



Post Office Box 3544
Ventura, CA 93006-3544
(805) 525-4431
<https://moundbasingsa.org>

**NOTICE IS HEREBY GIVEN that the
Mound Basin Groundwater Sustainability Agency (“Agency”)
Board of Directors (“Directors”) will hold a
REGULAR BOARD MEETING
at 1:00 P.M. on
Thursday, February 20, 2020
at Ventura City Hall, Santa Cruz Conference Room #223
501 Poli Street, Ventura, California 93001**

**MOUND BASIN GROUNDWATER SUSTAINABILITY AGENCY
BOARD OF DIRECTORS MEETING AGENDA**

CALL TO ORDER 1:00 p.m.

1. PLEDGE OF ALLEGIANCE

2. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA

The Board will receive public comments on items not appearing on the agenda and within the subject matter jurisdiction of the Agency. The Board will not enter into a detailed discussion or take any action on any items presented during public comments. Such items may only be referred to the Executive Director or other staff for administrative action or scheduled on a subsequent agenda for discussion. Persons wishing to speak on specific agenda items should do so at the time specified for those items. In accordance with Government Code § 54954.3(b)(1), public comment will be limited to three (3) minutes per speaker.

3. ROLL CALL

**4. APPROVAL OF AGENDA
Motion**

5. CONSENT CALENDAR

All matters listed under the Consent Calendar are considered routine by the Board and will be enacted by one motion. There will be no separate discussion of these items unless a Board member pulls an item from the Calendar. Pulled items will be discussed and acted on separately by the Board. Members of the public who want to comment on a Consent Calendar item should do so under Public Comments. (ROLL CALL VOTE REQUIRED)

**5a Approval of Minutes
Motion**

The Board will consider approving the Minutes from the December 19, 2019 Regular Mound Basin GSA Board of Directors meeting.

5b Approval of Warrants

Motion

The Board will consider approving payment of outstanding vendor invoices.

5c Monthly Financial Reports

Information Item

The Board will receive monthly profit and loss statements and balance sheets for the month of January 2020.

6. BOARD MEMBER ANNOUNCEMENTS

6a Directors will provide updates on matters not on the agenda.

6b Directors will provide oral reports of time spent on grant eligible activities since the previous regular Board meeting.

7. EXECUTIVE DIRECTOR UPDATE

Executive Director will provide an informational update on Agency activities since the previous Board meeting, including a recurring GSP Development update.

8. MOTION ITEMS

8a Groundwater Extraction Fee Payment Status

Motion

The Board will receive an update on the status of outreach concerning late groundwater extraction fees and consider providing direction to staff.

8b Fiscal Year 2019/2020 2nd Quarter Budget Report and Mid-Year Budget Modifications

Motion

The Board will consider receiving and filing the 2nd quarter budget report and approving mid-year budget modifications.

8c GSP Monthly Update (Grant Category (d), Task 4)

The Board will receive an update from the Executive Director concerning development of the Agency's Groundwater Sustainability Plan and may provide feedback or direction to staff.

8d Data Management System Update (Grant Category (d), Task 4)

Motion

The Board will receive an update from the Executive Director concerning development of the Agency's data management system and may provide feedback or direction to staff.

8e Isotope Study Report (Grant Category (b))

The Board will consider receiving and filing the Isotope study report.

9. INFORMATION ITEMS

None

10. FUTURE AGENDA ITEMS

ADJOURNMENT

The Board will adjourn to the next **Regular Board Meeting** on Thursday, **March 19, 2020**, or call of the Chair.

Materials, which are non-exempt public records and are provided to the Board of Directors to be used in consideration of the above agenda items, including any documents provided subsequent to the publishing of this agenda, are available for inspection at UWCD's offices at 106 North 8th Street in Santa Paula during normal business hours.

The Americans with Disabilities Act provides that no qualified individual with a disability shall be excluded from participation in, or denied the benefits of, the District's services, programs or activities because of any disability. If you need special assistance to

participate in this meeting, or if you require agenda materials in an alternative format, please contact the Mound Basin Clerk of the Board at (805) 525-4431 or the City of Ventura at (805) 654-7800. Notification of at least 48 hours prior to the meeting will enable the Agency to make appropriate arrangements.

Approved: _____


Executive Director Bryan Bondy

Posted: (date) February 14, 2020

(time) 2:15pm

(attest) *Kris Sofley*

At: <https://moundbasingsa.org>

Posted: (date) February 14, 2020

(time) 2:20pm

(attest) *Kris Sofley*

At: <https://www.facebook.com/moundbasingsa/>

Posted: (date) February 14, 2020

(time) 2:25pm

(attest) *Kris Sofley*

At: United Water Conservation District, 106 N 8th Street, Santa Paula CA 93060

Posted: (date) February 14, 2020

(time) 2:30pm

(attest) *Debra Gallegos*

At: Ventura City Hall, 501 Poli Street, Ventura, California 93001



MOUND BASIN GROUNDWATER SUSTAINABILITY AGENCY
REGULAR BOARD OF DIRECTORS MEETING

Thursday, December 19, 2019, at 1p.m.
Ventura City Hall, Santa Cruz Conference Room (Room No. 223)
501 Poli Street, Ventura, California 93001

MINUTES

DIRECTORS IN ATTENDANCE:

Conner Everts
Mike Mobley, Chair
Susan Rungren, Secretary
Glenn Shephard, Treasurer

DIRECTORS ABSENT:

Jim Chambers

STAFF IN ATTENDANCE:

Bryan Bondy, Executive Director
Kris Sofley, Clerk of the Board

PUBLIC IN ATTENDANCE:

John Lindquist, UWCD

CALL TO ORDER 1:02 p.m.

Chair Mobley called the meeting to order at 1:02p.m. and asked everyone to join him in reciting the Pledge of Allegiance

1. PLEDGE OF ALLEGIANCE

2. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA

Chair Mobley asked if there were any public comments, none were offered.

3. ROLL CALL

All of the Directors, with the exception of Director Chambers, were present.

4. APPROVAL OF AGENDA

Motion

Motion to approve the agenda, Director Everts; Second, Director Rungren. Voice vote: four ayes (Everts, Mobley, Rungren, Shephard); none opposed; one absent (Chambers). Agenda is approved unanimously by a vote of 4/0/1.

5. CONSENT CALENDAR

All matters listed under the Consent Calendar are considered routine by the Board and will be enacted by one motion. There will be no separate discussion of these items unless a Board member pulls an item from the Calendar. Pulled items will be discussed and acted on

separately by the Board. Members of the public who want to comment on a Consent Calendar item should do so under Public Comments. (ROLL CALL VOTE REQUIRED)

Director Shephard asked to abstain from voting on Consent Calendar item 5a as he was not in attendance at the previous Board meeting.

Motion to approve Consent Calendar item 5a with correction to item 6a requested by Director Rungren, Director Everts; Second, Director Rungren. Roll call vote: three ayes (Everts, Mobley, Rungren); none opposed; one abstained (Shepherd); one absent (Chambers). Consent Calendar item 5a approved by a vote of 3/0/1/1.

Motion to approve Consent Calendar items 5b-5d, Director Everts; Second, Director Rungren. Roll call vote: four ayes (Everts, Mobley, Rungren, Shephard); none opposed; one absent (Chambers). Consent Calendar items 5b through 5d approved by a vote of 4/0/1/1.

5a Approval of Minutes

Motion

The Board will consider approving the Minutes from the October 17, 2019 Regular Mound Basin GSA Board of Directors meeting.

5b Approval of Warrants

Motion

The Board will consider approving payment of outstanding vendor invoices.

5c Monthly Financial Reports

Information Item

The Board will receive monthly profit and loss statements and balance sheets for the months of July through November 2019.

5d Board Meeting Schedule for Calendar Year 2020

Information Item

The Board will consider approving the 2020 Regular Board Meeting Schedule as submitted or as modified by the Board.

6. BOARD MEMBER ANNOUNCEMENTS

6a Director Shephard reported that the Cuyama Basin Groundwater Sustainability Agency and Fox Canyon Groundwater Management Agency have both adopted their Groundwater Sustainability Plans.

6b None of the Directors reported time spent on grant eligible activities since the previous regular Board meeting.

7. EXECUTIVE DIRECTOR UPDATE

Executive Director Bryan Bondy wished everyone happy holidays and confirmed that the Department of Water Resources (DWR) had finalized the basin reprioritizations; the priority for Mound Basin did not change. The Executive Director and UWCD staff are reviewing the draft isotope study report and will present the findings to the Board after the New Year. Intera is doing background research on data management systems, as required by DWR's SGMA.

Director Shephard asked Executive Director Bondy if there were any basin priority changes in Ventura County. Executive Director Bondy said that Carpentaria Basin went from a low to high priority basin and that a GSA is being developed for that basin. Director Shephard added that the County is working with Carpentaria because seven wells are located in the Ventura County side of the basin.

8. MOTION ITEMS

8a Groundwater Extraction Fee Payment Status

Motion

Executive Director Bondy reported that he had received an email from Director Chambers stating that the Director had reached out to the two entities with past due extraction fees, and neither had responded to Director Chambers. Chair Mobley said that of the \$20,000 outstanding, about \$2,270 was penalties.

Chair Mobley suggested waiting until the next meeting to get a report from Director Chambers. The item was continued to the next Board meeting.

8b Request to Refund Groundwater Extraction Fees for CW Produce

Motion

Executive Director Bondy reviewed the staff report and recommendation with the Board.

No public comments.

Motion to approve refunding the groundwater extraction fees in the amount of \$5,918 to CW Produce, Director Everts; Second, Director Shephard. Roll call vote: four ayes (Everts, Mobley, Rungren, Shephard); none opposed; one absent (Chambers). Motion carries unanimously by a vote of 4/0/1.

8c Loan from the County of Ventura

Motion

Executive Director Bondy reviewed the staff report and recommendation with the Board and added that he and Ms. Gorospe have concluded that the County loan for \$50,000 is no longer needed. Staff now recommends the Board consider canceling the \$50,000 loan request from the County of Ventura.

Director Shephard asked if that was taking into account the non-payment accounts of the two entities discussed earlier. Executive Director Bondy said that staff did not assume there would be continued non-payment, but with the amount of revenue to date, he was confident that the GSA didn't need the loan. Director

Shephard added that if things change, the GSA can always go back to the County with the loan request.

No public comments.

Motion to cancel the GSA's \$50,000 loan request from the County of Ventura, Director Everts; Second, Director Rungren. Roll call vote: four ayes (Everts, Mobley, Rungren, Shephard); none opposed; one absent (Chambers). Motion carries unanimously by a vote of 4/0/1.

8d Approval of Intera, Inc. Work Order No. 4

Motion

Executive Director Bondy reviewed the staff report and recommendation with the Board concerning contractor for development of a data management system (DMS). Executive Director Bondy provided additional description the database, explaining that the tables will be designed to capture and include data for the GSP and to streamline the process for GSPs submittal. The database will also support the annual reporting process. Staff has concluded that web-based access to the data is not needed now but could be added later if it is in demand.

Executive Director Bondy surveyed some of the GSPs for critical overdraft basins and found that some have DMS with varying complexity and some GSAs don't even mention the DMW. He added that DWR will not tell you how to do it, providing zero guidance, so he's looking for a program that fits the needs of the GSA for now.

The proposed Work Order will carry the concept forward through design, construction, and data loading into the DMS for an estimated fee of \$15,640. \$5,000 contingency was recommended because software development typically has unexpected issues in the Executive Director's experience. Chair Mobley requested a Gantt chart or schedule at the January meeting that provides a monthly timeline. The Board and Executive Director discussed the request and it was decided that a monthly GSP update will be provided at each Board meeting together with a graphical schedule.

No public comments.

Motion to approve Intera Work Order No. 4 for an amount not-to-exceed \$15,640 to develop the MBGSA Data Management System and populate it with data for GSP development and up to \$5,000 in contingency, to be authorized at the discretion of the Executive Director, Director Rungren; Second, Director Everts. Roll call vote: four ayes (Everts, Mobley, Rungren, Shephard); none opposed; one absent (Chambers). Motion carries by a vote of 4/0/1.

9. INFORMATION ITEMS

None.

10. FUTURE AGENDA ITEMS

None were offered in addition to the recurring GSP Development Update.

ADJOURNMENT 1:28 p.m.

Chair Mobley adjourned the meeting at 1:28p.m. to the next **Regular Board Meeting** on Thursday, **January 16, 2020**, or call of the Chair.

I certify that the above is a true and correct copy of the minutes of the Mound Basin Groundwater Sustainability Agency's Board of Directors meeting of December 19, 2019.

ATTEST: _____
Susan Rungren, Board Secretary

ATTEST: _____
Kris Sofley, Clerk of the Board



MOUND BASIN GSA BOARD OF DIRECTORS MEETING
December 19, 2019

Name: John Lindquist

Organization: UWCD

Phone: _____

E-mail: _____

Name: _____

Organization: _____

Phone: _____

E-mail: _____

Name: _____

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Phone: _____

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Mound Basin Groundwater Sustainability Agency
Check Detail
February 1 - 13, 2020

<u>Type</u>	<u>Num</u>	<u>Date</u>	<u>Name</u>	<u>Account</u>	<u>Original Amount</u>
Bill Pmt -Check	11319	02/13/2020	Bondy Groundwater Consulting, Inc	10000 · Bank of the Sierra	(4,436.25)
Bill Pmt -Check	11320	02/13/2020	INTERA Incorporated	10000 · Bank of the Sierra	(4,677.17)
Bill Pmt -Check	11321	02/13/2020	S.S. Papadopulos & Associates, Inc.	10000 · Bank of the Sierra	(7,837.50)
Bill Pmt -Check	11322	02/13/2020	United Water Conservation District	10000 · Bank of the Sierra	(582.27)
				TOTAL	<u><u>(17,533.19)</u></u>



MoundBasin
GROUNDWATER SUSTAINABILITY AGENCY

MOUND BASIN GROUNDWATER SUSTAINABILITY AGENCY

Item No. 5(c)

DATE: February 20, 2020
TO: Board of Directors and Executive Director
FROM: Erin Gorospe, UWCD
SUBJECT: Monthly Financial Reports

SUMMARY

The Board will receive the monthly financial reports for the Mound Basin GSA.

INFORMATIONAL ITEM

UWCD accounting staff has prepared financial reports based on the Mound Basin GSA revenue and expenses for the month of January 2020.

BACKGROUND

FISCAL SUMMARY

Not applicable.

ATTACHMENTS

- A. January 2020 Profit/Loss Statement
- B. January 2020 Profit/Loss by Class
- C. January 2020 Balance Sheet

Mound Basin Groundwater Sustainability Agency
Profit & Loss Budget Performance
July 2019 through January 2020

	<u>Jul '19 - Jan 20</u>	<u>Annual Budget</u>	<u>Budget</u>
Income			
40001 · Groundwater Extraction Fees	-5,918.00	187,500.00	-3.16%
41000 · Grant revenue			
41001 · State Grants	0.00	153,778.00	0.00%
Total 41000 · Grant revenue	0.00	153,778.00	0.00%
47000 · Other Revenue			
47001 · Late Fees	3,084.19		
Total 47000 · Other Revenue	3,084.19		
Total Income	-2,833.81	341,278.00	-0.83%
Gross Profit	-2,833.81	341,278.00	-0.83%
Expense			
52200 · Professional Services			
52240 · Prof Svcs - IT Consulting	200.00	893.00	22.40%
52250 · Prof Svcs - Groundwater/GSP Pre			
52252 · Prof Svcs - GSP Consultant	43,289.75	269,830.00	16.04%
52250 · Prof Svcs - Groundwater/GSP Pre - Other	10,495.00	0.00	0.00%
Total 52250 · Prof Svcs - Groundwater/GSP Pre	53,784.75	269,830.00	19.93%
52270 · Prof Svcs - Accounting	3,678.39	18,560.00	19.82%
52275 · Prof Svcs - Admin/Clerk of Bd	1,273.88	20,000.00	6.37%
52280 · Prof Svcs - Executive Director	5,655.00	50,000.00	11.31%
Total 52200 · Professional Services	64,592.02	359,283.00	17.98%
52500 · Legal Fees			
52501 · Legal Counsel	972.00	21,600.00	4.50%
Total 52500 · Legal Fees	972.00	21,600.00	4.50%
53000 · Office Expenses			
53010 · Public Information	588.08	0.00	0.00%
53020 · Office Supplies	18.36	1,015.00	1.81%
53026 · Postage & Mailing	3,313.79	102.00	3248.81%
53110 · Travel & Training	217.56		0.00%
Total 53000 · Office Expenses	4,137.79	1,117.00	370.44%
53500 · Insurance			
53510 · Liability Insurance	2,099.24	2,126.00	98.74%
Total 53500 · Insurance	2,099.24	2,126.00	98.74%
70000 · Interest & Debt Service			
70120 · Interest Expense	0.00	2,363.00	0.00%
Total 70000 · Interest & Debt Service	0.00	2,363.00	0.00%
Total Expense	71,801.05	386,489.00	18.58%
Net Income	-74,634.86	-45,211.00	165.08%

Mound Basin Groundwater Sustainability Agency
Profit & Loss by Class
July 2019 through January 2020

	<u>A - Grant Administration</u>	<u>B - Model and Studies</u>	<u>Total C - Planning Activities</u>	<u>Total D - GSP Development</u>	<u>Unclassified</u>	<u>TOTAL</u>
Income						
40001 · Groundwater Extraction Fees	0.00	0.00	0.00	0.00	-5,918.00	-5,918.00
47000 · Other Revenue						
47001 · Late Fees	0.00	0.00	0.00	0.00	3,084.19	3,084.19
Total 47000 · Other Revenue	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>3,084.19</u>	<u>3,084.19</u>
Total Income	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>-2,833.81</u>	<u>-2,833.81</u>
Gross Profit	0.00	0.00	0.00	0.00	-2,833.81	-2,833.81
Expense						
52200 · Professional Services						
52240 · Prof Svcs - IT Consulting	0.00	0.00	0.00	0.00	200.00	200.00
52250 · Prof Svcs - Groundwater/GSP Pre						
52252 · Prof Svcs - GSP Consultant	11,505.00	16,293.50	146.25	13,833.75	1,511.25	43,289.75
52250 · Prof Svcs - Groundwater/GSP Pre - Other	0.00	10,495.00	0.00	0.00	0.00	10,495.00
Total 52250 · Prof Svcs - Groundwater/GSP Pre	<u>11,505.00</u>	<u>26,788.50</u>	<u>146.25</u>	<u>13,833.75</u>	<u>1,511.25</u>	<u>53,784.75</u>
52270 · Prof Svcs - Accounting	1,253.91	0.00	0.00	0.00	2,424.48	3,678.39
52275 · Prof Svcs - Admin/Clerk of Bd	0.00	0.00	0.00	0.00	1,273.88	1,273.88
52280 · Prof Svcs - Executive Director	0.00	0.00	0.00	0.00	5,655.00	5,655.00
Total 52200 · Professional Services	<u>12,758.91</u>	<u>26,788.50</u>	<u>146.25</u>	<u>13,833.75</u>	<u>11,064.61</u>	<u>64,592.02</u>
52500 · Legal Fees						
52501 · Legal Counsel	0.00	0.00	0.00	0.00	972.00	972.00
Total 52500 · Legal Fees	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>972.00</u>	<u>972.00</u>
53000 · Office Expenses						
53010 · Public Information	0.00	0.00	0.00	0.00	588.08	588.08
53020 · Office Supplies	0.00	0.00	0.00	0.00	18.36	18.36
53026 · Postage & Mailing	0.00	3,147.29	0.00	0.00	166.50	3,313.79
53110 · Travel & Training	0.00	0.00	0.00	50.28	167.28	217.56
Total 53000 · Office Expenses	<u>0.00</u>	<u>3,147.29</u>	<u>0.00</u>	<u>50.28</u>	<u>940.22</u>	<u>4,137.79</u>
53500 · Insurance						
53510 · Liability Insurance	0.00	0.00	0.00	0.00	2,099.24	2,099.24
Total 53500 · Insurance	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>2,099.24</u>	<u>2,099.24</u>
Total Expense	<u>12,758.91</u>	<u>29,935.79</u>	<u>146.25</u>	<u>13,884.03</u>	<u>15,076.07</u>	<u>71,801.05</u>
Net Income	<u>-12,758.91</u>	<u>-29,935.79</u>	<u>-146.25</u>	<u>-13,884.03</u>	<u>-17,909.88</u>	<u>-74,634.86</u>

Mound Basin Groundwater Sustainability Agency
Balance Sheet
As of January 31, 2020

	<u>Jan 31, 20</u>
ASSETS	
Current Assets	
Checking/Savings	
10000 · Bank of the Sierra	218,950.08
Total Checking/Savings	<u>218,950.08</u>
Accounts Receivable	
11000 · Accounts Receivable	36,988.68
Total Accounts Receivable	<u>36,988.68</u>
Total Current Assets	<u>255,938.76</u>
TOTAL ASSETS	<u><u>255,938.76</u></u>
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	
20000 · Accounts Payable	17,533.19
Total Accounts Payable	<u>17,533.19</u>
Other Current Liabilities	
20001 · Advance from City of Ventura	55,000.00
20510 · Interest Payable	894.60
Total Other Current Liabilities	<u>55,894.60</u>
Total Current Liabilities	<u>73,427.79</u>
Total Liabilities	73,427.79
Equity	
32000 · Retained Earnings	257,145.83
Net Income	<u>-74,634.86</u>
Total Equity	<u>182,510.97</u>
TOTAL LIABILITIES & EQUITY	<u><u>255,938.76</u></u>



Motion Item No. 8a

DATE: February 20, 2020
TO: Board of Directors
FROM: Staff
SUBJECT: Groundwater Extraction Fee Payment Status

SUMMARY

There are three well operators who have unpaid groundwater extraction fees, penalties, and interest totaling \$36,717.29¹. A detailed breakdown of the unpaid amounts is included in Table 1 on the second page of this staff report.

Staff has sent multiple statements to each well operator and has verified that the mailing addresses are the same as those used by United Water Conservation District (UWCD) for its semi-annual billing. Well Operator Nos. 1 – 3 have been paying their UWCD fees when invoiced at those addresses. Therefore, staff is fairly certain the MBGSA invoices and statements are being received.

The following outreach has also been performed:

- Pursuant to discussion at the October 17, 2019 Board meeting, Director Chambers reached out to Well Operator Nos 1 and 2, but did not receive a reply.
- Director Mobley spoke with Well Operator No. 1 in late December and reported that payment will be made.
- Executive Director Bondy left a voicemail with the owner of the company that is Well Operator No. 2, but did not receive a reply.
- Well Operator No. 3 contacted Executive Director Bondy in mid-January concerning their unpaid 2019-1 fees. The operator explained that the invoice was received but did not get routed to him from the corporate office until recently. He called immediately to let us know the status once he received the invoice. Well Operator No. 3 requests a waiver of the penalties and interest for the late 2019-1 fees. This request will be brought to the Board once payment is received.

RECOMMENDED ACTION

Receive an update on the status of outreach concerning late groundwater extraction fee payments and consider providing direction to staff.

¹ Interest amounts are through December 31, 2019.

BACKGROUND

Table 1. Summary of Past Due Accounts

Category	Well Operator #1	Well Operator #2 ⁽²⁾	Well Operator #3 ⁽³⁾	Totals
2018 – 1 Fee (Issued 9/1/18)	\$2,530.00	\$0.00	\$0.00	\$2,530.00
2018 – 2 Fee (Issued 4/30/19)	\$2,968.40	\$12,347.20	\$0.00	\$15,315.60
2019 – 1 Fee (Issued 10/31/19)	\$857.85	\$3,680.95	\$9,369.15	\$13,907.95
Subtotal Unpaid Fees	\$6,356.25	\$16,028.15	\$9,369.15	\$31,753.55
Penalties and Interest ⁽¹⁾	\$1,164.17	\$2,675.28	\$1,124.30	\$4,963.74
Totals	\$7,520.42	\$18,703.43	\$10,493.45	\$36,717.29

Notes:
(1)As of December 31, 2019
(2) Well Operator #2 has two wells (accounts); values are combined totals for all accounts.
(3) Well Operator #2 has two wells (accounts); values are combined totals for all accounts.

FISCAL SUMMARY

The Agency has collected \$36,717.29 less in cash than it is owed. Any collection efforts that the Agency decides to pursue may have a cost associated with them, which is unknown at this time. Penalties and interest are not included in the current fiscal year budget.

ATTACHMENTS

None.

Action: _____
Motion: _____ 2 nd : _____
J.Chambers: _____ C.Everts: _____ M.Mobley: _____ S.Rungren: _____ G.Shephard: _____



Motion Item No. 8b

DATE: February 20, 2020
TO: Board of Directors
FROM: Staff
SUBJECT: Fiscal Year 2019/2020 2nd Quarter Budget Report and Mid-Year Budget Modifications

SUMMARY

The 2nd quarter budget report and proposed mid-year budget modifications are enclosed (Attachment A). Highlights of the report are as follows:

- Expenses are under budget primarily because Executive Director, other professional services, and legal services expenses are lower than anticipated because GSP development activities were limited during first and second quarters.
- Income is under budget because: (1) it was previously assumed that four grant invoices would be booked in FY 19/20, only three will be booked and (2) expenses have been lower than anticipated, resulting in smaller grant invoices.

Additional information concerning budget deviations is noted in the “comments” column of the report (Attachment A).

Proposed budget modifications are presented in Attachment A. The dollar amount, percentage change, and justification for each proposed modification are documented in the rightmost three columns of the table. Further explanation can be provided by the Executive Director and UWCD Controller during the Board meeting, if desired.

RECOMMENDED ACTION

Receive and file the 2nd quarter budget report and approve mid-year budget modifications.

BACKGROUND

The Fiscal Year 2019/2020 budget was adopted on June 20, 2019.

FISCAL SUMMARY

Please see summary and Attachment A.

ATTACHMENTS

A. 2nd Quarter Profit & Loss Budget Performance with Proposed Mid-Year Budget Modifications

Action: _____
Motion: _____ 2 nd : _____
J.Chambers: _____ C.Everts: _____ M.Mobley: _____ S.Rungren: _____ G.Shephard: _____

8B Attachment A

- A. The attachment, “2nd Quarter Profit & Loss Budget Performance with Proposed Mid-Year Budget Modifications” was not available at the time this packet was published. Copies of the attachment will be distributed at the Board Meeting on the 20th of February at 1p.m.



Motion Item No. 8c

DATE: February 20, 2020
TO: Board of Directors
FROM: Staff
SUBJECT: GSP Monthly Update (Grant Category (d), Task 4)

SUMMARY

The Executive Director will provide a monthly status update on the Groundwater Sustainability Plan. An updated GSP schedule and a draft outreach newsletter are attached for discussion.

RECOMMENDED ACTION

Receive an update from the Executive Director concerning development of the Agency’s Groundwater Sustainability Plan and consider providing feedback or direction to staff.

BACKGROUND

None.

FISCAL SUMMARY

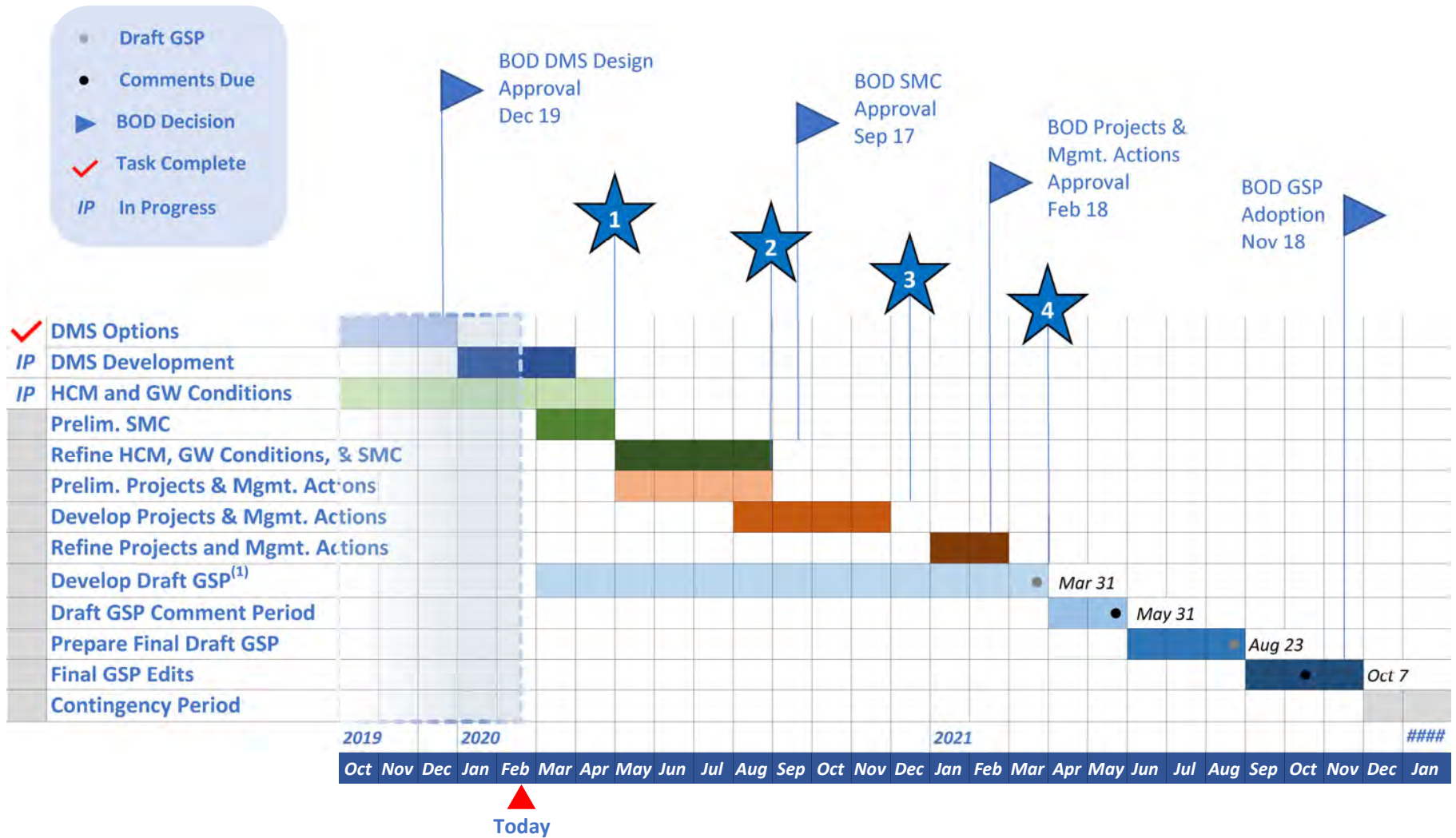
None.

ATTACHMENTS

- A. GSP Schedule
- B. Draft Outreach Newsletter

Action: _____
Motion: _____ 2 nd : _____
J.Chambers: _____ C.Everts: _____ M.Mobley: _____ S.Rungren: _____ G.Shephard: _____

Mound Basin GSA GSP Development Schedule



Notes:

(1) GSP topics not listed above generally consist of background or supporting information and will be prepared concurrently with the above-listed tasks.



Groundwater Sustainability Plan Development

The California Sustainable Groundwater Management Act of 2014 (SGMA) requires local agencies to form groundwater sustainability agencies (GSAs) in numerous groundwater basins across the state of California, including the Mound Basin, which spans from downtown Ventura to approximately Kimball Road between the foothills on the north and the Oxnard Basin on the south. In June of 2017, the Mound Basin Groundwater Sustainability Agency (MBGSA) was formed and began working on staffing the agency and studies, which will help inform development of a Groundwater Sustainability Plan (GSP). The GSP, which is required under SGMA, will be designed to maintain or achieve sustainable groundwater conditions within 20 years. Following adoption, the GSP will be submitted to the California Department of Water Resources on or before January of 2022 for review.

GSP Public Workshop

MBGSA plans to schedule its first public workshop this Spring. The workshop will focus on the basin setting and a preliminary discussion of sustainable basin management considerations.

Please stay tuned for the workshop details!

The agency has five board members: one elected Director from United Water Conservation District (UWCD); two appointed managers from City of Ventura Water and County of Ventura; and two public members representing agricultural and environmental interests. The agency secured a \$758,000 grant from the Department of Water Resources. The grant will pay for a considerable portion of the GSP costs, the remainder coming from a pumping fee.

Development of the GSP began in late 2019. The MBGSA Board of Directors has approved contracts with three entities who will team to prepare the GSP. The GSP development team is led by Bryan Bondy, Bondy Groundwater Consulting, Inc. who also serves as the Agency’s Executive Director. UWCD’s technical staff will prepare the primary technical components of the GSP, leveraging UWCD’s prior studies, groundwater modeling, and groundwater monitoring program. Mr. Bondy and UWCD are assisted by Intera, Inc. Mr. Bondy and Intera will focus on developing the sustainable management criteria and projects and management actions.



MBGSA encourages your participation in the GSP development process and welcomes your comments. The MBGSA Board of Directors typically meets every 3rd Thursday at 1 pm, typically at the Ventura City Hall. Past meeting agendas can be found on the agency website <https://www.moundbasingsa.org/>, which also contains a schedule for preparing the GSP, and contact information. Future meeting agendas will be posted prior to each meeting.

MBGSA Member Agencies

MBGSA was formed under a Joint Powers Authority agreement between:



MBGSA Needs Your Data!

The Sustainable Groundwater Management Act requires GSAs use the “best available data and information” when developing GSPs. MBGSA is going to great lengths to ensure it meets or exceeds this standard. The Agency is compiling data from numerous sources, including the Ventura County Watershed Protection District, California Department of Water Resources, California Division of Drinking Water, California State Water Resources Control Board, United States Geological Survey, and the MBGSA Member Agencies. However, we realize that you may have data not available from these sources. Of interest are data regarding groundwater levels, groundwater quality, surface water flow, and surface water quality. MBGSA Board members urge you to share any data as soon as possible. Substantial data are already being studied to prepare the hydrogeologic conceptual model and groundwater conditions sections of the GSP that will be presented at a workshop this coming spring, but your data may make the GSP better! Please contact Executive Director Bryan Bondy with any data at **EMAIL NEW MBGSA EMAIL ADDRESS**.

Meet the MBGSA

Board of Directors:

(from left to right in photo below)

Mike Mobley, Chair
United Water Conservation
District
EMAIL ADDRESS

Jim Chambers
Agricultural Stakeholder
EMAIL ADDRESS

Conner Everts
Environmental Stakeholder
EMAIL ADDRESS

Susan Rungren, Vice Chair / Sec.
Ventura Water
srungren@cityofventura.ca.gov

Glenn Shephard, Treasurer
Ventura County
Glenn.Shephard@ventura.org

Board Meetings

Regular Board Meetings are scheduled monthly on the third Thursday. Please visit our website for more information.

To receive Board meeting agendas via e-mail, please contact the Clerk of the Board
Kris Sofley at
kriss@unitedwater.org

Get Involved!

At the core of SGMA is the idea that locals should make groundwater management decisions, not the State. Your input is critical for ensuring the Mound Basin GSP reflects local values. Get added to our interested parties list by contacting the Clerk of the Board **Kris Sofley** at
kriss@unitedwater.org

PLACE HOLDER FOR BOARD OF DIRECTORS PICTURE



Motion Item No. 8d

DATE: February 20, 2020
TO: Board of Directors
FROM: Staff
SUBJECT: Data Management System Update (Grant Category (d), Task 4)

SUMMARY

The Agency's GSP team is nearing completion of the data management system (DMS) development. The Executive Director can provide an optional demonstration at the Board meeting and is interested in obtaining feedback before finalizing the project.

The DMS is a required element of the Groundwater Sustainability Plan (GSP) and its purpose is to serve as the data repository and provide data output for reporting. Regulations pertaining to the DMS are very broad (see background section below). DWR has not published any guidance documents pertaining to the DMS. It is clear that the DMS must be capable of storing and outputting data that is required to be reported to DWR upon GSP adoption and for annual reporting; however, there is no guidance concerning the platform or whether other functionality should be included. Other functionality could include, for example, data visualization tools or web-integration. The Executive Director reached out to DWR for more specific DMS design guidance. DWR did not provide specific guidance and simply stated that design decisions, including what DMS features to include are up to the Groundwater Sustainability Agencies (GSAs) and should be based on an assessment of the GSA's needs.

As discussed during the December 19, 2019, the GSP team decided to take a "start-simple-first" approach. We have developed the DMS using the Microsoft Access database software, a commonly used program that is part of the Microsoft Office suite of programs. Microsoft Access is ideal for UVRGA because it includes the necessary relational database features, but does not have the overhead of an enterprise database system such as SQL Server or Oracle. The data volume and security needs of the Agency do not justify the use of a more advanced database system. The tables included in the DMS are designed after the templates provided by DWR that must be used for GSP and annual report submittals. This ensures we are capturing the required data and metadata that will need to be uploaded to DWR. The tables are also designed to store information generated during data review pursuant to the Agency's Data Quality Control Review Procedures. The DMS includes a charting window that can be used to simplify data review. The DMS does not include data visualization features or web-integration. These features can be added at a later date if there is sufficient demand for them and budget permitting. In short, the DMS addresses both the SMGA requirements and facilitates implementation of the Agency's Data Quality Control Review Procedures. The DMS is fit-for-purpose given the Agency's current needs and resources.

RECOMMENDED ACTION

Receive an update from the Executive Director concerning development of the Agency's data management system and consider providing feedback or direction to staff.

BACKGROUND

The Board of Directors approved the DMS development approach (Intra Work Order No. 4) on December 19, 2019.

FISCAL SUMMARY

None.

ATTACHMENTS

None.

Action: _____
Motion: _____ 2 nd : _____
J.Chambers: _____ C.Everts: _____ M.Mobley: _____ S.Rungren: _____ G.Shephard: _____

Motion Item No. 8e

DATE: February 20, 2020
TO: Board of Directors
FROM: Staff
SUBJECT: Isotope Study Report (Grant Category (b))

SUMMARY

The isotope study was included in the Prop 1 Sustainable Groundwater Planning Grant to help improve the Agency’s understanding of the basin groundwater flow system, which consists of multiple aquifers. Specifically, the Agency was interested in improving its understanding of (1) the sources and mechanisms of groundwater recharge, (2) groundwater age and dynamics, (3) interconnections between aquifers, and (4) interaction between surface water and groundwater.

Groundwater samples were collected in July-August 2019 from the three multi-depth monitoring wells located in the basin:

- Well cluster 02N23W15J01S-03S (Marina Park);
- Well cluster 02N22W07M01S-03S (Camino Real Park); and
- Nested wells 02N22W09L03S-04S (Kimball Park).

The groundwater samples were analyzed for the parameters shown in Table 1 below.

Table 1. Groundwater Sample Analysis Parameters

Parameter Type	Parameter Data Objective	Parameter
General Geochemical Parameter	Characterize Groundwater Geochemistry	Conductivity
		Dissolved Oxygen
		ORP
		pH
		Temperature
	Characterize Groundwater Redox	Dissolved Organic Carbon
		Iron
		Manganese
Major Ion Tracer	Evaluate Sources of TDS	Sulfide
		Total Dissolved Solids
		Calcium
		Magnesium
		Potassium
		Sodium
		Alkalinity (TIC) - Total, Bicarbonate, Carbonate
		Sulfate
	Chloride	
	Evaluate Sources of Carbonate	Isotopes of Dissolved Inorganic Carbon (DIC) ($\delta^{13}C$)
	Evaluate Sources of Chloride	Barium
		Boron
		Bromide
Iodide		
Evaluate Sources of Sulfate	Isotopes of Sulfate ($\delta^{34}S-SO_4$ and $\delta^{18}O-SO_4$)	
Evaluate Agricultural Sources	Nitrate-N	
	Nitrite-N	
Groundwater Tracer	Evaluate Recharge Sources	Isotopes of Water ($\delta^{18}O$ and δD)
	Estimate Groundwater/ Recharge Age	Carbon-14
		Tritium

Results

1. Sources and mechanisms of groundwater recharge: Groundwater is meteoric (derived from rainfall). The relatively depleted isotopic signatures of deeper groundwater (generally >500 feet below ground surface [ft.-bgs]) indicates recharge from water derived from higher elevation and/or cooler temperatures than shallower groundwater (≤ 500 ft.-bgs).
2. Groundwater age: Groundwater at the sampled wells is more than 1,000 years old.
3. Interconnections between aquifers: There appear to be limited interactions vertically between aquifers, regardless of formation. Shallower groundwater (≤ 500 ft.-bgs) is geochemically- and isotopically distinct. There is also no evidence for interactions between Mound Basin groundwater and deeper, mineralized water.
4. Interaction between surface water and groundwater: There is no evidence for significant interactions between shallower groundwater (≤ 500 ft.-bgs) and the Santa Clara River. There is also no significant evidence for interactions between shallower groundwater and seawater, as the ionic composition of groundwater is inconsistent with a seawater source.

The results of this study will be used to provide an improved hydrogeologic conceptual model in the GSP. UWCD may also consider this new information in future groundwater model updates.

RECOMMENDED ACTION

Consider receiving and filing the Isotope study report.

BACKGROUND

None.

FISCAL SUMMARY

None.

ATTACHMENTS

A. Mound Basin Water Quality and Isotope Study, Ventura County, California

Action: _____

Motion: _____^{2nd}: _____

J.Chambers: _____ C.Everts: _____ M.Mobley: _____ S.Rungren: _____ G.Shephard: _____

Mound Basin Water Quality and Isotope Study, Ventura County, California



Charles B. Andrews
2-10-2020

Prepared for:

Mound Basin Groundwater Sustainability Agency (MBGSA)

Prepared by:



S.S. PAPANOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

February 10, 2020

416 NE Dallas Street, Camas, Washington 98607 • (360) 566-7119

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Appendix B	ALS Environmental Laboratory Analytical Reports
Appendix C	TestAmerica (Eurofins) Laboratory Analytical Reports
Appendix D	Isotech Laboratory Analytical Reports
Appendix E	Tritium Laboratory Analytical Report

Acronyms and Abbreviations

$\delta^{13}\text{C}$	Carbon-13
^{14}C	Carbon-14
$\delta^{18}\text{O-SO}_4$	Oxygen-18 in sulfate
^3H	Tritium
$\delta^{17}\text{O}$	Oxygen-17
$\delta^{18}\text{O}$	Oxygen-18

$\delta^{34}\text{S-SO}_4$	Sulfur-34 in sulfate
δD	Deuterium
‰	part-per-thousand or per mil
B	Boron
Ba	Barium
BaSO_4	Barite
Br	Bromide
CaCO_3	Calcite
CaSO_4	Gypsum
CFCs	Chlorofluorocarbons
Cl	Chloride
CSIA	Compound-specific isotope analysis
DIC	Dissolved inorganic carbon
DO	Dissolved oxygen
DOC	Dissolved organic carbon
ft.-bgs	feet-below-ground-surface
GMWL	Global Meteoric Water Line
I	Iodide
meq/L	milliequivalents per liter
mg/L	milligrams-per-liter
MBGSA	Mound Basin Groundwater Sustainability Agency
LMWL	Local Meteoric Water Line
ORP	Oxidation-reduction potential
PHREEQC	pH-REdox-EQuilibrium C-programming language model
pMC	Percent modern carbon
SF_6	Sulfur hexafluoride
SI	Saturation index
SO_4^{-2}	Sulfate
SSP&A	S.S. Papadopoulos & Associates, Inc.
TEAP	Terminal electron accepting process
TU	Tritium unit

UWCD United Water Conservation District

Section 1

Introduction

This report presents results of a groundwater sampling event that occurred in July and August 2019, from three nested/clustered monitoring well sites located in the Mound Basin in Ventura County, California (Figure 1). This work was performed as part of the Mound Basin Groundwater Sustainability Agency (MBGSA) water quality and isotope study. The primary objective was to better understand the groundwater flow system of the basin, which has multiple aquifers. Specific issues addressed in this report include (1) the sources and mechanisms of groundwater recharge, (2) groundwater age and dynamics, (3) interconnections between aquifers, and (4) interaction between surface water and groundwater, all of which the MBGSA desires to better understand.

The Mound Basin has a series of aquifers with varying water quality characteristics, including poorer-quality groundwater in the semi-perched (shallow) alluvial aquifer and at least one area of highly mineralized “warm” water reportedly at depth. The mineralized water could be sourced from older formations underlying the basin and directed upward along an unmapped fault zone. Additionally, groundwater levels in some areas such as near Kimball Road have proven difficult to calibrate in UWCD’s groundwater flow model (UCWD 2018). Investigation of the sources of recharge to the different aquifers could help refine the Ventura regional groundwater flow model, which is a numerical groundwater flow model developed by UWCD. Moreover, insights gained may improve the MBGSA’s ability to manage groundwater quality.

Groundwater analysis of ion tracers, stable isotopes, and radioactive isotopes was performed in this study, as the evaluation of these constituents has been shown in adjacent basins to be useful for identifying sources and mechanisms of groundwater recharge and better understanding interactions between aquifers. For example, the isotopic composition of groundwater (expressed as the relative abundance of oxygen-18 ($\delta^{18}\text{O}$) and deuterium (δD)) was used to distinguish between river leakage, regional recharge, and imported water in the nearby Los Posas Valley (Izbicki and Martin 1997). Also, age dating using radioactive isotopes (tritium and carbon-14) was used to confirm that shallow aquifers were being recharged by local streams, but some deeper aquifers were isolated and contained groundwater that was thousands of years old. Finally, in a more-recent study, Izbicki et al. (2005) used a combination of ion tracers and isotopes to demonstrate that high chloride concentrations in some deep groundwater in the Pleasant Valley Basin was associated with underlying oil-field production water.

The remainder of this document is divided into the following sections:

- Section 2 provides an overview of groundwater sampling and analysis.
- Section 3 summarizes the groundwater data and provides preliminary interpretations.
- Section 4 discusses the implications of results for understanding the groundwater flow system.

Section 2

Methods

2.1 Physical Setting

The Mound Basin is located in Ventura County, California, and has been an important source of water supply to both agricultural and municipal users since at least the 1920s (Figure 1). The basin is characterized by a low-lying alluvial plain which gently rises in a northerly direction (UWCD 2012). It is the westernmost basin within the Santa Clara River Valley drainage and is approximately seven miles long and four miles wide (approximately 10,000 acres). The majority of the Mound Basin is occupied by the city/suburban environment of San Buenaventura (Ventura), California. The remainder of the basin is occupied by agricultural lands.

Active thrust/reverse faults border the basins of the Santa Clara River Valley contributing to the uplift of the adjacent mountains and down-dropping of the basins. This configuration creates the elongated mountains and valleys that dominate Santa Barbara and Ventura Counties. Basins are filled with sediments that were deposited in both marine and terrestrial settings and have a total stratigraphic thickness that exceeds 55,000 feet. Basins on the coast, including the Mound Basin, are filled with recent sediments deposited on a wide delta complex that formed at the terminus of the Santa Clara River.

Figure 2 shows the relationship between the major hydrostratigraphic units (i.e., aquifers and aquifer systems) and the geologic formations and their ages, as typically defined for the region. The semi-perched (shallow) alluvial aquifer, Oxnard aquifer, and Mugu aquifer comprise the Upper Aquifer System (UAS) and the Hueneme and Fox Canyon aquifers comprise the Lower Aquifer System (LAS). In the Mound basin, the stratigraphic equivalent to the Oxnard aquifer is dominated by clay deposits and coarse-grained units and tends to be sparser and more lenticular in nature compared to the Oxnard aquifer in adjacent groundwater basins. Also, the Grimes Canyon aquifer is not present in the Mound basin. The relative position of hydrostratigraphic units to structural features (faults and synclines) is shown in a series of cross-sections in Figures 3A through 3C. Groundwater generally flows from east to west in the Mound Basin (Figure 4).

2.2 Sampling Locations

Three nested/cluster groundwater monitoring well sites in the Mound Basin were sampled for this study. As shown in Figure 1, sampled groundwater wells included (from west-to-east):

- Well cluster 02N23W15J01S-03S (Marina Park);
- Well cluster 02N22W07M01S-03S (Camino Real Park); and,
- Nested wells 02N22W09L03S-04S (Kimball Park).

The three well sites contain a total of eight (8) distinct screened groundwater intervals, with depths ranging between 170 and 1,280 ft.-bgs (UWCD 2012). The two wells at Kimball Park were both screened in the Hueneme aquifer (from 480 to 510 feet below ground surface (ft.-bgs), and 890 to 950 ft.-bgs; Table 1). The nested wells at Camino Real Park and Marina Park were screened

in multiple aquifers, including (from shallowest to deepest) the semi-perched (shallow) alluvial aquifer, the Mugu aquifer, and the Hueneme aquifer¹.

For comparative purposes, groundwater data was supplemented with ion and isotopic data from adjacent basins from the USGS's National Water Information System (USGS 2019). This data was originally collected during separate USGS investigations in the early 1990s and 2002 (Izbicki et al. 1995; Izbicki et al. 2005). Locations of the supplemental groundwater sampling data selected for this study are shown in Figure 1, and descriptions are provided in Table 1.

2.3 Sampling Methods

Groundwater sampling and analysis procedures are described in the Sampling and Analysis Plan (SSP&A 2019). Groundwater was collected using a pneumatic bladder pump and low flow sampling methods. Sampling involved placing the water-intake in the middle or slightly above the middle of the screened interval and pumping at a rate (typically <0.5 L/min) so as to not result in significant water level drawdown (<0.1 m) (Puls and Barcelona, 1996).

All wells were purged prior to sampling. The volume purged was at least equal to the screen interval volume. Water levels were monitored during purging and recorded. Also, temperature, specific conductance, pH, oxidation-reduction potential (ORP) and dissolved oxygen were recorded during well purging until all field parameters had stabilized. Completed field sampling forms are included as Appendix A.

Water samples designated for laboratory analysis were collected directly into appropriate containers provided by the laboratories. Samples requiring filtration were collected using clean, dedicated, in-line 0.45-micron capsule filters. The first 200 ml of filtrate was discarded prior to collecting samples.

2.4 Laboratory Methods

Table 2 lists the various study objectives and which parameters were analyzed to achieve these objectives. As reported in the table, general geochemical parameters were analyzed to characterize the composition of groundwater. Ionic and isotopic tracers were analyzed to understand recharge and aquifer interactions. Finally, groundwater age dating was accomplished using tritium (³H) and carbon-14 (¹⁴C). More details are provided in the sampling and analysis plan (SSP&A 2019).

¹ MP-240 and CWP-950 included both original and resampled groundwater. There was concern that the original samples from July, 2019 could have included some groundwater from above the screened interval. However, it was found that both the original and resampled groundwater had similar results, and therefore both sets are included in this report (original samples are used for quality control (comparative) purposes). Note that MP-240 is an artesian well, so no pumping was required. When resampled, three casing volumes of groundwater were purged, which was relatively more than other wells (Section 2.3).

Section 3

Results and Analysis

This section of the report includes analytical results and preliminary interpretations of those results. The naming convention used for discussion purposes is presented in Table 1 in the “Sample Name” column. It includes a well location, based largely on Densmore (1996), and a maximum well-screen depth. It is important to note that the laboratory analytical reports provided in the appendices use the naming convention presented in the column “Well ID.” As discussed above, groundwater data was supplemented with ion and isotopic data from adjacent basins from the USGS’s National Water Information System. This data is also included in the tables of this report.

Sampled groundwater in the Mound Basin is discussed as either representing shallower (≤ 500 ft.-bgs) or deeper (> 500 ft.-bgs) groundwater. This depth distinction is intended for discussion purposes and does not strictly correspond to the UAS and LAS, respectively. For example, CP-780 is in the UAS but discussed as representing “deeper” groundwater; CWP-510 is in the LAS but classified as representing “shallower” groundwater.

3.1 Field Parameters

Field parameters are indicators of the general geochemistry of groundwater. They can also be used to understand whether or not sampling artifacts may have affected analytical results. Completed field forms are included as Attachment A. A summary of measured field parameters is reported in Table 3. Results include the following:

- Conductivity was relatively high ($> 1,000$ $\mu\text{S}/\text{cm}$), with the highest conductivity measured in shallower groundwater (≤ 500 ft.-bgs) (MP-240, CP-280, and CWP-510).
- pH was near neutral (~ 7), with slightly lower values in shallower groundwater (≤ 500 ft.-bgs). Values are generally similar to groundwater from the Santa Paula Basin (K1-216, K3-720, K4-867) and Mound Basin (L1-1775) but are lower than some regional groundwater.
- Turbidity was low (< 5 NTU), indicating formation solids were not being collected with the water samples, and therefore, laboratory analytical results were of good quality.
- Dissolved oxygen (DO) was detected in all samples.
- ORP, which is a measure of groundwater redox potential, was low (< 160 mV) or negative.

An explanation for the co-occurrence of measurable DO and low ORP is redox disequilibria in groundwater, whereby reduced forms of redox-sensitive elements occur in disequilibrium with oxidized forms of others. Although this is a common phenomenon in groundwater, being attributed to slow redox chemical reactions and/or mixing of groundwater along screen intervals, it could also result from the purging and low-flow sampling methods employed for this study. Purging was performed for no less than the amount of water present in the screen interval. This was followed by low flow sampling, which was designed to minimize drawdown, thereby minimizing the introduction of casing water. It is possible, however, that some casing water and/or diffusion of

oxygen from above the screen interval could have occurred during sampling. Based on this possibility, ORP is interpreted to be a more-representative indicator of the actual redox conditions in groundwater.

3.2 Major Ion Concentrations

Table 4 reports the major ion concentrations of groundwater in the Mound Basin and adjacent basins. This data was evaluated using Piper diagrams and Stiff diagrams to understand the dominant ions present in groundwater and differences between samples. Geochemical modeling was additionally performed to further evaluate groundwater-aquifer reactions.

3.2.1 Piper Diagram

The major ion distribution of groundwater is an indicator of the water-rock interactions that have occurred along a groundwater flow path. This distribution is typically represented with the construction of a Piper diagram, which is a trilinear diagram consisting of two triangular plots and one diamond-shaped plot (see Figure 5A). Each of the triangular plots in a Piper diagram depicts either the cation or anion data as milliequivalent percentages of individual ions. The closer a particular groundwater sample plots to one of the apices of a triangle, the greater the relative abundance of that respective ion in the groundwater sample. Data from the two triangular plots in a Piper diagram are also projected onto the diamond-shaped plot, thereby providing an additional visual tool to compare geochemical variability between samples. Piper diagrams are useful for comparing the major ion chemistry of different groundwater samples. To the extent that samples plot close to one another, they can be considered “similar.” A Piper diagram can also be used to determine whether or not a groundwater sample represents a mixture of two or more separate groundwater samples (a mixture will plot on a straight line between end-member components; Hem 1985).

Figure 5A shows a Piper diagram for groundwater sampled in this study. Most groundwater clusters in similar regions of the Piper diagram, which is consistent with groundwater having a similar ionic composition. This is particularly true for the three deepest samples (MP-1070, CP-1280, and CWP-950). Groundwater is characterized as having no dominant cation, although calcium is generally the most abundant, followed by sodium. By contrast, sulfate is the dominant anion, with relatively higher abundances of this ion in shallower groundwater (≤ 500 ft.-bgs) (e.g., CP-280 and CWP-510). In the two well clusters where groundwater was sampled at three depths, the intermediate samples do not fall on a “mixing” line between groundwater above and below, indicating they are not simple mixtures of groundwater from adjacent aquifers. The major ion chemistry of these intermediate-depth samples is most similar to the deepest samples.

The Mound Basin has a similar composition to most regional groundwater (Figure 5B). The primary exception is deeper groundwater from the Oxnard Forebay and Oxnard Plain Basins, which includes CM3-1490, SG-1250, and PV2-1437 (as shown by Izbicki et al. (2005), PV2-1437 is likely influenced by deeper (saline) oil field production water²). The similarity between Mound Basin groundwater and other, regional waters is an indication that similar geochemical processes are responsible for their composition. Geochemical inverse modeling performed by

² In Figure 5B, PV2-1437 plots closest to oil field produced water.

Izbicki and Martin (1997) demonstrated that these processes likely include silicate weathering, carbonate precipitation, clay precipitation, cation exchange, and organic matter degradation (driven specifically by sulfate reduction).

3.2.2 Stiff Diagrams

Stiff diagrams graphically represent the major ion composition of surface water and groundwater. Concentrations of major cations (calcium, magnesium, sodium, and potassium) are expressed in units of milliequivalents per liter (meq/L) and plotted on the left side of the diagram—concentrations of major anions (sulfate, carbonate, bicarbonate, and chloride) are similarly plotted on the right. The width of a Stiff diagram pattern approximates the total ionic content of the sample. To the extent that a groundwater Stiff diagram pattern is similar to a particular source, it can be inferred that the sample is potentially derived from (or contains a component of) that source. Stiff diagrams are useful for understanding general similarities and differences in water; however, comparisons are qualitative and small differences in ionic composition may be indiscernible. Stiff diagrams were used in this study to further compare the major ion composition of groundwater.

Stiff diagrams for Mound Basin groundwater are presented in Figure 6A. Groundwater from deeper wells (>500 ft.-bgs) have similar relative and absolute ion concentrations. By contrast, groundwater from the shallowest well in each of the nested/clustered monitoring wells (MP-240, CP-280, and CWP-510) has much higher concentrations of dissolved ions. The distribution and concentrations of ions in shallower groundwater (≤ 500 ft.-bgs) are dissimilar to groundwater and surface water from adjacent basins (Figures 6B through 6D). Dissolved constituents in groundwater from less than 500 ft.-bgs are therefore not derived from mixing of regional waters, but instead, from reactions with local, aquifer minerals. It is important to note that MP-240 and CP-280 are both screened in the semi-perched (shallow) alluvial aquifer (Table 1), and therefore, may have interacted with a different mineral suite.

3.2.3 Geochemical Modeling

Geochemical modeling was performed using the USGS-supported geochemical software PHREEQC (Parkhurst and Appelo 1999) to understand the origin of dissolved constituents in groundwater. PHREEQC uses reported groundwater chemistry to predict mineral saturation indices³ (SI), which are useful indicators of mineral stability, and can be used to infer the presence of reactive aquifer minerals. Considering uncertainties in chemical analyses and thermodynamic data used to compute mineral solubility products, SI values falling within a range of ± 0.5 are interpreted as representing apparent equilibrium between groundwater and that mineral, which implies the mineral likely occurs in the aquifer, and is buffering groundwater composition.

³ As concentrations of dissolved aqueous species that comprise a particular mineral increase, the tendency for that mineral to precipitate out of groundwater is enhanced. This tendency is defined mathematically by a value called the saturation index (SI), which is expressed on a logarithmic scale as the ratio of the concentration of ions in solution to the concentration required for mineral precipitation to occur. SI values greater than zero indicates supersaturation and a tendency for a mineral to precipitate from the groundwater, whereas SI less than zero indicate undersaturation (i.e. a mineral would tend to dissolve into groundwater, if present).

Table 5 presents calculated saturation indices (SIs) for a group of minerals that were selected for their potential to inform on the origin of major ion, redox, and/or isotopic species. All Mound Basin and regional groundwaters are supersaturated with respect to calcite ($SI \geq 0$). This result is consistent with the reported identification of calcite in regional aquifer sediments (Densmore 1996). Also, CWP-510 and CP-280 are saturated or supersaturated with respect to gypsum ($CaSO_4$), which is also consistent with its occurrence in regional aquifer sediments (Densmore 1996, as cited by Izbicki et al. 2005). Although the SI of gypsum for groundwater sample MP-240 is slightly less than zero (-0.4), this SI is within a range of ± 0.5 , and could still represent some interaction with gypsum along the groundwater flow path⁴.

In summary, the origin of dissolved constituents in deeper Mound Basin groundwater (>500 ft.-bgs) is likely similar to other groundwater from adjacent basins. By contrast, shallower Mound Basin groundwater (≤ 500 ft.-bgs) has additionally interacted with gypsum (and potentially other evaporite minerals such as halite) that may not be as abundant in deeper aquifer materials. Gypsum mineral dissolution can explain observed differences in major ion chemistry between shallower groundwater (MP-240, CP-280, and CWP-510) and other Mound Basin and regional groundwater.

3.3 Redox Parameters

The term “redox” is an abbreviation for “reduction-oxidation,” which is a chemical reaction that transfers electrons between two redox-sensitive elements. In redox reactions, the net charge (or valence) of one element is increased, while the valence of the other is reduced. Redox reactions in groundwater aquifers are predominantly terminal electron accepting processes (TEAPs), which couple the conversion of redox-sensitive elements from their oxidized to reduced forms with the microbiological oxidation of naturally occurring organic matter⁵. TEAPs occur in a sequence based on metabolic efficiency (i.e. potential energy yield) of the associated redox reaction, with

⁴ The geochemical model PHREEQC was also used for geochemical inverse modeling, which involves a series of mass balance calculations to identify the mass transfer processes (such as specific mineral dissolution reactions) that are most consistent with reported groundwater chemistries. Specifically, inverse modeling was used to identify mineral reactions that potentially explain observed differences in major ion concentrations between shallower (≤ 500 ft.-bgs) and deeper Mound Basin groundwater (>500 ft.-bgs). Although not reported in any tables, it was found that the inverse model could only reproduce groundwater in MP-240, CP-280, and CWP-510 if gypsum dissolution were included (in addition to dissolution/precipitation of other minerals in common with deeper groundwater). Gypsum dissolution is important because it could indicate the presence of soluble salts (evaporites) that affect water quality in the semi-perched (shallow) alluvial aquifer.

⁵ TEAPs, or terminal electron accepting processes, are microbiologically mediated reactions that convert redox-sensitive elements from their oxidized to reduced forms, while simultaneously oxidizing natural organic carbon present in an aquifer. TEAPs are largely driven by molecular hydrogen (H_2), which is derived from the fermentation of natural (or anthropogenic) organic matter. In each TEAP, microorganisms obtain energy by transferring electrons from H_2 to naturally occurring electron acceptors (such as oxygen, nitrate, iron (III), manganese (IV), sulfate, and carbon dioxide). Significantly, each TEAP has a different affinity for H_2 uptake, with microbes that respire using more electrochemically positive electron acceptors (such as dissolved oxygen) able to survive at lower H_2 levels in groundwater. TEAPs occur in a sequence based on metabolic efficiency (i.e. potential energy yield) of the associated redox reaction. Aerobic respiration continues until there is insufficient oxygen. It is followed in sequence by denitrification, manganese reduction, iron reduction, sulfate reduction, and finally, methanogenesis.

aerobic respiration followed by denitrification, manganese reduction, iron reduction, sulfate reduction, and finally, methanogenesis. The predominant TEAPs in groundwater can often be inferred from concentrations of redox-sensitive elements. For example, elevated concentrations of nitrate (>0.5 mg/L), manganese (>0.05 mg/L), iron (>0.1 mg/L), and/or the presence of sulfide indicate nitrate-reducing, manganese-reducing, iron-reducing, and sulfate-reducing conditions, respectively (Jurgens et al. 2009). All TEAPs generate dissolved inorganic carbon (DIC).

Redox conditions in the Mound Basin change from more oxidizing to more-reducing conditions with depth, which is what would be expected from presumably greater groundwater residence times at depth and the occurrence of TEAPs⁶. Evidence for more-oxidized, shallower groundwater includes relatively high nitrate and manganese concentrations at CP-280 and CWP-510, and high manganese concentrations at MP-240 (Table 6). By comparison, evidence for more-reduced, deeper groundwater includes relatively high iron concentrations at CP-780, CP-1280, and MP-1070⁷. Differences in redox conditions with depth are important because they are an additional line-of-evidence that there is a lack of strong interaction between shallower (≤ 500 ft.-bgs) and deeper groundwater (>500 ft.-bgs). Differences are also important because they indicate TEAPs, which potentially affect the interpretation of stable and radiogenic carbon isotope data—the introduction of DIC from natural organic matter can change the $\delta^{13}\text{C}$ of groundwater and dilution of the DIC pool from aquifer sources requires corrections to reported ^{14}C ages (Izbicki and Martin 1997).

It is important to note that the source of the high nitrate concentrations at CWP-510 and CP-280 cannot be determined based on data collected in this study. Although nitrate and elevated DOC (which co-occurs with nitrate) are typically associated with surface water and/or irrigation recharge, the very high nitrate values in groundwater in the Mound Basin are potentially incompatible with this source. For example, as discussed above, there is evidence for evaporite mineral interactions, which could include shallow/vadose zone nitrate deposits that have been reported to occur in Southern California (Mansfield and Boardman 1932). Also, as discussed below, age dating indicates groundwater recharge occurred more than 1,000 years ago⁸, which implies groundwater nitrate potentially pre-dates irrigation activities.

⁶ More-reducing conditions commonly occur along a ground water flow path as organic matter degradation continues, and TEAPs proceed from aerobic respiration using (O_2) to denitrification, manganese reduction, iron reduction, sulfate reduction, and finally, methanogenesis. Importantly, manganese reduction and iron reduction involve the reductive dissolution of manganese and iron-bearing minerals, which results in elevated groundwater iron and manganese concentrations. Subsequent TEAPs involving sulfate reduction generates sulfide, which can be measured in groundwater.

⁷ In addition, Izbicki et al. (2005) found evidence that sulfate-reducing conditions occur at even greater depths (i.e., measurable sulfide was reported in PV2-1437).

⁸ In order to resolve the source of nitrate, additional isotopic and/or groundwater characterization would be required. Analyses that could be performed to determine the source of nitrate, and whether or not shallow groundwater has a more-recent component associated with agricultural use of groundwater, includes compound-specific isotope analysis (CSIA) on ^{17}O in nitrate, measurement of perchlorate concentrations in groundwater (which could co-occur with

3.4 Trace Ion Concentrations

Conservative ions such as chloride, bromide, and boron can be useful for determining sources of dissolved groundwater constituents because they typically occur at fixed ratios in saline waters such as seawater and oil field production water. For example, Izbicki et al. (2005) used ratios of chloride-to-bromide (Cl/Br), chloride-to-iodide (Cl/I), chlorine-to-barium (Cl/Ba), and chlorine-to-boron (Cl/B) to identify impacts in some deeper groundwater in the Oxnard Plain and Pleasant Valley Basins from oil-field production water. As shown in Figures 7A and 7B, groundwater sample PV2-1437 has similar ion ratios to, and plots near a mixing line with, oil field production water⁹.

Most groundwater in the Mound Basin has similar ion ratios as groundwater from adjacent basins (Figures 7A through 7C), which is consistent with a similar source of dissolved constituents (as discussed above). Although this generalization does not apply to the three shallower samples (MP-240, CP-280, and CWP-510), lines-of-evidence suggest these samples are similarly unimpacted by either seawater intrusion or oil-field production water. For example, MP-240 (which is closest geographically to the ocean) is more depleted in bromide and boron (and iodide, which is non-detect; Table 7) than groundwater that may have mixed with saline waters—this is reflected in low ratios of Cl/Br and Cl/B relative to the mixing lines of Izbicki et al. (2005) (see Figures 7A and 7C, respectively). Also, although CWP-510 and CP-280 plot near potential mixing lines with these saline sources, the primary dissolved anion in these samples is sulfate, which if derived from evaporites, implies a potential similar evaporitic origin for chloride. Finally, it is important to note that the barium-to-chloride ratios are not diagnostic of the source of chloride because all groundwater is supersaturated with respect to barite (BaSO₄) (Table 5)—this implies barium is predominantly a fixed value and the chloride-to-barium ratio would be expected to vary linearly with chloride concentrations, which it does (Figure 7B).

3.5 Stable Isotopes

3.5.1 Oxygen and Hydrogen Isotopes ($\delta^{18}\text{O}$ & δD)

Stable oxygen and hydrogen isotope ratios of groundwater are often used to determine recharge sources (e.g., infiltration of local versus orographic precipitation, evaporated surface waters); they can also be used to identify mixing between different water sources. Figure 8A is a water isotope plot showing Mound Basin groundwater samples relative to the global meteoric water line (GMWL). In general, waters that have recharged from areas of higher elevation and/or cooler temperatures are “depleted” in $\delta^{18}\text{O}$ and δD and plot at lower values along the GMWL than more

natural nitrates), and supplemental age dating using methods such as sulfur hexafluoride (SF₆), chlorofluorocarbons (CFCs), and isotopes of helium.

⁹ The mixing lines shown in the Figures 7A through 7C are based on mixing between seawater or oil-field production water and an initial groundwater composition reported in Izbicki et al. (2005). In fact, mixing lines are very specific to the groundwater endmember selected for presentation. The selected line in the figures is for demonstration purposes.

“enriched” samples. In addition, samples that have undergone significant evaporation generally lie to the right of the line due to isotopic fractionation during the evaporation process¹⁰.

As shown in Figure 8A (and reported in Table 7), Mound Basin groundwater predominantly plots along the GMWL. This result is consistent with groundwater recharge originating from meteoric/precipitation sources. Shallower groundwater in the basin (≤ 500 ft.-bgs) is more isotopically enriched than deeper groundwater (> 500 ft.-bgs), which is consistent with recharge for deeper groundwater occurring at relatively higher elevations and/or cooler temperatures¹¹. Finally, intermediate wells in a cluster are more depleted than the deepest wells, which indicates a lack of systematic change in water isotope ratios as a function of depth and is inconsistent with significant connection (and mixing) between aquifers.

As shown in Figure 8B, $\delta^{18}\text{O}$ and δD in Mound Basin groundwater is generally within the range of other, regional groundwater; however, Mound Basin groundwater is more isotopically enriched as a whole, with little to no contribution from surface water such as the Santa Clara River in the shallowest wells. This finding that shallower groundwater in the Mound Basin is significantly enriched relative to the Santa Clara River, is different than previous studies on the Oxnard Plain. For example, Izbicki et al. (1996) reported that shallower groundwater is more isotopically depleted than deeper groundwater (due to groundwater recharge from surface water such as the Santa Clara River, which drains the surrounding mountains). It is important to note that the Mound Basin wells in this study are farther from the Santa Clara River and potential surface water sources than the wells evaluated in Izbicki et al. (1996).

3.5.2 Oxygen and Sulfur Isotopes of Sulfate ($\delta^{18}\text{O-SO}_4$ & $\delta^{34}\text{S-SO}_4$)

Compound-specific isotope analysis (CSIA) of oxygen and sulfur isotopes in sulfate ($\delta^{18}\text{O-SO}_4$ & $\delta^{34}\text{S-SO}_4$) is commonly used to identify the source(s) of sulfate in groundwater. This is accomplished by plotting groundwater isotopic ratios of $\delta^{34}\text{S-SO}_4$ against either sulfate concentrations or $\delta^{18}\text{O-SO}_4$ and comparing the isotopic signatures to potential sources of sulfate. Data is interpreted by assuming that groundwater samples that plot near a particular source potentially contains sulfate derived from that source.

As shown in Figure 9A, marine evaporite minerals containing sulfate (such as gypsum) are isotopically enriched in $\delta^{34}\text{S-SO}_4$ relative to sulfate derived either from terrestrial evaporite (gypsum) minerals or the oxidation of sulfides (such as pyrite, FeS_2) (Clark and Fritz 1997; Cook and Herczeg 2000). The “Marine Gypsum Dissolution” line shown in the figure was used by Izbicki et al. (2005) to represent groundwater isotopic compositions expected from sulfate derived from the dissolution of marine gypsum. Similarly, the “Sulfate Reduction” line was used to represent groundwater isotopic compositions expected from reduction of groundwater sulfate to sulfide. As an example of how isotopic signatures can be used, Izbicki et al. (2005) hypothesized

¹⁰ Because there is often some local deviation from the GMWL, a local meteoric water line (LMWL) is sometimes used to define the isotope patterns of local precipitation; however, it is not known if a LMWL has been published for this basin.

¹¹ It is unclear if water isotopes from shallower groundwater samples CWP-510 and CP-280 represent an evaporation component because the shift in these samples from the GMWL may fall along a LMWL, which has not been defined.

that the relative isotopic depletion of $\delta^{34}\text{S-SO}_4$ in PV2-1437 was evidence of sulfate reduction and/or mixing with oil-field production water.

Deeper groundwater in the Mound Basin (>500 ft.-bgs) generally clusters between a $\delta^{34}\text{S-SO}_4$ ratio of -7 to -8‰ (Figure 9A; Table 7). Although CP-780 is slightly depleted (-5‰) relative to other deeper groundwater, this difference is likely insignificant, given the much larger scatter found in groundwater from adjacent basins (Izbicki et al. 2005). In contrast to this tight clustering of isotopic signatures, shallower Mound Basin groundwater (≤ 500 ft.-bgs) has higher sulfate concentrations and a more depleted $\delta^{34}\text{S-SO}_4$ signature.

As shown in Figure 9B, the isotopic composition of $\delta^{34}\text{S-SO}_4$ and $\delta^{18}\text{O-SO}_4$ in shallower groundwater (≤ 500 ft.-bgs) predominantly lies within the field of terrestrial evaporites, which indicates sulfate in these groundwater samples was predominantly derived from the dissolution of terrestrial gypsum in aquifer sediments. This result is consistent with other lines-of-evidence discussed above, such as gypsum saturation indices at or near zero for groundwater samples MP-240, CP-280, and CWP-510, and the reported presence of gypsum in adjacent groundwater aquifers (Densmore 1996). The origin of sulfate in deeper Mound Basin groundwater (>500 ft.-bgs) samples cannot be determined based on the potential source signatures shown in Figure 9B. According to Izbicki et al. (2005), sulfate in most groundwater in adjacent basins originates from the oxidation of sulfide minerals.

3.5.3 Stable Carbon Isotopes ($\delta^{13}\text{C}$)

Carbon isotopes ($\delta^{13}\text{C}$) are used to identify the source(s) of dissolved inorganic carbon in groundwater. As with sulfur and oxygen isotopes of sulfate, this is accomplished by plotting groundwater isotopic ratios of $\delta^{13}\text{C}$ against either dissolved inorganic carbon (DIC) or dissolved organic carbon (DOC) concentrations and comparing groundwater isotopic signatures to potential sources of carbon. Data is interpreted by assuming that groundwater samples that plot near a particular source potentially contains carbon derived from that source. It has been shown that the primary sources of DIC in regional groundwater include marine carbonates (0‰), dissolved soil gas (-22 to -15‰), oxidized marine organic carbon (-15 to -17‰), and dissolved methane (-55‰) (Clark and Fritz 1997; Izbicki and Martin 1997; Izbicki et al. 2005).

As shown in Figure 10 (and reported in Table 7), most Mound Basin groundwater has a similar $\delta^{13}\text{C}$ isotopic signature as groundwater from adjacent basins. According to inverse modeling presented in Izbicki and Martin (1997), this isotopic composition can be explained by DIC from organic matter oxidation, which leads to depleted $\delta^{13}\text{C}$ near -15‰¹².

Groundwater samples MP-240 and CP-280 are enriched in DIC, but further depleted in $\delta^{13}\text{C}$. Although these results could be considered evidence of additional oxidation of organic matter (Izbicki and Martin 1997), other factors must be considered based on differences in the geology and geochemistry of shallower groundwater (≤ 500 ft.-bgs). For example, natural mineral

¹² According to Izbicki and Martin (1997), more-depleted isotopic ratios were evidence of interactions with methane.

dissolution in the semi-perched (shallow) alluvial aquifer may have included terrestrial carbonates present as cementing agents¹³ (with different isotopic signatures than deeper, marine carbonates).

In summary, carbon isotopes indicate a similar source of DIC in the Mound Basin as adjacent basins. This likely includes carbon derived from the oxidation of natural organic matter. In shallower groundwater (such as MP-240 and CP-280) there may be an additional contribution of DIC from dissolution of carbonate minerals.

3.6 Age Dating

Age dating was performed using tritium (³H) and carbon-14 (¹⁴C). Tritium is the unstable, radioactive isotope of hydrogen, with a half-life of 12.43 years. Beginning in the 1950s, there was a rapid increase of tritium in the atmosphere due to atmospheric testing of nuclear weapons, which was banned in 1962. The increase and subsequent decline in atmospheric tritium levels produced a spike also called the bomb-peak or bomb-pulse that has been quantified. The short half-life makes tritium a useful isotope for age dating young groundwater. The tritium content of water is measured radiometrically and reported in tritium units (TU). One TU is equal to one ³H¹HO molecule in 10¹⁸ water (H₂O) molecules. Izbicki et al. (1996) interpreted groundwater with tritium concentrations less than 0.3 TU as being recharged prior to 1952.

Carbon-14 (¹⁴C), also referred to as radiocarbon, is a radioactive isotope of carbon with a half-life of 5,730 years. ¹⁴C is produced by cosmic radiation in the atmosphere and dissolves into atmospheric moisture and surface waters which eventually recharge groundwater. Once in the subsurface and assuming no further input of carbon (which is uncommon in most natural systems), the decay rate of ¹⁴C can be used to calculate the time elapsed since the water entered the subsurface; however, due to all of the external inputs of ¹⁴C that are possible, derivation of age dates by this method often require carefully-considered corrections. Most notably, corrections are usually required in groundwater systems where carbonate minerals such as calcite dissolve, or where organic matter is oxidized, or when sulfate reduction, methanogenesis, or geothermal processes are involved. Analyses of ¹⁴C are typically carried out by accelerator mass spectrometry and reported in units of percent modern carbon (pMC) referenced to 1950 (=100 pMC). The ¹⁴C age is calculated from:

$$t = -\ln\left(\frac{A}{q \cdot A_o}\right)\left(\frac{t_{1/2}}{\ln 2}\right) \quad (1)$$

where t is age, ln is the natural logarithm, A is the measured ¹⁴C content of the sample, A_o is the initial ¹⁴C content in equilibrium with the atmosphere, q is the dilution factor correction, and t_{1/2} is the half-life of ¹⁴C (5,730 years).

As reported in Table 8, Mound Basin groundwater has very low (in some cases negative) tritium concentrations. This indicates groundwater was recharge prior to 1952, and is consistent

¹³ Geochemical inverse modeling to reproduce δ¹³C ratios in groundwater could be performed to better understand processes responsible for the depleted isotopic signatures in MP-240 and CP-280; however, this evaluation is beyond the scope of the present study.

with uncorrected ages based on ^{14}C , which range between 6,295 and 19,202 years. The uncorrected ^{14}C ages in the Mound Basin are similar to uncorrected ages in adjacent aquifers (Table 8).

Izbicki and Martin (1997) used results of geochemical inverse modeling to provide corrections to the reported ^{14}C ages in Table 8 due to dilution of the DIC pool from aquifer DIC sources. Uncorrected ages are shown in Figure 11A and follow equation 1. By contrast, corrected ages are significantly younger (see the symbols associated with “Izbicki et al. 1996” in Figure 11B; also, see Table 8). Due to the similarity in groundwater geochemistry between adjacent aquifers and the Mound Basin, a curve-fit was applied to the Izbicki et al. (1996) data and used to calculate corrected groundwater ages in the Mound Basin. For MP-240 and CP-280, an additional dilution factor correction was applied based on the additional DIC found in these samples (see Figure 10).

Corrected groundwater ages in Mound Basin groundwater are predicted to range from 1,111 to 5,367 years (Table 8). Unlike Izbicki et al. (1996), which found systematic increases in age with depth and distance from recharge sources, no similar findings are reported. This is likely due to the “simple” correction used in the present study, which requires refinement. Consequently, a more general conclusion applicable to the data in this study is that groundwater is at least 1,000 years old.

Section 4

Summary and Conclusions

There were four primary objectives of this study. A summary of findings as they apply to these objectives include the following:

1. **Sources and mechanisms of groundwater recharge:** Groundwater is meteoric, as evidenced by stable oxygen and hydrogen isotope ratios of groundwater that largely plot along the GMWL. The relatively depleted $\delta^{18}\text{O}$ and δD signatures of deeper groundwater (>500 ft.-bgs) indicates recharge at higher elevation and/or cooler temperatures than shallower groundwater (≤ 500 ft.-bgs).
2. **Groundwater age and dynamics:** Groundwater at the sampled wells is more than 1,000 years old. There is uncertainty about the exact age owing to complexities in correcting ^{14}C ages for dilution by aquifer DIC sources (a more-comprehensive evaluation of stable and radiogenic isotope carbon data to refine age calculations was beyond the scope of this study). Also, tritium activities occur at low levels and do not indicate that there is a recent (post-1950s) recharge component to groundwater.
3. **Interconnections between aquifers:** There appear to be limited interactions vertically between aquifers, regardless of formation. Shallower groundwater (≤ 500 ft.-bgs) is geochemically- and isotopically distinct (even between CWP-510 and CWP-950, both of which are screened in the Hueneme aquifer). There is also no evidence for interactions between Mound Basin groundwater and deeper, mineralized water. Conditions in the Mound Basin are more-oxidizing and exhibit ion and isotopic ratios that are dissimilar to groundwater that has been impacted by deep, oil-field production water.
4. **Interaction between surface water and groundwater:** There is no evidence for significant interactions between shallower groundwater (≤ 500 ft.-bgs) and the Santa Clara River. In fact, $\delta^{18}\text{O}$ and δD signatures of shallower groundwater are distinctly different than the Santa Clara River. There is also no significant evidence for interactions between shallower groundwater and seawater, as the ionic composition of groundwater is inconsistent with a seawater source.

Unresolved issues in this study include the source of the high nitrate concentrations in CP-280 and CWP-510. Although nitrate and DOC are elevated in shallower groundwater, which is consistent with an agricultural origin, an alternative explanation is that nitrate is derived from nitrate deposits that may occur in semi-perched (shallow) alluvial aquifers in Southern California. For example, there is major ion and isotopic evidence for interactions between shallower groundwater (≤ 500 ft.-bgs) and other evaporites such as gypsum. CSIA on ^{17}O in nitrate, measurements of perchlorate concentrations in groundwater (which could co-occur with natural nitrates), and supplemental age dating using sulfur hexafluoride (SF_6), chlorofluorocarbons (CFCs), and isotopes of helium could help resolve whether or not shallower groundwater is being impacted by groundwater used for irrigation.

Section 5

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FIGURES

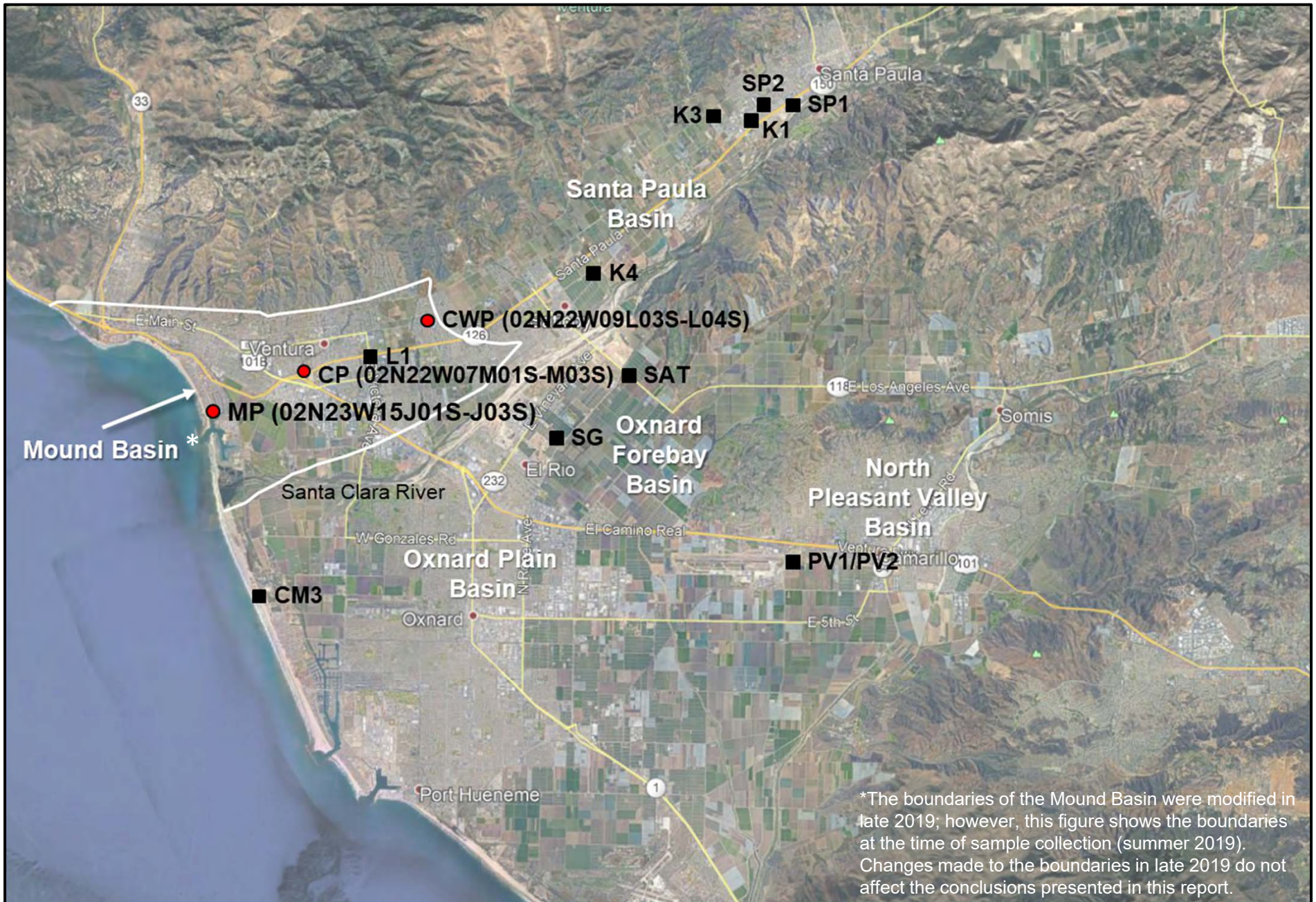


Figure 1. Location map showing the Mound Basin wells sampled for this study and supplemental wells in adjacent basins used for comparison.

Hydrostratigraphic Unit	Model Layer	Aquifer System	Formation	Age
Semi-perched (shallow) alluvial aquifer (rarely used for water supply)	1	Shallow	Unnamed alluvium	Holocene to Recent
Fine-grained Pleistocene deposits (abut or interfinger with Oxnard Aquifer along southern boundary of Mound Basin)	2	Upper Aquifer System		Late Pleistocene
	3			
	4			
Mugu Aquifer	5		Lower Aquifer System	
Mugu – Hueneme aquitard	6			
Hueneme Aquifer	7	Lower Aquifer System	San Pedro Formation	Late Pleistocene
Hueneme – Fox Canyon aquitard	8			
Fox Canyon Aquifer – main	9			
Fox Canyon upper-basal aquitard	10			
Fox Canyon Aquifer – basal (low hydraulic conductivity in Mound Basin)	11			

Figure 2. Schematic diagram of general aquifer systems (UWCD 2012).

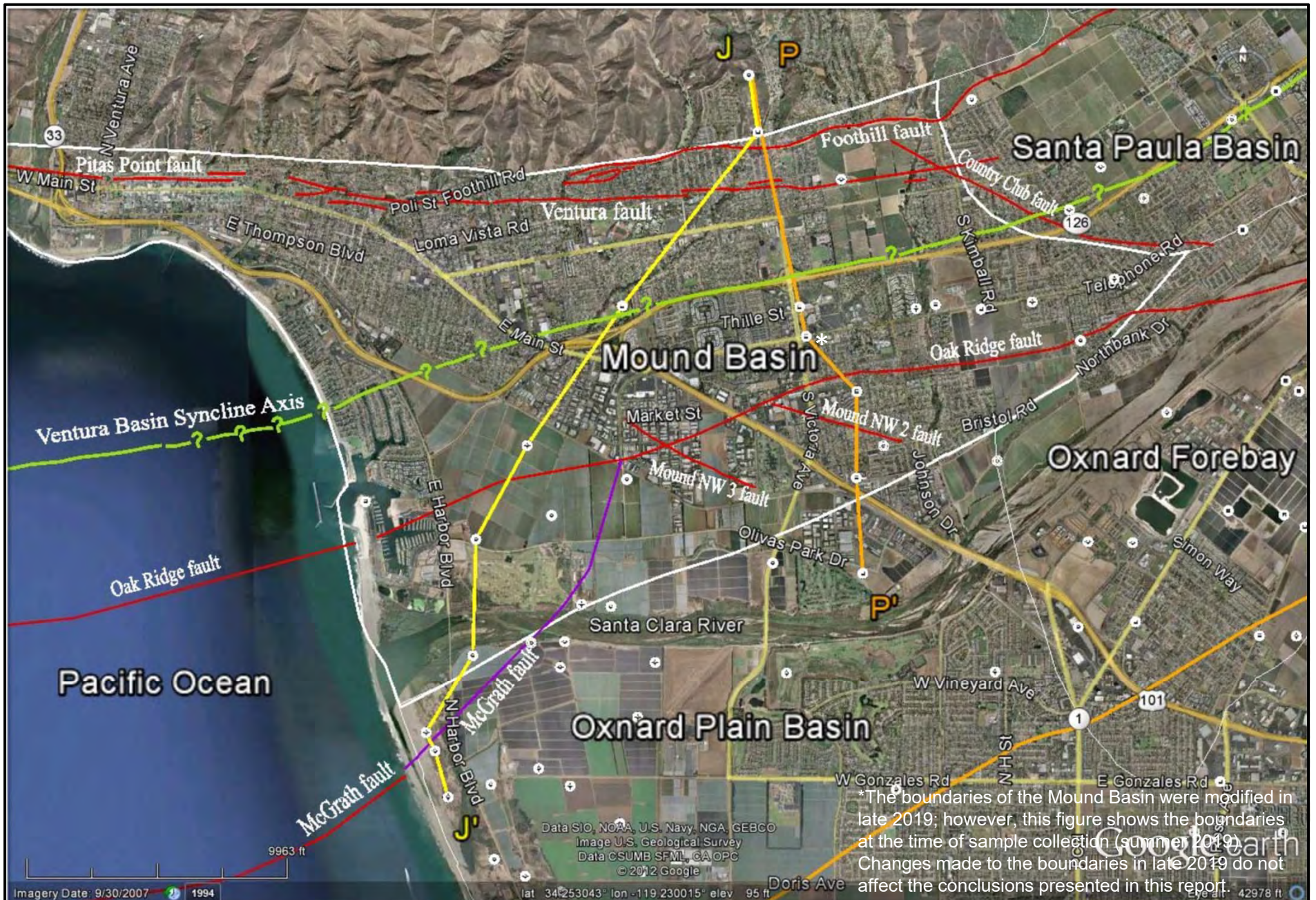


Figure 3A. Location map for United Water cross-sections J-J' and P-P' (UWCD 2012).

Cross-Section J-J'

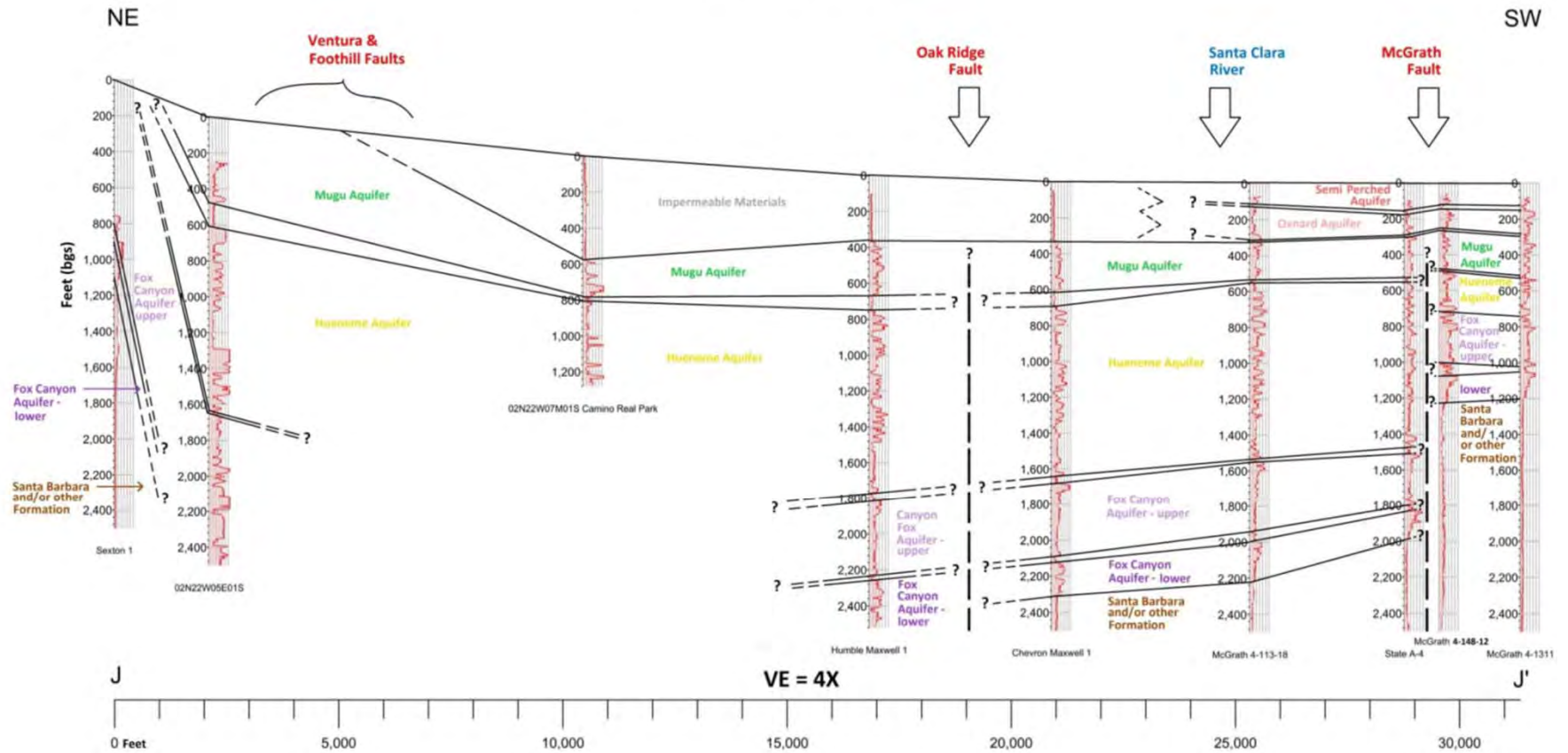


Figure 3B. United Water cross-sections J-J' (UWCD 2012)

Cross-Section P-P'

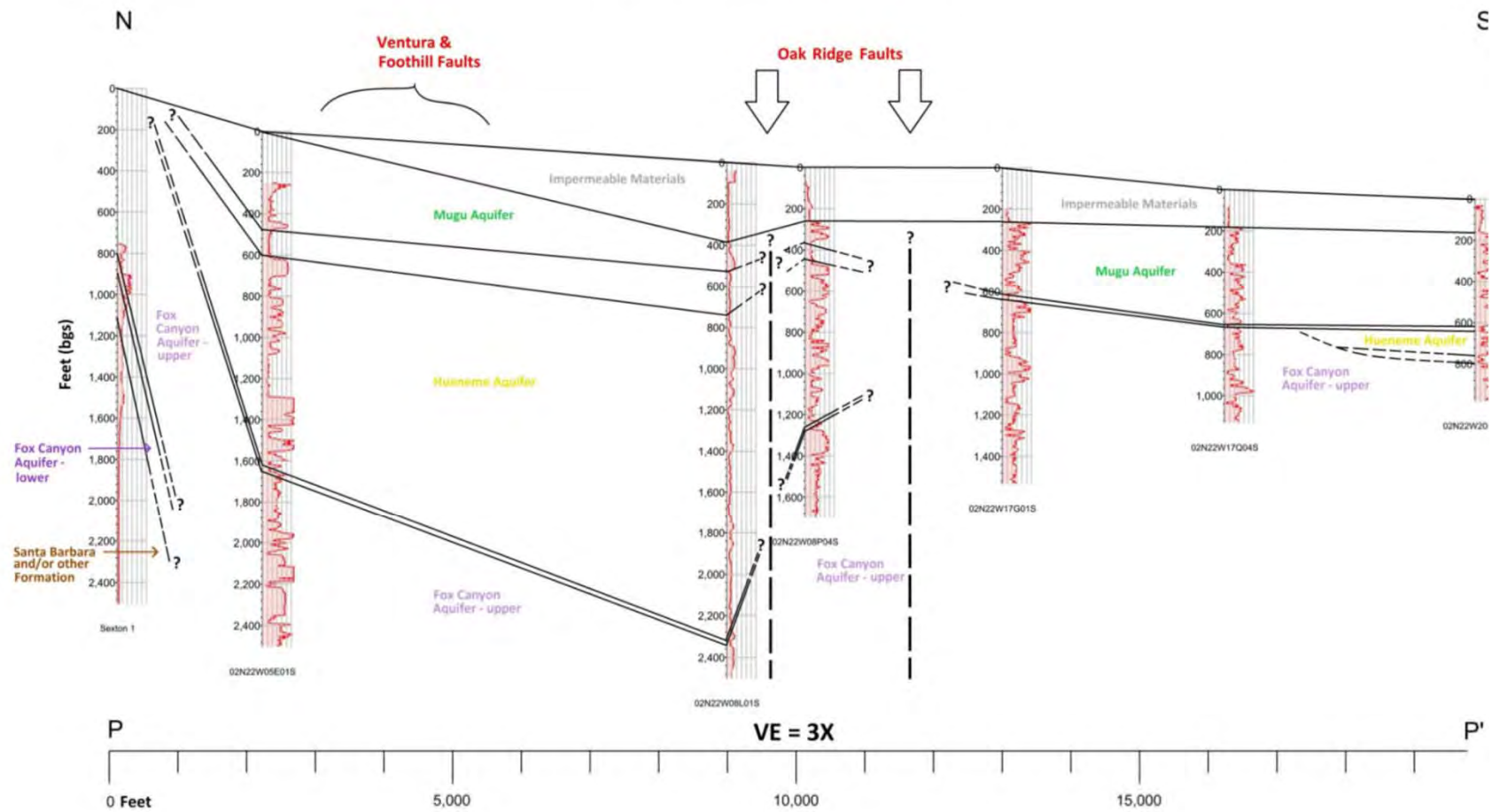


Figure 3C. United Water cross-sections P-P' (UWCD 2012).

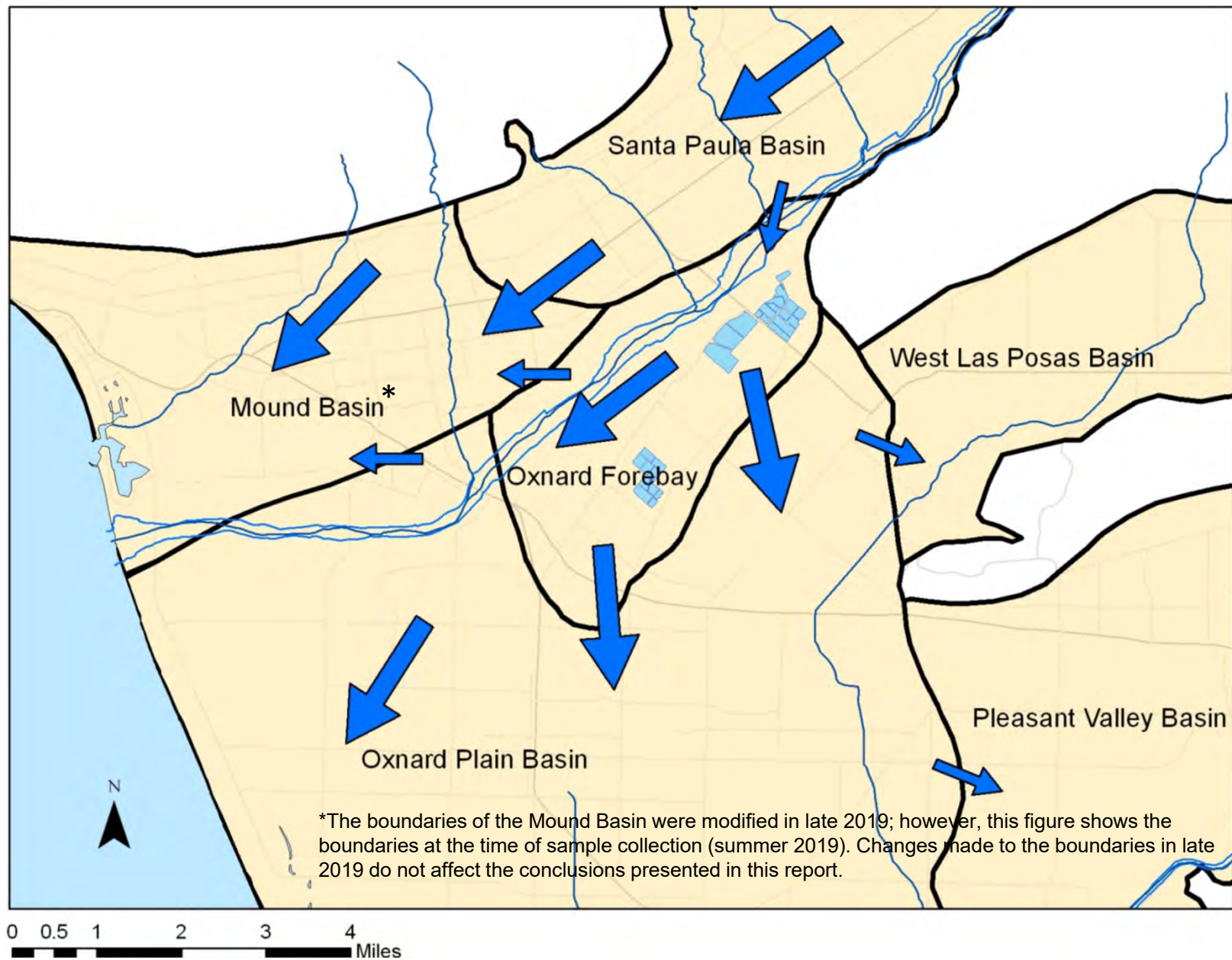


Figure 4. Generalized conceptual groundwater flow paths (UWCD 2012).

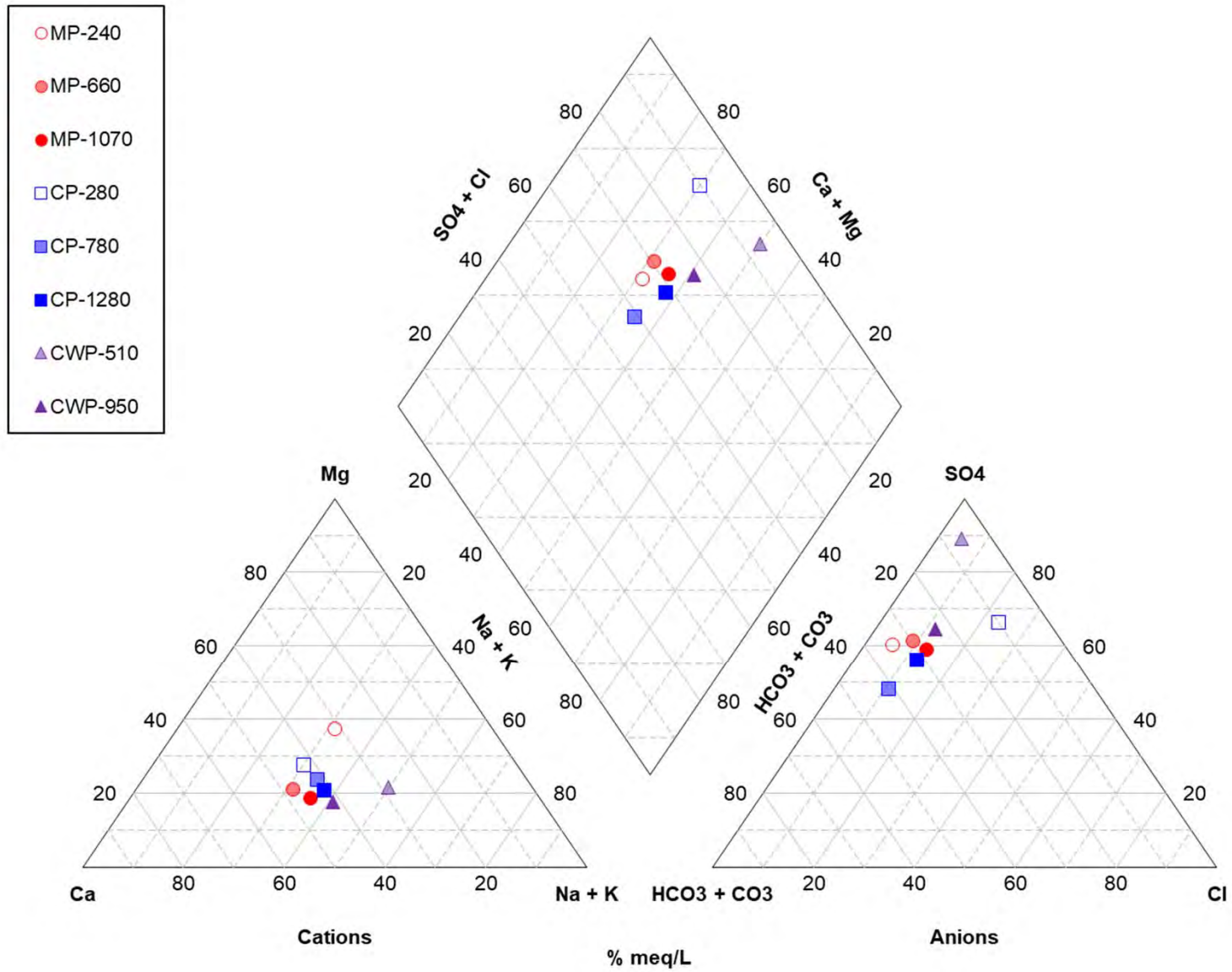


Figure 5A. Piper diagram of groundwater in the Mound Basin.

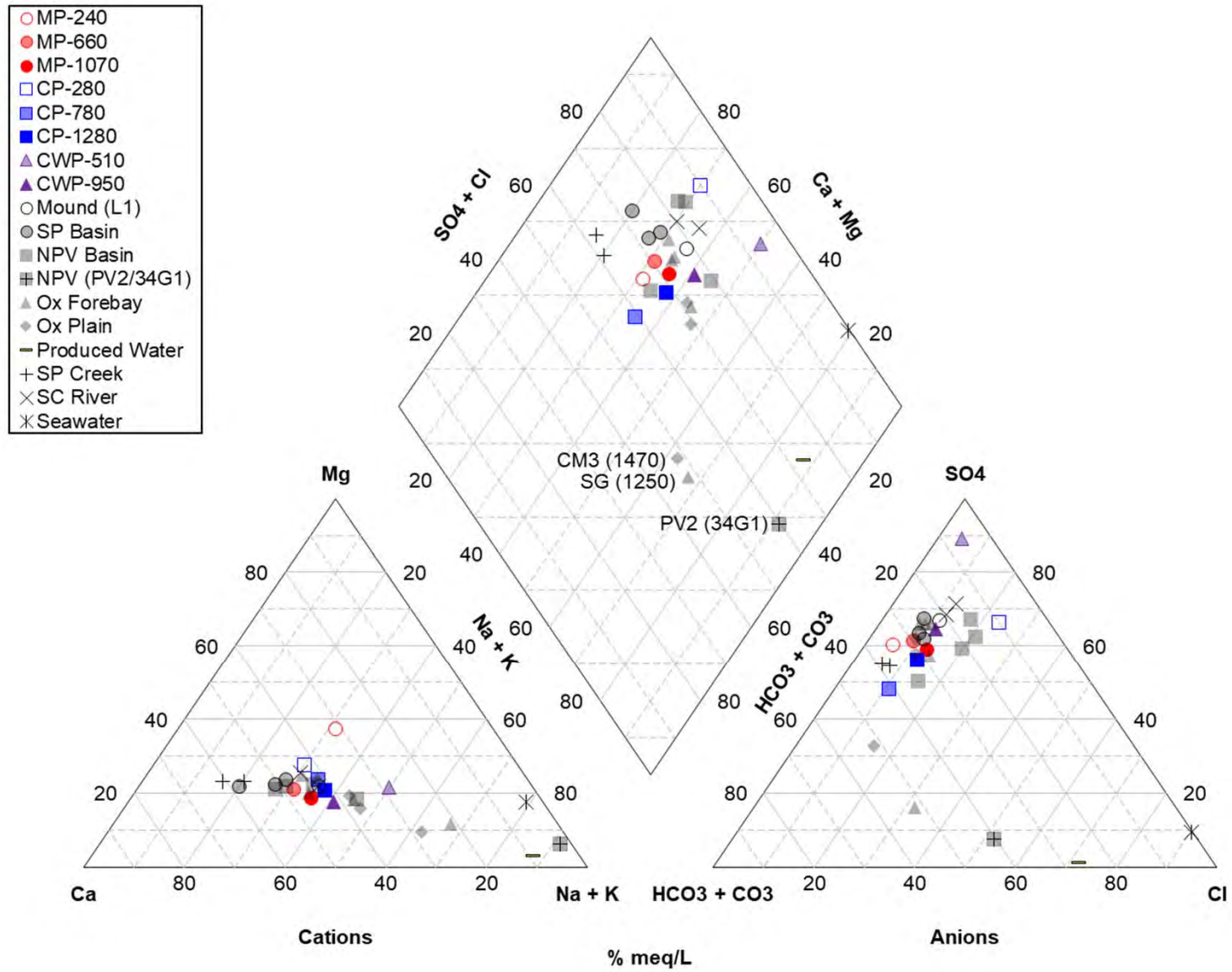


Figure 5B. Piper diagram of groundwater in the Mound Basin and adjacent basins.

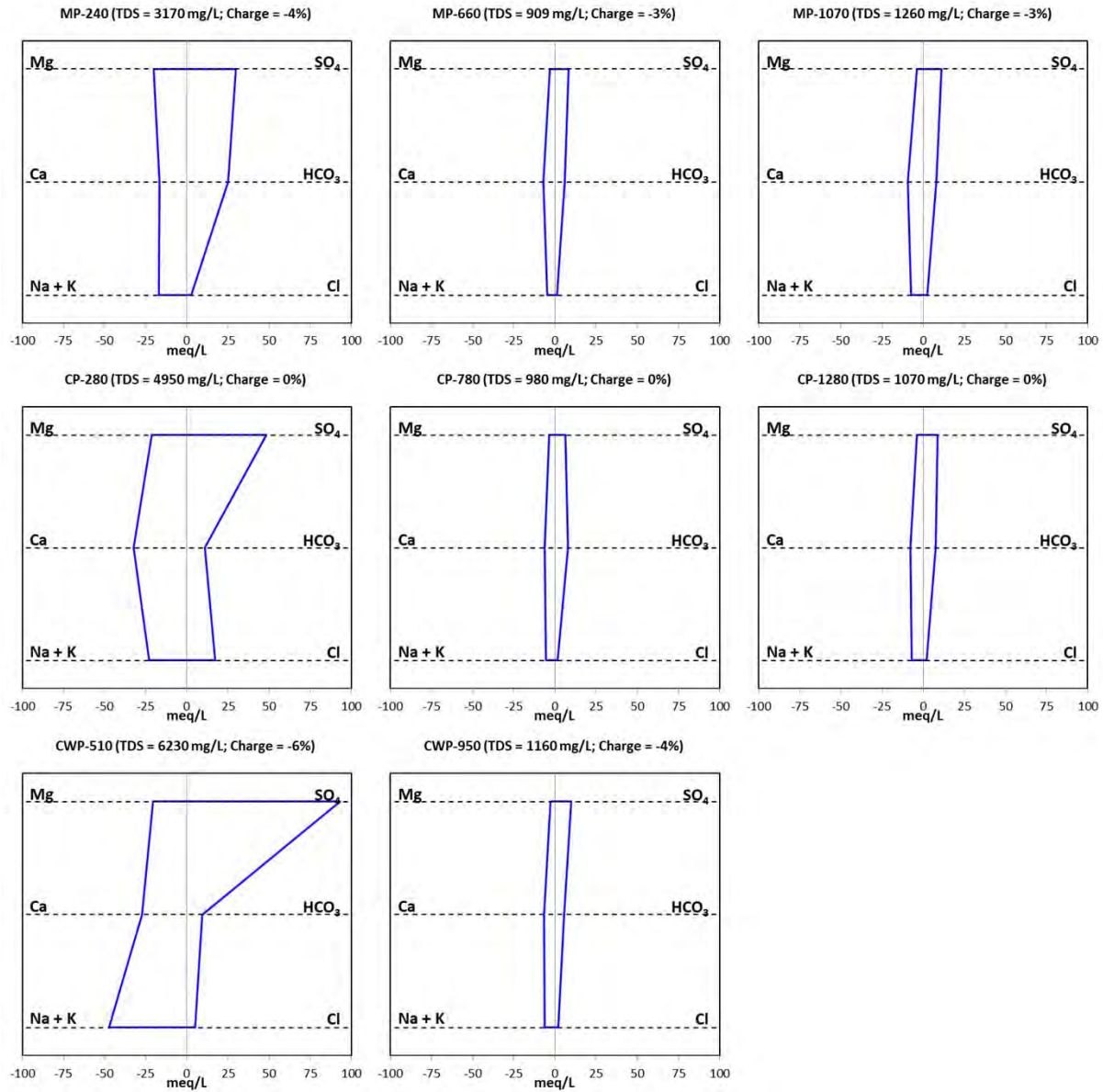


Figure 6A. Stiff diagrams of groundwater in the Mound Basin.

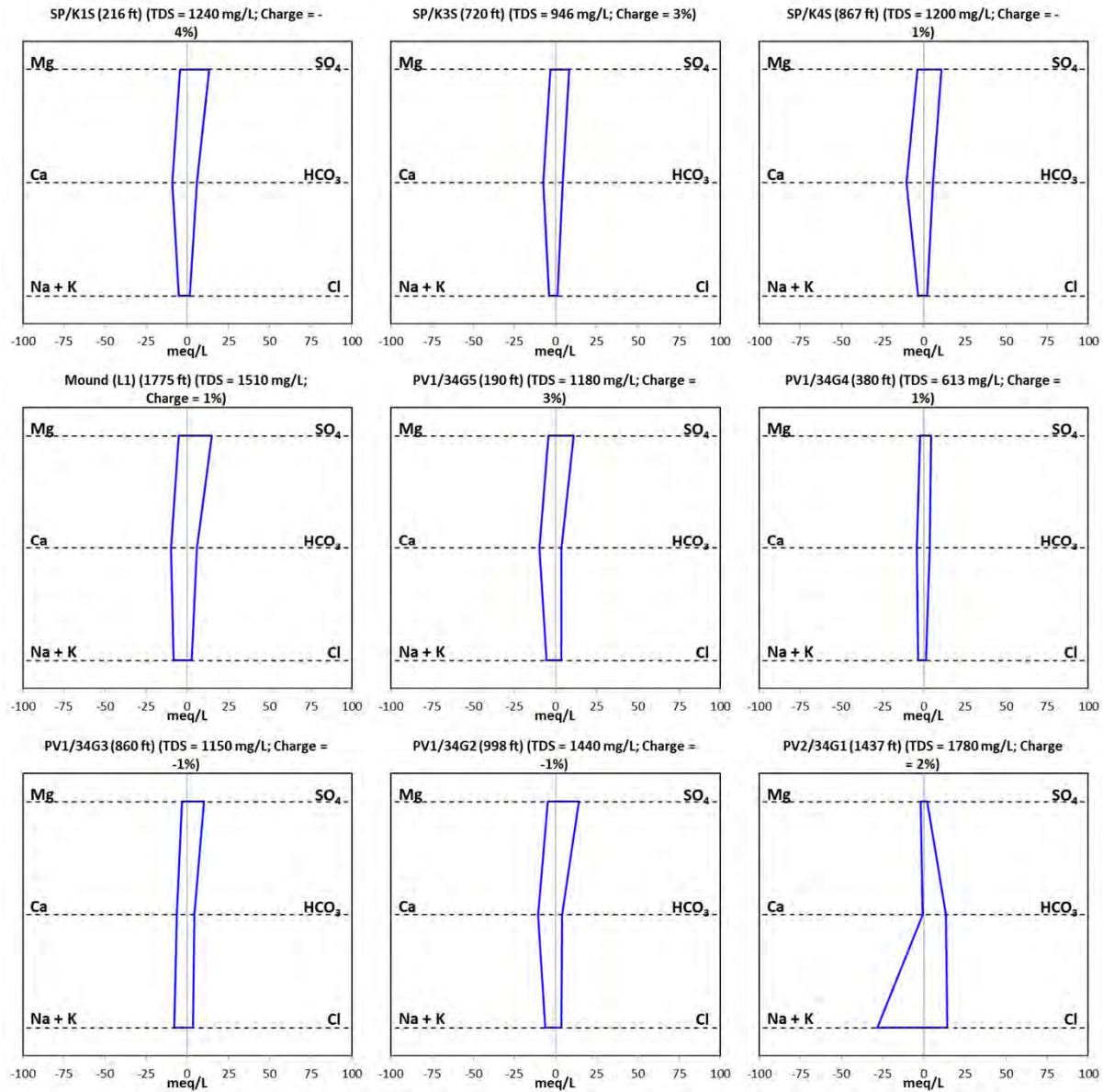


Figure 6B. Stiff diagrams of groundwater in the Santa Paula, Mound, and Pleasant Valley Basins.

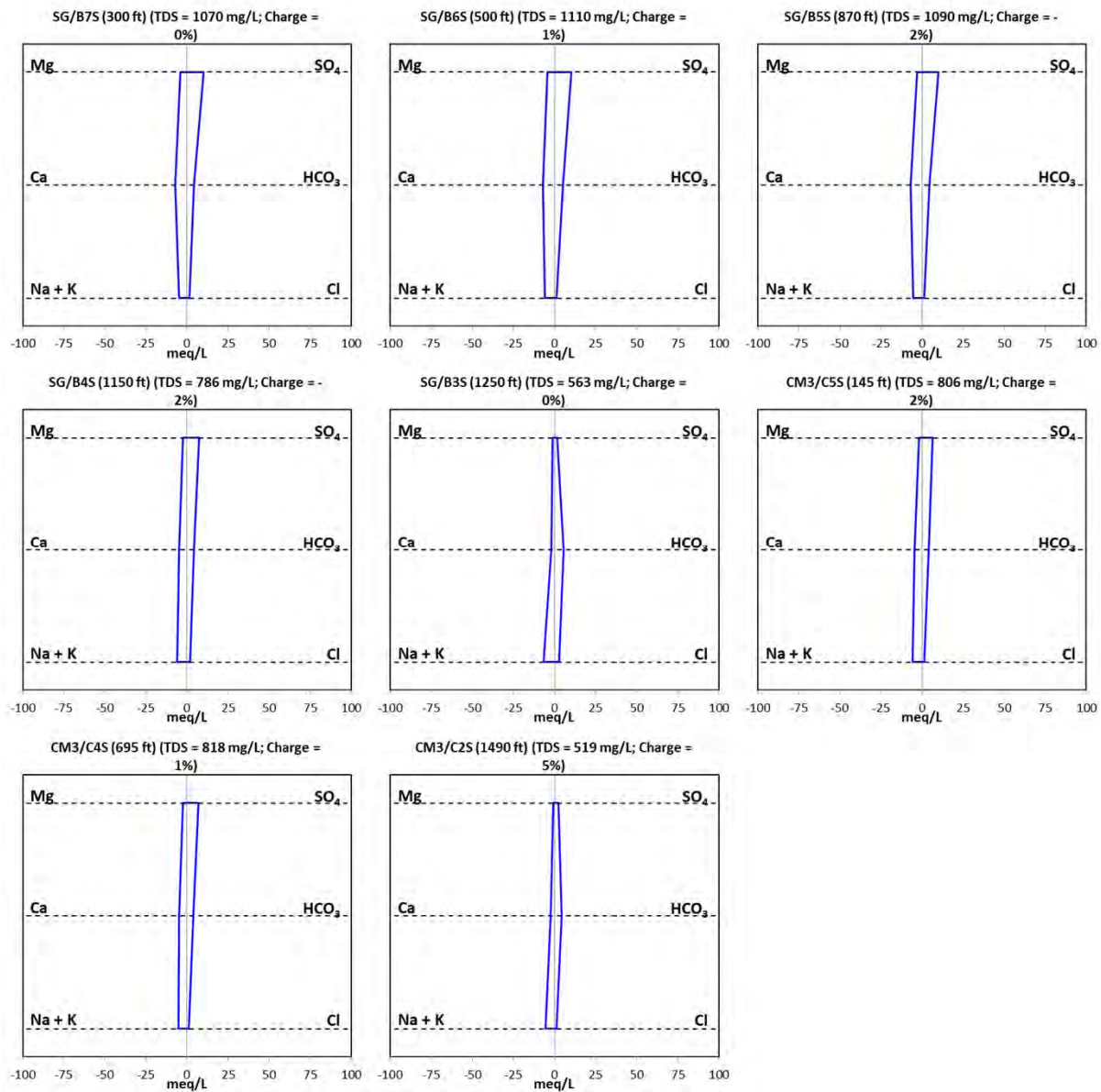


Figure 6C. Stiff diagrams of groundwater in the Oxnard Forebay and Oxnard Plain Basins.

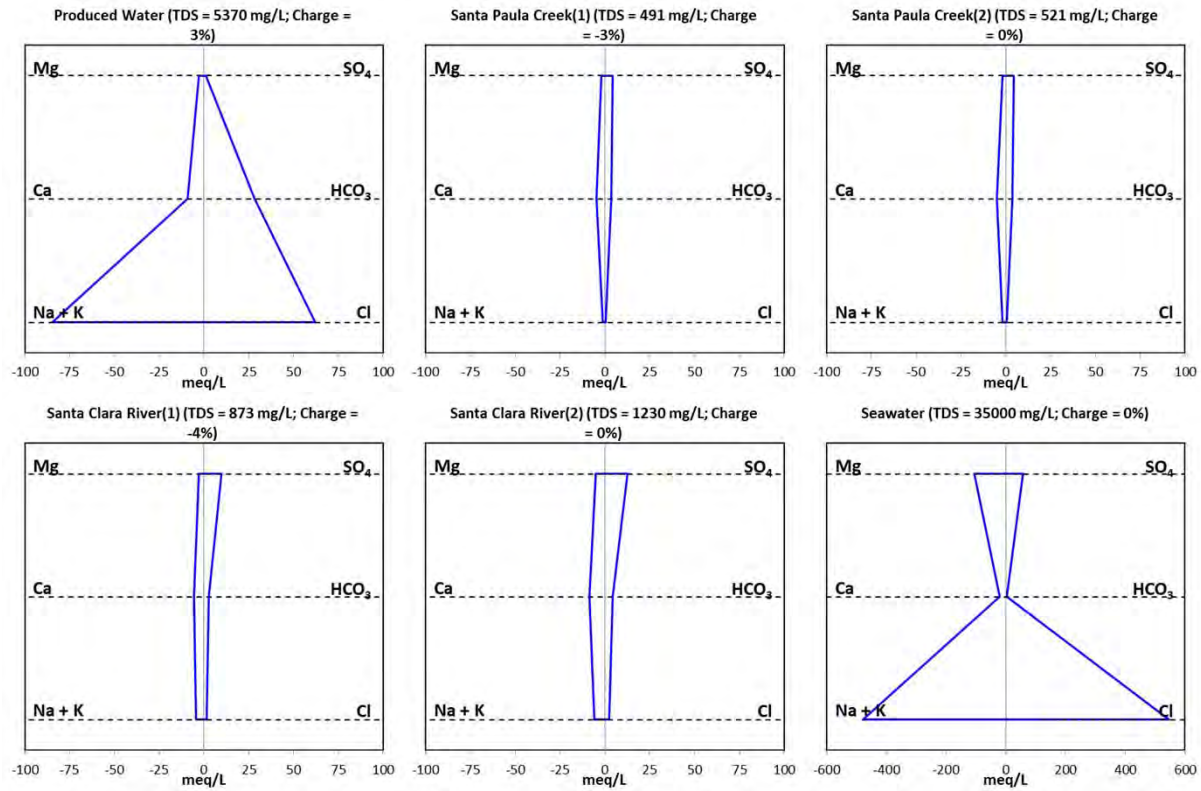


Figure 6D. Stiff diagrams of potential sources of dissolved constituents in the Mound Basin.

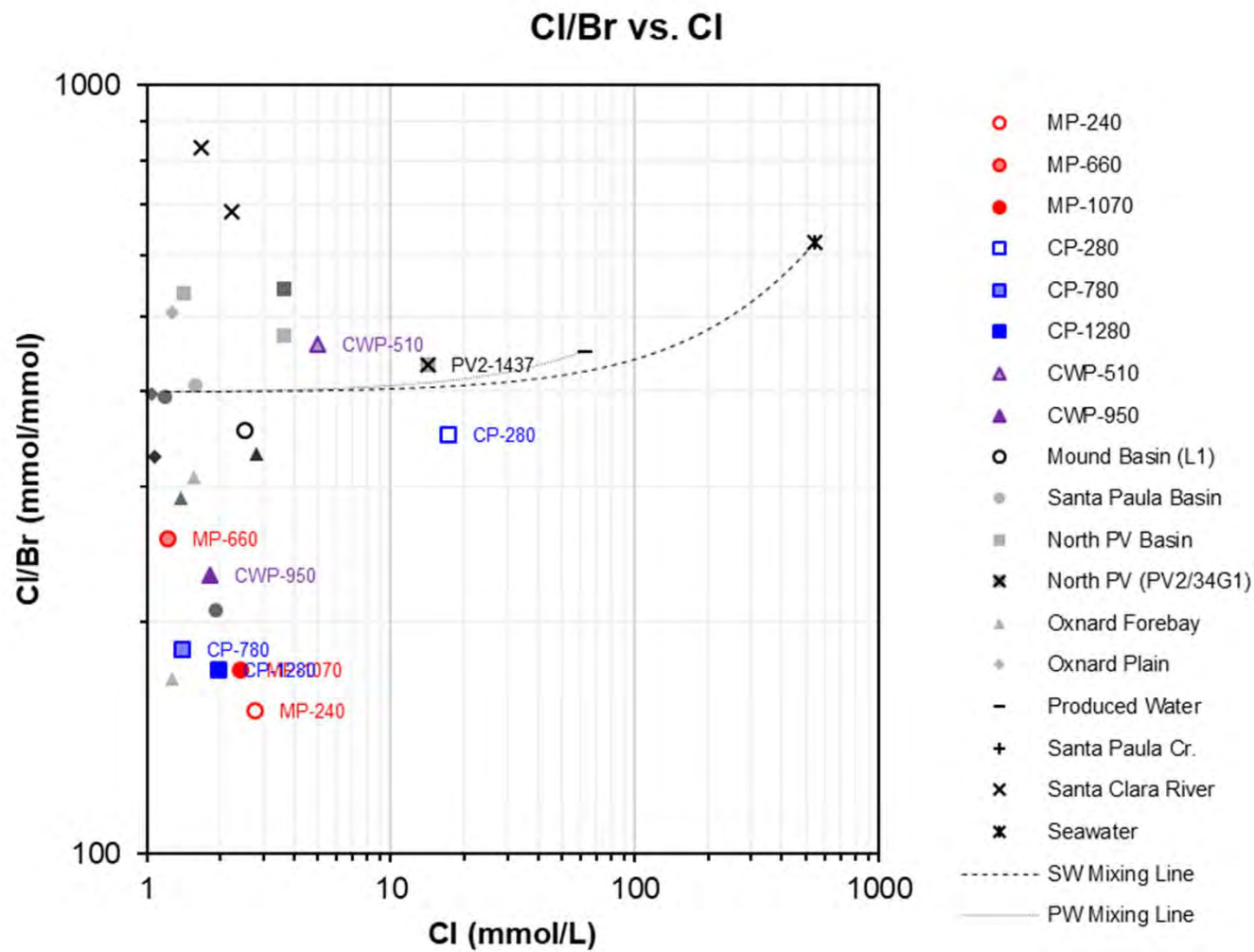


Figure 7A. Ratio of chloride-to-bromide (Cl/Br) as a function of chloride in groundwater and surface water in the Mound Basin and adjacent basins.

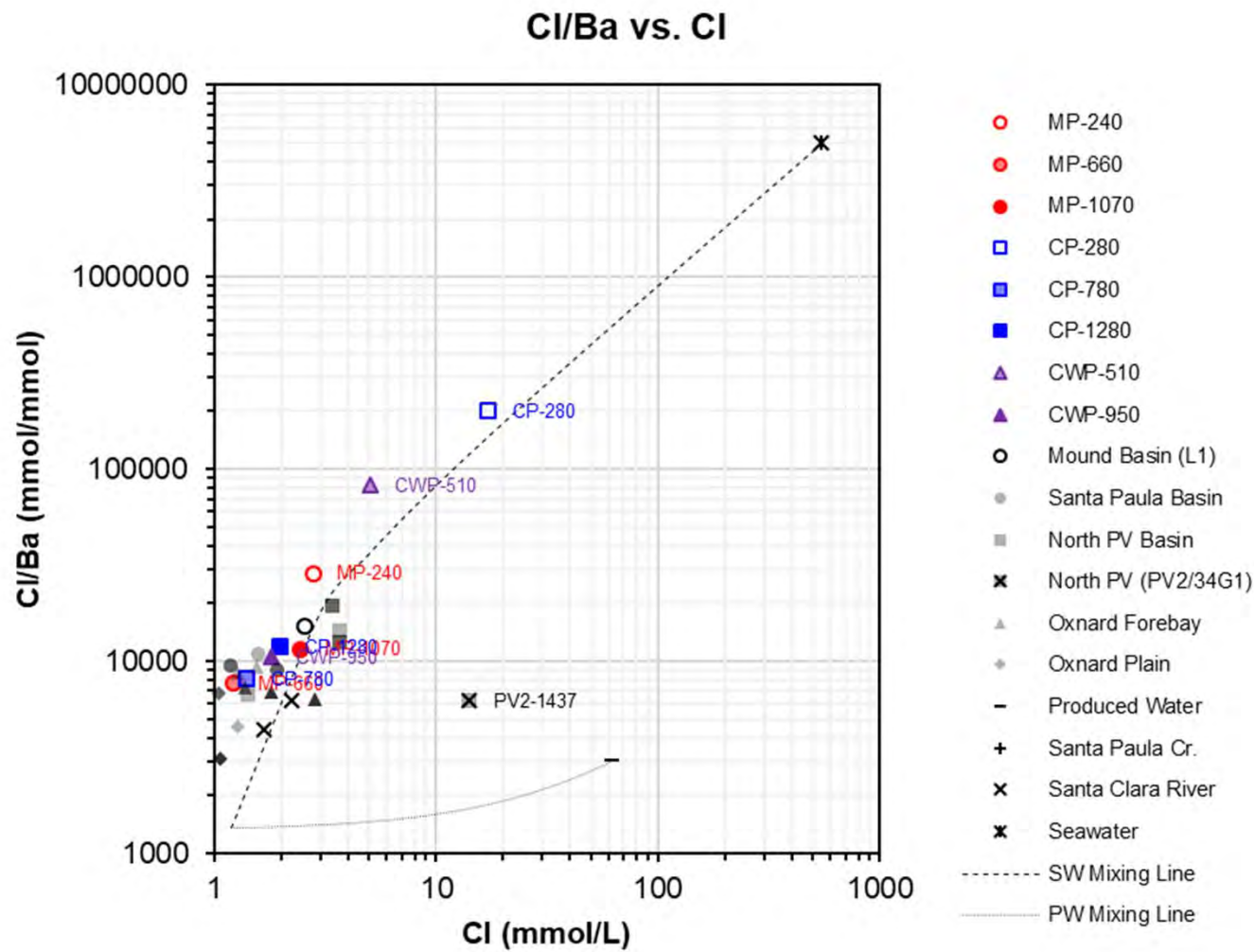


Figure 7B. Ratio of chloride-to-barium (Cl/Ba) as a function of chloride in groundwater and surface water in the Mound Basin and adjacent basins.

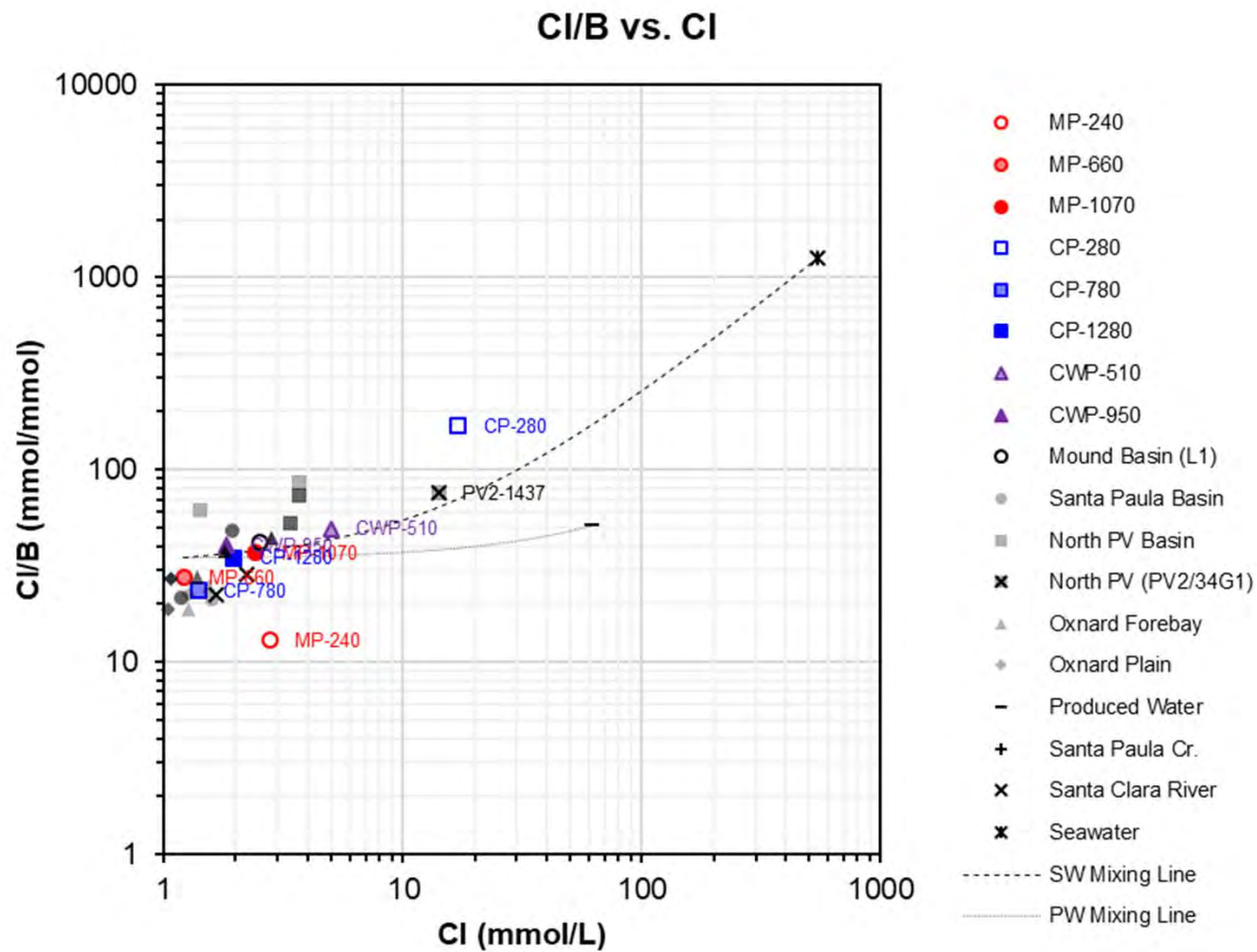


Figure 7C. Ratio of chloride-to-boron (Cl/B) as a function of chloride concentration in groundwater and surface water in the Mound Basin and adjacent basins.

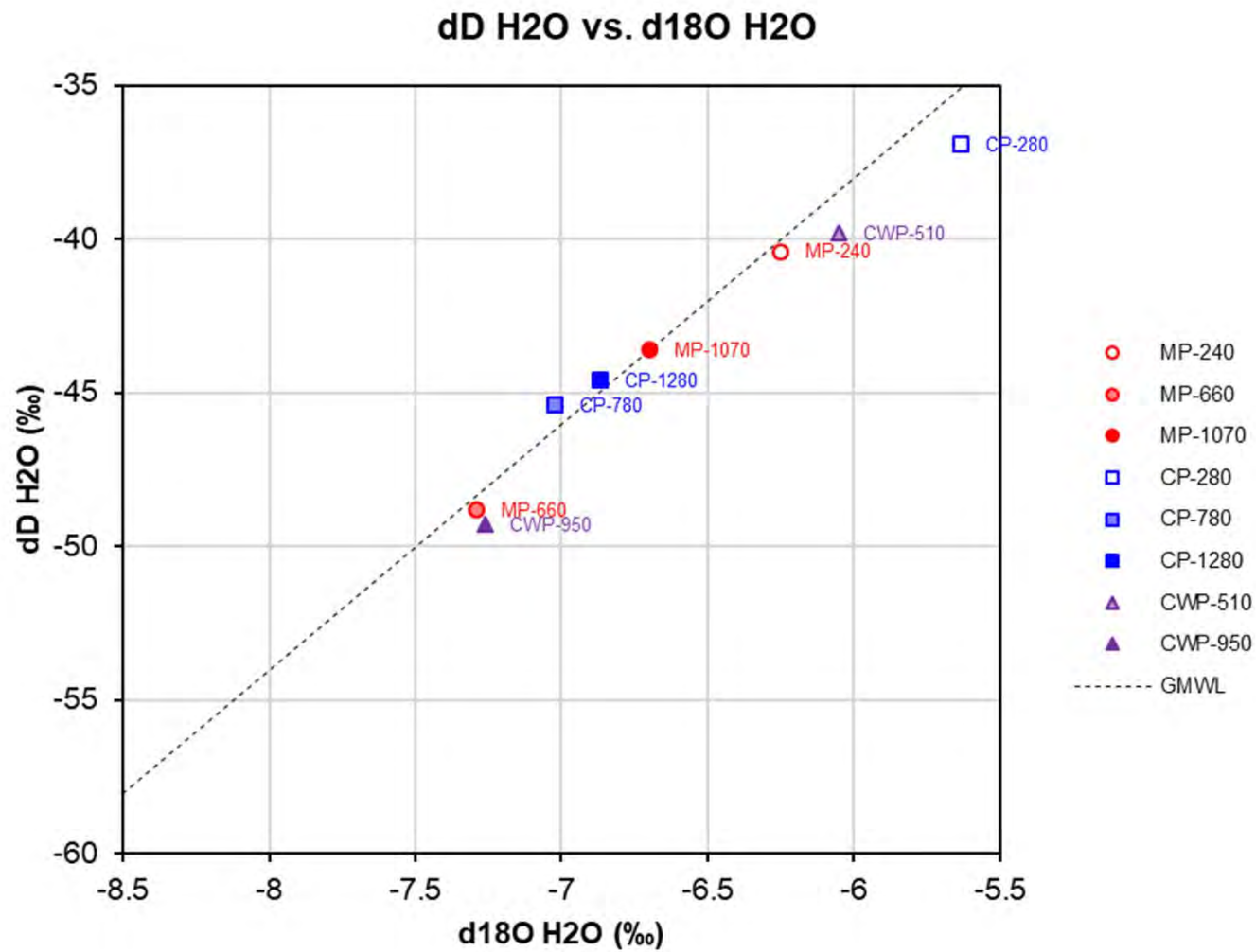


Figure 8A. δ D and δ^{18} O composition of groundwater in the Mound Basin.

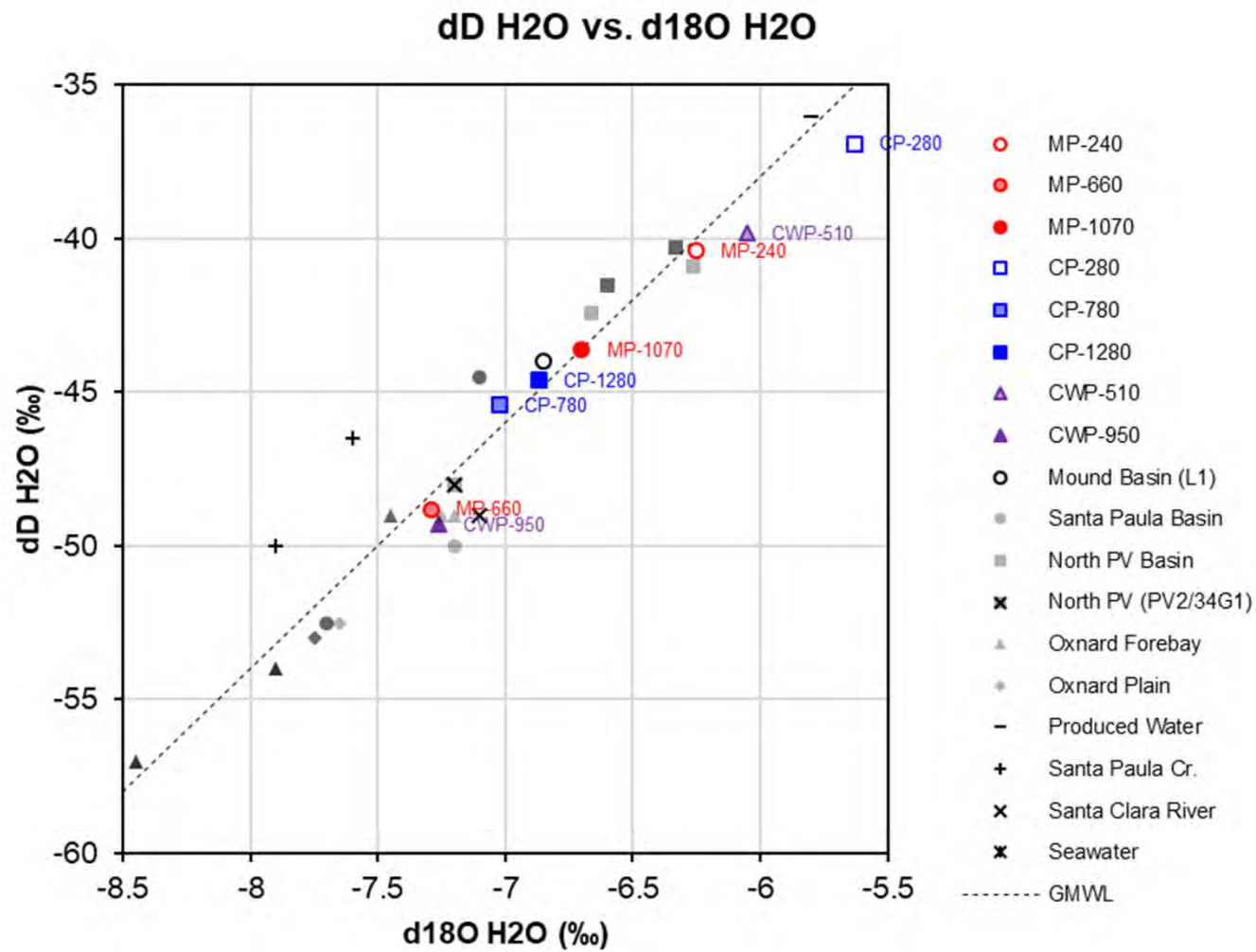


Figure 8B. δ D and δ^{18} O composition of groundwater and surface water in the Mound Basin and adjacent basins.

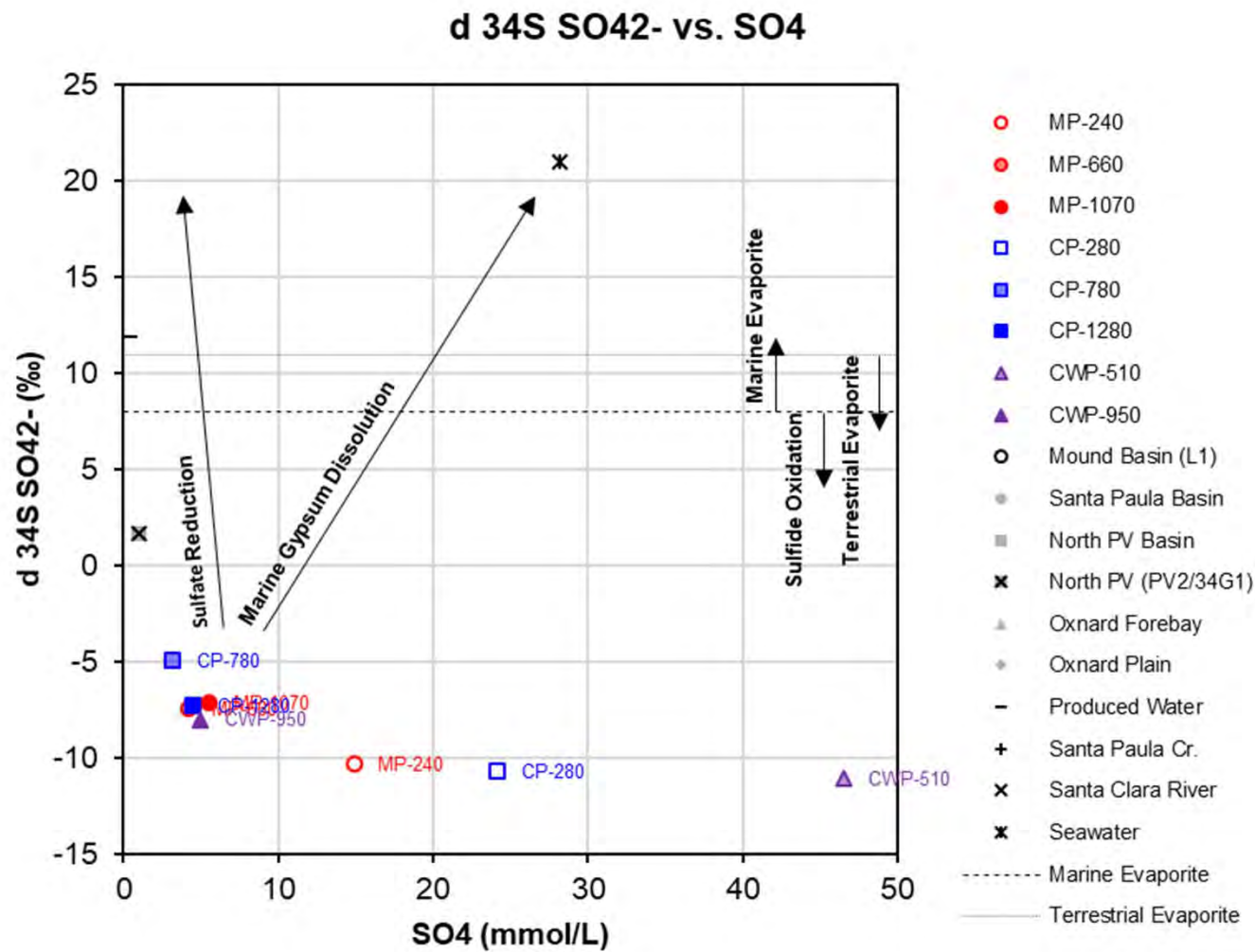


Figure 9A. δ³⁴S-SO₄ as a function of sulfate (SO₄²⁻) concentration in groundwater and surface water in the Mound Basin and adjacent basins.

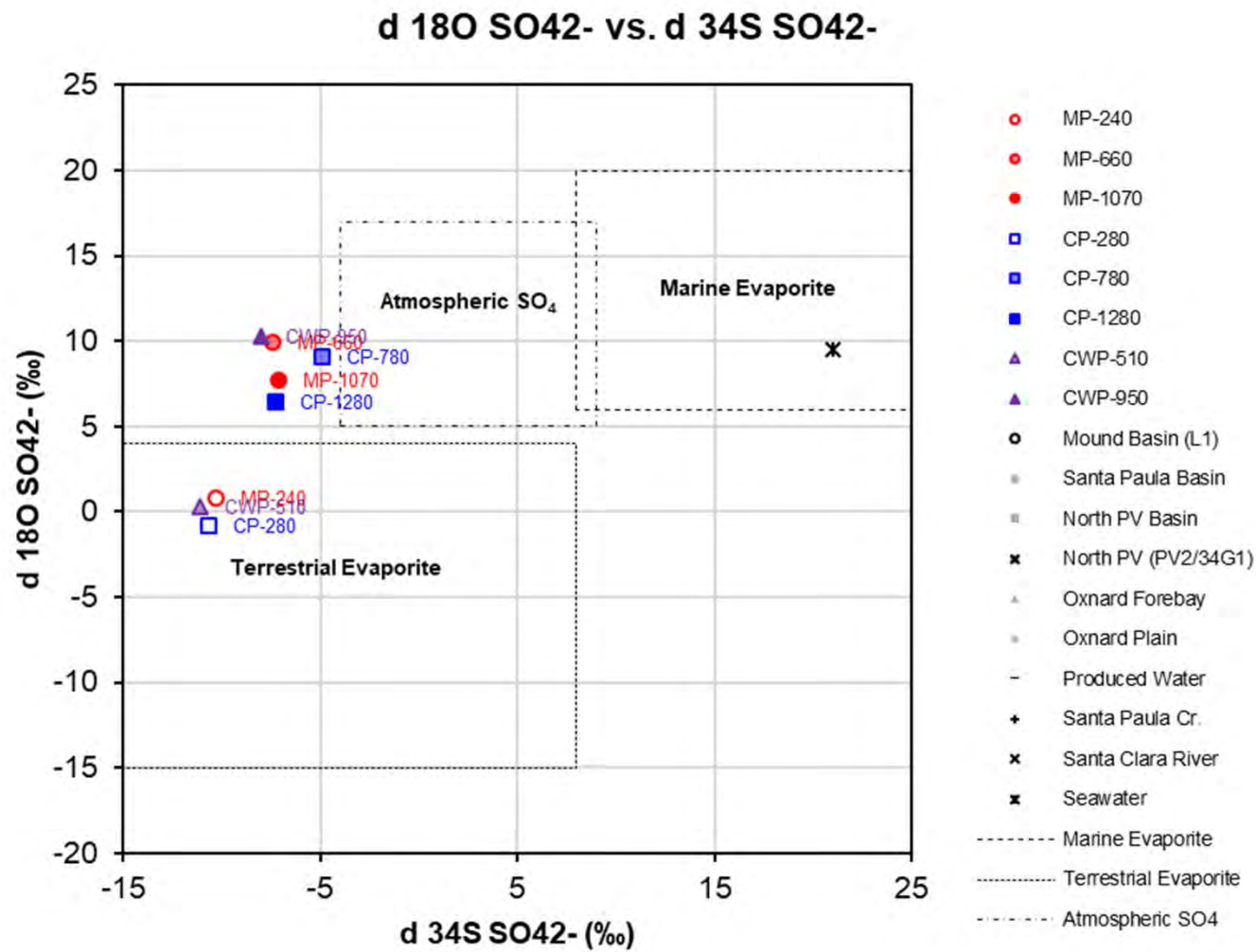


Figure 9B. $\delta^{18}\text{O-SO}_4$ as a function of $\delta^{34}\text{S-SO}_4$ in groundwater and surface water in the Mound Basin and adjacent basins.

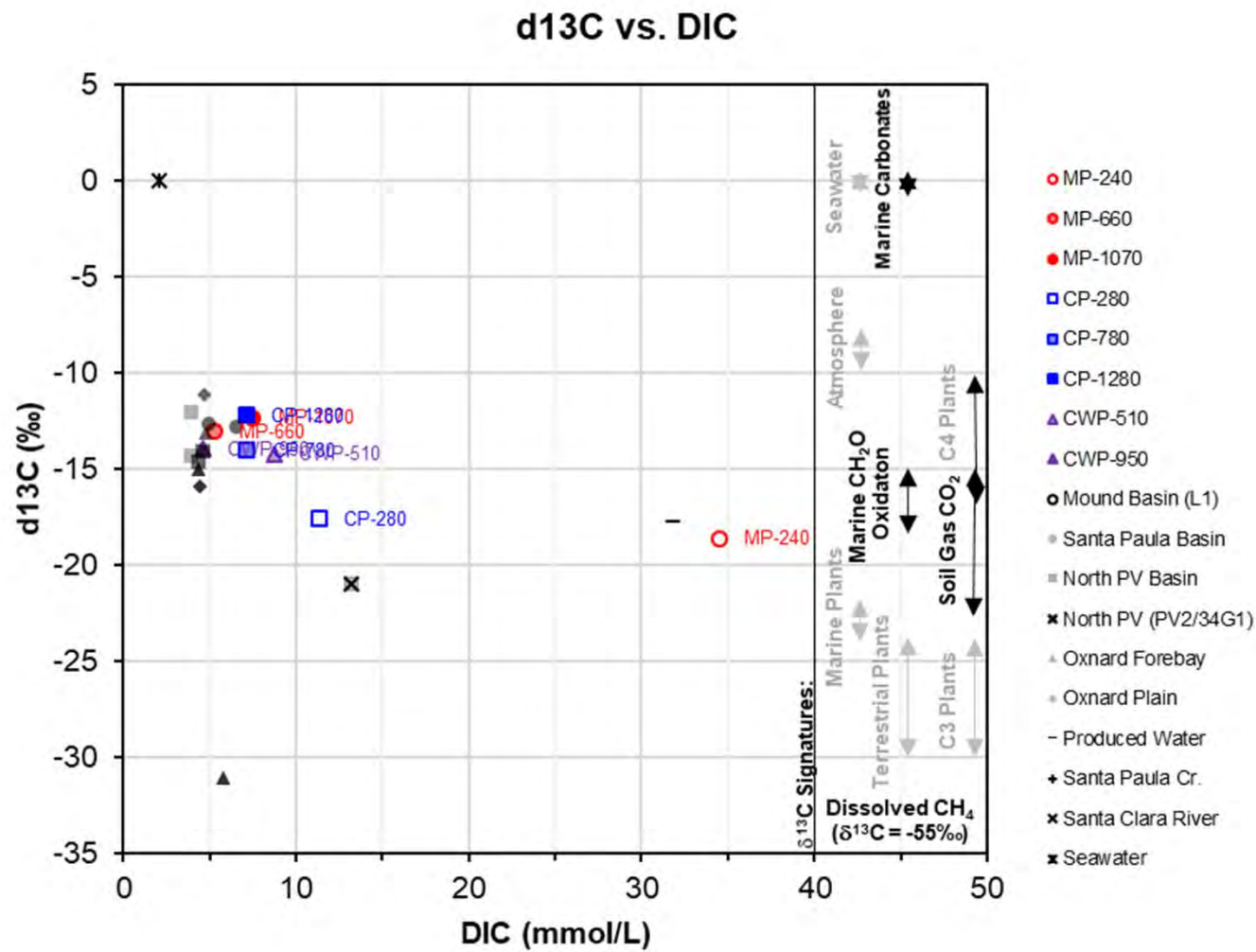


Figure 10. $\delta^{13}\text{C}$ as a function of dissolved inorganic carbon concentration in groundwater and surface water in the Mound Basin and adjacent basins.

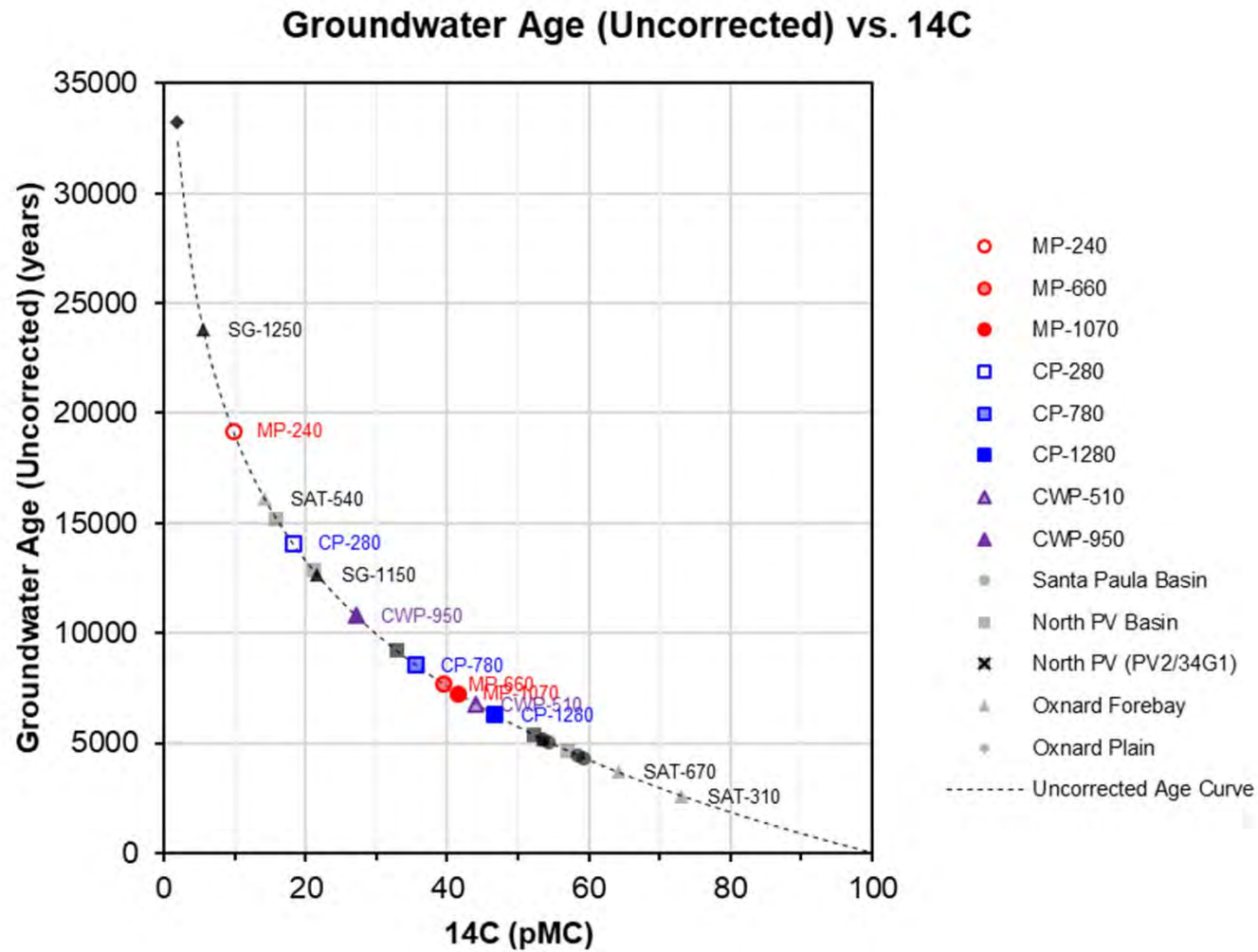


Figure 11A. Uncorrected groundwater ages as a function of carbon-14 (^{14}C) in groundwater in the Mound Basin and adjacent basins.

Groundwater Age (Uncorrected and Corrected) vs. 14C

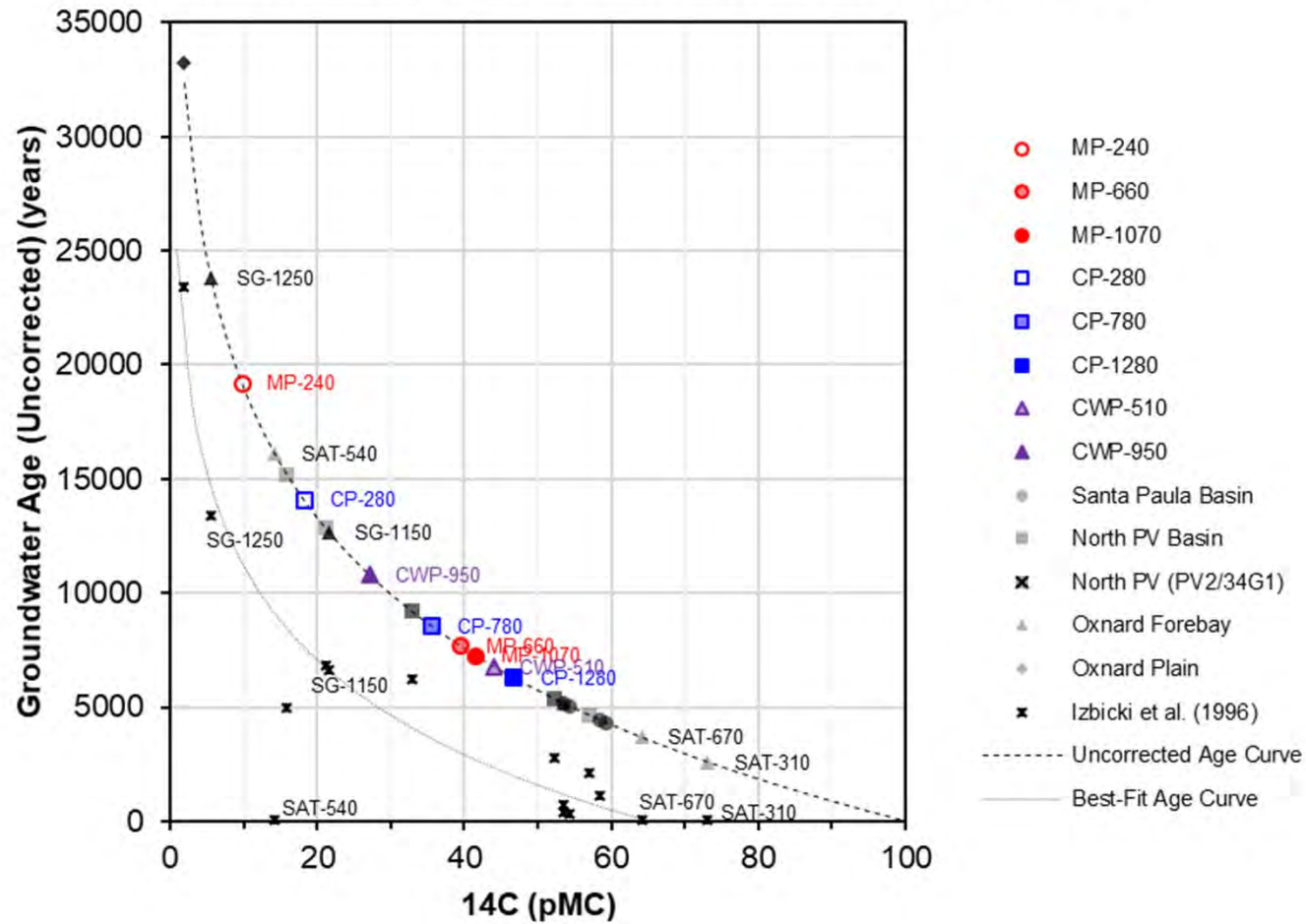


Figure 11B. Uncorrected and corrected groundwater ages as a function of carbon-14 (^{14}C) in groundwater in the Mound Basin and adjacent basins.

TABLES

Table 1. Description of Mound Basin Groundwater Samples and Other Samples Used for Comparison

Location	Well ID	Sample Description	Sample Name ¹	Min Depth (ft.-bgs)	Max Depth (ft.-bgs)	Date Sampled ²
Marina Park	02N23W15J03S	Semi-Perched	MP-240	170	240	7/30/2019
Marina Park	02N23W15J03S	Semi-Perched	MP-240	170	240	8/8/2019
Marina Park	02N23W15J02S	Mugu Aquifer	MP-660	480	660	7/30/2019
Marina Park	02N23W15J01S	Hueneme Aquifer	MP-1070	970	1070	7/30/2019
Marina Park	02N23W15J01S	Hueneme Aquifer	MP-1070 (DUP)	970	1070	7/30/2019
Camino Real Park	02N22W07M03S	Semi-Perched	CP-280	210	280	8/8/2019
Camino Real Park	02N22W07M02S	Mugu Aquifer	CP-780	710	780	7/31/2019
Camino Real Park	02N22W07M01S	Hueneme Aquifer	CP-1280	1200	1280	8/1/2019
Kimball Park	02N22W09L04S	Hueneme Aquifer	CWP-510	480	510	7/29/2019
Kimball Park	02N22W09L03S	Hueneme Aquifer	CWP-950	890	950	7/29/2019
Kimball Park	02N22W09L03S	Hueneme Aquifer	CWP-950	890	950	8/8/2019
Santa Paula Basin	003N021W16K001S	K1	K1-216	NR	216	8/27/1991
Santa Paula Basin	003N021W16K003S	K3	K3-720	NR	720	6/9/1992
Santa Paula Basin	003N022W36K004S	K4	K4-867	NR	867	6/10/1992
Santa Paula Basin	003N021W15G001S	SP1	SP1-680	660	680	6/14/1994
Santa Paula Basin	003N021W16H005S	SP2	SP2-550	530	550	6/16/1994
Mound Basin	002N022W08L001S	L1	L1-1775	NR	1775	7/23/1991
Pleasant Valley	002N021W34G005S	PV1	PV1-190	170	190	8/19/1993
Pleasant Valley	002N021W34G004S	PV1	PV1-380	360	380	8/18/1993
Pleasant Valley	002N021W34G003S	PV1	PV1-860	800	860	8/17/1993
Pleasant Valley	002N021W34G002S	PV1	PV1-998	938	998	8/17/1993
Pleasant Valley	002N021W34G001S	PV2	PV2-1437	403	1437	8/1/2002
Oxnard Forebay	002N022W23B007S	SG	SG-300	260	300	12/5/1990
Oxnard Forebay	002N022W23B006S	SG	SG-500	460	500	12/5/1990
Oxnard Forebay	002N022W23B005S	SG	SG-870	830	870	12/5/1990
Oxnard Forebay	002N022W23B004S	SG	SG-1150	1110	1150	11/28/1990
Oxnard Forebay	002N022W23B003S	SG	SG-1250	1210	1250	11/28/1990
Oxnard Forebay	002N022W23B003S	SG	SG-1250	1210	1250	11/28/1990
Oxnard Forebay	002N021W07L005S	SAT	SAT-310	270	310	11/27/1990
Oxnard Forebay	002N021W07L004S	SAT	SAT-540	500	540	11/28/1990
Oxnard Forebay	002N021W07L003S	SAT	SAT-670	640	670	11/27/1990
Oxnard Plain	001N023W01C005S	CM3	CM3-145	120	145	12/4/1990
Oxnard Plain	001N023W01C004S	CM3	CM3-695	630	695	12/4/1990
Oxnard Plain	001N023W01C002S	CM3	CM3-1490	1470	1490	12/4/1990
Oxnard Plain	001N021W-6	Produced Water	Produced Water	--	--	11/12/1992
Santa Paula Basin	11113500	Santa Paula Creek	Santa Paula Creek	--	--	4/28/1992
Santa Paula Basin	11113500	Santa Paula Creek	Santa Paula Creek	--	--	9/1/1992
Santa Paula Basin	3.41742E+14	Santa Clara River	Santa Clara River	--	--	2/28/1991
Santa Paula Basin	3.41742E+14	Santa Clara River	Santa Clara River	--	--	8/31/1992
Other	Seawater	Seawater	Seawater	--	--	--

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Table 2. Geochemical and Isotopic Testing Objectives and Parameters

Parameter Type	Parameter Data Objective	Parameter
General Geochemical Parameter	Characterize Groundwater Geochemistry	Conductivity
		Dissolved Oxygen
		ORP
		pH
		Temperature
	Characterize Groundwater Redox	Dissolved Organic Carbon
		Iron
		Manganese
Major Ion Tracer	Evaluate Sources of TDS	Total Dissolved Solids
		Calcium
		Magnesium
		Potassium
		Sodium
		Alkalinity (TIC) - Total, Bicarbonate, Carbonate
		Sulfate
		Chloride
	Evaluate Sources of Carbonate	Isotopes of Dissolved Inorganic Carbon (DIC) ($\delta^{13}C$)
	Evaluate Sources of Chloride	Barium
		Boron
		Bromide
		Iodide
	Evaluate Sources of Sulfate	Isotopes of Sulfate ($\delta^{34}S-SO_4$ and $\delta^{18}O-SO_4$)
	Evaluate Agricultural Sources	Nitrate-N
Nitrite-N		
Groundwater Tracer	Evaluate Recharge Sources	Isotopes of Water ($\delta^{18}O$ and δD)
	Estimate Groundwater/ Recharge Age	Carbon-14
		Tritium

Table 3. Summary of Field Parameters for Groundwater Samples

Location	Sample Name ¹	Date Sampled ²	Field Parameters					
			Temperature	Cond.	DO	ORP	Turbidity	pH
			deg.-C	uS/cm	mg/L	mV	NTU	s.u.
Marina Park	MP-240	7/30/2019	16.8	3096	0.94	-30	1	6.65
Marina Park	MP-240	8/8/2019	18.6	2330	--	--	Clear	6.44
Marina Park	MP-660	7/30/2019	19.1	1180	6	-37.7	3	7.39
Marina Park	MP-1070	7/30/2019	17.3	2207	0.85	-143	1	7.1
Marina Park	MP-1070 (DUP)	7/30/2019	--	--	--	--	--	--
Camino Real Park	CP-280	8/8/2019	19.93	6003	10.9	90.2	2	6.82
Camino Real Park	CP-780	7/31/2019	19.9	1240	5.3	-30.1	3	7.29
Camino Real Park	CP-1280	8/1/2019	16.9	1924	0.77	-138	5	7.09
Kimball Park	CWP-510	7/29/2019	19.3	6220	4.6	7.1	3	7.1
Kimball Park	CWP-950	7/29/2019	19.4	2153	1.08	-135	2	7.31
Kimball Park	CWP-950	8/8/2019	20.05	1474	7.3	159.3	1	7.5
Santa Paula Basin	K1-216	8/27/1991	19	1490	--	--	--	7.3
Santa Paula Basin	K3-720	6/9/1992	18.5	1300	--	--	--	7.2
Santa Paula Basin	K4-867	6/10/1992	19	1610	--	--	--	7.2
Mound Basin	L1-1775	7/23/1991	19.5	1960	--	--	--	7.4
Pleasant Valley	PV1-190	8/19/1993	21	1720	--	--	--	7.3
Pleasant Valley	PV1-380	8/18/1993	21	921	--	--	--	7.7
Pleasant Valley	PV1-860	8/17/1993	22.5	1630	--	--	--	7.5
Pleasant Valley	PV1-998	8/17/1993	23.5	1880	--	--	--	7.3
Pleasant Valley	PV2-1437	8/1/2002	--	3010	--	--	--	8.2
Oxnard Forebay	SG-300	12/5/1990	18.4	1490	--	--	--	7.4
Oxnard Forebay	SG-500	12/5/1990	17.5	1490	--	--	--	7.6
Oxnard Forebay	SG-870	12/5/1990	17.5	1450	--	--	--	8
Oxnard Forebay	SG-1150	11/28/1990	17.5	1160	0.4	--	--	8.1
Oxnard Forebay	SG-1250	11/28/1990	19	945	0.2	--	--	7.8
Oxnard Plain	CM3-145	12/4/1990	18	1200	0.7	--	--	8.4
Oxnard Plain	CM3-695	12/4/1990	18.5	1210	< 0.2	--	--	7.9
Oxnard Plain	CM3-1490	12/4/1990	19	830	< 0.2	--	--	8.1
Oxnard Plain	Produced Water	11/12/1992	>50	9000	--	--	--	7.1
Other	Santa Paula Creek	4/28/1992	20.5	693	--	--	--	8.4
Other	Santa Paula Creek	9/1/1992	23	775	--	--	--	8.6
Other	Santa Clara River	2/28/1991	13	1240	--	--	--	8.3
Other	Santa Clara River	8/31/1992	28	1730	--	--	--	--
Other	Seawater	--	--	--	--	--	--	8.22

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Table 4. Summary of Analytical Data for Groundwater and Surface Water Samples

Location	Sample Name ¹	Date Sampled ²	General		Cations				
			pH	TDS	Barium	Calcium	Magnesium	Potassium	Sodium
			s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Marina Park	MP-240	7/30/2019	6.89	3290	0.0131	366	241	18.8	374
Marina Park	MP-240	8/8/2019	7.03	3170	0.0133	336	244	19.4	376
Marina Park	MP-660	7/30/2019	7.66	909	0.0217	139	37.1	5.08	101
Marina Park	MP-1070	7/30/2019	7.59	1260	0.0288	185	45.9	5.46	164
Marina Park	MP-1070 (DUP)	7/30/2019	7.67	1300	0.0281	183	46.6	5.45	166
Camino Real Park	CP-280	8/8/2019	7.22	4950	0.0117	646	257	28	510
Camino Real Park	CP-780	7/31/2019	7.53	980	0.0239	129	44.8	5.31	121
Camino Real Park	CP-1280	8/1/2019	7.63	1070	0.0228	153	46	4.58	156
Kimball Park	CWP-510	7/29/2019	7.53	6230	0.0083	542	249	13.7	1080
Kimball Park	CWP-950	7/29/2019	7.93	1010	--	--	--	--	--
Kimball Park	CWP-950	8/8/2019	7.68	1160	0.0236	131	33.5	5.24	145
Santa Paula Basin	K1-216	8/27/1991	7.5	1240	0.02	180	54	3.8	120
Santa Paula Basin	K3-720	6/9/1992	7.4	946	0.017	150	40	4.2	89
Santa Paula Basin	K4-867	6/10/1992	7.4	1200	0.029	210	48	3.9	80
Mound Basin	L1-1775	7/23/1991	7.7	1510	0.023	200	62	6	190
Pleasant Valley	PV1-190	8/19/1993	7.8	1180	0.035	200	50	4.4	120
Pleasant Valley	PV1-380	8/18/1993	8	613	0.029	86	27	3.7	76
Pleasant Valley	PV1-860	8/17/1993	8	1150	0.024	130	40	4.9	180
Pleasant Valley	PV1-998	8/17/1993	7.4	1440	0.04	210	57	5.1	140
Pleasant Valley	PV2-1437	8/1/2002		1780	0.31	14	23	16	640
Oxnard Forebay	SG-300	12/5/1990	7.7	1070	0.023	140	48	4.9	110
Oxnard Forebay	SG-500	12/5/1990	7.7	1110	0.02	140	50	4.9	130
Oxnard Forebay	SG-870	12/5/1990	8	1090	0.026	140	38	4.7	120
Oxnard Forebay	SG-1150	11/28/1990	8	786	0.036	97	29	5.6	130
Oxnard Forebay	SG-1250	11/28/1990	7.9	563	0.061	42	14	4.4	150
Oxnard Plain	CM3-145	12/4/1990	8.1	806	0.038	92	24	5.8	130
Oxnard Plain	CM3-695	12/4/1990	7.9	818	0.021	93	29	4.9	120
Oxnard Plain	CM3-1490	12/4/1990	8	519	0.047	48	9.9	3.6	120
Oxnard Plain	Produced Water	11/12/1992	--	5370	2.8	180	35	74	1900
Other	Santa Paula Creek	4/28/1992	--	491	0.044	95	22	1.2	28
Other	Santa Paula Creek	9/1/1992	--	521	0.045	97	24	1.6	39
Other	Santa Clara River	2/28/1991	--	873	0.052	110	34	9.3	100
Other	Santa Clara River	8/31/1992	--	1230	0.049	170	60	6.9	130
Other	Seawater	--	--	35000	0.015	411	1290	399	10760

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Table 4. Summary of Analytical Data for Groundwater and Surface Water Samples

Location	Sample Name ¹	Date Sampled ²	Anions			Tracers		
			Alkalinity	Chloride	Sulfate	Boron	Bromide	Iodide
			mg/L CaCO ₃	mg/L	mg/L	mg/L	mg/L	mg/L
Marina Park	MP-240	7/30/2019	1010	96.8	1530	2.47	1.59	--
Marina Park	MP-240	8/8/2019	1030	98.7	1430	2.31	1.45	<0.25
Marina Park	MP-660	7/30/2019	244	43.3	400	0.48	0.38	<0.25
Marina Park	MP-1070	7/30/2019	323	86.2	531	0.709	1.12	<0.25
Marina Park	MP-1070 (DUP)	7/30/2019	319	86.1	532	0.656	1.12	--
Camino Real Park	CP-280	8/8/2019	450	607	2320	1.09	3.9	<0.25
Camino Real Park	CP-780	7/31/2019	326	49.8	302	0.642	0.61	<0.25
Camino Real Park	CP-1280	8/1/2019	304	69.8	427	0.611	0.91	<0.25
Kimball Park	CWP-510	7/29/2019	385	178	4470	1.1	0.87	<0.25
Kimball Park	CWP-950	7/29/2019	218	65.2	486	--	0.63	--
Kimball Park	CWP-950	8/8/2019	220	64.4	474	0.489	0.63	<0.25
Santa Paula Basin	K1-216	8/27/1991	290	56	630	0.81	0.31	0.023
Santa Paula Basin	K3-720	6/9/1992	220	42	400	0.59	0.24	0.038
Santa Paula Basin	K4-867	6/10/1992	290	68	520	0.43	0.74	0.16
Mound Basin	L1-1775	7/23/1991	290	90	710	0.66	0.57	0.11
Pleasant Valley	PV1-190	8/19/1993	180	130	530	0.46	0.62	0.005
Pleasant Valley	PV1-380	8/18/1993	190	50	220	0.25	0.21	0.052
Pleasant Valley	PV1-860	8/17/1993	220	120	490	0.7	0.26	0.038
Pleasant Valley	PV1-998	8/17/1993	200	130	690	0.54	0.54	0.039
Pleasant Valley	PV2-1437	8/1/2002	669	500	100	2	2.6	0.79
Oxnard Forebay	SG-300	12/5/1990	220	55	480	0.68	0.4	0.013
Oxnard Forebay	SG-500	12/5/1990	250	45	500	0.73	0.6	0.016
Oxnard Forebay	SG-870	12/5/1990	230	49	480	0.54	0.38	0.064
Oxnard Forebay	SG-1150	11/28/1990	220	64	350	0.52	0.1	0.15
Oxnard Forebay	SG-1250	11/28/1990	280	100	68	0.69	0.68	0.23
Oxnard Plain	CM3-145	12/4/1990	210	45	310	0.61	0.2	0.047
Oxnard Plain	CM3-695	12/4/1990	200	37	340	0.6	0.21	0.033
Oxnard Plain	CM3-1490	12/4/1990	220	38	110	0.43	0.26	0.063
Oxnard Plain	Produced Water	11/12/1992	1410	2200	47	13	11	4.8
Other	Santa Paula Creek	4/28/1992	175	21	200	0.11	0.1	0.009
Other	Santa Paula Creek	9/1/1992	188	17	210	0.16	0.16	0.018
Other	Santa Clara River	2/28/1991	131	59	460	0.8	0.16	0.038
Other	Santa Clara River	8/31/1992	221	79	610	0.84	0.26	0.033
Other	Seawater	--	116	19350	2710	4.7	69.7	--

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Table 5. Model-Calculated Saturation Indices for Selected Minerals in Regional Aquifers

Location	Sample Name ¹	Date Sampled ²	Saturation Index ³									
			CO2(g)	Calcite	Gypsum	Barite	Pyro-lusite	Bixbyite	Rhodo-chrosite	Fe(OH)3	Goethite	Siderite
Marina Park	MP-240	7/30/2019	-0.5	0.1	-0.4	0.3	-15.7	-16.7	-0.2	-0.4	2.4	-1.3
Marina Park	MP-240	8/8/2019	--	--	--	--	--	--	--	--	--	--
Marina Park	MP-660	7/30/2019	-2.0	0.3	-1.0	0.4	-13.3	-13.4	-0.9	3.0	5.8	-0.3
Marina Park	MP-1070	7/30/2019	-1.6	0.2	-0.8	0.6	-17.8	-18.2	-0.6	0.4	3.1	-0.4
Marina Park	MP-1070 (DUP)	7/30/2019	--	--	--	--	--	--	--	--	--	--
Camino Real Park	CP-280	8/8/2019	-1.2	0.4	0.0	0.4	-10.1	-10.4	-0.3	--	--	--
Camino Real Park	CP-780	7/31/2019	-1.8	0.3	-1.1	0.2	-12.9	-12.7	-0.4	2.9	5.7	-0.2
Camino Real Park	CP-1280	8/1/2019	-1.6	0.1	-0.9	0.4	-17.9	-18.4	-0.8	0.5	3.1	-0.4
Kimball Park	CWP-510	7/29/2019	-1.6	0.4	0.1	0.5	-12.6	-13.1	-0.8	-100.0	-100.0	-100.0
Kimball Park	CWP-950	7/29/2019	--	--	--	--	--	--	--	--	--	--
Kimball Park	CWP-950	8/8/2019	-2.1	0.4	-0.9	0.4	-5.8	-5.6	-0.7	4.5	7.3	-2.4
Santa Paula Basin	K1-216	8/27/1991	-1.8	0.4	-0.7	0.4	-11.4	-11.9	-1.1	--	--	--
Santa Paula Basin	K3-720	6/9/1992	-1.8	0.1	-0.9	0.2	-11.4	-11.6	-0.8	1.3	4.0	-2.9
Santa Paula Basin	K4-867	6/10/1992	-1.7	0.3	-0.7	0.5	-11.5	-11.8	-0.9	3.6	6.4	-0.4
Mound Basin	L1-1775	7/23/1991	-1.9	0.5	-0.7	0.5	-10.2	-9.8	-0.3	3.9	6.7	-0.5
Pleasant Valley	PV1-190	8/19/1993	-2.0	0.2	-0.8	0.6	-12.7	-14.7	-2.9	--	--	--
Pleasant Valley	PV1-380	8/18/1993	-2.4	0.4	-1.3	0.3	-9.8	-9.7	-1.1	--	--	--
Pleasant Valley	PV1-860	8/17/1993	-2.1	0.4	-0.9	0.4	-10.1	-10.1	-1.0	3.6	6.5	-1.1
Pleasant Valley	PV1-998	8/17/1993	-2.0	0.3	-0.7	0.7	-10.9	-11.4	-1.3	--	--	--
Pleasant Valley	PV2-1437	8/1/2002	-2.4	0.5	-2.6	0.8	-8.2	-7.6	-0.7	--	--	--
Oxnard Forebay	SG-300	12/5/1990	-1.6	0.7	-0.9	0.4	-12.3	-13.8	-1.8	1.8	4.6	-2.2
Oxnard Forebay	SG-500	12/5/1990	-2.2	0.5	-0.9	0.4	-11.5	-12.5	-2.0	2.5	5.2	-2.4
Oxnard Forebay	SG-870	12/5/1990	-2.6	0.9	-0.9	0.5	-8.6	-7.5	-0.3	4.1	6.8	-1.6
Oxnard Forebay	SG-1150	11/28/1990	-2.8	0.8	-1.1	0.6	-8.4	-7.2	-0.4	2.9	5.6	-3.0
Oxnard Forebay	SG-1250	11/28/1990	-2.3	0.4	-2.1	0.2	-9.7	-9.4	-0.9	3.3	6.0	-2.0
Oxnard Plain	CM3-145	12/4/1990	-3.0	1.1	-1.2	0.6	-7.1	-5.4	0.0	2.7	5.4	-3.8
Oxnard Plain	CM3-695	12/4/1990	-2.5	0.6	-1.2	0.3	-9.0	-8.2	-0.5	4.0	6.7	-1.5
Oxnard Plain	CM3-1490	12/4/1990	-2.7	0.6	-1.8	0.3	-8.3	-7.2	-0.5	3.9	6.6	-2.0
Oxnard Plain	Produced Water	11/12/1992	-1.0	0.8	-2.1	1.0	-10.8	-10.9	-0.1	2.2	5.2	-0.9
Other	Santa Paula Creek	4/28/1992	-3.2	1.1	-1.3	0.4	-7.7	-6.8	-1.1	2.7	5.5	-4.0
Other	Santa Paula Creek	9/1/1992	-3.3	1.3	-1.3	0.4	-6.9	-5.8	-1.2	2.4	5.3	-4.7
Other	Santa Clara River	2/28/1991	-3.2	0.7	-1.0	0.9	-8.5	-7.4	-0.7	3.2	5.8	-3.4
Other	Santa Clara River	8/31/1992	-2.9	1.3	-0.8	0.7	-7.0	-5.9	-1.0	2.3	5.4	-4.0
Other	Seawater	--	-3.5	0.7	-0.8	-0.3	-1.0	-2.4	-3.8	2.1	5.1	-9.1

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

3) "--" indicates incomplete data to calculate saturation index. For example, MP-240 (8/8/2019) is missing dissolved oxygen.

Table 6. Summary of Redox-Sensitive Analyte Concentrations in Groundwater and Surface Water Samples

Location	Sample Name ¹	Date Sampled ²	Redox Indicator					
			DOC	Iron	Manganese	Nitrate	Nitrite	Sulfide
			mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L
Marina Park	MP-240	7/30/2019	4.86	0.725	2.22	<0.1	<0.1	<0.05
Marina Park	MP-240	8/8/2019	5.31	0.688	2.22	<0.1	<0.1	<0.05
Marina Park	MP-660	7/30/2019	<0.5	1.15	0.108	<0.1	<0.1	<0.05
Marina Park	MP-1070	7/30/2019	1.24	1.61	0.354	<0.1	<0.1	<0.05
Marina Park	MP-1070 (DUP)	7/30/2019	1.13	1.59	0.354	<0.1	<0.1	<0.05
Camino Real Park	CP-280	8/8/2019	4.91	<0.021	1.72	53.4	0.6	<0.05
Camino Real Park	CP-780	7/31/2019	1.29	1.47	0.307	<0.1	<0.1	<0.05
Camino Real Park	CP-1280	8/1/2019	0.72	1.63	0.248	<0.1	<0.1	<0.05
Kimball Park	CWP-510	7/29/2019	2.47	<0.021	0.45	25.6	<0.1	<0.05
Kimball Park	CWP-950	7/29/2019	--	--	--	<0.1	<0.1	<0.05
Kimball Park	CWP-950	8/8/2019	0.85	0.538	0.163	<0.1	<0.1	<0.05
Santa Paula Basin	K1-216	8/27/1991	--	<0.003	0.086	0.74	< 0.010	--
Santa Paula Basin	K3-720	6/9/1992	--	0.005	0.23	1	< 0.010	--
Santa Paula Basin	K4-867	6/10/1992	--	1.3	0.18	< 0.050	< 0.010	--
Mound Basin	L1-1775	7/23/1991	--	0.78	0.47	2.98	0.02	--
Pleasant Valley	PV1-190	8/19/1993	--	<0.003	0.002	15	< 0.010	--
Pleasant Valley	PV1-380	8/18/1993	--	<0.003	0.035	--	0.01	--
Pleasant Valley	PV1-860	8/17/1993	--	0.18	0.082	< 0.050	< 0.010	--
Pleasant Valley	PV1-998	8/17/1993	--	<0.003	0.064	0.78	0.13	--
Pleasant Valley	PV2-1437	8/1/2002	7.9	<0.03	<0.005	<0.05	--	4
Oxnard Forebay	SG-300	12/5/1990	--	0.011	0.006	3.1	< 0.010	--
Oxnard Forebay	SG-500	12/5/1990	--	0.01	0.007	4.28	0.02	--
Oxnard Forebay	SG-870	12/5/1990	--	0.15	0.17	< 0.100	< 0.010	--
Oxnard Forebay	SG-1150	11/28/1990	--	0.009	0.11	< 0.100	< 0.010	--
Oxnard Forebay	SG-1250	11/28/1990	--	0.028	0.039	< 0.100	< 0.010	--
Oxnard Plain	CM3-145	12/4/1990	--	0.008	0.13	< 0.100	< 0.010	--
Oxnard Plain	CM3-695	12/4/1990	--	0.13	0.1	< 0.090	0.01	--
Oxnard Plain	CM3-1490	12/4/1990	--	0.085	0.071	< 0.100	< 0.010	--
Oxnard Plain	Produced Water	11/12/1992	--	0.28	0.37	<0.05	--	--
Other	Santa Paula Creek	4/28/1992	--	0.007	0.012	0.5	--	--
Other	Santa Paula Creek	9/1/1992	--	0.005	0.007	0.13	--	--
Other	Santa Clara River	2/28/1991	--	0.023	0.065	2.8	--	--
Other	Santa Clara River	8/31/1992	--	0.003	0.018	3.1	--	--
Other	Seawater	--	--	0.002	0.0002	0.001 - 0.45	--	--

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Table 7. Summary of Ion and Isotope Ratios in Groundwater and Surface Water Samples

Location	Sample Name ¹	Date Sampled ²	Ion Tracers			Stable Isotopes				
			Boron	Bromide	Iodide	d18O H2O	dD H2O	d 18O SO42-	d 34S SO42	d13C DIC
			mg/L	mg/L	mg/L	‰	‰	‰	‰	‰
Marina Park	MP-240	7/30/2019	2.47	1.59	--	--	--	--	--	--
Marina Park	MP-240	8/8/2019	2.31	1.45	<0.25	-6.25	-40.4	0.8	-10.3	-18.6
Marina Park	MP-660	7/30/2019	0.48	0.38	<0.25	-7.29	-48.8	9.9	-7.4	-13
Marina Park	MP-1070	7/30/2019	0.709	1.12	<0.25	-6.7	-43.6	7.7	-7.1	-12.3
Marina Park	MP-1070 (DUP)	7/30/2019	0.656	1.12	--	--	--	--	--	--
Camino Real Park	CP-280	8/8/2019	1.09	3.9	<0.25	-5.63	-36.9	-0.8	-10.7	-17.6
Camino Real Park	CP-780	7/31/2019	0.642	0.61	<0.25	-7.02	-45.4	9.1	-4.9	-14
Camino Real Park	CP-1280	8/1/2019	0.611	0.91	<0.25	-6.87	-44.6	6.4	-7.3	-12.2
Kimball Park	CWP-510	7/29/2019	1.1	0.87	<0.25	-6.05	-39.8	0.3	-11.1	-14.2
Kimball Park	CWP-950	7/29/2019	--	0.63	--	--	--	--	--	--
Kimball Park	CWP-950	8/8/2019	0.489	0.63	<0.25	-7.26	-49.3	10.3	-8	-13.9
Santa Paula Basin	K1-216	8/27/1991	0.81	0.31	0.023	-7.2	-50	--	--	--
Santa Paula Basin	K3-720	6/9/1992	0.59	0.24	0.038	-7.7	-52.5	--	--	-12.6
Santa Paula Basin	K4-867	6/10/1992	0.43	0.74	0.16	-7.1	-44.5	--	--	-12.8
Mound Basin	L1-1775	7/23/1991	0.66	0.57	0.11	-6.85	-44	--	--	--
Pleasant Valley	PV1-190	8/19/1993	0.46	0.62	0.005	-6.26	-40.9	--	--	-14.3
Pleasant Valley	PV1-380	8/18/1993	0.25	0.21	0.052	-6.66	-42.4	--	--	-12
Pleasant Valley	PV1-860	8/17/1993	0.7	0.26	0.038	-6.6	-41.5	--	--	-14.1
Pleasant Valley	PV1-998	8/17/1993	0.54	0.54	0.039	-6.33	-40.3	--	--	-14.6
Pleasant Valley	PV2-1437	8/1/2002	2	2.6	0.79	-7.2	-48	--	1.7	-21
Oxnard Forebay	SG-300	12/5/1990	0.68	0.4	0.013	-7.2	-49	--	--	--
Oxnard Forebay	SG-500	12/5/1990	0.73	0.6	0.016	-7.25	-49	--	--	--
Oxnard Forebay	SG-870	12/5/1990	0.54	0.38	0.064	-7.45	-49	--	--	-13.1
Oxnard Forebay	SG-1150	11/28/1990	0.52	0.1	0.15	-7.9	-54	--	--	-15
Oxnard Forebay	SG-1250	11/28/1990	0.69	0.68	0.23	-8.45	-57	--	--	-31.1
Oxnard Plain	CM3-145	12/4/1990	0.61	0.2	0.047	-7.65	-52.5	--	--	--
Oxnard Plain	CM3-695	12/4/1990	0.6	0.21	0.033	-7.75	-53	--	--	-11.1
Oxnard Plain	CM3-1490	12/4/1990	0.43	0.26	0.063	-8.85	-62.5	--	--	-15.9
Oxnard Plain	Produced Water	11/12/1992	13	11	4.8	-5.8	-36	--	11.9	-17.7
Other	Santa Paula Creek	4/28/1992	0.11	0.1	0.009	-7.9	-50	--	--	--
Other	Santa Paula Creek	9/1/1992	0.16	0.16	0.018	-7.6	-46.5	--	--	--
Other	Santa Clara River	2/28/1991	0.8	0.16	0.038	-13.6	-98.5	--	--	--
Other	Santa Clara River	8/31/1992	0.84	0.26	0.033	-7.1	-49	--	--	--
Other	Seawater	--	4.7	69.7	--	0.5	14	9.5	21	1E-12

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Table 8. Summary of Age Dating Results (Izbicki et al. 1996) and This Study

Location	Sample Name ¹	Date Sampled ²	Stable and Radiogenic Isotopes				Estimated Groundwater Ages		
			d13C DIC	14C DIC	14C Std. Dev.	Tritium	Uncorrected Age	Corrected Age (Izbicki et al. 1996)	Corrected Age (This Study)
			‰	pMC	pMC	TU	years	years	years
Marina Park	MP-240	7/30/2019	--	--	--	--	--	--	--
Marina Park	MP-240	8/8/2019	-18.6	9.8	0.1	-0.25	19202	--	1111
Marina Park	MP-660	7/30/2019	-13	39.5	0.1	0.03	7679	--	3037
Marina Park	MP-1070	7/30/2019	-12.3	41.6	0.2	-0.05	7251	--	2727
Marina Park	MP-1070 (DUP)	7/30/2019	--	--	--	--	--	--	--
Camino Real Park	CP-280	8/8/2019	-17.6	18.2	0.1	-0.12	14085	--	5367
Camino Real Park	CP-780	7/31/2019	-14	35.5	0.1	-0.04	8562	--	3677
Camino Real Park	CP-1280	8/1/2019	-12.2	46.7	0.2	-0.03	6295	--	2035
Kimball Park	CWP-510	7/29/2019	-14.2	44.1	0.2	0.04	6768	--	2378
Kimball Park	CWP-950	7/29/2019	--	--	--	--	--	--	--
Kimball Park	CWP-950	8/8/2019	-13.9	27.1	0.1	0.01	10794	--	5293
Santa Paula Basin	K3-720	6/9/1992	-12.6	59.3	--	0.9	4320	--	--
Santa Paula Basin	K4-867	6/10/1992	-12.8	58.4	--	--	4446	1100	--
Santa Paula Basin	SP1-680	6/14/1994	-13.4	54.3	--	--	5048	300	--
Santa Paula Basin	SP2-550	6/16/1994	-13.1	53.4	--	--	5186	400	--
Pleasant Valley	PV1-190	8/19/1993	-14.3	56.9	--	--	4662	2100	--
Pleasant Valley	PV1-436	8/19/1993	-14.5	15.9	--	--	15202	5000	--
Pleasant Valley	PV1-380	8/18/1993	-12	21.1	--	--	12863	6800	--
Pleasant Valley	PV1-860	8/17/1993	-14.1	52.3	--	--	5358	2800	--
Pleasant Valley	PV1-998	8/17/1993	-14.6	32.9	--	--	9190	6200	--
Oxnard Forebay	SG-870	12/5/1990	-13.1	53.5	--	--	5171	700	--
Oxnard Forebay	SG-1150	11/28/1990	-15	21.6	--	0.1	12669	6600	--
Oxnard Forebay	SG-1250	11/28/1990	-31.1	5.6	--	0.2	23829	13400	--
Oxnard Forebay	SAT-310	11/27/1990	-13.3	73.1	--	5.6	2590	<50	--
Oxnard Forebay	SAT-540	11/28/1990	-14.4	14.2	--	8.1	16137	<50	--
Oxnard Forebay	SAT-670	11/27/1990	-11.1	64.1	--	6	3677	<50	--
Oxnard Plain	CM3-1490	12/4/1990	-15.9	1.8	--	0.1	33212	23400	--

Footnotes: 1) MP-1070 (DUP) is a duplicate sample collected for quality control.

2) MP-240 (7/30/2019) and CWP-950 (7/29/2019) were resampled; The original July samples are reported for comparison.

Appendix A

Field Sampling Forms

MONITORING WELL WATER SAMPLE COLLECTION FORM

LOCATION	Project Number:	Location ID: CP-780	Start @ 1249
	Project Name: United Mound Basin		Date: 07/31/19
		Recorded By: Ap	

EQUIPMENT	Water Level: Durham Geoslope	Sampling Equipment: ST 1102	Equipment Decon: Hotsy
	PID:		

WELL INFO:	Casing ID (in) 2	Water Column (ft):	Ambient PID (ppm):
	Unit Casing Volume (gal/lin ft) 11.2	Well Volume (gal):	Well Head PID (ppm):
	Initial Depth to Water (ft): 182.88	Screen Interval (ft TOC): 110-780	Ground Condition of Well:
	Total Well Depth (ft): ~780	Pump Depth (ft TOC): 715'	Remarks:

CASING INFO	Casing ID (in)	1	1.5	2	3	4	5	6	8	10	12	16
	Unit Casing Volume (gal/lin ft):	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44

DATE	Time (24 hr)	Water Level (ft TOC)	Drawdown (ft)	Volume Removed (gal)	Pump Rate (gpm)	pH	Conductivity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remarks (odor, clarity, etc)
07/31/19	1331	183.00	0.12	5.5	50	7.29	1.27	360	6	9.6	20.6	0.64	Clear
	1404	183.04	0.16	11.2		7.31	1.25	-25.8	6	6.9	20.0	0.62	(Screen Vol.)
	1407	183.04	-	11.6		7.30	1.24	-26.2	4	6.9	20.0	0.62	
	1410	183.04	-	12.0		7.29	1.24	-28.3	3	6.3	19.9	0.62	
	1413	183.01	-	12.4		7.29	1.24	-30.1	3	6.3	19.9	0.62	

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailor	Parameter(s)
CP-780 @ 1415					

MONITORING WELL WATER SAMPLE COLLECTION FORM

LOCATION	Project Number:	Location ID: CP-1280	Date: 8-1-19
	Project Name: UNITED WATER - MOUND BASIN		Recorded By: TR

EQUIPMENT	Water Level: DURHAM	Sampling Equipment: ST1102	Equipment Decon: HOTS2
	PID:		

Screen WELL INFO:	Casing ID (in)	Water Column (ft):	Ambient PID (ppm): ~
	Unit Casing Volume (gal/lin ft) 12.8	Well Volume (gal):	Well Head PID (ppm): ~
	Initial Depth to Water (ft): 175.45	Screen Interval (ft TOC):	Ground Condition of Well:
	Total Well Depth (ft): 1280	Pump Depth (ft TOC): 1240	Remarks:

CASING INFO	Casing ID (in)	1	1.5	2	3	4	5	6	8	10	12	16
	Unit Casing Volume (gal/lin ft):	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44

DATE	Time (24 hr)	Water Level (ft TOC)	Drawdown (ft)	Volume Removed (gal)	Pump Rate (gpm) ML	pH	Conductivity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remarks (odor, clarity, etc)
BEGIN PURGE @ 0735 ~ 400 mL/min													
0825		175.87	0.22	5	400	7.14	1955	-120	5	1.59	16.9	1.00	NONE
0915		175.87	0.22	10	400	7.10	1938	-130	4	0.95	16.9	0.99	
0940		175.87	0.22	12.5		7.16	1929	-137	4	0.79	16.9	0.99	
0943		175.87	0.22	12.8		7.09	1925	-137	4	0.77	16.9	1.00	
0946		175.87	0.22	13.1		7.09	1924	-138	5	0.77	16.9	1.00	

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailor	Parameter(s)
0946 0947					

MONITORING WELL WATER SAMPLE COLLECTION FORM

LOCATION	Project Number:	Location ID: MP-1070	Date: 7-30-19
	Project Name: UNITED-MOUND BASIN		Recorded By: M

EQUIPMENT	Water Level: DURHAM	Sampling Equipment: ST1102	Equipment Decon: HOTS4
	PID: -		

SCREEN WELL INFO:	Casing ID (in): 2"	Water Column (ft):	Ambient PID (ppm): -
	Unit Casing Volume (gal/lin ft): 16 GALS	Well Volume (gal):	Well Head PID (ppm): -
	Initial Depth to Water (ft): 21.80	Screen Interval (ft TOC): 970-1070	Ground Condition of Well: 6000
	Total Well Depth (ft): ~1070	Pump Depth (ft TOC):	Remarks:

CASING INFO	Casing ID (in)	1	1.5	2	3	4	5	6	8	10	12	16
	Unit Casing Volume (gal/lin ft):	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44

DATE	Time (24 hr)	Water Level (ft TOC)	Drawdown (ft)	Volume Removed (gal)	Pump Rate (gpm)	pH	Conductivity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity ppt	Remarks (odor, clarity, etc)
7-30-19	BEGIN					0735			400 ml/min				
0825		21.82	0.08	5	400	7.03	2.151	-131	3	1.30	16.4	1.11	NONE
0915		21.88	0.08	10		7.14	2.179	-139	3	0.97	17.0	1.12	
1005		21.80	0.00	15		7.09	2.191	-142	2	0.88	17.2	1.13	
1015		21.82	0.02	16		7.09	2.205	-143	1	0.86	17.3	1.14	
1018		21.82	0.02	16.3		7.10	2.203	-143	1	0.86	17.3	1.14	
1021		21.82	0.02	16.6		7.10	2.207	-143	1	0.85	17.3	1.14	

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
02N23W15J01S					
1022					
(MS/MSD)					

TEST EQUIPMENT CALIBRATION LOG

PROJECT NAME UNITED WATER				PROJECT NUMBER 190729-TR				
EQUIPMENT NAME	EQUIPMENT NUMBER	DATE/TIME OF TEST	STANDARDS USED	EQUIPMENT READING	CALIBRATED TO: OR WITHIN 10%:	TEMP.	INITIALS	
YSI PRO +	176101533	0955	PH 7 10 4	7.03 10.04 4.00	OK	24°C	TR	
		7-29-19	↓	EC 3900	3918	OK	24°C	TR
			↓	D.O — ORP 240	102.5 241.6	OK	24°C	TR
YSI PRO +	176101533	0635	PH 7 10 4	7.05 10.03 3.98	7.00 10.00 4.00	19°C	TR	
		7-30-19	↓	EC 3900	3911	OK	19°C	TR
			↓	D.O — ORP 245	101.6% 240.7	OK	19°C	TR
YSI PRO +	176101533	0600	PH 7 10 4	7.00 10.02 4.02	OK	18°C	TR	
		7-31-19	↓	EC 3900	3909	OK	18°C	TR
			↓	D.O — ORP 240	101.2% 238.8	OK	18°C	TR
YSI PRO +	176101533	0635	PH 7 10 4	7.03 10.05 4.04	OK	19°C	TR	
		8-1-19	↓	EC 3900	3898	OK	20°C	TR
			↓	D.O — ORP 240.0	99.8% 240.6	OK	20°C	TR

MONITORING WELL WATER SAMPLE COLLECTION FORM

LOCATION	Project Number:	Location ID: CP-280	Date: 08/08/19
	Project Name:		Recorded By: HH

EQUIPMENT	Water Level: 1337127	Sampling Equipment: GED Bladder Pump	Equipment Decon: Liqui-nox + Steam / Pressure Wash
	PID:		

WELL INFO:	Casing ID (in) 2	Water Column (ft):	Ambient PID (ppm):
	Unit Casing Volume (gal/lin ft) Screen Vol = 11.2 gal	Well Volume (gal):	Well Head PID (ppm):
	Initial Depth to Water (ft): 20.43	Screen Interval (ft TOC): 70	Ground Condition of Well:
	Total Well Depth (ft): 280	Pump Depth (ft TOC): 245	Remarks:

CASING INFO	Casing ID (in) 2	1	1.5	2	3	4	5	6	8	10	12	16
	Unit Casing Volume (gal/lin ft):	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44

DATE	Time (24 hr)	Water Level (ft TOC)	Drawdown (ft)	Volume Removed (gal)	Pump Rate (gpm)	pH	Conductivity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remarks (odor, clarity, etc)
08/08/19	0930	start	None	0	0								
	1010	20.60	0.17	20000	500	6.77	6.016	109.9	12	13.6	19.83	3.29	Clear
	1048	20.68	0.25	39000	500	6.80	6.015	100.0	3.3	11.8	19.87	3.27	screen vol removed
	1051	20.69	0.26	40500	500	6.81	6.003	99.7	3	11.6	19.88	3.28	
	1054	20.69	0.26	42000	500	6.81	6.002	97.5	3	11.4	19.86	3.26	
	1057	20.69	0.26	43500	500	6.81	6.003	96.2	2	11.2	19.83	3.27	
	1100	20.69	0.26	45000	500	6.81	6.004	93.7	2	11.1	19.85	3.27	
	1103	20.69	0.26	46500	500	6.82	6.002	91.1	2	10.9	19.90	3.27	
	1106	20.69	0.26	48000	500	6.82	6.003	90.2	2	10.9	19.93	3.27	

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
02N22W07M035-1113					

MONITORING WELL WATER SAMPLE COLLECTION FORM

LOCATION	Project Number:	Location ID: GWP-950	Date: 08/08/19
	Project Name:		Recorded By: HA

EQUIPMENT	Water Level: 1337.21	Sampling Equipment: GED Bladder pump	Equipment Decon: Liguidox + Steam Pressure Wash
	PID:		

WELL INFO:	Casing ID (in) 2	Water Column (ft):	Ambient PID (ppm):
	Unit Casing Volume (gal/lin ft) Screen Vol =	Well Volume (gal):	Well Head PID (ppm):
	Initial Depth to Water (ft): 201.49	Screen Interval (ft TOC): 60	Ground Condition of Well:
	Total Well Depth (ft): 950	Pump Depth (ft TOC): 920	Remarks:

CASING INFO	Casing ID (in)	1	1.5	2	3	4	5	6	8	10	12	16
	Unit Casing Volume (gal/lin ft):	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44

DATE	Time (24 hr)	Water Level (ft TOC)	Drawdown (ft)	Volume Removed (gal)	Pump Rate (gpm)	pH	Conductivity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remarks (odor, clarity, etc)
08/08/19	1340												
	1350												- Start Purge -
	1415	201.54	0.05	17500	500	7.52	1.472	106.6	3	15.5	20.40	0.74	clear
	1453	201.56	0.07	36500	500	7.51	1.477	146.2	1	7.7	20.26	0.70	Screen Vol Removal
	1456	201.57	0.08	38000	500	7.51	1.480	151.3	1	7.7	20.07	0.74	
	1459	201.57	0.08	39500	500	7.50	1.475	155.6	1	7.5	20.10	0.74	
	1502	201.57	0.08	41000	500	7.50	1.474	159.3	1	7.3	20.05	0.74	

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
-1505					

Appendix B

ALS Environmental Laboratory Analytical Reports



August 19, 2019

Service Request No:K1906927

Brad Bessinger
S.S. Papadopoulos & Associates, Inc.
416 NE Dallas St., Suite 201
Camas, WA 98607

Laboratory Results for: Isotope Sampling

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory July 30, 2019
For your reference, these analyses have been assigned our service request number **K1906927**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3356. You may also contact me via email at Kurt.Clarkson@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kurt Clarkson
Sr. Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental



Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com



Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Received: 07/30/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Two water samples were received for analysis at ALS Environmental on 07/30/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by 

Date 08/19/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W09L03S	Lab ID: K1906927-001
--------------------------------	-----------------------------

Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	1010			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	218			15	mg/L	SM 2320 B
Bromide	0.63			0.10	mg/L	300.0
Chloride	65.2			1.0	mg/L	300.0
pH	7.93				pH Units	SM 4500-H+ B
Sulfate	486			20	mg/L	300.0

CLIENT ID: 02N22W09L04S	Lab ID: K1906927-002
--------------------------------	-----------------------------

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	2.47			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	6230			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	385			15	mg/L	SM 2320 B
Bromide	0.87			0.10	mg/L	300.0
Chloride	178			5.0	mg/L	300.0
Nitrate as Nitrogen	25.6			1.0	mg/L	300.0
pH	7.53				pH Units	SM 4500-H+ B
Sulfate	4470			400	mg/L	300.0
Barium	8.3			4.2	ug/L	6010C
Boron	1100			21	ug/L	6010C
Calcium	542000			21	ug/L	6010C
Magnesium	249000			5.3	ug/L	6010C
Manganese	450			1.1	ug/L	6010C
Potassium	13700			420	ug/L	6010C
Sodium	1080000			2100	ug/L	6010C



Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling

Service Request:K1906927

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
K1906927-001	02N22W09L03S	7/29/2019	1142
K1906927-002	02N22W09L04S	7/29/2019	1105



#bbessinger@sspa.com



CHAIN OF CUSTODY

101163

001

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068 www.alsglobal.com

SR# _____

COC Set _____ of _____

COC# _____

K1906927

Project Name: <u>isotope sampling</u>		Project Number: <u>150100-5111</u>		NUMBER OF CONTAINERS	0H	48H	7D	14D	28D	180D						Remarks				
Project Manager: <u>Brad Bessinger</u>		Company: <u>Mound Basin GSA - SS Papadopoulos +</u>			SM 4500-H+ B / pH	300.0 / NO2	300.0 / NO3	SM 2540 C / TDS	SM 4500-S2- D / Sulfide T	SM 2320 B-1997(2011) /	300.0 / Br	300.0 / Chloride	300.0 / SO4	SM 5310 C / TOC D	3010C / Metals T		1	2	3	4
Address: <u>416 NE Dallas St. suite 201, Camas, ASS.</u>		Phone #: <u>360-566-7119</u>		email: <u>* WA 98607</u>		Sampler Signature: <u>[Signature]</u>		Sampler Printed Name: <u>Andrew Pflam</u>		Matrix										
CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix																	
1. <u>02N22W09L03S</u>		<u>7/29/19</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
2. <u>02N22W09L04S</u>		<u>7/29/19</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				
9.																				
10.																				

Report Requirements <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	Invoice Information P.O.# _____ Bill To: <u>mound Basin</u> <u>GSA</u>	Circle which metals are to be analyzed Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg
	Turnaround Requirements <input type="checkbox"/> 24 hr. _____ 48 hr. <input type="checkbox"/> 5 Day <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____ *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)

Relinquished By: <u>K.K.</u>	Received By: _____	Relinquished By: _____	Received By: <u>[Signature]</u>	Relinquished By: _____	Received By: _____
Signature: <u>Katleen Kuepper</u>	Signature: <u>Yari R.</u>	Signature: _____	Signature: <u>Cody Graves</u>	Signature: _____	Signature: _____
Printed Name: <u>United Water</u>	Printed Name: <u>Fedex, Ventura</u>	Printed Name: _____	Printed Name: <u>ALS</u>	Printed Name: _____	Printed Name: _____
Firm: <u>7/29/19 2:17</u>	Firm: <u>7/29/19 2:17</u>	Firm: _____	Firm: <u>7/20/19 0940</u>	Firm: _____	Firm: _____
Date/Time: _____	Date/Time: _____	Date/Time: _____	Date/Time: _____	Date/Time: _____	Date/Time: _____



PC KC

Cooler Receipt and Preservation Form

Client Mound Basin GSA-SSPA Service Request K19 06927
 Received: 7/30/19 Opened: 7/30/19 By: CG Unloaded: 7/30/19 By: CG

1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) Cooler Box Envelope Other NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? 1 Front
- If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number	NA	Filed
1.3	1.3	5.9	5.9	0.0	386	101163	7887 6699 0481		

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
02N22W09L04S	1-250ml, P				X	NaOH	0.5ml	GENP/1-74E	CG	0950

Notes, Discrepancies, & Resolutions: _____



Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1906927

Sample Name: 02N22W09L03S
Lab Code: K1906927-001
Sample Matrix: Water

Date Collected: 07/29/19
Date Received: 07/30/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

Sample Name: 02N22W09L03S
Lab Code: K1906927-001.R01
Sample Matrix: Water

Date Collected: 07/29/19
Date Received: 07/30/19

Analysis Method	Extracted/Digested By	Analyzed By
6010C	YZOOK	EMCALLISTER

Sample Name: 02N22W09L04S
Lab Code: K1906927-002
Sample Matrix: Water

Date Collected: 07/29/19
Date Received: 07/30/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

ALS Group USA, Corp.

dba ALS Environmental

Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.

Service Request: K1906927

Project: Isotope Sampling/

Sample Name: 02N22W09L04S

Date Collected: 07/29/19

Lab Code: K1906927-002.R01

Date Received: 07/30/19

Sample Matrix: Water

Analysis Method

Extracted/Digested By

Analyzed By

6010C

YZOOK

EMCALLISTER



Sample Results

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L04S
Lab Code: K1906927-002

Service Request: K1906927
Date Collected: 07/29/19 11:05
Date Received: 07/30/19 09:40

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	8.3	ug/L	4.2	1	08/02/19 14:48	08/01/19	
Boron	6010C	1100	ug/L	21	1	08/02/19 14:48	08/01/19	
Calcium	6010C	542000	ug/L	21	1	08/02/19 14:48	08/01/19	
Iron	6010C	ND U	ug/L	21	1	08/02/19 14:48	08/01/19	
Magnesium	6010C	249000	ug/L	5.3	1	08/02/19 14:48	08/01/19	
Manganese	6010C	450	ug/L	1.1	1	08/02/19 14:48	08/01/19	
Potassium	6010C	13700	ug/L	420	1	08/02/19 14:48	08/01/19	
Sodium	6010C	1080000	ug/L	2100	10	08/05/19 14:48	08/01/19	



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L03S
Lab Code: K1906927-001

Service Request: K1906927
Date Collected: 07/29/19 11:42
Date Received: 07/30/19 09:40

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	218	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	0.63	mg/L	0.10	2	07/30/19 12:10	
Chloride	300.0	65.2	mg/L	1.0	10	07/30/19 14:12	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	07/30/19 12:10	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	07/30/19 12:10	
pH	SM 4500-H+ B	7.93	pH Units	-	1	07/30/19 13:15	H
Sulfate	300.0	486	mg/L	20	100	07/30/19 14:22	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L03S
Lab Code: K1906927-001

Service Request: K1906927
Date Collected: 07/29/19 11:42
Date Received: 07/30/19 09:40
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Solids, Total Dissolved	SM 2540 C	1010	mg/L	5.0	1	07/31/19 00:00	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L04S
Lab Code: K1906927-002

Service Request: K1906927
Date Collected: 07/29/19 11:05
Date Received: 07/30/19 09:40
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	385	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	0.87	mg/L	0.10	2	07/30/19 13:01	
Chloride	300.0	178	mg/L	5.0	50	07/30/19 14:52	
Nitrate as Nitrogen	300.0	25.6	mg/L	1.0	20	07/30/19 14:42	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	07/30/19 13:01	
pH	SM 4500-H+ B	7.53	pH Units	-	1	07/30/19 13:22	H
Sulfate	300.0	4470	mg/L	400	2000	07/30/19 15:02	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L04S
Lab Code: K1906927-002

Service Request: K1906927
Date Collected: 07/29/19 11:05
Date Received: 07/30/19 09:40
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	2.47	mg/L	0.50	1	08/02/19 16:20	
Solids, Total Dissolved	SM 2540 C	6230	mg/L	5.0	1	07/31/19 00:00	



QC Summary Forms

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: KQ1910752-07

Service Request: K1906927
Date Collected: NA
Date Received: NA
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	ND U	ug/L	4.2	1	08/02/19 14:26	08/01/19	
Boron	6010C	ND U	ug/L	21	1	08/02/19 14:26	08/01/19	
Calcium	6010C	37	ug/L	21	1	08/02/19 14:26	08/01/19	
Iron	6010C	ND U	ug/L	21	1	08/02/19 14:26	08/01/19	
Magnesium	6010C	ND U	ug/L	5.3	1	08/02/19 14:26	08/01/19	
Manganese	6010C	ND U	ug/L	1.1	1	08/02/19 14:26	08/01/19	
Potassium	6010C	ND U	ug/L	420	1	08/02/19 14:26	08/01/19	
Sodium	6010C	ND U	ug/L	210	1	08/05/19 14:26	08/01/19	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Analyzed: 08/02/19 - 08/05/19

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ1910752-08

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Barium	6010C	5300	5000	106	80-120
Boron	6010C	529	500	106	80-120
Calcium	6010C	13200	12500	105	80-120
Iron	6010C	2620	2500	105	80-120
Magnesium	6010C	12000	12500	96	80-120
Manganese	6010C	1200	1250	96	80-120
Potassium	6010C	13900	12500	111	80-120
Sodium	6010C	12300	12500	99	80-120



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906927-MB1

Service Request: K1906927
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	ND U	mg/L	0.050	1	07/30/19 12:00	
Chloride	300.0	ND U	mg/L	0.10	1	07/30/19 12:00	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	1	07/30/19 12:00	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	1	07/30/19 12:00	
Sulfate	300.0	ND U	mg/L	0.20	1	07/30/19 12:00	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906927-MB1

Service Request: K1906927
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	ND U	mg/L	0.50	1	08/02/19 14:42	
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	07/31/19 00:00	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906927-MB2

Service Request: K1906927
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	07/31/19 00:00	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Collected: 07/29/19
Date Received: 07/30/19
Date Analyzed: 7/30/19

**Duplicate Matrix Spike Summary
General Chemistry Parameters**

Sample Name: 02N22W09L03S **Units:** mg/L
Lab Code: K1906927-001 **Basis:** NA

Analyte Name	Method	Sample Result	Result	Matrix Spike K1906927-001MS			Duplicate Matrix Spike K1906927-001DMS			RPD	RPD Limit
				Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits		
Bromide	300.0	0.63	8.54	8.00	99	8.62	8.00	100	90-110	<1	20
Nitrate as Nitrogen	300.0	ND U	7.65	8.00	96	7.70	8.00	96	90-110	<1	20
Nitrite as Nitrogen	300.0	ND U	7.87	8.00	98	7.92	8.00	99	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Collected: 07/29/19
Date Received: 07/30/19
Date Analyzed: 07/30/19 - 07/31/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W09L03S
Lab Code: K1906927-001

Units: mg/L
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1906927-001DUP Result	Average	RPD	RPD Limit
Bromide	300.0	0.10	0.63	0.61	0.622	3	20
Nitrate as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20
Solids, Total Dissolved	SM 2540 C	5.0	1010	1000	1010	<1	5
Nitrite as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Collected: 07/29/19
Date Received: 07/30/19
Date Analyzed: 07/30/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W09L03S
Lab Code: K1906927-001

Units: pH Units
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1906927-001DUP Result	Average	RPD	RPD Limit
pH	SM 4500-H+ B	-	7.93	8.06	8.00	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.

Project: Isotope Sampling

Sample Matrix: Water

Service Request: K1906927

Date Collected: 07/29/19

Date Received: 07/30/19

Date Analyzed: 07/31/19 - 08/02/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W09L04S

Units: mg/L

Lab Code: K1906927-002

Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1906927-002DUP Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	2.47	2.43	2.45	2	10
Solids, Total Dissolved	SM 2540 C	5.0	6230	6390	6310	2	5

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Collected: NA
Date Received: NA
Date Analyzed: 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907038-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907038-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	145	143	144	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Collected: NA
Date Received: NA
Date Analyzed: 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907038-012

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907038-012DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	118	117	118	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Analyzed: 07/30/19 - 08/06/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1906927-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO ₃ , Total	SM 2320 B	163	163	100	90-110
Bromide	300.0	2.49	2.50	100	90-110
Carbon, Dissolved Organic (DOC)	SM 5310 C	24.8	25.0	99	83-117
Chloride	300.0	4.76	5.00	95	90-110
Nitrate as Nitrogen	300.0	2.43	2.50	97	90-110
Nitrite as Nitrogen	300.0	2.49	2.50	99	90-110
Solids, Total Dissolved	SM 2540 C	893	922	97	85-115
Sulfate	300.0	4.94	5.00	99	90-110
Total Sulfide	SM 4500-S2- D	0.190	0.193	98	85-106

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Analyzed: 07/30/19

Lab Control Sample Summary
General Chemistry Parameters

Units:pH Units
Basis:NA

Lab Control Sample
K1906927-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
pH	SM 4500-H+ B	9.35	9.34	100	85-115

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906927
Date Analyzed: 08/06/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 646126

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1906927-LCS2	164	163	101	90-110



August 19, 2019

Service Request No:K1906970

Brad Bessinger
S.S. Papadopoulos & Associates, Inc.
416 NE Dallas St., Suite 201
Camas, WA 98607

Laboratory Results for: Isotope Sampling

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory July 31, 2019
For your reference, these analyses have been assigned our service request number **K1906970**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3356. You may also contact me via email at Kurt.Clarkson@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kurt Clarkson
Sr. Project Manager

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ALS Group USA, Corp.
dba ALS Environmental



Narrative Documents

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Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Received: 07/31/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Three water samples were received for analysis at ALS Environmental on 07/31/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by *Kurt Clarkson*

Date 08/19/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N23W15J01S **Lab ID: K1906970-001**

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	1.24			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	1260			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	323			15	mg/L	SM 2320 B
Bromide	1.12			0.10	mg/L	300.0
Chloride	86.2			1.0	mg/L	300.0
pH	7.59				pH Units	SM 4500-H+ B
Sulfate	531			20	mg/L	300.0
Barium	28.8			4.2	ug/L	6010C
Boron	709			21	ug/L	6010C
Calcium	185000			21	ug/L	6010C
Iron	1610			21	ug/L	6010C
Magnesium	45900			5.3	ug/L	6010C
Manganese	354			1.1	ug/L	6010C
Potassium	5460			420	ug/L	6010C
Sodium	164000			210	ug/L	6010C

CLIENT ID: 02N23W15J02S **Lab ID: K1906970-002**

Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	909			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	244			15	mg/L	SM 2320 B
Bromide	0.38			0.10	mg/L	300.0
Chloride	43.3			1.0	mg/L	300.0
pH	7.66				pH Units	SM 4500-H+ B
Sulfate	400			20	mg/L	300.0
Barium	21.7			4.2	ug/L	6010C
Boron	480			21	ug/L	6010C
Calcium	139000			21	ug/L	6010C
Iron	1150			21	ug/L	6010C
Magnesium	37100			5.3	ug/L	6010C
Manganese	108			1.1	ug/L	6010C
Potassium	5080			420	ug/L	6010C
Sodium	101000			210	ug/L	6010C

CLIENT ID: 02N23W15J03S **Lab ID: K1906970-003**

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	4.86			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	3290			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	1010			150	mg/L	SM 2320 B
Bromide	1.59			0.10	mg/L	300.0
Chloride	96.8			2.0	mg/L	300.0
pH	6.89				pH Units	SM 4500-H+ B
Sulfate	1530			100	mg/L	300.0



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N23W15J03S

Lab ID: K1906970-003

Analyte	Results	Flag	MDL	MRL	Units	Method
Barium	13.1			4.2	ug/L	6010C
Boron	2470			21	ug/L	6010C
Calcium	366000			21	ug/L	6010C
Iron	725			21	ug/L	6010C
Magnesium	241000			5.3	ug/L	6010C
Manganese	2220			1.1	ug/L	6010C
Potassium	18800			420	ug/L	6010C
Sodium	374000			210	ug/L	6010C



Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling

Service Request:K1906970

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
K1906970-001	02N23W15J01S	7/30/2019	1022
K1906970-002	02N23W15J02S	7/30/2019	1055
K1906970-003	02N23W15J03S	7/30/2019	1115



CHAIN OF CUSTODY
101163

001

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

SR# K1906970
COC Set _____ of _____
COC# _____

Project Name <u>isotope sampling</u>		Project Number:		NUMBER OF CONTAINERS	0H	48H	7D	14D	28D			180D	Remarks			
Project Manager <u>Brad Bessinger</u>					SM 4500-H+ B / pH	300.0 / NO2	300.0 / NO3	SM 2540 C / TDS	SM 4500-S2-D / Sulfide T	SM 2320 B-1997(2011) /	300.0 / Br	300.0 / Chloride		300.0 / SO4	SM 5310 C / TOC D	8010C / Metals T
Company <u>SS Papadopoulos + ASS.</u>																
Address <u>416 NE Dallas St. suite 201, Camas</u>																
Phone # <u>360-566-7119</u>		email <u>WA, 98607</u>														
Sampler Signature		Sampler Printed Name <u>Andrew Phan</u> <u>Travis Rhym</u>														
CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix													
<u>1.02N23W15J01S</u>		<u>7/30/19 10:22</u>		<u>15</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>MS/MSD</u>		
<u>2.02N23W15J02S</u>		<u>7/30/19 10:55</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
<u>3.02N23W15J03S</u>		<u>7/30/19 11:15</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
4.02N22W07M02S		7/30/19		5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
5.																
6.																
7.																
8.																
9.																
10.																

Report Requirements <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	Invoice Information P.O.# _____ Bill To: <u>MOUND bottom</u> <u>GSA</u>	Circle which metals are to be analyzed Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg	
	Turnaround Requirements <input type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input checked="" type="checkbox"/> 5 Day <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____ *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)	
	Requested Report Date _____		

Relinquished By: <u>K. Kuepper</u>	Received By:	Relinquished By:	Received By: <u>Cody Graves</u>	Relinquished By:	Received By:
Signature <u>Katleen Kuepper</u>	Signature	Signature	Signature <u>Cody Graves</u>	Signature	Signature
Printed Name <u>United Water</u>	Printed Name <u>Fed ex</u>	Printed Name	Printed Name <u>ALS</u>	Printed Name	Printed Name
Firm <u>7/30/19 14:50</u>	Firm <u>7/30/19 14:50</u>	Firm	Firm <u>7/31/19 1000</u>	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time



PC KC

Cooler Receipt and Preservation Form

Client SS Papadopoulos / United Water Conservation Service Request K1906970

Received: 7/31/19 Opened: 7/31/19 By: CG Unloaded: 7/31/19 By: CG

- 1. Samples were received via? **USPS** **Fed Ex** **UPS** **DHL** **PDX** **Courier** **Hand Delivered**
- 2. Samples were received in: (circle) **Cooler** **Box** **Envelope** **Other** NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? (1 Front)
- If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
0.4	0.2	4.8	4.6	-0.2	384	101163	7887 9745 6323	

- 4. Packing material: **Inserts** **Baggies** **Bubble Wrap** **Gel Packs** **Wet Ice** **Dry Ice** **Sleeves**
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: **Frozen** **Partially Thawed** **Thawed**
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
02N23w15J03S	1	250 mL P				X	NaOH	0.5 mL	GENP/1-74-E	CG	1020

Notes, Discrepancies, & Resolutions: _____



Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.

i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1906970

Sample Name: 02N23W15J01S
Lab Code: K1906970-001
Sample Matrix: Water

Date Collected: 07/30/19
Date Received: 07/31/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

Sample Name: 02N23W15J01S
Lab Code: K1906970-001.R01
Sample Matrix: Water

Date Collected: 07/30/19
Date Received: 07/31/19

Analysis Method	Extracted/Digested By	Analyzed By
6010C	YZOOK	EMCALLISTER

Sample Name: 02N23W15J02S
Lab Code: K1906970-002
Sample Matrix: Water

Date Collected: 07/30/19
Date Received: 07/31/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1906970

Sample Name: 02N23W15J02S
Lab Code: K1906970-002.R01
Sample Matrix: Water

Date Collected: 07/30/19
Date Received: 07/31/19

Analysis Method	Extracted/Digested By	Analyzed By
6010C	YZOOK	EMCALLISTER

Sample Name: 02N23W15J03S
Lab Code: K1906970-003
Sample Matrix: Water

Date Collected: 07/30/19
Date Received: 07/31/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

Sample Name: 02N23W15J03S
Lab Code: K1906970-003.R01
Sample Matrix: Water

Date Collected: 07/30/19
Date Received: 07/31/19

Analysis Method	Extracted/Digested By	Analyzed By
6010C	YZOOK	EMCALLISTER
SM 2320 B		DBRADBURY



Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com



Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Service Request: K1906970
Date Collected: 07/30/19 10:22
Date Received: 07/31/19 10:00

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	28.8	ug/L	4.2	1	08/02/19 14:30	08/01/19	
Boron	6010C	709	ug/L	21	1	08/02/19 14:30	08/01/19	
Calcium	6010C	185000	ug/L	21	1	08/02/19 14:30	08/01/19	
Iron	6010C	1610	ug/L	21	1	08/02/19 14:30	08/01/19	
Magnesium	6010C	45900	ug/L	5.3	1	08/05/19 14:31	08/01/19	
Manganese	6010C	354	ug/L	1.1	1	08/02/19 14:30	08/01/19	
Potassium	6010C	5460	ug/L	420	1	08/02/19 14:30	08/01/19	
Sodium	6010C	164000	ug/L	210	1	08/05/19 14:31	08/01/19	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J02S
Lab Code: K1906970-002

Service Request: K1906970
Date Collected: 07/30/19 10:55
Date Received: 07/31/19 10:00

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	21.7	ug/L	4.2	1	08/02/19 14:40	08/01/19	
Boron	6010C	480	ug/L	21	1	08/02/19 14:40	08/01/19	
Calcium	6010C	139000	ug/L	21	1	08/02/19 14:40	08/01/19	
Iron	6010C	1150	ug/L	21	1	08/02/19 14:40	08/01/19	
Magnesium	6010C	37100	ug/L	5.3	1	08/05/19 14:40	08/01/19	
Manganese	6010C	108	ug/L	1.1	1	08/02/19 14:40	08/01/19	
Potassium	6010C	5080	ug/L	420	1	08/02/19 14:40	08/01/19	
Sodium	6010C	101000	ug/L	210	1	08/05/19 14:40	08/01/19	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J03S
Lab Code: K1906970-003

Service Request: K1906970
Date Collected: 07/30/19 11:15
Date Received: 07/31/19 10:00

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	13.1	ug/L	4.2	1	08/02/19 14:43	08/01/19	
Boron	6010C	2470	ug/L	21	1	08/02/19 14:43	08/01/19	
Calcium	6010C	366000	ug/L	21	1	08/02/19 14:43	08/01/19	
Iron	6010C	725	ug/L	21	1	08/02/19 14:43	08/01/19	
Magnesium	6010C	241000	ug/L	5.3	1	08/02/19 14:43	08/01/19	
Manganese	6010C	2220	ug/L	1.1	1	08/02/19 14:43	08/01/19	
Potassium	6010C	18800	ug/L	420	1	08/02/19 14:43	08/01/19	
Sodium	6010C	374000	ug/L	210	1	08/05/19 14:43	08/01/19	



General Chemistry

ALS Environmental—Kelso Laboratory
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Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Service Request: K1906970
Date Collected: 07/30/19 10:22
Date Received: 07/31/19 10:00

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	323	mg/L	15	1	08/06/19 20:42	
Bromide	300.0	1.12	mg/L	0.10	2	07/31/19 12:24	
Chloride	300.0	86.2	mg/L	1.0	10	07/31/19 11:28	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	07/31/19 12:24	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	07/31/19 12:24	
pH	SM 4500-H+ B	7.59	pH Units	-	1	07/31/19 11:56	H
Sulfate	300.0	531	mg/L	20	100	07/31/19 13:35	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Service Request: K1906970
Date Collected: 07/30/19 10:22
Date Received: 07/31/19 10:00
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	1.24	mg/L	0.50	1	08/02/19 12:28	
Solids, Total Dissolved	SM 2540 C	1260	mg/L	5.0	1	08/05/19 07:10	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J02S
Lab Code: K1906970-002

Service Request: K1906970
Date Collected: 07/30/19 10:55
Date Received: 07/31/19 10:00
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	244	mg/L	15	1	08/06/19 20:42	
Bromide	300.0	0.38	mg/L	0.10	2	07/31/19 14:16	
Chloride	300.0	43.3	mg/L	1.0	10	07/31/19 20:36	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	07/31/19 14:16	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	07/31/19 14:16	
pH	SM 4500-H+ B	7.66	pH Units	-	1	07/31/19 11:58	H
Sulfate	300.0	400	mg/L	20	100	07/31/19 20:46	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J02S
Lab Code: K1906970-002

Service Request: K1906970
Date Collected: 07/30/19 10:55
Date Received: 07/31/19 10:00
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	ND U	mg/L	0.50	1	08/02/19 13:34	
Solids, Total Dissolved	SM 2540 C	909	mg/L	5.0	1	08/05/19 07:10	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J03S
Lab Code: K1906970-003

Service Request: K1906970
Date Collected: 07/30/19 11:15
Date Received: 07/31/19 10:00

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	1010	mg/L	150	10	08/08/19 05:14	
Bromide	300.0	1.59	mg/L	0.10	2	07/31/19 14:26	
Chloride	300.0	96.8	mg/L	2.0	20	07/31/19 20:56	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	07/31/19 14:26	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	07/31/19 14:26	
pH	SM 4500-H+ B	6.89	pH Units	-	1	07/31/19 11:59	H
Sulfate	300.0	1530	mg/L	100	500	07/31/19 21:06	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J03S
Lab Code: K1906970-003

Service Request: K1906970
Date Collected: 07/30/19 11:15
Date Received: 07/31/19 10:00
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	4.86	mg/L	0.50	1	08/02/19 15:15	
Solids, Total Dissolved	SM 2540 C	3290	mg/L	5.0	1	08/05/19 07:10	



QC Summary Forms

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Metals

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: KQ1910752-07

Service Request: K1906970
Date Collected: NA
Date Received: NA
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	ND U	ug/L	4.2	1	08/02/19 14:26	08/01/19	
Boron	6010C	ND U	ug/L	21	1	08/02/19 14:26	08/01/19	
Calcium	6010C	37	ug/L	21	1	08/02/19 14:26	08/01/19	
Iron	6010C	ND U	ug/L	21	1	08/02/19 14:26	08/01/19	
Magnesium	6010C	ND U	ug/L	5.3	1	08/02/19 14:26	08/01/19	
Manganese	6010C	ND U	ug/L	1.1	1	08/02/19 14:26	08/01/19	
Potassium	6010C	ND U	ug/L	420	1	08/02/19 14:26	08/01/19	
Sodium	6010C	ND U	ug/L	210	1	08/05/19 14:26	08/01/19	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 08/02/19 - 08/05/19
Date Extracted: 08/1/19

Matrix Spike Summary
Total Metals

Sample Name: 02N23W15J01S
Lab Code: K1906970-001
Analysis Method: 6010C
Prep Method: EPA CLP ILM04.0

Units: ug/L
Basis: NA

Matrix Spike
KQ1910752-10

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Barium	28.8	1090	1000	106	75-125
Boron	709	1170	500	92	75-125
Calcium	185000	192000	10000	71 #	75-125
Iron	1610	2620	1000	102	75-125
Magnesium	45900	55000	10000	90 #	75-125
Manganese	354	819	500	93	75-125
Potassium	5460	15600	10000	102	75-125
Sodium	164000	171000	10000	70 #	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 08/02/19 - 08/05/19

Replicate Sample Summary

Total Metals

Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Units: ug/L
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample		Average	RPD	RPD Limit
				KQ1910752-09				
Barium	6010C	4.2	28.8	28.1	28.5	2	20	
Boron	6010C	21	709	656	683	8	20	
Calcium	6010C	21	185000	183000	184000	1	20	
Iron	6010C	21	1610	1590	1600	1	20	
Magnesium	6010C	5.3	45900	46600	46300	2	20	
Manganese	6010C	1.1	354	354	354	<1	20	
Potassium	6010C	420	5460	5450	5460	<1	20	
Sodium	6010C	210	164000	166000	165000	1	20	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Analyzed: 08/02/19 - 08/05/19

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ1910752-08

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Barium	6010C	5300	5000	106	80-120
Boron	6010C	529	500	106	80-120
Calcium	6010C	13200	12500	105	80-120
Iron	6010C	2620	2500	105	80-120
Magnesium	6010C	12000	12500	96	80-120
Manganese	6010C	1200	1250	96	80-120
Potassium	6010C	13900	12500	111	80-120
Sodium	6010C	12300	12500	99	80-120



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906970-MB1

Service Request: K1906970
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 20:42	
Bromide	300.0	ND U	mg/L	0.050	1	07/31/19 11:18	
Chloride	300.0	ND U	mg/L	0.10	1	07/31/19 11:18	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	1	07/31/19 11:18	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	1	07/31/19 11:18	
Sulfate	300.0	ND U	mg/L	0.20	1	07/31/19 11:18	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906970-MB1

Service Request: K1906970
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	ND U	mg/L	0.50	1	08/02/19 14:42	
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/05/19 07:10	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906970-MB2

Service Request: K1906970
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND U	mg/L	15	1	08/08/19 05:14	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906970-MB2

Service Request: K1906970
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/05/19 07:10	

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dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 8/2/19

Matrix Spike Summary
General Chemistry Parameters

Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Units: mg/L
Basis: NA

Matrix Spike
K1906970-001MS

<u>Analyte Name</u>	<u>Method</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	1.24	26.5	25.0	101	83-117

Results flagged with an asterisk (*) indicate values outside control criteria.

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 07/31/19 - 08/02/19

**Duplicate Matrix Spike Summary
General Chemistry Parameters**

Sample Name: 02N23W15J01S **Units:** mg/L
Lab Code: K1906970-001 **Basis:** NA

**Matrix Spike
K1906970-001MS**

**Duplicate Matrix Spike
K1906970-001DMS**

Analyte Name	Method	Sample Result	Result	Matrix Spike		Duplicate Matrix Spike		% Rec	% Rec Limits	RPD	RPD Limit
				Amount	% Rec	Result	Spike Amount				
Total Sulfide	SM 4500-S2- D	ND U	0.186	0.193	96	0.180	0.193	93	69-123	3	20
Chloride	300.0	86.2	125	40.0	96	124	40.0	96	90-110	<1	20
Bromide	300.0	1.12	9.15	8.00	100	9.23	8.00	101	90-110	<1	20
Nitrate as Nitrogen	300.0	ND U	7.78	8.00	97	7.88	8.00	99	90-110	1	20
Sulfate	300.0	531	932	400	100	929	400	99	90-110	<1	20
Nitrite as Nitrogen	300.0	ND U	7.98	8.00	100	8.07	8.00	101	90-110	1	20

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 07/31/19 - 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Units: mg/L
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate	Average	RPD	RPD Limit
				Sample K1906970-001DUP Result			
Bromide	300.0	0.10	1.12	1.12	1.12	<1	20
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	1.24	1.13	1.19	9	10
Chloride	300.0	1.0	86.2	86.1	86.2	<1	20
Nitrate as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20
Solids, Total Dissolved	SM 2540 C	5.0	1260	1300	1280	3	5
Sulfate	300.0	20	531	532	532	<1	20
Total Sulfide	SM 4500-S2- D	0.050	ND U	ND U	NC	NC	20
Alkalinity as CaCO3, Total	SM 2320 B	15	323	319	321	1	20
Nitrite as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 07/31/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N23W15J01S
Lab Code: K1906970-001

Units: pH Units
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1906970-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
pH	SM 4500-H+ B	-	7.59	7.67	7.63	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 08/02/19 - 08/05/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N23W15J02S
Lab Code: K1906970-002

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1906970-002DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	ND U	ND U	NC	NC	10
Solids, Total Dissolved	SM 2540 C	5.0	909	906	907	<1	5

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Collected: 07/30/19
Date Received: 07/31/19
Date Analyzed: 08/02/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N23W15J03S
Lab Code: K1906970-003

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1906970-003DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	4.86	4.80	4.83	1	10

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Analyzed: 07/31/19 - 08/06/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1906970-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO ₃ , Total	SM 2320 B	164	163	101	90-110
Bromide	300.0	2.49	2.50	100	90-110
Carbon, Dissolved Organic (DOC)	SM 5310 C	24.8	25.0	99	83-117
Chloride	300.0	4.76	5.00	95	90-110
Nitrate as Nitrogen	300.0	2.43	2.50	97	90-110
Nitrite as Nitrogen	300.0	2.48	2.50	99	90-110
Solids, Total Dissolved	SM 2540 C	899	922	97	85-115
Sulfate	300.0	4.94	5.00	99	90-110
Total Sulfide	SM 4500-S2- D	0.190	0.193	98	85-106

ALS Group USA, Corp.
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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Analyzed: 07/31/19

Lab Control Sample Summary
General Chemistry Parameters

Units:pH Units
Basis:NA

Lab Control Sample
K1906970-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
pH	SM 4500-H+ B	9.26	9.34	99	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Analyzed: 08/06/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 646129

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1906970-LCS2	162	163	99	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Analyzed: 08/08/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 646535

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1906970-LCS3	161	163	99	90-110

ALS Group USA, Corp.
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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906970
Date Analyzed: 08/08/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 646535

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1906970-LCS4	163	163	100	90-110



August 20, 2019

Service Request No:K1906997

Brad Bessinger
S.S. Papadopoulos & Associates, Inc.
416 NE Dallas St., Suite 201
Camas, WA 98607

Laboratory Results for: Isotope Sampling

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory August 01, 2019
For your reference, these analyses have been assigned our service request number **K1906997**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3356. You may also contact me via email at Kurt.Clarkson@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kurt Clarkson
Sr. Project Manager

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dba ALS Environmental



Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com



Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Received: 08/01/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 08/01/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by 

Date 08/20/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W07M025

Lab ID: K1906997-001

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	1.29			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	980			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	326			15	mg/L	SM 2320 B
Bromide	0.61			0.10	mg/L	300.0
Chloride	49.8			1.0	mg/L	300.0
pH	7.53				pH Units	SM 4500-H+ B
Sulfate	302			20	mg/L	300.0
Barium	23.9			4.2	ug/L	6010C
Boron	642			21	ug/L	6010C
Calcium	129000			42	ug/L	6010C
Iron	1470			21	ug/L	6010C
Magnesium	44800			5.3	ug/L	6010C
Manganese	307			1.1	ug/L	6010C
Potassium	5310			420	ug/L	6010C
Sodium	121000			210	ug/L	6010C



Sample Receipt Information

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Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling

Service Request:K1906997

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
K1906997-001	02N22W07M025	7/31/2019	1415



CHAIN OF CUSTODY

101163

001

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

SR# _____
COC Set _____ of _____
COC# _____

Handwritten: K1906997

Project Name: <u>Isotope samp</u>		Project Number: _____	
Project Manager: <u>Brad Bessinger</u>			
Company: <u>Wass Papadopoulos + ASS</u>			
Address: <u>416 NE Dallas St. suite 201, Camas, WA 98607</u>			
Phone #: <u>310-566-7119</u>	Email: <u>bbessinger@sspa.com</u>		
Sampler Signature: <u>Andrew Phm</u>		Sampler Printed Name: _____	

CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix	NUMBER OF CONTAINERS										Remarks		
				0H	48H	7D	14D	28D	180D	1	2	3	4		5	
1. 02N22W07M015		7/31/19		5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2. 02N22W07M025		7/31/19 14:15		5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3. 02N22W07M035		7/31/19		5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4.																
5.																
6.																
7.																
8.																
9.																
10.																

Report Requirements <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	Invoice Information P.O.# _____ Bill To: <u>Mound Basin</u> <u>GSA</u>	Circle which metals are to be analyzed Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg	
	Turnaround Requirements <input type="checkbox"/> 24 hr. _____ 48 hr. <input type="checkbox"/> 5 Day <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____	*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)
	Requested Report Date: _____		

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: <u>K.K. Kuepper</u>	Signature: _____	Signature: _____	Signature: <u>Cody Graves</u>	Signature: _____	Signature: _____
Printed Name: <u>United Water</u>	Printed Name: <u>Fed ex</u>	Printed Name: _____	Printed Name: <u>ALS</u>	Printed Name: _____	Printed Name: _____
Firm: _____	Firm: _____	Firm: _____	Firm: _____	Firm: _____	Firm: _____
Date/Time: <u>7/31/19</u>	Date/Time: <u>7/31/19 15:15</u>	Date/Time: _____	Date/Time: <u>8/1/19 0945</u>	Date/Time: _____	Date/Time: _____



PC KC

Cooler Receipt and Preservation Form

Client Papadopoulos Service Request K19 06997
 Received: 8/1/19 Opened: 8/1/19 By: CG Unloaded: 8/1/19 By: CG

- Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- Samples were received in: (circle) Cooler Box Envelope Other NA
- Were custody seals on coolers? NA Y N If yes, how many and where? 1 Front
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
1.9	2.1	5.5	5.7	+0.2	394	101163	8597 8710 7870		

- Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? *Indicate in the table below* NA Y N
- Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Miscellaneous Forms

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Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

ALS Group USA, Corp.
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Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1906997

Sample Name: 02N22W07M025
Lab Code: K1906997-001
Sample Matrix: Water

Date Collected: 07/31/19
Date Received: 08/1/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER



Sample Results

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Metals

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M025
Lab Code: K1906997-001

Service Request: K1906997
Date Collected: 07/31/19 14:15
Date Received: 08/01/19 09:45
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	23.9	ug/L	4.2	1	08/06/19 12:54	08/05/19	
Boron	6010C	642	ug/L	21	1	08/06/19 12:54	08/05/19	
Calcium	6010C	129000	ug/L	42	1	08/06/19 12:54	08/05/19	
Iron	6010C	1470	ug/L	21	1	08/06/19 12:54	08/05/19	
Magnesium	6010C	44800	ug/L	5.3	1	08/06/19 12:54	08/05/19	
Manganese	6010C	307	ug/L	1.1	1	08/06/19 12:54	08/05/19	
Potassium	6010C	5310	ug/L	420	1	08/06/19 12:54	08/05/19	
Sodium	6010C	121000	ug/L	210	1	08/06/19 12:54	08/05/19	



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M025
Lab Code: K1906997-001

Service Request: K1906997
Date Collected: 07/31/19 14:15
Date Received: 08/01/19 09:45
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	326	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	0.61	mg/L	0.10	2	08/01/19 12:46	
Chloride	300.0	49.8	mg/L	1.0	10	08/01/19 14:54	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	08/01/19 12:46	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	08/01/19 12:46	
pH	SM 4500-H+ B	7.53	pH Units	-	1	08/01/19 12:57	H
Sulfate	300.0	302	mg/L	20	100	08/01/19 13:50	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M025
Lab Code: K1906997-001

Service Request: K1906997
Date Collected: 07/31/19 14:15
Date Received: 08/01/19 09:45
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	1.29	mg/L	0.50	1	08/02/19 16:52	
Solids, Total Dissolved	SM 2540 C	980	mg/L	5.0	1	08/05/19 07:10	



QC Summary Forms

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Metals

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: KQ1910867-05

Service Request: K1906997
Date Collected: NA
Date Received: NA
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	ND U	ug/L	4.2	1	08/06/19 12:35	08/05/19	
Boron	6010C	ND U	ug/L	21	1	08/06/19 12:35	08/05/19	
Calcium	6010C	ND U	ug/L	42	1	08/06/19 12:35	08/05/19	
Iron	6010C	ND U	ug/L	21	1	08/06/19 12:35	08/05/19	
Magnesium	6010C	ND U	ug/L	5.3	1	08/06/19 12:35	08/05/19	
Manganese	6010C	ND U	ug/L	1.1	1	08/06/19 12:35	08/05/19	
Potassium	6010C	ND U	ug/L	420	1	08/06/19 12:35	08/05/19	
Sodium	6010C	ND U	ug/L	210	1	08/06/19 12:35	08/05/19	

ALS Group USA, Corp.
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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: 07/31/19
Date Received: 08/01/19
Date Analyzed: 08/6/19
Date Extracted: 08/5/19

Matrix Spike Summary
Total Metals

Sample Name: 02N22W07M025
Lab Code: K1906997-001
Analysis Method: 6010C
Prep Method: EPA CLP ILM04.0

Units: ug/L
Basis: NA

Matrix Spike
KQ1910867-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Barium	23.9	1020	1000	100	75-125
Boron	642	1080	500	88	75-125
Calcium	129000	135000	10000	53 #	75-125
Iron	1470	2400	1000	93	75-125
Magnesium	44800	52800	10000	81 #	75-125
Manganese	307	766	500	92	75-125
Potassium	5310	15200	10000	99	75-125
Sodium	121000	125000	10000	35 #	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: 07/31/19
Date Received: 08/01/19
Date Analyzed: 08/06/19

Replicate Sample Summary

Total Metals

Sample Name: 02N22W07M025
Lab Code: K1906997-001

Units: ug/L
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample		Average	RPD	RPD Limit
				KQ1910867-03				
Barium	6010C	4.2	23.9	23.5	23.7	2	20	
Boron	6010C	21	642	618	630	4	20	
Calcium	6010C	42	129000	128000	129000	<1	20	
Iron	6010C	21	1470	1450	1460	1	20	
Magnesium	6010C	5.3	44800	44100	44500	2	20	
Manganese	6010C	1.1	307	299	303	3	20	
Potassium	6010C	420	5310	5200	5260	2	20	
Sodium	6010C	210	121000	118000	120000	3	20	

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Analyzed: 08/06/19

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ1910867-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Barium	6010C	5050	5000	101	80-120
Boron	6010C	505	500	101	80-120
Calcium	6010C	12500	12500	100	80-120
Iron	6010C	2500	2500	100	80-120
Magnesium	6010C	13200	12500	105	80-120
Manganese	6010C	1230	1250	98	80-120
Potassium	6010C	13000	12500	104	80-120
Sodium	6010C	13200	12500	105	80-120



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906997-MB1

Service Request: K1906997
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	ND U	mg/L	0.050	1	08/01/19 12:36	
Chloride	300.0	ND U	mg/L	0.10	1	08/01/19 12:36	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	1	08/01/19 12:36	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	1	08/01/19 12:36	
Sulfate	300.0	ND U	mg/L	0.20	1	08/01/19 12:36	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/02/19 13:12	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906997-MB1

Service Request: K1906997
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	ND U	mg/L	0.50	1	08/02/19 14:42	
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/05/19 07:10	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1906997-MB2

Service Request: K1906997
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/05/19 07:10	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: 07/31/19
Date Received: 08/01/19
Date Analyzed: 8/1/19

**Duplicate Matrix Spike Summary
General Chemistry Parameters**

Sample Name: 02N22W07M025 **Units:** mg/L
Lab Code: K1906997-001 **Basis:** NA

Analyte Name	Method	Sample Result	Result	Matrix Spike K1906997-001MS		Duplicate Matrix Spike K1906997-001DMS		% Rec	% Rec Limits	RPD	RPD Limit
				Spike Amount	% Rec	Result	Spike Amount				
Chloride	300.0	49.8	87.5	40.0	94	87.8	40.0	95	90-110	<1	20
Bromide	300.0	0.61	8.39	8.00	97	8.39	8.00	97	90-110	<1	20
Nitrate as Nitrogen	300.0	ND U	7.57	8.00	95	7.62	8.00	95	90-110	<1	20
Sulfate	300.0	302	707	400	101	734	400	108	90-110	4	20
Nitrite as Nitrogen	300.0	ND U	7.59	8.00	95	7.65	8.00	96	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: 07/31/19
Date Received: 08/01/19
Date Analyzed: 08/01/19 - 08/02/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W07M025
Lab Code: K1906997-001

Units: mg/L
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1906997-001DUP Result	Average	RPD	RPD Limit
Bromide	300.0	0.10	0.61	0.52	0.569	16	20
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	1.29	1.31	1.30	1	10
Chloride	300.0	1.0	49.8	49.9	49.9	<1	20
Nitrate as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20
Sulfate	300.0	20	302	318	310	5	20
Nitrite as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: 07/31/19
Date Received: 08/01/19
Date Analyzed: 08/01/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W07M025
Lab Code: K1906997-001

Units: pH Units
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1906997-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
pH	SM 4500-H+ B	-	7.53	7.61	7.57	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: NA
Date Received: NA
Date Analyzed: 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC **Units:** mg/L
Lab Code: K1907038-001 **Basis:** NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1907038-001DUP Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Total	SM 2320 B	15	145	143	144	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Collected: NA
Date Received: NA
Date Analyzed: 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907038-012

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907038-012DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	118	117	118	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Analyzed: 08/01/19 - 08/06/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1906997-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO ₃ , Total	SM 2320 B	163	163	100	90-110
Bromide	300.0	2.46	2.50	98	90-110
Carbon, Dissolved Organic (DOC)	SM 5310 C	24.8	25.0	99	83-117
Chloride	300.0	4.71	5.00	94	90-110
Nitrate as Nitrogen	300.0	2.38	2.50	95	90-110
Nitrite as Nitrogen	300.0	2.38	2.50	95	90-110
Solids, Total Dissolved	SM 2540 C	899	922	97	85-115
Sulfate	300.0	4.78	5.00	96	90-110
Total Sulfide	SM 4500-S2- D	0.190	0.193	98	85-106

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Analyzed: 08/01/19

Lab Control Sample Summary
General Chemistry Parameters

Units:pH Units
Basis:NA

Lab Control Sample
K1906997-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
pH	SM 4500-H+ B	9.27	9.34	99	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1906997
Date Analyzed: 08/06/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 646126

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1906997-LCS2	164	163	101	90-110



August 21, 2019

Service Request No:K1907030

Brad Bessinger
S.S. Papadopoulos & Associates, Inc.
416 NE Dallas St., Suite 201
Camas, WA 98607

Laboratory Results for: Isotope Sampling

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory August 02, 2019
For your reference, these analyses have been assigned our service request number **K1907030**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3356. You may also contact me via email at Kurt.Clarkson@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kurt Clarkson
Sr. Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental



Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com



Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Received: 08/02/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 08/02/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by 

Date 08/21/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W07M01S **Lab ID: K1907030-001**

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	0.72			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	1070			5.0	mg/L	SM 2540 C
Alkalinity as CaCO ₃ , Total	304			15	mg/L	SM 2320 B
Bromide	0.91			0.10	mg/L	300.0
Chloride	69.8			1.0	mg/L	300.0
pH	7.63				pH Units	SM 4500-H+ B
Sulfate	427			20	mg/L	300.0
Barium	22.8			4.2	ug/L	6010C
Boron	611			21	ug/L	6010C
Calcium	153000			21	ug/L	6010C
Iron	1630			21	ug/L	6010C
Magnesium	46000			5.3	ug/L	6010C
Manganese	248			1.1	ug/L	6010C
Potassium	4580			420	ug/L	6010C
Sodium	156000			420	ug/L	6010C



Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling

Service Request:K1907030

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
K1907030-001	02N22W07M01S	8/1/2019	0947



CHAIN OF CUSTODY

101163

001

SR# K1907030
 COC Set _____ of _____
 COC# _____

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
 www.alsglobal.com

Project Name <u>isotopK sample</u>		Project Number:		NUMBER OF CONTAINERS	0H	48H	7D	14D	28D	180D	Remarks					
Project Manager <u>Brad Bessinger</u>					SM 4500-H+ B / pH	300.0 / NO2	300.0 / NO3	SM 2540 C / TDS	SM 4500-S2- D / Sulfide T	SM 2320 B-1997(2011) /		300.0 / Br				
Company <u>SS Papadopoulos + ASS</u>					300.0 / Chloride	300.0 / SO4	SM 5310 C / TOC D	6010C / Metals T	1	2		3	4	5		
Address <u>416 NE Dallas St. suite 201, Camas, WA 98607</u>					SM 4500-H+ B / pH	300.0 / NO2	300.0 / NO3	SM 2540 C / TDS	SM 4500-S2- D / Sulfide T	SM 2320 B-1997(2011) /		300.0 / Br	300.0 / Chloride	300.0 / SO4	SM 5310 C / TOC D	6010C / Metals T
Phone # <u>30-566-7119</u>		email <u>bbessinger@sspa.com</u>			300.0 / Chloride	300.0 / SO4	SM 5310 C / TOC D	6010C / Metals T	1	2		3	4	5		
Sampler Signature		Sampler Printed Name <u>Traus</u>														
CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix													
<u>1.02 N22 W07 MOIS</u>		<u>8/1/19 9:47</u>		<u>S</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
<u>2.02 N22 W07 MOIS</u>		<u>8/1/19</u>		<u>S</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
3.																
4.																
5.																
6.																
7.																
8.																
9.																
10.																

Report Requirements <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	Invoice Information P.O.# _____ Bill To: <u>Mauro Basin</u> <u>GSA</u>	Circle which metals are to be analyzed Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg
	Turnaround Requirements <input type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input type="checkbox"/> 5 Day <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____ *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)

Relinquished By: <u>KK</u>	Received By:	Relinquished By:	Received By: <u>[Signature]</u>	Relinquished By:	Received By:
Signature <u>Kathleen Kuepper</u>	Signature	Signature	Signature <u>[Signature]</u>	Signature	Signature
Printed Name <u>United Water</u>	Printed Name <u>Fedex</u>	Printed Name	Printed Name <u>[Signature]</u>	Printed Name	Printed Name
Firm <u>8/1/19 14:00</u>	Firm <u>8/1/19 14:00</u>	Firm	Firm <u>8/2/19 1000</u>	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time



PC KC

Cooler Receipt and Preservation Form

Client United Water / S.S. Papadopoulos Service Request K19 07030
Received: 8/2/19 Opened: 8/2/19 By: [Signature] Unloaded: 8/2/19 By: [Signature]

- 1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box Envelope Other NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? one, side
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
<u>0.7</u>	<u>0.5</u>	<u>-</u>	<u>-</u>	<u>0.2</u>	<u>308</u>	<u>NA</u>	<u>7882 4866 4148</u>	<u>NA</u>	

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

SHORT HOLD TIME



Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

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Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1907030

Sample Name: 02N22W07M01S
Lab Code: K1907030-001
Sample Matrix: Water

Date Collected: 08/1/19
Date Received: 08/2/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		HMIRENTA
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER



Sample Results

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Metals

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M01S
Lab Code: K1907030-001

Service Request: K1907030
Date Collected: 08/01/19 09:47
Date Received: 08/02/19 10:00
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	22.8	ug/L	4.2	1	08/13/19 13:02	08/12/19	
Boron	6010C	611	ug/L	21	1	08/13/19 13:02	08/12/19	
Calcium	6010C	153000	ug/L	21	1	08/13/19 13:02	08/12/19	
Iron	6010C	1630	ug/L	21	1	08/13/19 13:02	08/12/19	
Magnesium	6010C	46000	ug/L	5.3	1	08/13/19 13:02	08/12/19	
Manganese	6010C	248	ug/L	1.1	1	08/13/19 13:02	08/12/19	
Potassium	6010C	4580	ug/L	420	1	08/13/19 13:02	08/12/19	
Sodium	6010C	156000	ug/L	420	1	08/13/19 13:02	08/12/19	



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M01S
Lab Code: K1907030-001

Service Request: K1907030
Date Collected: 08/01/19 09:47
Date Received: 08/02/19 10:00

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	304	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	0.91	mg/L	0.10	2	08/02/19 13:20	
Chloride	300.0	69.8	mg/L	1.0	10	08/02/19 13:30	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	08/02/19 13:20	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	08/02/19 13:20	
pH	SM 4500-H+ B	7.63	pH Units	-	1	08/02/19 12:07	H
Sulfate	300.0	427	mg/L	20	100	08/02/19 13:40	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/07/19 12:15	

ALS Group USA, Corp.
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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M01S
Lab Code: K1907030-001

Service Request: K1907030
Date Collected: 08/01/19 09:47
Date Received: 08/02/19 10:00
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.72	mg/L	0.50	1	08/07/19 12:05	
Solids, Total Dissolved	SM 2540 C	1070	mg/L	5.0	1	08/06/19 09:55	



QC Summary Forms

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: KQ1911077-02

Service Request: K1907030
Date Collected: NA
Date Received: NA
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	ND U	ug/L	4.2	1	08/13/19 12:30	08/12/19	
Boron	6010C	ND U	ug/L	21	1	08/13/19 12:30	08/12/19	
Calcium	6010C	ND U	ug/L	21	1	08/13/19 12:30	08/12/19	
Iron	6010C	ND U	ug/L	21	1	08/13/19 12:30	08/12/19	
Magnesium	6010C	ND U	ug/L	5.3	1	08/13/19 12:30	08/12/19	
Manganese	6010C	ND U	ug/L	1.1	1	08/13/19 12:30	08/12/19	
Potassium	6010C	ND U	ug/L	420	1	08/13/19 12:30	08/12/19	
Sodium	6010C	ND U	ug/L	420	1	08/13/19 12:30	08/12/19	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: N/A
Date Received: N/A
Date Analyzed: 08/13/19
Date Extracted: 08/12/19

Matrix Spike Summary
Total Metals

Sample Name: Batch QC
Lab Code: K1907194-020
Analysis Method: 6010C
Prep Method: EPA CLP ILM04.0

Units: ug/L
Basis: NA

Matrix Spike
KQ1911077-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Barium	19.3	1110	1000	109	75-125
Boron	ND U	510	500	101	75-125
Calcium	24500	35200	10000	106	75-125
Iron	ND U	1070	1000	107	75-125
Magnesium	5390	17000	10000	116	75-125
Manganese	ND U	481	500	96	75-125
Potassium	1430	12300	10000	109	75-125
Sodium	2930	14300	10000	114	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: NA
Date Received: NA
Date Analyzed: 08/13/19

Replicate Sample Summary

Total Metals

Sample Name: Batch QC
Lab Code: K1907194-020

Units: ug/L
Basis: NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample		Average	RPD	RPD Limit
				KQ1911077-03				
Barium	6010C	4.2	19.3	18.5	18.9	4	20	
Boron	6010C	21	ND U	ND U	ND	-	20	
Calcium	6010C	21	24500	24500	24500	<1	20	
Iron	6010C	21	ND U	ND U	NC	NC	20	
Magnesium	6010C	5.3	5390	5410	5400	<1	20	
Manganese	6010C	1.1	ND U	ND U	ND	-	20	
Potassium	6010C	420	1430	1510	1470	5	20	
Sodium	6010C	420	2930	3000	2970	2	20	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Analyzed: 08/13/19

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ1911077-01

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Barium	6010C	5530	5000	111	80-120
Boron	6010C	491	500	98	80-120
Calcium	6010C	13600	12500	109	80-120
Iron	6010C	2720	2500	109	80-120
Magnesium	6010C	13700	12500	109	80-120
Manganese	6010C	1240	1250	99	80-120
Potassium	6010C	12800	12500	103	80-120
Sodium	6010C	13800	12500	110	80-120



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907030-MB1

Service Request: K1907030
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 17:14	
Bromide	300.0	ND U	mg/L	0.050	1	08/02/19 11:18	
Chloride	300.0	ND U	mg/L	0.10	1	08/02/19 11:18	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	1	08/02/19 11:18	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	1	08/02/19 11:18	
Sulfate	300.0	ND U	mg/L	0.20	1	08/02/19 11:18	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/07/19 12:15	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907030-MB1

Service Request: K1907030
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	ND U	mg/L	0.50	1	08/07/19 00:46	
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/06/19 09:55	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907030-MB2

Service Request: K1907030
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/06/19 09:55	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: 08/01/19
Date Received: 08/02/19
Date Analyzed: 08/7/19
Date Extracted: NA

Duplicate Matrix Spike Summary
Total Sulfide

Sample Name: 02N22W07M01S
Lab Code: K1907030-001
Analysis Method: SM 4500-S2- D
Prep Method: None

Units: mg/L
Basis: NA

Analyte Name	Sample Result	Result	Matrix Spike K1907030-001MS		Result	Duplicate Matrix Spike K1907030-001DMS		% Rec Limits	RPD	RPD Limit
			Spike Amount	% Rec		Spike Amount	% Rec			
Total Sulfide	ND U	1.94	1.88	104	1.93	1.88	103	69-123	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: 08/01/19
Date Received: 08/02/19
Date Analyzed: 08/07/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W07M01S
Lab Code: K1907030-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907030-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.72	0.66	0.692	8	10
Total Sulfide	SM 4500-S2- D	0.050	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: 08/01/19
Date Received: 08/02/19
Date Analyzed: 08/02/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W07M01S
Lab Code: K1907030-001

Units: pH Units
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907030-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
pH	SM 4500-H+ B	-	7.63	7.72	7.68	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: NA
Date Received: NA
Date Analyzed: 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907038-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907038-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	145	143	144	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Collected: NA
Date Received: NA
Date Analyzed: 08/06/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907038-012

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907038-012DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	118	117	118	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Analyzed: 08/02/19 - 08/07/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1907030-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO ₃ , Total	SM 2320 B	163	163	100	90-110
Bromide	300.0	2.52	2.50	101	90-110
Carbon, Dissolved Organic (DOC)	SM 5310 C	24.6	25.0	98	83-117
Chloride	300.0	4.78	5.00	96	90-110
Nitrate as Nitrogen	300.0	2.43	2.50	97	90-110
Nitrite as Nitrogen	300.0	2.51	2.50	100	90-110
Solids, Total Dissolved	SM 2540 C	957	922	104	85-115
Sulfate	300.0	4.90	5.00	98	90-110
Total Sulfide	SM 4500-S2- D	1.83	1.88	98	85-106

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Analyzed: 08/02/19

Lab Control Sample Summary
General Chemistry Parameters

Units:pH Units
Basis:NA

Lab Control Sample
K1907030-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
pH	SM 4500-H+ B	9.26	9.34	99	85-115

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Analyzed: 08/06/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1907030-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO ₃ , Total	SM 2320 B	164	163	101	90-110

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Analyzed: 08/02/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1907030-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Bromide	300.0	2.51			90-110
Chloride	300.0	4.77			90-110
Nitrate as Nitrogen	300.0	2.43			90-110
Nitrite as Nitrogen	300.0	2.50			90-110
Sulfate	300.0	4.89			90-110

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907030
Date Analyzed: 08/02/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1907030-LCS4

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Bromide	300.0	2.51			90-110
Chloride	300.0	4.78			90-110
Nitrate as Nitrogen	300.0	2.43			90-110
Nitrite as Nitrogen	300.0	2.51			90-110
Sulfate	300.0	4.89			90-110



August 30, 2019

Service Request No:K1907311

Brad Bessinger
S.S. Papadopoulos & Associates, Inc.
416 NE Dallas St., Suite 201
Camas, WA 98607

Laboratory Results for: Isotope Sampling

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory August 09, 2019
For your reference, these analyses have been assigned our service request number **K1907311**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3356. You may also contact me via email at Kurt.Clarkson@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kurt Clarkson
Sr. Project Manager

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dba ALS Environmental



Narrative Documents

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Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Received: 08/09/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Three water samples were received for analysis at ALS Environmental on 08/09/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

Method SM 5310 C, 08/28/2019: The Relative Percent Difference (RPD) criterion for the replicate analysis of Dissolved Organic Carbon in sample 02N22W09L03S was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Approved by 

Date 08/30/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N23W15J03S **Lab ID: K1907311-001**

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	5.31			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	3170			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	1030			150	mg/L	SM 2320 B
Bromide	1.45			0.10	mg/L	300.0
Chloride	98.7			1.0	mg/L	300.0
pH	7.03				pH Units	SM 4500-H+ B
Sulfate	1430			100	mg/L	300.0
Barium	13.3			4.2	ug/L	6010C
Boron	2310			21	ug/L	6010C
Calcium	336000			21	ug/L	6010C
Iron	688			21	ug/L	6010C
Magnesium	244000			5.3	ug/L	6010C
Manganese	2220			1.1	ug/L	6010C
Potassium	19400			210	ug/L	6010C
Sodium	376000			210	ug/L	6010C

CLIENT ID: 02N22W07M03S **Lab ID: K1907311-002**

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	4.91			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	4950			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	450			15	mg/L	SM 2320 B
Bromide	3.90			0.10	mg/L	300.0
Chloride	607			10	mg/L	300.0
Nitrate as Nitrogen	53.4			5.0	mg/L	300.0
Nitrite as Nitrogen	0.60			0.10	mg/L	300.0
pH	7.22				pH Units	SM 4500-H+ B
Sulfate	2320			100	mg/L	300.0
Barium	11.7			4.2	ug/L	6010C
Boron	1090			21	ug/L	6010C
Calcium	646000			21	ug/L	6010C
Magnesium	257000			5.3	ug/L	6010C
Manganese	1720			1.1	ug/L	6010C
Potassium	28000			210	ug/L	6010C
Sodium	510000			42000	ug/L	6010C

CLIENT ID: 02N22W09L03S **Lab ID: K1907311-003**

Analyte	Results	Flag	MDL	MRL	Units	Method
Carbon, Dissolved Organic (DOC)	0.85			0.50	mg/L	SM 5310 C
Solids, Total Dissolved	1160			5.0	mg/L	SM 2540 C
Alkalinity as CaCO3, Total	220			15	mg/L	SM 2320 B
Bromide	0.63			0.10	mg/L	300.0
Chloride	64.4			1.0	mg/L	300.0

SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W09L03S

Lab ID: K1907311-003

Analyte	Results	Flag	MDL	MRL	Units	Method
pH	7.68				pH Units	SM 4500-H+ B
Sulfate	474			20	mg/L	300.0
Barium	23.6			4.2	ug/L	6010C
Boron	489			21	ug/L	6010C
Calcium	131000			21	ug/L	6010C
Iron	538			21	ug/L	6010C
Magnesium	33500			5.3	ug/L	6010C
Manganese	163			1.1	ug/L	6010C
Potassium	5240			210	ug/L	6010C
Sodium	145000			210	ug/L	6010C



Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling

Service Request:K1907311

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
K1907311-001	02N23W15J03S	8/8/2019	1018
K1907311-002	02N22W07M03S	8/8/2019	1113
K1907311-003	02N22W09L03S	8/8/2019	1505



CHAIN OF CUSTODY

101163

001

SR# K1907311
 COC Set _____ of _____
 COC# _____

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
 www.alsglobal.com

Project Name <u>Isotope Sampling</u>		Project Number:		NUMBER OF CONTAINERS	0H	48H	7D	14D	28D	180D						Remarks					
Project Manager <u>Brad Bessinger</u>					SM 4500-H+ B / pH	300.0 / NO2	300.0 / NO3	SM 2540 C / TDS	SM 4500-S2- D / Sulfide T	SM 2320 B-1997(2011) /	300.0 / Br	300.0 / Chloride	300.0 / SO4	SM 5310 C / TOC D	6010C / Metals T		1	2	3	4	5
Company <u>SS Papadopoulos + Ass.</u>		Address <u>416 NE Dallas St., suite 201 Camas WA 97607</u>																			
Phone # <u>360-566-7119</u>		email <u>hbessinger@sspa.com</u>																			
Sampler Signature		Sampler Printed Name																			
CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix																	
<u>1.02N23W15J03S</u>		<u>8/8/19</u>	<u>10:18</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
<u>2.02N22W07M03S</u>		<u>8/8/19</u>	<u>11:13</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
<u>3.02N22W09L03S</u>		<u>8/8/19</u>	<u>15:05</u>		<u>5</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
<u>4.</u>																					
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<u>6.</u>																					
<u>7.</u>																					
<u>8.</u>																					
<u>9.</u>																					
<u>10.</u>																					

Report Requirements <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	Invoice Information P.O.# _____ Bill To: <u>Mound basin</u> <u>GSA</u>	Circle which metals are to be analyzed Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg
	Turnaround Requirements <input type="checkbox"/> 24 hr. _____ 48 hr. <input type="checkbox"/> 5 Day _____ <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____ *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
<u>K. Kuepper</u>	<u>Pa</u>		<u>Norini Pedersen</u>		
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name
<u>United Water</u>	<u>fed ex</u>		<u>ALS</u>		
Firm	Firm	Firm	Firm	Firm	Firm
<u>8/8/19 16:00</u>	<u>8/8/19 16:00</u>		<u>8-9-19 1030</u>		
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time



PC HC

Cooler Receipt and Preservation Form

Client SS ^{NY} ~~NY~~ United Water Conservation Dist. Service Request K19 07311
Received: 8.9.17 Opened: 8.9.19 By: NP Unloaded: 8.9.19 By: NP

- 1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box Envelope Other _____ NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? 1 front
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number			NA	Filed
1.2	1.0			0.2	325	101163	8597	8710	7881		

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

SHORT HOLD TIME

Notes, Discrepancies, & Resolutions: _____



Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.

i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdwlabservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1907311

Sample Name: 02N23W15J03S
Lab Code: K1907311-001
Sample Matrix: Water

Date Collected: 08/8/19
Date Received: 08/9/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

Sample Name: 02N23W15J03S
Lab Code: K1907311-001.R01
Sample Matrix: Water

Date Collected: 08/8/19
Date Received: 08/9/19

Analysis Method	Extracted/Digested By	Analyzed By
SM 2320 B		DBRADBURY

Sample Name: 02N22W07M03S
Lab Code: K1907311-002
Sample Matrix: Water

Date Collected: 08/8/19
Date Received: 08/9/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling/

Service Request: K1907311

Sample Name: 02N22W09L03S
Lab Code: K1907311-003
Sample Matrix: Water

Date Collected: 08/8/19
Date Received: 08/9/19

Analysis Method	Extracted/Digested By	Analyzed By
300.0		MRODRIGUEZ
6010C	YZOOK	AMCKORNEY
SM 2320 B		DBRADBURY
SM 2540 C		JMADISON
SM 4500-H+ B		ACHEATLEY
SM 4500-S2- D		BDITZLER
SM 5310 C		BDITZLER



Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com



Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J03S
Lab Code: K1907311-001

Service Request: K1907311
Date Collected: 08/08/19 10:18
Date Received: 08/09/19 10:30

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	13.3	ug/L	4.2	1	08/21/19 15:03	08/19/19	
Boron	6010C	2310	ug/L	21	1	08/21/19 15:03	08/19/19	
Calcium	6010C	336000	ug/L	21	1	08/21/19 15:03	08/19/19	
Iron	6010C	688	ug/L	21	1	08/21/19 15:03	08/19/19	
Magnesium	6010C	244000	ug/L	5.3	1	08/21/19 15:03	08/19/19	
Manganese	6010C	2220	ug/L	1.1	1	08/21/19 15:03	08/19/19	
Potassium	6010C	19400	ug/L	210	1	08/21/19 15:03	08/19/19	
Sodium	6010C	376000	ug/L	210	1	08/21/19 15:03	08/19/19	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M03S
Lab Code: K1907311-002

Service Request: K1907311
Date Collected: 08/08/19 11:13
Date Received: 08/09/19 10:30

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	11.7	ug/L	4.2	1	08/21/19 15:06	08/19/19	
Boron	6010C	1090	ug/L	21	1	08/21/19 15:06	08/19/19	
Calcium	6010C	646000	ug/L	21	1	08/21/19 15:06	08/19/19	
Iron	6010C	ND U	ug/L	21	1	08/21/19 15:06	08/19/19	
Magnesium	6010C	257000	ug/L	5.3	1	08/21/19 15:06	08/19/19	
Manganese	6010C	1720	ug/L	1.1	1	08/21/19 15:06	08/19/19	
Potassium	6010C	28000	ug/L	210	1	08/21/19 15:06	08/19/19	
Sodium	6010C	510000	ug/L	42000	100	08/21/19 15:41	08/19/19	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L03S
Lab Code: K1907311-003

Service Request: K1907311
Date Collected: 08/08/19 15:05
Date Received: 08/09/19 10:30

Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	23.6	ug/L	4.2	1	08/21/19 15:09	08/19/19	
Boron	6010C	489	ug/L	21	1	08/21/19 15:09	08/19/19	
Calcium	6010C	131000	ug/L	21	1	08/21/19 15:09	08/19/19	
Iron	6010C	538	ug/L	21	1	08/21/19 15:09	08/19/19	
Magnesium	6010C	33500	ug/L	5.3	1	08/21/19 15:09	08/19/19	
Manganese	6010C	163	ug/L	1.1	1	08/21/19 15:09	08/19/19	
Potassium	6010C	5240	ug/L	210	1	08/21/19 15:09	08/19/19	
Sodium	6010C	145000	ug/L	210	1	08/21/19 15:09	08/19/19	



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J03S
Lab Code: K1907311-001

Service Request: K1907311
Date Collected: 08/08/19 10:18
Date Received: 08/09/19 10:30

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	1030	mg/L	150	10	08/16/19 16:03	
Bromide	300.0	1.45	mg/L	0.10	2	08/09/19 19:17	
Chloride	300.0	98.7	mg/L	1.0	10	08/09/19 19:28	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	08/09/19 19:17	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	08/09/19 19:17	
pH	SM 4500-H+ B	7.03	pH Units	-	1	08/09/19 13:25	H
Sulfate	300.0	1430	mg/L	100	500	08/12/19 16:07	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/10/19 17:25	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N23W15J03S
Lab Code: K1907311-001

Service Request: K1907311
Date Collected: 08/08/19 10:18
Date Received: 08/09/19 10:30
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	5.31	mg/L	0.50	1	08/28/19 17:32	
Solids, Total Dissolved	SM 2540 C	3170	mg/L	5.0	1	08/12/19 12:15	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M03S
Lab Code: K1907311-002

Service Request: K1907311
Date Collected: 08/08/19 11:13
Date Received: 08/09/19 10:30

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	450	mg/L	15	1	08/15/19 17:47	
Bromide	300.0	3.90	mg/L	0.10	2	08/09/19 19:49	
Chloride	300.0	607	mg/L	10	100	08/09/19 20:10	
Nitrate as Nitrogen	300.0	53.4	mg/L	5.0	100	08/09/19 20:10	
Nitrite as Nitrogen	300.0	0.60	mg/L	0.10	2	08/09/19 19:49	
pH	SM 4500-H+ B	7.22	pH Units	-	1	08/09/19 13:26	H
Sulfate	300.0	2320	mg/L	100	500	08/12/19 16:17	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/10/19 17:25	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W07M03S
Lab Code: K1907311-002

Service Request: K1907311
Date Collected: 08/08/19 11:13
Date Received: 08/09/19 10:30
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	4.91	mg/L	0.50	1	08/28/19 18:00	
Solids, Total Dissolved	SM 2540 C	4950	mg/L	5.0	1	08/12/19 12:15	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L03S
Lab Code: K1907311-003

Service Request: K1907311
Date Collected: 08/08/19 15:05
Date Received: 08/09/19 10:30

Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	220	mg/L	15	1	08/15/19 17:47	
Bromide	300.0	0.63	mg/L	0.10	2	08/09/19 20:21	
Chloride	300.0	64.4	mg/L	1.0	10	08/09/19 20:32	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	2	08/09/19 20:21	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.10	2	08/09/19 20:21	
pH	SM 4500-H+ B	7.68	pH Units	-	1	08/09/19 13:27	H
Sulfate	300.0	474	mg/L	20	100	08/09/19 20:42	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/10/19 17:25	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: 02N22W09L03S
Lab Code: K1907311-003

Service Request: K1907311
Date Collected: 08/08/19 15:05
Date Received: 08/09/19 10:30
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.85	mg/L	0.50	1	08/28/19 19:27	
Solids, Total Dissolved	SM 2540 C	1160	mg/L	5.0	1	08/12/19 12:15	



QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: KQ1911513-04

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Barium	6010C	ND U	ug/L	4.2	1	08/21/19 14:48	08/19/19	
Boron	6010C	ND U	ug/L	21	1	08/21/19 14:48	08/19/19	
Calcium	6010C	ND U	ug/L	21	1	08/21/19 14:48	08/19/19	
Iron	6010C	ND U	ug/L	21	1	08/21/19 14:48	08/19/19	
Magnesium	6010C	ND U	ug/L	5.3	1	08/21/19 14:48	08/19/19	
Manganese	6010C	ND U	ug/L	1.1	1	08/21/19 14:48	08/19/19	
Potassium	6010C	ND U	ug/L	210	1	08/21/19 14:48	08/19/19	
Sodium	6010C	ND U	ug/L	210	1	08/21/19 14:48	08/19/19	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/21/19

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ1911513-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Barium	6010C	5120	5000	102	80-120
Boron	6010C	494	500	99	80-120
Calcium	6010C	12500	12500	100	80-120
Iron	6010C	2510	2500	100	80-120
Magnesium	6010C	12700	12500	101	80-120
Manganese	6010C	1240	1250	99	80-120
Potassium	6010C	12400	12500	100	80-120
Sodium	6010C	12500	12500	100	80-120



General Chemistry

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907311-MB1

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	ND U	mg/L	15	1	08/15/19 17:47	
Bromide	300.0	ND U	mg/L	0.050	1	08/09/19 11:53	
Chloride	300.0	ND U	mg/L	0.10	1	08/09/19 11:53	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	1	08/09/19 11:53	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	1	08/09/19 11:53	
Sulfate	300.0	ND U	mg/L	0.20	1	08/09/19 11:53	
Total Sulfide	SM 4500-S2- D	ND U	mg/L	0.050	1	08/10/19 17:25	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907311-MB1

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>Result</u>	<u>Units</u>	<u>MRL</u>	<u>Dil.</u>	<u>Date Analyzed</u>	<u>Q</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	ND U	mg/L	0.50	1	08/28/19 18:57	
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/12/19 12:15	

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Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907311-MB2

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO ₃ , Total	SM 2320 B	ND U	mg/L	15	1	08/16/19 16:03	
Bromide	300.0	ND U	mg/L	0.050	1	08/09/19 19:06	
Chloride	300.0	ND U	mg/L	0.10	1	08/09/19 19:06	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	1	08/09/19 19:06	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	1	08/09/19 19:06	
Sulfate	300.0	ND U	mg/L	0.20	1	08/09/19 19:06	

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dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907311-MB2

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	08/12/19 12:15	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907311-MB3

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Sulfate	300.0	ND U	mg/L	0.20	1	08/12/19 10:58	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water
Sample Name: Method Blank
Lab Code: K1907311-MB4

Service Request: K1907311
Date Collected: NA
Date Received: NA
Basis: NA

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Sulfate	300.0	ND U	mg/L	0.20	1	08/12/19 20:24	

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: 08/08/19
Date Received: 08/09/19
Date Analyzed: 08/28/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N23W15J03S
Lab Code: K1907311-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907311-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	5.31	5.02	5.17	6	10

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: 08/08/19
Date Received: 08/09/19
Date Analyzed: 08/28/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W07M03S
Lab Code: K1907311-002

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907311-002DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	4.91	4.96	4.94	<1	10

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: 08/08/19
Date Received: 08/09/19
Date Analyzed: 08/28/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 02N22W09L03S
Lab Code: K1907311-003

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907311-003DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.85	0.75	0.798	13 *	10

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: NA
Date Received: NA
Date Analyzed: 08/15/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907379-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907379-001DUP1 Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	790	>660	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: NA
Date Received: NA
Date Analyzed: 08/16/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907379-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907379-001DUP2 Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	150	790	800	794	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: NA
Date Received: NA
Date Analyzed: 08/16/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC **Units:** mg/L
Lab Code: K1907456-002 **Basis:** NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1907456-002DUP Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Total	SM 2320 B	15	50	50	50.2	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Collected: NA
Date Received: NA
Date Analyzed: 08/15/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1907462-001

Units: mg/L
Basis: NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1907462-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Alkalinity as CaCO3, Total	SM 2320 B	15	127	127	127	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/10/19 - 08/28/19

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1907311-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO ₃ , Total	SM 2320 B	163	163	100	90-110
Carbon, Dissolved Organic (DOC)	SM 5310 C	25.2	25.0	101	83-117
Solids, Total Dissolved	SM 2540 C	934	922	101	85-115
Total Sulfide	SM 4500-S2- D	0.182	0.186	98	85-106

ALS Group USA, Corp.
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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/09/19

Lab Control Sample Summary
General Chemistry Parameters

Units:pH Units
Basis:NA

Lab Control Sample
K1907311-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
pH	SM 4500-H+ B	9.23	9.34	99	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/15/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 647503

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1907311-LCS4	165	163	101	90-110

ALS Group USA, Corp.
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QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/16/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 647635

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1907311-LCS5	162	163	99	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/16/19
Date Extracted: NA

Lab Control Sample Summary
Alkalinity as CaCO₃, Total

Analysis Method: SM 2320 B
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 647635

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1907311-LCS6	163	163	100	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/09/19

Duplicate Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K1907311-LCS1

Duplicate Lab Control Sample
K1907311-DLCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
Bromide	300.0	2.51	2.50	101	2.49	2.50	100	90-110	<1	20
Chloride	300.0	4.70	5.00	94	4.75	5.00	95	90-110	1	20
Nitrate as Nitrogen	300.0	2.41	2.50	96	2.43	2.50	97	90-110	<1	20
Nitrite as Nitrogen	300.0	2.40	2.50	96	2.42	2.50	97	90-110	<1	20
Sulfate	300.0	4.75	5.00	95	4.85	5.00	97	90-110	2	20

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: S.S. Papadopoulos & Associates, Inc.
Project: Isotope Sampling
Sample Matrix: Water

Service Request: K1907311
Date Analyzed: 08/12/19
Date Extracted: NA

Duplicate Lab Control Sample Summary
General Chemistry Parameters

Analysis Method: 300.0
Prep Method: None

Units: mg/L
Basis: NA
Analysis Lot: 646897

Lab Control Sample
K1907311-LCS2

Duplicate Lab Control Sample
K1907311-DLCS2

<u>Analyte Name</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>	<u>RPD</u>	<u>RPD Limit</u>
Sulfate	4.76	5.00	95	4.82	5.00	96	90-110	1	20

Appendix C

TestAmerica (Eurofins) Laboratory Analytical Reports

ANALYTICAL REPORT

Eurofins TestAmerica, Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

Laboratory Job ID: 720-94266-1
Client Project/Site: Mount Basin- GSA

For:
United Water Conservation District
106 North 8th Street
Santa Paula, California 93060

Attn: Kathleen Kuepper



Authorized for release by:
8/15/2019 4:24:51 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

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Results relate only to the items tested and the sample(s) as received by the laboratory.



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Definitions/Glossary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Job ID: 720-94266-1

Laboratory: Eurofins TestAmerica, Pleasanton

Narrative

Job Narrative
720-94266-1

Comments

No additional comments.

Receipt

The samples were received on 7/30/2019 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2° C.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Client Sample ID: 02N22W09L04S

Lab Sample ID: 720-94266-1

No Detections.

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This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Pleasanton

Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Client Sample ID: 02N22W09L04S

Lab Sample ID: 720-94266-1

Date Collected: 07/29/19 11:05

Matrix: Water

Date Received: 07/30/19 09:45

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 01:23	1

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QC Sample Results

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/14/19 21:54	1

Lab Sample ID: LCS 160-439568/11
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iodide	4.00	4.07		mg/L		102	90 - 110

Lab Sample ID: 720-94266-1 MS
Matrix: Water
Analysis Batch: 439568

Client Sample ID: 02N22W09L04S
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Iodide	ND		4.00	4.14		mg/L		103	90 - 110

Lab Sample ID: 720-94266-1 DU
Matrix: Water
Analysis Batch: 439568

Client Sample ID: 02N22W09L04S
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iodide	ND		ND		mg/L		NC	20

QC Association Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

HPLC/IC

Analysis Batch: 439568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-94266-1	02N22W09L04S	Total/NA	Water	300.0	
MB 160-439568/10	Method Blank	Total/NA	Water	300.0	
LCS 160-439568/11	Lab Control Sample	Total/NA	Water	300.0	
720-94266-1 MS	02N22W09L04S	Total/NA	Water	300.0	
720-94266-1 DU	02N22W09L04S	Total/NA	Water	300.0	

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Lab Chronicle

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Client Sample ID: 02N22W09L04S

Lab Sample ID: 720-94266-1

Date Collected: 07/29/19 11:05

Matrix: Water

Date Received: 07/30/19 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 01:23	JCB	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Accreditation/Certification Summary

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State		2496	01-31-20
California	State Program	9	2496	01-31-20
USDA	Federal		P330-17-00380	12-11-20

Laboratory: Eurofins TestAmerica, St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
ANAB	Dept. of Defense ELAP		L2305	04-06-22
ANAB	DoD		L2305	04-06-22
ANAB	DOE		L2305.01	04-06-22
Arizona	State		AZ0813	12-08-19
Arizona	State Program	9	AZ0813	12-08-19
California	State		2886	06-30-20
California	State Program	9	2886	06-30-20
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-20
Florida	NELAP		E87689	06-30-20
Hawaii	State Program	9	NA	06-30-20
Illinois	NELAP	5	200023	11-30-19
Illinois	NELAP		004553	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State		KY90125	12-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-20
Louisiana (DW)	NELAP	6	LA011	12-31-19
Louisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
Maryland	State Program	3	310	09-30-20
Michigan	State Program	5	9005	06-30-20
Missouri	State		780	06-30-22
Missouri	State Program	7	780	06-30-20
New Jersey	NELAP	2	MO002	06-30-20
New Jersey	NELAP		MO002	06-30-20
New York	NELAP	2	11616	03-31-20
New York	NELAP		11616	04-01-20
North Dakota	State Program	8	R207	06-30-20
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State		9997	08-31-19
Oklahoma	State Program	6	9997	08-31-19 *
Pennsylvania	NELAP	3	68-00540	02-28-20
Pennsylvania	NELAP		68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-20
Texas	NELAP	6	T104704193-19-14	07-31-20
Texas	NELAP		T104704193-19-13	07-31-20
US Fish & Wildlife	Federal		058448	07-31-20
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542019-11	07-31-20
Virginia	NELAP	3	460230	06-14-20

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton

Accreditation/Certification Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Virginia	NELAP		10310	06-14-20
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton

Method Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL SL

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94266-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
720-94266-1	02N22W09L04S	Water	07/29/19 11:05	07/30/19 09:45	

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720-94266

Report To

Analysis Request

Attn: Brad Bessinger
 Company: SS Papadopoulos & ASS., INC
 Address: 416 NE Dallas St. Suite 201, Camas,
 Email: bbessinger@sspa.com WA 98607
 Bill To: Mound Basin GSA Sampled By: AP+TR
 Attn: Kathleen Kuepper Phone: 805-317-8993

Volatile Organics GC/MS (VOCs) <input type="checkbox"/> EPA 8260B HVOCS by <input type="checkbox"/> EPA 8260B EPA 8260B: <input type="checkbox"/> Gas <input type="checkbox"/> BTEX <input type="checkbox"/> 5 Oxygenates <input type="checkbox"/> DCA, EDB <input type="checkbox"/> Ethanol TEPH EPA 8015B <input type="checkbox"/> Silica Gel <input type="checkbox"/> Diesel <input type="checkbox"/> Motor Oil <input type="checkbox"/> Other SemiVolatile Organics GC/MS <input type="checkbox"/> EPA 8270C PNAPAH's by <input type="checkbox"/> 8270C <input type="checkbox"/> 8270C SIM Oil and Grease (EPA 1664/9071) <input type="checkbox"/> Total Pesticides <input type="checkbox"/> EPA 8081 <input type="checkbox"/> PCBs <input type="checkbox"/> EPA 8082 CAM17 Metals (EPA 6010/7470/7471) Metals: <input type="checkbox"/> 6010B <input type="checkbox"/> 200.7 <input type="checkbox"/> Lead <input type="checkbox"/> LUFT <input type="checkbox"/> CRCA <input type="checkbox"/> Other: Metals: <input type="checkbox"/> 6020 <input type="checkbox"/> 200.8 (ICP-MS): <input type="checkbox"/> W.E.T (STLC) <input type="checkbox"/> TCLP <input type="checkbox"/> W.E.T (DI) <input type="checkbox"/> Hex. Chrom by <input type="checkbox"/> EPA 7196 <input type="checkbox"/> or EPA 7199 pH <input type="checkbox"/> 9040 <input type="checkbox"/> S.M.A.S.500 <input type="checkbox"/> Spec. Cond. <input type="checkbox"/> Alkalinity <input type="checkbox"/> TSS <input type="checkbox"/> SS <input type="checkbox"/> TDS Anions: <input type="checkbox"/> Cl <input type="checkbox"/> SO ₄ <input type="checkbox"/> NO ₃ <input type="checkbox"/> F <input type="checkbox"/> Br <input type="checkbox"/> NO ₂ <input type="checkbox"/> PO ₄ <input type="checkbox"/> Perchlorate by EPA 314.0 COD <input type="checkbox"/> EPA 410.4 <input type="checkbox"/> SM5220D <input type="checkbox"/> Turbidity Iodide, 300	Sample ID Date Time Mat. Priority
	02N22W09L04S 7/29/19 11:05 02N22W09L03S 7/29/19 11:42

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720-94266 Chain of Custody



UNITED WATER CONSERVATION DISTRICT

KATHLEEN KUEPPER
 Staff Hydrogeologist

106 N 8th Street - Santa Paula, CA 93060
 Office (805) 525-4431 - Direct Line (805) 317-8993 - Fax (805) 525-2661
 kathleenk@unitedwater.org www.unitedwater.org

Project Info. Project Name/ #: _____ PO#: _____ Credit Card Y/N: _____
 If yes, please call with payment information ASAP

Sample Receipt # of Containers: _____ Head Space: _____ Temp: 4.22

TA 10 Day 5 Day 4 Day 3 Day 2 Day 1 Day Other: _____

1) Relinquished by: K. Kuepper 13:57
 Signature _____ Time _____
Kathleen 7/29/19
 Printed Name _____ Date _____
United Water
 Company _____

2) Relinquished by: _____
 Signature _____
 Printed Name _____ Date _____
 Company _____

1) Received by: FEDEX 13:57
 Signature _____ Time _____
Yari R. 7/29/19
 Printed Name _____ Date _____
FEDEX, Ventura, CA
 Company _____

2) Received by: Juan Muller 9:45
 Signature _____ Time _____
Muller 7-30-19
 Printed Name _____ Date _____
ETA P/S
 Company _____

3) Received by: _____
 Signature _____ Time _____
 Printed Name _____ Date _____
 Company _____

Report: Routine Level 3 Level 4 EDD EDF
 Special Instructions / Comments: Global ID _____

See Terms and Conditions on reverse

8/15/2019



Eurofins TestAmerica, Pleasanton

1220 Quarry Lane
 Pleasanton, CA 94566
 Phone: 925-484-1919 Fax: 925-600-3002

Chain of Custody Record



Environment Testing
 TestAmerica

Client Information (Sub Contract Lab)		Sampler:		Lab PM:		Carrier Tracking No(s):		COC No:																									
Client Contact:		Phone:		E-Mail:		State of Origin:		Page:																									
Shipping/Receiving				afsaneh.salimpour@testamericainc.com		California		Page 1 of 1																									
Company: TestAmerica Laboratories, Inc.				Accreditations Required (See note):				Job #:																									
Address: 13715 Rider Trail North,				Due Date Requested: 8/7/2019		Analysis Requested																											
City: Earth City				TAT Requested (days):																													
State, Zip: MO, 63045				PO #:		<table border="0"> <tr> <td>A - HCL</td> <td>M - Hexane</td> </tr> <tr> <td>B - NaOH</td> <td>N - None</td> </tr> <tr> <td>C - Zn Acetate</td> <td>O - AsNaO2</td> </tr> <tr> <td>D - Nitric Acid</td> <td>P - Na2O4S</td> </tr> <tr> <td>E - NaHSO4</td> <td>Q - Na2SO3</td> </tr> <tr> <td>F - MeOH</td> <td>R - Na2S2O3</td> </tr> <tr> <td>G - Amchlor</td> <td>S - H2SO4</td> </tr> <tr> <td>H - Ascorbic Acid</td> <td>T - TSP Dodecahydrate</td> </tr> <tr> <td>I - Ice</td> <td>U - Acetone</td> </tr> <tr> <td>J - DI Water</td> <td>V - MCAA</td> </tr> <tr> <td>K - EDTA</td> <td>W - pH 4-5</td> </tr> <tr> <td>L - EDA</td> <td>Z - other (specify)</td> </tr> </table>				A - HCL	M - Hexane	B - NaOH	N - None	C - Zn Acetate	O - AsNaO2	D - Nitric Acid	P - Na2O4S	E - NaHSO4	Q - Na2SO3	F - MeOH	R - Na2S2O3	G - Amchlor	S - H2SO4	H - Ascorbic Acid	T - TSP Dodecahydrate	I - Ice	U - Acetone	J - DI Water	V - MCAA	K - EDTA	W - pH 4-5	L - EDA	Z - other (specify)
A - HCL	M - Hexane																																
B - NaOH	N - None																																
C - Zn Acetate	O - AsNaO2																																
D - Nitric Acid	P - Na2O4S																																
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I - Ice	U - Acetone																																
J - DI Water	V - MCAA																																
K - EDTA	W - pH 4-5																																
L - EDA	Z - other (specify)																																
Project Name: Mount Basin- GSA				Project #: 72014607		Other: Preservation Codes:																											
Site:				SSOW#:																													
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Sample Type (C=comp, G=grab)		Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		300_ORGFM_280/Iodide		Total Number of containers		Special Instructions/Note:															
																				Preservation Code:													
02N22W09L045 (720-94266-1)		7/29/19		11:05 Pacific		Water				X						1																	
02N22W09L035 (720-94266-2)		7/29/19		11:42 Pacific		Water				X						1																	
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.																																	
Possible Hazard Identification										Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)																							
Unconfirmed										<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months																							
Deliverable Requested: I, II, III, IV, Other (specify)					Primary Deliverable Rank: 2					Special Instructions/QC Requirements:																							
Empty Kit Relinquished by:										Date/Time:																							
										7/31/19 1413																							
Relinquished by:					Date/Time:					Received by:					Date/Time:																		
					7/31/19 1413										8-1-19 09:15																		
Relinquished by:					Date/Time:					Received by:					Date/Time:																		
Custody Seals Intact:					Custody Seal No.:					Cooler Temperature(s) °C and Other Remarks:																							
<input type="checkbox"/> Yes <input type="checkbox"/> No																																	

Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94266-1

Login Number: 94266
List Number: 1
Creator: Bullock, Tracy

List Source: Eurofins TestAmerica, Pleasanton

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94266-1

Login Number: 94266
List Number: 2
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 08/01/19 04:08 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.1
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Eurofins TestAmerica, Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

Laboratory Job ID: 720-94276-1
Client Project/Site: Mount Basin- GSA

For:
United Water Conservation District
106 North 8th Street
Santa Paula, California 93060

Attn: Kathleen Kuepper



Authorized for release by:
8/15/2019 4:28:45 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



Table of Contents

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Detection Summary	5
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Certification Summary	11
Method Summary	13
Sample Summary	14
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Definitions/Glossary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Job ID: 720-94276-1

Laboratory: Eurofins TestAmerica, Pleasanton

Narrative

Job Narrative
720-94276-1

Comments

No additional comments.

Receipt

The samples were received on 7/31/2019 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.0° C.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Client Sample ID: 02N23W15J01S

Lab Sample ID: 720-94276-1

No Detections.

Client Sample ID: 02N23W15J02S

Lab Sample ID: 720-94276-2

No Detections.

- 1
- 2
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This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Pleasanton

Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Client Sample ID: 02N23W15J01S

Lab Sample ID: 720-94276-1

Date Collected: 07/30/19 10:22

Matrix: Water

Date Received: 07/31/19 09:30

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 03:07	1

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Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Client Sample ID: 02N23W15J02S

Lab Sample ID: 720-94276-2

Date Collected: 07/30/19 10:55

Matrix: Water

Date Received: 07/31/19 09:30

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 04:17	1

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QC Sample Results

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/14/19 21:54	1

Lab Sample ID: LCS 160-439568/11
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iodide	4.00	4.07		mg/L		102	90 - 110

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QC Association Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

HPLC/IC

Analysis Batch: 439568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-94276-1	02N23W15J01S	Total/NA	Water	300.0	
720-94276-2	02N23W15J02S	Total/NA	Water	300.0	
MB 160-439568/10	Method Blank	Total/NA	Water	300.0	
LCS 160-439568/11	Lab Control Sample	Total/NA	Water	300.0	

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Lab Chronicle

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Client Sample ID: 02N23W15J01S

Date Collected: 07/30/19 10:22

Date Received: 07/31/19 09:30

Lab Sample ID: 720-94276-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 03:07	JCB	TAL SL

Client Sample ID: 02N23W15J02S

Date Collected: 07/30/19 10:55

Date Received: 07/31/19 09:30

Lab Sample ID: 720-94276-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 04:17	JCB	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Accreditation/Certification Summary

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State		2496	01-31-20
California	State Program	9	2496	01-31-20
USDA	Federal		P330-17-00380	12-11-20

Laboratory: Eurofins TestAmerica, St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
ANAB	Dept. of Defense ELAP		L2305	04-06-22
ANAB	DoD		L2305	04-06-22
ANAB	DOE		L2305.01	04-06-22
Arizona	State		AZ0813	12-08-19
Arizona	State Program	9	AZ0813	12-08-19
California	State		2886	06-30-20
California	State Program	9	2886	06-30-20
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-20
Florida	NELAP		E87689	06-30-20
Hawaii	State Program	9	NA	06-30-20
Illinois	NELAP	5	200023	11-30-19
Illinois	NELAP		004553	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State		KY90125	12-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-20
Louisiana (DW)	NELAP	6	LA011	12-31-19
Louisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
Maryland	State Program	3	310	09-30-20
Michigan	State Program	5	9005	06-30-20
Missouri	State		780	06-30-22
Missouri	State Program	7	780	06-30-20
New Jersey	NELAP	2	MO002	06-30-20
New Jersey	NELAP		MO002	06-30-20
New York	NELAP	2	11616	03-31-20
New York	NELAP		11616	04-01-20
North Dakota	State Program	8	R207	06-30-20
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State		9997	08-31-19
Oklahoma	State Program	6	9997	08-31-19 *
Pennsylvania	NELAP	3	68-00540	02-28-20
Pennsylvania	NELAP		68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-20
Texas	NELAP	6	T104704193-19-14	07-31-20
Texas	NELAP		T104704193-19-13	07-31-20
US Fish & Wildlife	Federal		058448	07-31-20
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542019-11	07-31-20
Virginia	NELAP	3	460230	06-14-20

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton

Accreditation/Certification Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Virginia	NELAP		10310	06-14-20
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton



Method Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL SL

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
720-94276-1	02N23W15J01S	Water	07/30/19 10:22	07/31/19 09:30	
720-94276-2	02N23W15J02S	Water	07/30/19 10:55	07/31/19 09:30	

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720-94276

Report To **Analysis Request**

Attn: Brad Bessinger
 Company: SS Papadopoulos & ASS.
 Address: 416 NE Dallas St. suite 201,
 Email: bbessinger@sspa.com, WA 98607
 Bill To: mound basin 65A Sampled By: AP+TR
 Attn: Erin Gorospe Phone: 805-525-4431

Volatile Organics GC/MS (VOCs)
 EPA 8260B
HVOCs by EPA 8260B
 EPA 8260B: Gas BTEX
 5 Oxygenates DCA, EDB Ethanol
 TEPH EPA 8015B Silica Gel
 Diesel Motor Oil Other
SemiVolatile Organics GC/MS
 EPA 8270C
PNAPAH's by 8270C 8270C SIM
Oil and Grease (EPA 1664/9071) Petroleum Total
Pesticides EPA 8081 EPA 8082
CAM17 Metals (EPA 6010/7470/7471)
Metals: 6010B 200.7 Lead LUFT RCRA Other: _____
Metals: 6020 200.8 (ICP-MS): _____
 W.E.T (STLC) TCLP
 W.E.T (DI) T.C.P.
Hex. Chrom by EPA 7196 or EPA 7199
pH 9040 SMA500
Spec. Cond. Alkalinity TDS
 TSS SS TDS
Anions: Cl SO₄ NO₃ F Br NO₂ PO₄
 Perchlorate by EPA 314.0
COD EPA 410.4 SM5220D Turbidity
Iodide, 300

Sample ID	Date	Time	Mat	Preserv
02N23W15J01S	7/30/19	10:22		
02N23W15J02S	7/30/19	10:55		
02N23W15J03S	7/30/19	11:15		
02N22WCFM02S	7/30/19			



720-94276 Chain of Custody

Project Info. **Sample Receipt**
 Project Name/ #: _____ # of Containers: _____
 Head Space: _____
 PO#: _____ Temp: 50
 Credit Card Y/N: _____ If yes, please call with payment information ASAP

1) Relinquished by:
K. Kuepper 14:50
 Signature Time
Kathleen Kuepper 7/30/19
 Printed Name Date
United Water
 Company

2) Relinquished by:
 Signature Time
 Printed Name Date
 Company

3) Relinquished by:
 Signature Time
 Printed Name Date
 Company

T A T
 10 Day 5 Day 4 Day 3 Day 2 Day 1 Day Other: _____

1) Received by:
14:50
 Signature Time
7/30/19
 Printed Name Date
Fed ex
 Company

2) Received by:
John Mulder 9:30
 Signature Time
Mulder 7-31-19
 Printed Name Date
ETA PLS
 Company

3) Received by:
 Signature Time
 Printed Name Date
 Company

Report: Routine Level 3 Level 4 EDD EDF
 Special Instructions / Comments: Global ID _____

See Terms and Conditions on reverse



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94276-1

Login Number: 94276

List Source: Eurofins TestAmerica, Pleasanton

List Number: 1

Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94276-1

Login Number: 94276
List Number: 2
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 08/01/19 04:08 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.1
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



ANALYTICAL REPORT

Eurofins TestAmerica, Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

Laboratory Job ID: 720-94293-1
Client Project/Site: Mount Basin- GSA

For:

United Water Conservation District
106 North 8th Street
Santa Paula, California 93060

Attn: Kathleen Kuepper



Authorized for release by:
8/15/2019 4:31:39 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

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results through
TotalAccess

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



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Definitions/Glossary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Job ID: 720-94293-1

Laboratory: Eurofins TestAmerica, Pleasanton

Narrative

Job Narrative
720-94293-1

Comments

No additional comments.

Receipt

The sample was received on 8/1/2019 9:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Client Sample ID: 02N22W07M02S

Lab Sample ID: 720-94293-1

No Detections.

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This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Pleasanton

Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Client Sample ID: 02N22W07M02S

Lab Sample ID: 720-94293-1

Date Collected: 07/31/19 14:15

Matrix: Water

Date Received: 08/01/19 09:45

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 04:52	1

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QC Sample Results

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/14/19 21:54	1

Lab Sample ID: LCS 160-439568/11
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iodide	4.00	4.07		mg/L		102	90 - 110

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QC Association Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

HPLC/IC

Analysis Batch: 439568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-94293-1	02N22W07M02S	Total/NA	Water	300.0	
MB 160-439568/10	Method Blank	Total/NA	Water	300.0	
LCS 160-439568/11	Lab Control Sample	Total/NA	Water	300.0	

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- 13
- 14

Lab Chronicle

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Client Sample ID: 02N22W07M02S

Lab Sample ID: 720-94293-1

Date Collected: 07/31/19 14:15

Matrix: Water

Date Received: 08/01/19 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 04:52	JCB	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Accreditation/Certification Summary

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State		2496	01-31-20
California	State Program	9	2496	01-31-20
USDA	Federal		P330-17-00380	12-11-20

Laboratory: Eurofins TestAmerica, St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
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ANAB	DoD		L2305	04-06-22
ANAB	DOE		L2305.01	04-06-22
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California	State Program	9	2886	06-30-20
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Florida	NELAP	4	E87689	06-30-20
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Hawaii	State Program	9	NA	06-30-20
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Illinois	NELAP		004553	11-30-19
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Louisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
Maryland	State Program	3	310	09-30-20
Michigan	State Program	5	9005	06-30-20
Missouri	State		780	06-30-22
Missouri	State Program	7	780	06-30-20
New Jersey	NELAP	2	MO002	06-30-20
New Jersey	NELAP		MO002	06-30-20
New York	NELAP	2	11616	03-31-20
New York	NELAP		11616	04-01-20
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NRC	NRC		24-24817-01	12-31-22
Oklahoma	State		9997	08-31-19
Oklahoma	State Program	6	9997	08-31-19 *
Pennsylvania	NELAP	3	68-00540	02-28-20
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South Carolina	State Program	4	85002001	06-30-20
Texas	NELAP	6	T104704193-19-14	07-31-20
Texas	NELAP		T104704193-19-13	07-31-20
US Fish & Wildlife	Federal		058448	07-31-20
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542019-11	07-31-20
Virginia	NELAP	3	460230	06-14-20

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton

Accreditation/Certification Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Virginia	NELAP		10310	06-14-20
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton



Method Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL SL

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94293-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
720-94293-1	02N22W07M02S	Water	07/31/19 14:15	08/01/19 09:45	

- 1
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Environment Testing
TestAmerica

Pleasanton Chain of Custody
1220 Quarry Lane • Pleasanton CA 94566-4756
Phone: (925) 484-1919 Fax: (925) 608-2000

Reference #: 191553

Date 7/31/19 Page 1 of 1

720-94293

Report To Analysis Request

Attn: Brad Bessinger
Company: SS Papadopoulos + Ass.
Address: 416 NE Dallas St, Suite 201, WA, 98601
Email: bbessinger@sspa.com
Bill To: Mouad Kasim GSA Sampled By: AP + TR
Attn: Erin Garospe Phone: 206-525-4431

<input type="checkbox"/> EPA 8260B	<input type="checkbox"/> EPA 8260B	<input type="checkbox"/> EPA 8260B	<input type="checkbox"/> Gas <input type="checkbox"/> BTEX	<input type="checkbox"/> Silica Gel	<input type="checkbox"/> 8270C	<input type="checkbox"/> Petroleum	<input type="checkbox"/> EPA 8081	<input type="checkbox"/> Metals: <input type="checkbox"/> 6010B <input type="checkbox"/> 200.7	<input type="checkbox"/> W.T (STLC)	<input type="checkbox"/> PH	<input type="checkbox"/> Spec. Cond.	<input type="checkbox"/> Anions: <input type="checkbox"/> Cl <input type="checkbox"/> SO ₄ <input type="checkbox"/> NO ₃ <input type="checkbox"/> F	<input type="checkbox"/> EPA 314.0	<u>Iodide</u>
<input type="checkbox"/> EPA 8260B	<input type="checkbox"/> EPA 8260B	<input type="checkbox"/> Gas <input type="checkbox"/> BTEX	<input type="checkbox"/> Diesel <input type="checkbox"/> Motor Oil <input type="checkbox"/> Other	<input type="checkbox"/> EPA 8270C	<input type="checkbox"/> PNA/PAH's by <input type="checkbox"/> 8270C <input type="checkbox"/> 8270C SIM	<input type="checkbox"/> Total	<input type="checkbox"/> EPA 8082	<input type="checkbox"/> Lead <input type="checkbox"/> LUFT <input type="checkbox"/> RCRA <input type="checkbox"/> Other	<input type="checkbox"/> W.T (DI) <input type="checkbox"/> TCLP	<input type="checkbox"/> 9040 <input type="checkbox"/> SM4500	<input type="checkbox"/> SS <input type="checkbox"/> TDS	<input type="checkbox"/> Br <input type="checkbox"/> NO ₂ <input type="checkbox"/> PO ₄	<input type="checkbox"/> EPA 410.4 <input type="checkbox"/> SM5220D	

Sample ID	Date	Time	Mat	Preserv
<u>02N22W07M015</u>	<u>7/31/19</u>			
<u>02N22W07M025</u>	<u>7/31/19</u>	<u>14:15</u>		
<u>02N22W07M035</u>	<u>7/31/19</u>			



720-94293 Chain of Custody

Page 14 of 17

Project Info.	Sample Receipt
Project Name/ #: _____	# of Containers: _____
PO#: _____	Head Space: _____
Credit Card Y/N: _____	Temp: <u>2.20</u>
If yes, please call with payment information ASAP	

1) Relinquished by:

K. King 7/31/19 15:15
Signature Time

Kathleen Kupper 7/31/19
Printed Name Date

United Water
Company

2) Received by:

Signature Time

Printed Name Date

Company

3) Relinquished by:

Signature Time

Printed Name Date

Company

T	10 Day	5 Day	4 Day	3 Day	2 Day	1 Day	Other:
---	--------	-------	-------	-------	-------	-------	--------

1) Received by:

Signature Time 15:15

7/31/19
Printed Name Date

Fedex
Company

2) Received by:

John Kelly 945
Signature Time

Wulley 8-1-19
Printed Name Date

ETAPIS
Company

3) Received by:

Signature Time

Printed Name Date

Company

Report: Routine Level 3 Level 4 EDD EDF
Special Instructions / Comments: Global ID _____

See Terms and Conditions on reverse

8/15/2019



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94293-1

Login Number: 94293

List Source: Eurofins TestAmerica, Pleasanton

List Number: 1

Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94293-1

Login Number: 94293
List Number: 2
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 08/02/19 01:27 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	19.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Eurofins TestAmerica, Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

Laboratory Job ID: 720-94309-1
Client Project/Site: Mount Basin- GSA

For:
United Water Conservation District
106 North 8th Street
Santa Paula, California 93060

Attn: Kathleen Kuepper



Authorized for release by:
8/15/2019 4:33:48 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



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Definitions/Glossary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Job ID: 720-94309-1

Laboratory: Eurofins TestAmerica, Pleasanton

Narrative

Job Narrative
720-94309-1

Comments

No additional comments.

Receipt

The sample was received on 8/2/2019 10:00 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.1° C.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Client Sample ID: 02N22W07M01S

Lab Sample ID: 720-94309-1

No Detections.

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This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Pleasanton

Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Client Sample ID: 02N22W07M01S

Lab Sample ID: 720-94309-1

Date Collected: 08/01/19 09:47

Matrix: Water

Date Received: 08/02/19 10:00

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 05:26	1

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QC Sample Results

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/14/19 21:54	1

Lab Sample ID: LCS 160-439568/11
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iodide	4.00	4.07		mg/L		102	90 - 110



QC Association Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

HPLC/IC

Analysis Batch: 439568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-94309-1	02N22W07M01S	Total/NA	Water	300.0	
MB 160-439568/10	Method Blank	Total/NA	Water	300.0	
LCS 160-439568/11	Lab Control Sample	Total/NA	Water	300.0	

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Lab Chronicle

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Client Sample ID: 02N22W07M01S

Lab Sample ID: 720-94309-1

Date Collected: 08/01/19 09:47

Matrix: Water

Date Received: 08/02/19 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 05:26	JCB	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Accreditation/Certification Summary

Client: United Water Conservation District
 Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State		2496	01-31-20
California	State Program	9	2496	01-31-20
USDA	Federal		P330-17-00380	12-11-20

Laboratory: Eurofins TestAmerica, St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
ANAB	Dept. of Defense ELAP		L2305	04-06-22
ANAB	DoD		L2305	04-06-22
ANAB	DOE		L2305.01	04-06-22
Arizona	State		AZ0813	12-08-19
Arizona	State Program	9	AZ0813	12-08-19
California	State		2886	06-30-20
California	State Program	9	2886	06-30-20
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-20
Florida	NELAP		E87689	06-30-20
Hawaii	State Program	9	NA	06-30-20
Illinois	NELAP	5	200023	11-30-19
Illinois	NELAP		004553	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State		KY90125	12-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-20
Louisiana (DW)	NELAP	6	LA011	12-31-19
Louisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
Maryland	State Program	3	310	09-30-20
Michigan	State Program	5	9005	06-30-20
Missouri	State		780	06-30-22
Missouri	State Program	7	780	06-30-20
New Jersey	NELAP	2	MO002	06-30-20
New Jersey	NELAP		MO002	06-30-20
New York	NELAP	2	11616	03-31-20
New York	NELAP		11616	04-01-20
North Dakota	State Program	8	R207	06-30-20
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State		9997	08-31-19
Oklahoma	State Program	6	9997	08-31-19 *
Pennsylvania	NELAP	3	68-00540	02-28-20
Pennsylvania	NELAP		68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-20
Texas	NELAP	6	T104704193-19-14	07-31-20
Texas	NELAP		T104704193-19-13	07-31-20
US Fish & Wildlife	Federal		058448	07-31-20
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542019-11	07-31-20
Virginia	NELAP	3	460230	06-14-20

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton

Accreditation/Certification Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Virginia	NELAP		10310	06-14-20
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.



Method Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL SL

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94309-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
720-94309-1	02N22W07M01S	Water	08/01/19 09:47	08/02/19 10:00	

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Environment Testing
TestAmerica

Pleasanton Chain of Custody
1220 Quarry Lane • Pleasanton CA 94566-4756
Phone: (925) 484-1919 Fax: (925) 600-3009

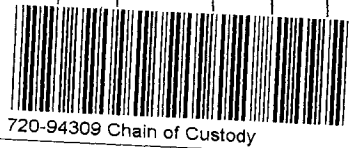
Reference #: 191574
Date 8/11/19 Page 1 of 1

720-94309

Report To Analysis Request

Attn: Brad Bessinger
Company: SS Papadopoulos FASS
Address: 4116 NE Dallas St. Suite 201, Camas WA, 98607
Email: bbessinger@sspa.com
Bill To: Mound bwin GSA Sampled By: NR
Attn: Erin Gorospe Phone: 805-525-4431

Volatile Organics GC/MS (VOCs) <input type="checkbox"/> EPA 8260B	HVOCs by <input type="checkbox"/> EPA 8260B	EPA 8260B: <input type="checkbox"/> Gas <input type="checkbox"/> BTEX <input type="checkbox"/> 5 Oxygenates <input type="checkbox"/> DCA, ED8 <input type="checkbox"/> Ethanol	TEPH EPA 8015B <input type="checkbox"/> Silica Gel <input type="checkbox"/> Diesel <input type="checkbox"/> Motor Oil <input type="checkbox"/> Other	SemiVolatile Organics GC/MS <input type="checkbox"/> EPA 8270C	PNAP/PAH's by <input type="checkbox"/> 8270C <input type="checkbox"/> 8270C SIM	Oil and Grease (EPA 1664/9071) <input type="checkbox"/> Total	Pesticides <input type="checkbox"/> EPA 8081 PCBs <input type="checkbox"/> EPA 8082	CAM17 Metals (EPA 6010/7470/7471)	Metals: <input type="checkbox"/> 6010B <input type="checkbox"/> 200.7 <input type="checkbox"/> Lead <input type="checkbox"/> LUFT <input type="checkbox"/> RCRA <input type="checkbox"/> Other: _____	Metals: <input type="checkbox"/> 6020 <input type="checkbox"/> 200.8 (ICP-MS): _____	<input type="checkbox"/> W.E.T (STLC) <input type="checkbox"/> W.E.T (DI) <input type="checkbox"/> TCLP	Hex. Chrom by <input type="checkbox"/> EPA 7196 <input type="checkbox"/> or EPA 7199	pH <input type="checkbox"/> 9040 <input type="checkbox"/> SM4500	<input type="checkbox"/> Spec. Cond. <input type="checkbox"/> Alkalinity <input type="checkbox"/> TSS <input type="checkbox"/> SS <input type="checkbox"/> TDS	Anions: <input type="checkbox"/> Cl <input type="checkbox"/> SO ₄ <input type="checkbox"/> NO ₃ <input type="checkbox"/> F <input type="checkbox"/> Br <input type="checkbox"/> NO ₂ <input type="checkbox"/> PO ₄	<input type="checkbox"/> Perchlorate by EPA 314.0	COD <input type="checkbox"/> EPA 410.4 <input type="checkbox"/> SM5220D <input type="checkbox"/> Turbidity	<u>Iodide, 300</u>	
	Sample ID	Date	Time	Mat	Priority														
<u>02N22W07M01S</u>	<u>8/1/19</u>	<u>9:47</u>																	
<u>02N22W07M05S</u>	<u>8/1/19</u>																		



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Project Info.
Project Name/ #: _____
PO#: _____
Credit Card Y/N: _____
If yes, please call with payment information ASAP

Sample Receipt
of Containers: _____
Head Space: _____
Temp: 3.1°C

Report: Routine Level 3 Level 4 EDD EDF
Special Instructions / Comments: Global ID _____

See Terms and Conditions on reverse

1) Relinquished by:
K. Kuepper 14:00
Signature _____ Time _____
Printed Name Kathleen Kuepper Date 8/1/19
Company United Water

1) Received by:
Signature _____ Time 14:00
Printed Name _____ Date 8/1/19
Company FedEx

2) Relinquished by:
Signature _____ Time _____
Printed Name _____ Date _____
Company _____

2) Received by:
John Mullen 10:00
Signature _____ Time _____
Printed Name Mullen Date 8-2-19
Company ETA DIS

3) Relinquished by:
Signature _____ Time _____
Printed Name _____ Date _____
Company _____

3) Received by:
Signature _____ Time _____
Printed Name _____ Date _____
Company _____

8/15/2019



Eurofins TestAmerica, Pleasanton

1220 Quarry Lane
 Pleasanton, CA 94566
 Phone: 925-484-1919 Fax: 925-600-3002

Chain of Custody Record



Environment Testing
 TestAmerica

Client Information (Sub Contract Lab)		Sampler:		Lab PM: Salimpour, Afsaneh F		Carrier Tracking No(s):		COC No: 720-42975.1			
Client Contact: Shipping/Receiving		Phone:		E-Mail: afsaneh.salimpour@testamericainc.com		State of Origin: California		Page: Page 1 of 1			
Company: TestAmerica Laboratories, Inc.				Accreditations Required (See note):				Job #: 720-94309-1			
Address: 13715 Rider Trail North,		Due Date Requested: 8/12/2019		Analysis Requested						Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Z - other (specify)	
City: Earth City		TAT Requested (days):									
State, Zip: MO, 63045		PO #:		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		300_ORGFM_28D_Iodide		Total Number of containers	
Phone: 314-298-8566(Tel) 314-298-8757(Fax)		WO #:									
Email:		Project #: 72014607		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		300_ORGFM_28D_Iodide		Total Number of containers	
Project Name: Mount Basin- GSA		SSOW#:									
Site:		Sample Date		Sample Time		Sample Type (C=comp, G=grab)		Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)		Special Instructions/Note:	
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Sample Type (C=comp, G=grab)		Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)		Special Instructions/Note:	
02N22W07M01S (720-94309-1)		8/1/19		09:47 Pacific		Water		X		1	
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.											
Possible Hazard Identification						Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)					
Unconfirmed						<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months					
Deliverable Requested: I, II, III, IV, Other (specify)				Primary Deliverable Rank: 2		Special Instructions/QC Requirements:					
Empty Kit Relinquished by:				Date:		Time:		Method of Shipment:			
Relinquished by:				Date/Time: 8/2/19 13:22		Company: ETAPLW		Received by:		Date/Time: 8/3/19 08:30	
Relinquished by:				Date/Time:		Company:		Received by:		Date/Time:	
Relinquished by:				Date/Time:		Company:		Received by:		Date/Time:	
Custody Seals Intact: Δ Yes Δ No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:							

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8/15/2019



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94309-1

Login Number: 94309

List Source: Eurofins TestAmerica, Pleasanton

List Number: 1

Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94309-1

Login Number: 94309

List Number: 2

Creator: Harris, Lorin C

List Source: Eurofins TestAmerica, St. Louis

List Creation: 08/03/19 10:11 AM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



ANALYTICAL REPORT

Eurofins TestAmerica, Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

Laboratory Job ID: 720-94454-1

Client Project/Site: Mount Basin- Ventura GW

For:

United Water Conservation District
106 North 8th Street
Santa Paula, California 93060

Attn: Kathleen Kuepper



Authorized for release by:
8/15/2019 4:36:54 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



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Definitions/Glossary

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Job ID: 720-94454-1

Laboratory: Eurofins TestAmerica, Pleasanton

Narrative

Job Narrative
720-94454-1

Comments

No additional comments.

Receipt

The samples were received on 8/9/2019 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.0° C.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Client Sample ID: 02N23W15J03S

Lab Sample ID: 720-94454-1

No Detections.

Client Sample ID: 02N22W07M03S

Lab Sample ID: 720-94454-2

No Detections.

Client Sample ID: 02N22W09L03S

Lab Sample ID: 720-94454-3

No Detections.

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This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Pleasanton

Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Client Sample ID: 02N23W15J03S

Lab Sample ID: 720-94454-1

Date Collected: 08/08/19 10:18

Matrix: Water

Date Received: 08/09/19 09:45

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 06:01	1

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Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Client Sample ID: 02N22W07M03S

Lab Sample ID: 720-94454-2

Date Collected: 08/08/19 11:13

Matrix: Water

Date Received: 08/09/19 09:45

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 06:36	1

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Client Sample Results

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Client Sample ID: 02N22W09L03S

Lab Sample ID: 720-94454-3

Date Collected: 08/08/19 15:05

Matrix: Water

Date Received: 08/09/19 09:45

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/15/19 07:46	1

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QC Sample Results

Client: United Water Conservation District
 Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodide	ND		1.0		mg/L			08/14/19 21:54	1

Lab Sample ID: LCS 160-439568/11
Matrix: Water
Analysis Batch: 439568

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iodide	4.00	4.07		mg/L		102	90 - 110



QC Association Summary

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

HPLC/IC

Analysis Batch: 439568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-94454-1	02N23W15J03S	Total/NA	Water	300.0	
720-94454-2	02N22W07M03S	Total/NA	Water	300.0	
720-94454-3	02N22W09L03S	Total/NA	Water	300.0	
MB 160-439568/10	Method Blank	Total/NA	Water	300.0	
LCS 160-439568/11	Lab Control Sample	Total/NA	Water	300.0	



Lab Chronicle

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Client Sample ID: 02N23W15J03S

Lab Sample ID: 720-94454-1

Date Collected: 08/08/19 10:18

Matrix: Water

Date Received: 08/09/19 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 06:01	JCB	TAL SL

Client Sample ID: 02N22W07M03S

Lab Sample ID: 720-94454-2

Date Collected: 08/08/19 11:13

Matrix: Water

Date Received: 08/09/19 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 06:36	JCB	TAL SL

Client Sample ID: 02N22W09L03S

Lab Sample ID: 720-94454-3

Date Collected: 08/08/19 15:05

Matrix: Water

Date Received: 08/09/19 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	439568	08/15/19 07:46	JCB	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: United Water Conservation District
 Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State		2496	01-31-20
California	State Program	9	2496	01-31-20
USDA	Federal		P330-17-00380	12-11-20

Laboratory: Eurofins TestAmerica, St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
ANAB	Dept. of Defense ELAP		L2305	04-06-22
ANAB	DoD		L2305	04-06-22
ANAB	DOE		L2305.01	04-06-22
Arizona	State		AZ0813	12-08-19
Arizona	State Program	9	AZ0813	12-08-19
California	State		2886	06-30-20
California	State Program	9	2886	06-30-20
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-20
Florida	NELAP		E87689	06-30-20
Hawaii	State Program	9	NA	06-30-20
Illinois	NELAP	5	200023	11-30-19
Illinois	NELAP		004553	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State		KY90125	12-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-20
Louisiana (DW)	NELAP	6	LA011	12-31-19
Louisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
Maryland	State Program	3	310	09-30-20
Michigan	State Program	5	9005	06-30-20
Missouri	State		780	06-30-22
Missouri	State Program	7	780	06-30-20
New Jersey	NELAP	2	MO002	06-30-20
New Jersey	NELAP		MO002	06-30-20
New York	NELAP	2	11616	03-31-20
New York	NELAP		11616	04-01-20
North Dakota	State Program	8	R207	06-30-20
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State		9997	08-31-19
Oklahoma	State Program	6	9997	08-31-19 *
Pennsylvania	NELAP	3	68-00540	02-28-20
Pennsylvania	NELAP		68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-20
Texas	NELAP	6	T104704193-19-14	07-31-20
Texas	NELAP		T104704193-19-13	07-31-20
US Fish & Wildlife	Federal		058448	07-31-20
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542019-11	07-31-20
Virginia	NELAP	3	460230	06-14-20

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton

Accreditation/Certification Summary

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Virginia	NELAP		10310	06-14-20
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pleasanton



Method Summary

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL SL

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: United Water Conservation District
Project/Site: Mount Basin- Ventura GW

Job ID: 720-94454-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
720-94454-1	02N23W15J03S	Water	08/08/19 10:18	08/09/19 09:45	
720-94454-2	02N22W07M03S	Water	08/08/19 11:13	08/09/19 09:45	
720-94454-3	02N22W09L03S	Water	08/08/19 15:05	08/09/19 09:45	

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Eurofins TestAmerica, Pleasanton

1220 Quarry Lane
 Pleasanton, CA 94566
 Phone: 925-484-1919 Fax: 925-600-3002

Chain of Custody Record



Client Information (Sub Contract Lab)		Sampler:		Lab PM: Salimpour, Afsaneh F		Carrier Tracking No(s):		COC No: 720-43046.1			
Client Contact: Shipping/Receiving		Phone:		E-Mail: afsaneh.salimpour@testamericainc.com		State of Origin: California		Page: Page 1 of 1			
Company: TestAmerica Laboratories, Inc.				Accreditations Required (See note):				Job #: 720-94454-1			
Address: 13715 Rider Trail North.		Due Date Requested: 8/19/2019		Analysis Requested						Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Z - other (specify)	
City: Earth City		TAT Requested (days):									
State, Zip: MO, 63045		PO #:		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		Total Number of containers			
Phone: 314-298-8566(Tel) 314-298-8757(Fax)		WO #:									
Email:		Project #: 72014607		300_ORGFM_28D/Iodide							
Project Name: Mount Basin- Ventura GW		SSOW#:									
Site:											
Sample Identification - Client ID (Lab ID)		Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Total Number of containers	Special Instructions/Note:		
02N23W15J03S (720-94454-1)		8/8/19	10:18 Pacific	Water	Water		X	1			
02N22W07M03S (720-94454-2)		8/8/19	11:13 Pacific	Water	Water		X	1			
02N22W09L03S (720-94454-3)		8/8/19	15:05 Pacific	Water	Water		X	1			
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.											
Possible Hazard Identification				Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months							
Unconfirmed				Special Instructions/QC Requirements:							
Deliverable Requested: I, II, III, IV, Other (specify)		Primary Deliverable Rank: 2									
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:					
Relinquished by: <i>Soren Mueller</i>		Date/Time: 8-9-19 1500		Company: PIS		Received by: <i>[Signature]</i>		Date/Time: 8/10/19 08:50			
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:			
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:			
Custody Seals Intact: Δ Yes Δ No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:							



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94454-1

Login Number: 94454

List Source: Eurofins TestAmerica, Pleasanton

List Number: 1

Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94454-1

Login Number: 94454

List Number: 2

Creator: Harris, Lorin C

List Source: Eurofins TestAmerica, St. Louis

List Creation: 08/10/19 12:09 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Appendix D

Isotech Laboratory Analytical Reports

Lab #: 728319 Job #: 42338 IS-104602 Co. Job#: _____
 Sample Name: 02N22W09L04S Co. Lab#: _____
 Company: Mound Basin Groundwater Sustainability
 API/Well: _____
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Base GSA
 Location: Ventura, CA
 Formation/Depth: _____
 Sampling Point: _____
 Date Sampled: 7/29/2019 11:05 Date Received: 7/30/2019 Date Reported: 9/23/2019

δD of water	-----	-39.8 ‰ relative to VSMOW
δ ¹⁸ O of water	-----	-6.05 ‰ relative to VSMOW
Tritium content of water	-----	na
δ ¹³ C of DIC	-----	-14.2 ‰ relative to VPDB
¹⁴ C content of DIC	-----	44.1 ± 0.2 percent modern carbon
δ ¹⁵ N of nitrate	-----	na
δ ¹⁸ O of nitrate	-----	na
δ ³⁴ S of sulfate	-----	-11.1 ‰ relative to VCDT
δ ¹⁸ O of sulfate	-----	0.3 ‰ relative to VSMOW
Vacuum Distilled? *	-----	No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 728601 Job #: 42364 IS-104602 Co. Job#: _____
 Sample Name: 02N23W15J01S Co. Lab#: _____
 Company: Mound Basin Groundwater Sustainability
 API/Well: _____
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Basin GSA
 Location: Ventura, CA
 Formation/Depth: _____
 Sampling Point: _____
 Date Sampled: 7/30/2019 10:22 Date Received: 7/31/2019 Date Reported: 9/23/2019

δD of water	-----	-43.6 ‰ relative to VSMOW
δ ¹⁸ O of water	-----	-6.70 ‰ relative to VSMOW
Tritium content of water	-----	na
δ ¹³ C of DIC	-----	-12.3 ‰ relative to VPDB
¹⁴ C content of DIC	-----	41.6 ± 0.2 percent modern carbon
δ ¹⁵ N of nitrate	-----	na
δ ¹⁸ O of nitrate	-----	na
δ ³⁴ S of sulfate	-----	-7.1 ‰ relative to VCDT
δ ¹⁸ O of sulfate	-----	7.7 ‰ relative to VSMOW
Vacuum Distilled? *	-----	No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 728602 Job #: 42364 IS-104602 Co. Job#:
Sample Name: 02N23W15J02S Co. Lab#:
Company: Mound Basin Groundwater Sustainability
API/Well:
Container: Plastic Bottle
Field/Site Name: Isotope Sampling - Mound Basin GSA
Location: Ventura, CA
Formation/Depth:
Sampling Point:
Date Sampled: 7/30/2019 10:55 Date Received: 7/31/2019 Date Reported: 9/23/2019

δD of water ----- -48.8 ‰ relative to VSMOW
 $\delta^{18}O$ of water ----- -7.29 ‰ relative to VSMOW
Tritium content of water ----- na
 $\delta^{13}C$ of DIC ----- -13.0 ‰ relative to VPDB
 ^{14}C content of DIC ----- 39.5 ± 0.1 percent modern carbon
 $\delta^{15}N$ of nitrate ----- na
 $\delta^{18}O$ of nitrate ----- na
 $\delta^{34}S$ of sulfate ----- -7.4 ‰ relative to VCDT
 $\delta^{18}O$ of sulfate ----- 9.9 ‰ relative to VSMOW
Vacuum Distilled? * ----- No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 728741 Job #: 42371 IS-104602 Co. Job#:
 Sample Name: 02N22W07M02S Co. Lab#:
 Company: Mound Basin Groundwater Sustainability
 API/Well:
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Basin GSA
 Location: Ventura, CA
 Formation/Depth:
 Sampling Point:
 Date Sampled: 7/31/2019 14:15 Date Received: 8/01/2019 Date Reported: 9/23/2019

δ D of water ----- -45.4 ‰ relative to VSMOW
 δ^{18} O of water ----- -7.02 ‰ relative to VSMOW
 Tritium content of water ----- na
 δ^{13} C of DIC ----- -14.0 ‰ relative to VPDB
 14 C content of DIC ----- 35.5 ± 0.1 percent modern carbon
 δ^{15} N of nitrate ----- na
 δ^{18} O of nitrate ----- na
 δ^{34} S of sulfate ----- -4.9 ‰ relative to VCDT
 δ^{18} O of sulfate ----- 9.1 ‰ relative to VSMOW
 Vacuum Distilled? * ----- No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 728917 Job #: 42388 IS-104602 Co. Job#:
 Sample Name: 02N22W07M01S Co. Lab#:
 Company: Mound Basin Groundwater Sustainability
 API/Well:
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Basin GSA
 Location: Ventura, CA
 Formation/Depth:
 Sampling Point:
 Date Sampled: 8/01/2019 9:47 Date Received: 8/02/2019 Date Reported: 9/23/2019

δ D of water ----- -44.6 ‰ relative to VSMOW
 δ ¹⁸O of water ----- -6.87 ‰ relative to VSMOW
 Tritium content of water ----- na
 δ ¹³C of DIC ----- -12.2 ‰ relative to VPDB
¹⁴C content of DIC ----- 46.7 ± 0.2 percent modern carbon
 δ ¹⁵N of nitrate ----- na
 δ ¹⁸O of nitrate ----- na
 δ ³⁴S of sulfate ----- -7.3 ‰ relative to VCDT
 δ ¹⁸O of sulfate ----- 6.4 ‰ relative to VSMOW
 Vacuum Distilled? * ----- No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 729566 Job #: 42449 IS-104602 Co. Job#: _____
 Sample Name: 02N23W15J03S Co. Lab#: _____
 Company: Mound Basin Groundwater Sustainability
 API/Well: _____
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Basin GSA
 Location: Ventura, CA
 Formation/Depth: _____
 Sampling Point: _____
 Date Sampled: 8/08/2019 10:18 Date Received: 8/09/2019 Date Reported: 9/23/2019

δD of water	-----	-40.4 ‰ relative to VSMOW
δ ¹⁸ O of water	-----	-6.25 ‰ relative to VSMOW
Tritium content of water	-----	na
δ ¹³ C of DIC	-----	-18.6 ‰ relative to VPDB
¹⁴ C content of DIC	-----	9.8 ± 0.1 percent modern carbon
δ ¹⁵ N of nitrate	-----	na
δ ¹⁸ O of nitrate	-----	na
δ ³⁴ S of sulfate	-----	-10.3 ‰ relative to VCDT
δ ¹⁸ O of sulfate	-----	0.8 ‰ relative to VSMOW
Vacuum Distilled? *	-----	No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 729567 Job #: 42449 IS-104602 Co. Job#:
 Sample Name: 02N22W07M03S Co. Lab#:
 Company: Mound Basin Groundwater Sustainability
 API/Well:
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Basin GSA
 Location: Ventura, CA
 Formation/Depth:
 Sampling Point:
 Date Sampled: 8/08/2019 11:13 Date Received: 8/09/2019 Date Reported: 9/23/2019

δ D of water ----- -36.9 ‰ relative to VSMOW
 δ^{18} O of water ----- -5.63 ‰ relative to VSMOW
 Tritium content of water ----- na
 δ^{13} C of DIC ----- -17.6 ‰ relative to VPDB
 14 C content of DIC ----- 18.2 ± 0.1 percent modern carbon
 δ^{15} N of nitrate ----- na
 δ^{18} O of nitrate ----- na
 δ^{34} S of sulfate ----- -10.7 ‰ relative to VCDT
 δ^{18} O of sulfate ----- -0.8 ‰ relative to VSMOW
 Vacuum Distilled? * ----- No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Lab #: 729568 Job #: 42449 IS-104602 Co. Job#: _____
 Sample Name: 02N22W09L03S Co. Lab#: _____
 Company: Mound Basin Groundwater Sustainability
 API/Well: _____
 Container: Plastic Bottle
 Field/Site Name: Isotope Sampling - Mound Basin GSA
 Location: Ventura, CA
 Formation/Depth: _____
 Sampling Point: _____
 Date Sampled: 8/08/2019 15:05 Date Received: 8/09/2019 Date Reported: 9/23/2019

δD of water	-----	-49.3 ‰ relative to VSMOW
δ ¹⁸ O of water	-----	-7.26 ‰ relative to VSMOW
Tritium content of water	-----	na
δ ¹³ C of DIC	-----	-13.9 ‰ relative to VPDB
¹⁴ C content of DIC	-----	27.1 ± 0.1 percent modern carbon
δ ¹⁵ N of nitrate	-----	na
δ ¹⁸ O of nitrate	-----	na
δ ³⁴ S of sulfate	-----	-8.0 ‰ relative to VCDT
δ ¹⁸ O of sulfate	-----	10.3 ‰ relative to VSMOW
Vacuum Distilled? *	-----	No

Remarks:

nd = not detected. na = not analyzed.

*Indicates if vacuum distillation was utilized for hydrogen and oxygen isotopic analysis of water

Appendix E

Tritium Laboratory Analytical Report



October 21, 2019

TRITIUM LABORATORY

Data Release #19-089
Job # 3826

SS Papadopoulos & Associates, Inc.

Dr. James D. Happell
Associate Research Professor

Distribution:
Brad Bessinger
416 NE Dallas St.
Suite 201
Camas, WA 98607

Tritium Scale New Half-life

Tritium concentrations are normally expressed in TU, where 1 TU indicates a T/H abundance ratio of 10^{-18} . The values refer to the tritium scale recommended by U.S. National Institute of Science and Technology (NIST, formerly NBS), and International Atomic Energy Agency (IAEA). The TU-numbers are based on the NIST tritium water standard #4926E. Age corrections and conversions are made using the recommended half-life of **12.32 years**, i.e., a decay rate of $\lambda = 5.626\% \text{ year}^{-1}$. In this scale, 1 TU is equivalent to 7.151 dpm/kg H₂O, or 3.222 pCi/kg H₂O, (equivalent to pCi/L in freshwater) or 0.1192 Bq/kg H₂O (Bq = disint/sec). We can also express tritium concentrations in pCi/L upon client request.

Tritium concentrations in TU or pCi/L are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used.

The stated errors, eTU or err, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Very low tritium values

In some cases, negative tritium values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU or pCi/L. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU or pCi/L should be used.

Additional information

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling", and our Web-site www.rsmas.miami.edu/groups/tritium.

Tritium efficiencies and background values are somewhat different in each of the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50× enrichment, the efficiency is equivalent to 1.00 cpm per 2.4 TU. The background is typically 0.3 cpm, known to about ± 0.02 cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

Client: SS Papadopulos & Associates, Inc.

Purchase Order: NEED IT

Recvd : 19/08/13

Contact: Brad Bessinger, 310-566-7119

Job# : 3826

bbessinger@sspa.com

416 NE Dallas St. Suite 201

Final : 19/10/17

Mound Basin GSA Isotope Study

Camas, WA 98607

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
02N22W09L03S		3826.01	190808	950	275	0.01	0.09
02N22W09L04S		3826.02	190729	950	275	0.04	0.09
02N23W15J01S		3826.03	190730	950	275	-0.05	0.09
02N23W15J02S		3826.04	190730	950	275	0.03	0.09
02N23W15J03S		3826.05	190808	950	275	-0.25	0.09
02N22W07M01S		3826.06	190801	950	275	-0.03	0.09
02N22W07M02S		3826.07	190731	950	275	-0.04	0.09
02N22W07M03S		3826.08	190808	950	275	-0.12	0.09