

## **TECHNICAL MEMORANDUM**

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TO: Steve Teel, L. Hg., Washington State Department of Ecology

cc: John Felder, PE, Environmental Services, Washington State Department of Natural Resources

FROM: Lauren Knickrehm, E.I.T. and Eric Weber, L.Hg.

DATE: March 27, 2014

**RE: FEBRUARY 2014 SEMIANNUAL GROUNDWATER MONITORING  
WEBSTER NURSERY SITE, SITE ID 3380  
TUMWATER, WASHINGTON**

### **INTRODUCTION**

On behalf of Washington State Department of Natural Resources (DNR), Landau Associates is providing this semiannual groundwater monitoring technical memorandum, which covers groundwater monitoring activities conducted in February 2014. DNR has been conducting semiannual groundwater monitoring activities in the vicinity of the DNR's Webster Nursery former pesticide storage warehouse (site). The site is associated with past releases of organochlorine pesticides to soil and groundwater. The site location is shown on Figure 1.

Monitoring is being conducted under an Agreed Order (No. DE 00TCP-SR295) with the Washington State Department of Ecology (Ecology) dated January 8, 2001. Since January 2010, sampling has been conducted by DNR staff. Landau Associates began sampling in February 2014 under contract to DNR.

A recent letter from Ecology received in January 2014 discussed concerns with persistent pesticide groundwater concentrations at two wells (SW-10 and SW-11; Ecology 2014). In response to this concern, DNR proposed to include the following two additional activities during the February 2014 sampling event: 1) redevelopment of the two wells, and 2) collection of split samples with laboratory application of centrifuging from the two wells (Knickrehm, L. 2014). Ecology approved of DNR's proposal to conduct the additional activities at the two wells (Teel, S. 2014).

### **SEMIANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY**

The existing site groundwater monitoring well network includes a total of nine wells. Of the nine wells, six (SW-9, SW-10, SW-11, SW-14, SW-15, and SW-16) are sampled as part of an ongoing groundwater quality monitoring program. The other three wells (SW-1, SW-12, and SW-13) are not sampled due to historical data that indicates the wells were not impacted by the organochlorine pesticide release. Water levels are collected at all nine wells. The locations of the nine wells are provided on

Figure 2. The six wells (SW-9, SW-10, SW-11, SW-14, SW-15, and SW-16) that are sampled are tested for pesticides, and four of the six wells (SW-9, SW-10, SW-11, and SW-16) are also tested for monitored natural attenuation (MNA) parameters. The locations of the wells sampled for pesticides and MNA parameters are shown on Figure 3 and Figure 4, respectively.

Groundwater quality samples are collected using a peristaltic pump with dedicated tubing stationed at each well<sup>1</sup>. Field parameters were collected using a YSI water quality meter and a ferrous iron field test kit. Purge water from sampling is collected in a 5 gallon bucket and is transported to onsite drums provided by DNR.

Groundwater data is screened using the current Model Toxics Control Act (MTCA) Method B groundwater cleanup levels for applicable constituents. The primary constituents of concern at the site are heptachlor<sup>2</sup>, chlorodane and heptachlor epoxide. Currently heptachlor epoxide is the only constituent detected above applicable groundwater cleanup levels. All samples were analyzed for organochlorine pesticides by U.S. Environmental Protection Agency Method 8081A. Four of the six samples were also analyzed for MNA parameters. Field parameters were collected for all samples. A groundwater sampling matrix is presented in Table 1. Analytical methods, reporting limits, preservatives, and holding times are presented in Table 2.

For the February 2014 event (only), additional field split samples were collected at the wells where heptachlor epoxide has been consistently detected (SW-10 and SW-11) with instructions for the laboratory to centrifuge the split samples. The purpose of centrifuging is to reduce the amount of colloidal matter that might impact sampling results for highly adsorbed constituents like heptachlor epoxide. February 2014 groundwater analytical data and MNA field parameter data are presented in Table 3. The associated laboratory analytical report is provided in Attachment 1.

## **WELL SW-10 AND SW-11 REDEVELOPMENT AND PURGE WATER MANAGEMENT**

During the February 2014 sampling event, wells SW-10 and SW-11 were redeveloped to further define conditions at the two wells. Historical and recent detections of heptachlor epoxide are consistently above MTCA Method B cleanup levels at wells SW-10 and SW-11. Heptachlor epoxide is strongly adsorbed to soil rather than partitioning to and dissolving in groundwater (Syracuse Research Corporation 2007). Therefore, the presence of sediment in a sample can have a potentially significant affect on the total heptachlor epoxide concentration. Consequently, wells SW-10 and SW-11 were redeveloped prior to sampling in an attempt to reduce sample turbidity and increase the likelihood that water quality results

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<sup>1</sup> New 3/8 inch high-density polyethylene tubing was installed at each of the wells to allow for samples to be collected approximately 2 feet (ft) off of the bottom of the well.

<sup>2</sup> Heptachlor is generally no longer detected, but was detected with data qualifiers in September 2013 at low-level concentrations.

would reflect dissolved groundwater concentrations instead of concentrations adsorbed to colloidal particles in the sample.

During redevelopment, the wells were over-purged using a submersible centrifugal pump (whale pump) and regularly surged to flush and loosen fine material from the surrounding formation. Water was continuously pumped from the wells until a minimum of 10 casing volumes was removed. Water from the wells was visibly clear of sediment and turbidity readings were below 50 nephelometric turbidity units. Approximately 0.25 ft of sediment was removed from each well. Sediments appeared to be sandy silt with some organic material. Groundwater samples were collected 24 hours after redevelopment.

All purge water and decontamination water is stored on site in drums provided by DNR. Water will be disposed of at a later date once the drums are full. Drums were properly labeled and sealed. One drum contains water from redevelopment and sampling of SW-10 and SW-11 while the second drum contains water from the sampling of SW-9, SW-14, SW-15, and SW-16.

#### **GROUNDWATER LEVEL DATA**

A complete round of water levels for all existing wells was collected on February 24 and 25, 2014. The groundwater flow direction is generally to the northwest. The water level measurement at SW-1 was somewhat elevated relative to the September 2013 water level collection event and was not incorporated into the groundwater elevation contours. The February 2014 groundwater elevations and contours are provided on Figure 5.

#### **ORGANOCHLORINE PESTICIDES DATA**

There were no detections of heptachlor. Heptachlor epoxide, which is a degradation product of heptachlor, was only detected at SW-10 and SW-11. Chlordane was also only detected at SW-10 and SW-11. No other pesticides were detected. February 2014 organochlorine pesticide concentration data is presented in Table 3.

Alpha-Chlordane and gamma-Chlordane were both detected at concentrations well below the associated MTCA Method B cleanup levels of 0.25 micrograms per liter ( $\mu\text{g/L}$ ). Concentrations at SW-10 were 0.045 $\mu\text{g/L}$  for alpha-Chlordane and 0.044 $\mu\text{g/L}$  for gamma-Chlordane. Of the two chemicals, only gamma-Chlordane was detected at SW-11 at a concentration of 0.013 $\mu\text{g/L}$ . Concentrations of heptachlor epoxide were detected at SW-10 and SW-11 above the MTCA Method B cleanup level of 0.0048  $\mu\text{g/L}$ . Concentrations were 0.40  $\mu\text{g/L}$  and 0.67  $\mu\text{g/L}$ , respectively. Pesticide concentrations are generally consistent with recent sampling events.

Split samples were collected at wells SW-10 and SW-11 and centrifuged by the laboratory before being run for organochlorine pesticides. Centrifuging was an additional measure to reduce sample

turbidity and suspended colloidal material prior to analysis. Despite centrifuging, pesticide results were not noticeably different between the standard (non-centrifuged) and centrifuged split samples. Heptachlor epoxide, the primary contaminant of concern, had comparable (standard and centrifuged) results at both wells. Concentration comparison between the standard and centrifuged samples showed no notable difference (0.44 µg/L compared to 0.39 µg/L at SW-10 and 0.65 µg/L compared to 0.67 µg/L at SW-11).

As mentioned, pesticide concentrations collected in February 2014 were generally consistent with historical data, with heptachlor epoxide being detected only at SW-10 and SW-11. The data for wells SW-10 and SW-11 did not vary appreciably despite redevelopment and sample centrifuging. A comparison of recent heptachlor epoxide groundwater concentrations with historical data dating back to January 2010 is presented in the time series plot on Figure 6.

### **MONITORED NATURAL ATTENUATION DATA**

MNA data collected during this sampling event indicate that groundwater conditions are aerobic. Dissolved oxygen concentrations were greater than 6.71 milligrams per liter; oxidation reduction potential (ORP) was greater than 170 millivolts (mV), and nitrate and ferrous iron were generally not detected. A summary of MNA data is presented in Table 3.

Natural attenuation of pesticides in groundwater occurs via aerobic biodegradation [Minnesota Department of Agriculture (MDA) 2005]. According to guidance prepared by the MDA, conditions necessary to enable biodegradation include the presence of oxygen (an electron acceptor), a relatively neutral pH (5 to 9), positive redox voltage (minimum of 50 mV; offsets negative potential caused when oxygen becomes depleted), and the availability of nutrients (such as carbon). The pH range is 5.29 to 5.67. The ORP (redox voltage) is within a consistent range of approximately +170.6 to +192.8. However, total organic carbon was not detected at any of the sampled wells. These data suggest the natural attenuation could be occurring; however, the slow rate of decline of heptachlor epoxide suggests that natural attenuation is not a strong process for this constituent.

### **OTHER GROUNDWATER MONITORING ACTIVITIES AND OBSERVATIONS**

General well maintenance activities were performed at the request of DNR. All well cap locks were replaced with one standard lock. Damaged well caps were replaced. Monument bolts at flush-mount monitoring wells were replaced where needed. Most flush-mount wells had stripped monument threads as opposed to stripped bolts; at these locations, the old bolts were left in place. GPS coordinates were collected at all nine wells, as well as the tree line at the southeast of the former pesticide storage warehouse to more adequately plan for any future direct-push drilling method explorations.

A survey of stormwater roof drainage controls around the storage building was conducted. Most drainage was collected and conveyed north of the building or to the east. It was noted that the roof downspout at the very southeast corner of the building drained down to a splash block, which releases to the landscaped area south of the building near the former excavation. DNR is working to reroute the drainage away from the landscaped area.

Please let us know if you have any questions concerning groundwater monitoring activities presented in this semiannual groundwater monitoring report.

SMM/LKK/EFW/jrc

## REFERENCES

Ecology. 2014. Letter: *Need for Additional Work, Washington State Department of Natural Resources (DNR) Webster Nursery Site, 9805 Bloomberg Street SW, Tumwater, Washington, Agreed Order DE 00 TCPSR-295, Facility/Site No. 8786341, Cleanup Site ID No. 3380*. From Steve Teel, Toxics Cleanup Program, Washington State Department of Ecology, to John Felder, Engineering Division, Washington State Department of Natural Resources. January 9.

Knickrehm, L. 2014. Email message from Lauren Knickrehm, Landau Associates, to Steve Teel, Toxics Cleanup Program, Washington State Department of Ecology. Re: *Webster Nursery- Ecology Letter and Post-Meeting Follow-up*. Copy of the Webster Nursery project schedule was attached. February 27.

MDA. 2005. Guidance Document: *Natural Attenuation of Contaminated Soil and Ground Water at Agricultural Chemical Incident Sites*. Minnesota Department of Agriculture Pesticide & Fertilizer Management Division. November.

Syracuse Research Corporation. 2007. Report: *Toxicological Profile for Heptachlor and Heptachlor Epoxide*. Prepared for U.S. Department of Health and Human Services. November.

Teel, Steve. 2014. Email message from Steve Teel, Toxics Cleanup Program, Washington State Department of Ecology, to Lauren Knickrehm, Landau Associates. Re: *Re: Webster Nursery- Ecology Letter and Post-Meeting Follow-up*. March 3.

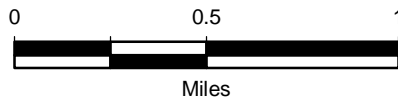
## ATTACHMENTS

Figure 1: Vicinity Map  
Figure 2: Existing Monitoring Well Network  
Figure 3: Organochlorine Pesticide Groundwater Sampling Locations  
Figure 4: Natural Attenuation Parameter Groundwater Sampling Locations  
Figure 5: Groundwater Contours February 2014  
Figure 6: Heptachlor Epoxide Time Series Concentrations for SW-10 and SW-11

Table 1: February 2014 Semiannual Groundwater Sampling Matrix  
Table 2: Semiannual Groundwater Sampling Laboratory and Field Parameter Details  
Table 3: Groundwater Analytical Results

Attachment 1: February 2014 Lab Data Report

G:\Projects\774\006\Semianual GW Monitoring Report\F01VicinityMap.mxd 3/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Data Source: Esri 2012

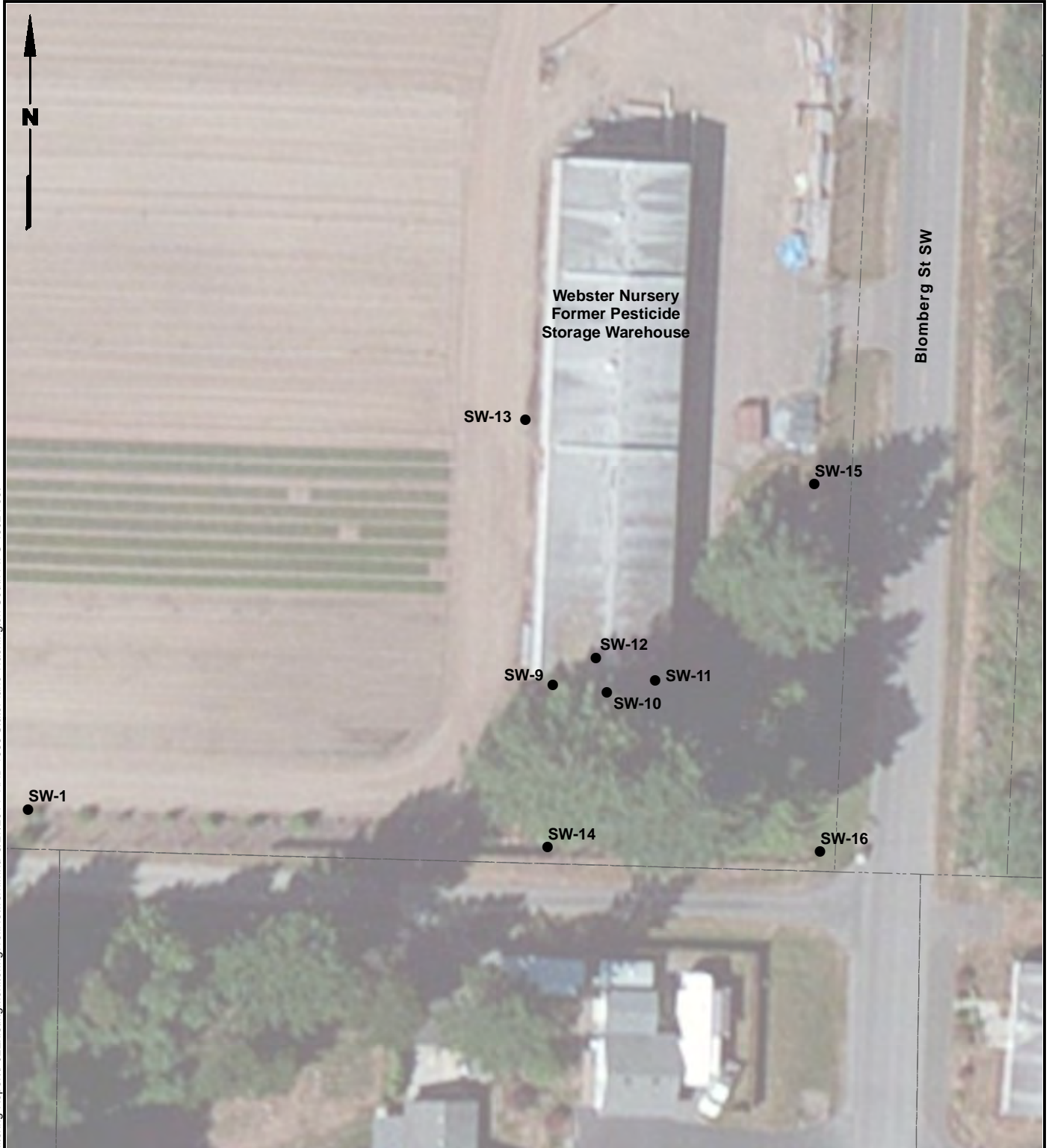


Webster Nursery Site  
Tumwater, Washington

Vicinity Map

Figure  
1

G:\Projects\774\006\Semianual GW Monitoring Report\F02ExistingMonitoringWellNetwork.mxd 3/27/2014 NAD 1983 StatePlane Washington South FIPS 4602 Feet



**Legend**

- Monitoring Well
- Tax Parcels

**Note**

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Sources: Thurston County GIS; Esri World Imagery.

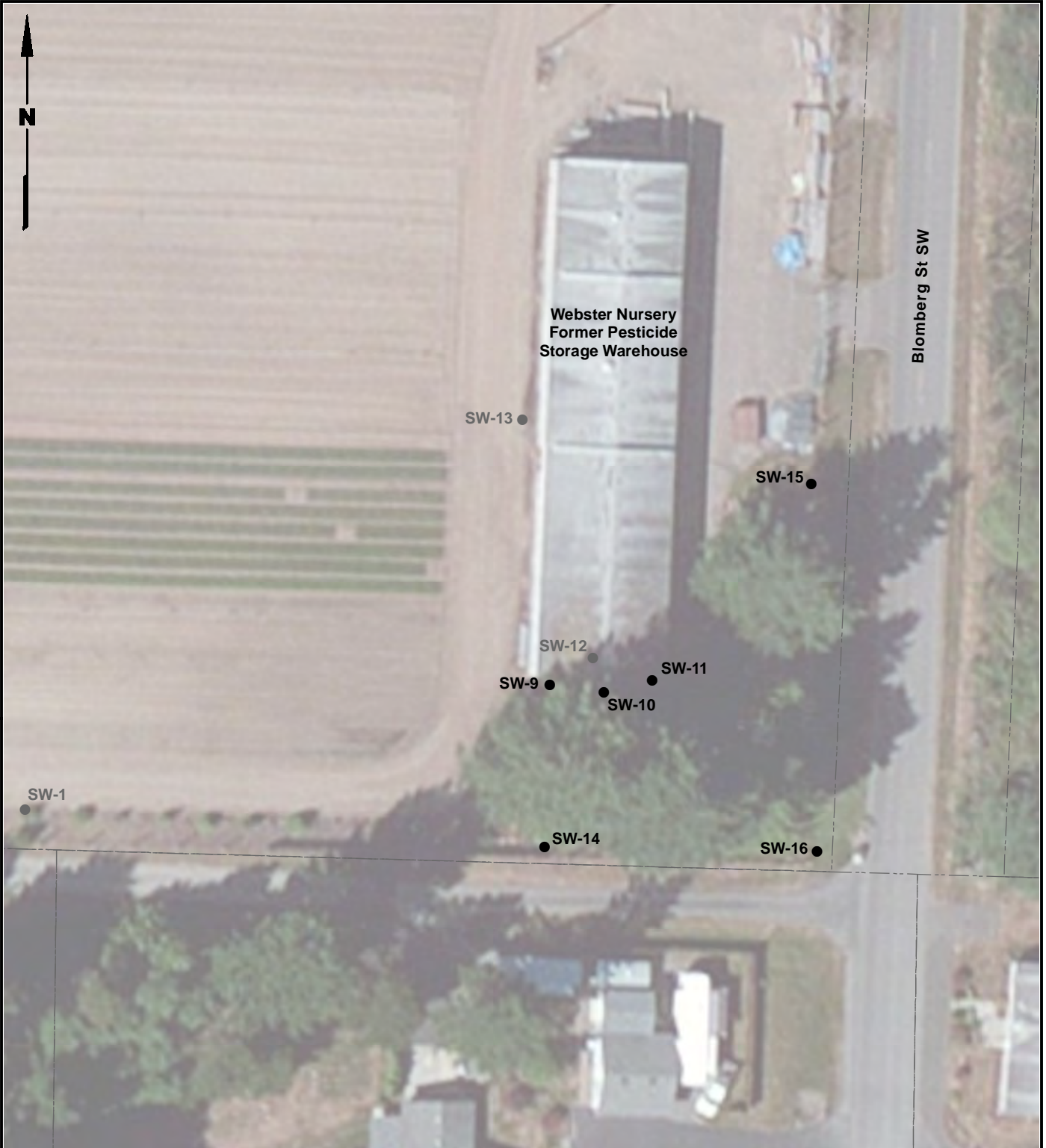


Webster Nursery Site  
Tumwater, Washington

**Existing Monitoring Well Network**

Figure  
**2**

G:\Projects\774\006\Semianual GW Monitoring Report\F03OrganochlorinePesticideLocations.mxd 3/27/2014 NAD 1983 StatePlane Washington South FIPS 4602 Feet

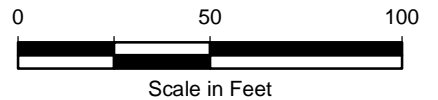


**Legend**

- Organochlorine Pesticide Groundwater Sampling Location
- Other Monitoring Wells
- Tax Parcels

**Note**

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Sources: Thurston County GIS; Esri World Imagery.



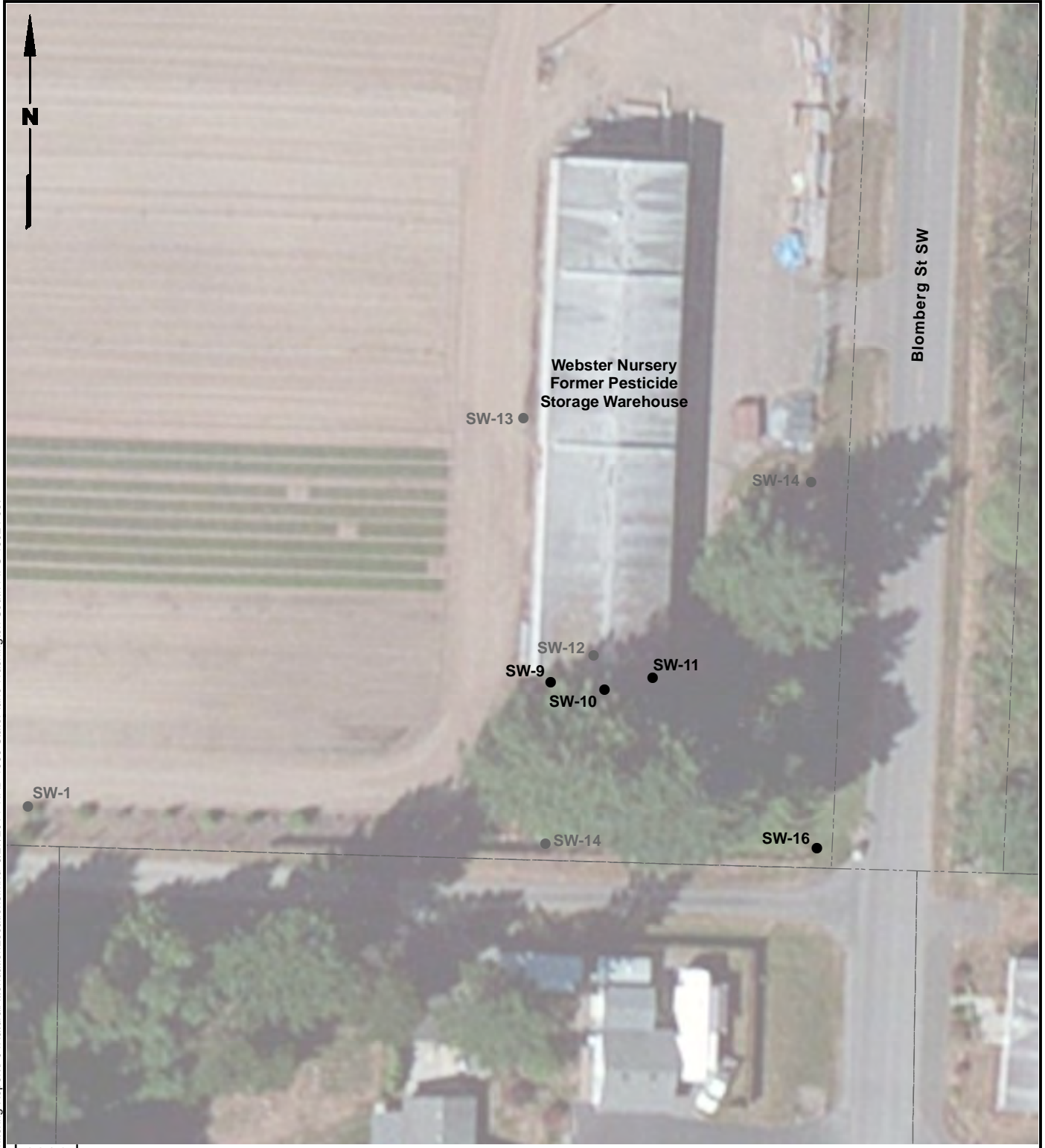
Webster Nursery Site  
Tumwater, Washington

**Organochlorine Pesticide  
Groundwater Sampling Locations**

Figure  
**3**



G:\Projects\774\006\Semianual GW Monitoring Report\F04NaturalAttenuationLocations.mxd 3/27/2014 NAD 1983 StatePlane Washington South FIPS 4602 Feet

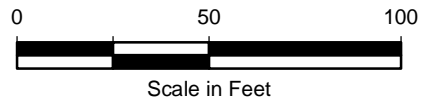


**Legend**

- Natural Attenuation Parameter Groundwater Sampling Location
- Other Monitoring Wells
- Tax Parcels

**Note**

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Sources: Thurston County GIS; Esri World Imagery.

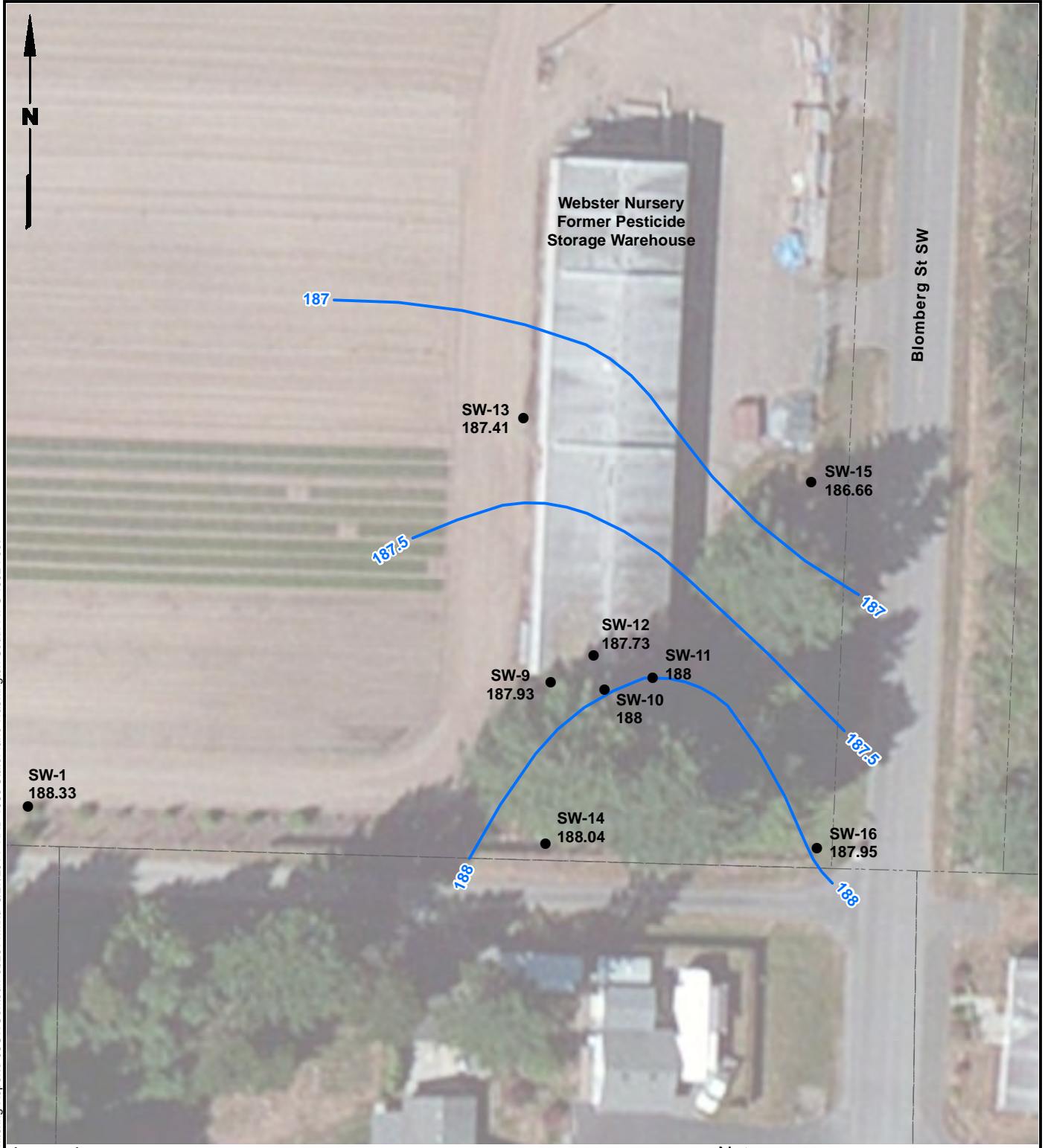


Webster Nursery Site  
Tumwater, Washington

**Natural Attenuation Parameter  
Groundwater Sampling Locations**

Figure  
**4**

G:\Projects\774\006\Semianual GW Monitoring Report\F05GWContourFeb2014.mxd 3/27/2014 NAD 1983 StatePlane Washington South FIPS 4602 Feet

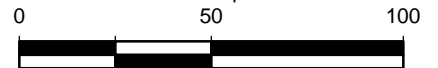


**Legend**

- Monitoring Well
- Groundwater Contour
- Tax Parcels

**Notes**

1. Well SW-1 data is variable and therefore was not used in drawing contours.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Scale in Feet

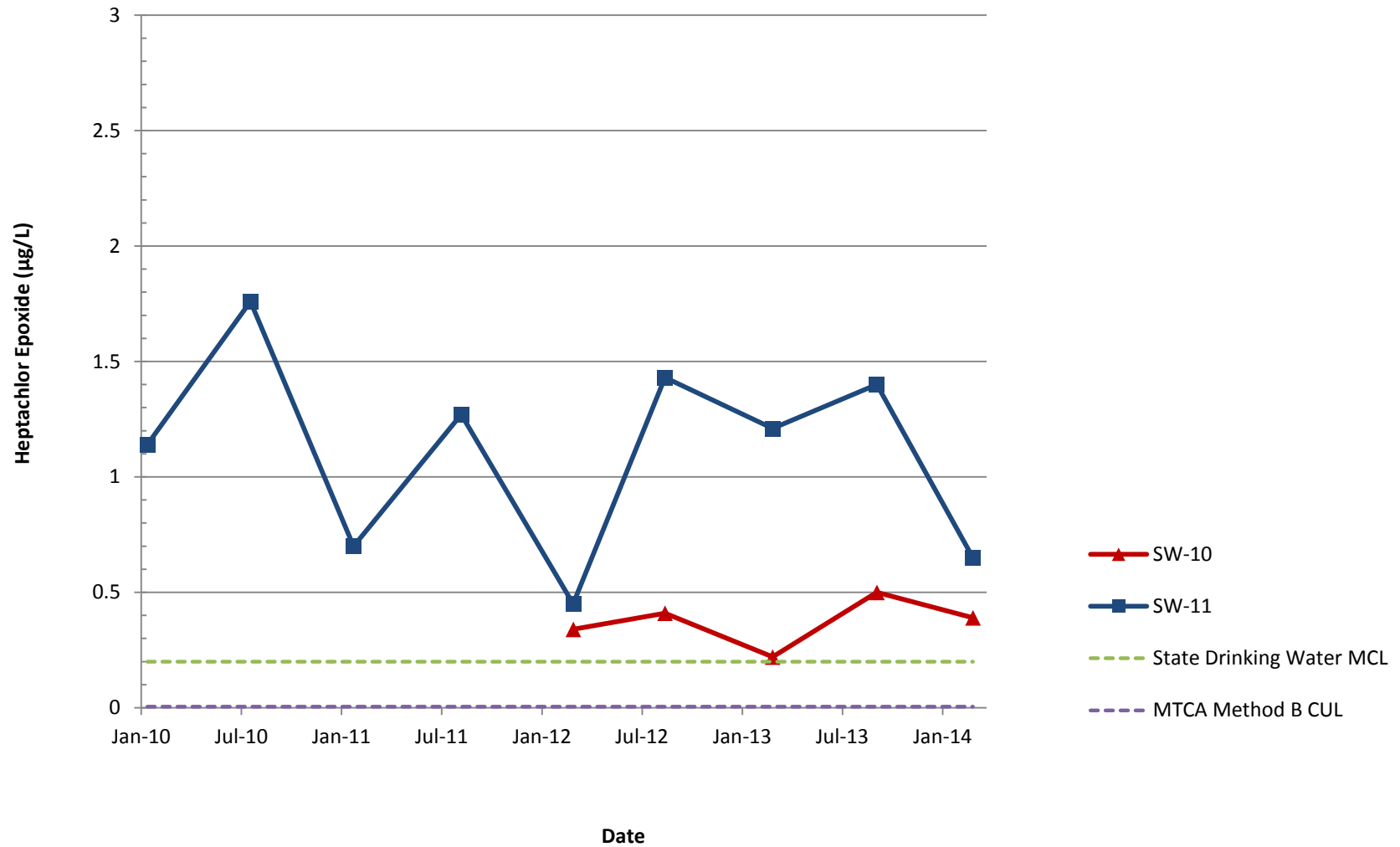
Data Sources: Thurston County GIS; Esri World Imagery.



Webster Nursery Site  
Tumwater, Washington

**Groundwater Contours**  
**February 2014**

Figure  
**5**



**TABLE 1**  
**FEBRUARY 2014 GROUNDWATER SAMPLING MATRIX**  
**WEBSTER NURSERY**  
**TUMWATER, WASHINGTON**

Location	Water Level	Organochlorine Pesticides EPA 8081A	Organochlorine Pesticides With Laboratory Centrifuge (a) EPA 8010A	Nitrate/Sulfate EPA 300.0	Total Organic Carbon EPA 415.1	Reactive Sulfide EPA 9034	Ferrous Iron Hach® Test Kit
SW-1	x						
SW-9	x	x		x	x	x	x
SW-10	x	x	x	x	x	x	x
SW-11	x	x	x	x	x	x	x
SW-12	x						
SW-13	x						
SW-14	x	x					x
SW-15	x	x					x
SW-16	x	x		x	x	x	x

## Notes

(a) The application of centrifuging the samples was a one-time test for February 2014 data only.

X = measurement or sample type to be collected at a given well location

EPA = U.S. Environmental Protection Agency

**TABLE 2**  
**GROUNDWATER MONITORING LABORATORY AND FIELD PARAMETER DETAILS**  
**WEBSTER NURSERY**  
**TUMWATER, WASHINGTON**

Groundwater Analytical Parameters	EPA Analytical Method	Practical Quantitation Limit	Preservation	Maximum Holding Time (Days)
<b>Pesticides</b>				
Heptachlor	8081A	0.01 µg/L	Store cool at 6°C	7
Heptachlor Epoxide	8081A	0.05 µg/L	Store cool at 6°C	7
alpha-Chlordane	8081A	0.05 µg/L	Store cool at 6°C	7
gamma-Chlordane	8081A	0.05 µg/L	Store cool at 6°C	7
<b>Conventionals</b>				
Nitrate (NO <sub>3</sub> ) (Total) as N	EPA 300.0	0.01 mg/L	Store cool at 6°C	48 hours
Nitrite (NO <sub>2</sub> ) (Total) as N	EPA 300.0	0.010 mg/L	Store cool at 6°C	48 hours
Total Organic Carbon	EPA 415.1	1.00 mg/L	Add 2mL 9N H <sub>2</sub> SO <sub>4</sub> pH<2; Store at 6°C	28
Sulfate (SO <sub>4</sub> ) (Total)	EPA 300.0	5.0 mg/L	Store cool at 6°C	28
Sulfide, Reactive	9034	0.2 mg/L	Add 2mL NaOH pH <2; Store cool at 6°C	No holding time
Groundwater Field Parameters	Data Collection Method	Instrument	Units	
<b>Monitored Natural Attenuation</b>				
Conductivity	Field	YSI (a)	microSiemens per centimeter	
Dissolved Oxygen	Field	YSI	mg/L	
Oxidation Reduction Potential	Field	YSI	+/- millivolts	
pH	Field	YSI	unitless	
Temperature	Field	YSI	°C	
Ferrous Iron (Fe <sup>2+</sup> )	Field	Hach® Kit	mg/L	
Turbidity	Field	Turbidity Meter	nephelometric turbidity units	
<b>Water Level</b>	Field	Water Level Indicator	0.01 foot	

## Notes:

(a) YSI will be calibrated daily  
°C = degrees Celsius  
EPA = U.S. Environmental Protection Agency  
mg/L = Milligrams per Liter  
µg/L = Micrograms per Liter

**TABLE 3  
GROUNDWATER ANALYTICAL RESULTS  
WEBSTER NURSERY  
TUMWATER, WASHINGTON**

Location: Lab ID: Date Collected:	MTCA Method B Groundwater Cleanup Level for Unrestricted Land Use (a)	SW-9 580-42461-1 2/25/2014	SW-10 580-42461-5 2/25/2014	Dup of SW-10 SW-99 580-42461-6 2/25/2014	SW-11 580-42461-2 2/25/2014	SW-14 580-42461-4 2/24/2014	SW-15 580-42461-3 2/24/2014	SW-16 580-42461-7 2/25/2014
<b>PESTICIDES (µg/L)</b>								
<b>EPA Method 8081A</b>								
Aldrin		0.0098 U	0.0098 U	0.0098 U	0.0099 U	0.0096 U	0.0097 U	0.0097 U
alpha-BHC		0.0098 U	0.0098 U	0.0098 U	0.0099 U	0.0096 U	0.0097 U	0.0097 U
beta-BHC		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
delta-BHC		0.0098 U	0.0098 U	0.0098 U	0.0099 U	0.0096 U	0.0097 U	0.0097 U
gamma-BHC (Lindane)		0.0098 U	0.0098 U	0.0098 U	0.0099 U	0.0096 U	0.0097 U	0.0097 U
4,4'-DDD		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
4,4'-DDE		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
4,4'-DDT		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Dieldrin		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Endosulfan I		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Endosulfan II		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Endosulfan sulfate		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Endrin		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Endrin aldehyde		0.049 U	0.049 U	0.049 U	0.050 U	0.048 U	0.048 U	0.048 U
Heptachlor	0.019	0.0098 U	0.0098 U	0.0098 U	0.0099 U	0.0096 U	0.0097 U	0.0097 U
Heptachlor epoxide	0.0048	0.0098 U	0.44	0.42	0.65	0.0096 U	0.0097 U	0.0097 U
Methoxychlor		0.098 U	0.098 U	0.098 U	0.099 U	0.096 U	0.097 U	0.097 U
Endrin ketone		0.020 U	0.020 U	0.020 U	0.020 U	0.019 U	0.019 U	0.019 U
Toxaphene		0.98 U	0.98 U	0.98 U	0.99 U	0.96 U	0.97 U	0.97 U
alpha-Chlordane		0.0098 U	0.040	0.042	0.0099 U	0.0096 U	0.0097 U	0.0097 U
gamma-Chlordane		0.0098 U	0.042	0.043	0.013	0.0096 U	0.0097 U	0.0097 U
Total Chlordane	0.25 (b)	ND	0.082	0.085	0.013	ND	ND	ND
<b>PESTICIDES (µg/L) (Centrifuged)</b>								
<b>EPA Method 8081A</b>								
Aldrin			0.010 U	0.010 U	0.011 U			
alpha-BHC			0.010 U	0.010 U	0.011 U			
beta-BHC			0.020 U	0.020 U	0.021 U			
delta-BHC			0.010 U	0.010 U	0.011 U			
gamma-BHC (Lindane)			0.010 U	0.010 U	0.011 U			
4,4'-DDD			0.020 U	0.020 U	0.021 U			
4,4'-DDE			0.020 U	0.020 U	0.021 U			
4,4'-DDT			0.020 U	0.020 U	0.021 U			
Dieldrin			0.020 U	0.020 U	0.021 U			
Endosulfan I			0.020 U	0.020 U	0.021 U			
Endosulfan II			0.020 U	0.020 U	0.021 U			
Endosulfan sulfate			0.020 U	0.020 U	0.021 U			
Endrin			0.020 U	0.020 U	0.021 U			
Endrin aldehyde			0.050 U	0.050 U	0.054 U			
Heptachlor	0.019		0.010 U	0.010 U	0.011 U			
Heptachlor epoxide	0.0048		0.39	0.40	0.67			
Methoxychlor			0.10 U	0.10 U	0.11 U			
Endrin ketone			0.020 U	0.020 U	0.021 U			
Toxaphene			1.0 U	1.0 U	1.1 U			
alpha-Chlordane			0.045	0.036 J	0.011 U			
gamma-Chlordane			0.044	0.036 J	0.013			
Total Chlordane	0.25 (b)		0.089	0.072	0.024			

**TABLE 3  
GROUNDWATER ANALYTICAL RESULTS  
WEBSTER NURSERY  
TUMWATER, WASHINGTON**

Location:	MTCA Method B	SW-9	SW-10	Dup of SW-10		SW-14	SW-15	SW-16
Lab ID:	Groundwater Cleanup Level	580-42461-1	580-42461-5	SW-99	SW-11	SW-14	SW-15	SW-16
Date Collected:	for Unrestricted Land Use (a)	2/25/2014	2/25/2014	SW-99	SW-11	SW-14	SW-15	SW-16
		580-42461-6	580-42461-2	580-42461-4	580-42461-3	580-42461-7	580-42461-7	580-42461-7
		2/25/2014	2/25/2014	2/25/2014	2/25/2014	2/24/2014	2/24/2014	2/25/2014
<b>CONVENTIONALS</b>								
Nitrite as N (EPA 300.0; mg/L)		<b>1.2 J</b>	<b>1.1</b>	<b>0.94</b>	<b>1.4</b>			<b>0.98</b>
Sulfate (EPA 300.0; mg/L)		<b>7.2</b>	<b>6.5</b>	<b>6.6</b>	<b>1.3</b>			1.2 U
Nitrate as N (EPA 300.0; mg/L)		0.90 U	0.90 U	0.90 U	0.90 U			0.90 U
Total Organic Carbon (EPA 415.1; mg/L)		1.0 U	1.0 U	1.0 U	1.0 U			1.0 U
Sulfide, Reactive (EPA 9034; mg/L)		<b>18</b>	19 U	19 U	20 U			18 U
<b>FIELD PARAMETERS</b>								
Dissolved Oxygen (mg/L)		9.52	10.18	10.18	10.00	9.66	13.81	6.71
Oxidation Reduction Potential (mV)		+184.5	+187.2	+187.2	+192.8	+174.2	+170.6	+176.8
pH		5.39	5.36	5.35	5.28	5.49	5.67	5.50
Ferrous Iron (mg/L)		0.0	0.0	0.0	0.0	0.4	0.2	0.0

## Notes:

- (a) MTCA Method B CULs were used as screening criteria.  
 (b) Screening criteria cannot be exceeded by the sum of individual chlordane concentrations.

Bold = Detected compound.

Box = Exceedance of Cleanup Level

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

ND = Not detected for the sum

U = Indicates the compound was not detected at the reported concentration.

EPA = U.S. Environmental Protection Agency

mg/L = Milligrams per Liter

MTCA = Model Toxics Control Act

mV = Millivolt

µg/L = Micrograms per Liter

ATTACHMENT 1

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# February 2014 Lab Data Report



# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle  
5755 8th Street East  
Tacoma, WA 98424  
Tel: (253)922-2310

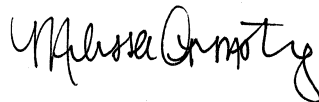
TestAmerica Job ID: 580-42461-1

Client Project/Site: Webster Nursery, Tumwater, WA

For:

Landau & Associates, Inc.  
950 Pacific Avenue, Suite 515  
Tacoma, Washington 98402

Attn: Ms. Lauren Knickrehm



Authorized for release by:  
3/11/2014 2:27:37 PM

Melissa Armstrong, Project Manager II  
(253)922-2310 x135  
[melissa.armstrong@testamericainc.com](mailto:melissa.armstrong@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

1

2

3

4

5

6

7

8

9

10

11



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Case Narrative . . . . .	3
Definitions . . . . .	4
Sample Summary . . . . .	5
Chain of Custody . . . . .	6
Receipt Checklists . . . . .	7
Client Sample Results . . . . .	8
QC Sample Results . . . . .	16
Chronicle . . . . .	21
Certification Summary . . . . .	23

# Case Narrative

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

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## Job ID: 580-42461-1

---

### Laboratory: TestAmerica Seattle

#### Narrative

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##### Receipt

The samples were received on 2/25/2014 1:43 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2° C.

##### GC Semi VOA - Method(s) 8081A

The samples that were centrifuged prior to extraction have been reported under the 8081A - Organochlorine Pesticide (GC) - Aqueous Matrix. These samples involved were SW-11-20140225 (580-42461-2), SW-10-20140225 (580-42461-5) and SW-99-20140225 (580-42461-6).

Sample SW-99-20140225 (580-42461-6), that was centrifuged, had surrogate DCB Decachlorobiphenyl recover outside the upper control limit 126% (53-122). The affected data has been "X" qualified and reported.

The continuing calibration verification (CCV) associated with analysis batch 154539 recovered above the upper control limit. The samples associated with this CCV were non-detects for the affected analytes and the QC was not adversely affected by the high bias; therefore, the data have been "^" qualified and reported. The following samples are impacted: (CCV 580-154539/47), (CCV 580-154539/62), (LCS 580-154363/2-A), (LCSD 580-154363/3-A), (MB 580-154363/1-A), SW-9-20140225 (580-42461-1), SW-11-20140225 (580-42461-2), SW-15-20140224 (580-42461-3), SW-14-20140224 (580-42461-4), SW-10-20140225 (580-42461-5), SW-99-20140225 (580-42461-6) and SW-16-20140225 (580-42461-7). The CCV failures are as follows: CCV47 fails high for 4,4'-DDD, 4,4'-DDT, Dieldrin, Endosulfan II, Endrin, Endrin aldehyde, Endrin ketone, Heptachlor and Methoxychlor. CCV62 failed high for 4,4'-DDD, 4,4'-DDE, Endosulfan II, Endrin, Endrin aldehyde and Endrin ketone.

No other analytical or quality issues were noted.

##### General Chemistry - Method(s) 300.0

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 154276 were outside control limits for Nitrite as N. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits. Affected data has been qualified and reported.

No other analytical or quality issues were noted.

##### Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



# Definitions/Glossary

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Qualifiers

### GC Semi VOA

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.
X	Surrogate is outside control limits

### General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery exceeds the control limits

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Sample Summary

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-42461-1	SW-9-20140225	Water	02/25/14 09:01	02/25/14 13:43
580-42461-2	SW-11-20140225	Water	02/25/14 11:33	02/25/14 13:43
580-42461-3	SW-15-20140224	Water	02/24/14 12:23	02/25/14 13:43
580-42461-4	SW-14-20140224	Water	02/24/14 13:39	02/25/14 13:43
580-42461-5	SW-10-20140225	Water	02/25/14 10:45	02/25/14 13:43
580-42461-6	SW-99-20140225	Water	02/25/14 10:51	02/25/14 13:43
580-42461-7	SW-16-20140225	Water	02/25/14 09:51	02/25/14 13:43





LANDAU ASSOCIATES  
 1 Tacoma (253) 926-2493  
 Spokane (509) 327-9737  
 Portland (503) 542-1080

- Seattle/Edmonds (425) 778-0907

# Chain-of-Custody Record

Date 2/25/14  
 Page 1 of 1

## Testing Parameters

8091A  
 8081A  
 CENTREFLOW  
 Nitrate/Sulfate 300.0  
 TOC 415.1  
 Reactive Sulfide 9034

Project Name Webster Nursery Project No. 774006.010.011  
 Project Location/Event Thurston Co, WA - Winter 2014 SW Sampling  
 Sampler's Name Sierra Mott  
 Project Contact: Lauren Knicker  
 Send Results To: John Felder (DUE) Lauren Knicker

Turnaround Time  
 Standard  
 Accelerated  
 \_\_\_\_\_

Observations/Comments

Sample I.D.	Date	Time	Matrix	No. of Containers	Testing Parameters	Observations/Comments
SW-9-20140225	2/25/14	0901	H2O	5	XXX	
SW-11-20140225	2/25/14	1133		7	XXX	
SW-15-20140224	2/24/14	1223		2	XX	
SW-14-20140224	2/24/14	1339		2	XX	
SW-10-20140225	2/25/14	1045		7	XXX	
SW-9-20140225	2/25/14	1051		7	XXX	
SW-16-20140225	2/25/14	0951		5	XXX	

Special Shipment/Handling or Storage Requirements: cooler on ice

Relinquished by: Sierra Mott  
 Signature: [Signature]  
 Printed Name: Sierra Mott  
 Company: Landau Associates  
 Date: 2/25/14 Time: 1343

Received by: [Signature]  
 Signature: [Signature]  
 Printed Name: Blankenship  
 Company: TA-Sea  
 Date: 2/25/14 Time: 1343

Relinquished by: [Signature]  
 Signature: [Signature]  
 Printed Name: [Signature]  
 Company: Compar-580-42461 Chain of Custody  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received by: drop off  
 Signature: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_

Method of Shipment: \_\_\_\_\_

Other: 1g grab/bw wet/bubb  
AITB = 4.2/4.2 w/6

WHITE COPY - Project File

YELLOW COPY - Laboratory

PINK COPY - Client Representative

## Login Sample Receipt Checklist

Client: Landau & Associates, Inc.

Job Number: 580-42461-1

**Login Number: 42461**

**List Number: 1**

**Creator: Presley, Kim A**

**List Source: TestAmerica Seattle**

Question	Answer	Comment
Radioactivity wasn't checked or is <= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



# Client Sample Results

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC) - Aqueous Matrix

**Client Sample ID: SW-11-20140225**

**Date Collected: 02/25/14 11:33**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-2**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
alpha-BHC	ND		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
beta-BHC	ND		0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
delta-BHC	ND		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
gamma-BHC (Lindane)	ND		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
4,4'-DDD	ND	^	0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
4,4'-DDE	ND		0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
4,4'-DDT	ND	^	0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Dieldrin	ND	^	0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Endosulfan I	ND		0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Endosulfan II	ND	^	0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Endosulfan sulfate	ND		0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Endrin	ND	^	0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Endrin aldehyde	ND	^	0.054	ug/L		02/27/14 10:15	03/04/14 21:49	1
Heptachlor	ND	^	0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
<b>Heptachlor epoxide</b>	<b>0.67</b>		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
Methoxychlor	ND	^	0.11	ug/L		02/27/14 10:15	03/04/14 21:49	1
Endrin ketone	ND	^	0.021	ug/L		02/27/14 10:15	03/04/14 21:49	1
Toxaphene	ND		1.1	ug/L		02/27/14 10:15	03/04/14 21:49	1
alpha-Chlordane	ND		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
<b>gamma-Chlordane</b>	<b>0.013</b>		0.011	ug/L		02/27/14 10:15	03/04/14 21:49	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
<i>Tetrachloro-m-xylene</i>	77		18 - 181			02/27/14 10:15	03/04/14 21:49	1
<i>DCB Decachlorobiphenyl</i>	106		53 - 122			02/27/14 10:15	03/04/14 21:49	1

**Client Sample ID: SW-10-20140225**

**Date Collected: 02/25/14 10:45**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-5**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
alpha-BHC	ND		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
delta-BHC	ND		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
gamma-BHC (Lindane)	ND		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
4,4'-DDD	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
4,4'-DDT	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Dieldrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Endosulfan II	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Endrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Endrin aldehyde	ND	^	0.050	ug/L		02/27/14 10:15	03/04/14 22:48	1
Heptachlor	ND	^	0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
<b>Heptachlor epoxide</b>	<b>0.39</b>		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
Methoxychlor	ND	^	0.10	ug/L		02/27/14 10:15	03/04/14 22:48	1
Endrin ketone	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:48	1
Toxaphene	ND		1.0	ug/L		02/27/14 10:15	03/04/14 22:48	1
<b>alpha-Chlordane</b>	<b>0.045</b>		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1

TestAmerica Seattle



# Client Sample Results

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC) - Aqueous Matrix (Continued)

**Client Sample ID: SW-10-20140225**

**Date Collected: 02/25/14 10:45**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-5**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>gamma-Chlordane</b>	<b>0.044</b>		0.010	ug/L		02/27/14 10:15	03/04/14 22:48	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
<i>Tetrachloro-m-xylene</i>	81		18 - 181			02/27/14 10:15	03/04/14 22:48	1
<i>DCB Decachlorobiphenyl</i>	115		53 - 122			02/27/14 10:15	03/04/14 22:48	1

**Client Sample ID: SW-99-20140225**

**Date Collected: 02/25/14 10:51**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-6**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
alpha-BHC	ND		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
delta-BHC	ND		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
gamma-BHC (Lindane)	ND		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
4,4'-DDD	ND ^		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
4,4'-DDT	ND ^		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Dieldrin	ND ^		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Endosulfan II	ND ^		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Endrin	ND ^		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Endrin aldehyde	ND ^		0.050	ug/L		02/27/14 10:19	03/04/14 23:16	1
Heptachlor	ND ^		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
<b>Heptachlor epoxide</b>	<b>0.40</b>		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
Methoxychlor	ND ^		0.10	ug/L		02/27/14 10:19	03/04/14 23:16	1
Endrin ketone	ND ^		0.020	ug/L		02/27/14 10:19	03/04/14 23:16	1
Toxaphene	ND		1.0	ug/L		02/27/14 10:19	03/04/14 23:16	1
<b>alpha-Chlordane</b>	<b>0.036</b>		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
<b>gamma-Chlordane</b>	<b>0.036</b>		0.010	ug/L		02/27/14 10:19	03/04/14 23:16	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
<i>Tetrachloro-m-xylene</i>	78		18 - 181			02/27/14 10:19	03/04/14 23:16	1
<i>DCB Decachlorobiphenyl</i>	126	X	53 - 122			02/27/14 10:19	03/04/14 23:16	1

# Client Sample Results

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC)

**Client Sample ID: SW-9-20140225**

**Date Collected: 02/25/14 09:01**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-1**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
alpha-BHC	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
delta-BHC	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
gamma-BHC (Lindane)	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
4,4'-DDD	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
4,4'-DDT	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Dieldrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Endosulfan II	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Endrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Endrin aldehyde	ND	^	0.049	ug/L		02/27/14 10:15	03/04/14 21:21	1
Heptachlor	ND	^	0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
Heptachlor epoxide	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
Methoxychlor	ND	^	0.098	ug/L		02/27/14 10:15	03/04/14 21:21	1
Endrin ketone	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:21	1
Toxaphene	ND		0.98	ug/L		02/27/14 10:15	03/04/14 21:21	1
alpha-Chlordane	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
gamma-Chlordane	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 21:21	1
<b>Surrogate</b>		<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>		<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
<i>Tetrachloro-m-xylene</i>		81		18 - 181		02/27/14 10:15	03/04/14 21:21	1
<i>DCB Decachlorobiphenyl</i>		106		53 - 122		02/27/14 10:15	03/04/14 21:21	1

**Client Sample ID: SW-11-20140225**

**Date Collected: 02/25/14 11:33**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-2**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
alpha-BHC	ND		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
delta-BHC	ND		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
gamma-BHC (Lindane)	ND		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
4,4'-DDD	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
4,4'-DDT	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Dieldrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Endosulfan II	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Endrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Endrin aldehyde	ND	^	0.050	ug/L		02/27/14 10:15	03/04/14 21:35	1
Heptachlor	ND	^	0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
<b>Heptachlor epoxide</b>	<b>0.65</b>		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
Methoxychlor	ND	^	0.099	ug/L		02/27/14 10:15	03/04/14 21:35	1
Endrin ketone	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 21:35	1
Toxaphene	ND		0.99	ug/L		02/27/14 10:15	03/04/14 21:35	1
alpha-Chlordane	ND		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1

TestAmerica Seattle

# Client Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC) (Continued)

**Client Sample ID: SW-11-20140225**

**Date Collected: 02/25/14 11:33**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-2**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
gamma-Chlordane	0.013		0.0099	ug/L		02/27/14 10:15	03/04/14 21:35	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Tetrachloro-m-xylene	77		18 - 181			02/27/14 10:15	03/04/14 21:35	1
DCB Decachlorobiphenyl	95		53 - 122			02/27/14 10:15	03/04/14 21:35	1

**Client Sample ID: SW-15-20140224**

**Date Collected: 02/24/14 12:23**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-3**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
alpha-BHC	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
beta-BHC	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
delta-BHC	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
gamma-BHC (Lindane)	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
4,4'-DDD	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
4,4'-DDE	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
4,4'-DDT	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Dieldrin	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Endosulfan I	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Endosulfan II	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Endosulfan sulfate	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Endrin	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Endrin aldehyde	ND ^		0.048	ug/L		02/27/14 10:15	03/04/14 22:04	1
Heptachlor	ND ^		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
Heptachlor epoxide	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
Methoxychlor	ND ^		0.097	ug/L		02/27/14 10:15	03/04/14 22:04	1
Endrin ketone	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:04	1
Toxaphene	ND		0.97	ug/L		02/27/14 10:15	03/04/14 22:04	1
alpha-Chlordane	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
gamma-Chlordane	ND		0.0097	ug/L		02/27/14 10:15	03/04/14 22:04	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Tetrachloro-m-xylene	82		18 - 181			02/27/14 10:15	03/04/14 22:04	1
DCB Decachlorobiphenyl	102		53 - 122			02/27/14 10:15	03/04/14 22:04	1

**Client Sample ID: SW-14-20140224**

**Date Collected: 02/24/14 13:39**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-4**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
alpha-BHC	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
beta-BHC	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
delta-BHC	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
gamma-BHC (Lindane)	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
4,4'-DDD	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
4,4'-DDE	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
4,4'-DDT	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
Dieldrin	ND ^		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
Endosulfan I	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1

TestAmerica Seattle

# Client Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC) (Continued)

**Client Sample ID: SW-14-20140224**

**Date Collected: 02/24/14 13:39**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-4**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Endosulfan II	ND	^	0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
Endosulfan sulfate	ND		0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
Endrin	ND	^	0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
Endrin aldehyde	ND	^	0.048	ug/L		02/27/14 10:15	03/04/14 22:19	1
Heptachlor	ND	^	0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
Heptachlor epoxide	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
Methoxychlor	ND	^	0.096	ug/L		02/27/14 10:15	03/04/14 22:19	1
Endrin ketone	ND	^	0.019	ug/L		02/27/14 10:15	03/04/14 22:19	1
Toxaphene	ND		0.96	ug/L		02/27/14 10:15	03/04/14 22:19	1
alpha-Chlordane	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1
gamma-Chlordane	ND		0.0096	ug/L		02/27/14 10:15	03/04/14 22:19	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	85		18 - 181	02/27/14 10:15	03/04/14 22:19	1
DCB Decachlorobiphenyl	104		53 - 122	02/27/14 10:15	03/04/14 22:19	1

**Client Sample ID: SW-10-20140225**

**Date Collected: 02/25/14 10:45**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-5**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
alpha-BHC	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
delta-BHC	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
gamma-BHC (Lindane)	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
4,4'-DDD	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
4,4'-DDT	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Dieldrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Endosulfan II	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Endrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Endrin aldehyde	ND	^	0.049	ug/L		02/27/14 10:15	03/04/14 22:33	1
Heptachlor	ND	^	0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
<b>Heptachlor epoxide</b>	<b>0.44</b>		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
Methoxychlor	ND	^	0.098	ug/L		02/27/14 10:15	03/04/14 22:33	1
Endrin ketone	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 22:33	1
Toxaphene	ND		0.98	ug/L		02/27/14 10:15	03/04/14 22:33	1
<b>alpha-Chlordane</b>	<b>0.040</b>		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1
<b>gamma-Chlordane</b>	<b>0.042</b>		0.0098	ug/L		02/27/14 10:15	03/04/14 22:33	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	77		18 - 181	02/27/14 10:15	03/04/14 22:33	1
DCB Decachlorobiphenyl	113		53 - 122	02/27/14 10:15	03/04/14 22:33	1

TestAmerica Seattle

# Client Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC)

**Client Sample ID: SW-99-20140225**

**Date Collected: 02/25/14 10:51**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-6**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
alpha-BHC	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
delta-BHC	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
gamma-BHC (Lindane)	ND		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
4,4'-DDD	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
4,4'-DDT	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Dieldrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Endosulfan II	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Endrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Endrin aldehyde	ND	^	0.049	ug/L		02/27/14 10:15	03/04/14 23:02	1
Heptachlor	ND	^	0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
<b>Heptachlor epoxide</b>	<b>0.42</b>		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
Methoxychlor	ND	^	0.098	ug/L		02/27/14 10:15	03/04/14 23:02	1
Endrin ketone	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 23:02	1
Toxaphene	ND		0.98	ug/L		02/27/14 10:15	03/04/14 23:02	1
<b>alpha-Chlordane</b>	<b>0.042</b>		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
<b>gamma-Chlordane</b>	<b>0.043</b>		0.0098	ug/L		02/27/14 10:15	03/04/14 23:02	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
<i>Tetrachloro-m-xylene</i>	77		18 - 181			02/27/14 10:15	03/04/14 23:02	1
<i>DCB Decachlorobiphenyl</i>	112		53 - 122			02/27/14 10:15	03/04/14 23:02	1

**Client Sample ID: SW-16-20140225**

**Date Collected: 02/25/14 09:51**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-7**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
alpha-BHC	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
beta-BHC	ND		0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
delta-BHC	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
gamma-BHC (Lindane)	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
4,4'-DDD	ND	^	0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
4,4'-DDE	ND		0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
4,4'-DDT	ND	^	0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Dieldrin	ND	^	0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Endosulfan I	ND		0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Endosulfan II	ND	^	0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Endosulfan sulfate	ND		0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Endrin	ND	^	0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Endrin aldehyde	ND	^	0.048	ug/L		02/27/14 10:19	03/04/14 23:31	1
Heptachlor	ND	^	0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
Heptachlor epoxide	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
Methoxychlor	ND	^	0.097	ug/L		02/27/14 10:19	03/04/14 23:31	1
Endrin ketone	ND	^	0.019	ug/L		02/27/14 10:19	03/04/14 23:31	1
Toxaphene	ND		0.97	ug/L		02/27/14 10:19	03/04/14 23:31	1
alpha-Chlordane	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1

TestAmerica Seattle

# Client Sample Results

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC) (Continued)

**Client Sample ID: SW-16-20140225**

**Lab Sample ID: 580-42461-7**

**Date Collected: 02/25/14 09:51**

**Matrix: Water**

**Date Received: 02/25/14 13:43**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
gamma-Chlordane	ND		0.0097	ug/L		02/27/14 10:19	03/04/14 23:31	1
Surrogate	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	83		18 - 181			02/27/14 10:19	03/04/14 23:31	1
DCB Decachlorobiphenyl	96		53 - 122			02/27/14 10:19	03/04/14 23:31	1



# Client Sample Results

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## General Chemistry

**Client Sample ID: SW-9-20140225**

**Date Collected: 02/25/14 09:01**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-1**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	1.2		0.60	mg/L			02/25/14 16:40	1
Sulfate	7.2		1.2	mg/L			02/25/14 16:40	1
Nitrate as N	ND		0.90	mg/L			02/25/14 16:40	1
Total Organic Carbon	ND		1.0	mg/L			02/26/14 16:26	1
Sulfide, Reactive	18		16	mg/L		03/06/14 17:36	03/07/14 12:35	1

**Client Sample ID: SW-11-20140225**

**Date Collected: 02/25/14 11:33**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-2**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	1.4		0.60	mg/L			02/25/14 17:23	1
Sulfate	1.3		1.2	mg/L			02/25/14 17:23	1
Nitrate as N	ND		0.90	mg/L			02/25/14 17:23	1
Total Organic Carbon	ND		1.0	mg/L			02/26/14 16:26	1
Sulfide, Reactive	ND		20	mg/L		03/06/14 17:36	03/07/14 12:35	1

**Client Sample ID: SW-10-20140225**

**Date Collected: 02/25/14 10:45**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-5**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	1.1		0.60	mg/L			02/25/14 17:38	1
Sulfate	6.5		1.2	mg/L			02/25/14 17:38	1
Nitrate as N	ND		0.90	mg/L			02/25/14 17:38	1
Total Organic Carbon	ND		1.0	mg/L			02/26/14 16:26	1
Sulfide, Reactive	ND		19	mg/L		03/06/14 17:36	03/07/14 12:35	1

**Client Sample ID: SW-99-20140225**

**Date Collected: 02/25/14 10:51**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-6**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	0.94		0.60	mg/L			02/25/14 17:52	1
Sulfate	6.6		1.2	mg/L			02/25/14 17:52	1
Nitrate as N	ND		0.90	mg/L			02/25/14 17:52	1
Total Organic Carbon	ND		1.0	mg/L			02/26/14 16:26	1
Sulfide, Reactive	ND		19	mg/L		03/06/14 17:36	03/07/14 12:35	1

**Client Sample ID: SW-16-20140225**

**Date Collected: 02/25/14 09:51**

**Date Received: 02/25/14 13:43**

**Lab Sample ID: 580-42461-7**

**Matrix: Water**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	0.98		0.60	mg/L			02/25/14 18:06	1
Sulfate	ND		1.2	mg/L			02/25/14 18:06	1
Nitrate as N	ND		0.90	mg/L			02/25/14 18:06	1
Total Organic Carbon	ND		1.0	mg/L			02/26/14 16:26	1
Sulfide, Reactive	ND		18	mg/L		03/06/14 17:36	03/07/14 12:35	1

TestAmerica Seattle

# QC Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC)

**Lab Sample ID: MB 580-154363/1-A**

**Matrix: Water**

**Analysis Batch: 154539**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 154363**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
alpha-BHC	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
beta-BHC	ND		0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
delta-BHC	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
gamma-BHC (Lindane)	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
4,4'-DDD	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
4,4'-DDE	ND		0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
4,4'-DDT	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Dieldrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Endosulfan I	ND		0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Endosulfan II	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Endosulfan sulfate	ND		0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Endrin	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Endrin aldehyde	ND		0.050	ug/L		02/27/14 10:15	03/04/14 17:58	1
Heptachlor	ND	^	0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
Heptachlor epoxide	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
Methoxychlor	ND	^	0.10	ug/L		02/27/14 10:15	03/04/14 17:58	1
Endrin ketone	ND	^	0.020	ug/L		02/27/14 10:15	03/04/14 17:58	1
Toxaphene	ND		1.0	ug/L		02/27/14 10:15	03/04/14 17:58	1
alpha-Chlordane	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1
gamma-Chlordane	ND		0.010	ug/L		02/27/14 10:15	03/04/14 17:58	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	88		18 - 181	02/27/14 10:15	03/04/14 17:58	1
DCB Decachlorobiphenyl	80		53 - 122	02/27/14 10:15	03/04/14 17:58	1

**Lab Sample ID: LCS 580-154363/2-A**

**Matrix: Water**

**Analysis Batch: 154539**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 154363**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aldrin	0.160	0.126		ug/L		79	60 - 125
alpha-BHC	0.160	0.107		ug/L		67	57 - 125
beta-BHC	0.160	0.128		ug/L		80	54 - 125
delta-BHC	0.160	0.104		ug/L		65	39 - 124
gamma-BHC (Lindane)	0.160	0.118		ug/L		74	59 - 125
4,4'-DDD	0.160	0.155	^	ug/L		97	71 - 125
4,4'-DDE	0.160	0.150		ug/L		93	66 - 125
4,4'-DDT	0.160	0.154	^	ug/L		96	54 - 136
Dieldrin	0.160	0.149	^	ug/L		93	71 - 124
Endosulfan I	0.160	0.151		ug/L		94	70 - 125
Endosulfan II	0.160	0.152	^	ug/L		95	70 - 128
Endosulfan sulfate	0.160	0.126		ug/L		79	63 - 125
Endrin	0.160	0.148	^	ug/L		92	72 - 130
Endrin aldehyde	0.160	0.177		ug/L		111	73 - 125
Heptachlor	0.160	0.141	^	ug/L		88	34 - 128
Heptachlor epoxide	0.160	0.150		ug/L		94	69 - 125
Methoxychlor	0.160	0.167	^	ug/L		104	62 - 149

TestAmerica Seattle



# QC Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 8081A - Organochlorine Pesticides (GC) (Continued)

**Lab Sample ID: LCS 580-154363/2-A**

**Matrix: Water**

**Analysis Batch: 154539**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 154363**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Endrin ketone	0.160	0.183	^	ug/L		114	70 - 133
alpha-Chlordane	0.160	0.135		ug/L		85	66 - 125
gamma-Chlordane	0.160	0.136		ug/L		85	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Tetrachloro-m-xylene	81		18 - 181
DCB Decachlorobiphenyl	87		53 - 122

**Lab Sample ID: LCSD 580-154363/3-A**

**Matrix: Water**

**Analysis Batch: 154539**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

**Prep Batch: 154363**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Aldrin	0.160	0.130		ug/L		81	60 - 125	3	38
alpha-BHC	0.160	0.0992		ug/L		62	57 - 125	7	41
beta-BHC	0.160	0.130		ug/L		81	54 - 125	1	34
delta-BHC	0.160	0.138		ug/L		86	39 - 124	29	49
gamma-BHC (Lindane)	0.160	0.116		ug/L		72	59 - 125	2	42
4,4'-DDD	0.160	0.152	^	ug/L		95	71 - 125	2	47
4,4'-DDE	0.160	0.149		ug/L		93	66 - 125	0	43
4,4'-DDT	0.160	0.146	^	ug/L		92	54 - 136	5	49
Dieldrin	0.160	0.149	^	ug/L		93	71 - 124	0	39
Endosulfan I	0.160	0.153		ug/L		95	70 - 125	1	40
Endosulfan II	0.160	0.135	^	ug/L		84	70 - 128	12	37
Endosulfan sulfate	0.160	0.116		ug/L		73	63 - 125	8	34
Endrin	0.160	0.149	^	ug/L		93	72 - 130	1	41
Endrin aldehyde	0.160	0.174		ug/L		109	73 - 125	2	43
Heptachlor	0.160	0.137	^	ug/L		86	34 - 128	3	39
Heptachlor epoxide	0.160	0.151		ug/L		94	69 - 125	1	35
Methoxychlor	0.160	0.162	^	ug/L		101	62 - 149	3	37
Endrin ketone	0.160	0.171	^	ug/L		107	70 - 133	6	37
alpha-Chlordane	0.160	0.136		ug/L		85	66 - 125	1	43
gamma-Chlordane	0.160	0.137		ug/L		86	65 - 125	1	40

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Tetrachloro-m-xylene	70		18 - 181
DCB Decachlorobiphenyl	73		53 - 122

## Method: 300.0 - Nitrate & Nitrite

**Lab Sample ID: MB 580-154276/3**

**Matrix: Water**

**Analysis Batch: 154276**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.60	mg/L			02/25/14 08:12	1
Nitrate as N	ND		0.90	mg/L			02/25/14 08:12	1

TestAmerica Seattle

# QC Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 300.0 - Nitrate & Nitrite (Continued)

**Lab Sample ID: LCS 580-154276/4**

**Matrix: Water**

**Analysis Batch: 154276**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	1.20	1.24		mg/L		103	90 - 110
Nitrate as N	1.80	1.82		mg/L		101	90 - 110

**Lab Sample ID: LCSD 580-154276/5**

**Matrix: Water**

**Analysis Batch: 154276**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrite as N	1.20	1.24		mg/L		103	90 - 110	0	15
Nitrate as N	1.80	1.82		mg/L		101	90 - 110	0	15

**Lab Sample ID: 580-42461-1 MS**

**Matrix: Water**

**Analysis Batch: 154276**

**Client Sample ID: SW-9-20140225**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	1.2		1.20	2.05	F1	mg/L		73	90 - 110
Nitrate as N	ND		1.80	2.13		mg/L		100	90 - 110

**Lab Sample ID: 580-42461-1 DU**

**Matrix: Water**

**Analysis Batch: 154276**

**Client Sample ID: SW-9-20140225**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Nitrite as N	1.2			1.11		mg/L		6	10
Nitrate as N	ND			ND		mg/L		NC	10

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 580-154275/3**

**Matrix: Water**

**Analysis Batch: 154275**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.2	mg/L			02/25/14 08:12	1

**Lab Sample ID: LCS 580-154275/4**

**Matrix: Water**

**Analysis Batch: 154275**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	12.0	13.0		mg/L		108	90 - 110

**Lab Sample ID: LCSD 580-154275/5**

**Matrix: Water**

**Analysis Batch: 154275**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	12.0	13.1		mg/L		109	90 - 110	1	15

TestAmerica Seattle

# QC Sample Results

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 580-42461-1 MS**  
**Matrix: Water**  
**Analysis Batch: 154275**

**Client Sample ID: SW-9-20140225**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	7.2		12.0	18.5		mg/L		94	90 - 110

**Lab Sample ID: 580-42461-1 DU**  
**Matrix: Water**  
**Analysis Batch: 154275**

**Client Sample ID: SW-9-20140225**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Sulfate	7.2		6.96		mg/L		3	10

## Method: 415.1 - TOC

**Lab Sample ID: MB 580-154315/1**  
**Matrix: Water**  
**Analysis Batch: 154315**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	mg/L			02/26/14 16:26	1

**Lab Sample ID: LCS 580-154315/2**  
**Matrix: Water**  
**Analysis Batch: 154315**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	15.0	16.3		mg/L		108	85 - 115

## Method: 9034 - Reactive Sulfide

**Lab Sample ID: MB 580-154775/1-A**  
**Matrix: Water**  
**Analysis Batch: 154812**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 154775**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide, Reactive	ND		20	mg/L		03/06/14 17:36	03/07/14 12:35	1

**Lab Sample ID: LCS 580-154775/2-A**  
**Matrix: Water**  
**Analysis Batch: 154812**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 154775**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide, Reactive	401	353		mg/L		88	30 - 114

**Lab Sample ID: 580-42461-1 MS**  
**Matrix: Water**  
**Analysis Batch: 154812**

**Client Sample ID: SW-9-20140225**  
**Prep Type: Total/NA**  
**Prep Batch: 154775**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide, Reactive	18		373	320		mg/L		81	30 - 114

TestAmerica Seattle

# QC Sample Results

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Method: 9034 - Reactive Sulfide (Continued)

Lab Sample ID: 580-42461-1 MSD

Matrix: Water

Analysis Batch: 154812

Client Sample ID: SW-9-20140225

Prep Type: Total/NA

Prep Batch: 154775

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfide, Reactive	18		367	313		mg/L		80	30 - 114	2	

Lab Sample ID: 580-42461-1 DU

Matrix: Water

Analysis Batch: 154812

Client Sample ID: SW-9-20140225

Prep Type: Total/NA

Prep Batch: 154775

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Sulfide, Reactive	18		ND		mg/L		NC	20

# Lab Chronicle

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

**Client Sample ID: SW-9-20140225**

**Lab Sample ID: 580-42461-1**

Date Collected: 02/25/14 09:01

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 21:21	SGH	TAL SEA
Total/NA	Analysis	300.0		1	154275	02/25/14 16:40	RSB	TAL SEA
Total/NA	Analysis	300.0		1	154276	02/25/14 16:40	RSB	TAL SEA
Total/NA	Analysis	415.1		1	154315	02/26/14 16:26	IWH	TAL SEA
Total/NA	Prep	7.3.4			154775	03/06/14 17:36	SPP	TAL SEA
Total/NA	Analysis	9034		1	154812	03/07/14 12:35	SPP	TAL SEA

**Client Sample ID: SW-11-20140225**

**Lab Sample ID: 580-42461-2**

Date Collected: 02/25/14 11:33

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 21:35	SGH	TAL SEA
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 21:49	SGH	TAL SEA
Total/NA	Analysis	300.0		1	154275	02/25/14 17:23	RSB	TAL SEA
Total/NA	Analysis	300.0		1	154276	02/25/14 17:23	RSB	TAL SEA
Total/NA	Analysis	415.1		1	154315	02/26/14 16:26	IWH	TAL SEA
Total/NA	Prep	7.3.4			154775	03/06/14 17:36	SPP	TAL SEA
Total/NA	Analysis	9034		1	154812	03/07/14 12:35	SPP	TAL SEA

**Client Sample ID: SW-15-20140224**

**Lab Sample ID: 580-42461-3**

Date Collected: 02/24/14 12:23

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8081A		1	154539	03/04/14 22:04	SGH	TAL SEA
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA

**Client Sample ID: SW-14-20140224**

**Lab Sample ID: 580-42461-4**

Date Collected: 02/24/14 13:39

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 22:19	SGH	TAL SEA

# Lab Chronicle

Client: Landau & Associates, Inc.  
 Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

**Client Sample ID: SW-10-20140225**

**Lab Sample ID: 580-42461-5**

Date Collected: 02/25/14 10:45

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 22:33	SGH	TAL SEA
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 22:48	SGH	TAL SEA
Total/NA	Analysis	300.0		1	154275	02/25/14 17:38	RSB	TAL SEA
Total/NA	Analysis	300.0		1	154276	02/25/14 17:38	RSB	TAL SEA
Total/NA	Analysis	415.1		1	154315	02/26/14 16:26	IWH	TAL SEA
Total/NA	Prep	7.3.4			154775	03/06/14 17:36	SPP	TAL SEA
Total/NA	Analysis	9034		1	154812	03/07/14 12:35	SPP	TAL SEA

**Client Sample ID: SW-99-20140225**

**Lab Sample ID: 580-42461-6**

Date Collected: 02/25/14 10:51

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			154363	02/27/14 10:15	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 23:02	SGH	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 23:16	SGH	TAL SEA
Total/NA	Prep	3510C			154363	02/27/14 10:19	ALC	TAL SEA
Total/NA	Analysis	300.0		1	154275	02/25/14 17:52	RSB	TAL SEA
Total/NA	Analysis	300.0		1	154276	02/25/14 17:52	RSB	TAL SEA
Total/NA	Analysis	415.1		1	154315	02/26/14 16:26	IWH	TAL SEA
Total/NA	Prep	7.3.4			154775	03/06/14 17:36	SPP	TAL SEA
Total/NA	Analysis	9034		1	154812	03/07/14 12:35	SPP	TAL SEA

**Client Sample ID: SW-16-20140225**

**Lab Sample ID: 580-42461-7**

Date Collected: 02/25/14 09:51

Matrix: Water

Date Received: 02/25/14 13:43

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			154363	02/27/14 10:19	ALC	TAL SEA
Total/NA	Analysis	8081A		1	154539	03/04/14 23:31	SGH	TAL SEA
Total/NA	Analysis	300.0		1	154275	02/25/14 18:06	RSB	TAL SEA
Total/NA	Analysis	300.0		1	154276	02/25/14 18:06	RSB	TAL SEA
Total/NA	Analysis	415.1		1	154315	02/26/14 16:26	IWH	TAL SEA
Total/NA	Prep	7.3.4			154775	03/06/14 17:36	SPP	TAL SEA
Total/NA	Analysis	9034		1	154812	03/07/14 12:35	SPP	TAL SEA

**Laboratory References:**

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

# Certification Summary

Client: Landau & Associates, Inc.  
Project/Site: Webster Nursery, Tumwater, WA

TestAmerica Job ID: 580-42461-1

## Laboratory: TestAmerica Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-15

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
415.1		Water	Total Organic Carbon
8081A	3510C	Water	4,4'-DDD
8081A	3510C	Water	4,4'-DDE
8081A	3510C	Water	4,4'-DDT
8081A	3510C	Water	Aldrin
8081A	3510C	Water	alpha-BHC
8081A	3510C	Water	alpha-Chlordane
8081A	3510C	Water	beta-BHC
8081A	3510C	Water	delta-BHC
8081A	3510C	Water	Dieldrin
8081A	3510C	Water	Endosulfan I
8081A	3510C	Water	Endosulfan II
8081A	3510C	Water	Endosulfan sulfate
8081A	3510C	Water	Endrin
8081A	3510C	Water	Endrin aldehyde
8081A	3510C	Water	Endrin ketone
8081A	3510C	Water	gamma-BHC (Lindane)
8081A	3510C	Water	gamma-Chlordane
8081A	3510C	Water	Heptachlor
8081A	3510C	Water	Heptachlor epoxide
8081A	3510C	Water	Methoxychlor
8081A	3510C	Water	Toxaphene
9034	7.3.4	Water	Sulfide, Reactive