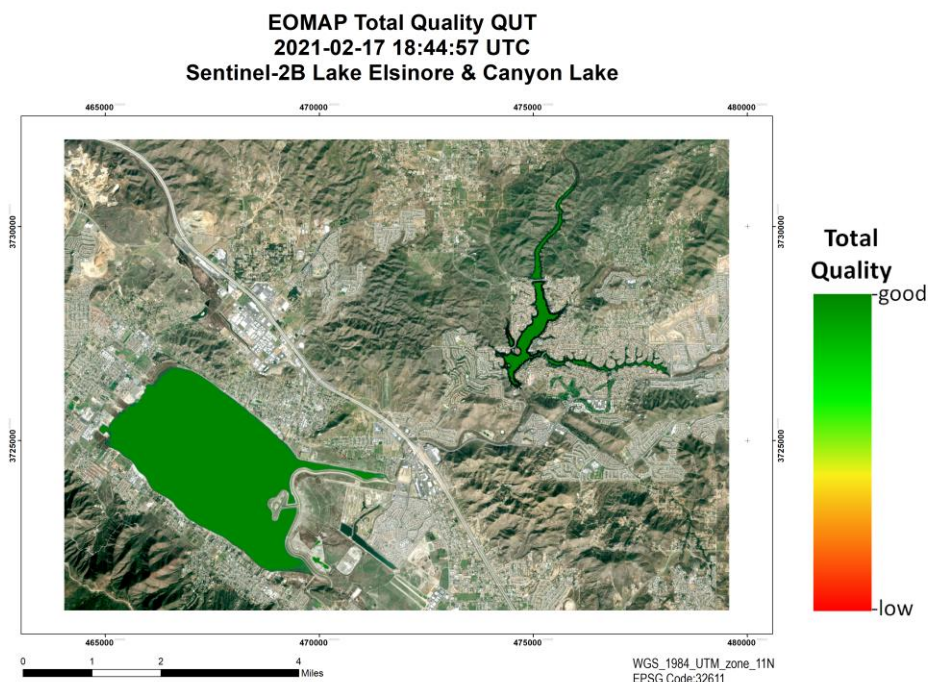


Figure 5: QUT product from 2021-02-17

**EOMAP Quality Coding QUC**  
**2021-02-17 18:44:57 UTC**  
**Sentinel-2B Lake Elsinore & Canyon Lake**

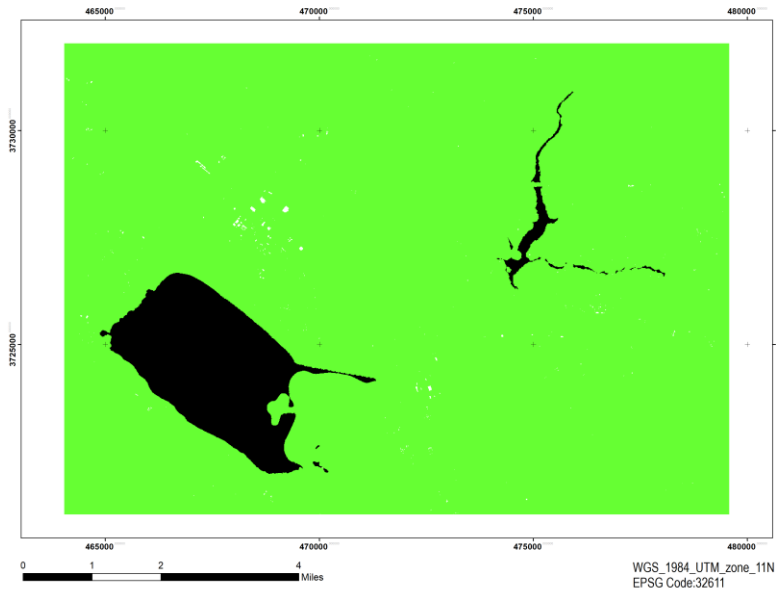


Figure 6: QUC product from 2021-02-17

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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.

## **2.4 Data Format**

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, metadata is stored in the .xml and the metadata .pdf files.

## **2.5 Data Sources**

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

## Contact

<b>Head Office</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Postal Address</b>	EOMAP GmbH & Co. KG, Schlosshof 4, 82229 Seefeld, Germany
<b>Phone</b>	+49 (0)8152 99861 10
<b>Fax</b>	+49 (0)8152 99861 29
<b>Email</b>	<a href="mailto:info@eomap.com">info@eomap.com</a>
<b>Website</b>	<a href="http://www.eomap.com">www.eomap.com</a>

© EOMAP GmbH & Co. KG March 2021

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

Delivery report

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2021-04-14  
Version: 7

Clients: Wood Plc.  
Reference: 2370\_Delivery\_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,  
Schlosshof 4, 82229 Seefeld  
Germany

Authors:	e-mail	Phone
Philip Klinger	klinger@eomap.de	+49 8152 99861 13
Karin Schenk	schenk@eomap.de	+49 8152 99861 12



## CONTENT

<b>1. SERVICE PROVISION REPORT</b> .....	<b>3</b>
1.1 LIST OF ALL DELIVERED SCENES.....	3
1.2 CONTENT .....	3
1.3 LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
1.4 FILE NAMING .....	4
1.5 NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.) .....	4
<b>2. METHODOLOGY: MODULAR INVERSION AND PROCESSING SYSTEM (MIP)</b> .....	<b>5</b>
<b>3. PRODUCTS</b> .....	<b>7</b>
4.1 TURBIDITY (TUR) .....	7
4.2 CHLOROPHYLL-A (CHL) .....	8
4.3 HARMFUL ALGAE BLOOM INDICATOR (HAB).....	9
4.4 TRUE COLOR COMPOSITE (RGB).....	9
<b>4. QUALITY CONTROL AND FLAGGING</b> .....	<b>10</b>
<b>5. DATA FORMAT</b> .....	<b>13</b>
<b>6. DATA SOURCES</b> .....	<b>13</b>

## 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2021-04-14
Version	7

### 1.1 List of all delivered scenes

Sensor	Time of record
Sentinel-2B	2021-04-08 18:44:56 UTC

### 1.2 Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

### 1.3 List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs7_20210414.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20210408_184456_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20210408_184456_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20210408_184456_SENT2_m0010_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20210408_184456_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20210408_184456_SENT2_m0010_metadata.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20210408_184456_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]	see list of product abbreviations
[Country code]	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 be 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.)

Data Analyst



Philip Klinger

QA/QC



Karin Schenk

## 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

---

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

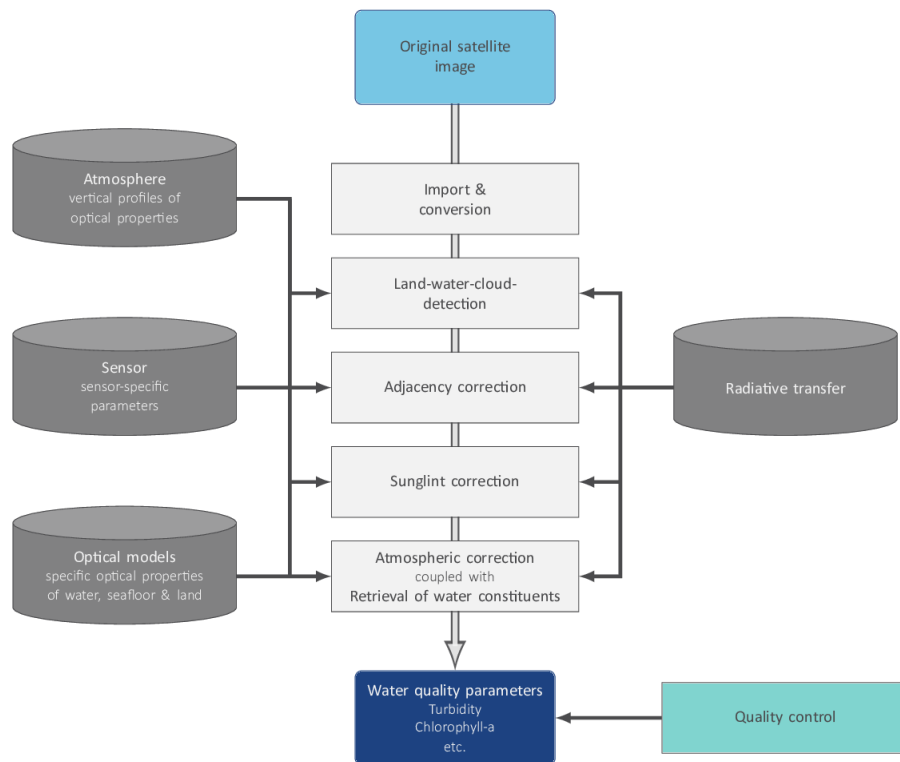


Figure 1: EOMAP’s physics-based workflow to derive satellite-based water quality

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

#### 4.1 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 2021-04-08 is shown in Figure 2.

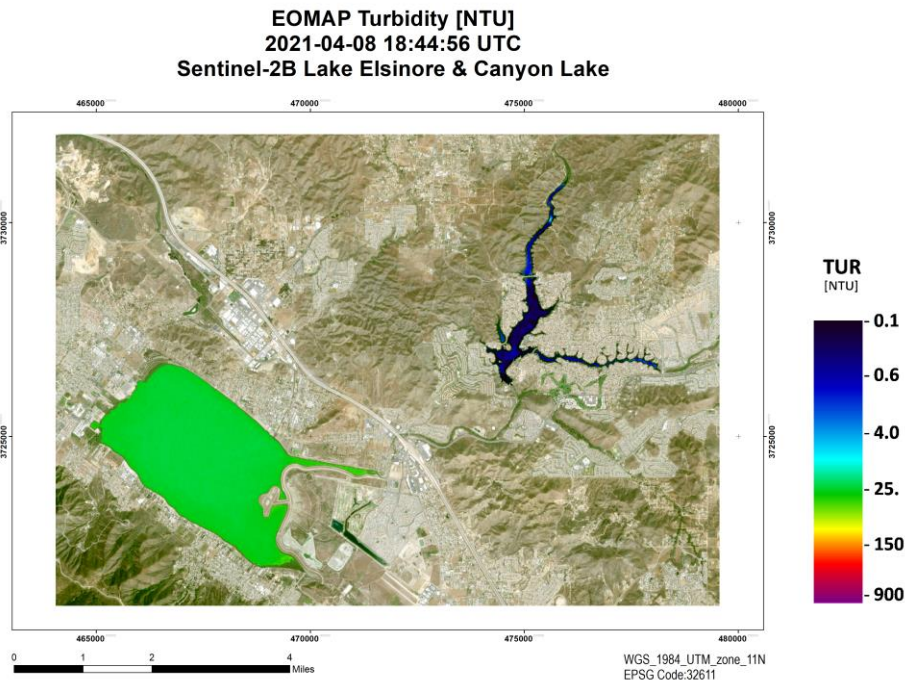


Figure 2: Turbidity product from 2021-04-08

## 4.2 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 [ $\mu\text{g/l}$ ], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu\text{g/l}$  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. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu\text{g/l}$ , while for eutrophic lakes concentrations can reach 100  $\mu\text{g/l}$  and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2021-04-08 is shown in Figure 3.

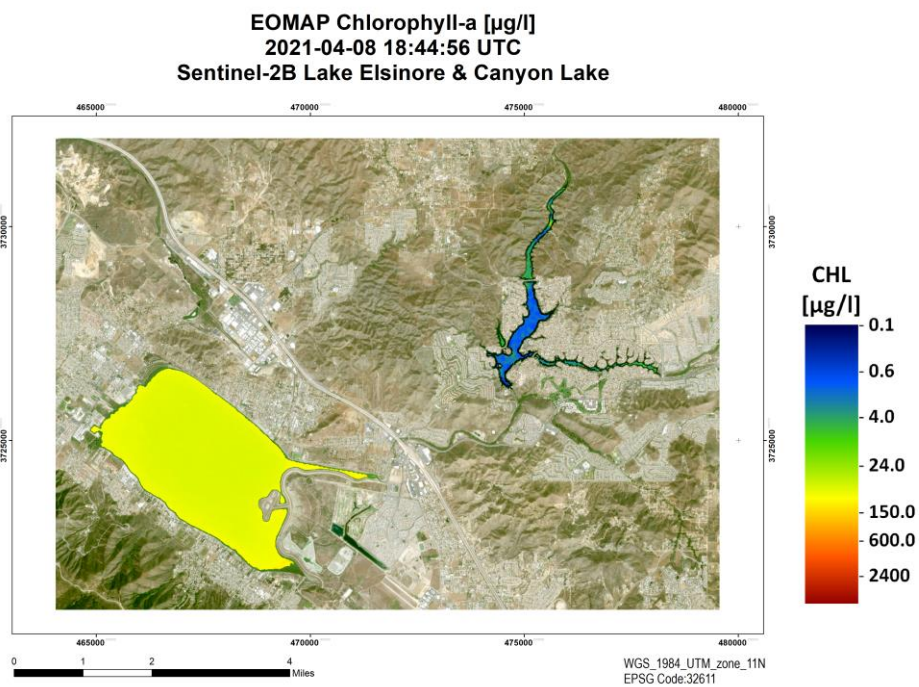


Figure 3: Chlorophyll-a product from 2021-04-08

<sup>9</sup> 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

<sup>10</sup> 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

### 4.3 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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2021-04-08 is shown in Figure 4.

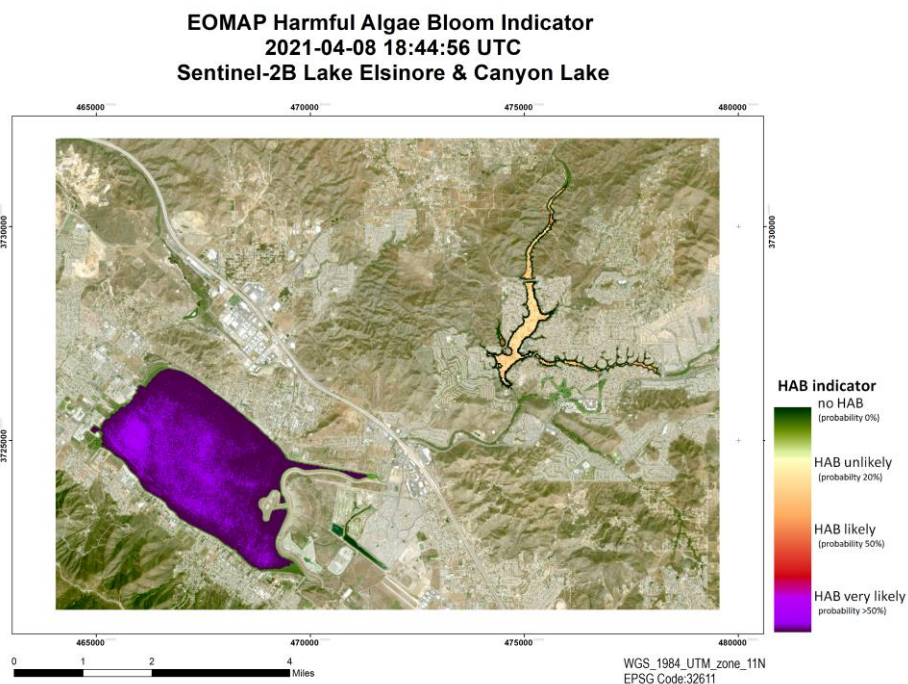


Figure 4: Harmful Algae Bloom Indicator product from 2021-04-08

### 4.4 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 Total Quality QUT  
2021-04-08 18:44:56 UTC  
Sentinel-2B Lake Elsinoe & Canyon Lake**

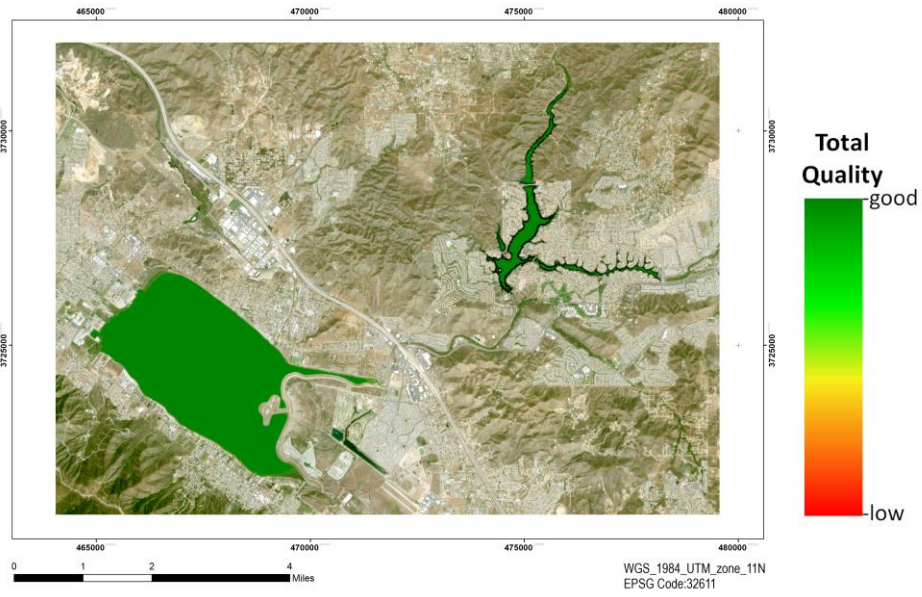


Figure 5: QUT product from 2021-04-08

**EOMAP Quality Coding QUC  
2021-04-08 18:44:56 UTC  
Sentinel-2B Lake Elsinoe & Canyon Lake**

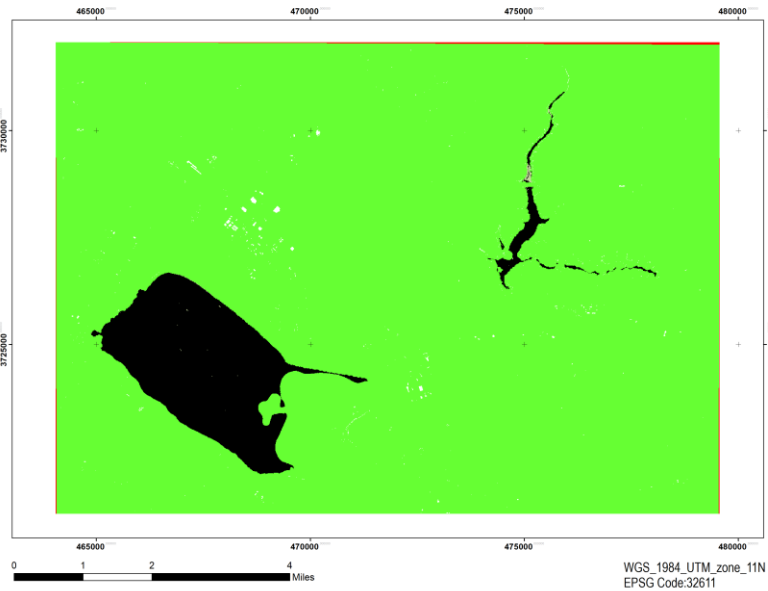


Figure 6: QUC product from 2021-04-08

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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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 is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

## 6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

© EOMAP GmbH & Co. KG April 2021

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable un-less stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

## EOMAP

Schlosshof 4

82229 Seefeld

Germany

+49 (0)8152 99861 10

info@eomap.com

www.eomap.com

Delivery report

# Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2021-06-11

Version: 8

Clients: Wood Plc.

Reference: 2370\_Delivery\_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,  
Schlosshof 4, 82229 Seefeld  
Germany

Authors:	e-mail	Phone
Philip Klinger	klinger@eomap.de	+49 8152 99861 13
Karin Schenk	bernert@eomap.de	+49 8152 99861 16

## CONTENT

<b>1. SERVICE PROVISION REPORT</b> .....	<b>3</b>
1.1 LIST OF ALL DELIVERED SCENES.....	3
1.2 CONTENT .....	3
1.3 LIST OF DELIVERED FILES (ONE PRODUCT EXAMPLE).....	3
1.4 FILE NAMING .....	4
1.5 NOTES (E.G. TECHNICAL ISSUES, EXCEPTIONAL CONDITIONS, ETC.) .....	4
<b>2. METHODOLOGY: MODULAR INVERSION AND PROCESSING SYSTEM (MIP)</b> .....	<b>5</b>
<b>3. PRODUCTS</b> .....	<b>7</b>
4.1 TURBIDITY (TUR) .....	7
4.2 CHLOROPHYLL-A (CHL) .....	8
4.3 HARMFUL ALGAE BLOOM INDICATOR (HAB).....	9
4.4 TRUE COLOR COMPOSITE (RGB).....	9
<b>4. QUALITY CONTROL AND FLAGGING</b> .....	<b>10</b>
<b>5. DATA FORMAT</b> .....	<b>13</b>
<b>6. DATA SOURCES</b> .....	<b>13</b>

## 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	Philip Klinger
john.rudolph@woodplc.com	klinger@eomap.de, +49 (0)8152 9986115

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2021-06-11
Version	8

### 1.1 List of all delivered scenes

Sensor	Time of record
Landsat-8	2021-05-28 18:22:16 UTC

### 1.2 Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	<input type="checkbox"/>
Aerosol Optical Thickness	AOT	<input type="checkbox"/>
Yellow Substances	CDM	<input type="checkbox"/>
Chlorophyll-a	CHL	<input checked="" type="checkbox"/>
Ratio of Absorption and Scattering	DIV	<input type="checkbox"/>
Harmful Algae Bloom Indicator	HAB	<input checked="" type="checkbox"/>
Diffuse Attenuation Coefficient	KDC	<input type="checkbox"/>
Quality Coding	QUC	<input checked="" type="checkbox"/>
Total Quality	QUT	<input checked="" type="checkbox"/>
True Color/False Color Composite	RGB	<input checked="" type="checkbox"/>
Remote Sensing Reflectance	RRS	<input type="checkbox"/>
Secchi Disc Depth	SDD	<input type="checkbox"/>
Sum of Inorganic Absorption	SIA	<input type="checkbox"/>
Sum of Organic Absorption	SOA	<input type="checkbox"/>
Surface Temperature	SST	<input type="checkbox"/>
Turbidity	TUR	<input checked="" type="checkbox"/>
Trophic State Index (Chlorophyll)	TSC	<input type="checkbox"/>
Total Suspended Matter	TSM	<input type="checkbox"/>
Light Penetration Depth	Z90	<input type="checkbox"/>
Water Body Extent	WEX	<input type="checkbox"/>

### 1.3 List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs8_20210611.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20210528_182216_LSAT8_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20210528_182216_LSAT8_m0030_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_040037_EOMAP_20210528_182216_LSAT8_m0030_wgs84_xyz.txt	ASCII	Product text file, real values
CHL_us-california_040037_EOMAP_20210528_182216_LSAT8_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EOMAP_20210528_182216_LSAT8_m0030_metadata.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20210528_182216_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]	see list of product abbreviations
[Country code]	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 be 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.)

- Sunlight on parts of Lake Elsinore (especially southeastern part) which was corrected for, however values might still be slightly biased.

Data Analyst

*Philip Kliger*

Philip Kliger

QA/QC

*Hendrik Bernert*

Hendrik Bernert

## 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<sup>1 2</sup>
- c. correction altitude level impacts<sup>3</sup>
- d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)<sup>4</sup>
- e. correction<sup>5</sup> or flagging<sup>6</sup> of sunglitter impact
- f. retrieval of in-water absorption and scattering as physical measures<sup>7</sup>
- g. accounting for varying spectral slopes of specific inherent optical properties<sup>8</sup>
- 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.

---

<sup>1</sup> 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

<sup>2</sup> 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

<sup>3</sup> 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

<sup>4</sup> 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, <http://dx.doi.org/10.1016/j.rse.2014.07.025>

<sup>5</sup> Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

<sup>6</sup> EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): [www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf](http://www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf)

<sup>7</sup> 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

<sup>8</sup> 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

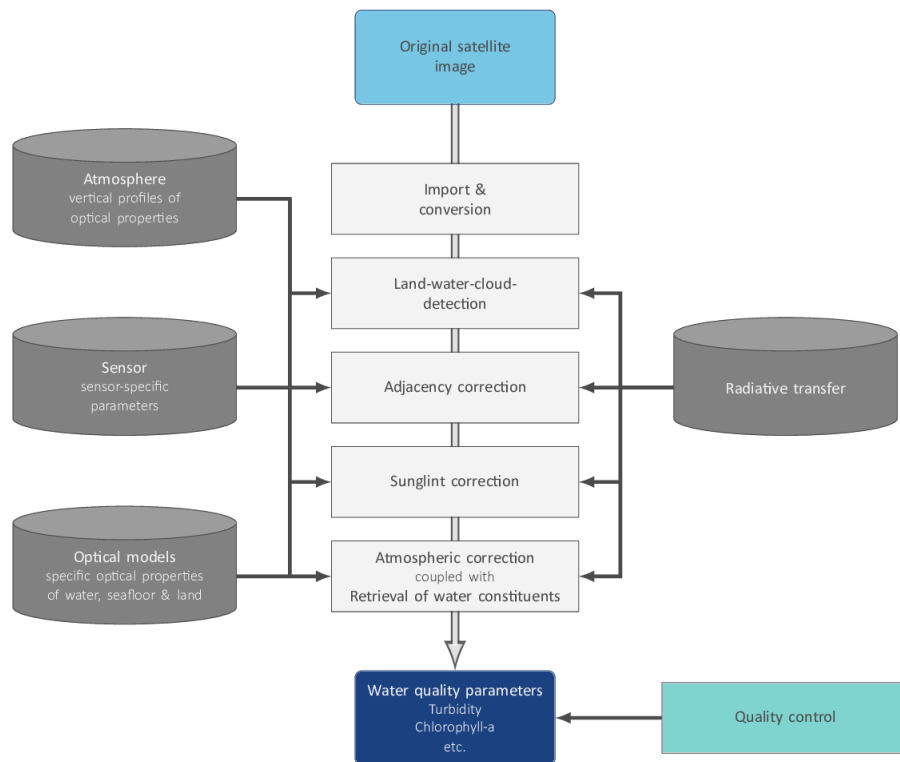


Figure 1: EOMAP’s physics-based workflow to derive satellite-based water quality

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

#### 4.1 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 2021-05-28 is shown in Figure 2.

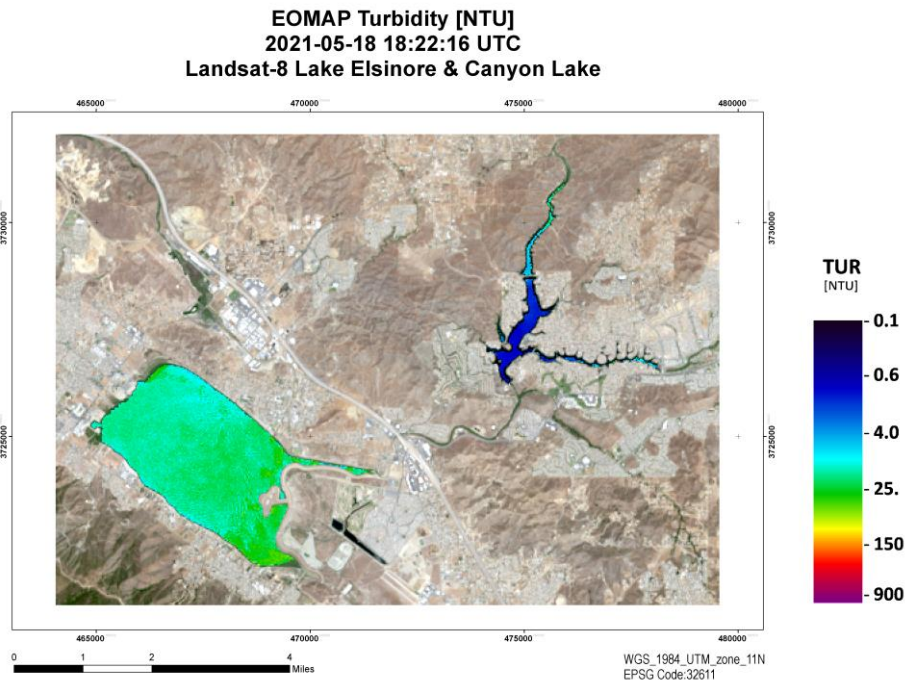


Figure 2: Turbidity product from 2021-05-28

## 4.2 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 [ $\mu\text{g/l}$ ], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1  $\mu\text{g/l}$  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. 1995<sup>9</sup>). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10  $\mu\text{g/l}$ , while for eutrophic lakes concentrations can reach 100  $\mu\text{g/l}$  and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015<sup>10</sup>), 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 2021-05-28 is shown in Figure 3.

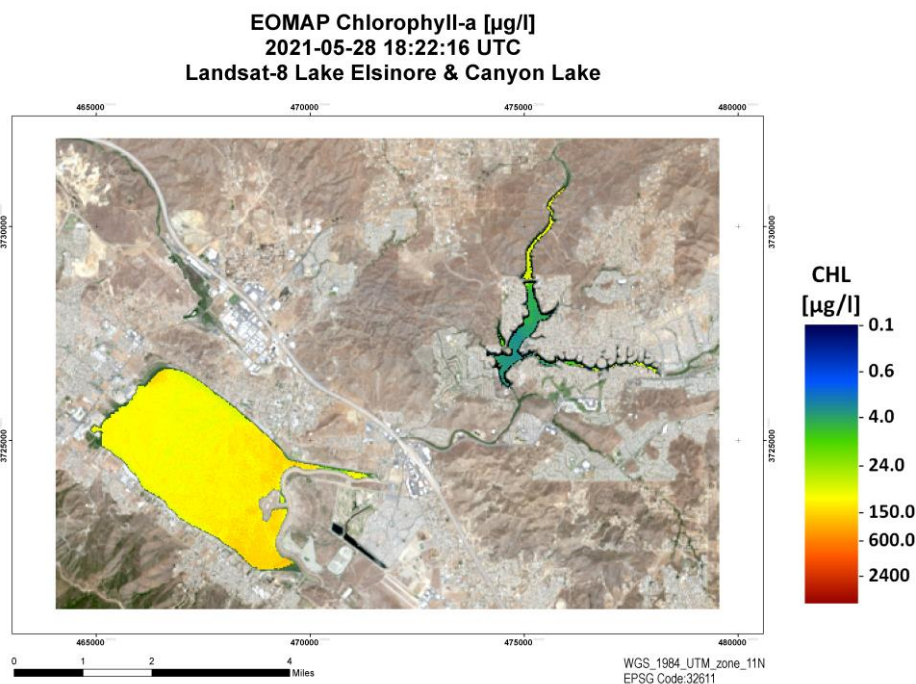


Figure 3: Chlorophyll-a product from 2021-05-28

<sup>9</sup> 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

<sup>10</sup> 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

### 4.3 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 in the retrieval process. The modelled phytoplankton absorption therefore lacks the 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 2021-05-28 is shown in Figure 4.

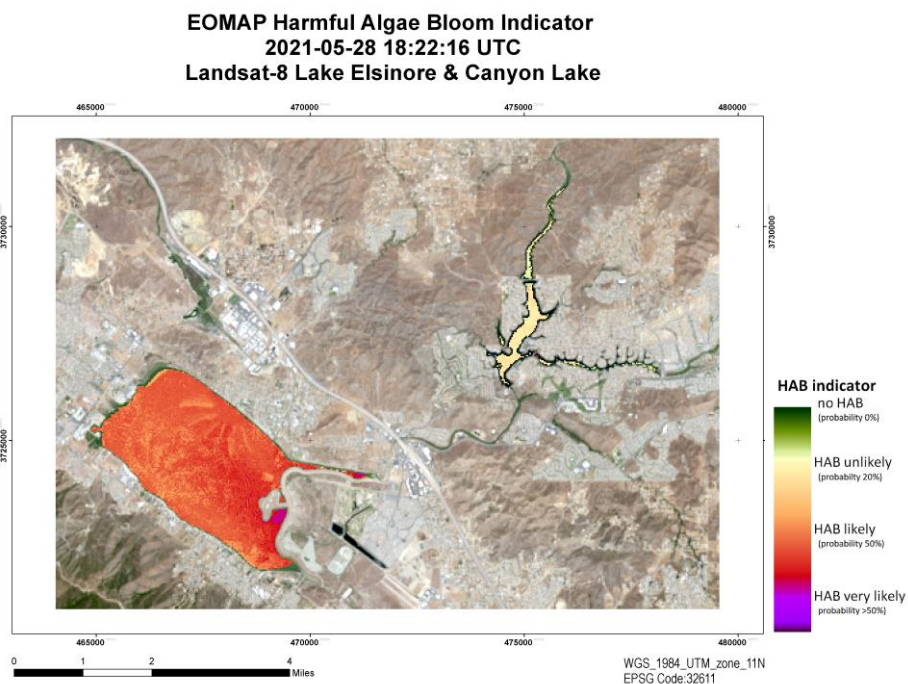


Figure 4: Harmful Algae Bloom Indicator product from 2021-05-28

### 4.4 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.

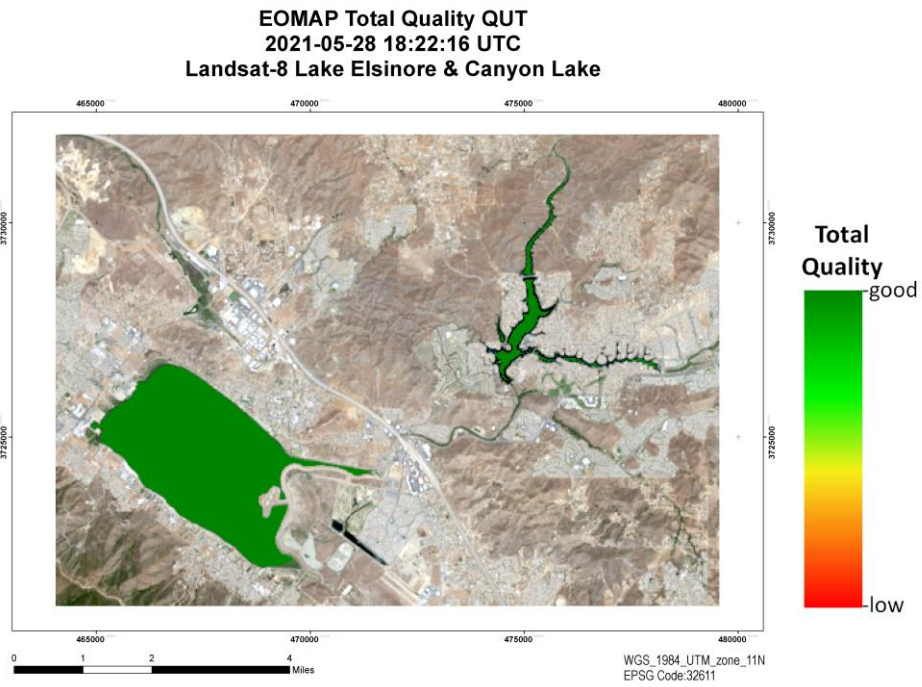


Figure 5: QUT product from 2021-05-28

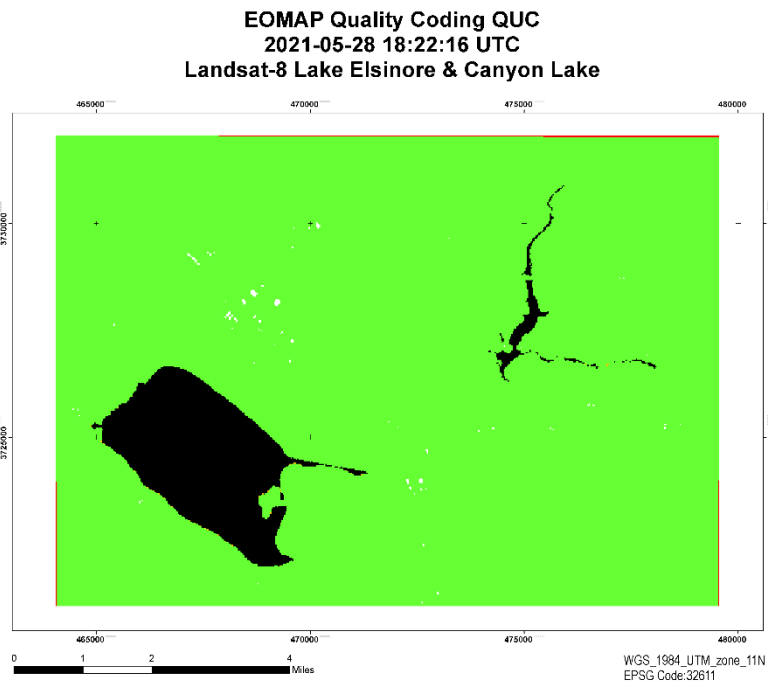


Figure 6: QUC product from 2021-05-28



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 version allow combination of the two most relevant flags:					
First number = most relevant flag					
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle					
Examples: 25 Warning flag for large zenit solar angle and Whitecaps					
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	0 0 0	
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: 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 is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

## 6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Sentinel-3: PEPS <https://peps.cnes.fr>
- Landsat-8 Amazon Web Services, <https://landsat-pds.s3.amazonaws.com>
- Sentinel-2: ESA Sentinel HUB <https://scihub.copernicus.eu/dhus/#/home>
- MODIS Aqua and Terra: USGS <https://earthexplorer.usgs.gov/>

Disclaimer: This document contains confidential information that is intended only for the use by EOMAP's Client. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or EOMAP GmbH & Co. KG. The concepts and information contained in this document are the property of EOMAP GmbH & Co. KG. Use or copying of this document in whole or in part without the written permission of EOMAP GmbH & Co. KG constitutes an infringement of copyright.

While the findings presented in this report are based on information that EOMAP GmbH & Co. KG considers reliable un-less stated otherwise, the accuracy and completeness of source information cannot be guaranteed. Furthermore, the information compiled in this report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, EOMAP GmbH & Co. KG and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

**EOMAP**

Schlosshof 4

82229 Seefeld

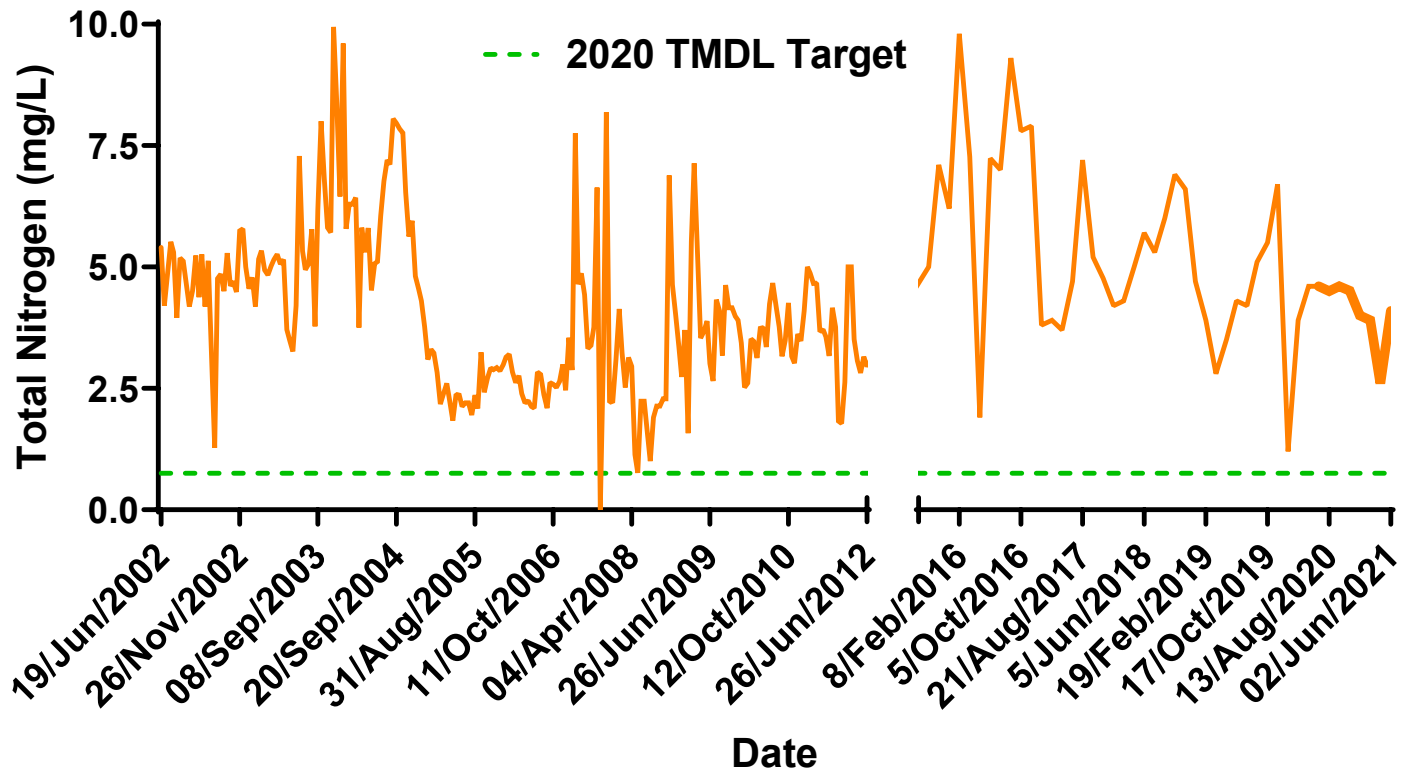
Germany

+49 (0)8152 99861 10

info@eomap.com

www.eomap.com

## Lake Elsinore- Historical Monitoring Results

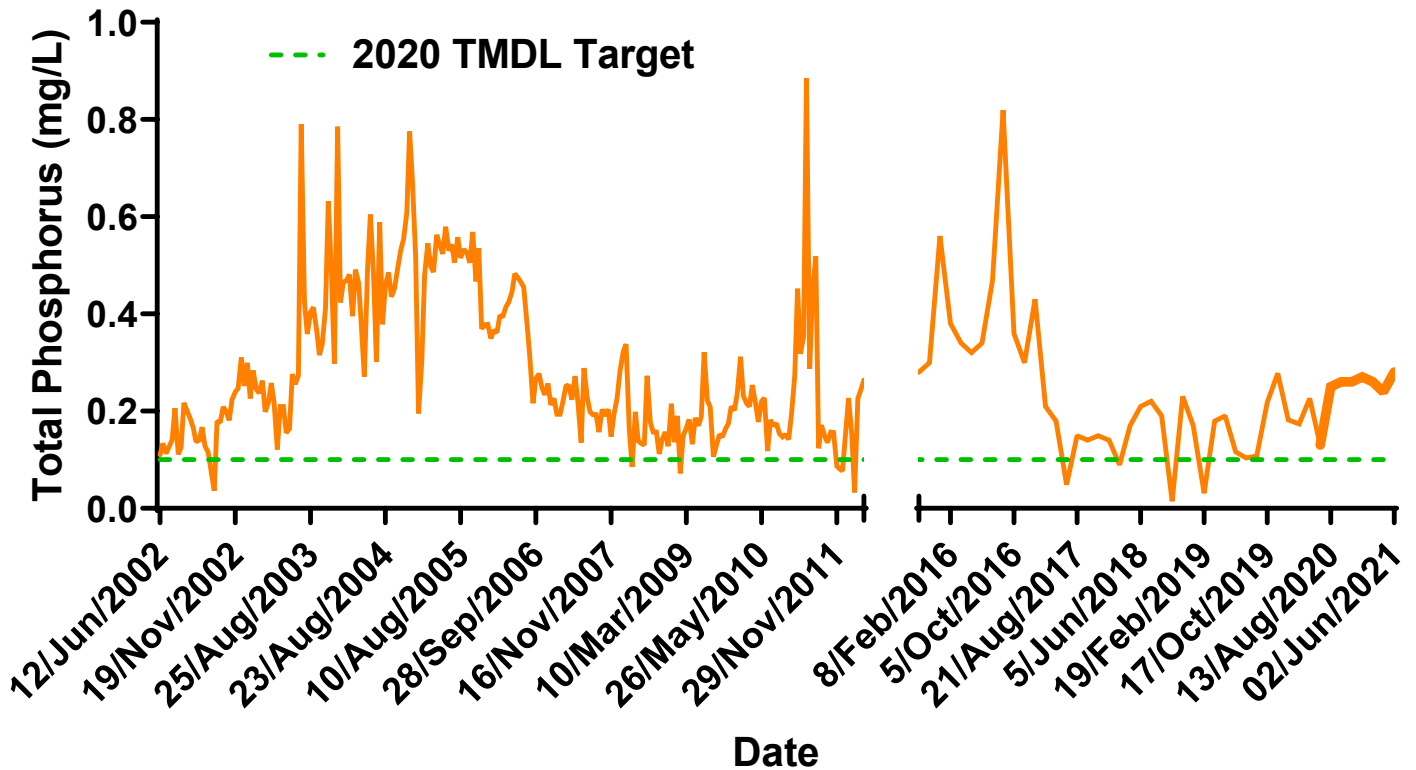


No data available from June 2012-July 2015

TMDL target of 0.75 mg/L is annual average to be attained by 2020

**Bold represents current monitoring year July 2020-June 2021**

## Lake Elsinore- Historical Monitoring Results (continued)

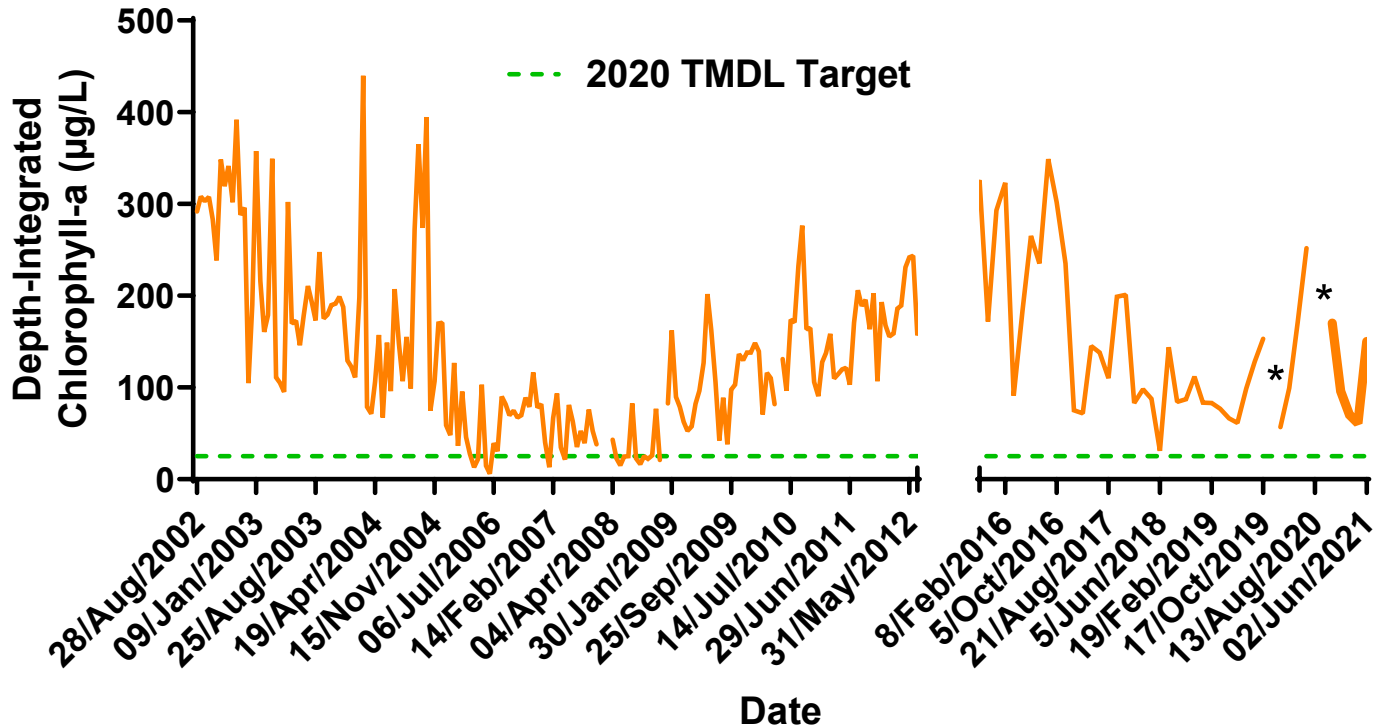


No data available from June 2012-July 2015

TMDL target of 0.1 mg/L is annual average to be attained by 2020

**Bold represents current monitoring year July 2020-June 2021**

## Lake Elsinore- Historical Monitoring Results (continued)



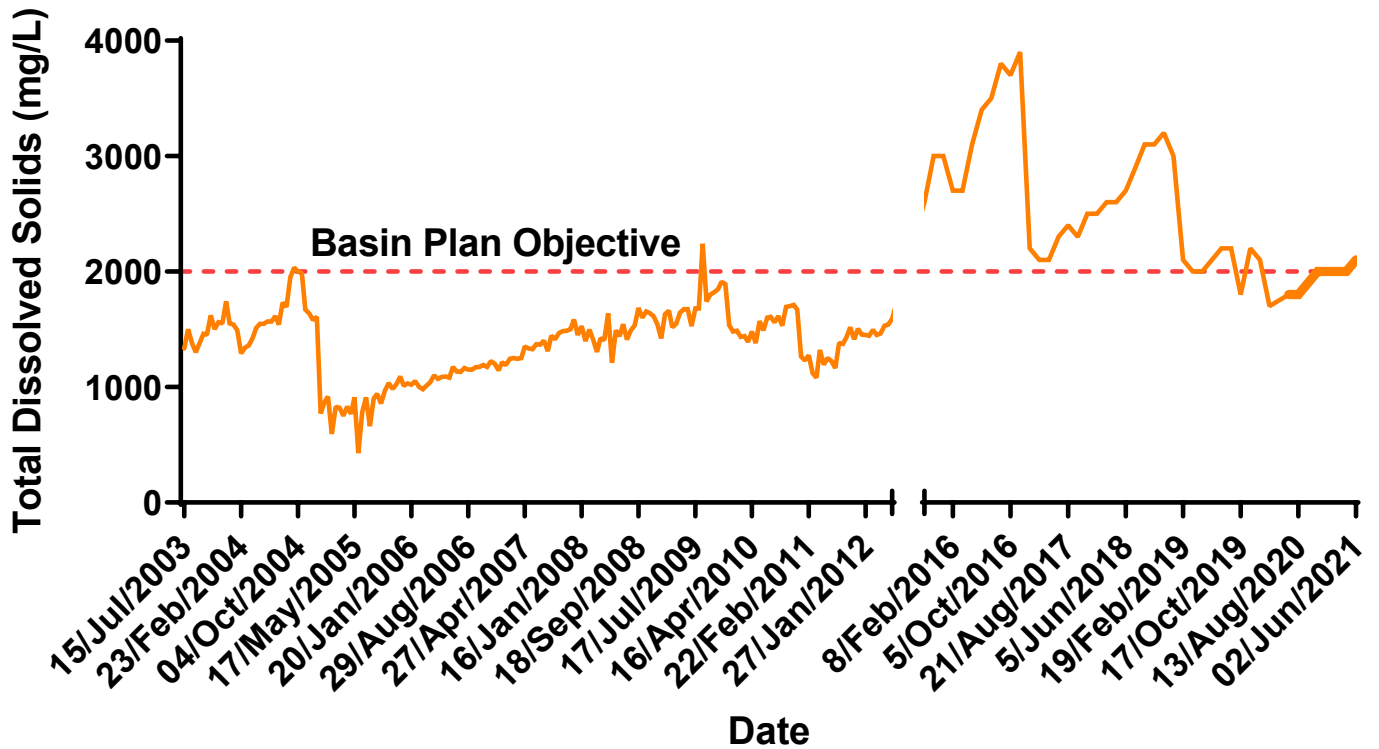
No data available from June 2012-July 2015

TMDL target of 25 µg/L is summer average to be attained by 2020

**Bold represents current monitoring year July 2020-June 2021**

**\*Not measured due to laboratory error. See report for details.**

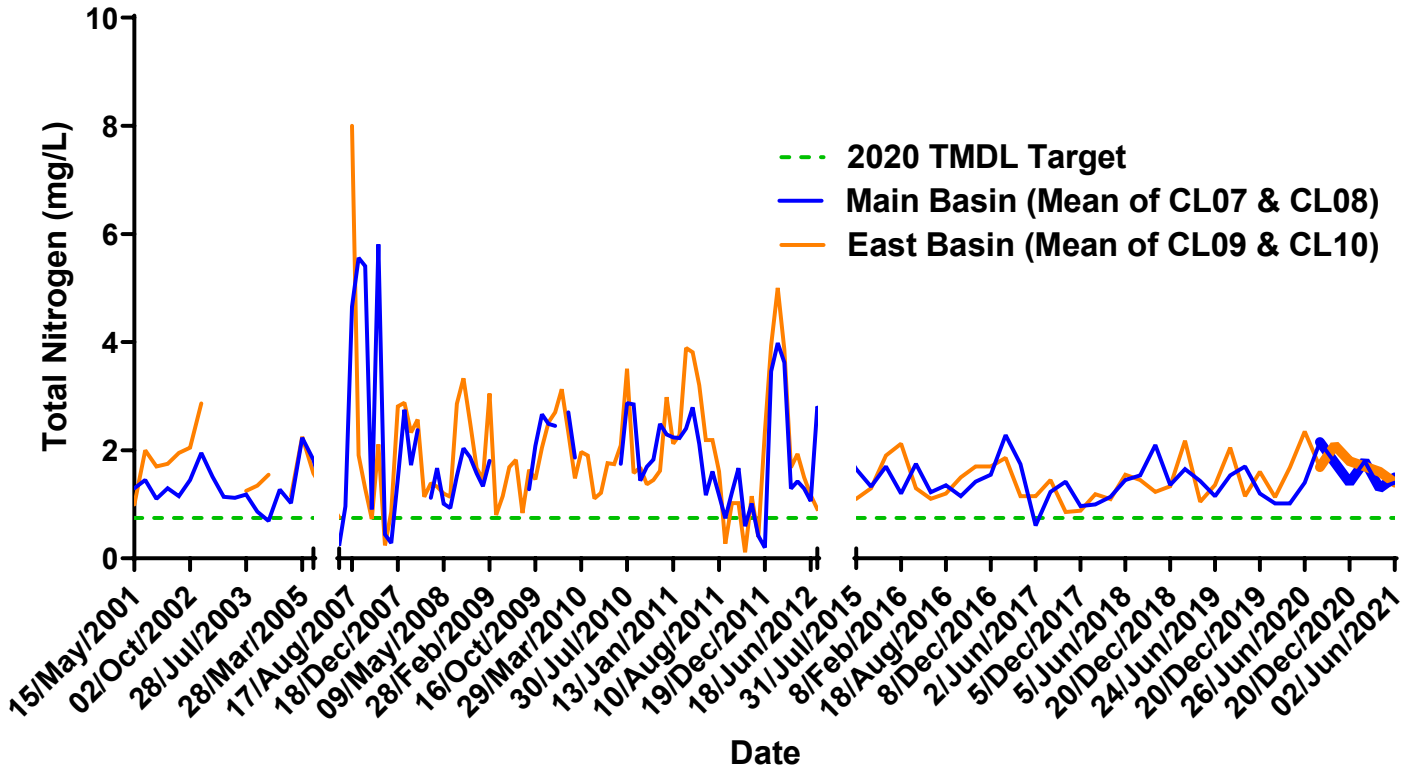
## Lake Elsinore- Historical Monitoring Results (continued)



No data available from June 2012-July 2015

**Bold represents current monitoring year July 2020-June 2021**

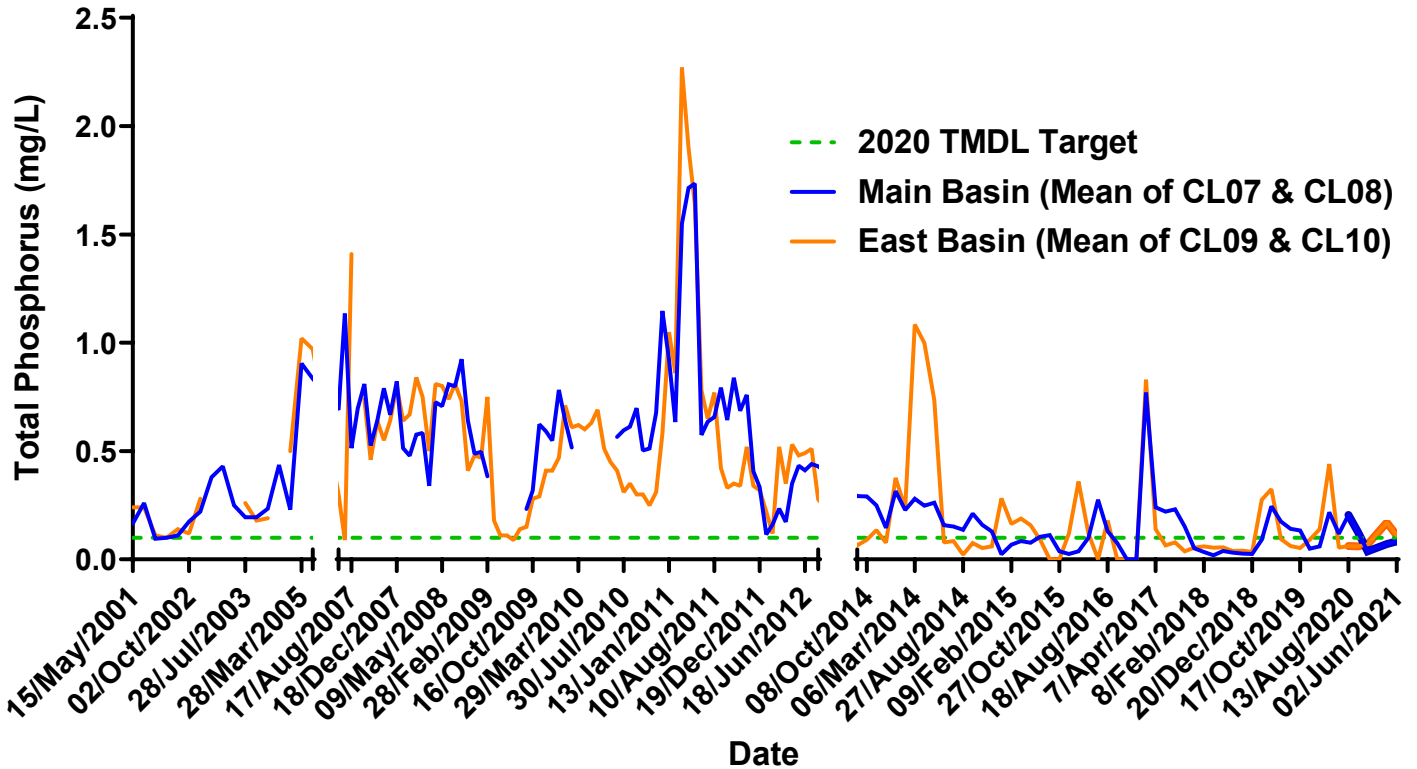
## Canyon Lake- Historical Monitoring Results



No data available from May 2005-July 2007; June 2012-July 2015  
TMDL target of 0.75 mg/L is annual average to be attained by 2020  
**Bold represents current monitoring year July 2020-June 2021**

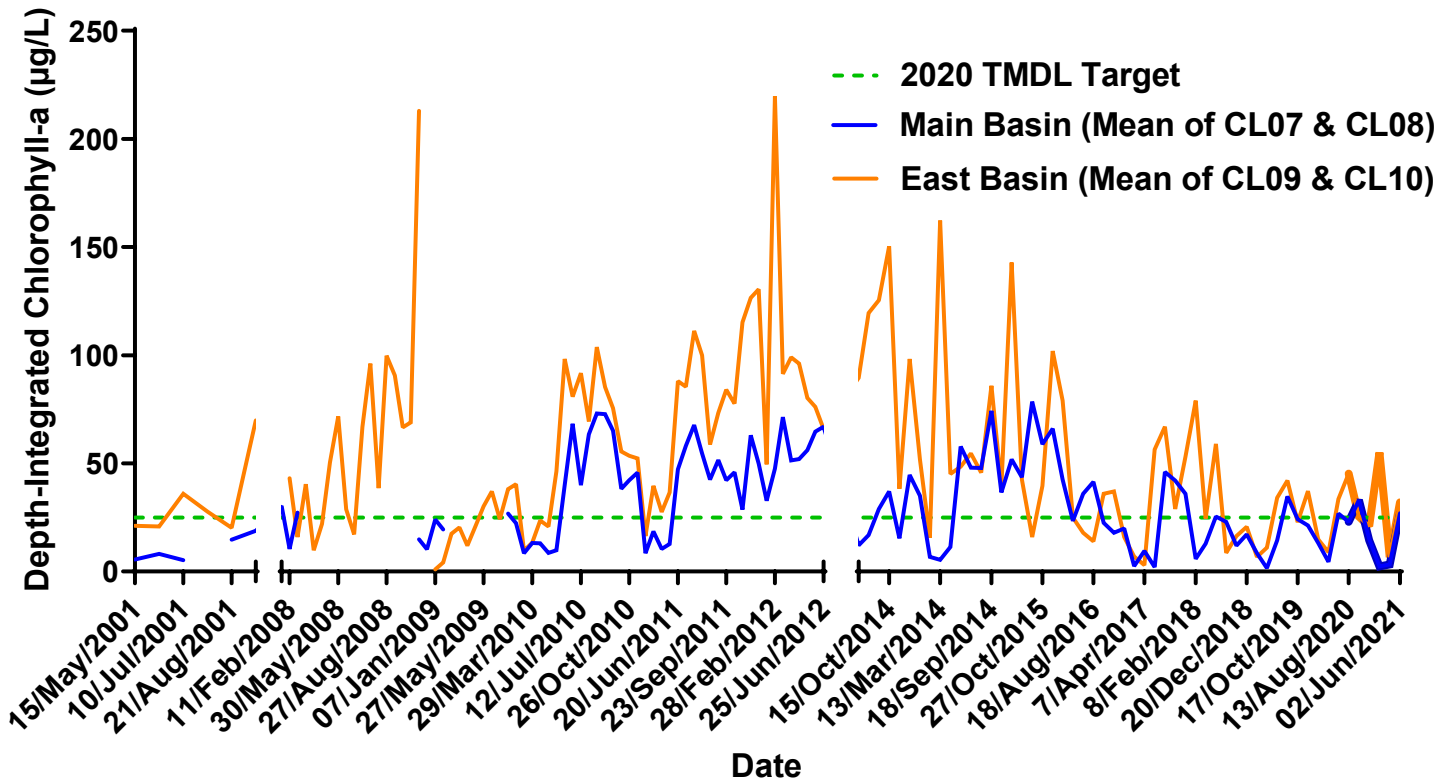


## Canyon Lake- Historical Monitoring Results (continued)



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 2020-June 2021

## Canyon Lake- Historical Monitoring Results (continued)

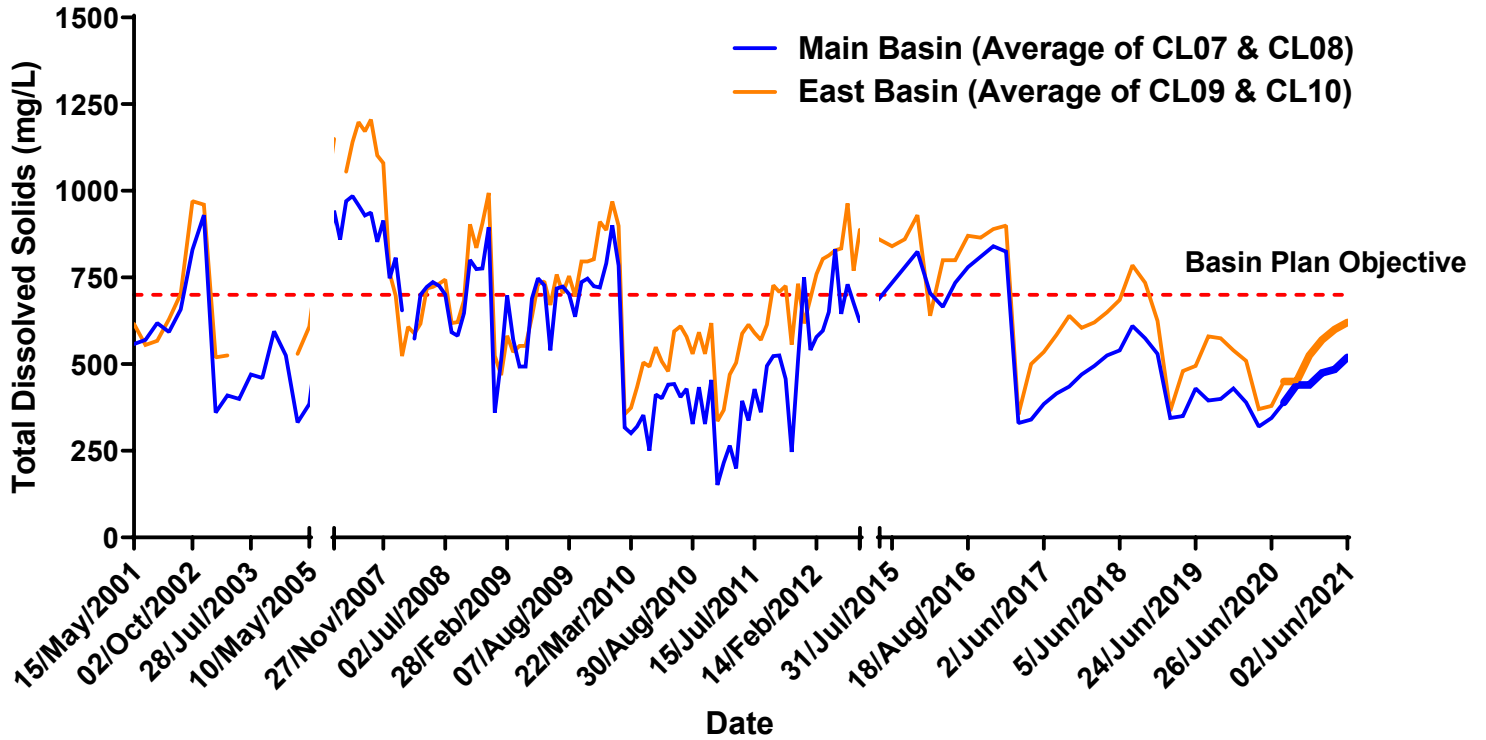


No data available from June 2012-July2015

2020 TMDL target of 25 µg/L is annual average to be attained by 2020

**Bold** represents current monitoring year July 2020-June 2021

## Canyon Lake- Historical Monitoring Results (continued)



No data available from May 2005-July 2007; June 2012-July 2015  
Bold represents current monitoring year July 2020-June 2021