Technical Memorandum

TO:	Steve Teal, Washington State Department of Ecology
CC:	Amy Sikora, Washington State Department of Natural Resources
FROM:	Katie Gauglitz, LG
DATE:	October 12, 2022
RE:	**Third 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

Third quarter 2022 (3Q22) groundwater monitoring was completed on August 23, 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) 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 detected in the sample collected from SW-10R at an estimated concentration of 0.0029 micrograms per liter (µg/L), which is below the cleanup level (CUL; 0.00481 µg/L).
- HE was detected in the sample collected from SW-11R, and the duplicate sample of SW-11R (i.e., SW-99) at concentrations of 0.0021 and 0.0028 µg/L, respectively, which is below the CUL.
- No other analytes were detected in either well during 3Q22 groundwater monitoring.

August 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 HE concentrations are lower during the wet season, however, in 2022, HE was not detected above the laboratory reporting limit in SW-10R and SW-11R in February or May. Concentrations of HE may rebound slightly during the upcoming November sampling event (the highest annual concentrations of HE occurred in November for 2020 and 2021), however overall concentrations of HE appear to be decreasing over time.

Groundwater elevations at SW-10R and SW-11R were 183.70 and 183.34 feet mean sea level, respectively. This represents an approximate 4-foot decrease from the previous monitoring event, completed in May 2022. 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. Figure 3 indicates that the groundwater elevation measured during August 2022 was relatively high compared to that time in previous years, based on historical trends.

Environmental Information Management Submittal

An Environmental Information Management (EIM) submittal is required. The 3Q22 submittal was completed on September 28, 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 as needed through May 2023. The next monitoring event is scheduled for November 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 M. Gauglitz

Katie Gauglitz, LG
Senior Project Geologist

KMG/SMM/kjg
[\\TACOMA3\PROJECT\774\006 WEBSTER\R\QUARTERLY GW MONITORING REPORTS\2022_08_3Q22\LAI_WEBSTER NURSERY 3Q22 GW MONITORING_TM_09-29-22.DOCX]

References

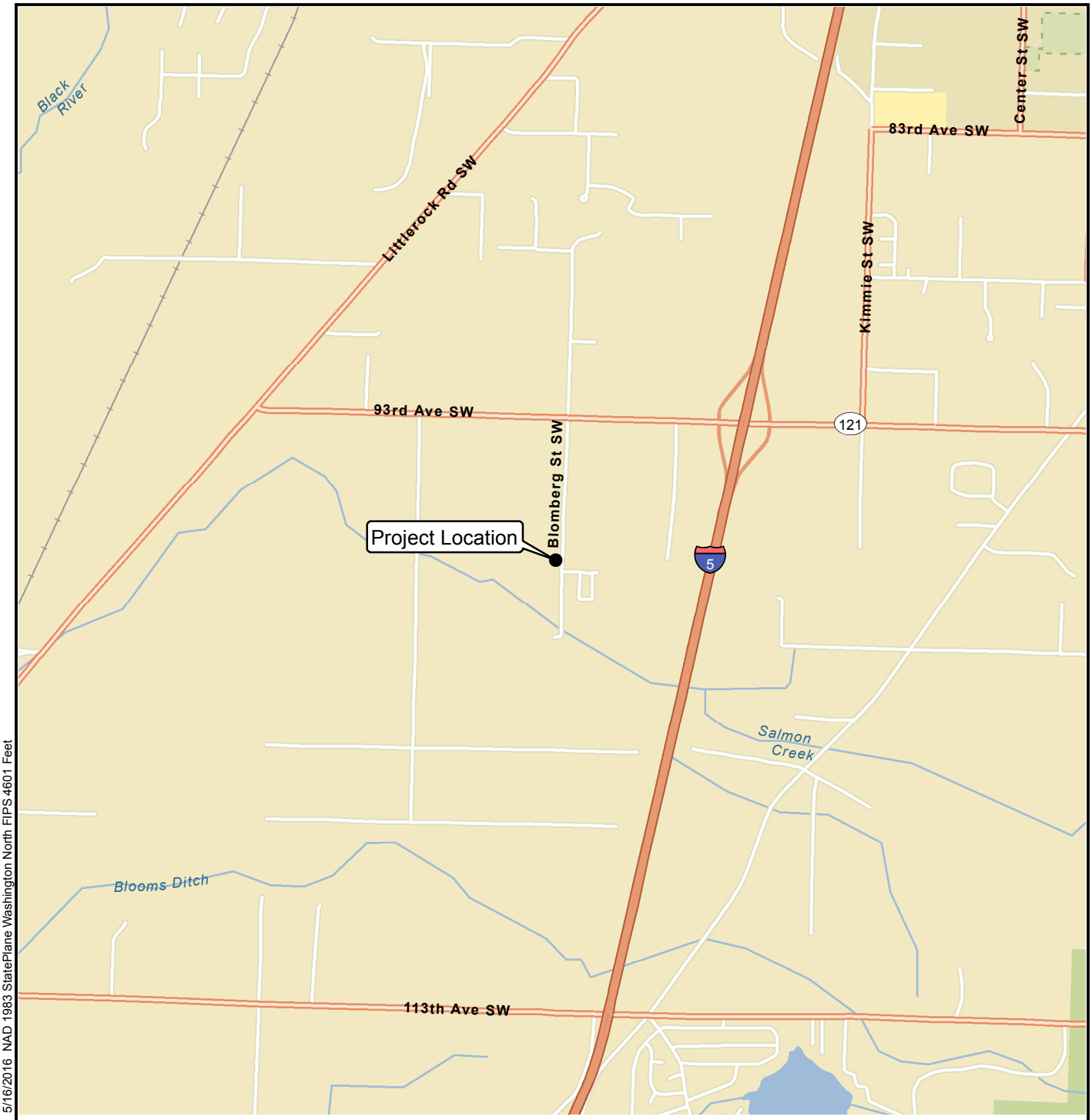
Landau. 2017. Remedial Action Work Plan, Webster Nursery, 9805 Blomberg Street SW, Tumwater, Washington. Landau Associates, Inc. October 31.

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	August 2022 Laboratory Data Package



N

0 0.5 1

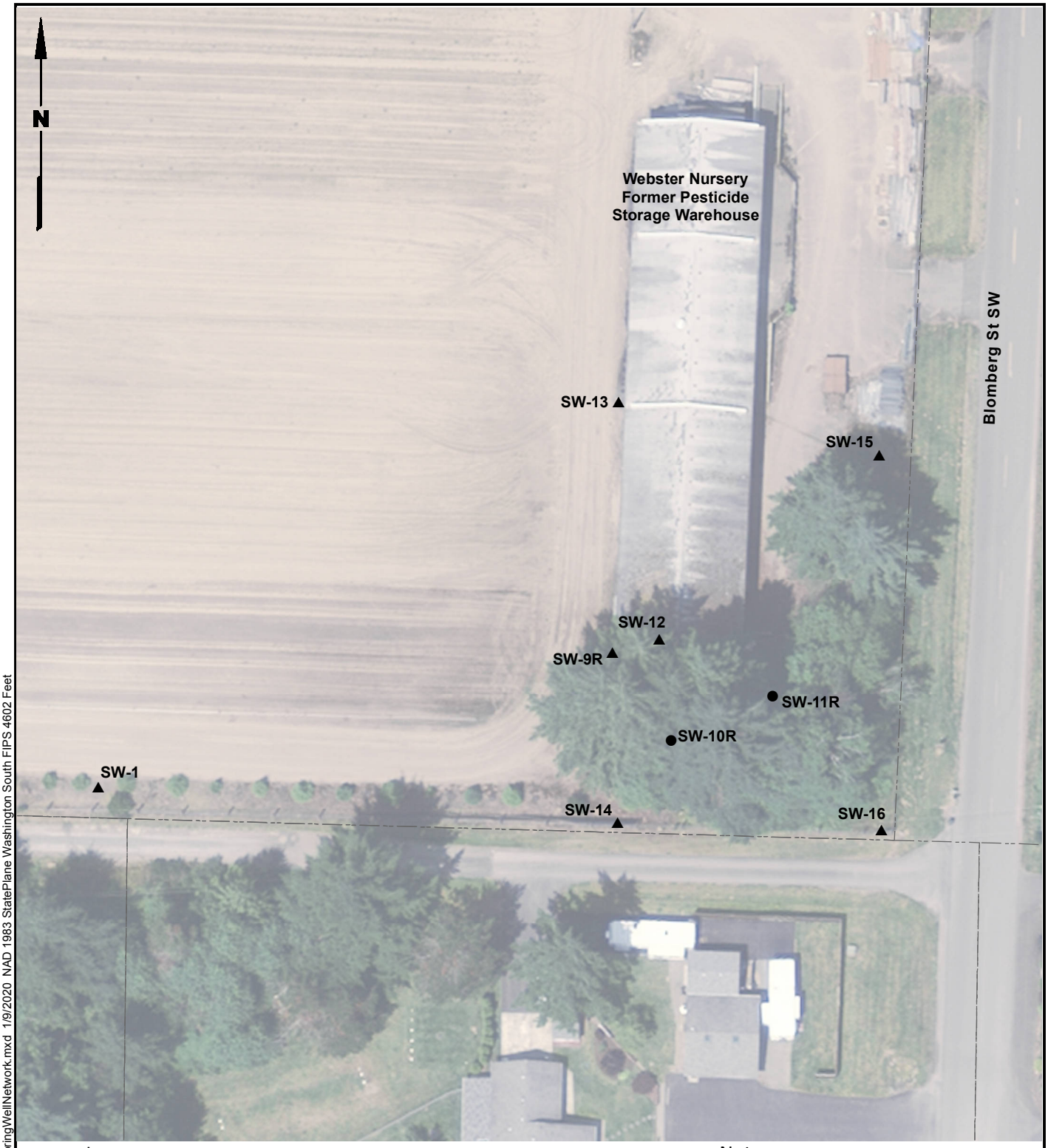
Miles

Data Source: Esri 2012

G:\Projects\774\006\020\026\FSIF01 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

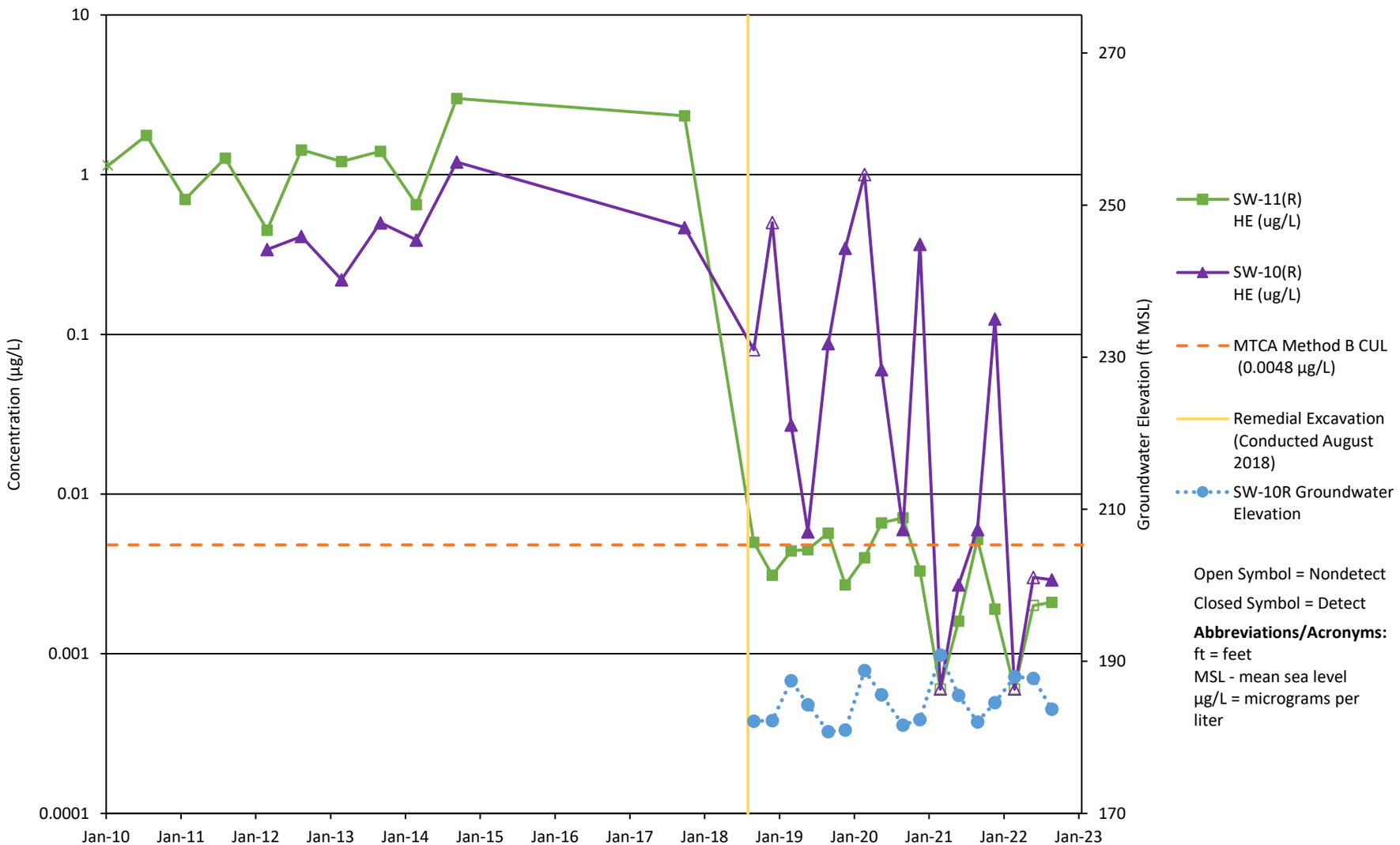
1. SW-9R, SW-10R, and SW-11R are new (replacement) wells.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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

LANDAU ASSOCIATES

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

\\tacoma3\PROJECT\774\006 Webster\R\Quarterly GW Monitoring Reports\2022_08_3Q22\Figures\F03_HE and GWE Timeseries 3Q



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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	Sample Location, Sample ID, Laboratory SDG, Sample Date, and Sample Type		
		SW-10R 22H0430-01 22H0430 8/23/2022	SW-11R 22H0430-02 22H0430 8/23/2022	SW-11R 22H0430-03 22H0430 8/23/2022
	Cancerous	N	N	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	**0.0029 J**	**0.0021 J**	**0.0028 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	0.0006 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

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	9.71	183.70
SW-11R	192.50	9.16	183.34

Notes:

Groundwater elevation data was measured August 23, 2022.

Abbreviations:

bgs = below ground surface
ft = feet
ID = identification

Attachment 1

August 2022 Laboratory Data Package

Analytical Resources, LLC
Analytical Chemists and Consultants

16 September 2022

Sierra Mott
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)	Associated SDG ID(s)
22H0430	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, 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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

22H0438

LANDAU ASSOCIATES

Chain-of-Custody Record

☐ North Seattle (206) 631-8660 ☒ Tacoma (253) 926-2493 ☐ Olympia (360) 791-3178
☐ Spokane (509) 327-9737 ☐ Portland (503) 542-1080 ☐ _____

Date 8/23/2022 Page 1 of 1

Turnaround Time: (Standard) Accelerated

Project Name Webster Nursery Project No. 077400G.040.047
Project Location/Event Olympia, WA / 3Q GWM
Sampler's Name SMR
Project Contact Katie Ganglitz (SMR)
Send Results To K. Ganglitz, ~~D. Jorgensen~~, S. Mott, E. Weber
data@landauinc.com

Testing Parameters 1.9

Special Handling Requirements:

Shipment Method:

Stored on ice: (Yes) No

Sample I.D.	Date	Time	Matrix	No. of Containers	dissolved chromium (3010B)											Observations/Comments
SW-10R-20220823	8/23/22	10:36	Aq	2	X											
SW-11R-20220823	"	9:05	Aq	2	X											___ Allow water samples to settle, collect aliquot from clear portion ☐
SW-99-20220823	"	9:08	Aq	2	X											___ NWTPH-Dx - Acid wash cleanup ☐ - Silica gel cleanup ☐
																___ Dissolved metal samples were field filtered
																Other no pres.

Relinquished by	Received by	Relinquished by	Received by
Signature SMR	Signature Carlo Amor	Signature	Signature
Printed Name Simone Rodriguez	Printed Name Carlo Amos	Printed Name	Printed Name
Company Landau Associates	Company ARI	Company	Company
Date 8/23/22 Time 12:27	Date 8/23/22 Time 1227	Date Time	Date Time

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

10/2018

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SW-10R-20220823	22H0430-01	Water	23-Aug-2022 10:36	23-Aug-2022 12:27
SW-11R-20220823	22H0430-02	Water	23-Aug-2022 09:05	23-Aug-2022 12:27
SW-99-20220823	22H0430-03	Water	23-Aug-2022 09:08	23-Aug-2022 12:27

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

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.

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Landau

COC No(s): _____ (NA)

Assigned ARI Job No: 22H443A

Project Name: Webster Nursery

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

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 1227 — 1.9

If cooler temperature is out of compliance fill out form 00070F — Temp Gun ID#: 9708

Cooler Accepted by: Carlo Amer — Date: 8/23/22 — Time: 1227

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 8/23/22
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: JSm — Date: 8/24/22 — Time: 1447 — Labels checked by: JSm

*** 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	16-Sep-2022 12:59

SW-10R-20220823

22H0430-01 (Water)

Chlorinated Pesticides

Method: EPA 8081B — Sampled: 08/23/2022 10:36

Instrument: ECD6 Analyst: YZ — Analyzed: 09/09/2022 19:08

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3510C SepF		Extract ID: 22H0430-01 A 01
	Preparation Batch: BKH0678	Sample Size: 1000 mL	
	Prepared: 08/30/2022	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 22H0430-01 A 01
	Cleanup Batch: CKI0066	Initial Volume: 0.5 uL	
	Cleaned: 09-Sep-2022	Final Volume: 0.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:22H0430-01 A 01
	Cleanup Batch: CKI0065	Initial Volume: 0.5 uL	
	Cleaned: 09-Sep-2022	Final Volume: 0.5 uL	

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	0.0029	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 %*	*90.2*	*%*	
Surrogate: Decachlorobiphenyl [2C]			*30-160 %*	*99.2*	*%*	
Surrogate: Tetrachlorometaxylene			*30-160 %*	*74.2*	*%*	
Surrogate: Tetrachlorometaxylene [2C]			*30-160 %*	*74.8*	*%*	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

SW-11R-20220823

22H0430-02 (Water)

Chlorinated Pesticides

Method: EPA 8081B — Sampled: 08/23/2022 09:05

Instrument: ECD6 Analyst: YZ — Analyzed: 09/09/2022 19:26

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3510C SepF		Extract ID: 22H0430-02 A 01
	Preparation Batch: BKH0678	Sample Size: 1000 mL	
	Prepared: 08/30/2022	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 22H0430-02 A 01
	Cleanup Batch: CKI0066	Initial Volume: 0.5 uL	
	Cleaned: 09-Sep-2022	Final Volume: 0.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:22H0430-02 A 01
	Cleanup Batch: CKI0065	Initial Volume: 0.5 uL	
	Cleaned: 09-Sep-2022	Final Volume: 0.5 uL	

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	
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 %*	*93.2*	*%*	
Surrogate: Decachlorobiphenyl [2C]			*30-160 %*	*106*	*%*	
Surrogate: Tetrachlorometaxylene			*30-160 %*	*72.3*	*%*	
Surrogate: Tetrachlorometaxylene [2C]			*30-160 %*	*87.1*	*%*	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

SW-99-20220823

22H0430-03 (Water)

Chlorinated Pesticides

Method: EPA 8081B — Sampled: 08/23/2022 09:08

Instrument: ECD6 Analyst: YZ — Analyzed: 09/09/2022 19:45

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3510C SepF		Extract ID: 22H0430-03 A 01
	Preparation Batch: BKH0678	Sample Size: 1000 mL	
	Prepared: 08/30/2022	Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 22H0430-03 A 01
	Cleanup Batch: CKI0066	Initial Volume: 0.5 uL	
	Cleaned: 09-Sep-2022	Final Volume: 0.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:22H0430-03 A 01
	Cleanup Batch: CKI0065	Initial Volume: 0.5 uL	
	Cleaned: 09-Sep-2022	Final Volume: 0.5 uL	

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	0.0028	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 %*	*90.0*	*%*	
Surrogate: Decachlorobiphenyl [2C]			*30-160 %*	*90.0*	*%*	
Surrogate: Tetrachlorometaxylene			*30-160 %*	*58.8*	*%*	
Surrogate: Tetrachlorometaxylene [2C]			*30-160 %*	*66.1*	*%*	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

Analysis by: Analytical Resources, LLC

Chlorinated Pesticides - Quality Control

Batch BKH0678 - 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 (BKH0678-BLK1)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 17:36						
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	0.0146		ug/L	*0.0200*		*73.0*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0142		ug/L	*0.0200*		*70.8*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0141		ug/L	*0.0200*		*70.6*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0150		ug/L	*0.0200*		*75.2*	*30-160*			
LCS (BKH0678-BS1)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 17:54						
alpha-BHC [2C]	0.0078	0.0006	ug/L	0.0100		77.7	30-160			
beta-BHC	0.0080	0.0006	ug/L	0.0100		80.3	30-160			
gamma-BHC (Lindane) [2C]	0.0076	0.0006	ug/L	0.0100		75.8	30-160			
delta-BHC	0.0079	0.0006	ug/L	0.0100		79.5	30-160			
Heptachlor	0.0072	0.0006	ug/L	0.0100		71.9	30-160			
Aldrin [2C]	0.0083	0.0006	ug/L	0.0100		83.3	30-160			
Heptachlor Epoxide [2C]	0.0085	0.0006	ug/L	0.0100		85.3	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	16-Sep-2022 12:59

Analysis by: Analytical Resources, LLC

Chlorinated Pesticides - Quality Control

Batch BKH0678 - 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 (BKH0678-BS1)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 17:54						
trans-Chlordane (beta-Chlordane)	0.0086	0.0006	ug/L	0.0100		85.9	30-160			
cis-Chlordane (alpha-chlordane) [2C]	0.0079	0.0006	ug/L	0.0100		79.2	30-160			
Endosulfan I [2C]	0.0082	0.0006	ug/L	0.0100		81.8	30-160			
4,4'-DDE [2C]	0.0159	0.0013	ug/L	0.0200		79.4	30-160			
Dieldrin [2C]	0.0166	0.0013	ug/L	0.0200		82.9	30-160			
Endrin [2C]	0.0170	0.0013	ug/L	0.0200		85.2	30-160			
Endosulfan II [2C]	0.0172	0.0013	ug/L	0.0200		85.8	30-160			
4,4'-DDD [2C]	0.0170	0.0013	ug/L	0.0200		85.2	30-160			
Endrin Aldehyde [2C]	0.0147	0.0013	ug/L	0.0200		73.3	30-160			
4,4'-DDT [2C]	0.0165	0.0013	ug/L	0.0200		82.4	30-160			
Endosulfan Sulfate [2C]	0.0168	0.0013	ug/L	0.0200		84.1	30-160			
Endrin Ketone [2C]	0.0170	0.0013	ug/L	0.0200		85.0	30-160			
Methoxychlor [2C]	0.0823	0.0063	ug/L	0.100		82.3	30-160			
Surrogate: Decachlorobiphenyl	0.0178		ug/L	*0.0200*		*89.2*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0194		ug/L	*0.0200*		*97.1*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0143		ug/L	*0.0200*		*71.7*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0156		ug/L	*0.0200*		*78.1*	*30-160*			
LCS (BKH0678-BS2)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 18:13						
Toxaphene [2C]	0.739	0.0625	ug/L	1.00		73.9	30-160			
Surrogate: Decachlorobiphenyl	0.0171		ug/L	*0.0200*		*85.6*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0180		ug/L	*0.0200*		*90.1*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0142		ug/L	*0.0200*		*70.8*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0152		ug/L	*0.0200*		*75.8*	*30-160*			
LCS (BKH0678-BS3)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 18:31						
Chlordane (NOS) [2C]	0.485	0.0050	ug/L	0.400		121	0-200			E
Surrogate: Decachlorobiphenyl	0.0184		ug/L	*0.0200*		*91.9*	*30-160*			*P1*
Surrogate: Decachlorobiphenyl [2C]	0.0312		ug/L	*0.0200*		*156*	*30-160*			*P1*
Surrogate: Tetrachlorometaxylene	0.0189		ug/L	*0.0200*		*94.7*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0246		ug/L	*0.0200*		*123*	*30-160*			
LCS Dup (BKH0678-BSD1)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 18:50						
alpha-BHC [2C]	0.0080	0.0006	ug/L	0.0100		79.9	30-160	2.83	30	

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

Analysis by: Analytical Resources, LLC

Chlorinated Pesticides - Quality Control

Batch BKH0678 - 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 (BKH0678-BSD1)				Prepared: 30-Aug-2022 Analyzed: 09-Sep-2022 18:50						
beta-BHC	0.0082	0.0006	ug/L	0.0100		82.5	30-160	2.73	30	
gamma-BHC (Lindane)	0.0080	0.0006	ug/L	0.0100		80.1	30-160	5.67	30	
delta-BHC	0.0084	0.0006	ug/L	0.0100		83.8	30-160	5.26	30	
Heptachlor	0.0077	0.0006	ug/L	0.0100		76.6	30-160	6.35	30	
Aldrin [2C]	0.0088	0.0006	ug/L	0.0100		88.4	30-160	5.90	30	
Heptachlor Epoxide [2C]	0.0084	0.0006	ug/L	0.0100		83.5	30-160	2.05	30	
trans-Chlordane (beta-Chlordane)	0.0090	0.0006	ug/L	0.0100		90.4	30-160	5.08	30	
cis-Chlordane (alpha-chlordane) [2C]	0.0080	0.0006	ug/L	0.0100		80.2	30-160	1.25	30	
Endosulfan I [2C]	0.0083	0.0006	ug/L	0.0100		83.5	30-160	2.08	30	
4,4'-DDE [2C]	0.0158	0.0013	ug/L	0.0200		79.0	30-160	0.53	30	
Dieldrin [2C]	0.0168	0.0013	ug/L	0.0200		83.9	30-160	1.30	30	
Endrin [2C]	0.0191	0.0013	ug/L	0.0200		95.4	30-160	11.30	30	
Endosulfan II [2C]	0.0188	0.0013	ug/L	0.0200		93.8	30-160	8.87	30	
4,4'-DDD [2C]	0.0187	0.0013	ug/L	0.0200		93.4	30-160	9.22	30	
Endrin Aldehyde [2C]	0.0156	0.0013	ug/L	0.0200		77.8	30-160	6.07	30	
4,4'-DDT [2C]	0.0182	0.0013	ug/L	0.0200		91.0	30-160	9.91	30	
Endosulfan Sulfate [2C]	0.0185	0.0013	ug/L	0.0200		92.7	30-160	9.73	30	
Endrin Ketone [2C]	0.0185	0.0013	ug/L	0.0200		92.7	30-160	8.76	30	
Methoxychlor [2C]	0.0907	0.0063	ug/L	0.100		90.7	30-160	9.72	30	
Surrogate: Decachlorobiphenyl	0.0173		ug/L	*0.0200*		*86.3*	*30-160*			
Surrogate: Decachlorobiphenyl [2C]	0.0192		ug/L	*0.0200*		*95.8*	*30-160*			
Surrogate: Tetrachlorometaxylene	0.0140		ug/L	*0.0200*		*69.9*	*30-160*			
Surrogate: Tetrachlorometaxylene [2C]	0.0151		ug/L	*0.0200*		*75.5*	*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	16-Sep-2022 12:59

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

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
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Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

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
Oxychlordane	DoD-ELAP
Oxychlordane [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
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2023

Landau Associates, Inc. - Tacoma	Project: Webster Nursery	
2107 South C Street	Project Number: Webster Nursery	**Reported:**
Tacoma WA, 98402	Project Manager: Sierra Mott	16-Sep-2022 12:59

Notes and Definitions

*	Flagged value is not within established control limits.
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.