Technical Memorandum

TO:	Steve Teal, Washington State Department of Ecology
CC:	Amy Sikora, Washington State Department of Natural Resources
FROM:	Katie Gauglitz, LG, and Eric Weber, LHG, CWRE
DATE:	June 15, 2021
RE:	**Second Quarter 2021 Groundwater Monitoring Results** **Webster Nursery Site, Site Identification 3380** **Tumwater, Washington** **Project No. 0774006.040.046**

Introduction

This technical memorandum summarizes the results of quarterly groundwater monitoring completed by Landau Associates, Inc. (LAI) at the Washington State Department of Natural Resources Webster Nursery site, a former pesticide-storage warehouse in Tumwater, Washington (site; Figure 1). The site is associated with past releases of organochlorine pesticides to soil and groundwater. Constituents of concern include the organochlorine pesticides heptachlor epoxide (HE; breakdown product of heptachlor) and technical chlordane.

Remedial action excavation and disposal of HE-contaminated soil was completed in August 2018. A summary of the remedial action is provided in a draft Cleanup Action Completion Report (LAI 2018).

Groundwater Monitoring Summary

Second quarter 2021 (2Q21) groundwater monitoring was completed on May 25, 2021 in accordance with the framework established by Washington State Department of Ecology (Ecology) Agreed Order Number DE 00TCP-SR295, the Remedial Action Work Plan (LAI 2017), and the Compliance Monitoring Plan (LAI 2019). Groundwater samples were collected from two wells (SW-10R and SW-11R). Analytical Resources, Inc. of Tukwila, Washington analyzed the groundwater samples for organochlorine pesticides using U.S. Environmental Protection Agency Method 8081B low-level.

Groundwater samples were collected using a peristaltic pump and dedicated tubing following low-flow groundwater sampling procedures. Low-flow groundwater monitoring consists of measuring the depth-to-water with an electronic groundwater level indicator, monitoring field parameters with a YSI 554 multi-parameter probe, and measuring turbidity with a handheld meter. One duplicate sample (SW-99 at SW-11R) was collected for quality control purposes.

Groundwater Monitoring Results

Groundwater monitoring results are summarized below:

- HE was detected in SW-10R at a concentration of 0.0027 micrograms per liter (µg/L), below the cleanup level (CUL; 0.00481 µg/L).

- HE was detected in SW-11R at a concentration of 0.0016 µg/L, below the CUL. HE was detected in the SW-11R duplicate sample at a concentration of 0.0021 µg/L, also below the CUL.
- Trans-Chlordane was detected in SW-11R, and in the SW-11R duplicate sample, at a concentration of 0.0014 µg/L.
- No analytes other than HE and trans-Chlordane were detected in either well during 2Q21 groundwater monitoring.

May 2021 organochlorine pesticide data are provided in Table 1, and the laboratory data package is provided in Attachment 1. Time series data of recent HE concentrations in groundwater at SW-10R and SW-11R (dating back to January 2010) are presented on Figure 3.

Groundwater elevations at SW-10R and SW-11R were 185.52 and 185.22 feet mean sea level, respectively. This represents an approximate 5.5-foot decrease from the previous monitoring event, completed in February 2021. Depth-to-water and groundwater elevation data are provided in Table 2 and SW-10R groundwater elevation data collected since the remedial action is shown on Figure 3.

Environmental Information Management Submittal

An Environmental Information Management (EIM) submittal is required. The submittal was completed on June 11, 2021 and confirmation that the results have been uploaded to the EIM database is pending.

LANDAU ASSOCIATES, INC.

Katie M. Gauglitz

Katie Gauglitz, LG
Project Geologist

Eric Weber

Eric Weber, LHG, CWRE
Principal

KMG/EFW/kjg
[\\TACOMA3\PROJECT\774\006\R\QUARTERLY GW MONITORING REPORTS\2021_05_2Q21\LAI_WEBSTER NURSERY 2Q21 GW MONITORING_TM_06-15-21.DOCX]

References

LAI. 2017. Remedial Action Work Plan, Webster Nursery, 9805 Blomberg Street SW, Tumwater, Washington. Landau Associates, Inc. October 31.

LAI. 2018. Draft Cleanup Action Completion Report, Washington State Department of Natural Resources Webster Nursery, Tumwater, Washington. Landau Associates, Inc. October 12.

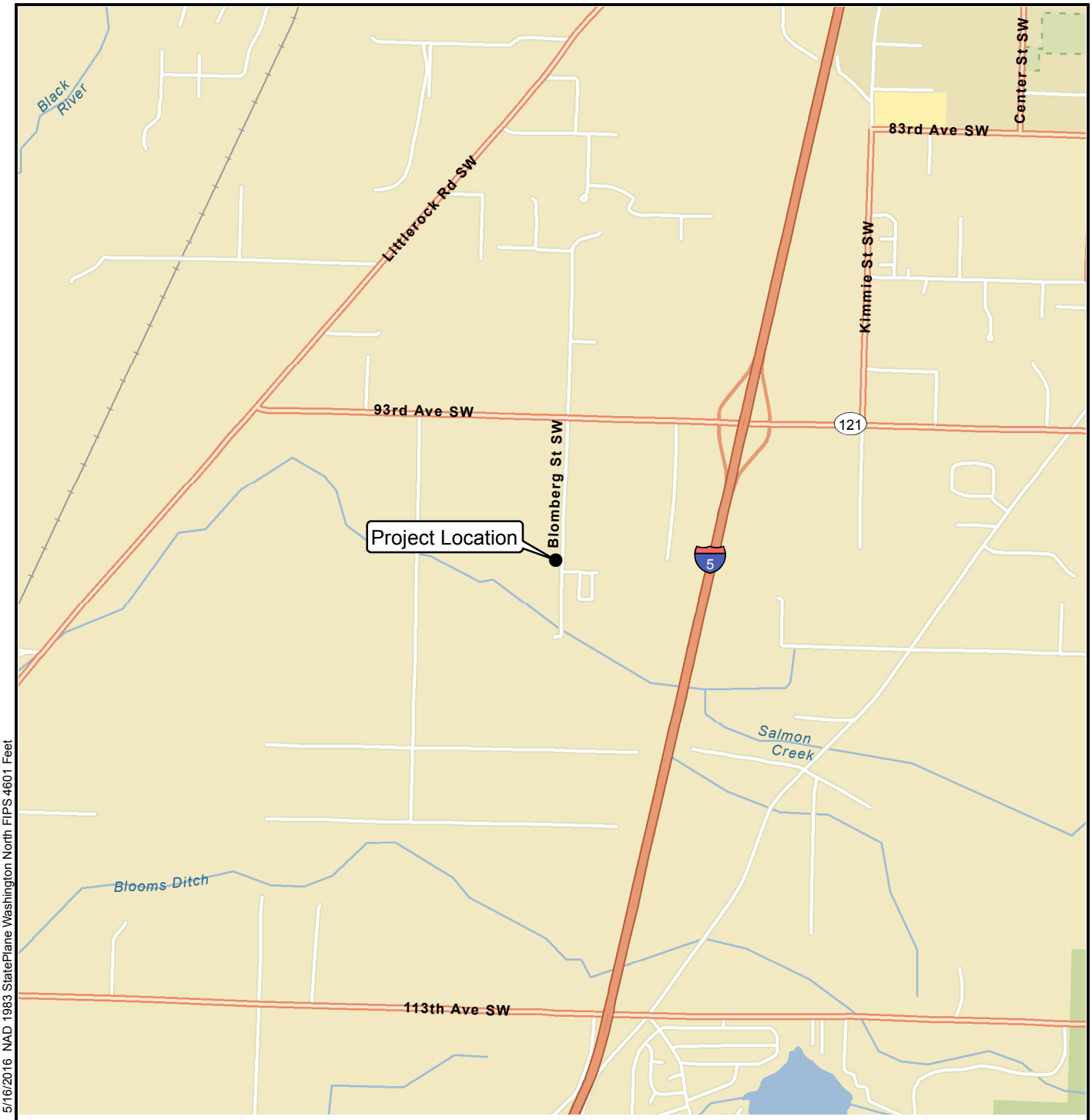
LAI. 2019. Compliance Monitoring Plan, Washington State Department of Natural Resources Webster Nursery, Tumwater, Washington. Landau Associates, Inc. July 24.

Attachments

Figure 1. Vicinity Map
Figure 2. Monitoring Well Network
Figure 3. Heptachlor Epoxide and Groundwater Elevation Time Series, SW-10(R) and SW-11(R)

Table 1. Groundwater Analytical Results
Table 2. Groundwater Level Measurements

Attachment 1. May 2021 Laboratory Data Package



N

0 0.5 1

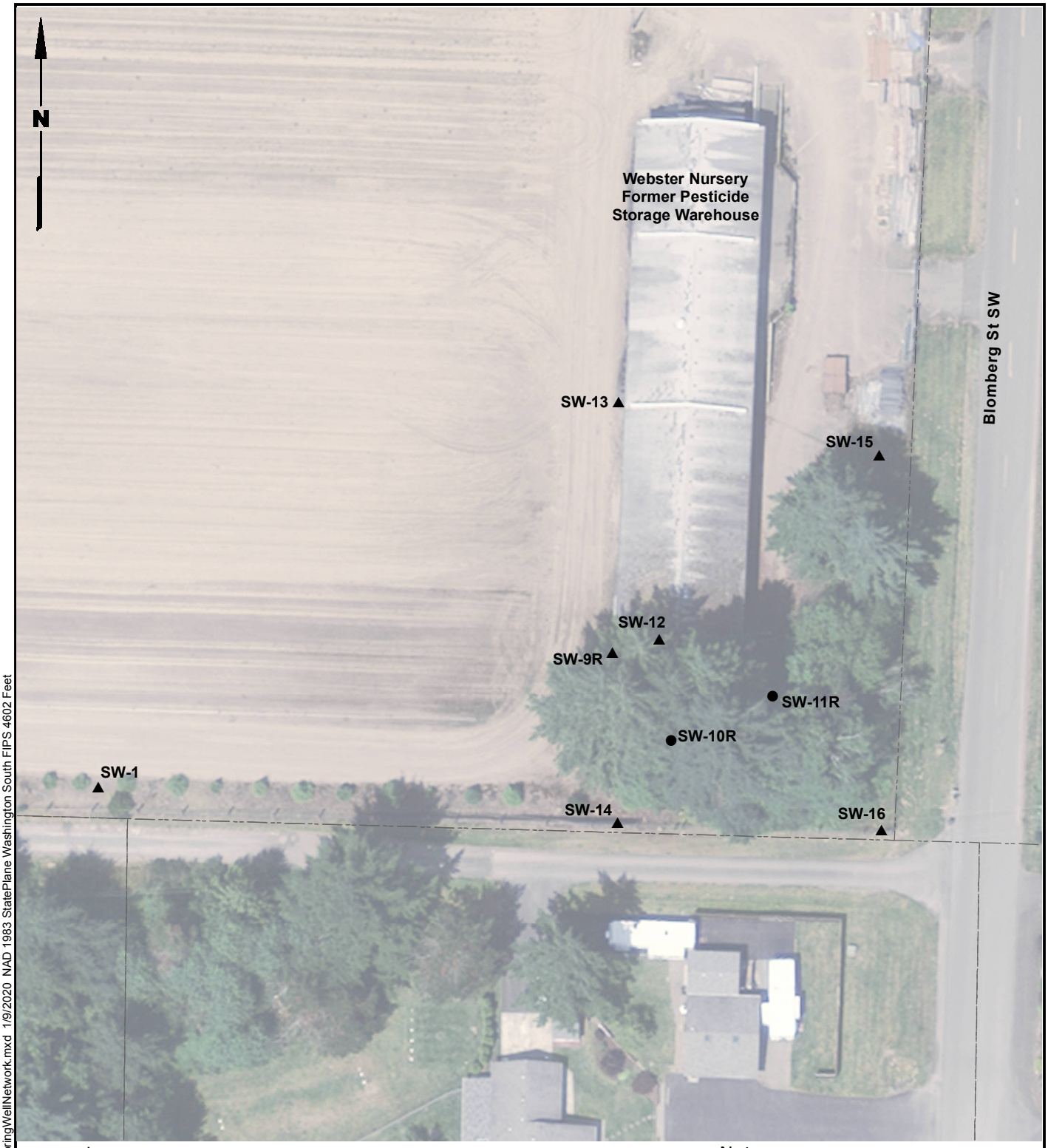
Miles

Data Source: Esri 2012

G:\Projects\774\006\020\026\FS\F01 VicinityMap.mxd 5/16/2016 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Webster Nursery Site Tumwater, Washington	**Vicinity Map**	Figure 1



G:\Projects\774\006\040\045\F02MonitoringWellNetwork.mxd 1/9/2020 NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- ● Pesticide Monitoring Well
- ▲ Other Monitoring Well
- Tax Parcels

0 50 100

Scale in Feet

Notes

1. SW-9R, SW-10R, and SW-11R are new (replacement) wells.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Sources: Thurston County GIS; WA DNR Survey, 2018.

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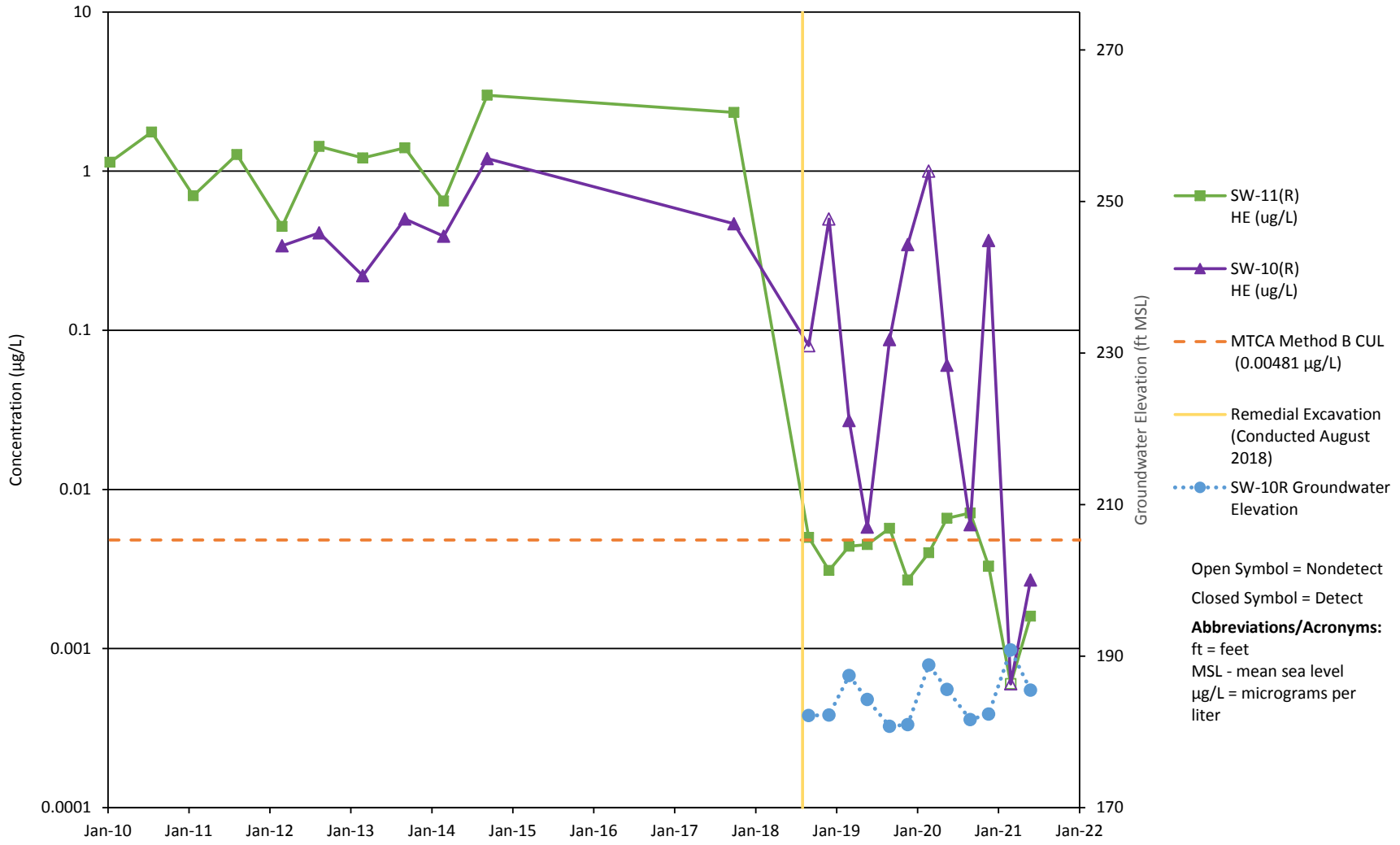
Webster Nursery Site Tumwater, Washington	**Monitoring Well Network**	Figure 2

\\tacoma3\PROJECT\774\006\R\Quarterly GW Monitoring Reports\2021_05_2Q21\Figures\F03_HE and GWE Timeseries



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Webster Nursery Site
Tumwater, Washington

Heptachlor Epoxide and Groundwater Elevation Time Series SW-10(R) and SW-11(R)

Figure
3

Table 1
Groundwater Analytical Results
Webster Nursery
Tumwater, Washington

Analyte	MTCA Method B Cleanup Levels Cancerous	Sample Location, Sample ID, Laboratory SDG, Sample Date, and Sample Type SW-10R SW-10R-20210525 21E0298 5/25/2021 N	 SW-11R SW-11R-20210525 21E0298 5/25/2021 N	 SW-11R SW-99-20210525 21E0298 5/25/2021 FD
Pesticides (µg/L; SW-846 8081B)				
4,4'-DDD	--	0.0013 U	0.0013 U	0.0013 U
4,4'-DDE	--	0.0013 U	0.0013 U	0.0013 U
4,4'-DDT	--	0.0013 U	0.0013 U	0.0013 U
Aldrin	--	0.0006 U	0.0006 U	0.0006 U
alpha-BHC	--	0.0006 U	0.0006 U	0.0006 U
beta-BHC	--	0.0006 U	0.0006 U	0.0006 U
Chlordane	0.25	0.0050 U	0.0050 U	0.0050 U
cis-Chlordane	--	0.0006 U	0.0006 U	0.0006 U
delta-BHC	--	0.0006 U	0.0006 U	0.0006 U
Dieldrin	--	0.0013 U	0.0013 U	0.0013 U
Endosulfan I	--	0.0006 U	0.0006 U	0.0006 U
Endosulfan II	--	0.0013 U	0.0013 U	0.0013 U
Endosulfan Sulfate	--	0.0013 U	0.0013 U	0.0013 U
Endrin	--	0.0013 U	0.0013 U	0.0013 U
Endrin Aldehyde	--	0.0013 U	0.0013 U	0.0013 U
Endrin Ketone	--	0.0013 U	0.0013 U	0.0013 U
gamma-BHC	--	0.0006 U	0.0006 U	0.0006 U
Heptachlor	0.0194	0.0006 U	0.0006 U	0.0006 U
Heptachlor Epoxide	0.00481	**0.0027 J**	**0.0016**	**0.0021 J**
Methoxychlor	--	0.0063 U	0.0063 U	0.0063 U
Toxaphene	--	0.0625 U	0.0625 U	0.0625 U
trans-Chlordane	--	0.0006 U	**0.0014**	**0.0014**

Notes:

-- = cleanup level not applicable

Bold text = Indicates detected analyte.

Green Box = Detected concentration is greater than the cleanup level

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte

Abbreviations and Acronyms:

FD = field duplicate

ID = identification

µg/L = micrograms per liter

MTCA = Model Toxics Control Act

N = primary sample

SDG = sample delivery group

Table 2
Groundwater Level Measurements
Webster Nursery
Tumwater, Washington

Well ID	Top of Casing Elevation (ft)	Depth to Water (ft bgs)	Groundwater Elevation (ft)
SW-10R	193.41	7.89	185.52
SW-11R	192.50	7.28	185.22

Notes:
Groundwater elevation data was collected May 25, 2021.

Abbreviations:
bgs = below ground surface
ft = feet
ID = identification

Attachment 1

May 2021 Laboratory Data Package

Analytical Resources, Incorporated
Analytical Chemists and Consultants

10 June 2021

Sierra Mott
Landau Associates, Inc. - Tacoma
2107 South C Street
Tacoma, WA 98402

RE: Webster Nursery

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
21E0298	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

21E0298

LANDAU ASSOCIATES

Chain-of-Custody Record

☐ **Seattle/Edmonds** (425) 778-0907 ☐ **Spokane** (509) 327-9737
☒ **Tacoma** (253) 926-2493 ☐ **Portland** (503) 542-1080
☐ _____

Date 5/25/2021
Page _____ of _____

Turnaround Time:
(Standard) _____
Accelerated _____

Project Name Webster Nursery Project No. 774006.040.046
Project Location/Event Olympia WA/2Q Sampling
Sampler's Name SMR
Project Contact Sierra Mott, Katie Gauglitz
Send Results To S. Mott, D. Jorgensen, E. Weber

Special Handling Requirements: _____
Shipment Method: _____
Stored on ice: (Yes) / No

Sample I.D.	Date	Time	Matrix	No. of Containers	Testing Parameters: Pesticides-organochlorine EPA 8081B	Observations/Comments
SW-10R-20210525	5/25/21	920	Aq	2	X	
SW-11R-20210525	5/25/21	1010	Aq	2	X	
SW-99-20210525	5/25/21	1011	Aq	2	X	

Allow water samples to settle, collect aliquot from clear portion ☐

NWTPH-Dx - Acid wash cleanup ☐
- Silica gel cleanup ☐

Dissolved metal samples were field filtered

Other _____

Relinquished by	Received by	Relinquished by	Received by
Signature [signature]	Signature [signature]	Signature	Signature
Printed Name Simone Rodriguez	Printed Name Samantha Colon	Printed Name	Printed Name
Company Landau Associates Inc	Company ARI	Company	Company
Date 5/25/2021 Time	Date 5/25/21 Time 1418	Date Time	Date Time

WHITE COPY - Laboratory YELLOW COPY - Project File PINK COPY - Client Representative

10/2018

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SW-10R-20210525	21E0298-01	Water	25-May-2021 09:20	25-May-2021 14:18
SW-11R-20210525	21E0298-02	Water	25-May-2021 10:10	25-May-2021 14:18
SW-99-20210525	21E0298-03	Water	25-May-2021 10:11	25-May-2021 14:18

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

Work Order Case Narrative

Pesticides - EPA Method SW8081B

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Landau

Project Name: Webster Nursery

COC No(s): _____ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 21E0298

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1452 4.3 4.8 ____ ____ ____ ____

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D00520L

Cooler Accepted by: SC Date: 5/25/21 Time: 1418

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA YES NO

How were bottles sealed in plastic bags? Individually Grouped Not

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA _____

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: SC Date: 5/25/21 Time: 1501 Labels checked by: SC

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

SW-10R-20210525

21E0298-01 (Water)

Chlorinated Pesticides

Method: EPA 8081B — Sampled: 05/25/2021 09:20

Instrument: ECD6 Analyst: YZ — Analyzed: 06/07/2021 19:35

Sample Preparation:	Preparation Method: EPA 3510C SepF		Extract ID: 21E0298-01 A 01
	Preparation Batch: BJE0709	Sample Size: 1000 mL	
	Prepared: 06/01/2021	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 21E0298-01 A 01
	Cleanup Batch: CJF0051	Initial Volume: 0.5 mL	
	Cleaned: 06-Jun-2021	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:21E0298-01 A 01
	Cleanup Batch: CJF0050	Initial Volume: 0.5 mL	
	Cleaned: 05-Jun-2021	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.0006	ND	ug/L	U
beta-BHC	319-85-7	1	0.0006	ND	ug/L	U
gamma-BHC (Lindane)	58-89-9	1	0.0006	ND	ug/L	U
delta-BHC	319-86-8	1	0.0006	ND	ug/L	U
Heptachlor	76-44-8	1	0.0006	ND	ug/L	U
Aldrin	309-00-2	1	0.0006	ND	ug/L	U
Heptachlor Epoxide	1024-57-3	1	0.0006	0.0027	ug/L	P1
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.0006	ND	ug/L	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.0006	ND	ug/L	U
Endosulfan I	959-98-8	1	0.0006	ND	ug/L	U
4,4'-DDE	72-55-9	1	0.0013	ND	ug/L	U
Dieldrin	60-57-1	1	0.0013	ND	ug/L	U
Endrin	72-20-8	1	0.0013	ND	ug/L	U
Endosulfan II	33213-65-9	1	0.0013	ND	ug/L	U
4,4'-DDD	72-54-8	1	0.0013	ND	ug/L	U
Endrin Aldehyde	7421-93-4	1	0.0013	ND	ug/L	U
4,4'-DDT	50-29-3	1	0.0013	ND	ug/L	U
Endosulfan Sulfate	1031-07-8	1	0.0013	ND	ug/L	U
Endrin Ketone	53494-70-5	1	0.0013	ND	ug/L	U
Methoxychlor	72-43-5	1	0.0063	ND	ug/L	U
Toxaphene	8001-35-2	1	0.0625	ND	ug/L	U
Chlordane (NOS)	57-74-9	1	0.0050	ND	ug/L	U
Surrogate: Decachlorobiphenyl			*30-160 %*	*86.2*	*%*	
Surrogate: Decachlorobiphenyl [2C]			*30-160 %*	*91.2*	*%*	
Surrogate: Tetrachlorometaxylene			*30-160 %*	*81.7*	*%*	
Surrogate: Tetrachlorometaxylene [2C]			*30-160 %*	*73.2*	*%*	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

SW-11R-20210525

21E0298-02 (Water)

Chlorinated Pesticides

Method: EPA 8081B — Sampled: 05/25/2021 10:10

Instrument: ECD6 Analyst: YZ — Analyzed: 06/07/2021 19:54

Sample Preparation:	Preparation Method: EPA 3510C SepF		Extract ID: 21E0298-02 A 01
	Preparation Batch: BJE0709	Sample Size: 1000 mL	
	Prepared: 06/01/2021	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 21E0298-02 A 01
	Cleanup Batch: CJF0051	Initial Volume: 0.5 mL	
	Cleaned: 06-Jun-2021	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:21E0298-02 A 01
	Cleanup Batch: CJF0050	Initial Volume: 0.5 mL	
	Cleaned: 05-Jun-2021	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.0006	ND	ug/L	U
beta-BHC	319-85-7	1	0.0006	ND	ug/L	U
gamma-BHC (Lindane)	58-89-9	1	0.0006	ND	ug/L	U
delta-BHC	319-86-8	1	0.0006	ND	ug/L	U
Heptachlor	76-44-8	1	0.0006	ND	ug/L	U
Aldrin	309-00-2	1	0.0006	ND	ug/L	U
Heptachlor Epoxide	1024-57-3	1	0.0006	0.0016	ug/L	
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.0006	0.0014	ug/L	
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.0006	ND	ug/L	U
Endosulfan I	959-98-8	1	0.0006	ND	ug/L	U
4,4'-DDE	72-55-9	1	0.0013	ND	ug/L	U
Dieldrin	60-57-1	1	0.0013	ND	ug/L	U
Endrin	72-20-8	1	0.0013	ND	ug/L	U
Endosulfan II	33213-65-9	1	0.0013	ND	ug/L	U
4,4'-DDD	72-54-8	1	0.0013	ND	ug/L	U
Endrin Aldehyde	7421-93-4	1	0.0013	ND	ug/L	U
4,4'-DDT	50-29-3	1	0.0013	ND	ug/L	U
Endosulfan Sulfate	1031-07-8	1	0.0013	ND	ug/L	U
Endrin Ketone	53494-70-5	1	0.0013	ND	ug/L	U
Methoxychlor	72-43-5	1	0.0063	ND	ug/L	U
Toxaphene	8001-35-2	1	0.0625	ND	ug/L	U
Chlordane (NOS)	57-74-9	1	0.0050	ND	ug/L	U
Surrogate: Decachlorobiphenyl			*30-160 %*	*83.9*	*%*	
Surrogate: Decachlorobiphenyl [2C]			*30-160 %*	*87.4*	*%*	
Surrogate: Tetrachlorometaxylene			*30-160 %*	*80.9*	*%*	
Surrogate: Tetrachlorometaxylene [2C]			*30-160 %*	*77.2*	*%*	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

SW-99-20210525

21E0298-03 (Water)

Chlorinated Pesticides

Method: EPA 8081B — Sampled: 05/25/2021 10:11

Instrument: ECD6 Analyst: YZ — Analyzed: 06/07/2021 20:12

Sample Preparation:	Preparation Method: EPA 3510C SepF		Extract ID: 21E0298-03 A 01
	Preparation Batch: BJE0709	Sample Size: 1000 mL	
	Prepared: 06/01/2021	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 21E0298-03 A 01
	Cleanup Batch: CJF0051	Initial Volume: 0.5 mL	
	Cleaned: 06-Jun-2021	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:21E0298-03 A 01
	Cleanup Batch: CJF0050	Initial Volume: 0.5 mL	
	Cleaned: 05-Jun-2021	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.0006	ND	ug/L	U
beta-BHC	319-85-7	1	0.0006	ND	ug/L	U
gamma-BHC (Lindane)	58-89-9	1	0.0006	ND	ug/L	U
delta-BHC	319-86-8	1	0.0006	ND	ug/L	U
Heptachlor	76-44-8	1	0.0006	ND	ug/L	U
Aldrin	309-00-2	1	0.0006	ND	ug/L	U
Heptachlor Epoxide	1024-57-3	1	0.0006	0.0021	ug/L	P1
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.0006	0.0014	ug/L	
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.0006	ND	ug/L	U
Endosulfan I	959-98-8	1	0.0006	ND	ug/L	U
4,4'-DDE	72-55-9	1	0.0013	ND	ug/L	U
Dieldrin	60-57-1	1	0.0013	ND	ug/L	U
Endrin	72-20-8	1	0.0013	ND	ug/L	U
Endosulfan II	33213-65-9	1	0.0013	ND	ug/L	U
4,4'-DDD	72-54-8	1	0.0013	ND	ug/L	U
Endrin Aldehyde	7421-93-4	1	0.0013	ND	ug/L	U
4,4'-DDT	50-29-3	1	0.0013	ND	ug/L	U
Endosulfan Sulfate	1031-07-8	1	0.0013	ND	ug/L	U
Endrin Ketone	53494-70-5	1	0.0013	ND	ug/L	U
Methoxychlor	72-43-5	1	0.0063	ND	ug/L	U
Toxaphene	8001-35-2	1	0.0625	ND	ug/L	U
Chlordane (NOS)	57-74-9	1	0.0050	ND	ug/L	U
Surrogate: Decachlorobiphenyl			*30-160 %*	*86.4*	*%*	
Surrogate: Decachlorobiphenyl [2C]			*30-160 %*	*85.9*	*%*	
Surrogate: Tetrachlorometaxylene			*30-160 %*	*79.4*	*%*	
Surrogate: Tetrachlorometaxylene [2C]			*30-160 %*	*73.5*	*%*	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

Chlorinated Pesticides - Quality Control

Batch BJE0709 - EPA 3510C SepF

Instrument: ECD6 Analyst: YZ

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BJE0709-BLK1)				Prepared: 01-Jun-2021 Analyzed: 07-Jun-2021 18:04						
alpha-BHC	ND	0.0006	ug/L							U
beta-BHC	ND	0.0006	ug/L							U
gamma-BHC (Lindane)	ND	0.0006	ug/L							U
delta-BHC	ND	0.0006	ug/L							U
Heptachlor	ND	0.0006	ug/L							U
Aldrin	ND	0.0006	ug/L							U
Heptachlor Epoxide	ND	0.0006	ug/L							U
trans-Chlordane (beta-Chlordane)	ND	0.0006	ug/L							U
cis-Chlordane (alpha-chlordane)	ND	0.0006	ug/L							U
Endosulfan I	ND	0.0006	ug/L							U
4,4'-DDE	ND	0.0013	ug/L							U
Dieldrin	ND	0.0013	ug/L							U
Endrin	ND	0.0013	ug/L							U
Endosulfan II	ND	0.0013	ug/L							U
4,4'-DDD	ND	0.0013	ug/L							U
Endrin Aldehyde	ND	0.0013	ug/L							U
4,4'-DDT	ND	0.0013	ug/L							U
Endosulfan Sulfate	ND	0.0013	ug/L							U
Endrin Ketone	ND	0.0013	ug/L							U
Methoxychlor	ND	0.0063	ug/L							U
Toxaphene	ND	0.0625	ug/L							U
Chlordane (NOS)	ND	0.0050	ug/L							U
Surrogate: Decachlorobiphenyl	0.0208		ug/L	*0.0200*		*104*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0239		ug/L	*0.0200*		*119*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0149		ug/L	*0.0200*		*74.7*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0178		ug/L	*0.0200*		*88.9*	*30-160*			
LCS (BJE0709-BS1)				Prepared: 01-Jun-2021 Analyzed: 07-Jun-2021 18:22						
alpha-BHC [2C]	0.0086	0.0006	ug/L	0.0100		86.1	30-160			
beta-BHC [2C]	0.0085	0.0006	ug/L	0.0100		84.8	30-160			
gamma-BHC (Lindane) [2C]	0.0086	0.0006	ug/L	0.0100		85.6	30-160			
delta-BHC [2C]	0.0096	0.0006	ug/L	0.0100		96.3	30-160			
Heptachlor [2C]	0.0084	0.0006	ug/L	0.0100		84.1	30-160			
Aldrin [2C]	0.0103	0.0006	ug/L	0.0100		103	30-160			
Heptachlor Epoxide [2C]	0.0104	0.0006	ug/L	0.0100		104	30-160			

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

Chlorinated Pesticides - Quality Control

Batch BJE0709 - EPA 3510C SepF

Instrument: ECD6 Analyst: YZ

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BJE0709-BS1)				Prepared: 01-Jun-2021	Analyzed: 07-Jun-2021 18:22					
trans-Chlordane (beta-Chlordane) [2C]	0.0103	0.0006	ug/L	0.0100		103	30-160			
cis-Chlordane (alpha-chlordane) [2C]	0.0100	0.0006	ug/L	0.0100		100	30-160			
Endosulfan I [2C]	0.0103	0.0006	ug/L	0.0100		103	30-160			
4,4'-DDE [2C]	0.0211	0.0013	ug/L	0.0200		105	30-160			
Dieldrin [2C]	0.0212	0.0013	ug/L	0.0200		106	30-160			
Endrin [2C]	0.0213	0.0013	ug/L	0.0200		106	30-160			
Endosulfan II [2C]	0.0224	0.0013	ug/L	0.0200		112	30-160			
4,4'-DDD [2C]	0.0219	0.0013	ug/L	0.0200		109	30-160			
Endrin Aldehyde [2C]	0.0145	0.0013	ug/L	0.0200		72.5	30-160			
4,4'-DDT [2C]	0.0205	0.0013	ug/L	0.0200		102	30-160			
Endosulfan Sulfate [2C]	0.0198	0.0013	ug/L	0.0200		99.0	30-160			
Endrin Ketone [2C]	0.0195	0.0013	ug/L	0.0200		97.3	30-160			
Methoxychlor [2C]	0.0967	0.0063	ug/L	0.100		96.7	30-160			
Surrogate: Decachlorobiphenyl	0.0186		ug/L	*0.0200*		*93.0*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0237		ug/L	*0.0200*		*119*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0149		ug/L	*0.0200*		*74.6*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0171		ug/L	*0.0200*		*85.4*	*30-160*			
LCS (BJE0709-BS2)				Prepared: 01-Jun-2021	Analyzed: 07-Jun-2021 18:41					
Toxaphene	0.724	0.0625	ug/L	1.00		72.4	30-160			
Surrogate: Decachlorobiphenyl	0.0157		ug/L	*0.0200*		*78.7*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0184		ug/L	*0.0200*		*92.2*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0129		ug/L	*0.0200*		*64.6*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0130		ug/L	*0.0200*		*65.1*	*30-160*			
LCS (BJE0709-BS3)				Prepared: 01-Jun-2021	Analyzed: 07-Jun-2021 18:59					
Chlordane (NOS) [2C]	0.279	0.0050	ug/L	0.400		69.8	0-200			
Surrogate: Decachlorobiphenyl	0.0159		ug/L	*0.0200*		*79.7*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0164		ug/L	*0.0200*		*82.1*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0126		ug/L	*0.0200*		*63.0*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0133		ug/L	*0.0200*		*66.4*	*30-160*			
LCS Dup (BJE0709-BSD1)				Prepared: 01-Jun-2021	Analyzed: 07-Jun-2021 19:17					
alpha-BHC [2C]	0.0091	0.0006	ug/L	0.0100		90.8	30-160	5.36	30	

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Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

Chlorinated Pesticides - Quality Control

Batch BJE0709 - EPA 3510C SepF

Instrument: ECD6 Analyst: YZ

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BJE0709-BSD1)				Prepared: 01-Jun-2021 Analyzed: 07-Jun-2021 19:17						
beta-BHC [2C]	0.0089	0.0006	ug/L	0.0100		89.4	30-160	5.20	30	
gamma-BHC (Lindane) [2C]	0.0088	0.0006	ug/L	0.0100		87.8	30-160	2.50	30	
delta-BHC [2C]	0.0104	0.0006	ug/L	0.0100		104	30-160	7.71	30	
Heptachlor	0.0094	0.0006	ug/L	0.0100		93.8	30-160	20.90	30	
Aldrin [2C]	0.0115	0.0006	ug/L	0.0100		115	30-160	11.50	30	
Heptachlor Epoxide [2C]	0.0107	0.0006	ug/L	0.0100		107	30-160	2.95	30	
trans-Chlordane (beta-Chlordane) [2C]	0.0108	0.0006	ug/L	0.0100		108	30-160	4.48	30	
cis-Chlordane (alpha-chlordane) [2C]	0.0104	0.0006	ug/L	0.0100		104	30-160	3.99	30	
Endosulfan I [2C]	0.0106	0.0006	ug/L	0.0100		106	30-160	3.52	30	
4,4'-DDE [2C]	0.0221	0.0013	ug/L	0.0200		110	30-160	4.68	30	
Dieldrin [2C]	0.0220	0.0013	ug/L	0.0200		110	30-160	3.73	30	
Endrin [2C]	0.0190	0.0013	ug/L	0.0200		95.1	30-160	11.10	30	
Endosulfan II [2C]	0.0242	0.0013	ug/L	0.0200		121	30-160	7.63	30	
4,4'-DDD [2C]	0.0232	0.0013	ug/L	0.0200		116	30-160	5.91	30	
Endrin Aldehyde [2C]	0.0138	0.0013	ug/L	0.0200		69.1	30-160	4.87	30	
4,4'-DDT [2C]	0.0213	0.0013	ug/L	0.0200		107	30-160	4.12	30	
Endosulfan Sulfate [2C]	0.0207	0.0013	ug/L	0.0200		103	30-160	4.34	30	
Endrin Ketone [2C]	0.0215	0.0013	ug/L	0.0200		107	30-160	9.83	30	
Methoxychlor [2C]	0.102	0.0063	ug/L	0.100		102	30-160	5.80	30	
Surrogate: Decachlorobiphenyl	0.0189		ug/L	*0.0200*		*94.5*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0232		ug/L	*0.0200*		*116*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0159		ug/L	*0.0200*		*79.6*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0185		ug/L	*0.0200*		*92.4*	*30-160*			

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Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
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Tacoma WA, 98402	Project Manager: Sierra Mott	10-Jun-2021 11:06

Certified Analyses included in this Report

Analyte	Certifications
EPA 8081B in Water	
alpha-BHC	DoD-ELAP,NELAP
alpha-BHC	DoD-ELAP,WADOE,NELAP
alpha-BHC [2C]	DoD-ELAP,WADOE,NELAP
alpha-BHC [2C]	DoD-ELAP,NELAP
beta-BHC	DoD-ELAP,WADOE,NELAP
beta-BHC	DoD-ELAP,NELAP
beta-BHC [2C]	DoD-ELAP,WADOE,NELAP
beta-BHC [2C]	DoD-ELAP,NELAP
gamma-BHC (Lindane)	DoD-ELAP,NELAP
gamma-BHC (Lindane)	DoD-ELAP,WADOE,NELAP
gamma-BHC (Lindane) [2C]	DoD-ELAP,NELAP
gamma-BHC (Lindane) [2C]	DoD-ELAP,WADOE,NELAP
delta-BHC	DoD-ELAP,WADOE,NELAP
delta-BHC	DoD-ELAP,NELAP
delta-BHC [2C]	DoD-ELAP,NELAP
delta-BHC [2C]	DoD-ELAP,WADOE,NELAP
Heptachlor	DoD-ELAP,NELAP
Heptachlor	DoD-ELAP,WADOE,NELAP
Heptachlor [2C]	DoD-ELAP,NELAP
Heptachlor [2C]	DoD-ELAP,WADOE,NELAP
Aldrin	DoD-ELAP,WADOE,NELAP
Aldrin	DoD-ELAP,NELAP
Aldrin [2C]	DoD-ELAP,NELAP
Aldrin [2C]	DoD-ELAP,WADOE,NELAP
Heptachlor Epoxide	DoD-ELAP,WADOE,NELAP
Heptachlor Epoxide	DoD-ELAP,NELAP
Heptachlor Epoxide [2C]	DoD-ELAP,NELAP
Heptachlor Epoxide [2C]	DoD-ELAP,WADOE,NELAP
trans-Chlordane (beta-Chlordane)	DoD-ELAP,WADOE,NELAP
trans-Chlordane (beta-Chlordane)	DoD-ELAP,NELAP
trans-Chlordane (beta-Chlordane) [2C]	DoD-ELAP,NELAP
trans-Chlordane (beta-Chlordane) [2C]	DoD-ELAP,WADOE,NELAP
cis-Chlordane (alpha-chlordane)	DoD-ELAP,NELAP
cis-Chlordane (alpha-chlordane)	DoD-ELAP,WADOE,NELAP
cis-Chlordane (alpha-chlordane) [2C]	DoD-ELAP,WADOE,NELAP

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cis-Chlordane (alpha-chlordane) [2C]	DoD-ELAP,NELAP
Endosulfan I	DoD-ELAP,NELAP
Endosulfan I	DoD-ELAP,WADOE,NELAP
Endosulfan I [2C]	DoD-ELAP,NELAP
Endosulfan I [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDE	DoD-ELAP,NELAP
4,4'-DDE	DoD-ELAP,WADOE,NELAP
4,4'-DDE [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDE [2C]	DoD-ELAP,NELAP
Dieldrin	DoD-ELAP,WADOE,NELAP
Dieldrin	DoD-ELAP,NELAP
Dieldrin [2C]	DoD-ELAP,WADOE,NELAP
Dieldrin [2C]	DoD-ELAP,NELAP
Endrin	DoD-ELAP,NELAP
Endrin	DoD-ELAP,WADOE,NELAP
Endrin [2C]	DoD-ELAP,NELAP
Endrin [2C]	DoD-ELAP,WADOE,NELAP
Endosulfan II	DoD-ELAP,WADOE,NELAP
Endosulfan II	DoD-ELAP,NELAP
Endosulfan II [2C]	DoD-ELAP,NELAP
Endosulfan II [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDD	DoD-ELAP,NELAP
4,4'-DDD	DoD-ELAP,WADOE,NELAP
4,4'-DDD [2C]	DoD-ELAP,NELAP
4,4'-DDD [2C]	DoD-ELAP,WADOE,NELAP
Endrin Aldehyde	DoD-ELAP,WADOE,NELAP
Endrin Aldehyde	DoD-ELAP,NELAP
Endrin Aldehyde [2C]	DoD-ELAP,WADOE,NELAP
Endrin Aldehyde [2C]	DoD-ELAP,NELAP
4,4'-DDT	DoD-ELAP,NELAP
4,4'-DDT	DoD-ELAP,WADOE,NELAP
4,4'-DDT [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDT [2C]	DoD-ELAP,NELAP
Endosulfan Sulfate	DoD-ELAP,NELAP
Endosulfan Sulfate	DoD-ELAP,WADOE,NELAP
Endosulfan Sulfate [2C]	DoD-ELAP,NELAP
Endosulfan Sulfate [2C]	DoD-ELAP,WADOE,NELAP
Endrin Ketone	DoD-ELAP,WADOE,NELAP
Endrin Ketone	DoD-ELAP,NELAP

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Endrin Ketone [2C]	DoD-ELAP,NELAP
Endrin Ketone [2C]	DoD-ELAP,WADOE,NELAP
Methoxychlor	DoD-ELAP,NELAP
Methoxychlor	DoD-ELAP,WADOE,NELAP
Methoxychlor [2C]	DoD-ELAP,NELAP
Methoxychlor [2C]	DoD-ELAP,WADOE,NELAP
Hexachlorobutadiene	DoD-ELAP,WADOE,NELAP
Hexachlorobutadiene	DoD-ELAP,NELAP
Hexachlorobutadiene [2C]	DoD-ELAP,WADOE,NELAP
Hexachlorobutadiene [2C]	DoD-ELAP,NELAP
Hexachlorobenzene	DoD-ELAP,NELAP
Hexachlorobenzene	DoD-ELAP,WADOE,NELAP
Hexachlorobenzene [2C]	DoD-ELAP,NELAP
Hexachlorobenzene [2C]	DoD-ELAP,WADOE,NELAP
2,4'-DDE	DoD-ELAP
2,4'-DDE	DoD-ELAP
2,4'-DDE [2C]	DoD-ELAP
2,4'-DDE [2C]	DoD-ELAP
2,4'-DDD	DoD-ELAP
2,4'-DDD	DoD-ELAP
2,4'-DDD [2C]	DoD-ELAP
2,4'-DDD [2C]	DoD-ELAP
2,4'-DDT	DoD-ELAP
2,4'-DDT	DoD-ELAP
2,4'-DDT [2C]	DoD-ELAP
2,4'-DDT [2C]	DoD-ELAP
Oxychlordane	DoD-ELAP
Oxychlordane	DoD-ELAP
Oxychlordane [2C]	DoD-ELAP
Oxychlordane [2C]	DoD-ELAP
cis-Nonachlor	DoD-ELAP
cis-Nonachlor	DoD-ELAP
cis-Nonachlor [2C]	DoD-ELAP
cis-Nonachlor [2C]	DoD-ELAP
trans-Nonachlor	DoD-ELAP
trans-Nonachlor	DoD-ELAP
trans-Nonachlor [2C]	DoD-ELAP
trans-Nonachlor [2C]	DoD-ELAP
Mirex	DoD-ELAP

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Mirex	DoD-ELAP
Mirex [2C]	DoD-ELAP
Mirex [2C]	DoD-ELAP
Toxaphene	DoD-ELAP
Toxaphene	DoD-ELAP
Toxaphene [2C]	DoD-ELAP
Toxaphene [2C]	DoD-ELAP
Chlordane, technical	DoD-ELAP
Chlordane, technical	DoD-ELAP
Chlordane, technical [2C]	DoD-ELAP
Chlordane, technical [2C]	DoD-ELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2023
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/28/2022
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2022

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Notes and Definitions

*	Flagged value is not within established control limits.
P1	The reported value is greater than 40% difference between the concentrations determined on two GC columns where applicable.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.