TECHNICAL MEMORANDUM

Monitoring Well Installation Report (MW-1 and MW-2) – Los Olivos Groundwater Quality Monitoring Network

To: Guy Savage, Los Olivos Community Services District
Doug Pike, Los Olivos Community Services District

From: Tim Thompson, GSI Water Solutions
Andy Lapostol, GSI Water Solutions

Attachments: Attachment A – Lithologic Logs
Attachment B – Chip Tray Photos
Attachment C – Final Laboratory Report

Date: January 31, 2023

Introduction

This memorandum details the drilling, installation, and initial testing results for the first two monitoring wells constructed as part of the new shallow groundwater monitoring network for the community of Los Olivos, California. This monitoring network is being built in alignment with the Los Olivos Groundwater Monitoring Plan (GSI, 2021), the purpose of which is to define baseline groundwater quality conditions and to monitor changes over time as the Los Olivos Community Services District's (District) Wastewater Reclamation Program is implemented.

The following sections describe the construction and installation, development, and preliminary water quality testing for the two new monitoring wells (MW-1 and MW-2). The locations of these wells are shown on Figure 1.

Well Construction and Installation

MW-1 and MW-2 were drilled and constructed by BC2 Environmental, under permits from the County of Santa Barbara Environmental Health Services Department. Drilling commenced at MW-1, located on Ballard Canyon Road (Figure 1), on November 14, 2022 and the well was completed on November 15, 2022. Drilling commenced at MW-2, adjacent to Grand Avenue (Figure 1) on November 15, 2022 and the well was completed on November 16, 2022.

Drilling was conducted using a CME 95 truck-mounted drill rig, with 8-inch diameter hollow stem augers. Soil samples were collected at 5-foot intervals using a split-spoon sampler. GSI personnel inspected cuttings and prepared a lithologic log of each borehole, in addition to chip trays of the cuttings. Copies of the lithologic logs are included in Attachment A and photos of the chip trays are included in Attachment B.

MW-1 and MW-2 were drilled to total depths of 120 and 90 feet below ground surface (bgs), respectively. The lithology in both boreholes consists of recent Alluvium overlying Paso Robles Formation. Both formations are generally composed of fines with interspersed lenses of coarse, gravelly sands. Alluvium and Paso Robles

Formation are very similar in lithology and are not clearly distinguishable in the cuttings. In MW-1 and MW-2, water was encountered at depths of approximately 75 and 55 feet bgs, respectively.

MW-1 was backfilled with bentonite chips to a depth of 85 feet bgs before the well was installed. Similarly, MW-2 was backfilled to 70 feet bgs prior to installing the well[1]. Table 1 shows the completion details of each monitoring well.

Table 1. Monitoring Well Construction Details

Well ID	Total Depth (feet bgs)	Perforated Interval (feet bgs)
MW-1	85	55 - 80
MW-2	70	35 - 65

Both monitoring wells were constructed with 2-inch, schedule 40 PVC casing. The perforations have a slot size of 0.020-inches. The annular space of each boring was filled a Cemex No. 3 sand gravel pack from the bottom of the hole to approximately 2 feet above the top of screen. One foot of transition sand was added on top of the gravel pack, followed by one foot of bentonite chips, and then each monitoring well was sealed with a bentonite grout to slightly below ground surface. The wells were then completed with concrete and an above-ground monument casing with surrounding safety bollards.

Well Development

Following the installation of MW-1 and MW-2, BC2 Environmental mobilized a truck-mounted development rig to develop each well under supervision of GSI personnel. Each well was developed for one day, with MW-1 being completed on November 21, 2022, and MW-2 being completed on November 22, 2022. A combination of bailing, swabbing, and pumping was utilized at each well to remove excess sediment and improve the hydraulic connection between the well's screened interval and the surrounding aquifer. Pumped water was discharged to the ground adjacent to the well.

Water Quality

After developing the monitoring wells, water quality samples were collected at MW-1 and MW-2 and sent to a certified laboratory for analysis. The selected analytes and results are shown in Table 2, and the final report from the laboratory is included in Attachment C.

Based upon review of the analytical results, there are a few key observations:

- Nitrate concentration from groundwater sample collected at MW-2 was 10 mg/L, which is same concentration of the MCL.
- Nitrate concentration from groundwater sample collected at MW-1 was 2.6 mg/L, which is considerably lower than the MCL.
- The groundwater sample from MW-1 had a much higher concentration of aluminum, iron and manganese. Meanwhile, MW-2 had a higher concentration of nitrate, sulfate, and total dissolved solids.
- Overall, the analytical results from the groundwater samples collected at the two new monitoring wells indicates markedly different water quality.

[1] The boreholes were advanced past the target depth for exploratory purposes.

Table 2. Water Quality Sampling Results

Analyte	Units	Maximum Contaminant Level[1]	Basin Water Quality Objective[2]	MW-1 Result	MW-2 Result
Chloride	mg/L	500[3]	50	110	130
Nitrate as N	mg/L	10	1	2.6	**10**
Sulfate	mg/L	500[3]	10	40	120
Total Dissolved Solids	mg/L	1,000[3]	600	450	840
Aluminum	mg/L	-	-	11	1.1
Arsenic	mg/L	-	-	0.011	0.004
Boron	mg/L	-	0.5	0.078	0.29
Iron	mg/L	-	-	22	2
Manganese	mg/L	-	-	0.37	0.11

Notes:

1 – State and federal drinking water standards

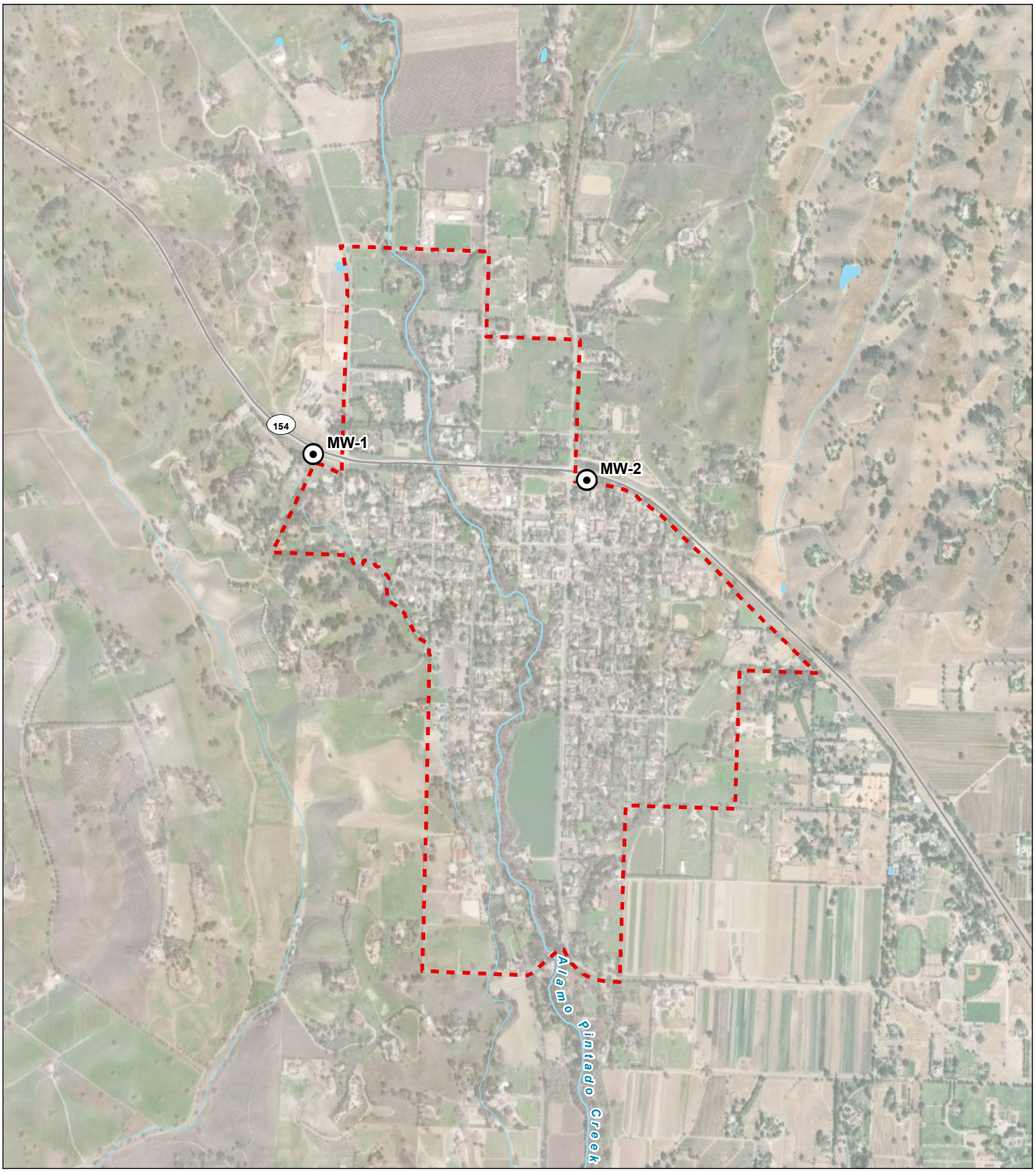
2 – Established in the Water Quality Control Plan for the Central Coast Basin (Regional Water Quality Control Board, 2019)

3 – Secondary maximum contaminant level

Bolded values are at or above the Maximum Contaminant Level

Next Steps and Recommendations

- The successful installation of these first 2 monitoring wells represents a significant step forward for the District, helping to support the understanding of the shallow sediments effected by the long history of septic systems.
- Installing additional monitoring wells in various locations across the LOCSD area will allow for more groundwater quality sampling which, in turn, will provide useful information on the character of the groundwater throughout the District.
- Figure 6 of the Los Olivos Groundwater Monitoring Plan (GSI, 2021) identifies several preferred locations for future monitoring wells.
- Conducting Quarterly sampling over the years to come (as recommended in the Monitoring Plan) will establish a time-series of water quality data which will be valuable in determining typical water quality for each well.



LEGEND

- Monitoring Well
- Los Olivos Special Problem Area

All Other Features

- Major Road
- Watercourse
- Waterbody

FIGURE 1

Well Location Map

MW-1 and MW-2 Well Construction Report

N

0 750 1,500

Feet

GSI Water Solutions, Inc.

Date: January 27, 2023
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2020

Document Path: Y:\0876_Los_Olivos_CSD\Source_Figures\001_GW_Quality_Mgmt_Svcs\Well_Construction_Report\Figure1_Well_Construction_Report.mxd, npalmer

Attachment A

Lithologic Logs

GSI Water Solutions, Inc.

PROJECT NUMBER:	BORING NUMBER
00876.001.003	MW-1 (Ballard Cyn) SHEET 1 OF 3

SOIL BORING LOG

11-14-22

PROJECT: LOCATION:

ELEVATION: DRILLING CONTRACTOR: BC-2

DRILLING METHOD AND EQUIPMENT USED: HSA

WATER LEVELS: START: END: LOGGER: AL

DEPTH BELOW SURFACE (FT)	CONSTRUCTION	# BLOWS	LITHOLOGIC LOG	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
5		17/20/26	SM-SW	5' - silty sand and gravel, (artificial fill?), dark brown, fg-cg. Sub rounded to angular gravel	
10		12/25/36			
15		25/40/50 4"		15' - increase in fines. yellowish brown. Some 2"+ cobbles	
20		12/15/21	CL	17' - silty clay, yellowish brown, trace fg-cg sand, some fine gravel	
25		11/14/19		25' - decrease silt content	
30		10/15/22			
35		14/21/30	GC SW	30' - clayey gravel with sand, dark yellowish brown, fg-cg, Sub-rounded to angular 33' - Well graded sand + gravel with fines (~15%-20%) fg-cg, Sub angular - angular gravels. Moist	
40		15/17/25		- thin alternating lenses of finer/coarser material	
45		11/16/24	ML	40' increase in clay content	
50		11/15/19		(42?) - silt w/ clay y. brown, trace fg-mg sand thin lenses of gravelly sand 50' - increase clay content	

GSI Water Solutions, Inc.

PROJECT NUMBER:	BORING NUMBER	
00876.001.003	MW-1	SHEET 2 OF 3

SOIL BORING LOG

11-14-22

PROJECT:
LOCATION:
ELEVATION:
DRILLING CONTRACTOR: BC-2
DRILLING METHOD AND EQUIPMENT USED: HSA
WATER LEVELS:
START: END: LOGGER: AL

DEPTH BELOW SURFACE (FT)	CONSTRUCTION # BLOWS	LITHOLOGIC LOG	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
55	8/12/17		55' - same as 50'	
60	13/18/24	SC	58' - clayey sand and gravel, y. brown, fg-cg, subrounded - angular gravel. interspersed lenses of finer/coarser material coarse material is moist	
65	11/14/21		64' - very gravelly lenses, very moist	
70	9/13/19	ML SW	65' - clayey silt, yellowish brn, trace fg sand 68' - well graded sand w/ clay, light brn. to dark y. brn, fg-cg, fine to coarse gravels, subround - angular v. moist	
75	10/15/26	CL	74' - wet clay in shoe at 75' 75(?) - silty clay, dark y. brn, trace fg sand. not saturated	
80	8/12/16			
85	7/11/14		85' - darker brown, increased sand content	
90	6/9/14		90' - thin gravelly lenses in same matrix	
95	7/10/15	ML	93' - silt, dark y. brn, v. moist	
100	7/10/14		98' - sparse, thin gravelly lenses, v. moist to wet	

GSI Water Solutions, Inc.

PROJECT NUMBER:	BORING NUMBER MW-1	SHEET 3 OF 3

SOIL BORING LOG

11-14-22

PROJECT: LOCATION:

ELEVATION: DRILLING CONTRACTOR: BC-2

DRILLING METHOD AND EQUIPMENT USED: HSA

WATER LEVELS: START: END: LOGGER: AL

DEPTH BELOW SURFACE (FT)	CONSTRUCTION	# BLOWS	LITHOLOGIC LOG	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			ML		
105		9/11/16	CL	103' - grades to silty clay, d.y. brn. some thin lenses of fg-mg sand.	
110		6/8/13		110' - gravelly clay with sand, d.y. brn. fg-cg sand, fg-cg gravels in clayey matrix, wet	
115		25/33/50-3"	SW	113' - well graded sand, d.y. brn, fg-cg, fine to coarse gravel, trace cobbles, wet	
120		11/23/40	CL	118' - clay with sand and gravel, yellowish brown, fg-cg sand, fine to coarse gravel, stiff	
				BORING TERMINATED AT 120'	

GSI Water Solutions, Inc.

PROJECT NUMBER:	BORING NUMBER	
00876.001.003	MW-2	SHEET 1 OF 2

SOIL BORING LOG

PROJECT:
LOCATION: Alley E. of Grand Ave, N. of Jonata St.
ELEVATION:
DRILLING CONTRACTOR: BC2
DRILLING METHOD AND EQUIPMENT USED: HSA
WATER LEVELS:
START: END:
LOGGER: AL

DEPTH BELOW SURFACE (FT)	CONSTRUCTION	# BLOWS	LITHOLOGIC LOG	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
5		11/17/24		0-5' - Artificial fill (?) - silty sand and gravel, d. brn, fg-cg	
10		16/20/25	SM	6' - silty sand, d. y. brn, fg-mg. some fine-coarse gravel	
15		7/14/19	SM - SW	12' - silty sand and gravel, d. y. brn, fg-cg, fine to coarse gravel. some cobbles. Alternating lenses of finer/coarser materials	
20		12/16/27			
25		14/22/28	SW	20' - decrease in fines	
30		16/25/38	SM	25' - silty sand, brn to reddish brn, fg-mg, some cg and fine-coarse gravel, dry	
35		11/15/17		28' - inc. sand and gravel content, subrounded - angular	
40		8/13/16	GC/CL	34' - gravelly clay with sand, d. brn, fg-cg. 50% clay, ~30% gravel, subrounded - angular	
45		7/10/19	CL	38' - silty clay, d. brn, trace fg-mg, sand and gravel, moist	
50		14/17/19		45' - 6" lense of gravel interbedded gravels cont. 48' - see Next page	

GSI Water Solutions, Inc.

PROJECT NUMBER:	BORING NUMBER	
00876.001.003	MW-2	SHEET 2 OF 2

SOIL BORING LOG

PROJECT:
LOCATION: Alley E. of Grand Ave, N. of Jonata St.
ELEVATION:
DRILLING CONTRACTOR: BC2
DRILLING METHOD AND EQUIPMENT USED: HSA
WATER LEVELS:
START: END:
LOGGER: AL

DEPTH BELOW SURFACE (FT)	CONSTRUCTION # BLOWS	LITHOLOGIC LOG	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
55	8/11/16	SW	48'- well graded sand and gravel with clay, d. brn, fg-cg, subrounded-angular, v. moist to wet	
60	11/16/23	CL	53'- clay with gravel, d.y. brn, some fg-mg sand. fine to med. gravel, moist thin lenses of coarse, wet, material	
65	12/15/24	SC	60'- inc. gravel cont. still a dense clay matrix 63'- clayey sand, d.y. brn, some fg-cg 60% sand + gravel, 40% clay	
70	15/19/20	CL	69'- sandy clay, d.y. brn, fg-mg some gravel	
75	10/14/20		75'- silty clay. Thin interspersed layers of coarser material	
80	16/24/32		80'- clay w/ gravel, d.y. brn. some fg-mg sand	
85	16/23/40		85'- inc. gravel cont.	
90	15/28/22		BORING TERMINATED AT 90'	

Attachment B

Chip Tray Photos

10		15		20	
25	30	35	45	50	60
65	70	74	80	90	95
100	110	115			

MW-1

0 | 15 | 2 | 10

25 | 30 | 35 | 40 | 45 | 50

55 | 60 | 65 | 70 | 75 | 80

85 | 90

MW-2

Attachment C

Final Laboratory Report

Date of Report: 01/03/2023

Andy Lapostol

GSI Water Solutions, Inc.
5855 Capistran Avenue, Suite C
Atascadero, CA 93422

Client Project:	[none]
BCL Project:	Los Olivos GW Monitoring
BCL Work Order:	2228010
Invoice ID:	B466581

Enclosed are the results of analyses for samples received by the laboratory on 11/22/2022. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Ragen Schallock
Client Service Rep

Table of Contents

DAB-83, 11/22, 3A, 1

Pace
ANALYTICAL SERVICES 4100 Atlas Ct. – Bakersfield, CA 93308 – 661.327.4911 – Fax: 661.327.1918 – www.pacelabs.com

Chain of Custody Form

Page 1 of 1

Report To:
Client: GSI Water Solutions, Inc.
Attn: Tim Nicely, Andy Lapostol
Street Address: 418 Chapala Sreeet, Suite H
City, State, Zip: Santa Barbara CA 93101
Phone: 805.979.3084 Fax:
Email: alapostol@gsiws.com
Work Order #: 22-28010

Project #:
Project Name: Los Olivos
BID# 00126506
Sampler(s) Name Printed: John Gauthier

Comments:

Result Request **Surcharge
[X] STD (7 days) [ ] 5 Day** [ ] 4 Day**
[ ] 3 Day** [ ] 2 Day** [ ] 1 Day**
Rush requests must be approved

Sample #	Description	Date Sampled	Time Sampled	Nitrate (EPA 300.0)	TDS (EPA 160.1)	Chloride (EPA 300.0)	Sulfate 9EPA 300.0)	Total Metals: Fe, Mn, B, Al, As	Sample Matrix: Soil	Sludge	Drinking Water	Ground Water	Waste Water	Other	Notes
-1	MW-1	11/22/22	1130	X	X	X	X	X				X			
-2	MW-2	11/22/22	1140	X	X	X	X	X				X			

SHORT HOLDING TIME
O^{18} NO_3 NO OP SS
DD Cl_2 BOD MBAS COT

CHK BY
DISTRIBUTION
SUB OUT

Billing
[ ] Same as above
Client:
Address:
City: State Zip
Attn:
P.O. #:

System # (Needed for CLIP)
GIS/Key [ ] Well Star [ ]

EDF Required Geotracker [ ] Yes [ ] No Global ID

	Relinquished By	Date	Time	Received By	Date	Time
1.	John Gauthier	11-22-22	1400	Daniel Begalla	11/22/22	1400
2.	Daniel Begalla	11/22/22	1800		11/22/22	1800
3.		11/22/22	2015	Isbel Olivero	11/23/22	1053

Pace Analytical Bakersfield does not accept samples containing radioactive material above background levels. Samples containing radioactive material must be disclosed prior to receipt. Any samples suspected of containing radioactive material above background levels will not be accepted and will be returned to client.

REV 13/2021

Chain of Custody and Cooler Receipt Form for 2228010 Page 2 of 2

PACE ANALYTICAL — COOLER RECEIPT FORM — Page ___ Of ___

Submission #: 22-28010

SHIPPING INFORMATION	SHIPPING CONTAINER	FREE LIQUID
Fed Ex ☐ UPS ☐ GSO / GLS ☐ Hand Delivery ☐	Ice Chest ☑ None ☐ Box ☐	YES ☑ NO ☐
Pace Lab Field Service ☑ Other ☐ (Specify)___	Other ☐ (Specify)___	(W) / S

Refrigerant: Ice ☑ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals: Ice Chest ☐ (Intact? Yes ☐ No ☐) Containers ☐ (Intact? Yes ☐ No ☐) None ☑ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

COC Received ☑ YES ☐ NO

Emissivity: 0.97 Container: clear Thermometer ID: 274 Date/Time 11/22/22

Temperature: (A) 0.6 °C / (C) 0.9 °C Analyst Init JD 1953

SAMPLE CONTAINERS	SAMPLE NUMBERS 1	2	3	4	5	6	7	8	9	10
QT PE UNPRES	A	A								
4oz / 8oz / 16oz PE UNPRES										
2oz Cr+6										
QT INORGANIC CHEMICAL METALS										
INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz	B	B								
PT CYANIDE										
PT NITROGEN FORMS										
PT TOTAL SULFIDE										
2oz. NITRATE / NITRITE										
PT TOTAL ORGANIC CARBON										
PT CHEMICAL OXYGEN DEMAND										
PtA PHENOLICS										
40ml VOA VIAL TRAVEL BLANK										
40ml VOA VIAL										
QT EPA 1664B										
PT ODOR										
RADIOLOGICAL										
BACTERIOLOGICAL										
40 ml VOA VIAL- 504										
QT EPA 508/608.3/8081A										
QT EPA 515.1/8151A										
QT EPA 525.2										
QT EPA 525.2 TRAVEL BLANK										
40ml EPA 547										
40ml EPA 531.1										
8oz EPA 548.1										
QT EPA 549.2										
QT EPA 8015M										
QT EPA 8270C										
8oz / 16oz / 32oz AMBER										
8oz / 16oz / 32oz JAR										
SOIL SLEEVE										
PCB VIAL										
PLASTIC BAG										
TEDLAR BAG										
FERROUS IRON										
ENCORE										
SMART KIT										
SUMMA CANISTER										

Comments:

Sample Numbering Completed By: JD Date/Time: 11/23/22 0710

A = Actual / C = Corrected

Rev 23 05/20/22

[S:\WPDocs\WordPerfect\LAB_DOCS\Forms\SAMREC rev 23]

GSI Water Solutions, Inc.
5855 Capistran Avenue, Suite C
Atascadero, CA 93422

Reported: 01/03/2023 11:52
Project: Los Olivos GW Monitoring
Project Number: [none]
Project Manager: Andy Lapostol

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
2228010-01	**COC Number:**	---	**Receive Date:**	11/22/2022 19:53
	Project Number:	---	**Sampling Date:**	11/22/2022 11:30
	Sampling Location:	---	**Sample Depth:**	---
	Sampling Point:	MW-1	**Lab Matrix:**	Water
	Sampled By:	John Gauthier	**Sample Type:**	Groundwater
2228010-02	**COC Number:**	---	**Receive Date:**	11/22/2022 19:53
	Project Number:	---	**Sampling Date:**	11/22/2022 11:40
	Sampling Location:	---	**Sample Depth:**	---
	Sampling Point:	MW-2	**Lab Matrix:**	Water
	Sampled By:	John Gauthier	**Sample Type:**	Groundwater

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GSI Water Solutions, Inc.
5855 Capistran Avenue, Suite C
Atascadero, CA 93422

Reported: 01/03/2023 11:52
Project: Los Olivos GW Monitoring
Project Number: [none]
Project Manager: Andy Lapostol

Water Analysis (General Chemistry)

BCL Sample ID: 2228010-01 | **Client Sample Name:** MW-1, 11/22/2022 11:30:00AM, John Gauthier

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	DCN
Chloride	**110**	**mg/L**	**0.50**	**0.13**	**EPA-300.0**	0.21		1
Nitrate as N	**2.6**	**mg/L**	**0.10**	**0.024**	**EPA-300.0**	ND		1
Sulfate	**40**	**mg/L**	**1.0**	**0.14**	**EPA-300.0**	ND		1
Total Dissolved Solids @ 180 C	**450**	**mg/L**	**20**	**10**	**EPA-160.1**	ND	**A10**	2

DCN	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID	Prep Method
1	EPA-300.0	11/23/22 09:00	11/23/22 16:06	RC1	IC2	1	B154472	No Prep
2	EPA-160.1	11/28/22 14:00	11/28/22 14:00	CAD	MANUAL	2	B154566	No Prep

DCN = Data Continuation Number

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GSI Water Solutions, Inc.
5855 Capistran Avenue, Suite C
Atascadero, CA 93422

Reported: 01/03/2023 11:52
Project: Los Olivos GW Monitoring
Project Number: [none]
Project Manager: Andy Lapostol

Metals Analysis

BCL Sample ID: 2228010-01 | **Client Sample Name:** MW-1, 11/22/2022 11:30:00AM, John Gauthier

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	DCN
Total Recoverable Aluminum	**11000**	**ug/L**	**20**	**14**	**EPA-200.8**	ND		1
Total Recoverable Arsenic	**11**	**ug/L**	**2.0**	**0.70**	**EPA-200.8**	ND		1
Total Recoverable Boron	**78**	**ug/L**	**20**	**1.7**	**EPA-200.8**	ND		1
Total Recoverable Iron	**22**	**mg/L**	**0.050**	**0.030**	**EPA-200.7**	ND		2
Total Recoverable Manganese	**370**	**ug/L**	**1.0**	**0.45**	**EPA-200.8**	ND		1

DCN	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID	Prep Method
1	EPA-200.8	12/06/22 09:50	12/14/22 10:04	KHS	PE-EL4	1	B155264	EPA 200.2
2	EPA-200.7	12/06/22 21:50	12/09/22 13:24	JRG	PE-OP4	1	B155345	EPA 200.2

DCN = Data Continuation Number

Pace Analytical
ENVIRONMENTAL SCIENCES

GSI Water Solutions, Inc.
5855 Capistran Avenue, Suite C
Atascadero, CA 93422

Reported: 01/03/2023 11:52
Project: Los Olivos GW Monitoring
Project Number: [none]
Project Manager: Andy Lapostol

Water Analysis (General Chemistry)

BCL Sample ID: 2228010-02 | **Client Sample Name:** MW-2, 11/22/2022 11:40:00AM, John Gauthier

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	DCN
Chloride	**130**	**mg/L**	**0.50**	**0.13**	**EPA-300.0**	0.28		1
Nitrate as N	**10**	**mg/L**	**0.10**	**0.024**	**EPA-300.0**	ND		1
Sulfate	**120**	**mg/L**	**1.0**	**0.14**	**EPA-300.0**	0.39		1
Total Dissolved Solids @ 180 C	**840**	**mg/L**	**50**	**25**	**EPA-160.1**	ND	**A10**	2

DCN	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID	Prep Method
1	EPA-300.0	11/23/22 14:00	11/23/22 14:04	KSA	IC5	1	B154473	No Prep
2	EPA-160.1	11/28/22 14:00	11/28/22 14:00	CAD	MANUAL	5	B154566	No Prep

DCN = Data Continuation Number

Pace Analytical
ENVIRONMENTAL SCIENCES

GSI Water Solutions, Inc.
5855 Capistran Avenue, Suite C
Atascadero, CA 93422

Reported: 01/03/2023 11:52
Project: Los Olivos GW Monitoring
Project Number: [none]
Project Manager: Andy Lapostol

Metals Analysis

BCL Sample ID: 2228010-02 | **Client Sample Name:** MW-2, 11/22/2022 11:40:00AM, John Gauthier

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	DCN
Total Recoverable Aluminum	**1100**	**ug/L**	**20**	**14**	**EPA-200.8**	ND		1
Total Recoverable Arsenic	**3.8**	**ug/L**	**2.0**	**0.70**	**EPA-200.8**	ND		1
Total Recoverable Boron	**290**	**ug/L**	**20**	**1.7**	**EPA-200.8**	ND		1
Total Recoverable Iron	**2.0**	**mg/L**	**0.050**	**0.030**	**EPA-200.7**	ND		2
Total Recoverable Manganese	**110**	**ug/L**	**1.0**	**0.45**	**EPA-200.8**	ND		1

DCN	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID	Prep Method
1	EPA-200.8	12/06/22 09:50	12/14/22 10:06	KHS	PE-EL4	1	B155264	EPA 200.2
2	EPA-200.7	12/06/22 21:50	12/09/22 13:27	JRG	PE-OP4	1	B155345	EPA 200.2

DCN = Data Continuation Number

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Water Analysis (General Chemistry)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals	Run #
QC Batch ID: B154472							
Chloride	**B154472-BLK1**	**0.21200**	**mg/L**	**0.50**	**0.13**	**J**	1
Nitrate as N	B154472-BLK1	ND	mg/L	0.10	0.024		1
Sulfate	B154472-BLK1	ND	mg/L	1.0	0.14		1
QC Batch ID: B154473							
Chloride	**B154473-BLK1**	**0.27600**	**mg/L**	**0.50**	**0.13**	**J,M02**	2
Nitrate as N	B154473-BLK1	ND	mg/L	0.10	0.024		2
Sulfate	**B154473-BLK1**	**0.38600**	**mg/L**	**1.0**	**0.14**	**J**	2
QC Batch ID: B154566							
Total Dissolved Solids @ 180 C	B154566-BLK1	ND	mg/L	6.7	3.3		3

Run #	QC Sample ID	QC Type	Method	Prep Date	Run Date Time	Analyst	Instrument	Dilution
1	B154472-BLK1	PB	EPA-300.0	11/23/22	11/23/22 10:15	SAV	IC2	1
1	B154472-BLK1	PB	EPA-300.0	11/23/22	11/23/22 10:15	SAV	IC2	1
2	B154473-BLK1	PB	EPA-300.0	11/23/22	11/23/22 10:12	SAV	IC5	1
2	B154473-BLK1	PB	EPA-300.0	11/23/22	11/23/22 10:12	SAV	IC5	1
3	B154566-BLK1	PB	EPA-160.1	11/28/22	11/28/22 14:00	CAD	MANUAL	0.667

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Water Analysis (General Chemistry)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals	Run #
QC Batch ID: B154472											
Chloride	B154472-BS1	LCS	48.186	50.000	mg/L	96.4		90 - 110			1
Nitrate as N	B154472-BS1	LCS	4.7370	5.0000	mg/L	94.7		90 - 110			1
Sulfate	B154472-BS1	LCS	96.932	100.00	mg/L	96.9		90 - 110			1
QC Batch ID: B154473											
Chloride	B154473-BS1	LCS	49.341	50.000	mg/L	98.7		90 - 110			2
Nitrate as N	B154473-BS1	LCS	4.8420	5.0000	mg/L	96.8		90 - 110			2
Sulfate	B154473-BS1	LCS	98.538	100.00	mg/L	98.5		90 - 110			2
QC Batch ID: B154566											
Total Dissolved Solids @ 180 C	B154566-BS1	LCS	585.00	586.00	mg/L	99.8		90 - 110			3

Run #	QC Sample ID	QC Type	Method	Prep Date	Run Date Time	Analyst	Instrument	Dilution
1	B154472-BS1	LCS	EPA-300.0	11/23/22	11/23/22 10:36	SAV	IC2	1
1	B154472-BS1	LCS	EPA-300.0	11/23/22	11/23/22 10:36	SAV	IC2	1
2	B154473-BS1	LCS	EPA-300.0	11/23/22	11/23/22 10:29	SAV	IC5	1
2	B154473-BS1	LCS	EPA-300.0	11/23/22	11/23/22 10:29	SAV	IC5	1
3	B154566-BS1	LCS	EPA-160.1	11/28/22	11/28/22 14:00	CAD	MANUAL	5

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Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals	R#
QC Batch ID: B154472	Used client sample: N											
Chloride	DUP	2228007-02	152.41	152.80		mg/L	0.3		10			1
	MS	2228007-02	152.41	202.08	50.505	mg/L		98.4		80 - 120		2
	MSD	2228007-02	152.41	202.00	50.505	mg/L	0.0	98.2	10	80 - 120		3
Nitrate as N	DUP	2228007-02	6.8600	6.8510		mg/L	0.1		10			1
	MS	2228007-02	6.8600	11.820	5.0505	mg/L		98.2		80 - 120		2
	MSD	2228007-02	6.8600	11.830	5.0505	mg/L	0.1	98.4	10	80 - 120		3
Sulfate	DUP	2228007-02	42.030	42.105		mg/L	0.2		10			1
	MS	2228007-02	42.030	147.32	101.01	mg/L		104		80 - 120		2
	MSD	2228007-02	42.030	147.40	101.01	mg/L	0.1	104	10	80 - 120		3
QC Batch ID: B154473	Used client sample: N											
Chloride	DUP	2227969-01	51.686	51.574		mg/L	0.2		10			4
	MS	2227969-01	51.686	105.93	50.505	mg/L		107		80 - 120		5
	MSD	2227969-01	51.686	105.85	50.505	mg/L	0.1	107	10	80 - 120		6
Nitrate as N	DUP	2227969-01	2.5930	2.5950		mg/L	0.1		10			4
	MS	2227969-01	2.5930	7.5394	5.0505	mg/L		97.9		80 - 120		5
	MSD	2227969-01	2.5930	7.5364	5.0505	mg/L	0.0	97.9	10	80 - 120		6
Sulfate	DUP	2227969-01	165.40	164.94		mg/L	0.3		10			4
	MS	2227969-01	165.40	269.72	101.01	mg/L		103		80 - 120		5
	MSD	2227969-01	165.40	269.60	101.01	mg/L	0.0	103	10	80 - 120		6
QC Batch ID: B154566	Used client sample: Y - Description: MW-2, 11/22/2022 11:40											
Total Dissolved Solids @ 180 C	DUP	2228010-02	845.00	835.00		mg/L	1.2		10			7

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Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Run #	QC Sample ID	QC Type	Method	Prep Date	Run Date Time	Analyst	Instrument	Dilution
1	B154472-DUP1	DUP	EPA-300.0	11/23/22	11/23/22 11:17	KSA	IC2	1
1	B154472-DUP1	DUP	EPA-300.0	11/23/22	11/23/22 11:17	KSA	IC2	1
2	B154472-MS1	MS	EPA-300.0	11/23/22	11/23/22 11:38	KSA	IC2	1.010
2	B154472-MS1	MS	EPA-300.0	11/23/22	11/23/22 11:38	KSA	IC2	1.010
3	B154472-MSD1	MSD	EPA-300.0	11/23/22	11/23/22 11:58	KSA	IC2	1.010
3	B154472-MSD1	MSD	EPA-300.0	11/23/22	11/23/22 11:58	KSA	IC2	1.010
4	B154473-DUP1	DUP	EPA-300.0	11/23/22	11/23/22 11:05	KSA	IC5	1
4	B154473-DUP1	DUP	EPA-300.0	11/23/22	11/23/22 11:05	KSA	IC5	1
5	B154473-MS1	MS	EPA-300.0	11/23/22	11/23/22 11:23	KSA	IC5	1.010
5	B154473-MS1	MS	EPA-300.0	11/23/22	11/23/22 11:23	KSA	IC5	1.010
6	B154473-MSD1	MSD	EPA-300.0	11/23/22	11/23/22 11:41	KSA	IC5	1.010
6	B154473-MSD1	MSD	EPA-300.0	11/23/22	11/23/22 11:41	KSA	IC5	1.010
7	B154566-DUP1	DUP	EPA-160.1	11/28/22	11/28/22 14:00	CAD	MANUAL	5

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Metals Analysis

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals	Run #
QC Batch ID: B155264							
Total Recoverable Aluminum	B155264-BLK1	ND	ug/L	20	14		1
Total Recoverable Arsenic	B155264-BLK1	ND	ug/L	2.0	0.70		1
Total Recoverable Boron	B155264-BLK2	ND	ug/L	20	1.7		2
Total Recoverable Manganese	B155264-BLK1	ND	ug/L	1.0	0.45		1
QC Batch ID: B155345							
Total Recoverable Iron	B155345-BLK1	ND	mg/L	0.050	0.030		3

Run #	QC Sample ID	QC Type	Method	Prep Date	Run Date Time	Analyst	Instrument	Dilution
1	B155264-BLK1	PB	EPA-200.8	12/06/22	12/14/22 09:08	KHS	PE-EL4	1
2	B155264-BLK2	PB	EPA-200.8	12/06/22	12/14/22 09:08	KHS	PE-EL4	1
3	B155345-BLK1	PB	EPA-200.7	12/06/22	12/09/22 13:00	JRG	PE-OP4	1

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Metals Analysis

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals	Run #
QC Batch ID: B155264											
Total Recoverable Aluminum	B155264-BS1	LCS	317.73	300.00	ug/L	106		85 - 115			1
Total Recoverable Arsenic	B155264-BS1	LCS	99.998	100.00	ug/L	100		85 - 115			1
Total Recoverable Boron	B155264-BS2	LCS	418.93	400.00	ug/L	105		85 - 115			2
Total Recoverable Manganese	B155264-BS1	LCS	109.17	100.00	ug/L	109		85 - 115			1
QC Batch ID: B155345											
Total Recoverable Iron	B155345-BS1	LCS	1.0099	1.0000	mg/L	101		85 - 115			3

Run #	QC Sample ID	QC Type	Method	Prep Date	Run Date Time	Analyst	Instrument	Dilution
1	B155264-BS1	LCS	EPA-200.8	12/06/22	12/14/22 09:15	KHS	PE-EL4	1
2	B155264-BS2	LCS	EPA-200.8	12/06/22	12/14/22 13:08	KHS	PE-EL4	1
3	B155345-BS1	LCS	EPA-200.7	12/06/22	12/09/22 13:02	JRG	PE-OP4	1

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Metals Analysis

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals	R#
QC Batch ID: B155264	Used client sample: N											
Total Recoverable Aluminum	DUP	2228467-01	ND	ND		ug/L			20			1
	MS	2228467-01	ND	329.46	300.00	ug/L		110		70 - 130		2
	MSD	2228467-01	ND	338.71	300.00	ug/L	2.8	113	20	70 - 130		3
Total Recoverable Arsenic	DUP	2228467-01	79.043	80.002		ug/L	1.2		20			1
	MS	2228467-01	79.043	194.95	100.00	ug/L		116		70 - 130		2
	MSD	2228467-01	79.043	195.67	100.00	ug/L	0.4	117	20	70 - 130		3
Total Recoverable Boron	DUP	**2228467-01**	**191.98**	**204.91**		**ug/L**	**6.5**		**20**			4
	MS	**2228467-01**	**191.98**	**644.48**	**400.00**	**ug/L**		**113**		**70 - 130**		5
	MSD	**2228467-01**	**191.98**	**721.96**	**400.00**	**ug/L**	**11.3**	**132**	**20**	**70 - 130**	**Q03**	6
Total Recoverable Manganese	DUP	2228467-01	1.4080	1.2010		ug/L	15.9		20			1
	MS	2228467-01	1.4080	108.25	100.00	ug/L		107		70 - 130		2
	MSD	2228467-01	1.4080	115.81	100.00	ug/L	6.7	114	20	70 - 130		3
QC Batch ID: B155345	Used client sample: N											
Total Recoverable Iron	DUP	2228212-01	ND	ND		mg/L			20			7
	MS	2228212-01	ND	0.98376	1.0000	mg/L		98.4		75 - 125		8
	MSD	2228212-01	ND	1.0077	1.0000	mg/L	2.4	101	20	75 - 125		9

Run #	QC Sample ID	QC Type	Method	Prep Date	Run Date Time	Analyst	Instrument	Dilution
1	B155264-DUP1	DUP	EPA-200.8	12/06/22	12/14/22 09:12	KHS	PE-EL4	1
2	B155264-MS1	MS	EPA-200.8	12/06/22	12/14/22 09:17	KHS	PE-EL4	1
3	B155264-MSD1	MSD	EPA-200.8	12/06/22	12/14/22 09:19	KHS	PE-EL4	1
4	B155264-DUP2	DUP	EPA-200.8	12/06/22	12/14/22 09:12	KHS	PE-EL4	1
5	B155264-MS2	MS	EPA-200.8	12/06/22	12/14/22 09:17	KHS	PE-EL4	1
6	B155264-MSD2	MSD	EPA-200.8	12/06/22	12/14/22 09:19	KHS	PE-EL4	1
7	B155345-DUP1	DUP	EPA-200.7	12/06/22	12/09/22 13:07	JRG	PE-OP4	1
8	B155345-MS1	MS	EPA-200.7	12/06/22	12/09/22 13:11	JRG	PE-OP4	1
9	B155345-MSD1	MSD	EPA-200.7	12/06/22	12/09/22 13:14	JRG	PE-OP4	1

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Notes And Definitions

J	Estimated Value (CLP Flag)
MDL	Method Detection Limit
ND	Analyte Not Detected
PQL	Practical Quantitation Limit
A10	Detection and quantitation limits were raised due to matrix interference.
M02	Analyte detected in the Method Blank at a level between the PQL and > 1/2 the PQL.
Q03	Matrix spike recovery(s) was(were) not within the control limits.