

Technical Memorandum

TO: Steve Teal, Washington State Department of Ecology
CC: Amy Sikora, Washington State Department of Natural Resources
FROM: Katie Gauglitz, LG
DATE: April 5, 2022
RE: **First Quarter 2022 Groundwater Monitoring Results
Webster Nursery Site, Site Identification 3380
Tumwater, Washington
Project No. 0774006.040.047**

Introduction

This technical memorandum summarizes the results of quarterly groundwater monitoring completed by Landau Associates, Inc. (Landau) 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 chlordanes.

Remedial action excavation and disposal of HE-contaminated soil was completed in August 2018. A summary of the remedial action is provided in a Cleanup Action Completion Report (Landau 2020).

Groundwater Monitoring

First quarter 2022 (1Q22) groundwater monitoring was completed on February 22, 2022 in accordance with the framework established by Washington State Department of Ecology (Ecology) Agreed Order Number DE 00TCP-SR295, the Remedial Action Work Plan (Landau 2017), and the Compliance Monitoring Plan (Landau 2019). Groundwater samples were collected from two wells (SW-10R and SW-11R; Figure 2).

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 Professional Plus multi-parameter instrument, and measuring turbidity with a handheld meter. One duplicate sample (SW-99 at SW-11R) was collected for quality control purposes. Analytical Resources, Inc. of Tukwila, Washington analyzed the groundwater samples for organochlorine pesticides using U.S. Environmental Protection Agency Method 8081B low-level.

Groundwater Monitoring Results

Groundwater monitoring results are summarized below:

- HE was not detected in SW-10R or SW-11R above laboratory reporting limits.

- No other analytes were detected in either well during 1Q22 groundwater monitoring.

February 2022 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. A review of historical trends indicates concentrations of HE are lowest during the wet season (HE was also not detected above the laboratory reporting limit in SW-10R and SW-11R in February 2021) and that overall concentrations of HE appear to be decreasing over time.

Groundwater elevations at SW-10R and SW-11R were 187.96 and 188.28 feet mean sea level, respectively. This represents an approximate 3.5-foot increase from the previous monitoring event, completed in November 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 1Q22 submittal was completed on March 30, 2022, and confirmation that the results have been uploaded to the EIM database is pending.

Conclusions and Next Steps

Landau will continue to conduct quarterly monitoring through May 2023. The next monitoring event is scheduled for May 2022.

Use of this Report

This technical memorandum has been prepared for the exclusive use of Washington State Department of Natural Resources and Washington State Department of Ecology for specific application to the Webster Nursery site. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau Associates makes no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.



Katie Gauglitz, LG
Senior Project Geologist

KMG/SMM/kjg

[\\TACOMA3\PROJECT\774\006 WEBSTER\R\QUARTERLY GW MONITORING REPORTS\2022_02_1Q22\LAI_WEBSTER NURSERY 1Q22 GW MONITORING_TM_4-5-22.DOCX]

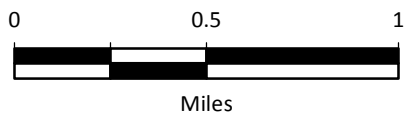
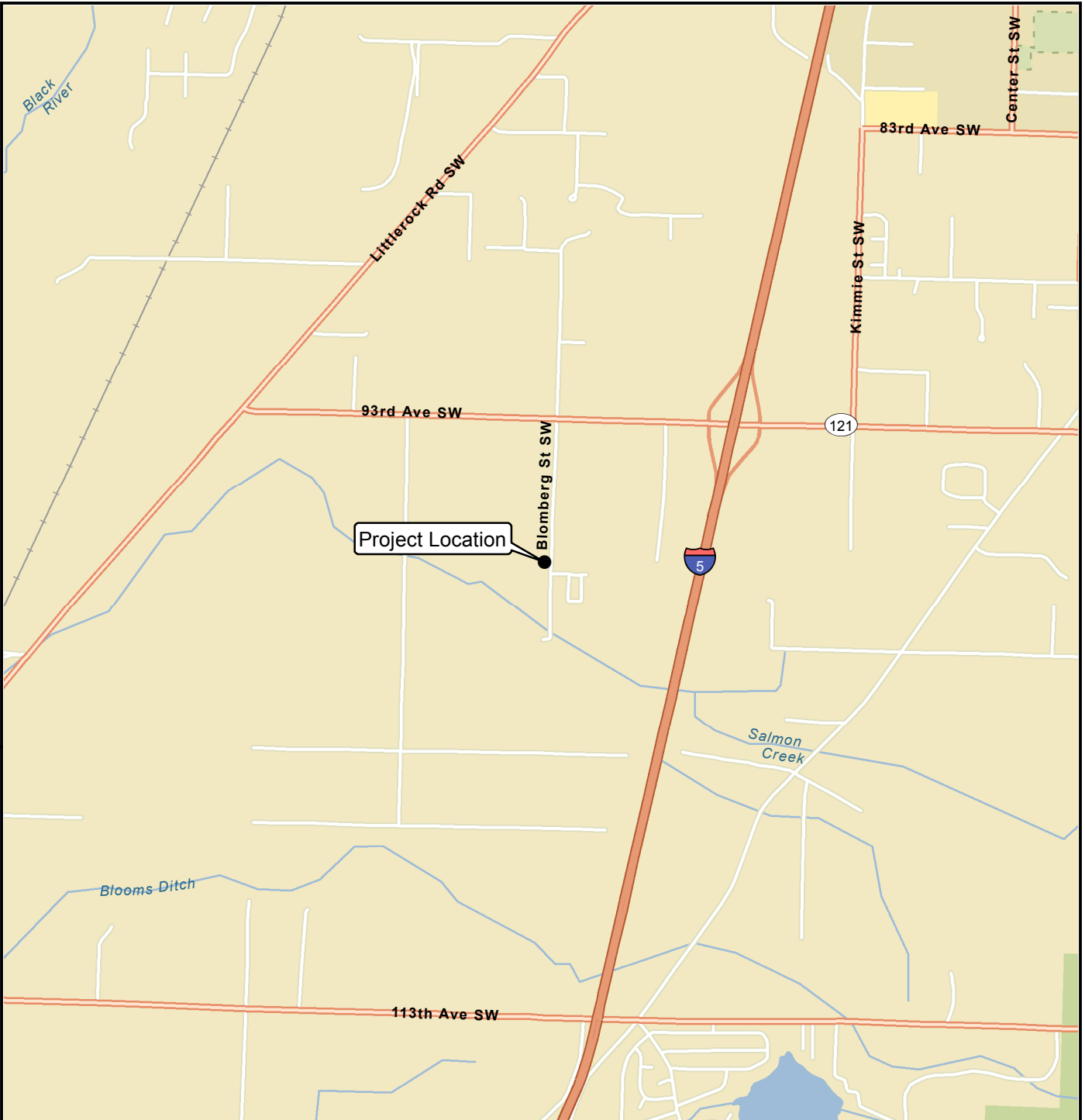
References

- Landau. 2017. Remedial Action Work Plan, Webster Nursery, 9805 Blomberg Street SW, Tumwater, Washington. Landau Associates, Inc. October 31.
- Landau. 2019. Compliance Monitoring Plan, Washington State Department of Natural Resources Webster Nursery, Tumwater, Washington. Landau Associates, Inc. July 24.
- Landau. 2020. Final: Cleanup Action Completion Report, Washington State Department of Natural Resources Webster Nursery, Tumwater, Washington. Landau Associates, Inc. May 29.

Attachments

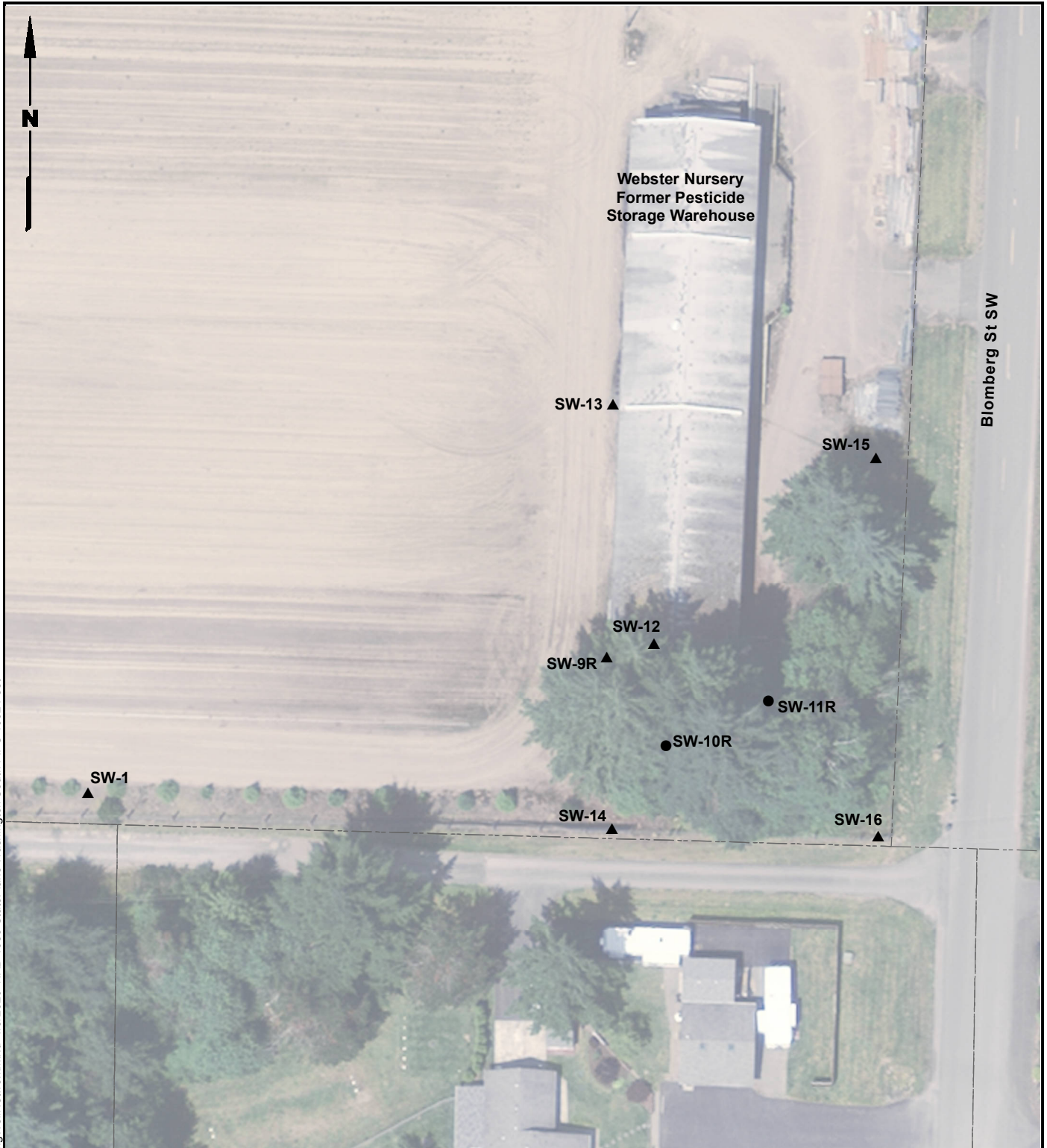
- Figure 1 Vicinity Map
- Figure 2 Monitoring Well Network
- Figure 3 Heptachlor Epoxide and Groundwater Elevation Time Series SW-10(R) and SW-11(R)
- Table 1 Groundwater Analytical Results
- Table 2 Groundwater Level Measurements
- Attachment 1 February 2022 Laboratory Data Packages

G:\Projects\774\006\020\026\FIS\F01_VicinityMap.mxd 5/16/2016 NAD 1983 StatePlane Washington North FIPS 4601 Feet



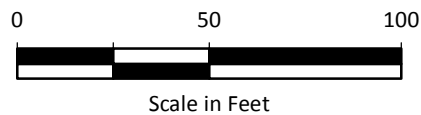
Data Source: Esri 2012

G:\Projects\7741006\0401\045\F02MonitoringWellNetwork.mxd 1/9/2020 NAD 1983 StatePlane Washington South FIPS 4602 Feet



Legend

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



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.

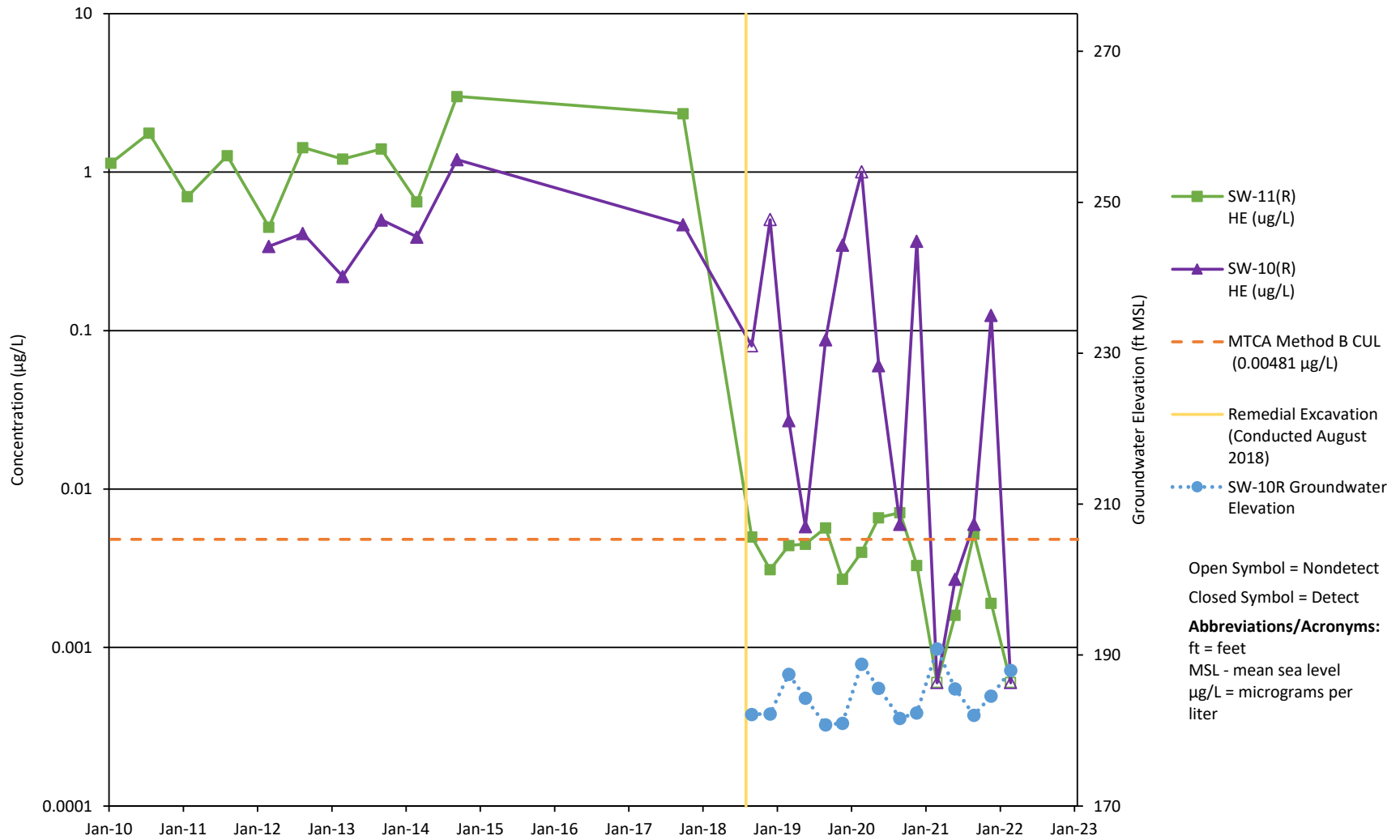


Table 1
Groundwater Analytical Results
Webster Nursery
Tumwater, Washington

Analyte	MTCA Method B Cleanup Levels	Sample Location, Sample ID, Laboratory SDG, Sample Date, and Sample Type		
		SW-10R	SW-11R	SW-11R
		SW-10R-20220222 22B0320 2/22/2022 N	SW-11R-20220222 22B0320 2/22/2022 N	SW-99-20220222 22B0320 2/22/2022 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	0.0006 U	0.0006 U	0.0006 U
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	0.0006 U	0.0006 U

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 in the sample.

Abbreviations and Acronyms:

FD = field duplicate

ID = identification

µg/L = micrograms per liter

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	5.45	187.96
SW-11R	192.50	4.22	188.28

Notes:

Groundwater elevation data was measured February 22, 2022.

Abbreviations:

bgs = below ground surface
ft = feet
ID = identification

February 2022 Laboratory Data Package



Analytical Resources, LLC
Analytical Chemists and Consultants

10 March 2022

Katie Gauglitz
Landau Associates, Inc. - Tacoma
2107 South C Street
Tacoma, WA 98402

RE: Webster Nursery (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)
22B0320

Associated SDG ID(s)
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 enclosed 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, LLC

Kelly Bottem, Client Services Manager

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.





Chain-of-Custody Record

2230320

<input type="checkbox"/> North Seattle (206) 631-8660	<input type="checkbox"/> Spokane (509) 327-9737	Date <u>Feb 02/22/22</u>	Turnaround Time: <u>Standard</u>
<input type="checkbox"/> Tacoma (253) 926-2493	<input type="checkbox"/> Portland (503) 542-1080	Page <u>1</u> of <u>1</u>	Accelerated _____
<input type="checkbox"/> Olympia (360) 791-3178	<input type="checkbox"/> _____		

Sample I.D.	Date	Time	Matrix	No. of Containers	Pesticides, Herbicides, Fungicides (40 CFR)	Testing Parameters										Observations/Comments						
						1	2	3	4	5	6	7	8	9	10		11	12				
SW-10R-20220222	2/22/22	10:20	Aq	2	X																	
SW-11R-20220222	1	9:10	Aq	2	X																	
SW-99-20220222	1	9:20	Aq	2	X																	

Special Handling Requirements:

Shipment Method:

Stored on ice: Yes / No

Observations/Comments

- ___ 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 SMR
 Signature [Signature]
 Printed Name Simone Rodriguez
 Company Landau Associates Inc
 Date 02/22/22 Time 1308

Received by SMR
 Signature [Signature]
 Printed Name Katie Gauglitz
 Company Landau Associates
 Date 2/22/22 Time 1308

Relinquished by SMR
 Signature [Signature]
 Printed Name Katie Gauglitz
 Company Landau Associates
 Date 2/22/22 Time 1340

Received by SMR
 Signature [Signature]
 Printed Name Karlene Beasley
 Company ART
 Date 2/22/22 Time 13:40



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

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SW-10R-20220222	22B0320-01	Water	22-Feb-2022 10:20	22-Feb-2022 13:40
SW-11R-20220222	22B0320-02	Water	22-Feb-2022 09:10	22-Feb-2022 13:40
SW-99-20220222	22B0320-03	Water	22-Feb-2022 09:20	22-Feb-2022 13:40



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

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

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.



Cooler Receipt Form

ARI Client: landau

Project Name: webster Nursery

COC No(s): _____ (NA)

Delivered by: Fed-Ex UPS (C) Courier Hand Delivered Other: _____

Assigned ARI Job No: 22B0320

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 2:49 pm 4.3

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

Temp Gun ID#: DOO 2565

Cooler Accepted by: LB Date: 2/22/22 Time: 13:40

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: AP Date: 2/23/22 Time: 0842 Labels checked by: _____

**** 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
2107 South C Street
Tacoma WA, 98402

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

SW-10R-20220222
22B0320-01 (Water)

Chlorinated Pesticides

Method: EPA 8081B Sampled: 02/22/2022 10:20
Instrument: ECD6 Analyst: YZ Analyzed: 03/08/2022 18:35

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3510C SepF Preparation Batch: BKB0617 Prepared: 02/28/2022	Sample Size: 1000 mL Final Volume: 0.5 mL	Extract ID: 22B0320-01 A 01
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CKC0012 Cleared: 01-Mar-2022	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Extract ID: 22B0320-01 A 01
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CKC0011 Cleared: 01-Mar-2022	Initial Volume: 0.5 uL Final Volume: 0.5 uL	Extract ID: 22B0320-01 A 01

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	ND	ug/L	U
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
<i>Surrogate: Decachlorobiphenyl</i>			30-160 %	87.1	%	
<i>Surrogate: Decachlorobiphenyl [2C]</i>			30-160 %	68.3	%	
<i>Surrogate: Tetrachlorometaxylene</i>			30-160 %	53.3	%	
<i>Surrogate: Tetrachlorometaxylene [2C]</i>			30-160 %	57.7	%	



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

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

SW-11R-20220222
22B0320-02 (Water)

Chlorinated Pesticides

Method: EPA 8081B Sampled: 02/22/2022 09:10
Instrument: ECD6 Analyst: YZ Analyzed: 03/08/2022 18:53

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3510C SepF Preparation Batch: BKB0617 Prepared: 02/28/2022	Sample Size: 1000 mL Final Volume: 0.5 mL	Extract ID: 22B0320-02 A 01
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CKC0012 Cleared: 01-Mar-2022	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Extract ID: 22B0320-02 A 01
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CKC0011 Cleared: 01-Mar-2022	Initial Volume: 0.5 uL Final Volume: 0.5 uL	Extract ID: 22B0320-02 A 01

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	ND	ug/L	U
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
<i>Surrogate: Decachlorobiphenyl</i>			30-160 %	94.5	%	
<i>Surrogate: Decachlorobiphenyl [2C]</i>			30-160 %	71.6	%	
<i>Surrogate: Tetrachlorometaxylene</i>			30-160 %	68.5	%	
<i>Surrogate: Tetrachlorometaxylene [2C]</i>			30-160 %	65.1	%	



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

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

SW-99-20220222
22B0320-03 (Water)

Chlorinated Pesticides

Method: EPA 8081B Sampled: 02/22/2022 09:20
Instrument: ECD6 Analyst: YZ Analyzed: 03/08/2022 19:11

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3510C SepF Preparation Batch: BKB0617 Prepared: 02/28/2022	Sample Size: 1000 mL Final Volume: 0.5 mL	Extract ID: 22B0320-03 A 01
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CKC0012 Cleared: 01-Mar-2022	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Extract ID: 22B0320-03 A 01
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CKC0011 Cleared: 01-Mar-2022	Initial Volume: 0.5 uL Final Volume: 0.5 uL	Extract ID: 22B0320-03 A 01

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	ND	ug/L	U
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
<i>Surrogate: Decachlorobiphenyl</i>			30-160 %	91.2	%	
<i>Surrogate: Decachlorobiphenyl [2C]</i>			30-160 %	69.5	%	
<i>Surrogate: Tetrachlorometaxylene</i>			30-160 %	57.3	%	
<i>Surrogate: Tetrachlorometaxylene [2C]</i>			30-160 %	53.8	%	



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

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

Analysis by: Analytical Resources, LLC

Chlorinated Pesticides - Quality Control

Batch BKB0617 - EPA 3510C SepF

Instrument: ECD6 Analyst: YZ/VTs

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BKB0617-BLK1)										
Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 17:04										
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
<i>Surrogate: Decachlorobiphenyl</i>	0.0139		ug/L	0.0200		69.4	30-160			
<i>Surrogate: Decachlorobiphenyl [2C]</i>	0.0121		ug/L	0.0200		60.5	30-160			
<i>Surrogate: Tetrachlorometaxylene</i>	0.0115		ug/L	0.0200		57.4	30-160			
<i>Surrogate: Tetrachlorometaxylene [2C]</i>	0.0118		ug/L	0.0200		59.2	30-160			

LCS (BKB0617-BS1)										
Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 17:22										
alpha-BHC	0.0075	0.0006	ug/L	0.0100		75.1	30-160			
beta-BHC	0.0080	0.0006	ug/L	0.0100		79.8	30-160			
gamma-BHC (Lindane)	0.0075	0.0006	ug/L	0.0100		74.9	30-160			
delta-BHC	0.0076	0.0006	ug/L	0.0100		76.1	30-160			
Heptachlor	0.0073	0.0006	ug/L	0.0100		73.2	30-160			
Aldrin	0.0066	0.0006	ug/L	0.0100		65.8	30-160			
Heptachlor Epoxide [2C]	0.0077	0.0006	ug/L	0.0100		76.6	30-160			



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

Project: Webster Nursery
Project Number: Webster Nursery
Project Manager: Katie Gauglitz

Reported:
10-Mar-2022 13:48

Analysis by: Analytical Resources, LLC

Chlorinated Pesticides - Quality Control

Batch BKB0617 - EPA 3510C SepF

Instrument: ECD6 Analyst: YZ/VTS

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BKB0617-BS1)										
					Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 17:22					
trans-Chlordane (beta-Chlordane) [2C]	0.0069	0.0006	ug/L	0.0100		69.4	30-160			
cis-Chlordane (alpha-chlordane) [2C]	0.0071	0.0006	ug/L	0.0100		71.3	30-160			
Endosulfan I	0.0075	0.0006	ug/L	0.0100		75.4	30-160			
4,4'-DDE	0.0146	0.0013	ug/L	0.0200		72.8	30-160			
Dieldrin	0.0151	0.0013	ug/L	0.0200		75.7	30-160			
Endrin	0.0148	0.0013	ug/L	0.0200		73.8	30-160			
Endosulfan II	0.0155	0.0013	ug/L	0.0200		77.3	30-160			
4,4'-DDD	0.0158	0.0013	ug/L	0.0200		79.0	30-160			
Endrin Aldehyde	0.0154	0.0013	ug/L	0.0200		77.0	30-160			
4,4'-DDT	0.0150	0.0013	ug/L	0.0200		74.8	30-160			
Endosulfan Sulfate [2C]	0.0140	0.0013	ug/L	0.0200		70.2	30-160			
Endrin Ketone	0.0166	0.0013	ug/L	0.0200		83.0	30-160			
Methoxychlor [2C]	0.0717	0.0063	ug/L	0.100		71.7	30-160			
Surrogate: Decachlorobiphenyl	0.0198		ug/L	0.0200		99.2	30-160			
Surrogate: Decachlorobiphenyl [2C]	0.0153		ug/L	0.0200		76.4	30-160			
Surrogate: Tetrachlorometaxylene	0.0125		ug/L	0.0200		62.4	30-160			
Surrogate: Tetrachlorometaxylene [2C]	0.0123		ug/L	0.0200		61.5	30-160			
LCS (BKB0617-BS2)										
					Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 17:40					
Toxaphene	0.697	0.0625	ug/L	1.00		69.7	30-160			
Surrogate: Decachlorobiphenyl	0.0174		ug/L	0.0200		86.9	30-160			
Surrogate: Decachlorobiphenyl [2C]	0.0142		ug/L	0.0200		70.9	30-160			
Surrogate: Tetrachlorometaxylene	0.0108		ug/L	0.0200		54.1	30-160			
Surrogate: Tetrachlorometaxylene [2C]	0.0108		ug/L	0.0200		53.8	30-160			
LCS (BKB0617-BS3)										
					Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 17:59					
Chlordane (NOS) [2C]	0.756	0.0050	ug/L	0.400		189	0-200			P1, E
Surrogate: Decachlorobiphenyl	0.0196		ug/L	0.0200		97.8	30-160			
Surrogate: Decachlorobiphenyl [2C]	0.0154		ug/L	0.0200		76.9	30-160			
Surrogate: Tetrachlorometaxylene	0.0106		ug/L	0.0200		53.1	30-160			
Surrogate: Tetrachlorometaxylene [2C]	0.0118		ug/L	0.0200		59.1	30-160			
LCS Dup (BKB0617-BSD1)										
					Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 18:17					
alpha-BHC	0.0075	0.0006	ug/L	0.0100		75.4	30-160	0.46	30	



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Batch BKB0617 - EPA 3510C SepF

Instrument: ECD6 Analyst: YZ/VTs

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BKB0617-BSD1)					Prepared: 28-Feb-2022 Analyzed: 08-Mar-2022 18:17					
beta-BHC	0.0080	0.0006	ug/L	0.0100		79.8	30-160	0.07	30	
gamma-BHC (Lindane)	0.0076	0.0006	ug/L	0.0100		76.3	30-160	1.83	30	
delta-BHC	0.0077	0.0006	ug/L	0.0100		77.1	30-160	1.30	30	
Heptachlor	0.0071	0.0006	ug/L	0.0100		71.5	30-160	2.36	30	
Aldrin [2C]	0.0068	0.0006	ug/L	0.0100		68.1	30-160	6.18	30	
Heptachlor Epoxide [2C]	0.0077	0.0006	ug/L	0.0100		76.6	30-160	0.04	30	
trans-Chlordane (beta-Chlordane) [2C]	0.0067	0.0006	ug/L	0.0100		67.1	30-160	3.37	30	
cis-Chlordane (alpha-chlordane) [2C]	0.0071	0.0006	ug/L	0.0100		70.8	30-160	0.72	30	
Endosulfan I	0.0074	0.0006	ug/L	0.0100		74.4	30-160	1.37	30	
4,4'-DDE	0.0148	0.0013	ug/L	0.0200		73.8	30-160	1.45	30	
Dieldrin	0.0159	0.0013	ug/L	0.0200		79.4	30-160	4.90	30	
Endrin	0.0153	0.0013	ug/L	0.0200		76.3	30-160	3.37	30	
Endosulfan II	0.0155	0.0013	ug/L	0.0200		77.3	30-160	0.07	30	
4,4'-DDD	0.0156	0.0013	ug/L	0.0200		78.2	30-160	1.01	30	
Endrin Aldehyde	0.0134	0.0013	ug/L	0.0200		67.1	30-160	13.80	30	
4,4'-DDT	0.0148	0.0013	ug/L	0.0200		73.8	30-160	1.45	30	
Endosulfan Sulfate [2C]	0.0143	0.0013	ug/L	0.0200		71.4	30-160	1.62	30	
Endrin Ketone	0.0153	0.0013	ug/L	0.0200		76.6	30-160	7.92	30	
Methoxychlor [2C]	0.0717	0.0063	ug/L	0.100		71.7	30-160	0.06	30	
Surrogate: Decachlorobiphenyl	0.0183		ug/L	0.0200		91.5	30-160			
Surrogate: Decachlorobiphenyl [2C]	0.0150		ug/L	0.0200		75.0	30-160			
Surrogate: Tetrachlorometaxylene	0.0115		ug/L	0.0200		57.4	30-160			
Surrogate: Tetrachlorometaxylene [2C]	0.0118		ug/L	0.0200		58.8	30-160			



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Certified Analyses included in this Report

Analyte	Certifications
EPA 8081B in Water	
alpha-BHC	DoD-ELAP,WADOE,NELAP
alpha-BHC [2C]	DoD-ELAP,WADOE,NELAP
beta-BHC	DoD-ELAP,WADOE,NELAP
beta-BHC [2C]	DoD-ELAP,WADOE,NELAP
gamma-BHC (Lindane)	DoD-ELAP,WADOE,NELAP
gamma-BHC (Lindane) [2C]	DoD-ELAP,WADOE,NELAP
delta-BHC	DoD-ELAP,WADOE,NELAP
delta-BHC [2C]	DoD-ELAP,WADOE,NELAP
Heptachlor	DoD-ELAP,WADOE,NELAP
Heptachlor [2C]	DoD-ELAP,WADOE,NELAP
Aldrin	DoD-ELAP,WADOE,NELAP
Aldrin [2C]	DoD-ELAP,WADOE,NELAP
Heptachlor Epoxide	DoD-ELAP,WADOE,NELAP
Heptachlor Epoxide [2C]	DoD-ELAP,WADOE,NELAP
trans-Chlordane (beta-Chlordane)	DoD-ELAP,WADOE,NELAP
trans-Chlordane (beta-Chlordane) [2C]	DoD-ELAP,WADOE,NELAP
cis-Chlordane (alpha-chlordane)	DoD-ELAP,WADOE,NELAP
cis-Chlordane (alpha-chlordane) [2C]	DoD-ELAP,WADOE,NELAP
Endosulfan I	DoD-ELAP,WADOE,NELAP
Endosulfan I [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDE	DoD-ELAP,WADOE,NELAP
4,4'-DDE [2C]	DoD-ELAP,WADOE,NELAP
Dieldrin	DoD-ELAP,WADOE,NELAP
Dieldrin [2C]	DoD-ELAP,WADOE,NELAP
Endrin	DoD-ELAP,WADOE,NELAP
Endrin [2C]	DoD-ELAP,WADOE,NELAP
Endosulfan II	DoD-ELAP,WADOE,NELAP
Endosulfan II [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDD	DoD-ELAP,WADOE,NELAP
4,4'-DDD [2C]	DoD-ELAP,WADOE,NELAP
Endrin Aldehyde	DoD-ELAP,WADOE,NELAP
Endrin Aldehyde [2C]	DoD-ELAP,WADOE,NELAP
4,4'-DDT	DoD-ELAP,WADOE,NELAP
4,4'-DDT [2C]	DoD-ELAP,WADOE,NELAP
Endosulfan Sulfate	DoD-ELAP,WADOE,NELAP



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Endosulfan Sulfate [2C]	DoD-ELAP,WADOE,NELAP
Endrin Ketone	DoD-ELAP,WADOE,NELAP
Endrin Ketone [2C]	DoD-ELAP,WADOE,NELAP
Methoxychlor	DoD-ELAP,WADOE,NELAP
Methoxychlor [2C]	DoD-ELAP,WADOE,NELAP
Hexachlorobutadiene	DoD-ELAP,WADOE,NELAP
Hexachlorobutadiene [2C]	DoD-ELAP,WADOE,NELAP
Hexachlorobenzene	DoD-ELAP,WADOE,NELAP
Hexachlorobenzene [2C]	DoD-ELAP,WADOE,NELAP
2,4'-DDE	DoD-ELAP
2,4'-DDE [2C]	DoD-ELAP
2,4'-DDD	DoD-ELAP
2,4'-DDD [2C]	DoD-ELAP
2,4'-DDT	DoD-ELAP
2,4'-DDT [2C]	DoD-ELAP
Oxychlorane	DoD-ELAP
Oxychlorane [2C]	DoD-ELAP
cis-Nonachlor	DoD-ELAP
cis-Nonachlor [2C]	DoD-ELAP
trans-Nonachlor	DoD-ELAP
trans-Nonachlor [2C]	DoD-ELAP
Mirex	DoD-ELAP
Mirex [2C]	DoD-ELAP
Toxaphene	DoD-ELAP
Toxaphene [2C]	DoD-ELAP
Chlordane, technical	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
WADOE	WA Dept of Ecology	C558	06/30/2022
WA-DW	Ecology - Drinking Water	C558	06/30/2022



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Notes and Definitions

- E The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
- 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.