

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 <u>not</u> 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. Mound Basin GSA Board of Directors Meeting Agenda February 20, 2020 Page 2

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

<u>Motion</u>

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) <u>Motion</u>

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.

Mound Basin GSA Board of Directors Meeting Agenda February 20, 2020 Page 3

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 At: https://moundbasingsa.org (time) 2:15pm

(attest) Kris Sofley

Posted: (date) February 14, 2020 (time) 2:20pm At: https://www.facebook.com/moundbasingsa/ (attest) Kris Sofley

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



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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/.

5a Approval of Minutes <u>Motion</u>

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

5b Approval of Warrants <u>Motion</u> The Board will consider one

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 well are located in the Ventura County side of the basin.

8. MOTION ITEMS

8a Groundwater Extraction Fee Payment Status

<u>Motion</u>

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 <u>Motion</u>

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 Ioan 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 <u>Motion</u>

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.

Mound Basin GSA Board of Directors Meeting MINUTES December 19, 2019 Page 5

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	Name:
Organization: <u>UWCD</u>	Organization:
Phone:	Phone:
E-mail:	E-mail:
Name:	Name:
Organization:	Organization:
Phone:	Phone:
E-mail:	E-mail:
Name:	Name:
Organization:	Organization:
Phone:	Phone:
E-mail:	E-mail:
Name:	Name:
Organization:	Organization:
Phone:	Phone:
E-mail:	E-mail:
Name:	Name:
Organization:	Organization:
Phone:	Phone:
E-mail:	E-mail:

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

Туре	Num	Date	Name	Account	Original Amount
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	(17,533.19)



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. January2020 Balance Sheet

8:28 AM 02/10/20 Accrual Basis

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

	Jul '19 - Jan 20	Annual Budget	Budget
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%
t Income	-74,634.86	-45,211.00	165.08%

8:25 AM 02/10/20 Accrual Basis

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

	A - Grant Administration	B - Model and Studies	Total C - Planning Activities	Total D - GSP Development	Unclassified	TOTAL
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	0.00	0.00	0.00	0.00	3,084.19	3,084.19
Total Income	0.00	0.00	0.00	0.00	-2,833.81	-2,833.81
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	11,505.00	26,788.50	146.25	13,833.75	1,511.25	53,784.75
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	12,758.91	26,788.50	146.25	13,833.75	11,064.61	64,592.02
52500 · Legal Fees						
52501 · Legal Counsel	0.00	0.00	0.00	0.00	972.00	972.00
Total 52500 · Legal Fees	0.00	0.00	0.00	0.00	972.00	972.00
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	0.00	3,147.29	0.00	50.28	940.22	4,137.79
53500 · Insurance						
53510 · Liability Insurance	0.00	0.00	0.00	0.00	2,099.24	2,099.24
Total 53500 · Insurance	0.00	0.00	0.00	0.00	2,099.24	2,099.24
Total Expense	12,758.91	29,935.79	146.25	13,884.03	15,076.07	71,801.05
let Income	-12,758.91	-29,935.79	-146.25	-13,884.03	-17,909.88	-74,634.86

Mound Basin Groundwater Sustainability Agency Balance Sheet

As of January 31, 2020

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

8:36 AM

02/10/20

Accrual Basis



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

	Well	Well	Well	
Category	Operator #1	Operator $#2^{(2)}$	Operator $#3^{(3)}$	Totals
2018 – 1 Fee	\$2,530.00	\$0.00	\$0.00	\$2,530.00
(Issued 9/1/18)				
2018 – 2 Fee	\$2,968.40	\$12,347.20	\$0.00	\$15,315.60
(Issued 4/30/19)				
2019 – 1 Fee	\$857.85	\$3,680.95	\$9,369.15	\$13,907.95
(Issued 10/31/19)				
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 Docombox 21, 2010				

Table 1.	Summary	of Past Due	Accounts
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(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
	1 col aal j	-v,	

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

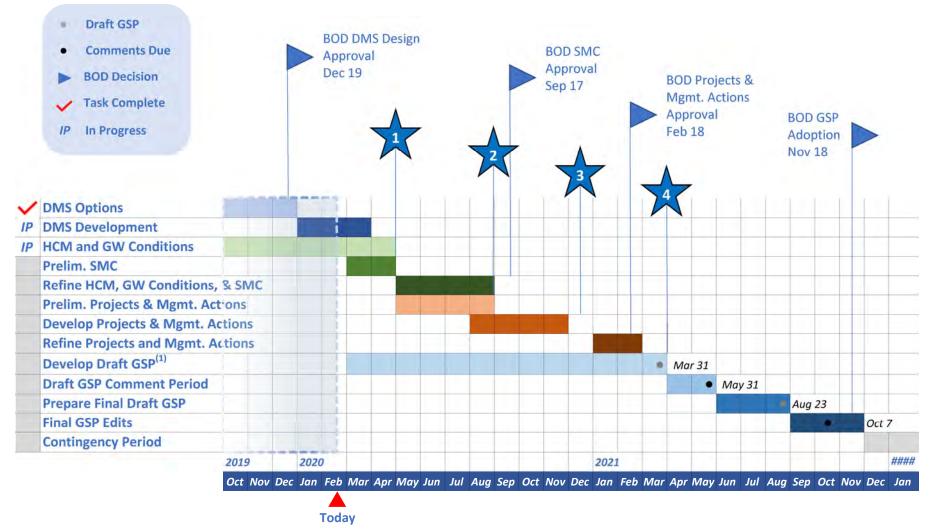
None.

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.



https://www.moundbasingsa.org/

February 2020

Volume 1, Issue 1



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!



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.

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 reminder 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:







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

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.

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 GSA's needs.

As discussed during the December 19, 2019, the GSP team decided to take a "start-simplefirst" 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 is 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 (Intera 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.

Parameter Type	Parameter Data Objective	Parameter	
General	Characterize Groundwater	Conductivity	
Geochemical	Geochemistry	Dissolved Oxygen	
Parameter		ORP	
		pН	
		Temperature	
	Characterize Groundwater Redox	Dissolved Organic Carbon	
		Iron	
		Manganese	
		Sulfide	
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) (δ13C)	
	Evaluate Sources of Chloride	Barium	
		Boron	
		Bromide	
		lodide	
	Evaluate Sources of Sulfate	Isotopes of Sulfate (δ34S-SO ₄ and δ18O-SO ₄)	
	Evaluate Agricultural Sources	Nitrate-N	
		Nitrite-N	
Groundwater	Evaluate Recharge Sources	Isotopes of Water (δ18O and δD)	
Tracer	Estimate Groundwater/ Recharge	Carbon-14	
	Age	Tritium	

Results

- 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. <u>Groundwater age</u>: Groundwater at the sampled wells is more than 1,000 years old.
- 3. <u>Interconnections between aquifers</u>: 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. <u>Interaction between surface water and groundwater</u>: 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

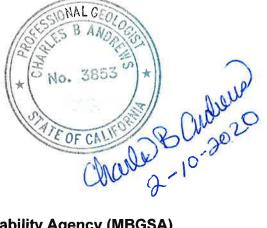
None.

ATTACHMENTS

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

Action:				
Motion:		_2 nd :		
J.Chambers:	C.Everts:	M.Mobley:	S.Rungren:	G.Shephard:

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



Prepared for:

Mound Basin Groundwater Sustainability Agency (MBGSA)

Prepared by:



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

February 10, 2020

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Appendix E Tritium Laboratory Analytical Report

Acronyms and Abbreviations

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

δ^{34} S-SO ₄	Sulfur-34 in sulfate
δD	Deuterium
‰ 0	part-per-thousand or per mil
В	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
ftbgs	feet-below-ground-surface
GMWL	Global Meteoric Water Line
Ι	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
SO4 ⁻²	Sulfate
SSP&A	S.S. Papadopulos & 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 (δ^{18} O) and deuterium (δ D)) 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 (\leq 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 μ S/cm), with the highest conductivity measured in shallower groundwater (\leq 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 (\leq 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 (\leq 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 \ge 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 (CaSO₄), 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 (\leq 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 (\leq 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 redoxsensitive elements from their oxidized to reduced forms, while simultaneously oxidizing natural organic carbon present in an aquifer. TEAPs are largely driven by molecular hydrogen (H₂), which is derived from the fermentation of natural (or anthropogenic) organic matter. In each TEAP, microorganisms obtain energy by transferring electrons from H₂ 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 H₂ uptake, with microbes that respire using more electrochemically positive electron acceptors (such as dissolved oxygen) able to survive at lower H₂ 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 (\leq 500 ft.-bgs) and deeper groundwater (\geq 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 δ^{13} C of groundwater and dilution of the DIC pool from aquifer sources requires corrections to reported ¹⁴C 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 (O₂) 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 ¹⁷O 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 (δ¹⁸O & 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 δ^{18} O and δ D 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 (\leq 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, δ^{18} O and δ D 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 <u>Oxygen and Sulfur Isotopes of Sulfate (δ¹⁸O-SO₄ & δ³⁴S-SO₄)</u>

Compound-specific isotope analysis (CSIA) of oxygen and sulfur isotopes in sulfate (δ^{18} O-SO₄ & δ^{34} S-SO₄) is commonly used to identify the source(s) of sulfate in groundwater. This is accomplished by plotting groundwater isotopic ratios of δ^{34} S-SO₄ against either sulfate concentrations or δ^{18} O-SO₄ 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 δ^{34} S-SO₄ relative to sulfate derived either from terrestrial evaporite (gypsum) minerals or the oxidation of sulfides (such as pyrite, FeS₂) (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 δ^{34} S-SO₄ 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 δ^{34} S-SO₄ 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 (\leq 500 ft.-bgs) has higher sulfate concentrations and a more depleted δ^{34} S-SO₄ signature.

As shown in Figure 9B, the isotopic composition of δ^{34} S-SO₄ and δ^{18} O-SO₄ in shallower groundwater (\leq 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 <u>Stable Carbon Isotopes (δ¹³C)</u>

Carbon isotopes (δ^{13} 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 δ^{13} 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 δ^{13} 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 δ^{13} C near -15‰¹².

Groundwater samples MP-240 and CP-280 are enriched in DIC, but further depleted in δ^{13} 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 (\leq 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 10^{18} 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 halflife 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:

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

where t is age, ln is the natural logarithm, A is the measured ¹⁴C content of the sample, A_0 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 δ^{13} C 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 ¹⁴C, which range between 6,295 and 19,202 years. The uncorrected ¹⁴C 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 ¹⁴C 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:

- 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 δ¹⁸O 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 ¹⁴C 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 (\leq 500 ft.-bgs) and the Santa Clara River. In fact, δ^{18} O and δ D 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 (\leq 500 ft.-bgs) and other evaporites such as gypsum. CSIA on ¹⁷O in nitrate, measurements of perchlorate concentrations in groundwater (which could co-occur with natural nitrates), and supplemental age dating using sulfur hexafluoride (SF6), chlorofluorocarbons (CFCs), and isotopes of helium could help resolve whether or not shallower groundwater is being impacted by groundwater used for irrigation.

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FIGURES

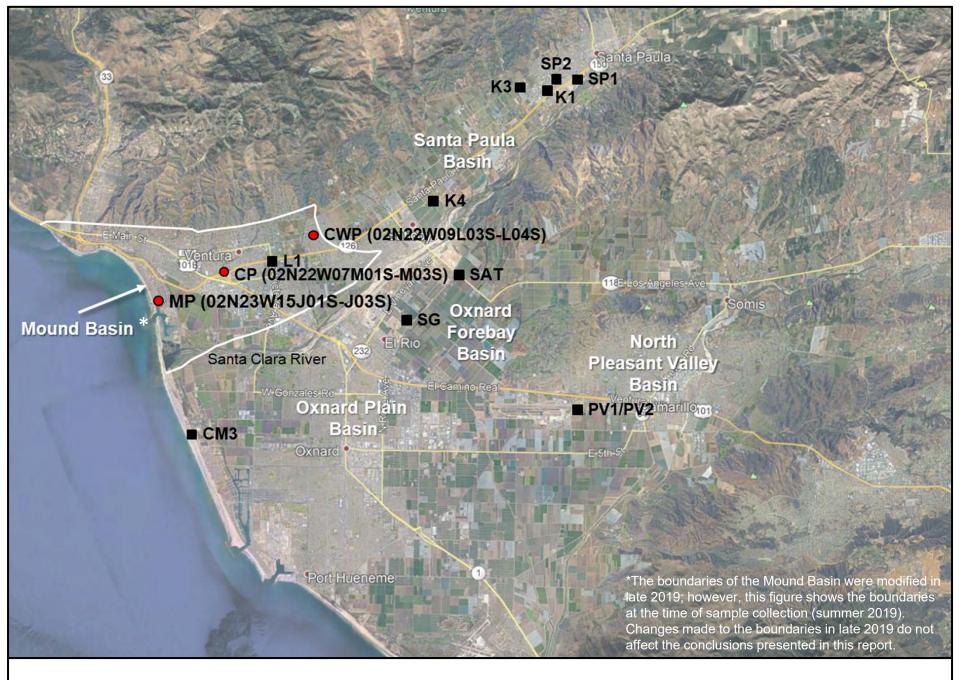


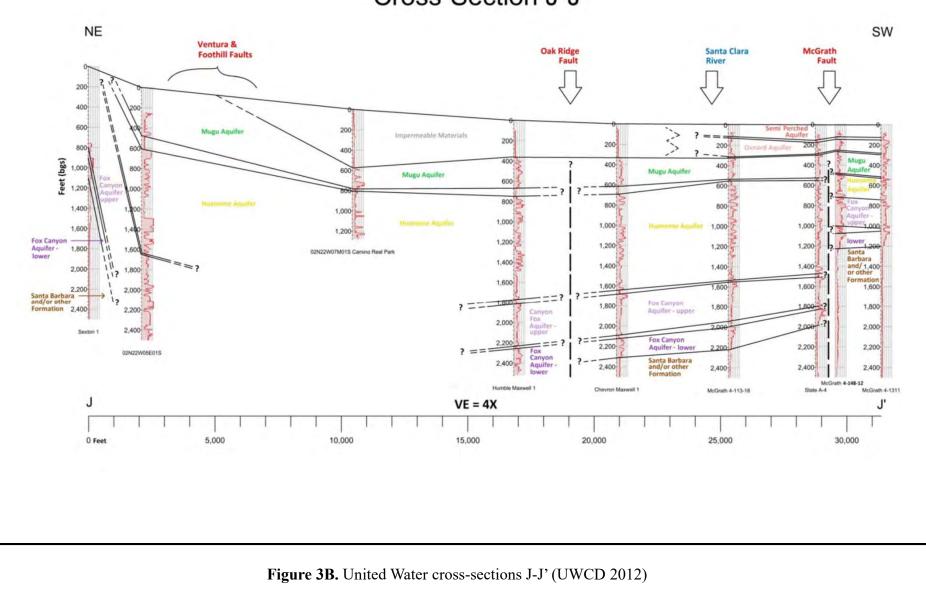
Figure 1. Location map showing the Mound Basin wells sampled for this study and supplemental wells in adjacent basins used for comparison.

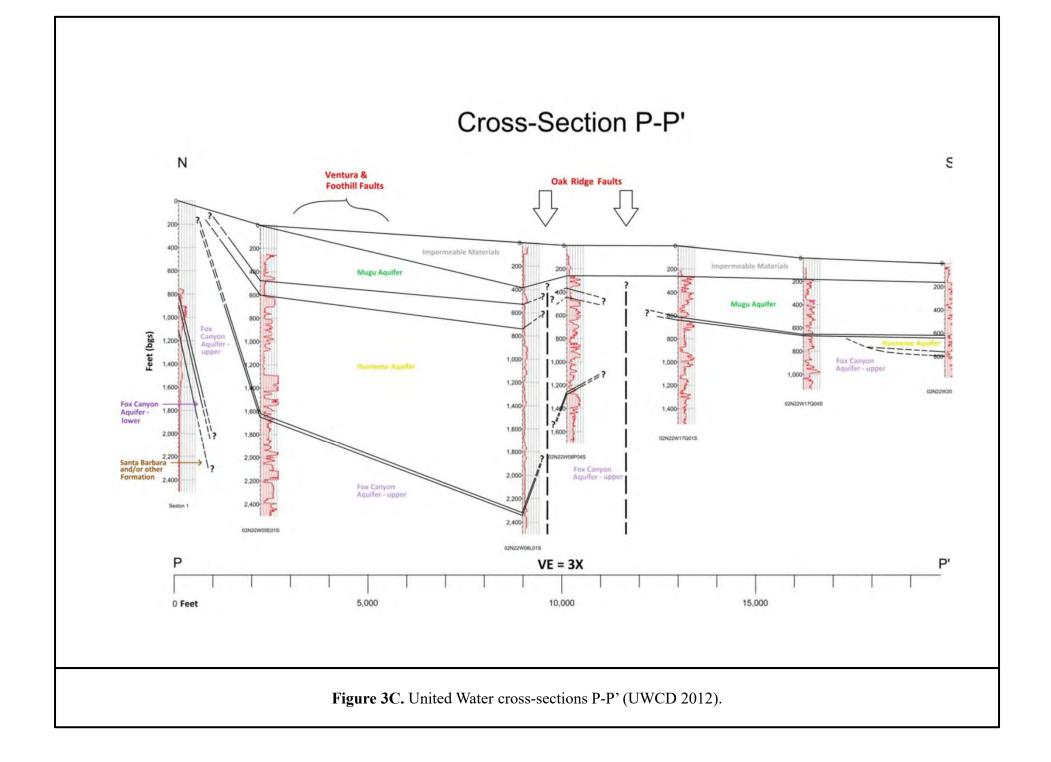
Hydrostatigraphic Unit	Layer	Aquifer System	Formation	Age
Semi-perched (shallow) alluvial aquifer (rarely used for water supply)	1	Shallow	Unnamed alluvium	Holocene to Recen
Fine-grained Pleistocene deposits	2	Upper Aquifer System		Holocene
(abut or interfinger with Oxnard Aquifer along southern boundary of Mound Basin)	3			and late Pleistocene
	4			
Mugu Aquifer	5			
Mugu – Hueneme aquitard	6	Lower Aquifer System	San Pedro Formation	Late Pleistocene
Hueneme Aquifer	7			
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			

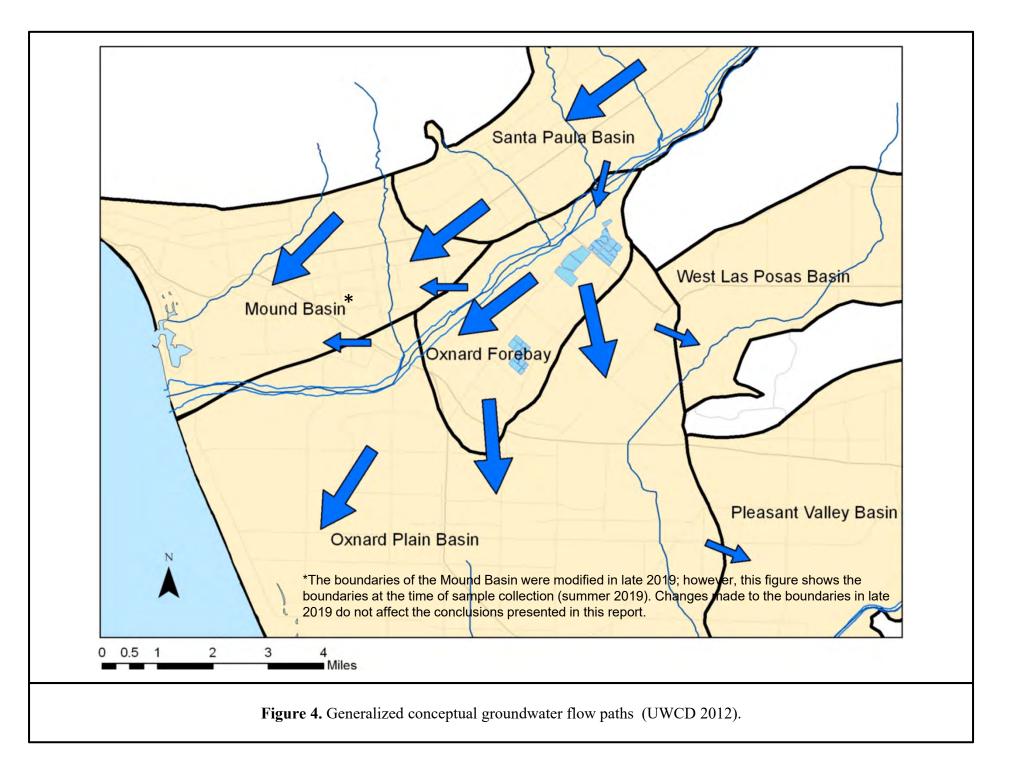


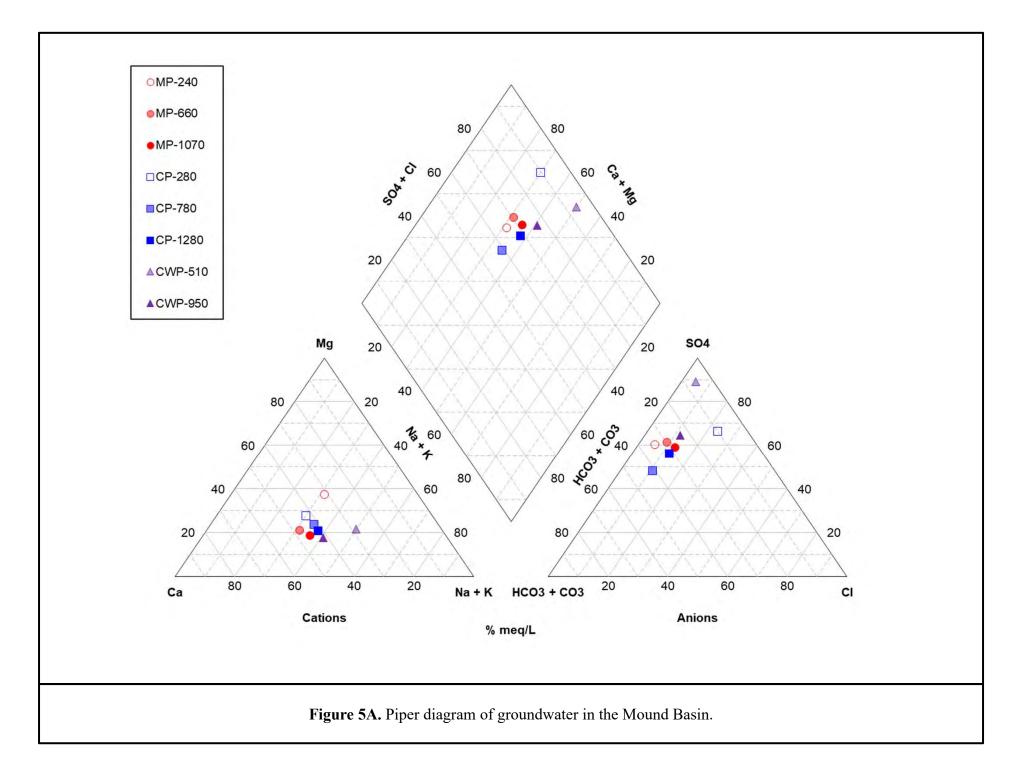
Figure 3A. Location map for United Water cross-sections J-J' and P-P' (UWCD 2012).

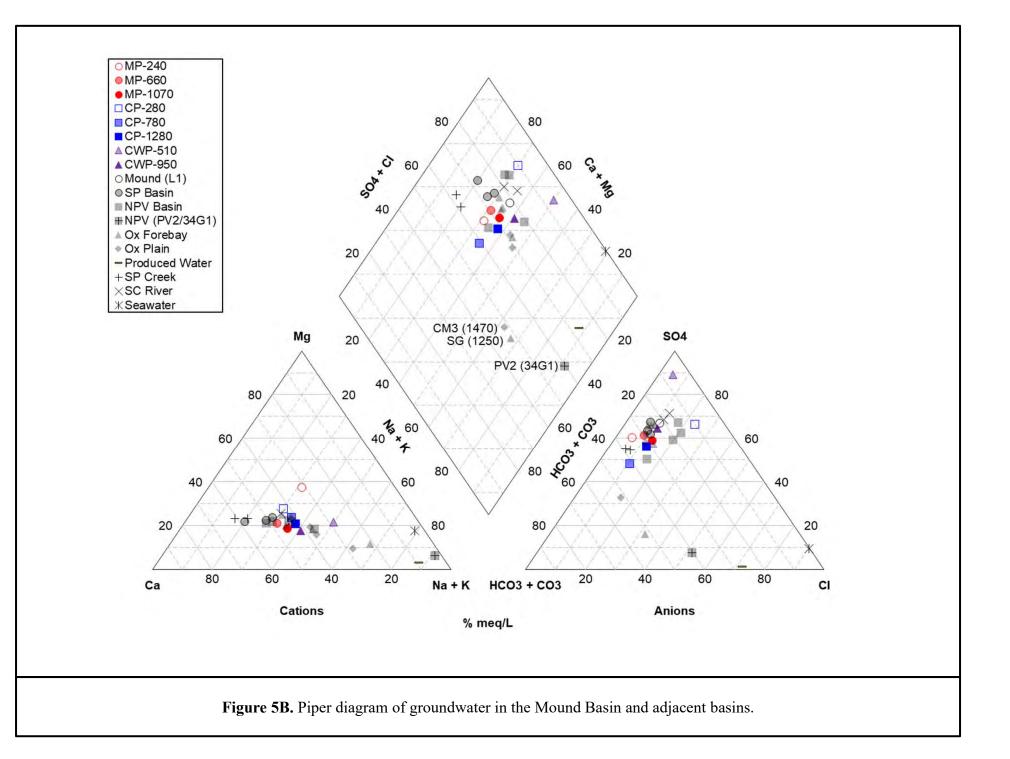
Cross-Section J-J'

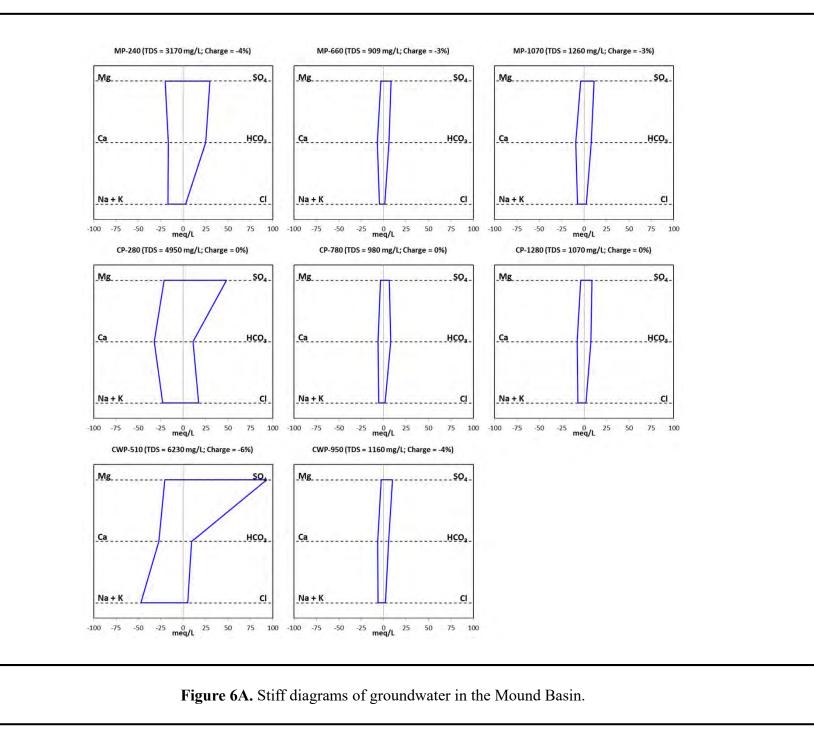












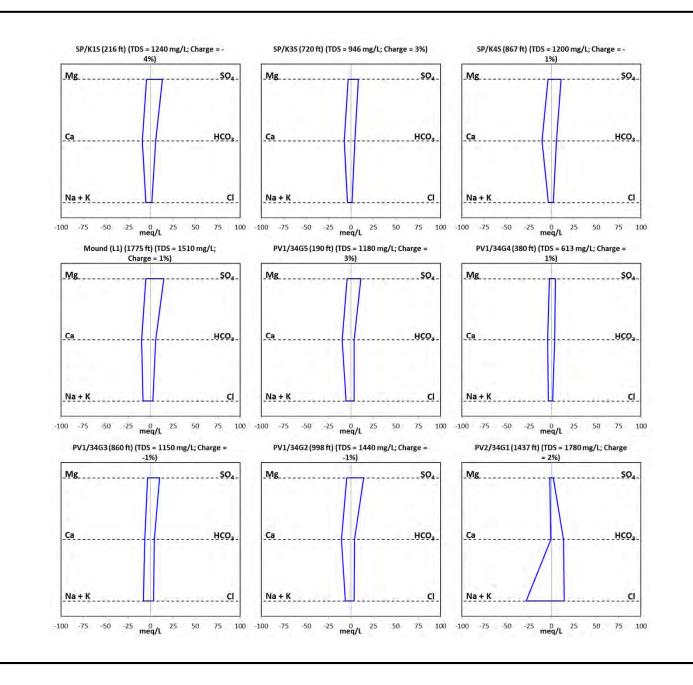
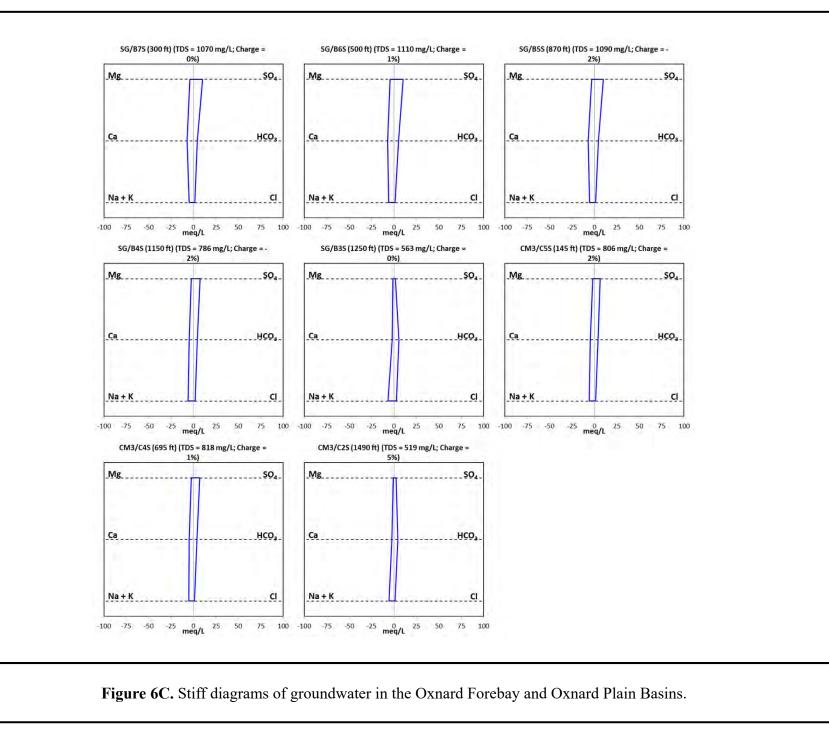


Figure 6B. Stiff diagrams of groundwater in the Santa Paula, Mound, and Pleasant Valley Basins.



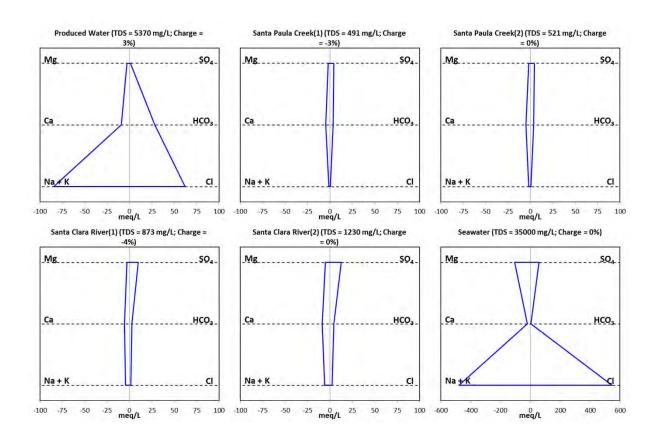
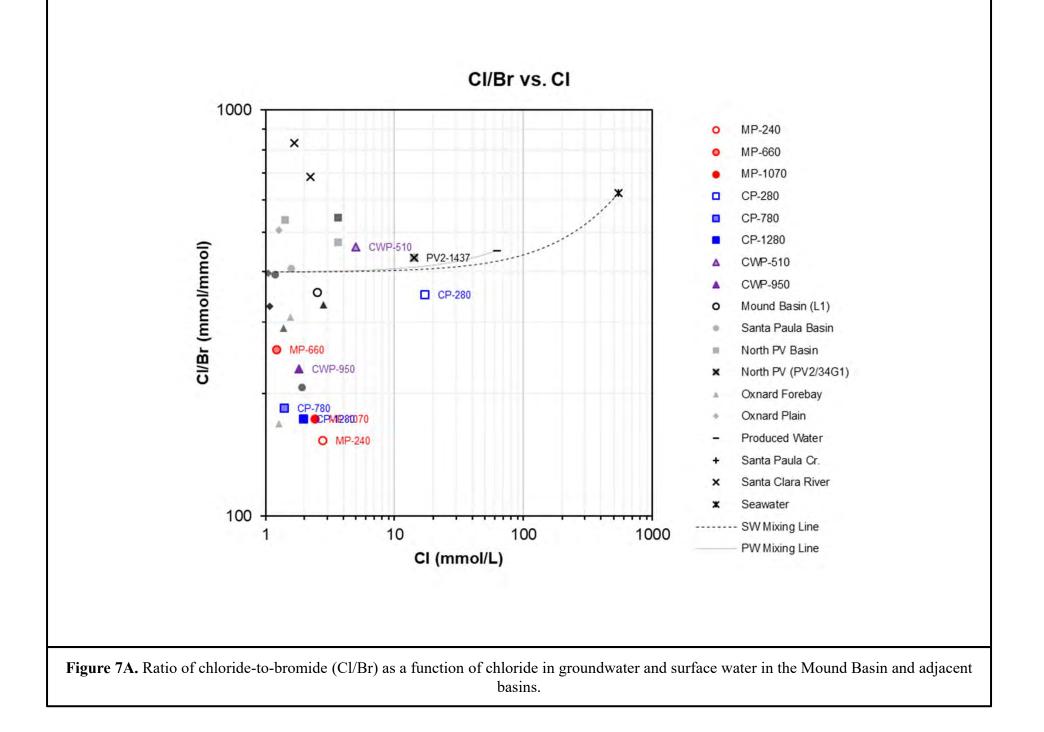
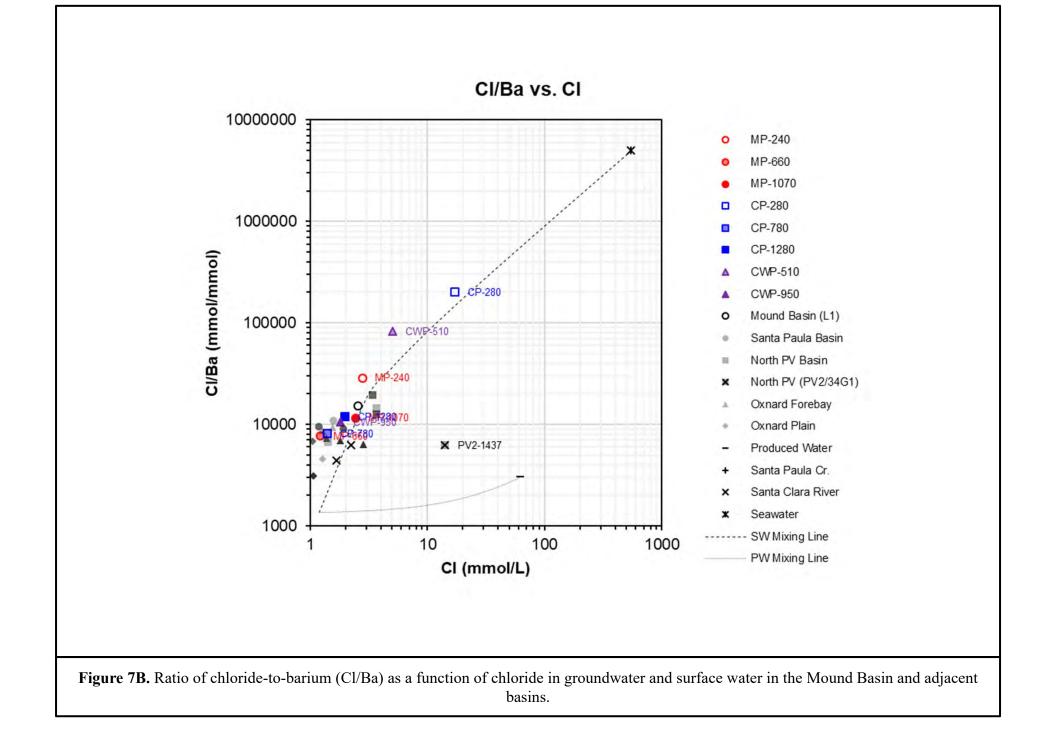
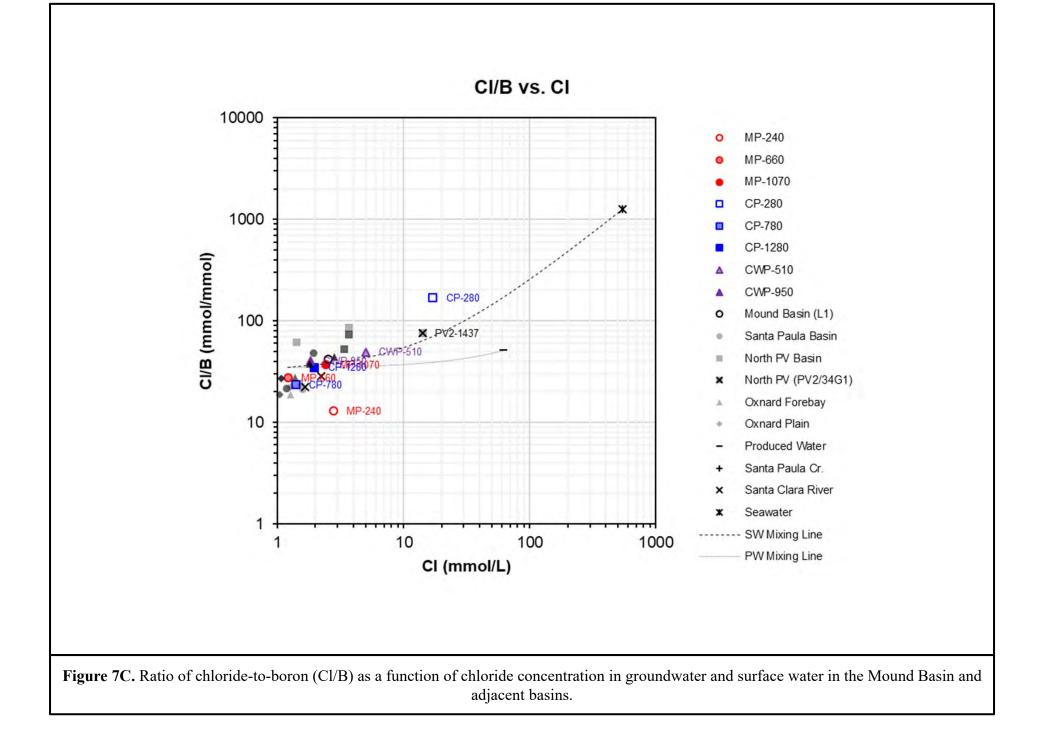
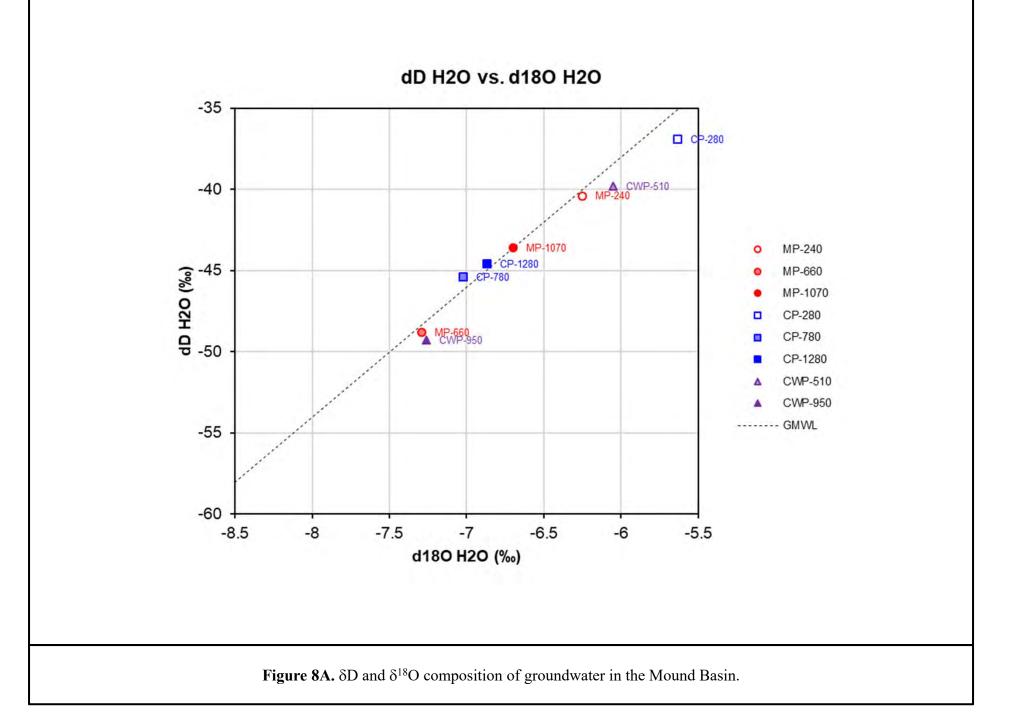


Figure 6D. Stiff diagrams of potential sources of dissolved constituents in the Mound Basin.









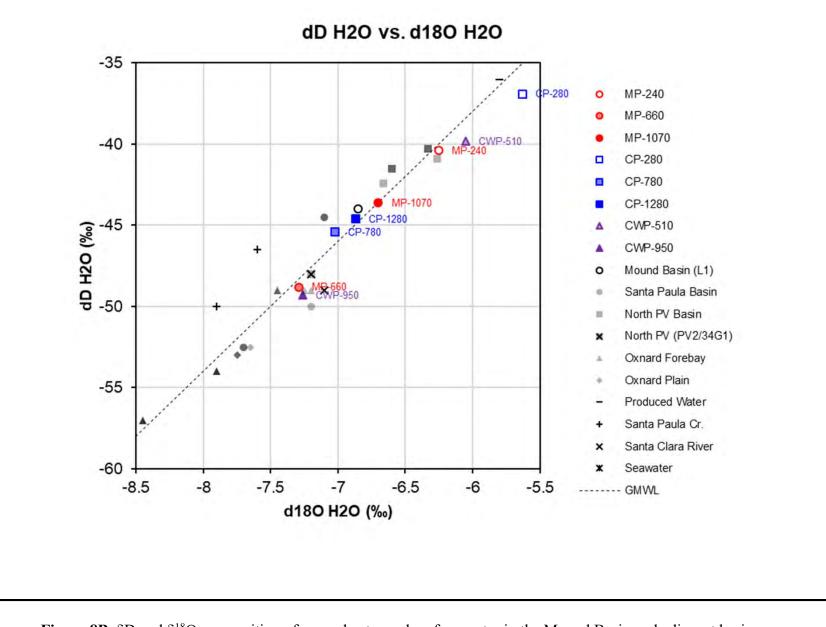


Figure 8B. δD and $\delta^{18}O$ composition of groundwater and surface water in the Mound Basin and adjacent basins.

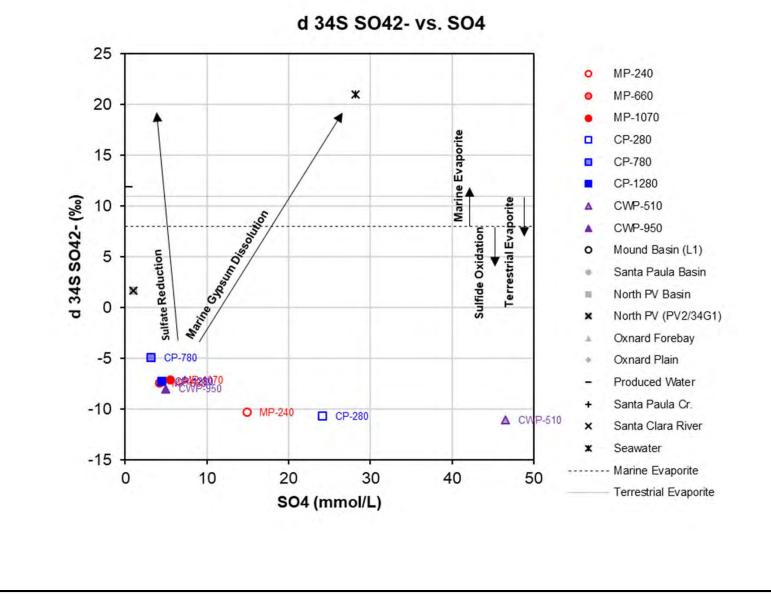


Figure 9A. δ^{34} S-SO₄ as a function of sulfate (SO₄⁻²) concentration in groundwater and surface water in the Mound Basin and adjacent basins.

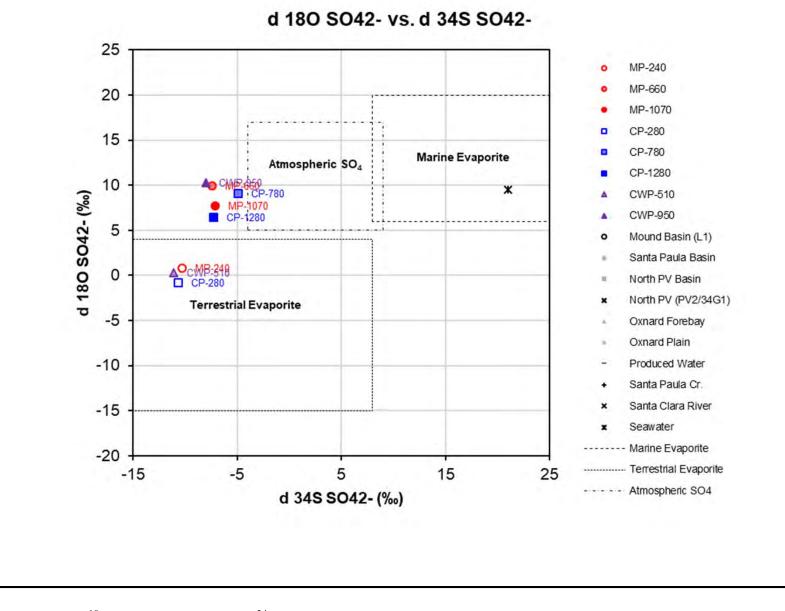
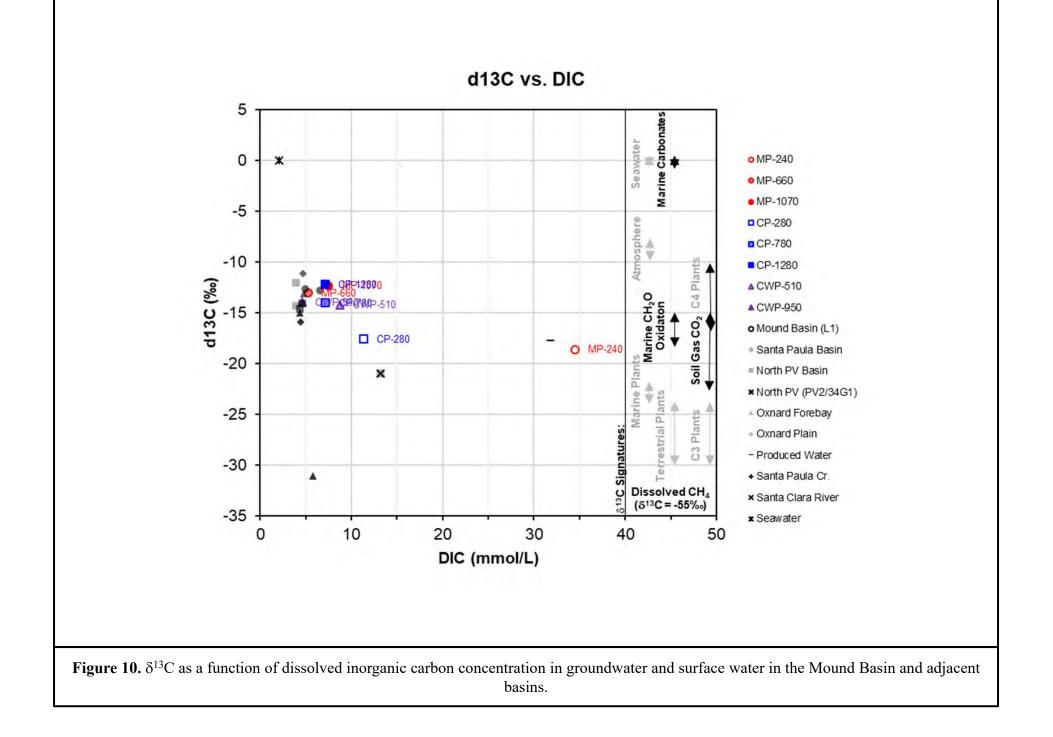


Figure 9B. δ^{18} O-SO₄ as a function of δ^{34} S-SO₄ in groundwater and surface water in the Mound Basin and adjacent basins.



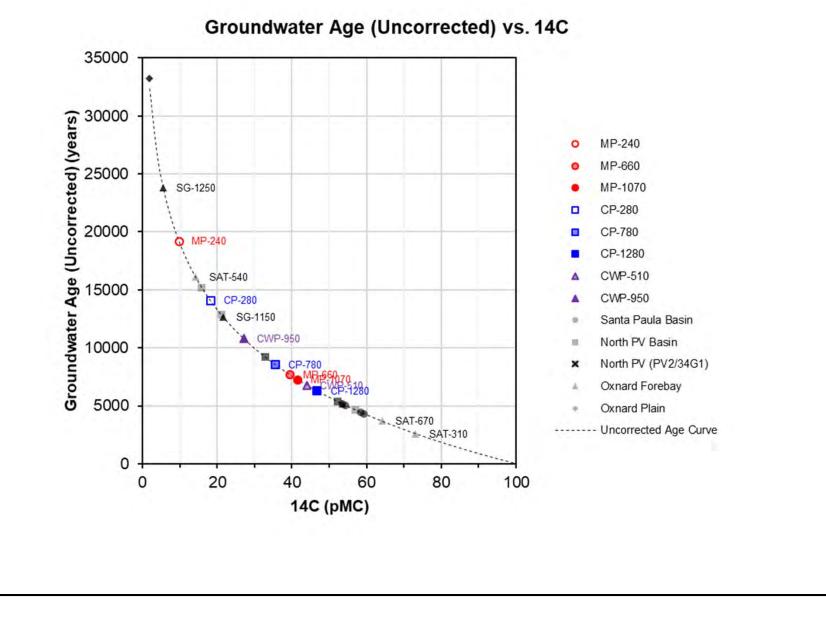
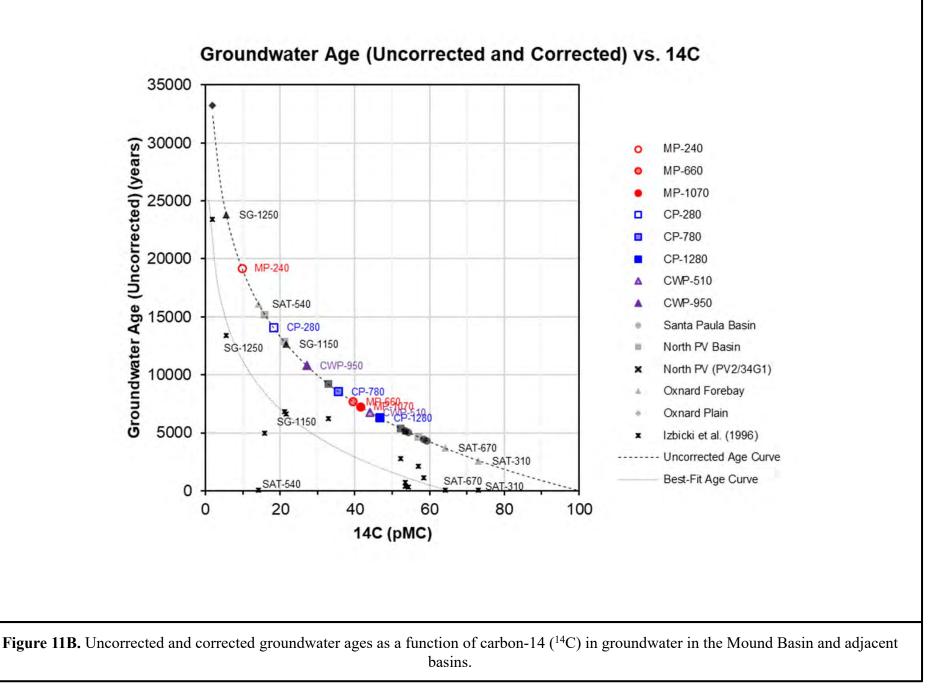


Figure 11A. Uncorrected groundwater ages as a function of carbon-14 (¹⁴C) in groundwater in the Mound Basin and adjacent basins.



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 (ftbgs)	Max Depth (ftbgs)	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.

Parameter Type	Parameter Data Objective	Parameter
General	Characterize Groundwater	Conductivity
Geochemical	Geochemistry	Dissolved Oxygen
Parameter		ORP
		рН
		Temperature
	Characterize Groundwater Redox	Dissolved Organic Carbon
		Iron
		Manganese
		Sulfide
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) (δ13C)
	Evaluate Sources of Chloride	Barium
		Boron
		Bromide
		lodide
	Evaluate Sources of Sulfate	Isotopes of Sulfate (δ 34S-SO ₄ and δ 18O-SO ₄)
	Evaluate Agricultural Sources	Nitrate-N
		Nitrite-N
Groundwater	Evaluate Recharge Sources	Isotopes of Water (δ 18O and δ D)
Tracer	Estimate Groundwater/ Recharge	Carbon-14
	Age	Tritium

Table 2. Geochemical and Isotopic Testing Objectives and Parameters

					Field Par	ameters		
		Date	Temperature	Cond.	DO	ORP	Turbidity	рН
Location	Sample Name ¹	Sampled ²	degC	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

Table 3. Summary of Field Parameters for Groundwater Samples

OtherSeawater--------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

			Ge	neral			Cations		
		Date	рН	TDS	Barium	Calcium	Magnesium	Potassium	Sodium
Location	Sample Name ¹	Sampled ²	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

				Anions		Tracers				
		Date	Alkalinity	Chloride	Sulfate	Boron	Bromide	lodide		
Location	Sample Name ¹	Sampled ²	mg/L CaCO3	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.

							Saturati	on Index ³				
		Date					Pyro-		Rhodo-			
Location	Sample Name ¹	Sampled ²	CO2(g)	Calcite	Gypsum	Barite	lusite	Bixbyite	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.

					Redox In	dicator		
		Date	DOC	Iron	Manganese	Nitrate	Nitrite	Sulfide
Location	Sample Name ¹	Sampled ²	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		

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

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

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

				Ion Tracers			St	able Isoto	pes	
								d 18O		
		Date	Boron	Bromide	lodide	d180 H2O	dD H2O	SO42-	d 34S SO42	d13C DIC
Location	Sample Name ¹	Sampled ²	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.

			Stab	le and Radi	ogenic Isote	opes	Estimat	ted Groundwat	er Ages
								Corrected Age	
					14C Std.		Uncorrected	(Izbicki et al.	Corrected Age
		Date	d13C DIC	14C DIC	Dev.	Tritium	Age	1996)	(This Study)
Location	Sample Name ¹	Sampled ²	‰	рМС	рМС	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.

Appendix A

Field Sampling Forms

al Maria Maria Salara

										ECTION F		18	100		
LOCATION	Project N	umber:					tion ID:				Date: 07	131/19	17		
	Project N	ame: Unite	6 mound	Basn		LUCA		P-780			Recorded				
EQUIPMENT	SUCCESSION STREET		1 Geoslope												Sector State
EQUIPIVIENT	PID:		1 Osnorabe				Equipment	:				nt Decon:			and a part of a subscript
		14				102 (I-102					Hots	1	Shed Weakling and same set of		
	Casing ID	(in) 2_			AND INTERNET OF CONTRACT, AND	Water Co	lumn (ft):			TAmbiont	PID (ppm):				
WELL INFO: 50	Unit Casir	ng Volume (gal/lin ft)	11.2		Well Volu					PID (ppm): PID (ppm	1.			
	Initial Dep	oth to Wate	r (ft): 182.4	68		Screen Int	terval (ft TO	C): -1	<u>م</u>		ondition of				
	l otal Wel	l Depth (ft):	~780			Pump De	oth (ft TOC)	: 745'		Remarks:		wen.			
	I Cardina JD	1. A								<u>T</u>					Upper contractor in
CASING INFO	Casing ID		1.011		1	1.5	2	3	4	5	6	8	10	12	10
		ig Volume (gal/lin ft):		0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	16 10.44
	1	<u> </u>	T T		in the second								1		
DATE	Time (24 hr)	Water Level (ft TOC)	t Drawdown (ft)	Volume Removed (gal)	Pump Rate (gpm)	рН	Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp C)	(Salinity	Remark	s (odor, cla	rity, etc)
07/31/19	1331	183.00	0.12	5.5	5 0	7.29	1.27	360	6	9.6	20.6	0.64			
	1404	183.04	0.16	11.2		7.31	1.25	•25. . 8	6	6.9	200	0.62	Clear		
	1407	183.04		11.6		7.30	1.24	-26.2	4	6.9	20.0	0.62	(50	Jeen Vol)	
	1410	183.01	-	12.0		7.29	1.2.4	-28.3	3	63					
	1413	183.01	-	D					1		19,9	0.62			
¥	<u> </u>	100,04	<u> </u>	12.4		7.29	1.2.4	-30.)	3	6.3	19.9	0.62			
······		<u> </u>													
															•
														···	
	L	L	L			<u> </u>									
SAMPLE IN	#(s) / Time	(c)	N1 1-				<u> </u>					·····	L		
		\ ³ /	Number	of Contain	ers/ Volum	ne/ Type	Pres	serv.	Filter	(Y/N)	Pump o	or Bailer	Р	arameter(s)
CP-780C	1415			······											
										·····					
													·		
												,			

LOCATION	Project Nu Project Na		1007	ATER		Locat	tion ID: 📿	P-17	20		Date: 9-1-19					
		r	<u>IEV n</u> Novano	BASI			<u></u>		-00	nilan martinita in cur anna an anna a	Recorded	By: TR				
EQUIPMENT	Water Lev PID:	el: Dre	HAM		<u>N</u>	Sampling	Equipment:	STIL	~~ ~~		Equipmen	it Decon: H	0752	~		
Sceeon Well INFO:	Initial Dep	(in) ∯ Volume (£ th to Water Depth (ft):	· (ft):	12.8 75.45		Pump-Dep	me (gal): erval (ft TO oth (ft TOC):			Well Head	ID (ppm): PID (ppm) ondition of	<u>~</u>				
CASING INFO	Casing ID (Unit Casing	in) g Volume (g	gal/lin ft):		1 0.09	1.5 0.09	€ 2 0.16	3 0.37	4	5	6 1.47	8 2.6	10 4.08	12	16	
					1					1 1.02	<u> </u>		4.08	5.87	10.44	
DATE	Time (24 hr)	Water Level (ft TOC)	(#)	Removed	Pump Rate (gpm) p		Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remark	s (odor, cla	rity, etc)	
	- 6	eg,	NF	reg	6	2 0	735	2	40	0 ml	[m]	2				
0325		175.87	0.22	- 5	400	7.14	1.955	120	5	1.59	16.9	1.00	Non	~		
5915		175,87		10	400	7.10	1938		4	1	16.9	5.99	~~~	<i>.</i>		
2940			9.22	. –		7.16	1929		Ý	0.79	16.9	0,99	······			
2943		17.5.37			6	7.9	10725	-137	4	シフフ	16,9	1.00				
0946		175.9-	0.22	13.1	~	7.007	1924	-138	5	0.77	16.9	1.00				
<i>۴</i>								` 								
											·					

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

LO	CATION	Project Nu Project Na						Locat	tion ID:	1D-510			Date: 07						
		<u></u>	<u></u>					<u>I</u>	<u></u>	M-210			Recorded By: AntwoPhyn						
EQI	UIPMENT	Water Lev PID:	rel: Durham	Geoslope.	1537-118				Equipment: STいつン				Equipmer Hot-s	nt Decon:					
		<u>.</u>						<u> </u>	<u> </u>				1 7073	<u> </u>					
WE	ELL INFO:	Initial Dep	g Volume (g	gal/lin ft) r (ft): 191.2	<u>4.8 -{5crc.</u> 9	~ Uol	5						PID (ppm): I PID (ppm ondition of						
		T- · ·																	
CAS	ING INFO	Casing ID Unit Casin	(in) g Volume (g	gal/lin ft):		1 0.0		1.5 0.09	2 0.16	3 0.37	4 0.65	5 1.02	6 1.47	8 2.6	10 4.08	12 5.87	16 10.44		
														1 2:0	1 4.00		10.44		
	DATE	Time (24 hr)	Water Level (ft TOC)	Drawdown (ft)	Volume Removed (gal)	Pum Rat (gpn	e	рН	Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp C)	(Salinity	Remark	s (odor, cla	urity, etc)		
076	9/19	7101	191.54	0.25	1.8	400		ר', וס	6.36	R1.5	41	7.3	19.1	3.48	Earcer Vol	L- Clev-			
		CZGI	191.54		5.1	1		7.10	630	182.0	6	L.L	19.2	3.45					
		EZCI	191.54	-	5.4			7.09	6.29	182.4	6	4.0	19.2	3.44					
J		1056	191.54		5.7	1		7.10	6.22	1826	3	4.6	19.3	3,42					
												······································							
															L		•		
														1		,			
														1			••••••••••••••••••••••••••••••••••••••		
			1	1				L,			L		L						

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
CWP-510 C 1105		· · · · · · · · · · · · · · · · · · ·			
					·
				••	
			· ·		

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	LOCATION	Project Nu					<u> </u>					Date: 7	1-29-1	<u>a</u>			
ļ		Project Na	me i/w/ 7	ED - P	ronno	BASIN	Locat	ion ID: U	NP-	950)		By: n	-)			
	EQUIPMENT	Water Lev PID:		2HAM				Equipment:		1102		Equipment Decon:					
100									5.07.00 - 1.00.00 5.07.00			HOTSY					
	WELL INFO:	Initial Dep	(in) 24 g Volume (g th to Water Depth (ft):	·(ft): 20	plila	ALS						Head PID (ppm): Head PID (ppm): nd Condition of Well: G 000					
ľ											T						
	CASING INFO	Casing ID (1	1.5	2	3	4	5	6	8	10	12	16	
_		JUNIT Casin	g Volume (g	gal/lin ft):	THE REPORT OF THE	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44	
	DATE 7-29-19	Time (24 hr)	Water Level (ft TOC)	(ft)	Volume Removed (gal)	Pump Rate (grain)	рн	Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	00 (%)	Temp (C)	Salinity PPT	Remark	s (odor, cla	rity, etc)	
		BC	31N	Pr	267	Ø	09:	5		40	Sonl	1mit	\sim				
ļ	1045		20115		5	400	7:26	2.115	-122	2	1,38	19.3	0.68	Nor	ME		
	1135		231.15	205	10		7.30	2.150	-134	2	1.12	19.3	1.10	,			
	1138		201.15	0.05	10.3			2.157				19:4			<u></u>		
ļ	11241		201.15	005	10.6	•		2153			1,08		1.10				
╞																	
ŀ																	

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
(0, 1) 22 $(0, 91, 02)$					
02N22N09103S					
1142					

LOCATION	Project Nu					Location ID: MP-240						Date: 7-30-19							
	Project Na	me:1/1/17	ED-M	OWND	BASI	Locat	ion ID: P	1P-7	240		Becorded	BV:	9						
	A. A. A. A. A. A.	a standard and a standard a stand A standard a		A State State							Recorded By:								
EQUIPMENT	Water Leve PID:	el: A.C	TESIF	2~~		Sampling I	Equipment:				Equipment Decon:								
			Carlos Protection								legislare screeninger	ana ang ang ang ang ang ang ang ang ang	(California and California and Californi						
SCPEEN WELL INFO:	Initial Dept	g Volume (g th to Water	gal/lin ft) (ft): AP	11-2 TES/A	· ~	Well Volume (gal): Well Screen Interval (ft TOC): 170 - 240 Group						Ambient PID (ppm):							
	Casing ID (in)			-				r T										
CASING INFO		g Volume (g	al/lin ft);		0.09	1.5 0.09	2	3	4	5	6	8	10	12	16				
		<u>s roiaine (</u>			0.03	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44				
							in and a second s		1	1	1999 (1997) T								
DATE 7-30-19	Time (24 hr)	Water Level (ft TOC)	(ft)	Volume Removed (gal)	Pump Rate	рн _/м	Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remark	s (odor, cla	rity, etc)				
	beg	IN P	rea	E (20	BYL	1	- 4	00	mi	mi	U		. <u></u>					
0934		NA	N/A	5	400	674	3.109	-61	2	1.06	17:2	1.43	Non	Ē					
\$02Y	_	1		10		6.71	3008	-52	2	0.90	18.6	1.90		,					
1049				125		6.67	3.014	-3J	2	0.99	16.8	1.62							
1052				12.8		6.65	3.095	-31	1	0,97	15.8	1.62							
1055		6	4	13.1	Ø			<u> </u>											
						6.65	3.09%	-SD	1	3.94	16.8	1.62			•				
						-													
	-																		
						L									<u>р</u>				
SAMPLEID	H(a) / Time - /	-1									·····								

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
MP-240 ellis					
	· · · · · · · · · · · · · · · · · · ·				

LOCATION	Project Nu					Location ID: MP-660					Start (), ()811 Date: 07/30/19						
	IFIOJECT Na	ime: United	mound Bur		and the second second second		MF	-660	versioned and the state of the		Recorded By: Ap						
EQUIPMENT	Water Lev PID:	el: Qr				Sampling	Equipment: Stl102_				Equipment Decon:						
WELL INFO:	Casing ID Unit Casin Initial Dep Total Well	g Volume (g th to Water	gal/lin ft) r (ft): 21.69 S79 (+/	,				Ambient PID (ppm): Well Head PID (ppm): OC): Ground Condition of Well:									
CASING INFO	Casing ID (Unit Casin	(in) g Volume (į	gal/lin ft):		1 0.09	1.5 0.09	2 0.16	3 0.37	4	5 1.02	6 1.47	8	10 4.08	12 5.87	16 10.44		
DATE	Time (24 hr)	Water Level (ft TOC) ₍ †		Volume Removed (gal)	Pump Rate ©(gpm)	рН	Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp C)	(Salinity		s (odor, cla			
01/30/19	0926	14.734	-	8	400	7.39	1.17	-39.1	Б	7.8	18.8	0.59	Clear	<u></u>			
	1011	14.80	70.0	16		7.38	1.18	-રૂન,બ	6	6.0	19.2	0.59	Screen Ud.)			
	1017	H.79	-	16.3		7.41	1.18	-36.6	4	5.8	19.1	0.59		J			
	1047	17'81	0.09	16.G		7.40	1.18	-37.0	ч	5.લ	19.1	0.54					
	1055	H.81	008	16.9		7.39	1.18	-37.7	3	6.0	19.1	0.59					
		to Water	level flue	waters -	might be	a slyht	leak for	w prop	when di	scharoly	air						

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
MP-660 C1055					

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LOCATION	Project N	umber:					·										
	Project Na	ame: UN	TED -	MOUN	0 BAG	Loca	ition ID: 🍟	MP-	1070	`	Date: 7-30-19						
		1		States and		STATISTICS AND	A MARK STATISTICS	Charles the second states and the	an she have a second state of the		Recorded By: m						
EQUIPMENT	Water Lev	rel: DV	ettam			Sampling	Equipment	STIL	and the second								
	PID: _				······	-	-quipment	STIL	02		Equipment Decon:						
	<u> </u>				and the second						HOTSY						
Screen	Casing ID	(in) 2″				Water Co	lumn (ft):			Amhient	PID (ppm):						
SCREEN WELL INFO:	Unit Casin	g Volume (gal/lin ft)	160	SALS	Well Volu	me (gal):			Well Hear	DID Inne	۱.			41		
						Screen In	terval (ft TC	DC): 970	- 1071	Ground C	ondition of	Woll: 6					
		Depth (ft):	213	70		Pump De	oth (ft TOC)	:	······	Remarks:		went G	000		<u></u>		
	Casing ID	(in)			T										New Adaption		
CASING INFO		g Volume (gal/lin ft)		1	1.5	\square	3	4	5	6	8	10	12	16		
	a second a		<u>5ai/iiii it).</u>		0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44		
			1	I	T	T.	Constanting of the second s	1	<u>,</u>								
DATE	Time	Water	Drawdown	Volume	Pump		Conductiv										
	(24 hr)	Level (ft TOC)	(ft)	Removed	Rate	рН	ity	Redox Potential	Turbidity	DO (%)	Temp (Salinity	Remark	s (odor, cla			
7-30-19		100,		(gal)	(gpm) a	K	(mS/cm)	Fotentia	(NTU)		C)	PPT		5 (0001, Cia	ity, etc)		
·	Bre	BIN	P	r-6t	FO	27-			140								
						073			40	OM	-1m	N			ĺ		
0825		21,89	0.08	5	400	7.02	2151	-121	3	1.30	11						
0915		21.88	0.09	10		1		· · ·			16.4		NOT	5			
							the second se	-139	3	0-97	17:0	1.12					
1005		21,80	2.00	15		7.09	2.191	-147-	2	0.30							
1015		21,82	0.02	16			1				17.2	1.13			·		
1018						1.09	2.705	-143	/	0,86	17.3	1.14					
		21.82		16.3		7.10	2.203	-143	1	2.01	17.3	1.14					
1021		21, 82	0.02	16:6	÷		_										
							2.207	-143	/	0.35	17:3	1.14					
										_							
											·				•		

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MONITORING WELL WATER SAMPLE COLLECTIO	N F	OR	М

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SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Draaawa	1	1	
	in the second se	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
02N23W151015		······································			
					• • ·
(MS MSD)					
Calman					
	- 3				

TEST EQUIPMENT CALIBRATION LOG

PROJECT NAM	ИЕ			PROJECT NUMBER 190729-140								
EQUIPMENT NAME	EQUIPMENT NUMBER	DATE/TIME OF TEST	STANDARDS USED	EQUIPMENT READING	CALIBRATED TO: OR WITHIN 10%:	TEMP.	INITIALS					
YSL AD Plus	18K102301	07/29/19	60.0 2400 CO.7 0.0 0.0 140 CO.5 4.00 240 240 CO.5	6લપ ૩વક્રડ ૧.૪૫ ૧.ઽ૫ ઉ.૪૧ ટર્ડા.૫	1.1	231°C	A					
L		57/28/14		7.03 3911 9.98 10.08 4.06 241.3	L L 4 L 1 L	20.2 ~	AP					
L	Ŀ	07/31/19	J	6.	L I 5 I 1	18.4°c	M					

TEST EQUIPMENT CALIBRATION LOG

PROJECT NAI	ME MITED	warter		PROJECT NUI	MBER 19072	1-TK	
EQUIPMENT NAME	EQUIPMENT NUMBER	DATE/TIME OF TEST	STANDARDS USED	EQUIPMENT READING	CALIBRATED TO: OR WITHIN 10%:	TEMP.	INITIALS
YSI PRO T	176101533	2955	DIA ig	7.03	BYL	24'	72
		p	Fr 3900	3913	DIL	24%	TE
		4	D.0 - ORP 240	1027	or or	24'a	R
451 \$20 +	176101533	2635 7.30.19	pH 10 4	7-05 10:03 3:98	7.00	19'c	TK
			EC 3900		OK	19'e	ĨN
		ł	0.0- ORP 245	101.6%. 240.7	or or	19'e	TR
YSI BRO +	179101533	0620 7-31-19	PH 10	7.02	or	10'2	TR
			EC 3900	3909	OR	18'2	TR
		Ą	5.0 - 02P246	101.3%	DC 245.0	18'c	-72 -72
YSI FRO T	179101533	0635 8-1-19	PH 12	7.03 10:05 4.04	OIL	19'c	TR
		ł	EC 3900 D.0	3898 99.8% 240.6	M M M M	26'2	TR

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WELL GAUGING DATA

Project # 190909-1414/ Date 08/08-119 Client United Water Site Ventures CA

		1	T	T	· 1	Thielmose	Volume of	1	1	Survey	r
			Well		Depth to	of	Immiscibles	1		Point:	
			Size	Sheen /		Immiscible			Donth to wall		
	Well ID	Time	(in.)	Odor	Liquid (ft.)		(ml)	Depth to water		TOB or	Natas
		1	1	Odor	Liquia (II.)	Liquia (ii.)	(111)	(ft.)	bottom (ft.)		Notes
	: <i>p.28</i> 6 wp.950	0838	2					201,43 201,49	280,00		
Ī		<u>×</u>	1	· · ·	····					117	
đ	wP-950	1223	2					201,49	950.00	\mathbb{V}	
ł	. <u> </u>										
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	LOCATION	Project Number: Project Name:		Locati	on ID: Cl	0-280			Date: (Recorded I	08/08 3v: 4 H	119		
	EQUIPMENT	Water Level: /337/27 PID:		Sampling E	a district and	Section and the	lader	Rmp		de la composition de la compos	guinax +	Steem (Pressure Uash
	WELL INFO:	Casing ID (in) Unit Casing Volume (gal/lin ft)Screen Vol = Initial Depth to Water (ft): 20, 43 Total Well Depth (ft): 280	-11,2ga	Water Colu Well Volun Screen Inte Pump Dep	ne (gal): erval (ft TOC	:): 70 245			ID (ppm): PID (ppm): pndition of V				
×	CASING INFO	Casing ID (in) 2 Unit Casing Volume (gal/lin ft):	1 0.09	1.5 0.09	2 0.16	3 0.37	4	5 1.02	6 1.47	8 2.6	10 4.08	12 5.87	16 10.44
	DATE	Time Water (24 hr) Level (ft Drawdown Removed TOC) (ft) (gal).	Pump Rate (gpm) M Jimm	рН	Conductiv ity (mS/cm)	Redox Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remark	s (odor, cla	rity, etc)
	08/08/19	0930 - Stant Puge - 1010 20.60 0,17 2000 1048 20.68 0.25 39000		6,77 6,801	6.016		12 334		19,83 19,87	3,29 3,27	Clear Schen		aved
		1051 20,69 0,26 40500 1054 20,69 0,26 42000 1057 20,69 0,26 43500	500	6,81	01003 01002 01003	97.5	333	11,6 11,4 11,2	19,8 B	3,28 3,26			
4. T		1100 20:69 0.26 45000 1103 20:69 0.26 46500 1106 20:69 0:26 48000	500	6.81	61004 01002		222	11.] 10:9	19,85 19,90 19,93	3,R7 3,R7			
			·										

SAMPLE ID#(s) / Time(s)	Number of Containers/ Volume/ Type	Preserv.	Filter (Y/N)	Pump or Bailer	Parameter(s)
02NZZW07M035-1113					

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	LOCATION	Project Nu	mber:				T .					Date:	26	teche		
ļ	LOCIMON	Project Na	me:				Locat	ion ID: い	wp.9	50		Recorded	BV: HA	05/17		
ſ		<u> </u>						a service in the			en al estadores de la composición de la Composición de la composición de la comp	<u>Inderded</u>	<u> µn</u>			
	EQUIPMENT	Water Leve PID:	el: 1337	721			Sampling E	quipment:	GEDI	Bloade	er-	Equipmen	t Decon: 🗸	-itacin ax	+Sta	in Price
L			ter of the second second		ST & USER STREET	and the second second second	pumo			Equipment Decon: Ligcinger + Steam Prosice						
ſ		Casing ID (in) 🥎			and the second second	Inverse Cal	(6.)								
				gal/lin ft)	mallala		Water Column (ft): Ambient P									
	WELL INFO:	Initial Dept	th to Water	(ft): 201.	$\frac{\omega n vol}{ua}$		Well Volume (gal): Well Head									
		Total Well	Depth (ft):	950	<u> </u>		Screen Interval (ft TOC):6C)Ground CoPump Depth (ft TOC):920Remarks:			ondition of	Well:					
travente							<u> </u>	<u></u>	-720							Rep. and a second s
<	CASING INFO	Casing ID (1	1.5	2	3	4	5	6	8		12	16
. [Unit Casing	g Volume (g	gal/lin ft):	AZ mail can de MARIO ANNO A MARINA	0.09	0.09	0.16	0.37	0.65	1.02	1.47	2.6	4.08	5.87	10.44
100		1	1													
		Time	Water	Drawdown	Volume	Pump		Conductiv	Redox	T					*******	
	DATE	(24 hr)	Level (ft	(ft)	Removed	Rate	рН	ity	Potential	Turbidity (NTU)	DO (%)	Temp (C)	Salinity	Remarks	(odor, cla	rity, etc)
Ļ		1340	TOC)		(gal)	n/1/min		(mS/cm)	rotentia	(1110)						
	NRIGE/19	1330"	-Sta	nt poi	30 -	-										
ľ	1	1415	20154			770	700	1/120	100 0	2	1	0.0 (10)				
┝		41.50	201.54	0.05	17500		7.5R	1.422	06,6	3	15.5	20,40	0.74	deco	-	
		1450	201.56	0.07	36500	500	7.51	1.477	146,2	1	7,7	2026	0.70	Screen V	10	/
		1456	201.57	6.68	3800	500	7.51	1,480	1513	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			Durenv	orkey	NOVEL
ľ	1	111		0105	2/000		F		DIU		///	20:07	0.79			
╞			201,57	0.00	39500		7,50	1,475	155,6		7,5	20,10	0.74			
		1502	201.57	0,08	41000	500	7,50	1.474	159.3	j	7.3	20.05	074			
	•							<u> </u>			11.5_	noice	$\rho_{i'i'}$			
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ŀ																
ſ								1 6 1 9								
L		1	L	L	I			·			<u> </u>					

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

WELLHEAD INSPECTION CHECKLIST

Page _____ of _____

	Client/ Site Address Job Number	nitel	Water					Date	081	108/19	
	Site Address	1/ent	ever Co	A							
	Job Number	1908	08-HI	4/		<u>.,</u>	Tech	nician	<u> </u>		
	Well ID	Well Inspected - No Corrective Action Required	WELL IS SECURABLE BY DESIGN (12"or less)	WELL IS CLEARLY MARKED WITH THE WORDS "MONITORING WELL" (12"or less)	Water Bailed From Wellbox	Wellbox Components Cleaned	Cap Replaced	Lock Replaced	Other Action Taken (explain below)	Well Not Inspected (explain below)	Repair Order Submitted
	CP-280		X	_ × (1/2 /2	Its mis.	sing-	1/2 tak	es stry	pal	
it t	WP-950-	\rightarrow	-6-	× ((rr tandpî	û.ckee	PVC	Casiv	19)			
	(JUP-950	×		tandpi	ne)						
			(-						
		-									
				· <u>·····</u> ······························							
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NOTES:

TEST EQUIPMENT CALIBRATION LOG

PROJECT NA	ME United U	Untra Ven	tora	PROJECT NUI	MBER /90808-1	441	
EQUIPMENT NAME	EQUIPMENT NUMBER	DATE/TIME OF TEST	STANDARDS USED	EQUIPMENT READING	CALIBRATED TO: OR WITHIN 10%:		INITIALS
YSI556	OBE 1362AT	08108/19 0830	410 PH	4,20 7,11 9,75	UiG 70 10+0	23,11	
<u>.</u>			Cond 3400	4303	3900	23,60°C	
			0KP 240 D.8.	213.6	240	23,542	HH
<u> </u>	V		1001.	119.61.	100.5%	23.01°C	H4
			-				

Well Nam	e:	P-2	40 #	<u>!</u>	S	WN		
Date: <u>4</u>				Sampier	(s) <u></u>	2		
Diameter in	liew ebie	(in.)	a		Voi. per li	inear ft. in casir	g	
Total depth			240		Inside Dia.(i	n.) 🕖 Voi. Pe	r ft (gal)	
Depth to W			-20.	21	2.0	0.1	63	\sim 1 \cdot 1
Ht. water c		well (ft.)	260.	21	3.0	0.3	67	SIMIN
Vol. of wat			Ha.	41	4.0	0.6	153	
Subtract wate			water colum	ก.	6	1.4	69	
Multiply ht. w	ater column	by factor fro	m chart to co	ompute	8	2.6		
volume or us	e equation:				10	4	.08	
Volume(gi	ai)= 0.0408	X Dia2 (in)	X Height(ft)		12		75	
		7 ~ (1	~		14		8	
3 X Vol	.=12	1.24	60.	min.	¹⁶ _		.44	
والمتحديدين الترجيبين			2.5gpr	fof purge	20	16	.32 *	
							Caculated Ter	np in F
Well produ	iction mea	surement				-1	C X 1.8 +32 =	
			Sec	onds per_	1/2 ga	the second s	C X 1.8 +32 =	
Well produ	GPM	Temp C	sec EC	onds per_ pH	1/2 ga Turbidity C	the second s		
Time S: 36			Sec	onds per_	1/2 ga Turbidity C מנפר	the second s	C X 1.8 +32 =	
Time 5:36 0:07			sec EC	олds рег_ рН 6.52 6.43	1/2 ga Turbidity C Clear Clear	the second s	C X 1.8 +32 =	
Time 5:36 0:07 9:09			EC 2.2325 3.26m5 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	the second s	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26м5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C Clear Clear	the second s	C X 1.8 +32 =	
Time 5:36 0:07 9:09		Temp C 66.72 65.48 65.48	<u>ес</u> 2.2325 3.26м5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	the second s	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26м5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	the second s	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26м5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	Color Odor	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26м5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	Color Odor	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26m5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	Color Odor	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26m5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	Color Odor	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26m5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	Color Odor	C X 1.8 +32 =	
Time 5:36 9:27 9:09 10:13		Temp C 66.72 65.46 65.48 65.48	<u>ес</u> 2.2325 3.26m5 2.2425 2.2425	onds per_ pH 6.52 6.43 6.45	1/2 ga Turbidity C C(Cav c(Cav c(Cav	Color Odor	C X 1.8 +32 =	
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Meter Model and last calibration:_

Purge method:

Sampling method:

Analysis: General Mineral

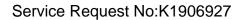
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Notes- Access, well maintenance, sampling anomalies, etc.

Appendix B

ALS Environmental Laboratory Analytical Reports





Brad Bessinger S.S. Papadopulos & 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

Kunt Clauson

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

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

Project: Isotope Sampling

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

Sample Matrix: Water

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.

Kunt Clauson

Approved by

Date

08/19/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W09L03S						
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
pН	7.93				pH Units	SM 4500-H+ B
Sulfate	486			20	mg/L	300.0

CLIENT ID: 02N22W09L04S		Lab	D: K1906	927-002		
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
рН	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

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

SAMPLE CROSS-REFERENCE

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

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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.

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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/EnvironmentalLaborator yAccreditation/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/anlayte 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906927
Project:	Isotope Sampling/	

Sample Name:	02N22W09L03S	Date Collected:	07/29/19
Lab Code:	K1906927-001	Date Received:	07/30/19
Sample Matrix:	Water		

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		Date Collected: 07/29/19
Lab Code:	K1906927-001.R01		Date Received: 07/30/19
Sample Matrix:	Water		
Analysis Method		Extracted/Digested By	Analyzed By
6010C		YZOOK	EMCALLISTER
00100		TLOOK	LMCALLISTER
Sample Name:	02N22W09L04S		Date Collected: 07/29/19
Lab Code:	K1906927-002		Date Received: 07/30/19
Sample Matrix:	Water		
-			
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

Analyst Summary report

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

Service Request: K1906927

Sample Name:02N22W09L04SLab Code:K1906927-002.R01Sample Matrix:Water

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

Analysis Method 6010C

Extracted/Digested By YZOOK **Analyzed By** EMCALLISTER



Sample Results

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Metals

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906927
Project:	Isotope Sampling	Date Collected:	07/29/19 11:05
Sample Matrix:	Water	Date Received:	07/30/19 09:40
Sample Name: Lab Code:	02N22W09L04S K1906927-002	Basis:	NA

Total Metals

	Analysis							
Analyte Name	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. Papadopulos & Associates, Inc.	Service Request:	K1906927
Project:	Isotope Sampling	Date Collected:	07/29/19 11:42
Sample Matrix:	Water	Date Received:	07/30/19 09:40
Sample Name: Lab Code:	02N22W09L03S K1906927-001	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, 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	Н
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906927
Project:	Isotope Sampling	Date Collected: 07/29/19 11:42
Sample Matrix:	Water	Date Received: 07/30/19 09:40
Sample Name: Lab Code:	02N22W09L03S K1906927-001	Basis: NA

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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906927
Project:	Isotope Sampling	Date Collected: 07/29/19 11:05
Sample Matrix:	Water	Date Received: 07/30/19 09:40
Sample Name: Lab Code:	02N22W09L04S K1906927-002	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, 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	Η
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906927
Project:	Isotope Sampling	Date Collected: 07/29/19 11:05
Sample Matrix:	Water	Date Received: 07/30/19 09:40
Sample Name: Lab Code:	02N22W09L04S K1906927-002	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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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Metals

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906927
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank KQ1910752-07	Basis:	NA

Total Metals

	Analysis							
Analyte Name	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	

QA/QC Report

Client:	S.S. Papadopulos & 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. Papadopulos & Associates, Inc.	Service Request:	K1906927
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1906927-MB1	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906927
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1906927-MB1	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906927
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1906927-MB2	Basis:	NA

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

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:K1906927
Project:	Isotope Sampling	Date Collected:07/29/19
Sample Matrix:	Water	Date Received: 07/30/19
		Date Analyzed:7/30/19

Duplicate Matrix Spike Summary General Chemistry Parameters

Sample Name: Lab Code:		N22W09L03S 906927-001							Units:mg/L Basis:NA			
				Matrix Spike K1906927-001MS		Duplicate Matrix Spike K1906927-001DMS						
		Sample		Spike			Spike		% Rec		RPD	
Analyte Name	Method	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit	
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.

QA/QC Report

Client:	S.S. Papadopulos & Associa	ates, Inc.			Service Request:	K1906	5927		
Project	Isotope Sampling				Date Collected:	07/29/	19		
Sample Matrix:	Water				Date Received:	07/30/	19		
					Date Analyzed:	07/30/	19 - 07/31/19		
		Replica	te Sample Sun	nmary					
General Chemistry Parameters									
Sample Name:	02N22W09L03S				Units: mg/L				
Lab Code:	K1906927-001				Basis	NA:			
			Sample	Duplicate Sample K1906927- 001DUP					
Analyte Name	Analysis Method	MRL	Result	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.

Client: Project	S.S. Papadopulos & Associa Isotope Sampling	ntes, Inc.			Service Reque Date Collecte					
Sample Matrix:	Water				Date Receive		-			
					Date Analyze	d: 07/30/	19			
	Replicate Sample Summary									
		General	Chemistry Para	ameters						
Sample Name:	02N22W09L03S				Uni	ts: pH U	nits			
Lab Code:	K1906927-001				Bas	is: NA				
			Sample	Duplicate Sample K1906927- 001DUP						
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit			
pН	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.

QA/QC Report

Client: Project Sample Matrix:	S.S. Papadopulos Isotope Sampling Water		Inc.			Service Request: Date Collected: Date Received: Date Analyzed:	07/29/1 07/30/1	9 9		
	Date Analyzed: 07/31/19 - 08/02/19 Replicate Sample Summary General Chemistry Parameters									
Sample Name: Lab Code:	02N22W09L04S K1906927-002	Analysis		Sample	Duplicate Sample K1906927- 002DUP	Units: Basis:	mg/L NA			
Analyte Name Carbon, Dissolved Organ Solids, Total Dissolved		Method SM 5310 C SM 2540 C	MRL 0.50 5.0	Result 2.47 6230	Result 2.43 6390	Average 2.45 6310	RPD 2 2	RPD Limit 10 5		

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

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

Client: Project	S.S. Papadopulos & Associa Isotope Sampling	tes, Inc.			Service Requ Date Collect		927		
Sample Matrix:	Water				Date Receiv	ed: NA	10		
Date Analyzed: 08/06/19 Replicate Sample Summary General Chemistry Parameters									
Sample Name: Lab Code:	Batch QC K1907038-001					nits: mg/L nsis: NA			
Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1907038- 001DUP Result	Average	RPD	RPD Limit		
Alkalinity as CaCO3, To	•	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.

Client: Project	S.S. Papadopulos & Associa Isotope Sampling	tes, Inc.			Service Requ Date Collec		927			
Sample Matrix:	Water				Date Receiv					
					Date Analyz	zed: 08/06/1	19			
	Replicate Sample Summary									
		General	Chemistry Par	ameters						
Sample Name:	Batch QC				U	nits: mg/L				
Lab Code:	K1907038-012				В	asis: NA				
Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1907038- 012DUP Result	Average	RPD	RPD Limit			
Alkalinity as CaCO3, Tot	l l	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.

QA/QC Report

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

Lab Control Sample Summary General Chemistry Parameters

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

> Units:mg/L Basis:NA

Lab Control Sample K1906927-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, 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

QA/QC Report

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

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

Lab Control Sample Summary General Chemistry Parameters

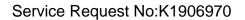
Units:pH Units Basis:NA

K1906927-LCS1							
Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits		
pН	SM 4500-H+ B	9.35	9.34	100	85-115		

Lab Control Sample

QA/QC Report

Client: Project: Sample Matrix:	S.S. Papadopulos & Isotope Sampling Water	z Associates, Inc.		Service Requ Date Analyz Date Extrac	ed:	K190692 08/06/19 NA	7
			rol Sample Summary ity as CaCO3, Total				
Analysis Method:	SM 2320 B			Units:		mg/L	
Prep Method:	None			Basis:		NA	
				Analysis Lot		646126	
Sample Name	Lab	Code	Result	Spike Amount	% Rec		% Rec Limits
Lab Control Sample	K19	06927-LCS2	164	163	101		90-110





Brad Bessinger S.S. Papadopulos & 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

Kunt Clauson

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

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

Project: Isotope Sampling

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

Sample Matrix: Water

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.

Kunt Clauson

Approved by

Date

08/19/2019



SAMPLE DETECTION SUMMARY

LIENT ID: 02N23W15J01S						
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
рН	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
рН	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
рН	6.89				pH Units	SM 4500-H+ B
Sulfate	1530			100	mg/L	300.0



SAMPLE DETECTION SUMMARY

Lab ID: K1906970-003						
Results	Flag	MDL	MRL	Units	Method	
13.1			4.2	ug/L	6010C	
2470			21	ug/L	6010C	
366000			21	ug/L	6010C	
725			21	ug/L	6010C	
241000			5.3	ug/L	6010C	
2220			1.1	ug/L	6010C	
18800			420	ug/L	6010C	
374000			210	ug/L	6010C	
	13.1 2470 366000 725 241000 2220 18800	Results Flag 13.1 2470 366000 725 241000 2220 18800	Results Flag MDL 13.1 2470 366000 725 241000 2220 18800 18800	ResultsFlagMDLMRL13.14.224702136600021725212410005.322201.118800420	Results Flag MDL MRL Units 13.1 4.2 ug/L 2470 21 ug/L 366000 21 ug/L 725 21 ug/L 241000 5.3 ug/L 2220 1.1 ug/L 18800 420 ug/L	



Sample Receipt Information

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SAMPLE CROSS-REFERENCE

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

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Project Name isotope sampling						1-	<u> </u>				Y	alsgio					<u> </u>					[٦			Pag	e 1 of 1
Designed Management	inger				1	F	3	484		2	140		200	707		180D											
Company TIDE SS Papa		05 + A3	s.		ERS											[
Address 416 NE Dall	las st	T. suite	201.0	amas	CONTAINERS					Sulfide 1	11)/						ĺ										
Phone # 360-566-711			WA	18607		B / pH			sa	n / Su	97(20		e		0.00	۰۰. ه											
Sampler Signature	And	Wis R	han	~.	NUMBER OF	M 4500-H+ I	300.0 / NO2	300.0 / NO3	M 2540 C / TDS	M 4500-S2- D /	M 2320 B-1997(2011)	300.0 / Br	00.0 / Chloride	300.0 / SO4	SM 5310 C / TOC	5010C / Metats						Remarks					
		SAMPL	ING	Matrix			8	~		ω	<u>ی</u> .	ö	<u> </u>	ē	- Ø	ö	-	-N	<u>_</u>	4	<u> </u>	Remarks	1				
CLIENT SAMPLE ID	LABID		rime																				4				
1.02N23W15J015 2.02N23W15J025		7/30/19 7/30/19			15 15		とと	~	5	$\frac{1}{2}$	5	~	v	~	7	ر د			_			MS/MSD					
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9.										\neg									1								
10.																											
Report Requirements I. Routine Report: Method Blank, Surrogate, as required ii. Report Dup., MS, MSD as required	Invoice Information Circle which metals are to be analyzed P.O.#																										
III. CLP Like Summary (no raw data)		hr.	lirement 48 hr.	ts	ecial	Instr	JCTIO	ns/C	omn	nents	5:				"Ind	licate	e Sta	ite Hy	/dro	carb	on P	rocedure: AK CA	WI No	rthwest	Other	(Circle	e One)
IV. Data Validation Report	🔀 Sta																										
V.EDD		Requested Report D	ate																								
Relinquished By:	R	eceived By			Reli	nqu	ishe	∋d B	y:				R	969	ived	By	:				Re	linquished By:		w	Recei	ved By:	
signatura Katuleen Kuepper	Signature			Signat							10	natu Îzr	de	<u>~</u> (Gr	21	1es	8	Si	igna	ture			Signature	9		
Katuleen Kuepper Printed Name Unifed Water		ne CY		Printe	d Nar	ne						nted	Nafr S	ie					Pr	rinte	d Na	me	I	Printed N	lame		
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ALS		PC K	١								
Cooler Receipt and Preservation Form		10-1-10									
lient SS Papadopulos / United Water Conservation Service Request K1906970											
	-//0										
Received: $\frac{7}{3}$ $\frac{1}{19}$ Opened: $\frac{7}{31}$ $\frac{19}{19}$ By: $\frac{12}{19}$ Unloaded:	<u>_//3///1</u> E	By: <u>(7</u>									
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 (?) N If yes, how many and where	? (Front	Г									
If present, were custody seals intact? (Y) N If present, were they sign	ed and dated?	Ì	N								
Raw Corrected. Raw Corrected Corr. Thermometer Cooler/COC ID	Tracking Nur	mber									
Cooler Temp Cooler Temp Blank Temp Blank Factor ID NA	27 0745	7777N	IA Filed								
0.4 0.2 4.8 4.6 -0.2 384 101163 78	21_11_	6263									
	••										
4. Packing material: Inserts (Baggies) Bubble Wrap Gel Packs) Wet Ice Dry Ice Slee	wes										
5. Were custody papers properly filled out (ink, signed, etc.)?		NA (Ŷ)	N								
6. Were samples received in good condition (temperature, unbroken)? Indicate in the table below	<i>,</i>	NA (Y)	N								
If applicable, tissue samples were received: Frozen Partially The	awed Thawed	\smile	,								
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 to	ible on page 2.	NA (Y'	N								
9. Were appropriate bottles/containers and volumes received for the tests indicated?		NA (Y)	Ν								
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.											
12. Was C12/Res negative?	(NA Y	N								
Sample ID on Bottle Sample ID on COC	Identified by:	<u> </u>									

Sample ID	Bottle Count Bottle Type		Head- space	Broke	рН	Reagent	Volume added	Reagent Lot Number	Initials	Time
02N 23W15J03S	1-250 mL, P				X	Naolt	0.5mL	GENP/1-74-E	CG	1020
ىيىغى بانى مى مەنىرىكى خارىپ ب ىرىنىي ت كارىپ خارىپ بار		1	1							
		1		-			1		<u> </u>	

Votes, 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.

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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/EnvironmentalLaborator yAccreditation/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/anlayte 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling/	

Sample Name:	02N23W15J01S	Date Collected:	07/30/19
Lab Code:	K1906970-001	Date Received:	07/31/19
Sample Matrix:	Water		

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		Date Collected: 07/30/19
Lab Code:	K1906970-001.R01		Date Received: 07/31/19
Sample Matrix:	Water		
Analysis Method		Extracted/Digested By	Analyzed By
6010C		YZOOK	EMCALLISTER
Sample Name:	02N23W15J02S		Date Collected: 07/30/19
Lab Code:	K1906970-002		Date Received: 07/31/19
Sample Matrix:	Water		
L.			
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

Analyst Summary report

Client: Project:	S.S. Papadopulos & Associates, Inc. Isotope Sampling/		Service Request: K1906970
Sample Name: Lab Code: Sample Matrix:	02N23W15J02S K1906970-002.R01 Water		Date Collected: 07/30/19 Date Received: 07/31/19
Analysis Method 6010C		Extracted/Digested By YZOOK	Analyzed By EMCALLISTER
Sample Name: Lab Code: Sample Matrix:	02N23W15J03S K1906970-003 Water		Date Collected: 07/30/19 Date Received: 07/31/19
Analysis Method		Extracted/Digested By	Analyzed By
300.0 6010C SM 2320 B SM 2540 C SM 4500-H+ B		YZOOK	MRODRIGUEZ AMCKORNEY DBRADBURY JMADISON ACHEATLEY
SM 4500-S2- D SM 5310 C			BDITZLER BDITZLER
Sample Name: Lab Code: Sample Matrix:	02N23W15J03S K1906970-003.R01 Water		Date Collected: 07/30/19 Date Received: 07/31/19
Analysis Method 6010C		Extracted/Digested By YZOOK	Analyzed By EMCALLISTER



Sample Results

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Metals

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	07/30/19 10:22
Sample Matrix:	Water	Date Received:	07/31/19 10:00
Sample Name: Lab Code:	02N23W15J01S K1906970-001	Basis:	NA

	Analysis							
Analyte Name	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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	07/30/19 10:55
Sample Matrix:	Water	Date Received:	07/31/19 10:00
Sample Name: Lab Code:	02N23W15J02S K1906970-002	Basis:	NA

	Analysis							
Analyte Name	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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	07/30/19 11:15
Sample Matrix:	Water	Date Received:	07/31/19 10:00
Sample Name: Lab Code:	02N23W15J03S K1906970-003	Basis:	NA

	Analysis							
Analyte Name	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

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling	Date Collected: 07/30/19 10:22
Sample Matrix:	Water	Date Received: 07/31/19 10:00
Sample Name: Lab Code:	02N23W15J01S K1906970-001	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed Q	2
Alkalinity as CaCO3, 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling	Date Collected: 07/30/19 10:22
Sample Matrix:	Water	Date Received: 07/31/19 10:00
Sample Name: Lab Code:	02N23W15J01S K1906970-001	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970	
Project:	Isotope Sampling	Date Collected: 07/30/19 10:5:	5
Sample Matrix:	Water	Date Received: 07/31/19 10:00	0
Sample Name: Lab Code:	02N23W15J02S K1906970-002	Basis: NA	

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed Q
Alkalinity as CaCO3, 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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	07/30/19 10:55
Sample Matrix:	Water	Date Received:	07/31/19 10:00
Sample Name: Lab Code:	02N23W15J02S K1906970-002	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling	Date Collected: 07/30/19 11:15
Sample Matrix:	Water	Date Received: 07/31/19 10:00
Sample Name: Lab Code:	02N23W15J03S K1906970-003	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed Q
Alkalinity as CaCO3, 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
рН	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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling	Date Collected: 07/30/19 11:15
Sample Matrix:	Water	Date Received: 07/31/19 10:00
Sample Name: Lab Code:	02N23W15J03S K1906970-003	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank KQ1910752-07	Basis:	NA

	Analysis							
Analyte Name	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	

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	07/30/19
Sample Matrix:	Water	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	Units:	ug/L
Lab Code:	K1906970-001	Basis:	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

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.

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project	Isotope Sampling	Date Collected:	07/30/19
Sample Matrix:	Water	Date Received:	07/31/19
		Date Analyzed:	08/02/19 - 08/05/19

Replicate Sample Summary Total Metals

Sample Name:	02N23W15J01S					Units: ug/L	
Lab Code:	K1906970-001					Basis: NA	
Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ1910752-09 Result	Average	RPD	RPD Limit
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. Papadopulos & 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. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1906970-MB1	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1906970-MB1	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1906970-MB2	Basis: NA

	Analysis						
Analyte Name	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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906970
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1906970-MB2	Basis: NA

	Analysis						
Analyte Name	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	

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:K1906970
Project:	Isotope Sampling	Date Collected:07/30/19
Sample Matrix:	Water	Date Received: 07/31/19
		Date Analyzed:8/2/19
	Matrix Spike Summary	
	General Chemistry Parameters	
Sample Name:	02N23W15J01S	Units:mg/L
Lab Code:	K1906970-001	Basis:NA

Matrix Spike K1906970-001MS

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

Results flagged with an asterisk (\ast) 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.

QA/QC Report

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

Duplicate Matrix Spike Summary General Chemistry Parameters

Sample Name:	02N23W15J01S		Units:mg/L
Lab Code:	K1906970-001		Basis:NA
		Matrix Spike	Duplicate Matrix Spike
		K1906970-001MS	K1906970-001DMS

Analvte Name	Method	Sample Result	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
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

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.

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

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

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906970
Project	Isotope Sampling	Date Collected:	07/30/19
Sample Matrix:	Water	Date Received:	07/31/19
		Date Analyzed:	07/31/19 - 08/06/19

Replicate Sample Summary General Chemistry Parameters

Sample Name:	02N23W15J01	S				Unit	s: mg/L	
Lab Code:	K1906970-001					Basi	s: NA	
Angleta Nomo		Analysis Method	MRL	Sample Result	Duplicate Sample K1906970- 001DUP Result	A	RPD	RPD Limit
Analyte Name Bromide		300.0	0.10	1.12	1.12	Average 1.12	<1 <1	20
Carbon, Dissolved Organi	c (DOC)	SM 5310 C	0.50	1.12	1.12	1.12	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, Tota	al	SM 2320 B	15	323	319	321	1	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.

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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.

QA/QC F	Report
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Client: Project Sample Matrix:	S.S. Papadopulos & Associ Isotope Sampling Water	S	Service Request: Date Collected: Date Received: Date Analyzed:	07/30/19 07/31/19)					
	Replicate Sample Summary									
		General Chemis	stry Parameter	S						
Sample Name:	02N23W15J01S				Units:	pH Uni	ts			
Lab Code:	K1906970-001				Basis:	NA				
			Sample	Duplicate Sample K1906970- 001DUP						
Analyte Name	Analysis N	Method MRL	Result	Result	Average	RPD	RPD Limit			
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.

QA/QC Report

Client: Project Sample Matrix:	S.S. Papadopulos Isotope Sampling Water		Inc.			Service Request: Date Collected: Date Received:	07/30/1	9
						Date Analyzed:	08/02/1	9 - 08/05/19
			Replicate Sa	ample Summa	ary			
		G	eneral Cher	nistry Param	eters			
Sample Name:	02N23W15J02S					Units	mg/L	
Lab Code:	K1906970-002					Basis	NA	
					Duplicate Sample K1906970-			
		Analysis		Sample	002DUP			
Analyte Name		Method	MRL	Result	Result	Average	RPD	RPD Limit
Carbon, Dissolved Organ	ic (DOC)	SM 5310 C	0.50	ND U	ND U	NC	NC	10
Solids, Total Dissolved	1	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.

QA/QC Report

Client: Project Sample Matrix:	S.S. Papadopulos Isotope Sampling Water		Inc.			Service Request: Date Collected: Date Received: Date Analyzed:	07/30/19 07/31/19	9
			-	ample Summa mistry Parame	·	2		
Sample Name: Lab Code:	02N23W15J03S K1906970-003				Duplicate Sample	Units: Basis:	mg/L NA	
Analyte Name Carbon, Dissolved Organ	ic (DOC)	Analysis Method SM 5310 C	MRL 0.50	Sample Result 4.86	K1906970- 003DUP Result 4.80	Average 4.83	RPD	RPD Limit 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.

QA/QC Report

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

Lab Control Sample Summary General Chemistry Parameters

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

> Units:mg/L Basis:NA

Lab Control Sample K1906970-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, 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

QA/QC Report

Client:	S.S. Papadopulos & 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

	K1906970-L	LCS1				
Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits	
pН	SM 4500-H+ B	9.26	9.34	99	85-115	

Lab Control Sample

QA/QC Report

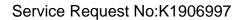
Client: Project: Sample Matrix:	S.S. Papadopulos & Associates, Inc. Isotope Sampling Water		Service Requ Date Analyze Date Extract	ed: 08/06/	
		Control Sample Summary calinity as CaCO3, Total			
Analysis Method: Prep Method:	SM 2320 B None		Units: Basis: Analysis Lot	mg/L NA 64612	9
Sample Name Lab Control Sample	Lab Code K1906970-LCS2	Result 162	Spike Amount 163	% Rec 99	% Rec Limits 90-110

QA/QC Report

Client: Project: Sample Matrix:	S.S. Papadopulos & Associates, Inc Isotope Sampling Water		Service Requ Date Analyze Date Extracte	ed: 08/08/19	
		Control Sample Summary kalinity as CaCO3, Total			
Analysis Method: Prep Method:	SM 2320 B None		Units: Basis: Analysis Lot:	mg/L NA 646535	
Sample Name Lab Control Sample	Lab Code K1906970-LCS3	Result 161	Spike Amount 163	% Rec 99	% Rec Limits 90-110

QA/QC Report

Client: Project: Sample Matrix:	S.S. Papadopulos & Asso Isotope Sampling Water	ciates, Inc.		Service Req Date Analyz Date Extrac	zed:	K190697 08/08/19 NA	
			Sample Summary as CaCO3, Total				
Analysis Method:	SM 2320 B			Units:		mg/L	
Prep Method:	None			Basis:		NA	
				Analysis Lo	t:	646535	
Sample Name	Lab Code		Result	Spike Amount	% Rec	2	% Rec Limits
Lab Control Sample	K1906970)-LCS4	163	163	100		90-110





Brad Bessinger S.S. Papadopulos & 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

Kunt Clauson

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

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

Project: Isotope Sampling

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

Sample Matrix: Water

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.

Kunt Clauson

Approved by

Date

08/20/2019

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SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W07M025		Lab	ID: K1906	997-001		
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
рН	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. Papadopulos & Associates, Inc.Project:Isotope Sampling

SAMPLE CROSS-REFERENCE

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

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(ALS) Enuir			13	17 Sout	h 13th	Ave, H	Keiso,	WA 9		-	-				695-722	2 / FAX	(360)	636-10			COC#
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916 NE Dallas St. S Phone# <u>310 NE Dattas</u> V Sampler Signature 310-566-7	19 Sampler F	Printed Name		ROF	± ±	8	ß	C/T	S2- E	B-195		horide	5	C/T	detais			1			
	(1	ndtew Ph	~~~	NUMBER OF CONTAINERS	SM 4500-H+	300.0 / NO2	300.0 / NO3	SM 2540 C / TDS	SM 4500-S2- D /	SM 2320 B-1997(2011).	300.0 / Br	300.0 / Chłoride	300.0 / SO4	SM 5310 C / TOC	5010C / Metals T					Remarks	
CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix									.67			<u> </u>				<u>v</u>	Komano	
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Report Requirements	Invo	ice Information		Ł	. 1					1											
I. Routine Report: Method	P.O.#				-				_											nalyzed	
Blank, Surrogate, as required	GSA GSA	Mound Basin																			Na Se Sr TI Sn V Zn Hg
II. Report Dup., MS, MSD as required		······									Sb E	Ba E									g Na Se Sr Ti Sn V Zn Hg
III. CLP Like Summary		und Requiremen	ts Sp	ecial	Instri	uctio	ns/C	omm	ents				L	*Indi	icate	State	Hydr	ocart	on F	Procedure: AK CA V	VI Northwest Other (Circle One)
(no raw data)	24 5 D)ay																			
IV. Data Validation Report	-X Sta	andard																			
V. EDD	F	Requested Report Date																			
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Client _	1 8/1/1	9(Opened:	8/1/1	9	By		$\frac{1}{6}$	e Reque	est KI S nloaded		1/19	By:(G	
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 N If yes, how many and where? If room to the provided of the pr							NA								
	esent, were cu	_		Ø)	N					igned and			Ø	N
Raw Cocler Tel	Corrected.	Raw	Corrected Temp Blank	Corr. Factor	The	rmome ID			/COC ID	NA		Tracking N	lumber	NA	Filed
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4. Pacl	king material:	Inserts i	Baggies	Bubble W	rad	Gel Pa	cks	Wet Ic	è Drv	Ice S	leeves				4
	e custody pap												ŇA	Ð	 N
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	• ballipies xee	-	licable, tis	• •	,	-		Froze			Thawed	Thawed	112 1	S	
7. Wer	e all sample la	abels comple	te (i.e anal	ysis, prese	rvatio	n, etc.)'	?			#			NA	(Y)	N
8. Did	all sample lab	els and tags	agree with	custody pa	apers?	Indice	ate maj	ior disc	crepanci	ies in th	e table on	page 2.	NA	Ø,	Ν
9. We	re appropriate	bottles/cont	ainers and	volumes re	eceive	d for th	ie tests	indica	ted?				NA	C/	Ν
10. We	ere the pH-pre	served bottle	es (see SMC	GEN SOP)) recei	ved at 1	the app	ropriat	te pH?	Indicate	in the tal	ble below	NA	Ì	N
11. We	ere VOA vials	received wi	thout head	space? Ind	dicate	in the t	able be	elow.					NA	/ Y	Ν
12. Wa	is C12/Res ne	gative?											NA	Y	N
	Sample ID	on Bottle			Samp	le ID or	COC					Identified by	: <u> </u>		
[······	· · · · · · · · · · · · · · · · · · ·													
	Sample I	D		e Count e Type	Out of Temp	Head- space	Broke	рH	Rea	gent	Volume added	Reagent L Number		nitials T	ime
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Notes, Discrepancies, & Resolutions:

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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.

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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/EnvironmentalLaborator yAccreditation/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/anlayte 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906997
Project:	Isotope Sampling/	
Sample Name:	02N22W07M025	Date Collected: 07/31/19
Lab Code:	K1906997-001	Date Received: 08/1/19
Sample Matrix:	Water	

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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Analytical Report

opulos & Associates, Inc. Service Request:	K1906997
npling Date Collected:	07/31/19 14:15
Date Received:	08/01/19 09:45
	NA
r	mpling Date Collected: Date Received: 7M025 Basis: -001

Total Metals

	Analysis							
Analyte Name	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. Papadopulos & Associates, Inc.	Service Request: K19	06997
Project:	Isotope Sampling	Date Collected: 07/3	1/19 14:15
Sample Matrix:	Water	Date Received: 08/0	1/19 09:45
Sample Name: Lab Code:	02N22W07M025 K1906997-001	Basis: NA	

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed (Q
Alkalinity as CaCO3, 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906997
Project:	Isotope Sampling	Date Collected: 07/31/19 14:15
Sample Matrix:	Water	Date Received: 08/01/19 09:45
Sample Name: Lab Code:	02N22W07M025 K1906997-001	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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. Papadopulos & Associates, Inc.	Service Request:	K1906997
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank KQ1910867-05	Basis:	NA

Total Metals

	Analysis							
Analyte Name	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	

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906997
Project:	Isotope Sampling	Date Collected:	07/31/19
Sample Matrix:	Water	Date Received:	08/01/19
		Date Analyzed:	08/6/19
		Date Extracted:	08/5/19
	Matrix Spike Summary		
	Total Metals		
Sample Name:	02N22W07M025	Units:	ug/L
Lab Code:	K1906997-001	Basis:	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

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.

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1906997
Project	Isotope Sampling	Date Collected:	07/31/19
Sample Matrix:	Water	Date Received:	08/01/19
		Date Analyzed:	08/06/19

Replicate Sample Summary Total Metals

Sample Name:	02N22W07M025					Units: ug/L	
Lab Code:	K1906997-001					Basis: NA	
Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ1910867-03 Result	Average	RPD	RPD Limit
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.

QA/QC Report

Client:	S.S. Papadopulos & 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. Papadopulos & Associates, Inc.	Service Request: K1906997
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1906997-MB1	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND U	mg/L	15	1	08/06/19 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906997
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1906997-MB1	Basis: NA
Lab Coue.	K1900997-WD1	

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906997
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1906997-MB2	Basis: NA

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	

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:K1906997
Project:	Isotope Sampling	Date Collected:07/31/19
Sample Matrix:	Water	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
		Matrix Spike K1906997-001MS	Duplicate Matrix Spike K1906997-001DMS

Analyte Name	Method	Sample Result	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
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.

QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1906997	
Project	Isotope Sampling	Date Collected: 07/31/19	
Sample Matrix:	Water	Date Received: 08/01/19	
		Date Analyzed: 08/01/19 - 08/02/1	9

Replicate Sample Summary General Chemistry Parameters

Sample Name:	02N22W07M0	025				Units	mg/L	
Lab Code:	K1906997-001	1				Basis	NA	
				Sample	Duplicate Sample K1906997- 001DUP			
Analyte Name		Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
Bromide		300.0	0.10	0.61	0.52	0.569	16	20
Carbon, Dissolved Organ	ic (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.

QA/QC	Report
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Client:	S.S. Papadopulos & Associates, Inc				Service Request:		
Project	Isotope Sampling				Date Collected:	07/31/19	9
Sample Matrix:	Water				Date Received:	08/01/19	9
					Date Analyzed:	08/01/19	9
	Rej	plicate Sam	ple Summary				
	Gene	eral Chemis	stry Parameter	rs			
Sample Name:	02N22W07M025				Units:	pH Uni	ts
Lab Code:	K1906997-001				Basis:	NA	
			Sample	Duplicate Sample K1906997- 001DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
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.

QA/QC Rej	port
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Client: Project	S.S. Papadopulos & Associa Isotope Sampling	tes, Inc.			Service Reques		997
Sample Matrix:	Water				Date Receive	d: NA	
					Date Analyze	d: 08/06/	19
Replicate Sample Summary General Chemistry Parameters							
Sample Name:	Batch QC		·		Uni	ts: mg/L	
Lab Code:	K1907038-001			D II (Bas	is: NA	
			Sample	Duplicate Sample K1907038- 001DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Tot	al 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.

Client:	S.S. Papadopulos & Associat	tes, Inc.			Service Reque	est: K1906	997
Project	Isotope Sampling				Date Collect	ed: NA	
Sample Matrix:	Water				Date Receive	ed: NA	
					Date Analyz	ed: 08/06/	19
		Replic	ate Sample Sun	nmary			
		General	Chemistry Par	ameters			
Sample Name:	Batch QC				Un	its: mg/L	
Lab Code:	K1907038-012				Ba	sis: NA	
			Sample	Duplicate Sample K1907038- 012DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Tota	al 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.

QA/QC Report

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

Lab Control Sample Summary General Chemistry Parameters

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

> Units:mg/L Basis:NA

Lab Control Sample K1906997-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, 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

QA/QC Report

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

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

Lab Control Sample Summary General Chemistry Parameters

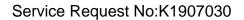
Units:pH Units Basis:NA

	K1906997-L	LCS1			
Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
pН	SM 4500-H+ B	9.27	9.34	99	85-115

Lab Control Sample

QA/QC Report

Client: Project: Sample Matrix:	S.S. Papadopulos & Associates, Inc. Isotope Sampling Water		Service Requ Date Analyze Date Extracte	d: 08/06/19	
		Control Sample Summary alinity as CaCO3, Total			
Analysis Method: Prep Method:	SM 2320 B None		Units: Basis: Analysis Lot:	mg/L NA 646126	
Sample Name Lab Control Sample	Lab Code K1906997-LCS2	Result 164	Spike Amount 163	% Rec	% Rec Limits 90-110





Brad Bessinger S.S. Papadopulos & 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

Kunt Clauson

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

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

Project: Isotope Sampling

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

Sample Matrix: Water

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.

Kunt Clauson

Approved by

Date

08/21/2019



SAMPLE DETECTION SUMMARY

CLIENT ID: 02N22W07M01S		Lab	ID: K1907	030-001		
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 CaCO3, 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
рН	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

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

SAMPLE CROSS-REFERENCE

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

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Project Manager Brad Be	SSIMA	2~	_]	Ľ	<u> </u>	র্ব ন			÷			Ň T	r	<u>۳</u>									
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	0 ST. SV 19 email Sampler F	17e 201, Campos Ssinger C 35p Printed Name	a, con	ER OF CONTAINERS	SM 4500-H+ B / pH	02	03	M 2540 C / TDS	SM 4500-S2- D / Sulfide T	M 2320 B-1997(2011)/		hloride	04	SM 5310 C / TOC D	5010C / Metals T									
	Tre	aùs		NUMBER	SM 4500	300.0 / NO2	300.0 / NO3	SM 2540	SM 4500	SM 2320	300.0 / Br	300.0 / Chloride	300.0 / SO4	SM 5310	5010C / #		~		4	5	Remarks			
CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix																					
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Report Requirements	P.O.#	bice Information			LJ		1	L		4										be analyz		I	ath at a sub a sub a sub an an a	
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as required			S	pecial	Instr	uctic	ons/C	omn	nent	s:				*inc	dicat	e Sta	te H	/droc	carbo	n Proce	edure: AK C	CA V	VI Northwest Other (Circle On	e)
III. CLP Like Summary (no raw data)	24]av	ts																					
IV. Data Validation Report	× Sta	andard																						
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(ALS)	PC	: NU	
Coøler Receipt and Preservation Form			
nt United Water 155, Papadepulos Service Request K19 07030		<u> </u>	
eived: $\frac{5}{2}$ Opened: $\frac{6}{2}$ By: Unloaded: $\frac{8}{2}$	By:	2	
Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Deliver	·ed		
Samples were received in: (circle) Cooler Box Envelope Other	/	NA	
Were <u>custody seals</u> on coolers? NA (\underline{Y}) N If yes, how many and where? $\underline{\mathcal{OUL}}_{i}$	SIR	L	
If present, were custody seals intact? (Y) N If present, were they signed and dated?		Y	N
	Number		
oler Temp Cooler Temp Blank Temp Blank Factor ID (NA)	LIIH	Q=NA	Filed
	2	<u>u</u>	
	·····	<u> </u>	
	·····		<u> </u>
Packing material: Inserts Baggies Bubble Write Gel Packs Wet Ice Dry Ice Sleeves		~~~~~	
Were custody papers properly filled out (ink, signed, etc.)?	NA	È	Ν
Were samples received in good condition (temperature, unbroken)? Indicate in the table below.	NA	প্র	Ν
If applicable, tissue samples were received: <i>Frozen Partially Thawed Thawee</i> Were all sample labels complete (i.e analysis, preservation, etc.)?	d NA	\mathbf{Q}	N
Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table on page 2.	NA	X	N
Were appropriate bottles/containers and volumes received for the tests indicated?	NA	U V	N
	NA	Y Y	N
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Ŷ	N
-	(NA	Y	N
. Was C12/Res negative?		I	
Sample ID on Bottle Sample ID on COC	by:	بالمنافقة المرقبة المراجع	<u></u>
	<u></u>	<u>ئىلى يېتىكى يىنىڭ يېتىكى ب</u> ىيىت	

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	рН	Reagent	Volume added	Reagent Lot Number	Initials	Time
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## Notes, Discrepancies, & Resolutions:

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## **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.

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## 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/EnvironmentalLaborator yAccreditation/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/anlayte 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907030
Project:	Isotope Sampling/	
Sample Name:	02N22W07M01S	Date Collected: 08/1/19
Lab Code:	K1907030-001	<b>Date Received:</b> 08/2/19
Sample Matrix:	Water	
-		

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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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project:	Isotope Sampling	Date Collected:	08/01/19 09:47
Sample Matrix:	Water	Date Received:	08/02/19 10:00
Sample Name: Lab Code:	02N22W07M01S K1907030-001	Basis:	NA

### **Total Metals**

	Analysis							
Analyte Name	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. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project:	Isotope Sampling	Date Collected:	08/01/19 09:47
Sample Matrix:	Water	Date Received:	08/02/19 10:00
Sample Name: Lab Code:	02N22W07M01S K1907030-001	Basis:	NA

## **General Chemistry Parameters**

Analyte Name	<b>Analysis Method</b>	Result	Units	MRL	Dil.	Date Analyzed Q
Alkalinity as CaCO3, 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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907030
Project:	Isotope Sampling	<b>Date Collected:</b> 08/01/19 09:47
Sample Matrix:	Water	Date Received: 08/02/19 10:00
Sample Name: Lab Code:	02N22W07M01S K1907030-001	Basis: NA

## **General Chemistry Parameters**

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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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## Metals

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank KQ1911077-02	Basis:	NA

### **Total Metals**

	Analysis							
Analyte Name	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	

### QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project:	Isotope Sampling	Date Collected:	N/A
Sample Matrix:	Water	Date Received:	N/A
		Date Analyzed:	08/13/19
		Date Extracted:	08/12/19
	Matrix Spike Summary		
	<b>Total Metals</b>		
Sample Name:	Batch QC	Units:	ug/L
Lab Code:	K1907194-020	Basis:	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

### **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.

### QA/QC Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
		Date Analyzed:	08/13/19

### Replicate Sample Summary Total Metals

Sample Name:	Batch QC					Units: ug/L	
Lab Code:	K1907194-020					Basis: NA	
	Analysis		Sample	Duplicate Sample KQ1911077-03			
Analyte Name	Method	MRL	Result	Result	Average	RPD	RPD Limit
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

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

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

QA/QC Report

Client:	S.S. Papadopulos & 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	<b>Analytical Method</b>	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. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1907030-MB1	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	08/06/19 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907030
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1907030-MB1	Basis:	NA

## **General Chemistry Parameters**

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907030
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1907030-MB2	Basis: NA

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

QA/QC Report

Client: Project: Sample Matrix:	S.S. Papadop Isotope Samp Water		iates, Inc.			Dat Dat Dat	vice Reque e Collected e Received e Analyzed e Extracted	l: 08 : 08 l: 08	1907030 /01/19 /02/19 /7/19	
			Dunligat	o Motuir S	nileo Sumu		e Extracted	<b>1:</b> 192	4	
			Duplicat	e Matrix S Total Sul	-	пагу				
Sample Name:	02N22W07N	101S					Unit	s: m	g/L	
Lab Code:	K1907030-00	)1					Basis	s: NA	4	
Analysis Method:	SM 4500-S2-	D								
Prep Method:	None									
				<b>x Spike</b> 80-001MS		Duplicate M K1907030-	-	e		
	Sample		Spike			Spike		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit
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.

#### QA/QC Report

Client: Project	S.S. Papadopul Isotope Sampli	los & Associates, Inc.				Service Request: Date Collected:		
Sample Matrix:	Water					Date Received:		-
Sampie Matrix.	water					Date Analyzed:		-
		Rep	licate Sam	ple Summary		Dute i indig zeut	00/07/1	·
		•		try Paramete				
Sample Name:	02N22W07M0	01 <b>S</b>				Units:	mg/L	
Lab Code:	K1907030-00	1				Basis:	NA	
					Duplicate Sample K1907030-			
				Sample	001DUP			
Analyte Name		Analysis Method	MRL	Result	Result	Average	RPD	<b>RPD</b> Limit
Carbon, Dissolved Organ	ic (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.

QA/QC	Report
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Client: Project Sample Matrix:	S.S. Papadopulos & Associates, Inc. Isotope Sampling Water				Service Request: Date Collected: Date Received: Date Analyzed:	08/01/19 08/02/19	9
	-		ple Summary try Paramete		2 4 6 1 1 1 4 1 9 2 6 4 1	00,02,1	, ,
Sample Name:	02N22W07M01S				Units:	pH Uni	ts
Lab Code:	K1907030-001				Basis:	NA	
			Sample	Duplicate Sample K1907030- 001DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	<b>RPD</b> Limit
pН	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.

QA/QC Rej	port
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Client:	S.S. Papadopulos & Associa	tes, Inc.			Service Reque Date Collect		/030
Project	Isotope Sampling						
Sample Matrix:	Water				Date Receive		
					Date Analyz	ed: 08/06/	19
		Replic	ate Sample Sun	nmary			
		General	Chemistry Par	ameters			
Sample Name:	Batch QC				Un	its: mg/L	
Lab Code:	K1907038-001				Ba	sis: NA	
	An alunda Mada al		Sample	Duplicate Sample K1907038- 001DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Tota	al 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.

QA/QC I	Report
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Client:	S.S. Papadopulos & Associat	tes, Inc.			Service Requ	est: K1907	/030
Project	Isotope Sampling				Date Collect	ed: NA	
Sample Matrix:	Water				Date Receiv	ed: NA	
					Date Analyz	ed: 08/06/	19
		Replic	ate Sample Sun	nmary			
		General	Chemistry Par	ameters			
Sample Name:	Batch QC				Uı	its: mg/L	
Lab Code:	K1907038-012				Ba	sis: NA	
			Sample	Duplicate Sample K1907038- 012DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	<b>RPD</b> Limit
Alkalinity as CaCO3, Tota	al 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.

QA/QC Report

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

# Lab Control Sample Summary General Chemistry Parameters

Service Request: K1907030 Date Analyzed: 08/02/19 - 08/07/19

> Units:mg/L Basis:NA

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, 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

QA/QC Report

Client:	S.S. Papadopulos & 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

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

QA/QC Report

Client:	S.S. Papadopulos & 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

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	164	163	101	90-110

QA/QC Report

Client:	S.S. Papadopulos & 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

Analyte Name	<b>Analytical Method</b>	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

QA/QC Report

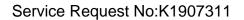
Client:	S.S. Papadopulos & Associates, Inc.
Project:	Isotope Sampling
Sample Matrix:	Water

# **Service Request:** K1907030 **Date Analyzed:** 08/02/19

# Lab Control Sample Summary General Chemistry Parameters

Units:mg/L Basis:NA

Analyte Name	<b>Analytical Method</b>	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





Brad Bessinger S.S. Papadopulos & 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

Kunt Clauson

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

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

Project: Isotope Sampling

Service Request: K1907311 Date Received: 08/09/2019

Sample Matrix: Water

### 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.

Kunt Clauson

Approved by

Date

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08/30/2019



# SAMPLE DETECTION SUMMARY

CLIENT ID: 02N23W15J03S		Lab	ID: K1907	311-001		
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
рН	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

Lab ID: K1907311-002					
Flag	MDL	MRL	Units	Method	
		0.50	mg/L	SM 5310 C	
		5.0	mg/L	SM 2540 C	
		15	mg/L	SM 2320 B	
		0.10	mg/L	300.0	
		10	mg/L	300.0	
		5.0	mg/L	300.0	
		0.10	mg/L	300.0	
			pH Units	SM 4500-H+ B	
		100	mg/L	300.0	
		4.2	ug/L	6010C	
		21	ug/L	6010C	
		21	ug/L	6010C	
		5.3	ug/L	6010C	
		1.1	ug/L	6010C	
		210	ug/L	6010C	
		42000	ug/L	6010C	
F			Flag         MDL         MRL           0.50         5.0           15         0.10           10         5.0           10         5.0           10         5.0           11         21           5.3         1.1           210         210	Flag         MDL         MRL         Units           0.50         mg/L         5.0         mg/L           15         mg/L         15         mg/L           0.10         mg/L         10         mg/L           5.0         mg/L         10         mg/L           0.10         mg/L         5.0         mg/L           0.10         mg/L         5.0         mg/L           0.10         mg/L         0.10         mg/L           100         mg/L         4.2         ug/L           21         ug/L         21         ug/L           5.3         ug/L         5.3         ug/L           1.1         ug/L         210         ug/L	

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
рН	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

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

# SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	<u>TIME</u>
K1907311-001	02N23W15J03S	8/8/2019	1018
K1907311-002	02N22W07M03S	8/8/2019	1113
K1907311-003	02N22W09L03S	8/8/2019	1505

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Project Name ISOTOPE Salup	Project NL	imber:				ы	Чан	Lo Lo	70		14D		780	3		180D												
Project Manager Brad Bes Company SS Payoudo Address 416 NE Dalle Phone # 360-566-711 Sampler Signature	as stars	+ Ass vite 20		,com	NUMBER OF CONTAINERS	SM 4500-H+ B / pH /	1	١	`		SM 2320 B-1997(2011) / 1	300.0/Br	300.0 / Chloride	300.0 / SO4	SM 5310 C / TOC D -	6010C / Metals T 🗾 🗾 1			m	st		Rema	rks					
		SAMF	LING Time	Matrix																								
CLIENT SAMPLE ID	LABID	Date 8/8/19	10:18		5	~		i	7	너	7	구	7	7	~	V				┢				1				
1.02NZ3W15JO35		8/8/19	11:13	<u></u>	5	Ż	~	~	٠	6	7	~	1	V	5	~				1		***		1				
2.02N 22W07M035 3.02N 22W091_035		8/8/19	15:05		र्षे	2	v	v	~	c	~	レ	v	1	~	1				T				]				
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10.					<u> </u>					-1																		
Report Requirements         I. Routine Report: Method         Blank, Surrogate, as         required         II. Report Dup., MS, MSD         as required         III. CLP Like Summary         (no raw data)         IV. Data Validation Report         V. EDD	P.O.# Bill To: 6_S	Dund Rec Day andard	ud had quiremen 48 hr.	s	pecia	Di	ssolv	ed Me	etals:	Al	As				вС	Cd a C	Co ( d Co	Cr Ci Cr	ı Fe Cu f	Pb ≂e ∣	Pb Mg	/In Mio N Min Mio	Ni K	Ag Na	Se Sr Ti a Se Sr Iorthwest	TI Sn '	Zn Hg V Zn Hg (Circle	One)
Relinquished By:	<b>1 F</b>	Requested Report			Re	ling	uish	ed l	3γ:	,		4	F	Rece	eive	d B	y:				Reli	nquishe	d By:			Rece	ived By:	
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Date/Time	Date/Time			Date	Time	,					<del>الم</del>	ate/T	ime						Da	ate/	Time				Date/Tir	ne		

	PC	:hC
Cooler Receipt and Preservation Form		
ient <u>-SS-part</u> United Water Concernation Pist.	7311	
	9.19 By:	NP
	Hand Delivered	
Samples were received in: (circle) <b>Cooler</b> Box Envelope Other	. 0. 1	NA
Were <u>custody seals</u> on coolers? NA $(Y)$ N If yes, how many and where?	1 filht	
If present, were custody seals intact? (D) N If present, were they signed a	and dated?	ØN
Raw corrected.         Raw Temp Blank         Corrected         Corr.         Thermometer         Cooler/COC ID           cooler Temp         Temp Blank         Temp Blank         Factor         ID         NA	Tracking Number	NA F
1.2 1.0 07 325 101163 859	7 8710 7881	/
		l_
Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves		(27)
Were custody papers properly filled out (ink, signed, etc.)?	NA	Y
. Were samples received in good condition (temperature, unbroken)? Indicate in the table below. If applicable, tissue samples were received: Frozen Partially Thaw	NA NA <b>Thawed</b>	(Y)
If applicable, tissue samples were received: Frozen Partially Thaw Were all sample labels complete (i.e analysis, preservation, etc.)?	eu Inuweu NA	Ŷ
Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table		$\succ$
· in the output we one and the office of the output of papers. Interest of the the the the	ρητηπαρ/ΝΑ	( <b>y</b> /
	• •	Y
. Were appropriate bottles/containers and volumes received for the tests indicated?	NA	Ŷ
<ul><li>Were appropriate bottles/containers and volumes received for the tests indicated?</li><li>Were the pH-preserved bottles (<i>see SMO GEN SOP</i>) received at the appropriate pH? <i>Indicate in the</i></li></ul>	NA e table below NA	Y Y
<ul> <li>Were appropriate bottles/containers and volumes received for the tests indicated?</li> <li>Were the pH-preserved bottles (<i>see SMO GEN SOP</i>) received at the appropriate pH? <i>Indicate in the</i></li> <li>Were VOA vials received without headspace? <i>Indicate in the table below.</i></li> </ul>	NA e table below NA	Y Y Y
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<ul> <li>Were appropriate bottles/containers and volumes received for the tests indicated?</li> <li>Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the 1. Were VOA vials received without headspace? Indicate in the table below.</li> <li>Was C12/Res negative?</li> </ul>	NA e table below NA NA Identified by:	Y Y Y
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<ul> <li>Were appropriate bottles/containers and volumes received for the tests indicated?</li> <li>Were the pH-preserved bottles (<i>see SMO GEN SOP</i>) received at the appropriate pH? <i>Indicate in the</i></li> <li>Were VOA vials received without headspace? <i>Indicate in the table below.</i></li> <li>Was C12/Res negative?</li> </ul> Sample ID on Bottle   Sample ID on Bottle     Bottle Count   Out of Head-	NA e table below NA NA Identified by:	Y Y Y Y
9. Were appropriate bottles/containers and volumes received for the tests indicated?         10. Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below.         11. Were VOA vials received without headspace? Indicate in the table below.         12. Was C12/Res negative?         Sample ID on Bottle       Sample ID on COC         Sample ID on Bottle       Sample ID on COC         Sample ID       Bottle Count       Out of Head-Temp space         Bottle Type       Temp space       Broke pH       Reagent       add	NA e table below NA NA Identified by:	Y Y Y Y
D.       Were appropriate bottles/containers and volumes received for the tests indicated?         10.       Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below.         11.       Were VOA vials received without headspace? Indicate in the table below.         12.       Was C12/Res negative?         Sample ID on Bottle       Sample ID on COC         Sample ID       Bottle Count       Out of Head- Temp space       PH       Reagent       Volu         Sample ID       Bottle Type       Temp space       Broke       PH       Reagent       add	NA e table below NA NA Identified by:	Y Y Y Y
D.       Were appropriate bottles/containers and volumes received for the tests indicated?         10.       Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below.         11.       Were VOA vials received without headspace? Indicate in the table below.         12.       Was C12/Res negative?         Sample ID on Bottle         Sample ID on Bottle         Sample ID on Bottle         Sample ID on Bottle         Sample ID on COC         Sample ID on Bottle         Sample ID on COC         Bottle Count Bottle Count Temp space Broke pH       Reagent       Volu         Reagent       Volu         Sample ID       Bottle Type         Bottle Type       Bottle PH       Reagent       add	NA e table below NA NA Identified by:	Y Y Y Y
D. Were appropriate bottles/containers and volumes received for the tests indicated?         10. Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below.         11. Were VOA vials received without headspace? Indicate in the table below.         12. Was C12/Res negative?         Sample ID on Bottle       Sample ID on COC         Sample ID       Bottle Count       Out of Head- Temp space Broke pH       Reagent       Volu         Reagent       Iddate Type       Iddate Type       Iddate Type       Iddate Type       Iddate Type	NA e table below NA NA Identified by:	Y Y Y Y

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# **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.

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# 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/EnvironmentalLaborator yAccreditation/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/anlayte 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling/	

Sample Name:	02N23W15J03S	Date Collected:	08/8/19
Lab Code:	K1907311-001	Date Received:	08/9/19
Sample Matrix:	Water		

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		Date Collected: 08/8/19
Lab Code:	K1907311-001.R01		Date Received: 08/9/19
Sample Matrix:	Water		
			Arris Inner I Der
Analysis Method		Extracted/Digested By	Analyzed By
SM 2320 B			DBRADBURY
	00110011001 (000		
Sample Name:	02N22W07M03S		Date Collected: 08/8/19
Lab Code:	K1907311-002		<b>Date Received:</b> 08/9/19
Sample Matrix:	Water		
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

Analyst Summary report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling/	
Sample Name:	02N22W09L03S	Date Collected: 08/8/19

Sample Name:	02N22W09L03S	Date Collected: 08/8/19
Lab Code:	K1907311-003	Date Received: 08/9/19
Sample Matrix:	Water	

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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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 10:18
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N23W15J03S K1907311-001	Basis:	NA

# **Total Metals**

	Analysis							
Analyte Name	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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 11:13
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N22W07M03S K1907311-002	Basis:	NA

# **Total Metals**

	Analysis							
Analyte Name	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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 15:05
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N22W09L03S K1907311-003	Basis:	NA

# **Total Metals**

	Analysis							
Analyte Name	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**

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling	<b>Date Collected:</b> 08/08/19 10:18
Sample Matrix:	Water	<b>Date Received:</b> 08/09/19 10:30
Sample Name: Lab Code:	02N23W15J03S K1907311-001	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed Q
Alkalinity as CaCO3, 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	<b>98.</b> 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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 10:18
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N23W15J03S K1907311-001	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling	<b>Date Collected:</b> 08/08/19 11:13
Sample Matrix:	Water	Date Received: 08/09/19 10:30
Sample Name: Lab Code:	02N22W07M03S K1907311-002	Basis: NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed Q
Alkalinity as CaCO3, 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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 11:13
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N22W07M03S K1907311-002	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 15:05
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N22W09L03S K1907311-003	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed Q
Alkalinity as CaCO3, 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

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	08/08/19 15:05
Sample Matrix:	Water	Date Received:	08/09/19 10:30
Sample Name: Lab Code:	02N22W09L03S K1907311-003	Basis:	NA

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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

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# Metals

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Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank KQ1911513-04	Basis:	NA

#### **Total Metals**

	Analysis							
Analyte Name	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	

QA/QC Report

Client:	S.S. Papadopulos & 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	<b>Analytical Method</b>	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. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1907311-MB1	Basis: NA

Analyte Name	<b>Analysis Method</b>	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name:	Method Blank	Basis: NA
Lab Code:	K1907311-MB1	

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1907311-MB2	Basis:	NA

	Analysis						
Analyte Name	Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, 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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1907311-MB2	Basis:	NA

	Analysis						
Analyte Name	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	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request:	K1907311
Project:	Isotope Sampling	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name: Lab Code:	Method Blank K1907311-MB3	Basis:	NA

	Analysis						
Analyte Name	Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Sulfate	300.0	ND U	mg/L	0.20	1	08/12/19 10:58	

Analytical Report

Client:	S.S. Papadopulos & Associates, Inc.	Service Request: K1907311
Project:	Isotope Sampling	Date Collected: NA
Sample Matrix:	Water	Date Received: NA
Sample Name: Lab Code:	Method Blank K1907311-MB4	Basis: NA

	Analysis						
Analyte Name	Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Sulfate	300.0	ND U	mg/L	0.20	1	08/12/19 20:24	

#### QA/QC Report

Client: Project Sample Matrix:	S.S. Papadopulos Isotope Sampling Water		Inc.			Service Request: Date Collected: Date Received: Date Analyzed:	08/08/19 08/09/19	)
			-	ample Summa nistry Parame	•	Dute Many Lear	00,20,19	
Sample Name:	02N23W15J03S					Units:	mg/L	
Lab Code:	K1907311-001	Analysis		Sample	Duplicate Sample K1907311- 001DUP	Basis:		
Analyte Name		Method	MRL	Result	Result	8	RPD	<b>RPD</b> Limit
Carbon, Dissolved Organi	ic (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.

#### QA/QC Report

Client:	S.S. Papadopulos		Inc.			Service Request:		
Project	Isotope Sampling	5				Date Collected:	08/08/19	
Sample Matrix:	Water					Date Received:	08/09/19	
						Date Analyzed:	08/28/19	
			Replicate S	ample Summa	nry			
		0	General Che	mistry Paramo	eters			
Sample Name:	02N22W07M03	S				Units:	mg/L	
Lab Code:	K1907311-002					Basis:	NA	
					Duplicate Sample K1907311-			
		Analysis		Sample	002DUP			
Analyte Name		Method	MRL	Result	Result	Average	RPD	<b>RPD Limit</b>
Carbon, Dissolved Organ	ic (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.

#### QA/QC Report

Client:	S.S. Papadopulos	& Associates,	Inc.			Service Request:	K190731	1
Project	Isotope Sampling	5				Date Collected:	08/08/19	
Sample Matrix:	Water					Date Received:	08/09/19	
						Date Analyzed:	08/28/19	
			Replicate S	Sample Summa	ary			
		6	General Che	mistry Paramo	eters			
Sample Name:	02N22W09L03S	5				Units:	mg/L	
Lab Code:	K1907311-003					Basis:	NA	
					Duplicate Sample K1907311-			
Analyte Name		Analysis Method	MRL	Sample Result	003DUP Result	Average	RPD	RPD Limit
Carbon, Dissolved Organ	ic (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.

QA/QC	Report
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Client:	S.S. Papadopulos & Associa	tes, Inc.			Service Reque	est: K1907	311
Project	Isotope Sampling				Date Collect	ed: NA	
Sample Matrix:	Water				Date Receiv	ed: NA	
					Date Analyz	ed: 08/15/	19
		Replic	ate Sample Sun	nmary			
		General	Chemistry Par	ameters			
Sample Name:	Batch QC				Ur	its: mg/L	
Lab Code:	K1907379-001				Ba	sis: NA	
			Sample	Duplicate Sample K1907379- 001DUP1			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	<b>RPD</b> Limit
Alkalinity as CaCO3, Tot	al 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.

Client:	S.S. Papadopulos & Associa	tes, Inc.			Service Requ	est: K1907	311
Project	Isotope Sampling				Date Collect	ed: NA	
Sample Matrix:	Water				Date Receiv	red: NA	
					Date Analyz	<b>ed:</b> 08/16/	19
		Replic	ate Sample Sun	nmary			
		General	Chemistry Par	ameters			
Sample Name:	Batch QC				U	nits: mg/L	
Lab Code:	K1907379-001				Ba	asis: NA	
	Anglusia Mashad		Sample	Duplicate Sample K1907379- 001DUP2	·		
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Tot	al 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.

Client: Project	S.S. Papadopulos & Associa Isotope Sampling	tes, Inc.			Service Requ Date Collect		311
Sample Matrix:	Water				Date Receiv	red: NA	10
		-	ate Sample Sun Chemistry Par	·	Date Analyz	<b>æu:</b> 08/10/1	19
Sample Name: Lab Code:	Batch QC K1907456-002					nits: mg/L asis: NA	
Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1907456- 002DUP Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Tot		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.

Client:	S.S. Papadopulos & Associa	tes, Inc.			Service Requ		311
Project	Isotope Sampling				Date Collect		
Sample Matrix:	Water				Date Receiv		
					Date Analyz	<b>ed:</b> 08/15/	19
		Replic	ate Sample Sun	nmary			
		General	Chemistry Par	ameters			
Sample Name:	Batch QC				U	nits: mg/L	
Lab Code:	K1907462-001				Ba	asis: NA	
	Anglusia Mashad		Sample	Duplicate Sample K1907462- 001DUP	·		
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Tota	al 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.

QA/QC Report

Client:	S.S. Papadopulos & 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 CaCO3, 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

QA/QC Report

Client:	S.S. Papadopulos & 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

Client: Project: Sample Matrix:	S.S. Papadopulos & Associates, Ind Isotope Sampling Water	с.	Service Requ Date Analyz Date Extract	ed: 08/	907311 15/19
		b Control Sample Summary Ikalinity as CaCO3, Total			
Analysis Method:	SM 2320 B		Units:	mg	/L
Prep Method:	None		Basis:	NA	
			Analysis Lot	: 647	503
Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1907311-LCS4	165	163	101	90-110

Client: Project: Sample Matrix:	S.S. Papadopulos & Associates, Ir Isotope Sampling Water	nc.	Service Requ Date Analyze Date Extract	ed: 08/16/19	
		b Control Sample Summary Alkalinity as CaCO3, Total			
Analysis Method: Prep Method:	SM 2320 B None		Units: Basis: Analysis Lat	mg/L NA 647635	
Sample Name	Lab Code	Result	Analysis Lot: Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1907311-LCS5	162	163	99	90-110

Client: Project: Sample Matrix:	S.S. Papadopulos & Associates, Inc Isotope Sampling Water	2.	Service Requ Date Analyz Date Extract	ed:	K190731 08/16/19 NA	1
		Control Sample Summary kalinity as CaCO3, Total				
Analysis Method:	SM 2320 B		Units:		mg/L	
Prep Method:	None		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

QA/QC Report

# Client:S.S. Papadopulos & Associates, Inc.Project:Isotope SamplingSample 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 Lal K19073	Sample			
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

Client: Project: Sample Matrix:	S.S. Papado Isotope San Water	pulos & Associate ppling	es, Inc.			Service R Date Ana Date Extr	lyzed:	K190731 08/12/19 NA	1
		Dup			mple Summary				
			General	Inemistry i	Parameters				
Analysis Method:	300.0					Units:		mg/L	
Prep Method:	None					Basis:		NA	
						Analysis	Lot:	646897	
	La	ub Control Sampl	e	Ι	Duplicate Lab Cor	ntrol Samp	ole		
	]	K1907311-LCS2			K1907311-D	DLCS2			
							% Rec		
Analyte Name	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	Limits	RPD	<b>RPD</b> Limit
Sulfate	4.76	5.00	95	4.82	5.00	96	90-110	1	20

# Appendix C

TestAmerica (Eurofins) Laboratory Analytical Reports

# 🔅 eurofins

# Environment Testing TestAmerica

# **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

Alamah Sa

Authorized for release by: 8/15/2019 4:24:51 PM

Afsaneh Salimpour, Senior Project Manager (925)484-1919 afsaneh.salimpour@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

Glossary

ID: 720-94266-1	2
	3
	4
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	13

¤       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	
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)	

### 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.

# **Detection Summary**

Client: United Water Conservation District Project/Site: Mount Basin- GSA

Client Sample ID: 02N22W09L04S

No Detections.

This Detection Summary does not include radiochemical test results.

# **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						
)ate Collected: 07/29/ )ate Received: 07/30/								Matrix	: wate		
	ons, Ion Chromatogra	• •									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac		
-											
lodide	ND		1.0		mg/L			08/15/19 01:23			
lodide	ND		1.0		mg/L			08/15/19 01:23			
lodide	ND		1.0		mg/L			08/15/19 01:23			
lodide	ND		1.0		mg/L			08/15/19 01:23			

Job ID: 720-94266-1

## Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-43 Matrix: Water	89568/10							C	Clier	nt Sam	ple ID: Metho Prep Type: T		
Analysis Batch: 439568		МВ МВ											
Analyte	Re	sult Qual	ifier	RL	I	MDL Ur	nit	D	Pre	pared	Analyzed	Di	l Fac
Iodide				1.0			g/L				08/14/19 21:54		1
Lab Sample ID: LCS 160-4 Matrix: Water	39568/11						C	lient	Sam	ple ID	: Lab Control : Prep Type: T		
Analysis Batch: 439568													
			Spike			LCS					%Rec.		
Analyte			Added			Qualifie			D	%Rec	Limits		
lodide			4.00		4.07		mg/L			102	90 - 110		
Lab Sample ID: 720-94266	-1 MS							Cli	ient	Samp	le ID: 02N22W	09L	04S
Matrix: Water											Prep Type: T		
Analysis Batch: 439568													
	Sample	Sample	Spike		MS	MS					%Rec.		
Analyte	Result	Qualifier	Added		Result	Qualifie	er Unit		D	%Rec	Limits		
lodide	ND		4.00		4.14		mg/L			103	90 - 110		_
Lab Sample ID: 720-94266 Matrix: Water	-1 DU							Cli	ient	Samp	le ID: 02N22W Prep Type: T		
Analysis Batch: 439568													
-	Sample	Sample			DU	DU							RPD
Analyte	Result	Qualifier			Result	Qualifie	er Unit		D		RP	DI	Limit
lodide	ND				ND		mg/L				N	<u> </u>	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	

5

Matrix: Water

Lab Sample ID: 720-94266-1

#### Client Sample ID: 02N22W09L04S Date Collected: 07/29/19 11:05 Date Received: 07/30/19 09:45

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	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

## **Accreditation/Certification Summary**

Client: United Water Conservation District Project/Site: Mount Basin- GSA

#### Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority California	Program State	EPA Region	Identification Number	Expiration Date		
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
llinois	NELAP	5	200023	11-30-19
llinois	NELAP		004553	11-30-19
lowa	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
_ouisiana (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
Vichigan	State Program	5	9005	06-30-20
Missouri	State		780	06-30-22
Vissouri	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.

Job ID: 720-94266-1

Eurofins TestAmerica, Pleasanton

## **Accreditation/Certification Summary**

Client: United Water Conservation District Project/Site: Mount Basin- GSA Job ID: 720-94266-1

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### 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 Virginia	Program NELAP	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C592	08-30-19
West Virginia DE	State Program	3	381	08-31-19 *

## **Method Summary**

# Client: United Water Conservation District Project/Site: Mount Basin- GSA

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

8/15/2019

## Sample Summary

Client: United Water Conservation District Project/Site: Mount Basin- GSA

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		

8/15/2019

## eurorins 😯

## **Environment Testing** 720-94266

Pleasanton Chain of Custody 1220 Quarry Lane ● Pleasanton CA 94566-4756 Phone: (925) 484-1919 ● Fax: (925) 600-3002

Reference #: _______

Date 7/29/19 Page _____ of _____

Report To						-			An	alysis F	eques	st							· · · · · ·	
Attn: Brad Bessinger				75	<b>.</b>		E	·					,	[						
Company: SS Papadopulas &	ASS. INC	So So	□ EPA 8260B HVOCs by □ EPA 8260B	EPA 82608: [] Gas [] BTEX [] 5 Oxygenates [] DCA, EDB[] Ethanol	e el	ş	3270C SIM						66		6			COD □ EPA 410.4 □ SM5220D □ Turbidity		
Address: 416 NE Dallas St. Email: bbescinger Cospa.com	svite 201 (	amas 8	260B		Sica	S S	S S S S S S S S S S S S S S S S S S S			0.7 RA	<b>x</b>	TCLP	EPA 7196 or EPA 7199	ŀ	<u></u>		314.0	SM5		
Email: bbescinger Cospa	A98607	String H	A 8,		П	nics	8270C	3   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	471)		500	H G	or EFA	8	P ¶ R P P	000	PA	4	300	
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			by	08 Jenate	A A A	atile 8270	Great	5.   ⊔∟ 7.   ⊔∟	Metal 1072	83		W.E.T (STLC) W.E.T (DI)			10	<u>ចត</u>	orate	ÊV Î	se	
Attn: Kathleen Knepper Phone:		- 6793	☐ EPA 8260B HVOCs by □ EPA 8260B	A 826 5 Oxyr	TEPH EPA 8015B 🔲 Silica Gel Diesel 🗆 Motor Oil 🗇 Other	Common Commence CC/MS	Oil and Grease	PCRe	CAM17 Metals (EPA 6010/7470/7471)	Metals: 0 6010B 0200.7 0 Lead 0 LUFT 0RCRA [ Other:010	Metals:	× ×	Ċ.		D Spec.	Anions :	Derchlorate by EPA 314.0	D piq U	rodide,	
Sample (D) Date		Intencity >		<u><u><u></u></u></u>	۳a	å 🗆	ā		2 S 🖱	₹ <u></u> _§	<u>G</u>		Hex.	E		Anic		85	н	-
02N22W09L0457/29/9												Ì							1	
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#### Eurofins TestAmerica, Pleasanton 1220 Quarry Lane

## Chain of Custody Record



eurofins

Environment Testing TestAmerica

Pleasanton, CA 94566 Phone: 925-484-1919 Fax: 925-600-3002

Client Information (Sub Contract Lab)	Sampler:								PM: Carrier T mpour, Afsaneh F								COC No: 720-42958.1			
Client Contact: Shipping/Receiving	Phone:			E-M	Mail:								te of Orig	in:		-	Page:			
Company:				an				ur@tes Required			.com	Ca	lifornia				Page 1 of 1 Job #;			
TestAmerica Laboratories, Inc. Address:	Dure Data Damina									and to							720-94266-1	_		
13715 Rider Trail North, ,	Due Date Request 8/7/2019	.ed:							A	nalvs	sis Re	aue	sted	1			Preservation Codes:			
City: Earth City	TAT Requested (d	lays):						T	T			1	TT				A - HCL B - NaOH	M - Hexane N - None		
State, Zip:						12											C - Zn Acetate D - Nitric Acid	O - AsNaO2 P - Na2O4S		
MO, 63045 Phone:																	E - NaHSO4 F - MeOH	Q - Na2SO3 R - Na2S2O3	8	
314-298-8566(Tel) 314-298-8757(Fax)	PO #:				0												G - Amchlor	S - H2SO4		
Email:	WO #:				or No	No)											H - Ascorbic Acid I - Ice	U - Acetone	cahydrate	
Project Name: Mount Basin- GSA	Project #:				Les	or N									containers	iners	K - EDTA	V - MCAA W - pH 4-5 Z - other (spe		
Site:	72014607 SSOW#:				ple	ISD (Yes	odide									onta	Other:	Z - Office (She	chy)	
								USN 1/088							of	of	-			
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=so O=waste/oil, BT=Tissue, A=A	ield Filtered	erform MS/M	300_ORGFM_28D/ lodide									Total Number				
			Preserv	ation Code:	"X	X	ē							-		F	Special I	nstructions/N	lote:	
02N22W09L045 (720-94266-1)	7/29/19	11:05		Water	H	4	x				-	-				0				
02N22W09L035 (720-94266-2)	7/29/19	Pacific 11:42		Water	+	H	×	-			-	-	+		-	1				
		Pacific	-	1 thene	+	$\vdash$					-	-	+++			-			-	
					+	$\vdash$	-	-		-	-	-								
					+	$\vdash$		-				-								
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			-		+	$\vdash$			-			-	++							
								1.12												
Note: Since laboratory accreditations are subject to change. TestAmeric: currently maintain accreditation in the State of Origin listed above for ane Laboratories, Inc. attention immediately. If all requested accreditations a	a Laboratories, Inc. places th alysis/tests/matrix being anal- are current to date, return the	e ownership c yzed, the sam signed Chair	of method, ana ples must be s n of Custody at	ilyte & accredi shipped back Itesting to said	itation of to the T d compl	compl TestA licanc	iliance merica ce to Tr	upon ou a laborate estAmeri	it subco ory or of ica Labo	ntract la ther ins oratorie	aborato struction es. Inc.	ries. Th s will be	iis sampl a provide	e shipmer d. Any ch	nt is forwa	arded u accred	under chain-of-custo ditation status shoul	dy. If the laborat	tory does not lestAmerica	
Possible Hazard Identification						San	nple l	Dispos	sal ( A	fee m	nay be	asse	ssed if	sample	es are r	retain	ned longer than	1 month)		
Unconfirmed	<b>D</b> ( )   <b>D</b>				-	-	Re	eturn To	Clien	t		Dispo	osal By				ive For	Months		
Deliverable Requested: I, II, III, IV, Other (specify)	Primary Delivera	able Rank:	2			Spe	cial Ir	nstructi	ions/Q	C Red	quirem	ents:								
Empty Kit Reinquished by:		Date:			Tin	me:							Method	d of Shipm	ent:	_				
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Δ Yes Δ No							000101	remper	atoreta	, c an	u ourer	Nemai	NO.							

8/15/2019

## Login Sample Receipt Checklist

Client: United Water Conservation District

#### Login Number: 94266 List Number: 1 Creator: Bullock, Tracy

	_	-
	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	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 <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Job Number: 720-94266-1

List Source: Eurofins TestAmerica, Pleasanton

## Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94266-1

# Login Number: 94266List Source: Eurofins TestAmerica, St. LouisList Number: 2List Creation: 08/01/19 04:08 PMCreator: Hellm, MichaelCreation: 08/01/19 04:08 PM

Question	Answer	Comment	
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td> <td></td>	True		
The cooler's custody seal, if present, is intact.	True		
Sample custody seals, if present, are intact.	N/A		8
The cooler or samples do not appear to have been compromised or tampered with.	True		ç
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		1
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		

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# Environment Testing TestAmerica

# **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

Alamah Sa

Authorized for release by: 8/15/2019 4:28:45 PM

Afsaneh Salimpour, Senior Project Manager (925)484-1919 afsaneh.salimpour@testamericainc.com

Have a Question?

Expert

Visit us at: www.testamericainc.com

LINKS

Review your project results through

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

Percent Recovery

**Dilution Factor** 

**Contains Free Liquid** 

Contains No Free Liquid

Detection Limit (DoD/DOE)

Estimated Detection Limit (Dioxin)

Limit of Detection (DoD/DOE)

Method Detection Limit

Minimum Level (Dioxin)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Not Calculated

**Quality Control** 

Limit of Quantitation (DoD/DOE)

Duplicate Error Ratio (normalized absolute difference)

Decision Level Concentration (Radiochemistry)

Minimum Detectable Activity (Radiochemistry)

Minimum Detectable Concentration (Radiochemistry)

Not Detected at the reporting limit (or MDL or EDL if shown)

Glossary Abbreviation

¤

%R

CFL

CNF

DER

DL

DLC

EDL

LOD

LOQ

MDA MDC

MDL

ML NC

ND

PQL

QC

RER

Dil Fac

DL, RA, RE, IN

Job ID: 720-94276-1	2
	3
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	4.4

 RL
 Reporting Limit or Requested Limit (Radiochemistry)

 RPD
 Relative Percent Difference, a measure of the relative difference between two points

These commonly used abbreviations may or may not be present in this report.

Listed under the "D" column to designate that the result is reported on a dry weight basis

Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample

- TEF Toxicity Equivalent Factor (Dioxin)
- TEQ Toxicity Equivalent Quotient (Dioxin)

#### 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.

Client: United Water Conservation District
Project/Site: Mount Basin- GSA

Job ID: 720-94276-1

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Lab Sample ID: 720-94276-1

Lab Sample ID: 720-94276-2

Client Sample ID: 02N23W15J01S

No Detections.

## Client Sample ID: 02N23W15J02S

No Detections.

This Detection Summary does not include radiochemical test results.

## **Client Sample Results**

Job ID: 720-94276-1

Client: United Water Conser Project/Site: Mount Basin- G							Job ID: 720-9	94276-1	2
Client Sample ID: 02N Date Collected: 07/30/19 10 Date Received: 07/31/19 09	0:22				L	ab Sampl	le ID: 720-94 Matrix	4276-1 « Water	
Method: 300.0 - Anions, I Analyte	on Chromatography Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	5
lodide	ND	1.0		mg/L		<u> </u>	08/15/19 03:07	1	6
									7
									8
									9
									12
									13

Eurofins TestAmerica, Pleasanton

## **Client Sample Results**

Client: United Water Conse Project/Site: Mount Basin-							Job ID: 720-9	94276-1	2
Client Sample ID: 02 Date Collected: 07/30/19 Date Received: 07/31/19	10:55				La	ab Sampl	le ID: 720-94 Matrix	4276-2 k: Water	
Method: 300.0 - Anions Analyte	, Ion Chromatography Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	5
Iodide	ND	1.0		mg/L		<u> </u>	- 08/15/19 04:17		6
									7
									8
									9
									12
									13

Job ID: 720-94276-1

## Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10 Matrix: Water Analysis Batch: 439568	)								Clie	ent Sam	ple ID: Method Prep Type: T	
	МВ	MB										
Analyte	Result	Qualifier		RL	ľ	MDL	Unit		D P	repared	Analyzed	Dil Fac
lodide	ND			1.0			mg/L				08/14/19 21:54	1
Lab Sample ID: LCS 160-439568/1 Matrix: Water Analysis Batch: 439568	1							Clie	ent Sai	mple ID	: Lab Control S Prep Type: T	
Analysis Baten: 400000			Spike		LCS	LCS					%Rec.	
Analyte			Added	I	Result	Qua	lifier	Unit	D	%Rec	Limits	
lodide			4.00		4.07			mg/L		102	90 - 110	

## **QC** Association Summary

Client: United Water Conservation District Project/Site: Mount Basin- GSA Job ID: 720-94276-1

## 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	

#### Client Sample ID: 02N23W15J01S Date Collected: 07/30/19 10:22 Data Pacaivad: 07/31/19 09:30

	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
Total/NA	Analysis	300.0		1	439568	08/15/19 03:07	JCB	TAL SL	
Client Sam	ple ID: 02N	23W15J02S					Lab S	Sample ID:	720-94276
ate Collecte	d: 07/30/19 1	0:55							Matrix: Wat
Date Receive	d: 07/31/19 0	9:30							
-	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab	

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

#### Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority California	Program State	EPA Region	Identification Number	Expiration Date
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
lawaii	State Program	9	NA	06-30-20
llinois	NELAP	5	200023	11-30-19
llinois	NELAP		004553	11-30-19
owa	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
_ouisiana	NELAP	6	04080	06-30-20
₋ouisiana (DW)	NELAP	6	LA011	12-31-19
ouisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
laryland	State Program	3	310	09-30-20
lichigan	State Program	5	9005	06-30-20
lissouri	State		780	06-30-22
lissouri	State Program	7	780	06-30-20
lew Jersey	NELAP	2	MO002	06-30-20
lew Jersey	NELAP		MO002	06-30-20
lew York	NELAP	2	11616	03-31-20
lew York	NELAP		11616	04-01-20
lorth Dakota	State Program	8	R207	06-30-20
IRC	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
JS 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

Job ID: 720-94276-1

## **Accreditation/Certification Summary**

Client: United Water Conservation District Project/Site: Mount Basin- GSA Job ID: 720-94276-1

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### 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 Virginia	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19 *

## **Method Summary**

# Client: United Water Conservation District Project/Site: Mount Basin- GSA

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

8/15/2019

Sample Summary

Client: United Water Conservation District Project/Site: Mount Basin- GSA

ab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
20-94276-1	02N23W15J01S	Water	07/30/19 10:22	07/31/19 09:30	
20-94276-2	02N23W15J02S	Water	07/30/19 10:55	07/31/19 09:30	

🐼 eurofins	1						<b>.</b>		•							Re	ferenc	e #:			915	4D		ي. ت
Report To	3	viron <del>n</del> stAme		Testin	ıg	1	Plea 220 Qu Phone	uarry	Lane	• Ple	easan	ton C	Ă 948	566-4750 00-300 alysis R	76		ate_7/	30/	19	_ Page	ə(_	of	(	
Attn: Brad Bessin Company: SS Papae Address: 416 NE Do Email: bbessinger Bill To: Mound basin 65A Attn: Erin Gorospe Sample 10	dopu 2005 Spart Sampi A Phone:	St a	1776 20 WA -R 525-	~1	Volatile Organics GC/MS (VOCs)	HVOCs by DEPA 8260B	EPA 8260B: II Gas II BTEX II 5 Oxygenates II DCA, EDBII Ethanol	TEPH EPA 80158	SemiVolatile Organics GC/MS	PNA/PAH's by D 8270C	Oil and Grease	Pesticides		0.7 RA 🗆	Metals: 0 6020 0 200.8 (ICP-MS):	U WET (STLC) WET (BI) D TCLP	Hex. Chrom by  C EPA 7196 C or EPA 7199	рН 🗆 9040 П SM4500	□ Spec. Cond. □ Alkalinity □ TSS □ SS □ TDS	Anions :	Perchlorate by EPA 314.0	COD D EPA 410.4 D SM5220D D Turbidity	Fodide, 300	
02N23W15J025	7/30/19	1 11:15																					X > X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X     X    X	
				· · · · · · · · · · · · · · · · · · ·							72	20-942	76 Chai	n of Custor										
Project Info. Project Name/ #:	# o	Imple F f Containe	ers:	t		/ Sign	ature	)m		14	<u>50</u>	2	2) Relir Signatu	nquished t	by:	<u> </u>	ime	-		Relinqui	shed by	/:	T	ime
	Ter	ad Space: np: with paym	5°	nation ASA	ар I	Ur	thlee ed Name i te d pany				7 <u> 30 </u> Date		Printed Compa	Name			Date		-	nted Na mpany	me		1	Date
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#### **Eurofins TestAmerica, Pleasanton** 1220 Quarry Lane

## **Chain of Custody Record**



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Environment Testing TestAmerica

Pleasanton, CA 94566 Phone: 925-484-1919 Fax: 925-600-3002

12-

15

Client Information (Sub Contract Lab)	Sampler			Lab I Sali		Afsaneh F			Carrier	fracking No	o(s):		COC No: 720-42958.1	
Client Contact: Shipping/Receiving	Phone:			E-Ma afsa		limpour@t	testameri	cainc.com	State of Califor				Page: Page 1 of 1	
Company: TestAmerica Laboratories, Inc.					-	itations Requ							Job #: 720-94276-1	
Address: 13715 Rider Trail North,	Due Date Request 8/8/2019	ted:					Ar	alysis R	equeste	d			Preservation Coc	1000
City: Earth City	TAT Requested (d	ays):			T						TT		A - HCL B - NaOH	M - Hexane N - None
State: Zip: MO, 63045	_												C - Zn Acetate D - Nitric Acid E - NaHSO4	O - AsNaO2 P - Na2O4S Q - Na2SO3
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:												F - MeOH G - Amchlor H - Ascorbic Acid	R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate
Email:	WO #:				s or No) No)							5	1-Ice	U - Acetone V - MCAA
Project Name. Mount Basin- GSA	Project #: 72014607				2 2							containers	K - EDTA L - EDA	W - pH 4-5 Z - other (specify)
Site:	SSOW#				Sample (	D/ lod						of con	Other:	
		Sample	Sample Type (C=comp,	Matrix (W=water, S=solid O=waste/oll,	rform MS/M	ORGFM_2						Total Number (		
Sample Identification - Client ID (Lab ID)	Sample Date	Time	G=grab) Preserv	BT=Tissue, A=Air) ation Code:	ц, в	300						X	Special In	structions/Note:
02N23W15J01S (720-94276-1)	7/30/19	10:22 Pacific		Water	m	×						1		
02N23W15J02S (720-94276-2)	7/30/19	10:55 Pacific		Water		x						1		
02N23W15J03S (720-94276-3)	7/30/19	11:15 Pacific		Water		x						1		
					1	-						1		
					++-						++			
			1		11									
Note: Since laboratory accreditations are subject to change. TestAmeric currently maintain accreditation in the State of Origin listed above for an Laboratories, Inc. attention immediately. If all requested accreditations a	alysis/tests/matrix being anal	vzed, the sam	ples must be	shipped back to	the Tes	America labo	oratory or o	ther instruction	ories. This s ns will be pr	ample ship ovided. An	oment is forw by changes to	varded o accre	under chain-of-custor ditation status should	dy. If the laboratory does not be brought to TestAmerica
Possible Hazard Identification									e assess	ed if sam	ples are	retair	ned longer than t	1 month)
Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify)	Primary Deliver	able Dask	2			a second s	To Clien		Disposa	l By Lab	1	Arch	nive For	Months
Empty Kit Relinquished by:	Finaly Deliver		2				uctions/Q	C Requiren	Contract of the second		-			
Belinquished by	Datesting	Date:	110	Company	Time	Received	ov:		M	ethod of St				Company
Relinquished by	Date/Time:	9 1	412	Company EIA-I Company	015	Received to	e ov:				ate/Time: 8-1-19 ate/Time:	7	09:15	Company
					-							_		
Relinquished by:	Date/Time:			Company		Received b	DV:			D	ate/Time:			Company

## Login Sample Receipt Checklist

Client: United Water Conservation District

#### Login Number: 94276 List Number: 1 Creator: Mullen, Joan

Question	A	Commont
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	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	

List Source: Eurofins TestAmerica, Pleasanton

## Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94276-1

#### Login Number: 94276 List Source: Eurofins TestAmerica, St. Louis List Number: 2 List Creation: 08/01/19 04:08 PM Creator: Hellm, Michael

Login Number: 94276 List Number: 2 Creator: Hellm, Michael		List Source: Eurofins TestAmerica, St. Louis List Creation: 08/01/19 04:08 PM	5
Question	Answer	Comment	
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td> <td></td>	True		
The cooler's custody seal, if present, is intact.	True		
Sample custody seals, if present, are intact.	N/A		8
The cooler or samples do not appear to have been compromised or tampered with.	True		9
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		13
There are no discrepancies between the containers received and the COC.	True		
Samples are received within Holding Time (excluding tests with immediate HTs)	True		14
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		

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# Environment Testing TestAmerica

# **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

Alamah Sa

Authorized for release by: 8/15/2019 4:31:39 PM

Afsaneh Salimpour, Senior Project Manager (925)484-1919 afsaneh.salimpour@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

Glossary Abbreviation

¤ %R

CFL

CNF

DER

DL

DLC

EDL

LOD

LOQ

MDA

MDC

MDL

ML NC

ND

PQL

QC

RL

RER

RPD

Dil Fac

DL, RA, RE, IN

Mount Basin- GSA	2
	3
These commonly used abbreviations may or may not be present in this report.	
Listed under the "D" column to designate that the result is reported on a dry weight basis	A
Percent Recovery	
Contains Free Liquid	5
Contains No Free Liquid	
Duplicate Error Ratio (normalized absolute difference)	6
Dilution Factor	0
Detection Limit (DoD/DOE)	7
Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
Decision Level Concentration (Radiochemistry)	
Estimated Detection Limit (Dioxin)	8
Limit of Detection (DoD/DOE)	
Limit of Quantitation (DoD/DOE)	9
Minimum Detectable Activity (Radiochemistry)	
Minimum Detectable Concentration (Radiochemistry)	10
Method Detection Limit	
Minimum Level (Dioxin)	11
Not Calculated	
Not Detected at the reporting limit (or MDL or EDL if shown)	12
Practical Quantitation Limit	
Quality Control	13
Relative Error Ratio (Radiochemistry)	
Reporting Limit or Requested Limit (Radiochemistry)	11
Relative Percent Difference, a measure of the relative difference between two points	

Relative Percent Difference, a measure of the relative difference between two points

- Toxicity Equivalent Factor (Dioxin) TEF
- Toxicity Equivalent Quotient (Dioxin) TEQ

#### 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.

## **Detection Summary**

Client: United Water Conservation District Project/Site: Mount Basin- GSA

Client Sample ID: 02N22W07M02S

No Detections.

This Detection Summary does not include radiochemical test results.

## **Client Sample Results**

Client: United Water Conservation District Project/Site: Mount Basin- GSA Job ID: 720-94293-1

					Matrix	: Wate
nhu						
	MDI	11	<b>_</b>	Dronorod	Analyzad	Dil Fac
·			U	Prepared	·	DIIFac
1.0		mg/L			08/15/19 04:52	1
		5				
	aphy Qualifier RL 1.0	Qualifier RL MDL	Qualifier RL MDL Unit	Qualifier RL MDL Unit D	Qualifier RL MDL Unit D Prepared	Qualifier RL MDL Unit D Prepared Analyzed

Eurofins TestAmerica, Pleasanton

Job ID: 720-94293-1

## Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568 Matrix: Water Analysis Batch: 439568	/10							Clie	ent Sam	ple ID: Method Prep Type: To	
	MB	MB									
Analyte	Result	Qualifier		RL	MDL	Unit	D	Ρ	repared	Analyzed	Dil Fac
lodide	ND			1.0		mg/L				08/14/19 21:54	1
Lab Sample ID: LCS 160-43956 Matrix: Water Analysis Batch: 439568	8/11						Client	Sar	mple ID	: Lab Control S Prep Type: To	
Analysis Batom 400000			Spike	LCS		5				%Rec.	
Analyte			Added	Resul	t Qua	lifier	Unit	D	%Rec	Limits	
lodide			4.00	4.07	,		mg/L	_	102	90 - 110	

## **QC** Association Summary

Client: United Water Conservation District Project/Site: Mount Basin- GSA Job ID: 720-94293-1

## 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	

Eurofins TestAmerica, Pleasanton

Matrix: Water

Lab Sample ID: 720-94293-1

#### Client Sample ID: 02N22W07M02S Date Collected: 07/31/19 14:15 Date Received: 08/01/19 09:45

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	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

# **Accreditation/Certification Summary**

Client: United Water Conservation District Project/Site: Mount Basin- GSA

## Laboratory: Eurofins TestAmerica, Pleasanton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority California	Program State	EPA Region	Identification Number	Expiration Date
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
lowa	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
_ouisiana (DW)	NELAP	6	LA011	12-31-19
_ouisiana (DW)	State		LA011	12-31-19
Maryland	State		310	09-30-20
Maryland	State Program	3	310	09-30-20
Vichigan	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: 720-94293-1

10

## 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 Virginia	Program NELAP	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C592	08-30-19
West Virginia DE	State Program	3	381	08-31-19 *

# **Method Summary**

# Client: United Water Conservation District Project/Site: Mount Basin- GSA

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

Lab Sample ID Client Sample ID Matrix Collected Received Asset ID						
	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	720-94293-1	02N22W07M02S	Water	07/31/19 14:15	08/01/19 09:45	

	🔅 eurofins	Environment Testing		Plea	santo	on Cł	nain	of Cu	isto	dv.			Re	eferenc	e #:			915	5	<u>}</u>	<b>⊳</b> €`
		Environment Testing TestAmerica		1220 Q	Jarry	ane	Ple	easan	ton C	À 94	566-475 <b>879</b>	6	Da	ate <u>7</u> ]:	31 \$	19	_ Page	•	of	1	-
1	Report To									Ana	alysis R	leques	st								
[	Attn: Brad Bessiv	nger		5 S				Ε			••						Π		Q		
	Company: SS Papade	pulos + Ass.		1 Etha	Silica Gel	WS	SIM	troleu						96 7199		DS		4.0	A5220		
	Address: 416 NE Dalla	D St. suite 201, WA, 9860	HVOCS by DEPA 8260B	EPA 82608: 🛛 Gas 🗆 BTEX 🗂 5 Oxygenates 🗆 DCA, EDBC Ethanol	Silic I O	SemiVolatile Organics GC/MS	8270C 8270C	<ul> <li>Petroleum</li> <li>Total</li> </ul>	8081 8082	-F	Metals: 0 6010B 0 200.7 0 Lead 0 LUFT 0 RCRA [ Other	8.00.8	TCLP	Hex. Chrom by  EPA 7196 Or EPA 7199	8	□ Spec. Cond. □ Alkalinity □ TSS □ SS □ TDS	0, 🗆 NO3	Derchlorate by EPA 314.0	COD □ EPA 410.4 □ SM5220D □ Turbidity		
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	Bill To: Manuel basin GSA	AP+TR			TEPH EPA 8015B	tile O	PNA/PAH's by	Oil and Grease (EPA 1664/9071)	Pesticides   EPA 8081  PCBs  CBA  DEPA 8082	CAM17 Metals (EPA 6010/7470/7471)	101 101	Metals:	W.E.T (STLC) W.E.T (DI)	yd mo	6 S 0 0	Cond.	<u>ວັ</u> ຜັ []]]	orate	EPA fy	dide	
	Attn: Erim Govespe	Phone: 205 - 525 - 443		0xyge	H EP	niVola EPA 8	VPAH	and G A 166	ticide: 3s	417 N A 601	ead D	als: [ (SM-	N.N.	. Chr		rss.	Anions :	erchio			
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# 13

#### Eurofins TestAmerica, Pleasanton 1220 Quarry Lane

**Chain of Custody Record** 



🔅 eurofins

Environment Testing TestAmerica

Pleasanton, CA 94566 Phone: 925-484-1919 Fax: 925-600-3002

202

Client Information (Sub Contract Lab)	Sampler:			Lab Sali		Afsan	eh F			C	Carrier Tr	racking	No(s):			COC No: 720-42969.1	
Client Contact: Shipping/Receiving	Phone:			E-Ma	ail:				-		State of C					Page:	
Company:				arsa				d (See no	ainc.co	m lo	Califorr	lia	_		_	Page 1 of 1 Job #:	
TestAmerica Laboratories, Inc. Address:	10.000							10000		_		_	_	_		720-94293-1	
13715 Rider Trail North,	Due Date Request 8/9/2019	ed:						An	alysis	Real	iester	4				Preservation Code	s:
City Earth City	TAT Requested (d	ays):			T			TT	alysis	T	lester	TT	-				M - Hexane N - None
State, Zip:	_												111			C - Zn Acetate	O - AsNaO2
MO, 63045																E - NaHSO4	P - Na2O4S Q - Na2SO3
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:																R - Na2S2O3 S - H2SO4
Email:	WO #:				N.												T - TSP Dodecahydrate U - Acetone
Project Name:	Designed #1			_	as or										20	J - DI Water	V - MCAA W - pH 4-5
Mount Basin- GSA	Project #: 72014607				e (Ye	ge									aine		Z - other (specify)
Site:	SSOW#:				Sample (Yes or No) ISD (Yes or No)	D/ lodi									of container	Other:	
Sample Identification - Client ID (Lab ID)	Secola Data	Sample	Sample Type (C=comp,		riorm MS/N	300_ORGFM_28D/ lodide									Total Number o		
Sample deminication - Chent ID (Lab ID)	Sample Date	Time	G=grab)	BT=Tissue, A=Air	E G	n n	-	-	-		-				£	Special Ins	tructions/Note:
02N22W07M02S (720-94293-1)	7/04/40	14:15	1103011	T	m			-							X		
021122110111020 (720 04200 1)	7/31/19	Pacific		Water		×	_		-						1		
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Note: Since laboratory accreditations are subject to change. TestAmerica L currently maintain accreditation in the State of Origin listed above for analyse	aboratories, Inc. places th	e ownership c	of method, and	alyte & accredita	tion com	pliance	upon out	t subcont	ract labo	atories.	This sa	mple shi	ipment is	forward	led un	nder chain-of-custody. itation status should b	If the laboratory does r e brought to TestAmeric
currently maintain accreditation in the State of Origin listed above for analy: Laboratories, Inc. attention immediately. If all requested accreditations are	sis/tests/matrix being anal; current to date, return the	yzed, the sam signed Chain	of Custody at	Itesting to said o	the Test omplicat	America	aborato estAmeri	ca Labor	er instruct atories, Ir	tions wil	I be prov	ided. A	ny chang	es to ac			
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Laboratories, Inc. attention immediately. If all requested accreditations are <b>Possible Hazard Identification</b> Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify)	Primary Delivera	signed Chain	Tor Custody at	tlesting to said o	omplicar Sa	mple L Rei ecial Ir	Dispos turn To	ca Labor al ( A f Client	er instruc atories, Ir ee may	be as	sessec sposal l s:	ided. A <b>d if sar</b> By Lab	mples a	are ret. — _{Ar}			
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8/15/2019

# Login Sample Receipt Checklist

Client: United Water Conservation District

#### Login Number: 94293 List Number: 1 Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	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	

#### Job Number: 720-94293-1

List Source: Eurofins TestAmerica, Pleasanton

# Login Sample Receipt Checklist

Client: United Water Conservation District

Job Number: 720-94293-1

#### Login Number: 94293 List Source: Eurofins TestAmerica, St. Louis List Number: 2 List Creation: 08/02/19 01:27 PM Creator: Hellm, Michael

Login Number: 94293 List Number: 2		List Source: Eurofins TestAmerica, St. Louis List Creation: 08/02/19 01:27 PM	
Creator: Hellm, Michael			5
Question	Answer	Comment	
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td> <td></td>	True		
The cooler's custody seal, if present, is intact.	True		
Sample custody seals, if present, are intact.	N/A		8
The cooler or samples do not appear to have been compromised or tampered with.	True		9
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		13
There are no discrepancies between the containers received and the COC.	True		
Samples are received within Holding Time (excluding tests with immediate HTs)	True		14
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		

# 🛟 eurofins

# Environment Testing TestAmerica

# **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

Alamah Sa

Authorized for release by: 8/15/2019 4:33:48 PM

Afsaneh Salimpour, Senior Project Manager (925)484-1919 afsaneh.salimpour@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

Glossary		3
Abbreviation	These commonly used abbreviations may or may not be present in this report.	
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	4
%R	Percent Recovery	
CFL	Contains Free Liquid	5
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)	3
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	9
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)	1 1
RPD	Relative Percent Difference, a measure of the relative difference between two points	
TEF	Toxicity Equivalent Factor (Dioxin)	
TEQ	Toxicity Equivalent Quotient (Dioxin)	

#### 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.

#### Client Sample ID: 02N22W07M01S

No Detections.

Lab Sample ID: 720-94309-1

This Detection Summary does not include radiochemical test results.

		Client	Sample R	esults	5					
Client: United Water Conservation I Project/Site: Mount Basin- GSA	District							Job ID: 720-	-94309-1	
Client Sample ID: 02N22W07 Date Collected: 08/01/19 09:47	M01S						Lab San	n <mark>ple ID: 720-9</mark> Matri	4309-1 x: Water	
Date Received: 08/02/19 10:00										
Method: 300.0 - Anions, Ion Chro Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	5
lodide	ND		1.0		mg/L		-	08/15/19 05:26	1	6
										7
										8
										9
										13

# Project/Site: Mount Basin- GSA

∟ab Sample ID: MB 160-439568/10 Matrix: Water Analysis Batch: 439568											Client S	ample ID: Me Prep Typ	ethod Blank be: Total/NA
Analyte		MB Qualifier		RL	N	NDL	Unit		D	Pr	epared	Analyzed	Dil Fac
odide	ND			1.0			mg/L				opulou	08/14/19 21:	
.ab Sample ID: LCS 160-439568/11 Matrix: Water Analysis Batch: 439568									CI	ient	Sample	ID: Lab Con Prep Typ	trol Sample be: Total/NA
-			Spike		LCS I							%Rec.	
nalyte			4.00		<b>Result</b> 4.07	Quali		Unit mg/L		D	%Rec 102	Limits 90 - 110	

**QC Sample Results** 

Eurofins TestAmerica, Pleasanton

# **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	

# Client Sample ID: 02N22W07M01SLab Sample ID: 720-94309-1Date Collected: 08/01/19 09:47Matrix: WaterDate Received: 08/02/19 10:00Matrix: Water

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	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

#### 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
Iorida	NELAP	4	E87689	06-30-20
Iorida	NELAP		E87689	06-30-20
ławaii	State Program	9	NA	06-30-20
linois	NELAP	5	200023	11-30-19
linois	NELAP		004553	11-30-19
owa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Centucky (DW)	State		KY90125	12-31-19
(entucky (DW)	State Program	4	KY90125	12-31-19
ouisiana	NELAP	6	04080	06-30-20
ouisiana (DW)	NELAP	6	LA011	12-31-19
ouisiana (DW)	State		LA011	12-31-19
laryland	State		310	09-30-20
laryland	State Program	3	310	09-30-20
lichigan	State Program	5	9005	06-30-20
lissouri	State		780	06-30-22
lissouri	State Program	7	780	06-30-20
lew Jersey	NELAP	2	MO002	06-30-20
lew Jersey	NELAP		MO002	06-30-20
lew York	NELAP	2	11616	03-31-20
lew York	NELAP		11616	04-01-20
lorth Dakota	State Program	8	R207	06-30-20
IRC	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
exas	NELAP	6	T104704193-19-14	07-31-20
exas	NELAP		T104704193-19-13	07-31-20
JS Fish & Wildlife	Federal		058448	07-31-20
JSDA	Federal		P330-17-0028	02-02-20
Jtah	NELAP	8	MO000542019-11	07-31-20
Virginia	NELAP	3	460230	06-14-20

4309-1

# Accreditation/Certification Summary

### 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 *

Job ID: 720-94309-1

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

#### Client: United Water Conservation District Project/Site: Mount Basin- GSA

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

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	

Eurofins TestAmerica, Pleasanton

	Environment Testi TestAmerica	-	1	220 Q	uarrv	Lane	hain • Pla 4-191 <b>2</b>	easar	ton C	CĂ 94	566-475 500-39	6							57L 		
Report To Attn: Brad Bessine Company: SS Papado Address: 416 NE Dallas Email: bbessinger CSS Bill To: MOULA basin S GSIA Attn: EVIN GOVOSPE PH Semple ID D. OZN 22WO7MOLS 8/1 OZN 22WO7MOLS 8/1	ate Fine Mat Preserv 719 9147	1 2 8	HVOCS by D EPA 8260B	EPA 8260B: Cl Gas Cl BTEX Cl 5 Oxygenates Cl DCA, EDBC Ethanol	TEPH EPA 8015B	SemiVolatile Organics GC/MS	PNA/PAH's by D 8270C	Oil and Grease D Petroleum (EPA 1664/9071) D Total	Pesticides  EPA 8081 PCBs EPA 8082		Metals: D 6010B D200.7 D Lead D LUFT DRCRA D Other.			Hex. Chrom by D EPA 7196	pH = 9040	Spec. Cond.      Alkalinity     TSS     SS     TDS	Anions :	Perchlorate by EPA 314.0	COD □ EPA 410.4 □ SM5220D	N N I odide, 3ce	
14 OF 1		ustody			·																
Project Info. Project Name/ #: PO#:	Sample Receipt # of Containers: Head Space: Temp: 3.12			Inquishe /// ture M.++ od Name N.+- Dany		epper Nat	14 Tir -8/1 B	100 ne /19 vate		1 2) Relin Signatu Printed		<u> </u> y:		ime Date		Sig	Relinqui nature nted Nar				ime Date
T 10 5 4 3 T Day Day Day Day Report: □ Routine □ Level 3		AP	1) Re Signa	ceived b	oy:		14.	<u>m</u> e		Compai 2) Rece Signatu	ived by:	ull	<u>luf</u> Ci	U, ime' 8-7	]04 -19	3) F	mpany Receive nature	d by:		Ti	ime
Special Instructions / Comments: 5 5 5 5 5 5 5 5 5 5 5 5 5	Global ID			ed Name			D	ate	_	Printed Compa	E	TA	- P		- 1		nted Nar	me		, ,	Date

Ω
N
2
6

14 12 11 10 9 8 7 6 5 4 3 2 1

#### **Eurofins TestAmerica, Pleasanton**

1220 Quarry Lane

Pleasanton, CA 94566

Phone: 925-484-1919 Fax: 925-600-3002

# **Chain of Custody Record**



eurofins Environment Testing

Client Information (Sub Contract Lab)	Sampler:			Lab Pl Salim		Afsan	eh F			Carrier Tr	racking M	4o(s):		COC No: 720-42975.1		
Client Contact: Shipping/Receiving	Phone:			E-Mail: afsan		limpou	r@test	america	inc.com	State of C Californ				Page: Page 1 of 1		
ompany: estAmerica Laboratories, Inc.	1000							(See not	C. O. C. M. A.					Job #:		
Address: 13715 Rider Trail North,	Due Date Request 8/12/2019	ed:			-									720-94309-1 Preservation Cor	les:	
Sity;	TAT Requested (d	ays):					1	Ana		equeste		-		A - HCL B - NaOH	M - Hexane N - None	
arth City tate, Zip:														C - Zn Acetate D - Nitric Acid	O - AsNaO2 P - Na2O4S	
MO, 63045	20.4													E - NaHSO4 F - MeOH	Q - Na2SO3 R - Na2S2O3	
14-298-8566(Tel) 314-298-8757(Fax)	PO #:	_			0									G - Amchlor H - Ascorbic Acid	S - H2SO4 T - TSP Dodecahydr	
mail:	WO #:				Vo)									I - Ice J - DI Water	U - Acetone V - MCAA	
roject Name: fount Basin- GSA	Project #: 72014607				s or h	e							ainer	K - EDTA L - EDA	W - pH 4-5 Z - other (specify)	
te:	SSOW#:				Field Filtered Sample (Yes or Perform MS/MSD (Yes or No)	ORGFM_28D/ lodide							f containe			
			Sample	Matrix	ms/ms	FM_28							uber of			
		Sample	Type (C=comp,	W=water, S=solid,	d File	ORGI			1.1				Total Number			
Sample Identification - Client ID (Lab ID)	Sample Date	Time	G=grab)		Fiel	300							Tota	Special In	structions/Note:	
	$\rightarrow$	09:47	Preservat	ion Code:	XX	11	- 11-									
2N22W07M01S (720-94309-1)	8/1/19	Pacific		Water		X							1			
							11									
								1.00								
					-		-					-				
							-					-				
lote: Since laboratory accreditations are subject to change. TestAmeric	a Laboratories, Inc. places th	e ownership c	f method analy	de & accreditati	ion com			Subcontr	act laborat							
urrently maintain accreditation in the State of Origin listed above for an aboratories, Inc. attention immediately. If all requested accreditations a	alvsis/lesis/matrix being anal	vzeg, ine sam	pies musi pe sn	inded back to t	ne lest	America	laborato	inv or othe	ar instructio	ns will be prov	vided. A	ny change	es to accr	editation status should	be brought to TestAm	
Possible Hazard Identification		( ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (						10. YANA		e assesse	d if sai	noles a	re retai	ned longer than	(month)	
Inconfirmed					1		turn To			Disposal				hive For	Months	
Deliverable Requested: I, II, III, IV, Other (specify)	Primary Deliver	able Rank:	2		Sp	ecial Ir	nstructio	ons/QC	Requirer	nents:						
mpty Kit Relinquished by:		Date:			Time:			-		Me		shipment:				
geinquished by:	X Date-Tyme/2/	19	1322	ETA-1	ZJ	Receiv	ed by	1	/			Date/Time	119	08:30	TASTL	
telinquished by.	Date/Tiple:		(	Company		Receiv	ed by:					Date/Time			Company	
elinquished by:	Date/Time:			Company		Receiv	red by:		-			Date/Time	4		Company	
Custody Seals Intact: Custody Seal No.:						Cooler	Temper	ature(s) °	C and Othe	r Remarks:	-	-				
Δ Yes Δ No						1										

8/15/2019

100

1.42

100

### Login Sample Receipt Checklist

Client: United Water Conservation District

# Login Number: 94309

List Number: 1 Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	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	

Job Number: 720-94309-1

List Source: Eurofins TestAmerica, Pleasanton

#### Client: United Water Conservation District

#### 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.</td <td>True</td> <td></td>	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	

14

Job Number: 720-94309-1

# 🛟 eurofins

# Environment Testing TestAmerica

# **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

Alamah Sa

Authorized for release by: 8/15/2019 4:36:54 PM

Afsaneh Salimpour, Senior Project Manager (925)484-1919 afsaneh.salimpour@testamericainc.com

Authori 8/15/20

Review your project results through TOTOLACCESS

LINKS



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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Method Summary	14
Sample Summary	15
Chain of Custody	16
Receipt Checklists	18

# **Definitions/Glossary**

#### Client: United Water Conservation District Project/Site: Mount Basin- Ventura GW

Glossary		2
Abbreviation	These commonly used abbreviations may or may not be present in this report.	3
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	
%R	Percent Recovery	
CFL	Contains Free Liquid	5
CNF	Contains No Free Liquid	3
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)	8
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	9
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	13
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)	

## 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.

Detection Summary		
Client: United Water Conservation District Project/Site: Mount Basin- Ventura GW	Job ID: 720-94454-1	2
Client Sample ID: 02N23W15J03S	Lab Sample ID: 720-94454-1	
No Detections.		
Client Sample ID: 02N22W07M03S	Lab Sample ID: 720-94454-2	2
No Detections.		ł
Client Sample ID: 02N22W09L03S	Lab Sample ID: 720-94454-3	
No Detections.		

Client: United Water Conservation District Project/Site: Mount Basin- Ventura GW

6

#### 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 RL Dil Fac Analyte Result Qualifier MDL Unit D Prepared Analyzed lodide ND 1.0 08/15/19 06:01 mg/L 1

Eurofins TestAmerica, Pleasanton

		Client	Sample R	esults	;									
Client: United Water Conservation D Project/Site: Mount Basin- Ventura								Job ID: 720-	94454-1					
Client Sample ID: 02N22W07M03S Date Collected: 08/08/19 11:13								Lab Sample ID: 720-9445 Matrix: W						
Date Received: 08/09/19 09:45														
Method: 300.0 - Anions, Ion Chro Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	5				
lodide	ND		1.0		mg/L		-	08/15/19 06:36	1	6				
									- 1	7				
										8				
										9				

		Client	Sample R	esults	;					
Client: United Water Conservation Dist Project/Site: Mount Basin- Ventura GV								Job ID: 720-	94454-1	
Client Sample ID: 02N22W09L0 Date Collected: 08/08/19 15:05						Lab San	nple ID: 720-9 Matri	4454-3 x: Water		
Date Received: 08/09/19 09:45           Method: 300.0 - Anions, Ion Chromatography										
Analyte	Result	Qualifier	RL	MDL		D	Prepared	Analyzed	Dil Fac	5
lodide	ND		1.0		mg/L			08/15/19 07:46	1	6
										7
										8
										9

### Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-439568/10 Matrix: Water Analysis Batch: 439568											Client S	ample ID: Metho Prep Type: ⁻	
· ····· <b>,···</b>	МВ	МВ											
Analyte	Result	Qualifier		RL		MDL	Unit		D	Pr	epared	Analyzed	Dil Fac
lodide	ND			1.0			mg/L					08/14/19 21:54	1
Lab Sample ID: LCS 160-439568/11 Matrix: Water									Cli	ent	Sample	D: Lab Control Prep Type:	
Analysis Batch: 439568			Spike		LCS	LCS						%Rec.	
Analyte			Added		Result	Qual	ifier	Unit		D	%Rec	Limits	
lodide			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

#### 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	

Matrix: Water

Lab Sample ID: 720-94454-1

# Client Sample ID: 02N23W15J03S Date Collected: 08/08/19 10:18

	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
Total/NA	Analysis	300.0		1	439568	08/15/19 06:01	JCB	TAL SL	
Client Samp	le ID: 02N22	W07M03S					La	ab Sample I	D: 720-94454-
ate Collected	: 08/08/19 11:1	3							Matrix: Wate
Date Received	08/09/19 09:4	5							
_	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
Total/NA	Analysis	300.0		1	439568	08/15/19 06:36	JCB	TAL SL	
Client Samp	le ID: 02N22	W09L03S					La	ab Sample I	D: 720-94454-
Date Collected	: 08/08/19 15:0	5							Matrix: Wate
Date Received	08/09/19 09:4	5							
_	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
					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

## 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
Iorida	NELAP	4	E87689	06-30-20
Iorida	NELAP		E87689	06-30-20
ławaii	State Program	9	NA	06-30-20
linois	NELAP	5	200023	11-30-19
linois	NELAP		004553	11-30-19
owa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Centucky (DW)	State		KY90125	12-31-19
(entucky (DW)	State Program	4	KY90125	12-31-19
ouisiana	NELAP	6	04080	06-30-20
ouisiana (DW)	NELAP	6	LA011	12-31-19
ouisiana (DW)	State		LA011	12-31-19
laryland	State		310	09-30-20
laryland	State Program	3	310	09-30-20
lichigan	State Program	5	9005	06-30-20
lissouri	State		780	06-30-22
lissouri	State Program	7	780	06-30-20
lew Jersey	NELAP	2	MO002	06-30-20
lew Jersey	NELAP		MO002	06-30-20
lew York	NELAP	2	11616	03-31-20
lew York	NELAP		11616	04-01-20
lorth Dakota	State Program	8	R207	06-30-20
IRC	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
exas	NELAP	6	T104704193-19-14	07-31-20
exas	NELAP		T104704193-19-13	07-31-20
JS Fish & Wildlife	Federal		058448	07-31-20
JSDA	Federal		P330-17-0028	02-02-20
Jtah	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

# 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 *

Job ID: 720-94454-1

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

## Client: United Water Conservation District Project/Site: Mount Basin- Ventura GW

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

ab Sample ID	Client Sample ID	Matrix	Collected	Received	A
20-94454-1	02N23W15J03S	Water	08/08/19 10:18	08/09/19 09:45	
20-94454-2	02N22W07M03S	Water	08/08/19 11:13	08/09/19 09:45	
20-94454-3	02N22W09L03S	Water	08/08/19 15:05	08/09/19 09:45	

Eurofins TestAmerica, Pleasanton

eurofins		Laboratory Ch	ain of Cus	tody Form	191717
Pleas anton CA Eurofins TestAmerica Phoenix, AZ 4685 East Cotton Center Boulevard Suite 189 Phoenix, AZ 55040-4807 Ph: (602) 437-3340 www.testamericainc.com Page: of Sampler: Project Na	Send Report To: <u>Bvac</u> Send Invoice To: <u>MA</u> Company: <u>M</u> Address: <u>PC</u> MCUMA BC	Bessinger, 35 A Bryan Bandy ound Basin GS > Box 3544, Uer Din GSA implin_ Project No.:	770 A utva C	- 944 +	SY
Lab Sample Date Number Identification Sample (Internal use Only)	Media Type	Analysis Method(s)/Analytes(s)	Sampling Time (Minutes)	Air Volume (Liters)	Pump ID
8/8/19 02N23W15J035	Fi Hered	lodide	10:18		
3/8/19 02N22W07M035	Filternel	iodide	11:13		
3/8/19 0212220091035	Filtereet	lodide	15:05		
		Chain of Custody			
Sample Receipt	Reporting/I		Turn Around Ti		
emperature°C mple Seals: YesNo	Fax Results: Yes		<u> </u>	Hours Hours	
mple Seals Intact: YesNo	EDD: YesNo Data Package: Standard Level III:	I Level II: RUSH Charge	ard 7 Business Days s AuthorizedYes eduling and availability		ylgge)
structions / Special Requirements:	• • • • • • • • • • • • • • • • • • •		· · · · · · · · · · · · · · · · · · ·		2%
Date: Time: 12/19 19/1 16:00		bles Relinquished By: Kuepper	- 6	Received By:	2_C_/C

All services are performed subject to the Terms & Conditions

8/15/2019

# Eurofins TestAmerica, Pleasanton

# Chain of Custody Record



5 Environment Testing TestAmerica

1220 Quarry Lane Pleasanton, CA 94566 Phone: 925-484-1919 Fax: 925-600-300.

hone: 925-484-1919 Fax: 925-600-3002	Sampler:	Salimp E-Mail:				Afsaneh F			Ca	Carrier Tracking No(s):				COC No: 720-43046.1		
ient Information (Sub Contract Lab)	Phone:									State of Origin: California				Page: Page 1 of 1		
ipping/Receiving						tions Required (See note):			-	Job #:						
estAmerica Laboratories, Inc.							-		_						720-94454-1 Preservation Codes	:
Idress:	Due Date Requested 8/19/2019	Due Date Requested: 8/19/2019						Ana	lysis	Requ	ested				A-HCL N	1 - Hexane
3715 Rider Trail North, .		TAT Requested (days):														I - None ) - AsNaO2
arth City															D - Nitric Acid P	- Na2O4S 2 - Na2SO3
ate, Zip: O. 63045															F - MeOH F	R - Na2S2O3
ione:	PO #			-	6										H - Ascorbic Acid T	5 - H2SO4 F - TSP Dodecahyd
14-298-8566(Tel) 314-298-8757(Fax) mail:	WO #:			-	o v									on.	J - DI Water	J - Acetone / - MCAA
	Project #:				Tytes or No)									ainer		W - pH 4-5 Z - other (specify)
oject Name: Iount Basin- Ventura GW	72014607				Yes	dide								containe		
te:	SSOW#:			-	Sample (Yes or No ISD (Yes or No)	ORGFM_28D/ lodide			1					5	Other:	
			Sample		AS/M	M_28			1					Number		
			Type	ater, S=solid,	Tite	RGF								I Nu		
	in the second second	Sample		waste/oll,	Field Filt Perform	300_0								Total	Special Inst	tructions/Note:
Sample Identification - Client ID (Lab ID)	Sample Date	Time	Preservation			m								X		<
	8/8/19	10:18		Nater	Ť	x	1							1		
)2N23W15J03S (720-94454-1)		Pacific 11:13			-	x	+	++	-	11				1	1	
02N22W07M03S (720-94454-2)	8/8/19	Pacific		Water	-		-			+			++	1		
02N22W09L03S (720-94454-3)	8/8/19	15:05 Pacific		Water		X	-		-		-	-		1		
						100						- 1				
		-														
					+	++	-		-	+		7				
		-	-		++		-	++		-	-		1		-	
				_	11				-	+	-		++-	-	-	
			12								1					
Note: Since laboratory accreditations are subject to change, TestAmer currently maintain accreditation in the State of Origin listed above for a Laboratories, Inc. attention immediately. If all requested accreditations	ica Laboratories, Inc. places t nalysis/tests/matrix being ana s are current to date, return th	he ownership lyzed, the sar e signed Cha	of method, analyte nples must be ship n of Custody attest	& accredita bed back to ng to said c	omplica	nce to Te	stAmeri	ica Labo	ratories.	. Inc.						
Possible Hazard Identification					S	ample D	Dispos	sal (A	fee ma	ay be a			ples are		ined longer than 1	
Unconfirmed				_	-	Ret pecial In				_	isposal l	By Lab		Arc	hive For	Months
Deliverable Requested: I, II, III, IV, Other (specify)	Primary Delive	rable Rank	: 2	_	5	pecial in	SHUCL	ions/u	Onequ	anomen						
Empty Kit Relinquished by:		Date:			Time	a de la companya de la compa					Met	hod of Sh				Company
Relinquished by:	Date/Time:	19	1500	DAK		Receiv	ed by:	0				D	S/10/1	9	68:50	TA STC
Joen Mult	Date/Time:		12001	ompany		Receiv	red by:	C					ate/Time:	-		Company
Relinquished by:				moanu		Recon	ed by:						Date/Time:	-		Company
Relinquished by:	Date/Time:		C	ompany		-			_				- Jana and and			
Custody Seals Intact: Custody Seal No.:						Coole	Tempe	erature(s	s) °C and	d Other R	emarks:					
Δ Yes Δ No						-								-		Ver: 01/16/20

ω

# Login Sample Receipt Checklist

## Client: United Water Conservation District

# Login Number: 94454

List Number: 1 Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	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	

Job Number: 720-94454-1

List Source: Eurofins TestAmerica, Pleasanton

## Client: United Water Conservation District

## Login Number: 94454 List Number: 2 Creator: Harris, Lorin C

<6mm (1/4").

Multiphasic samples are not present.

Residual Chlorine Checked.

Samples do not require splitting or compositing.

#### Question Answer Comment Radioactivity wasn't checked or is </= background as measured by a survey True meter. 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 True tampered with. True Samples were received on ice. 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 True HTs) 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 True MS/MSDs Containers requiring zero headspace have no headspace or bubble is N/A

Job Number: 720-94454-1

List Creation: 08/10/19 12:09 PM

List Source: Eurofins TestAmerica, St. Louis

N/A

True

N/A

Appendix D

Isotech Laboratory Analytical Reports



Lab #: Sample Name:	728319 02N22W09L0	Job #: 4S	42338	IS-104602	Co. Job#: Co. Lab#:	
Company: API/Well:			water Sustainab	bility	00. 200	
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Plastic Bottle Isotope Samp Ventura, CA	bling - M	ound Base GSA	A		
Date Sampled:	7/29/2019 1	1:05	Date Received:	7/30/2019	Date Reported:	9/23/2019
$\delta D$ of water		3	39.8 ‰ relative t	o VSMOW		
$\delta^{18}O$ of water		6	6.05 ‰ relative to	o VSMOW		
Tritium content of	water	na	a			
$\delta^{13}C$ of DIC		1	4.2 ‰ relative to	o VPDB		
¹⁴ C content of DIC	;	4	4.1 ± 0.2 percen	it modern carb	oon	
$\delta^{15}N$ of nitrate		na	a			
$\delta^{18}O$ of nitrate		na	a			
$\delta^{34}S$ of sulfate		1	1.1 ‰ relative to	o VCDT		
$\delta^{18}O$ of sulfate		0	.3 ‰ relative to V	VSMOW		
Vacuum Distilled?	*	N	o			
Remarks:						

Remarks:



Lab #: Sample Name:	728601 02N23W15J	Job #: 01S	42364	IS-104602	Co. Job#: Co. Lab#:					
Company: API/Well:	Mound Basir	ound Basin Groundwater Sustainability								
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Plastic Bottle Isotope Sam Ventura, CA	pling - N	lound Basin GS	A						
Date Sampled:	7/30/2019	10:22	Date Received:	7/31/2019	Date Reported:	9/23/2019				
$\delta D$ of water		4	43.6 ‰ relative t	o VSMOW						
$\delta^{18}O$ of water		6	6.70 ‰ relative t	o VSMOW						
Tritium content of	water	n	a							
$\delta^{13}C$ of DIC			12.3 ‰ relative t	o VPDB						
¹⁴ C content of DIC	;	4	1.6 ± 0.2 percer	nt modern cark	pon					
$\delta^{15}N$ of nitrate		n	а							
$\delta^{18}O$ of nitrate		n	а							
$\delta^{34}S$ of sulfate		7	7.1 ‰ relative to	VCDT						
$\delta^{\rm 18}O$ of sulfate		7	.7 ‰ relative to	VSMOW						
Vacuum Distilled?	*	N	lo							
Remarks:										



Lab #:		ob #: 42364	IS-104602	Co. Job#:	
Sample Name: Company:	02N23W15J02 Mound Basin G	S roundwater Sustai	nability	Co. Lab#:	
API/Well:					
Container:	Plastic Bottle				
Field/Site Name: Location:	Ventura, CA	ng - Mound Basin (	JSA		
Formation/Depth:	Ventura, err				
Sampling Point:					
Date Sampled:	7/30/2019 10	55 Date Receive	ed: 7/31/2019	Date Reported:	9/23/2019
$\delta D$ of water		48.8 ‰ relativ	ve to VSMOW		
$\delta^{18}O$ of water		7.29 ‰ relativ	e to VSMOW		
Tritium content of	water	- na			
$\delta^{13}C$ of DIC		13.0 ‰ relativ	e to VPDB		
¹⁴ C content of DIC	;	- 39.5 ± 0.1 per	cent modern carb	on	
$\delta^{15}N$ of nitrate		- na			
$\delta^{\mbox{\tiny 18}}O$ 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:					

Remarks:



Lab #: Sample Name:	728741 02N22W07M		42371 l	S-104602	Co. Job#: Co. Lab#:	
Company: API/Well:	Mound Basin	Groundw	vater Sustainab	ility		
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Plastic Bottle Isotope Samp Ventura, CA	ling - Mo	ound Basin GSA	A		
Date Sampled:	7/31/2019 1	4:15 D	ate Received:	8/01/2019	Date Reported:	9/23/2019
$\delta D$ of water		45	5.4 ‰ relative to	o VSMOW		
$\delta^{18}O$ of water		7.	02 ‰ relative to	o VSMOW		
Tritium content of	water	na				
$\delta^{13}C$ of DIC		14	4.0 ‰ relative to	o VPDB		
¹⁴ C content of DIC	;	35	.5 ± 0.1 percent	t modern carb	oon	
$\delta^{15}N$ of nitrate		na				
$\delta^{18}O$ of nitrate		na				
$\delta^{34}S$ of sulfate		4.	9 ‰ relative to	VCDT		
$\delta^{18}O$ of sulfate		9.1	1 % relative to	/SMOW		
Vacuum Distilled? Remarks:		No	)			

Remarks:



Lab #: Sample Name:	728917 02N22W07M	Job #: 101S	42388	IS-104602	Co. Job#: Co. Lab#:				
Company: API/Well:	Mound Basir	Mound Basin Groundwater Sustainability							
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Plastic Bottle Isotope Sam Ventura, CA	Isotope Sampling - Mound Basin GSA							
Date Sampled:	8/01/2019	9:47	Date Received:	8/02/2019	Date Reported:	9/23/2019			
$\delta D$ of water		2	14.6 ‰ relative t	o VSMOW					
$\delta^{18}O$ of water		6	6.87 ‰ relative t	o VSMOW					
Tritium content of	water	n	a						
$\delta^{13}C$ of DIC		1	2.2 ‰ relative t	o VPDB					
¹⁴ C content of DIC	;	4	6.7 ± 0.2 percer	nt modern cark	bon				
$\delta^{15}N$ of nitrate		n	a						
$\delta^{18}O$ of nitrate		n	a						
$\delta^{34}S$ of sulfate		7	7.3 ‰ relative to	VCDT					
$\delta^{18}O$ of sulfate		6	.4 ‰ relative to	VSMOW					
Vacuum Distilled? Remarks:		N	0						

Remarks:



Lab #:		b#: 42449	IS-104602	Co. Job#:					
Sample Name: Company: API/Well:	02N23W15J03S Co. Lab#: Mound Basin Groundwater Sustainability								
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Plastic Bottle Isotope Samplin Ventura, CA	Isotope Sampling - Mound Basin GSA							
Date Sampled:	8/08/2019 10:1	8 Date Received	d: 8/09/2019	Date Reported:	9/23/2019				
$\delta D$ of water		-40.4 ‰ relative	e to VSMOW						
$\delta^{18}O$ of water		-6.25 ‰ relative	e to VSMOW						
Tritium content of	water	na							
$\delta^{13}C$ of DIC		-18.6 ‰ relative	e to VPDB						
¹⁴ C content of DIC		9.8 ± 0.1 perce	nt modern carbo	on					
$\delta^{15}N$ of nitrate		na							
$\delta^{18}O$ of nitrate		na							
$\delta^{34}S$ of sulfate		-10.3 ‰ relative	e to VCDT						
$\delta^{18}O$ of sulfate		0.8 ‰ relative t	o VSMOW						
Vacuum Distilled? Remarks:	*	No							

Remarks:



Lab #: Sample Name:	729567	Job #:	42449 I	IS-104602	Co. Job#:				
Company: API/Well:		02N22W07M03S Co. Lab#: Mound Basin Groundwater Sustainability							
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Isotope Sam	Plastic Bottle Isotope Sampling - Mound Basin GSA Ventura, CA							
Date Sampled:	8/08/2019	11:13	Date Received:	8/09/2019	Date Reported:	9/23/2019			
$\delta D$ of water		;	36.9 ‰ relative to	o VSMOW					
$\delta^{18}O$ of water		{	5.63 ‰ relative to	o VSMOW					
Tritium content of water na									
$\delta^{13}C$ of DIC			17.6 ‰ relative to	o VPDB					
¹⁴ C content of DIC	;	1	8.2 ± 0.1 percen	t modern cark	bon				
$\delta^{15}N$ of nitrate		n	а						
$\delta^{18}O$ of nitrate		n	а						
$\delta^{34}S$ of sulfate			10.7 ‰ relative to	o VCDT					
$\delta^{\rm 18}O$ of sulfate		(	0.8 ‰ relative to	VSMOW					
Vacuum Distilled?	*	N	lo						
Remarks:									



Lab #:		Job #: 42449	IS-104602	Co. Job#:					
Sample Name: Company: API/Well:		02N22W09L03S Co. Lab#: Mound Basin Groundwater Sustainability							
Container: Field/Site Name: Location: Formation/Depth: Sampling Point:	Plastic Bottle Isotope Sampl Ventura, CA	Isotope Sampling - Mound Basin GSA							
Date Sampled:	8/08/2019 15	5:05 Date Rece	ived: 8/09/2019	Date Reported:	9/23/2019				
$\delta D$ of water		49.3 ‰ rela	ative to VSMOW						
$\delta^{18}O$ of water		7.26 ‰ rela	ative to VSMOW						
Tritium content of	water	na							
$\delta^{13}C$ of DIC		13.9 ‰ rela	ative to VPDB						
¹⁴ C content of DIC	)	27.1 ± 0.1 p	ercent modern carl	bon					
$\delta^{\rm 15}N$ of nitrate		na							
$\delta^{18}O$ of nitrate		na							
$\delta^{34}S$ of sulfate		8.0 ‰ relat	ive to VCDT						
$\delta^{18}O$ of sulfate		10.3 ‰ rela	tive to VSMOW						
Vacuum Distilled?	) *	No							
Remarks:									

Remarks:

# Appendix E

**Tritium Laboratory Analytical Report** 

UNIVERSITY OF MIAMI ROSENSTIEL SCHOOL of MARINE & ATMOSPHERIC SCIENCE



Tritium Laboratory 4600 Rickenbacker Causeway Fax:305-421-4112 Miami, Florida 33149-1031 E-mail: Tritium@rsmas.miami.edu Miami, Florida 33149-1031

Ph: 305-421-4100

October 21, 2019

TRITIUM LABORATORY

Data Release #19-089 Job # 3826

SS Papadopulos & 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  $\lambda = 5.626$ % 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 ITRecvd : 19/08/13Contact: Brad Bessinger, 310-566-7119Job# : 3826bbessinger@sspa.com416 NE Dallas St. Suite 201Final : 19/10/17Mound Basin GSA Isotope StudyCamas, WA 98607						
Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
02N22W09L03S 02N22W09L04S 02N23W15J01S 02N23W15J02S 02N23W15J03S 02N22W07M01S 02N22W07M02S 02N22W07M03S	3826.01 3826.02 3826.03 3826.04 3826.05 3826.06 3826.07 3826.08	190808 190729 190730 190730 190808 190801 190731 190808	950 950 950 950 950 950 950 950	275 275 275 275 275 275 275 275 275	$\begin{array}{c} 0.01 \\ 0.04 \\ -0.05 \\ 0.03 \\ -0.25 \\ -0.03 \\ -0.04 \\ -0.12 \end{array}$	0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09