APPENDIX P

Monitoring and Remediation Optimization System

Monitoring and Remediation Optimization System (MAROS) Analysis
Boeing Auburn Facility
Auburn, Washington

February 9, 2017

Prepared for

The Boeing Company
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Monitoring and Remediation Optimization System
Boeing Auburn Facility
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LIST OF ABBREVIATIONS AND ACRONYMS

AFCEE ..... Air Force Center for Environmental Excellence
bgs ..... below ground surface
COV ..... co-variance
CV ..... coefficient of variation
EPA ..... U.S. Environmental Protection Agency
Facility ..... Boeing Auburn Facility
ft ..... foot/feet
GSI ..... GSI Environmental, Inc.
kg ..... kilogram
lbs ..... pounds
MAROS ..... Monitoring and Remediation Optimization System
µg/L ..... micrograms per liter
S ..... Mann-Kendall statistic
SIM ..... selected ion monitoring
Site ..... Boeing Site
TCE ..... trichloroethene
VC ..... vinyl chloride

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INTRODUCTION

A trend analysis of trichloroethene (TCE) and vinyl chloride (VC) concentrations and mass in the Boeing Auburn monitoring well network was performed using Monitoring and Remediation Optimization System (MAROS) software. MAROS was developed for the Air Force Center for Environmental Excellence (AFCEE) by GSI Environmental, Inc. (GSI) and the University of Houston. The software is designed to analyze groundwater monitoring data for temporal trends with the goal of improving monitoring well network efficiency and supporting data management decisions (GSI 2012). MAROS was used to assess TCE and VC concentration trends at individual monitoring wells and Site-wide mass trends.

METHODS

Data Selection

Several pre-processing steps were taken to customize the TCE and VC concentration dataset for importation into the MAROS software. Monitoring data from all actively sampled "AGW" monitoring wells collected through June 2015 were included in the analysis. Data were separated into four separate input files: one for each groundwater zone in the upper aquifer (shallow, intermediate, and deep zones) and one for water table wells, which are a subset of the shallow zone. The period of record varied by well depending on the date the well was installed and the data collected at each well. The earliest data point recorded was in August 1990 for shallow zone and water table wells; October 1996 for intermediate zone wells; and December 1995 for deep zone wells. A complete list of wells used in the MAROS analysis are presented in Table P-1.

Inactive or decommissioned wells were not included in the MAROS analysis. However, data from wells that were abandoned and re-installed at the same location (i.e., AGW031 replaced by AGW031R) were retained. In these instances, data from the decommissioned well were combined with the data from the replacement well to provide a complete record of groundwater data at a single location. For example, the historical data from abandoned well AGW031 were combined with the data series for the actively-sampled replacement well AGW031R. Seventeen such wells were included in this analysis.

The dataset was modified to account for variable laboratory reporting limits (reporting limits) non-detect results, and duplicate data. Reporting limits for TCE and VC have varied through history of the pre-RI and RI investigations at the Site. For analysis purposes, AFCEE (GSI 2012) recommends selecting a uniform detection limit and a uniform value for non-detect results for a given compound, and recommends consolidating duplicate values. Uniform detection limits of 0.2 micrograms per liter (µg/L) and of 0.02 µg/L were selected for TCE and VC, respectively. For non-detect values, a value equal to half of the current reporting limit was selected; consequently, non-detect results are assigned values of 0.1 µg/L for TCE and 0.01 µg/L for VC. Concentration results for blind field duplicates were consolidated by averaging the two results. For VC results, if both scan (U.S. Environmental Protection Agency [EPA] Method 8260) and selected ion monitoring (SIM; EPA Method 8260 SIM) results were available, the SIM result was included in the MAROS analysis to incorporate the higher precision and lower reporting limit associated with the SIM method.

Individual Well Trend Analysis

MAROS analyzes for trends (i.e., increasing, decreasing, stable, etc.) in groundwater monitoring data using two approaches: the Mann-Kendall method, which does not assume an underlying statistical distribution (nonparametric); and first-order regression, which assumes a normal (or lognormal) data distribution. The nonparametric Mann-Kendall test was considered more appropriate for the Boeing Auburn dataset because it allows for irregularly spaced sampling intervals and does not require assumptions about the statistical distribution (GSI 2012).

The Mann-Kendall trend analysis provides an assessment of the concentration trend at an individual well. The method ranks time-ordered data for a given contaminant, and then determines the sign (positive or negative) of the difference between consecutive samples. The Mann-Kendall statistic (S) is then calculated as the number of positive differences minus the number of negative differences (GSI 2012). The sign of S indicates the direction of the trend (i.e., positive indicates an increasing trend), while the magnitude reflects the strength of the trend. MAROS calculates a "confidence in trend" value using the S statistic and number of samples (n) using a Kendall probability table found in many statistical textbooks, for example, Hollander (2013). MAROS also calculates a coefficient of variation (CV) as the standard deviation divided by the sample mean. A CV value of less than or equal to 1 signifies a dataset that groups closely around the sample mean, while a CV greater than 1 signifies more scatter about the mean. The Mann-Kendall statistic and CV are then used to classify the concentration trend at each well for each contaminant according to a decision matrix designed by GSI Environmental, Inc. (GSI 2012) presented on Table P-2.

Spatial Moment Analysis

The spatial stability of groundwater contamination is evaluated by calculating the zeroth and first moments at selected time steps from the spatial distribution of a given contaminant, then applying the Mann-Kendall test to the time series of moments (GSI 2012). The zeroth moment approximates the total dissolved contaminant mass and the first moment estimates the location of the center of contaminant mass. Concentration results from each monitoring well were spatially distributed using Delaunay triangulation, and converted to units of mass by accounting for porosity and saturated thickness of the aquifer.

The spatial moment analysis required additional groundwater dataset consolidation. The MAROS estimate of moments is sensitive to the addition or subtraction of wells between time steps, particularly when it changes the spatial footprint of the monitoring network. GSI recommends selecting a consistent number and identity of wells for the period of analysis[1]. Since 1995, monitoring wells have been added to the Site groundwater monitoring network on an annual to sub-annual basis. Additionally, the sampling frequency for individual wells has changed through time. These factors made it challenging to select a consistent group of wells that both adequately delineated the extent of contamination and that were sampled at concurrent intervals.

To remedy these dataset factors, a 1-year time step for the moment analysis was specified and the TCE and VC data was consolidated to yearly averages for each monitoring well. Then, wells were excluded from the dataset that have been uniformly non-detect and that were far removed from the extent of VC or TCE contamination. However, non-detect wells immediately adjacent to the contaminated zone were included. This improved the accuracy of the moment analysis by restricting its footprint to the spatial extent of contamination (GSI 2012). A list of wells not included in the

[1] Vanderford, M. 2015. "Re: MAROS technical support". Mindy Vanderford, GSI Environmental, Inc. June 23.

moment analysis is presented in Table P-3. After reviewing historical well network coverage, the time period of 2011 through 2015 was selected for the moment analysis. Beginning in 2011, water quality data was available for the areas with the highest concentrations in the shallow, intermediate, and deep zones and the extent of contamination had largely been determined. Additional wells installed after 2011 improved upon the spatial delineation of groundwater contamination and, therefore, were important to include in the analysis. Their inclusion, however, created gaps in the historical data (for the statistical analysis all wells must have the same number of data points). For example, a delineation well added in 2013 would have no data from 2011 through 2012. To address this issue, GSI recommends creating "historical" data to fill these gaps[2]. Concentration values were estimated for these points by assuming a constant value equal to the average of existing TCE or VC sample results for a given well. Estimating historical data points based trend analysis of the existing data points was also evaluated; however, the results were similar and use of average concentrations was selected for simplicity.

For the spatial moment analysis, the water table wells were consolidated with the shallow zone (i.e., consolidated shallow zone) as these wells are considered a subset of the shallow zone. As a part of the vapor intrusion evaluation and assessment (LAI 2016b), shallow zone wells were further classified as either shallow zone, water table zone, or both (shallow and water table zone). In addition, some locations had clustered wells or multi-level wells with screened intervals in both the water table and deeper shallow zone. In order to avoid redundancy, only the following wells were classified as within the consolidated shallow zone: a) all wells previously classified as shallow zone wells; b) wells classified as both shallow and water table zone wells; and c) water table wells that were spatially independent[3] (i.e., not part of a multi-channel well or paired set of collocated wells); water table wells with a paired well deeper in the shallow zone were not included. All wells included in the consolidated shallow zone are presented in Table P-4.

Additional Site information was also required for moment analysis input. A porosity of 0.3 was selected for this analysis, consistent with previously reported values of aquifer porosity (LAI 2016a). To estimate saturated thickness, uniform depth intervals were selected to approximate the thickness of each groundwater zone. Intervals of 5 to 35 ft below ground surface (bgs) was selected for the shallow zone, 35 to 75 ft bgs was selected for the intermediate zone, and 75 to 105 ft bgs was selected for the deep zone. These intervals provide saturated thickness estimates of 30 ft for the shallow zone, 40 ft for the intermediate zone, and 30 ft for deep zone. Collectively, these intervals represent the total saturated thickness between the water table and the Osceola Mudflow.

[2] Vanderford, M. 2015. "Re: MAROS technical support". Mindy Vanderford, GSI Environmental, Inc. June 23.
[3] Water table wells AGW224, AGW229, AGW244, AGW245, and AGW246 were added to the shallow zone for this analysis.

INDIVIDUAL WELL TRENDS

MAROS was used to calculate the Mann-Kendall statistic (S, covariance (COV), and the statistical confidence in the trend at each well for TCE and VC using data collected through June 2015. Trends were classified at each well based on calculated S, COV and trend confidence using the MAROS trend decision matrix (Table P-1). Possible classifications include: increasing, probably increasing, stable, probably decreasing, decreasing, no trend, non-detect, and not applicable. The classification "non-detect" was assigned to wells at which all concentration results for the specified compounds were below the laboratory detection limit (detection limit). The classification "not applicable" was assigned to wells that had an insufficient number of sample results (<4 samples) for statistical analysis; this classification is referred to below as "insufficient data". However, if there was insufficient data collected from a well and all data collected was non-detect the classification was assigned as non-detect.

Results

Tabulated results of the individual well trend analyses are presented in Table P-5, Table P-6, Table P-7, and Table P-8 for water table, shallow zone, intermediate zone, and deep zone wells, respectively. Time series plots of TCE and VC at individual wells are presented in Appendix N.

Water Table Trichloroethene

Results from the water table TCE trend analysis indicate that 40 of the 48 wells (83 percent) had concentrations that were decreasing, probably decreasing, or non-detect. Another four were classified as stable. Two wells (AGW251-1 and AGW263) had insufficient data. The remaining two wells (AGW069 and AGW229) were classified as having no trend due to low statistical confidence.

No water table wells were classified as having an increasing TCE concentration trend. Trend analysis results for TCE concentrations in water table wells are presented in Table P-5 and are plotted on Figure P-1.

Water Table Vinyl Chloride

Results from the water table VC trend analysis indicate that 31 of the 48 wells (65 percent) had concentrations that were decreasing, probably decreasing, or non-detect. An additional four wells were classified as stable. Three wells had insufficient data. Nine wells were classified as having no trend due to low statistical confidence. One well was classified as increasing. Trend analysis results for VC concentrations in water table wells are presented in Table P-5 and are plotted on Figure P-2.

One water table well (AGW115) was classified with an increasing VC concentration trend. Well AGW115 is located within the Boeing Auburn Facility (Facility). In the AGW115 concentration time series plot (Appendix N), VC concentrations increase from an initial sample in 2004, to a maximum concentration (1.0 µg/L) in the second quarter of 2013. VC results after 2013 have declined since the

2013 maximum. The increasing trend designation appears to be influenced by the length of the historical data when concentrations were increasing compared to the more recent data set where concentrations are stable.

Shallow Zone Trichloroethene

Results from the shallow zone TCE trend analysis indicate that 75 of the 98 wells (76 percent) had concentrations that are decreasing, probably decreasing, or non-detect. An additional eleven wells were classified as stable. Two wells had insufficient data. Seven wells were classified as having no trend due to low statistical confidence. Three wells were classified as increasing. Trend analysis results for TCE concentrations in shallow zone wells are presented in Table P-6 and are plotted on Figure P-3.

The three shallow zone wells classified with an increasing TCE concentration trend were AGW165, AGW225, and AGW228. Each of these wells were classified as increasing with a high degree of confidence (Table P-6). Well AGW165 is located within the Facility and wells AGW225 and AGW228 are located northwest and downgradient of the Facility. Evaluation of the more recent trends for the last four sampling events[4] indicated that the trends at these three wells were stable (AGW165 and AGW225) or had no trend (AGW228).

Shallow Zone Vinyl Chloride

Results from the shallow zone VC trend analysis indicate that 67 of the 98 wells (68 percent) had concentrations that were decreasing, probably decreasing, or non-detect. An additional 11 wells were classified as stable. Three wells had insufficient data. Twelve wells were classified as having no trend due to low statistical confidence. Five wells were classified as increasing or probably increasing. Trend analysis results for VC concentrations in shallow zone wells are presented in Table P-6 and are plotted on Figure P-4.

The five shallow zone wells classified as having an increasing or probably increasing VC concentration trend were AGW115[5] , AGW165, AGW232, AGW235-2, and AGW251-2. Well AGW115 and AGW165 are located at the Facility and wells AGW232, AGW235-2, and AGW251-2 are located northwest and downgradient of the Facility. Increasing trends for VC are expected at some wells as reductive dechlorination occurs and TCE is eventually converted to VC. Additional analysis could be completed at these wells to further identify if reductive dechlorination is occurring at these locations.

Intermediate Zone Trichloroethene

Results from the intermediate zone TCE trend analysis indicate that 60 of 90 wells (67 percent) had concentrations that were decreasing, probably decreasing, or non-detect. An additional 12 wells were classified as stable. One well (AGW256) had insufficient data. Ten wells were classified as having no

[4] Data through December 2015 was used in the additional analysis.
[5] AGW115 is classified as both a water table well and a shallow zone well. Consequently, results from AGW115 (and all other wells classified as both water table and shallow zone) were considered in both sections.

trend due to low statistical confidence. Seven wells were classified as increasing or probably increasing. Trend analysis results for TCE concentrations in intermediate zone wells are presented in Table P-7 and are plotted on Figure P-5.

The seven intermediate zone wells that were classified with increasing or probably increasing concentration trends were AGW105, AGW144, AGW145, AGW163, AGW168, AGW182, and AGW209-5. Wells AGW105 and AGW163 are located at the Facility and wellsAGW144, AGW145, AGW168, AGW182, and AGW209-5 are located northwest and downgradient of the Facility. Evaluation of the more recent trends for the last four sampling events[6] indicated that the trends at these seven wells were stable (AGW105, AGW144, AGW182, and AGW209-5) or decreasing (AGW145, AGW163, and AGW168).

Intermediate Zone Vinyl Chloride

Results from the intermediate zone VC trend analysis indicate that 61 of the 90 wells (68 percent) had concentrations that were decreasing, probably decreasing, or non-detect. An additional 12 wells were classified as stable. Two wells (AGW255-5 and AGW265) had insufficient data. Ten wells were classified as having no trend due to low statistical confidence. Five wells were classified as increasing or probably increasing. Trend analysis results for VC concentrations in intermediate zone wells are presented in Table P-7 and are plotted on Figure P-6.

The five intermediate zone wells classified with increasing or probably increasing concentration trends were AGW144, AGW156, AGW196, AGW209-5, and AGW251-3. Well AGW156 is located at the Facility and wells AGW144, AGW196, AGW209-5, and AGW251-3 are located northwest and downgradient of the Facility. Increasing trends for VC are expected at some wells as reductive dechlorination occurs and TCE is eventually converted to VC. Additional analysis could be completed at these wells to further identify if reductive dechlorination is occurring at these locations.

Deep Zone Trichloroethene

Results from the deep zone TCE trend analysis indicate that 32 of 44 wells (73 percent) had concentrations that were decreasing, probably decreasing, or non-detect. An additional five wells were classified as stable. One well (AGW212-7) was classified as having no trend due to low statistical confidence. Six wells were classified as increasing or probably increasing. Trend analysis results for TCE concentrations in deep zone wells are presented in Table P-8 and are plotted on Figure P-7.

The six deep zone wells classified with increasing or probably increasing concentration trends were AGW146, AGW167, AGW169, AGW199, AGW230, and AGW234. These six wells are located northwest and downgradient of the Facility, with the exception of AGW230 which is located northeast of the

[6] Data through December 2015 was used in the additional analysis.

Facility and crossgradient. Evaluation of the more recent trends for the last four sampling events[7] indicated that the trends at these six wells were stable.

Deep Zone Vinyl Chloride

Results from the deep zone VC trend analysis indicate that 34 out of 44 wells (77 percent) had concentrations that were decreasing, probably decreasing, or non-detect. An additional three wells were classified as stable. Five wells (AGW143, AGW171, AGW183, AGW197, and AGW211-6) were classified as having no trend due to low statistical confidence. Wells AGW143, AGW171, and AGW211-6 had a single VC detection, AGW183 had two detections, and AGW197 had four detections. Five wells were classified as having no trend due to low statistical confidence. Two wells were classified as increasing or probably increasing. Trend analysis results for VC concentrations in deep zone wells are presented in Table P-8 and are plotted on Figure P-8.

The two deep zone wells classified with increasing or probably increasing VC concentration trends were AGW234 and AGW251-6. These two wells are located northwest and downgradient of the Facility. Increasing trends for VC are expected at some wells as reductive dechlorination occurs and TCE is eventually converted to VC. Additional analysis could be completed at these wells to further identify if reductive dechlorination is occurring at these locations.

Discussion

According to results of the MAROS trend analyses at individual monitoring wells, the majority of wells at the Site have TCE and VC concentration trends classified as decreasing, probably decreasing, or non-detect over the analysis period. Of the 250 wells[8] analyzed, decreasing, probably decreasing, or non-detect trends were identified in 180 wells for TCE, and in 169 wells for VC. Stable TCE and VC concentration trends were identified at 30 and 29 wells, respectively. Increasing or probably increasing TCE and VC concentration trends were classified at 16 and 12 monitoring wells, respectively. The remaining wells (24 and 40 for TCE and VC, respectively) had insufficient data or were classified as having no trend due to low statistical confidence. The results for the individual well trend analysis indicate that a majority of wells at the Site wells have TCE and VC concentration trends that are decreasing, probably decreasing, stable or were non-detect.

[7] Data through December 2015 was used in the additional analysis.
[8] Some of these wells were included in both the water table and the shallow zone analysis.

SPATIAL MOMENT TRENDS

Site-wide trends in contaminant behavior were analyzed using the spatial moment analysis capability in MAROS. This analysis allows interpretation of the total dissolved contaminant mass (zeroth moment) and the location of the contamination center of mass (first moment).

Results

Tabulated spatial moment trend results are presented in Table P-9 and graphical results for TCE and VC are presented on Figure P-9 and Figure P-10, respectively.

Shallow Zone

The zeroth moment analysis estimated an average mass of 4.2 kilograms (kg) of TCE (9.3 pounds [lbs]) and 1.8 kg of VC (8.3 lbs equivalent mass TCE) in the shallow zone over the period from 2011 to 2015. The COV of the dissolved mass of TCE (0.06) and of VC (0.02) were small (COV<1), indicating that TCE and VC dissolved masses from 2011 to 2015 varied little from their mean values (AFCEE 2012). The analysis identified a stable trend in total dissolved mass of TCE and VC in the shallow zone over the period of analysis. The trend results are presented in Table P-9.

The results of the shallow zone first moment analysis indicate that the distance from the Facility[9] to the contaminant center of mass increased very slightly (increased distance from the source of approximately 100 ft) over the period from 2011 to 2015 for TCE; however, the centers of mass remain tightly clustered. No trend was identified for VC. In addition to distance from the Facility to the center of mass, the first moment analysis also estimates coordinates of the center of mass for each time step analyzed. The coordinates can then be mapped to graphically display spatial shifts in the center of mass. The centers of mass for TCE and VC are shown on Figures P-9 and P-10, respectively. The distances from the source for each year and moment trend are presented in Table P-9.

Intermediate Zone

The zeroth moment analysis estimated an average mass of 22 kg of TCE (48.5 lbs) and 1.5 kg of VC (6.8 lbs equivalent mass TCE) in the intermediate zone over the period from 2011 to 2015. The COV of the dissolved mass of TCE (0.06) and of VC (0.07) were small (COV<1), indicating that TCE and VC dissolved masses from 2011 to 2015 varied little from their mean values. The analysis identified a decreasing trend in total dissolved mass of TCE and a stable trend in total dissolved mass of VC in the intermediate zone of the period of analysis. The trend results are presented in Table P-9.

The results of the intermediate zone first moment analysis indicate that the distance between the Facility and the contaminant center of mass has decreased slightly for TCE and increased slightly for VC over the period from 2011 to 2015. The apparent shift in the TCE and VC centers of mass is small

[9] AGW201 selected as Facility reference location for distance to center of mass calculations for all zones.

(approximately 20 ft to the west for TCE and approximately 400 ft to the north for VC).The centers of mass for TCE and VC are shown on Figures P-9 and P-10, respectively. The distances from the source for each year and moment trend are presented in Table P-9.

Deep Zone

The zeroth moment analysis estimated an average mass of 14.4 kg of TCE (31.7 lbs) and 0.2 kg of VC (0.9 lbs equivalent mass TCE) in the deep zone over the period from 2011 to 2015. The COV of the dissolved mass of TCE (0.02) and VC (0.2) were small (COV<1), indicating that TCE and VC dissolved masses from 2011 to 2015 varied little from their mean values. The analysis identified a stable trend in total dissolved mass of TCE and a stable trend in total dissolved mass of VC in the deep zone over the period of analysis. The trend results are presented in Table P-9.

The results of the deep zone first moment analysis indicate that the distance between the source location and the contaminant center of mass was stable over time for TCE and identified no trend for VC. Although the estimated centers of mass of the TCE and VC plumes differed slightly from year to year over the period of analysis, neither center of mass shifted in a consistent direction. The centers of mass for TCE and VC are shown on Figures P-9 and P-10, respectively. The distances from the source for each year and moment trend are presented in Table P-9.

Discussion

The spatial moment analysis provides a measure of contaminant behavior and spatial extent at the Site. Results of the analysis over the period from 2011 to 2015 indicate that total dissolved mass of TCE and VC, as well as the spread and centers of mass, are generally stable.

The estimated total dissolved mass of TCE and VC were classified as having stable trends for all zones with the exception of intermediate zone TCE, which had a decreasing trend. The analysis estimated a considerably larger dissolved mass of TCE (total of approximately 40 kg; 88.2 lbs) than of VC (total of approximately 3.5 kg; 16.2 lbs equivalent mass TCE). Most of the dissolved mass of TCE occurs in the intermediate and deep zones (22 and 14 kg, respectively), whereas the majority of VC occurs in the shallow and intermediate zones (1.8 and 1.5 kg, respectively).

Over the period of analysis, estimated locations of TCE and VC center of mass were generally stationary for each groundwater zone (Figure P-9 and Figure P-10). The relative stability of the VOC mass indicates that the plume is not moving downgradient due to advection. The apparent plume stability and location of the center of mass supports the conclusion that source areas have been depleted and concentrations are dominated by desorption and back diffusion combined with attenuation processes (e.g., degradation and adsorption).

The period over which the spatial moment analysis could be applied was limited by the availability of spatially distributed water quality data. However, over the selected period, the analysis indicates that the TCE and VC plumes beneath the Site are generally stable.

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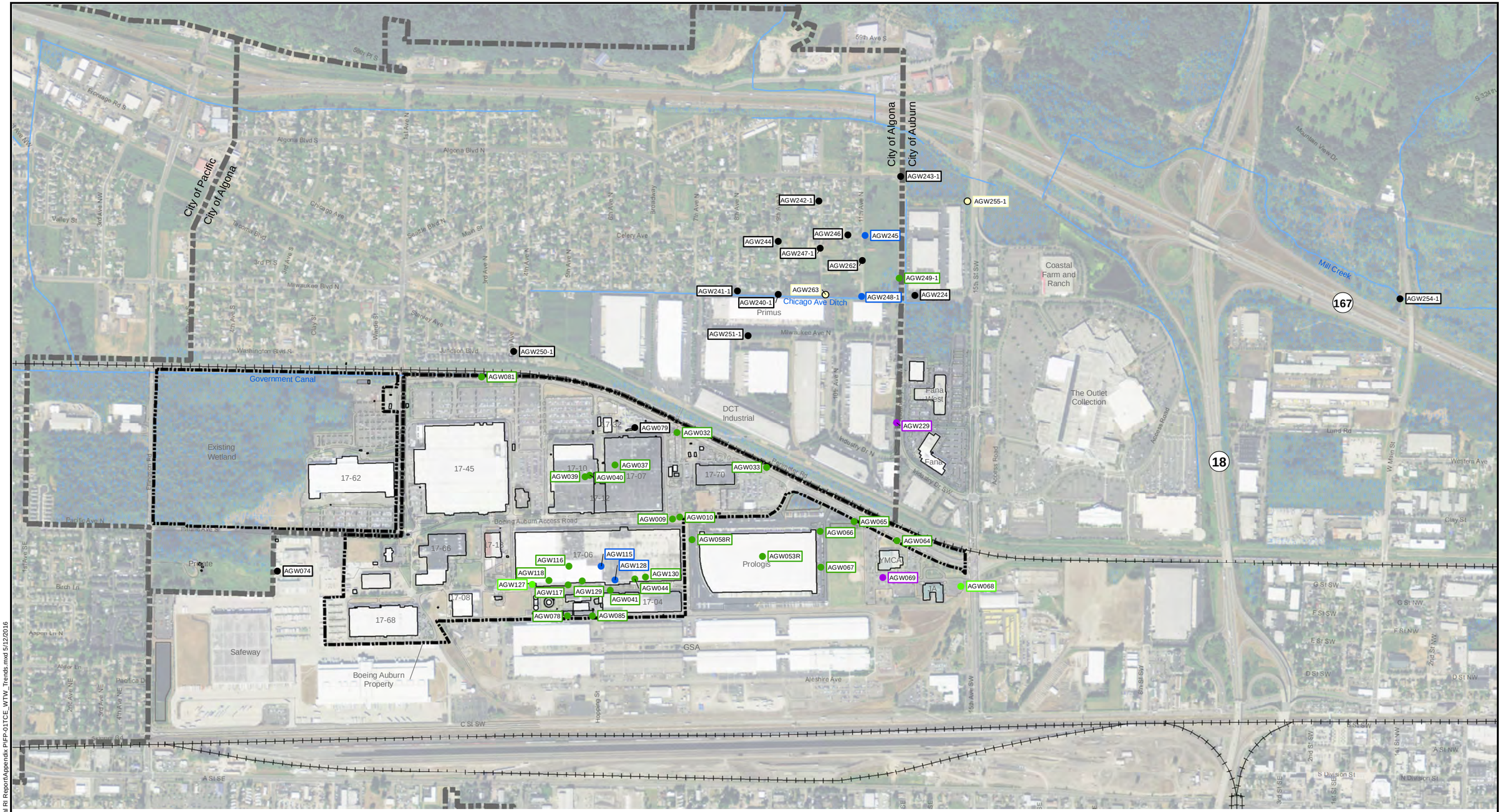

Notes

1. TCE and VC concentration trends were determined using the Mann-Kendall test and a trend criterion established by Monitoring and Remediation Optimization System (MAROS) Software.
2. TCE and VC data collected between (Water table and Shallow Zone -Aug 1990; Intermediate Zone - Oct 1996; Deep Zone - Dec 1995) and Jun 2015.
3. Multilevel wells have multiple channels. Channel designations are included in the well ID (ex: AGW208-2).
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Increasing
- Probably Increasing
- Stable
- Probably Decreasing
- Decreasing
- No Trend
- Non-Detect; All Samples Collected Non-Detect
- Insufficient Data, <4 Sampling Events
- Waterways
- Wetland Areas
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

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Boeing Auburn Remedial Investigation Auburn, Washington	**Water Table TCE Concentration Trends**	Figure P-1

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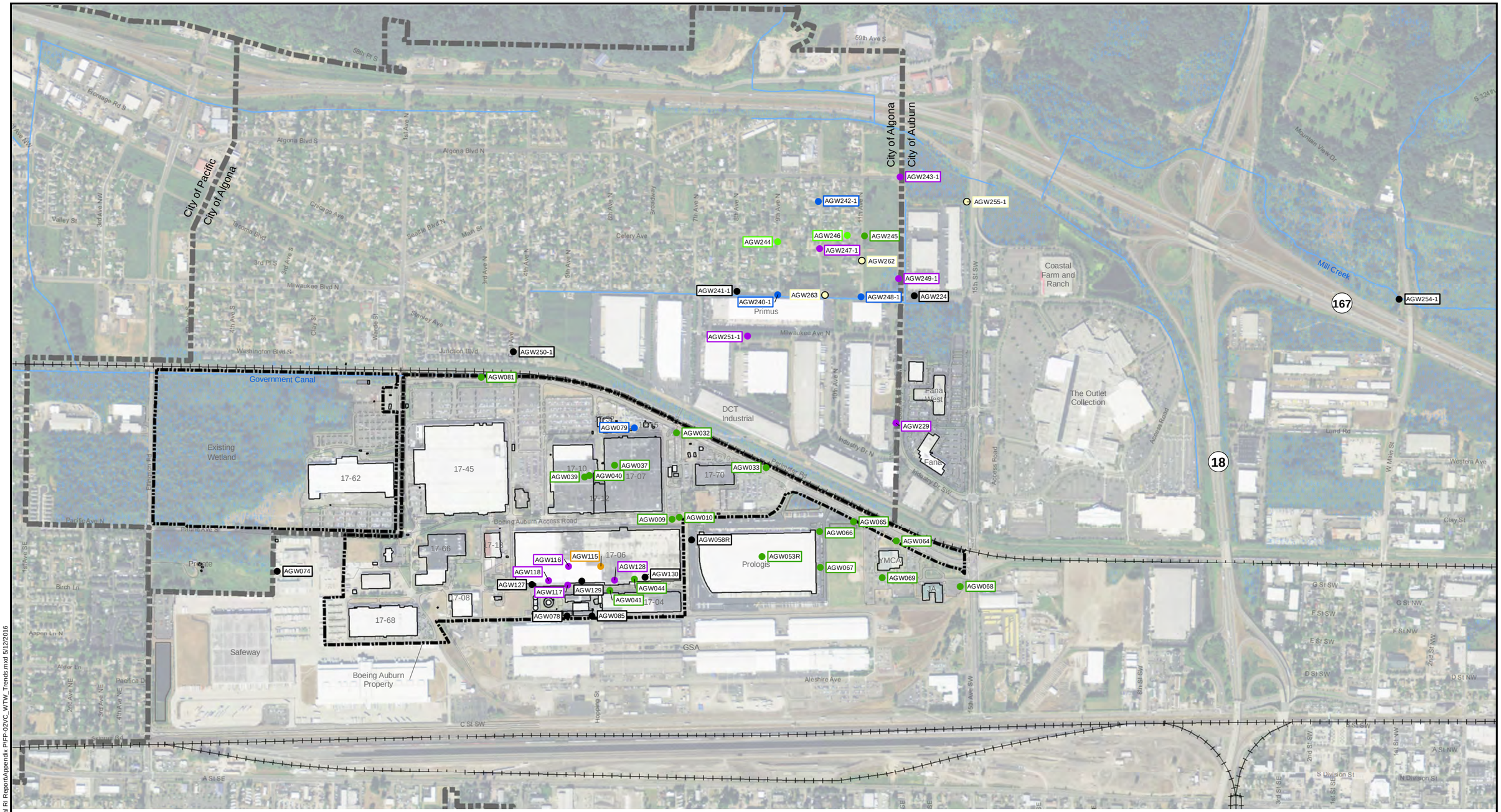

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Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

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Boeing Auburn Remedial Investigation Auburn, Washington	**Water Table VC Concentration Trends**	Figure P-2

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Notes

1. TCE and VC concentration trends were determined using the Mann-Kendall test and a trend criterion established by Monitoring and Remediation Optimization System (MAROS) Software.
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Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

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Boeing Auburn Remedial Investigation Auburn, Washington	**Shallow Zone TCE Concentration Trends**	Figure P-3

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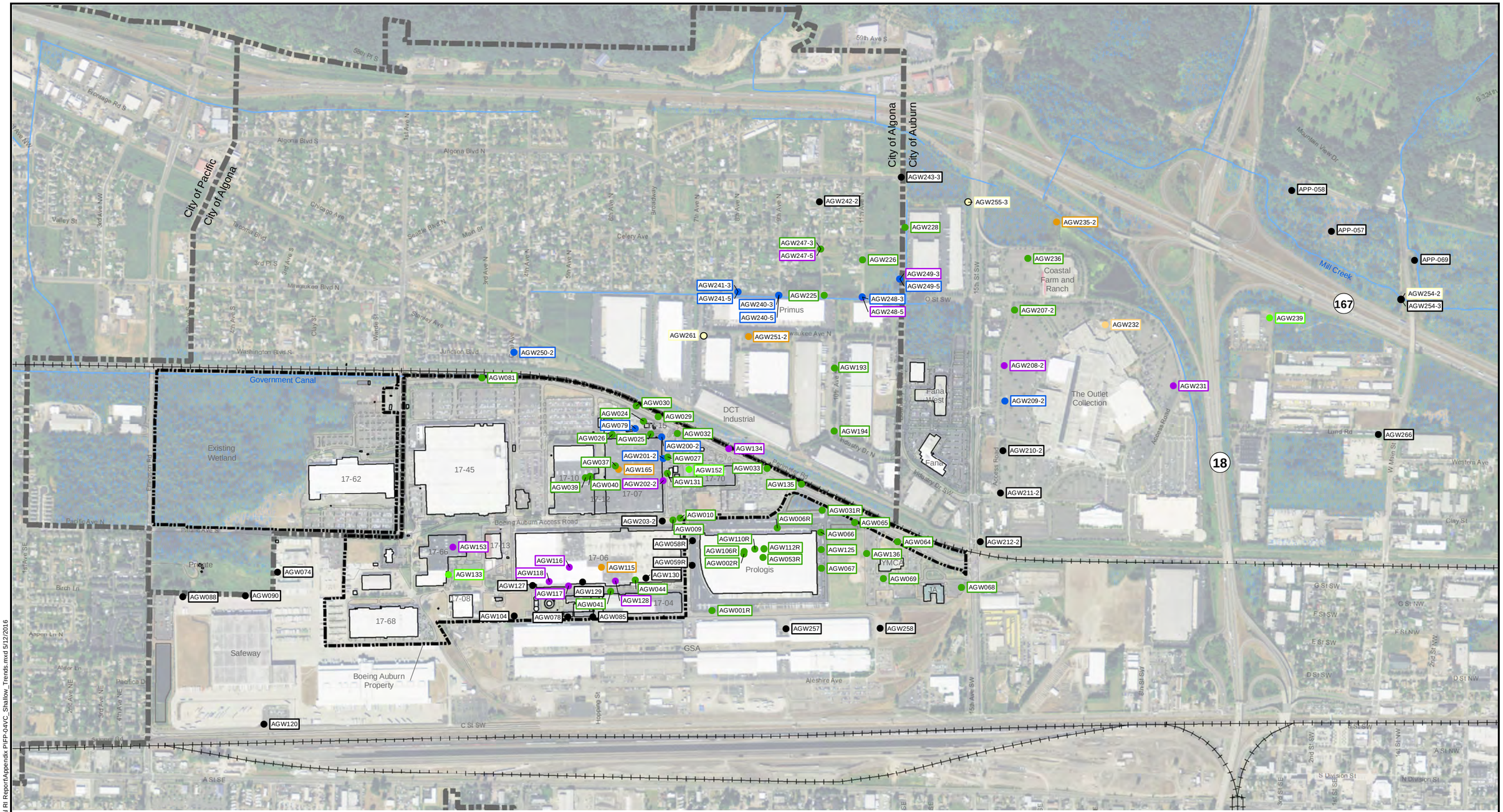

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- No Trend
- Non-Detect; All Samples Collected Non-Detect
- Insufficient Data, <4 Sampling Events
- Waterways
- Wetland Areas
- Boeing Property
- City Limits

N

0 1,000 2,000

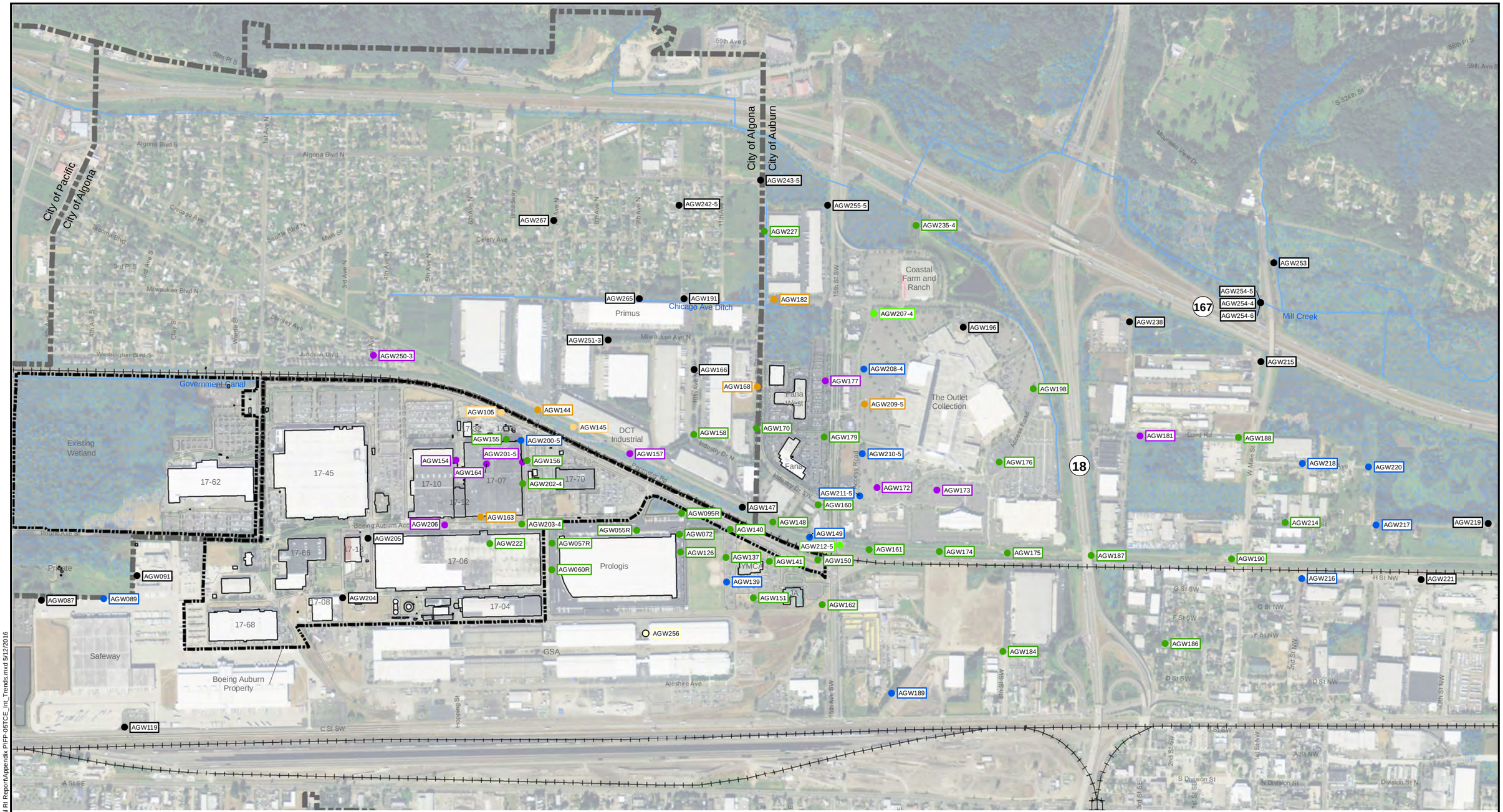
Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

LANDAU ASSOCIATES

Boeing Auburn Remedial Investigation Auburn, Washington	**Shallow Zone VC Concentration Trends**	Figure P-4

G:\Projects\023\16413\011\Final RI Report\Appendix P\FP-04\VC_Shallow_Trends.mxd 5/12/2016



Notes

1. TCE and VC concentration trends were determined using the Mann-Kendall test and a trend criterion established by Monitoring and Remediation Optimization System (MAROS) Software.
2. TCE and VC data collected between (Water table and Shallow Zone -Aug 1990; Intermediate Zone - Oct 1996; Deep Zone - Dec 1995) and Jun 2015.
3. Multilevel wells have multiple channels. Channel designations are included in the well ID (ex: AGW208-2).
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Increasing
- Probably Increasing
- Stable
- Probably Decreasing
- Decreasing
- No Trend
- Non-Detect; All Samples Collected Non-Detect
- Insufficient Data, <4 Sampling Events
- Waterways
- Wetland Areas
- Boeing Property
- City Limits

N

0 1,000 2,000

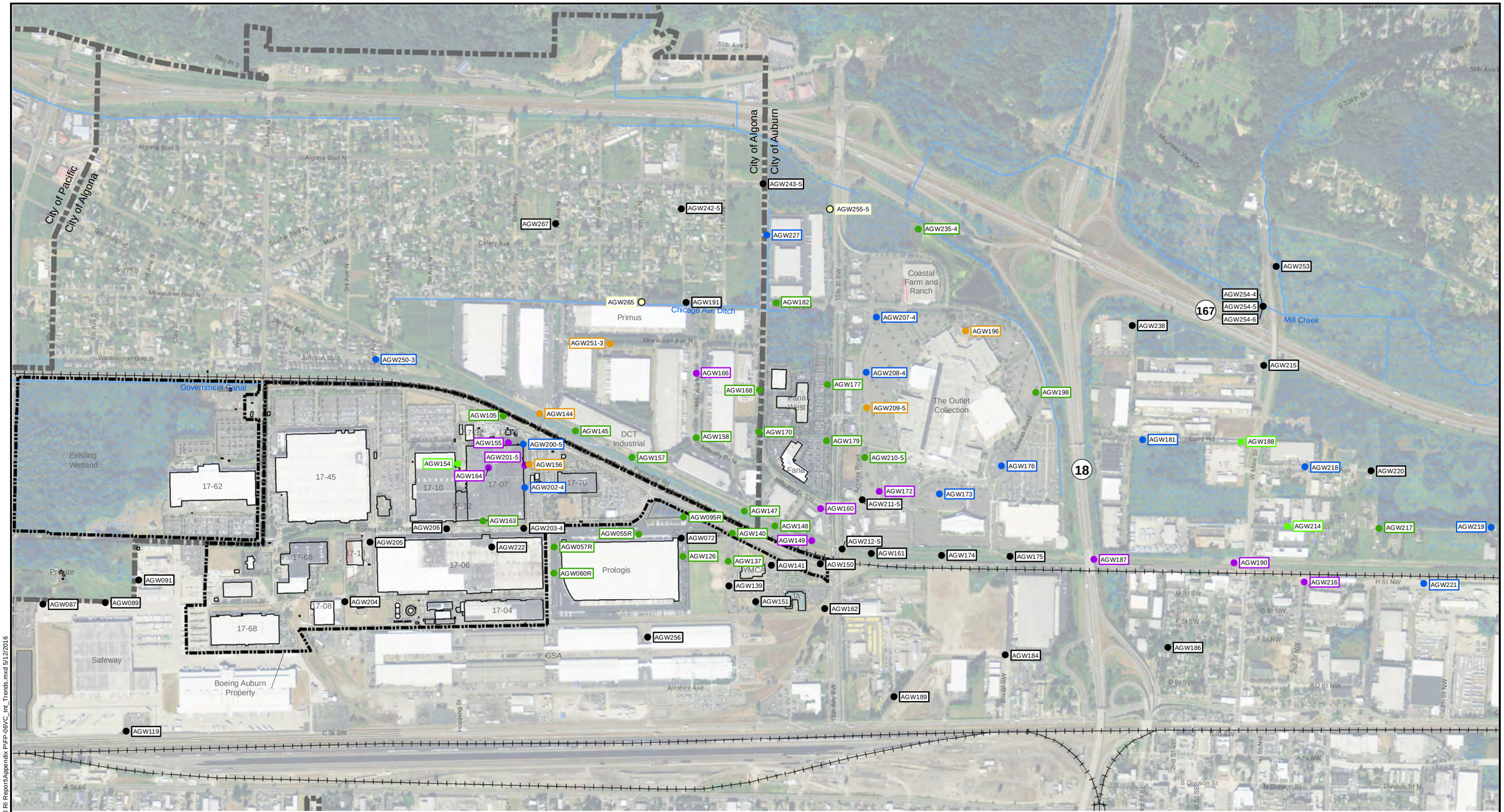
Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

LANDAU ASSOCIATES

Boeing Auburn Remedial Investigation Auburn, Washington	**Intermediate Zone TCE Concentration Trends**	Figure P-5

G:\Projects\023\16413\011\Final RI Report\Appendix P\FP-05TCE_int_Trends.mxd 5/12/2016



Notes

1. TCE and VC concentration trends were determined using the Mann-Kendall test and a trend criterion established by Monitoring and Remediation Optimization System (MAROS) Software.
2. TCE and VC data collected between (Water table and Shallow Zone -Aug 1990; Intermediate Zone - Oct 1996; Deep Zone - Dec 1995) and Jun 2015.
3. Multilevel wells have multiple channels. Channel designations are included in the well ID (ex: AGW208-2).
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Increasing
- Probably Increasing
- Stable
- Probably Decreasing
- Decreasing
- No Trend
- Non-Detect; All Samples Collected Non-Detect
- Insufficient Data, <4 Sampling Events
- Waterways
- Wetland Areas
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

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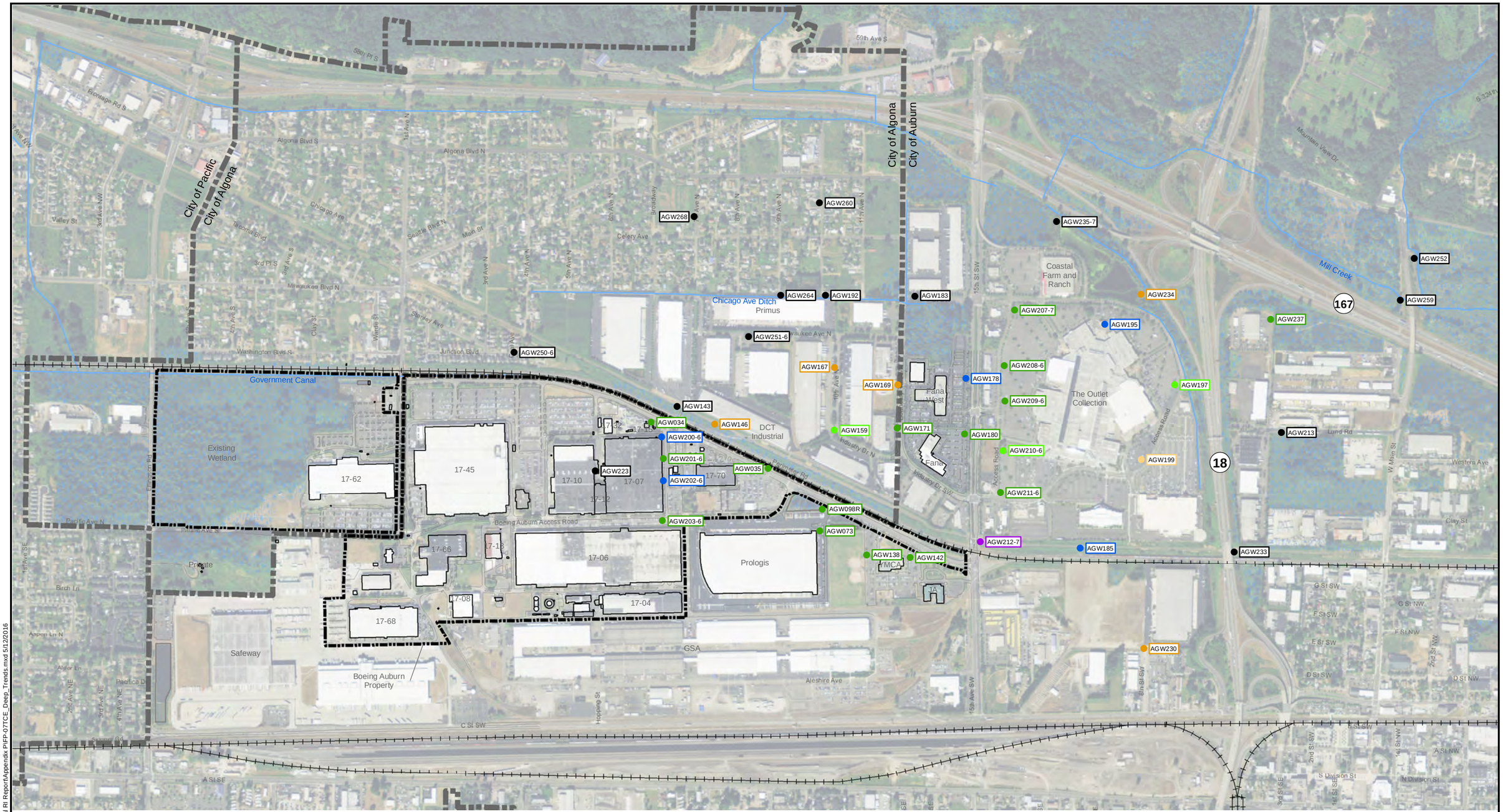
LANDAU ASSOCIATES

Boeing Auburn Remedial Investigation Auburn, Washington	**Intermediate Zone VC Concentration Trends**	Figure P-6



Notes

1. TCE and VC concentration trends were determined using the Mann-Kendall test and a trend criterion established by Monitoring and Remediation Optimization System (MAROS) Software.
2. TCE and VC data collected between (Water table and Shallow Zone -Aug 1990; Intermediate Zone - Oct 1996; Deep Zone - Dec 1995) and Jun 2015.
3. Multilevel wells have multiple channels. Channel designations are included in the well ID (ex: AGW208-2).
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Increasing
- Probably Increasing
- Stable
- Probably Decreasing
- Decreasing
- No Trend
- Non-Detect; All Samples Collected Non-Detect
- Insufficient Data, <4 Sampling Events
- Waterways
- Wetland Areas
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

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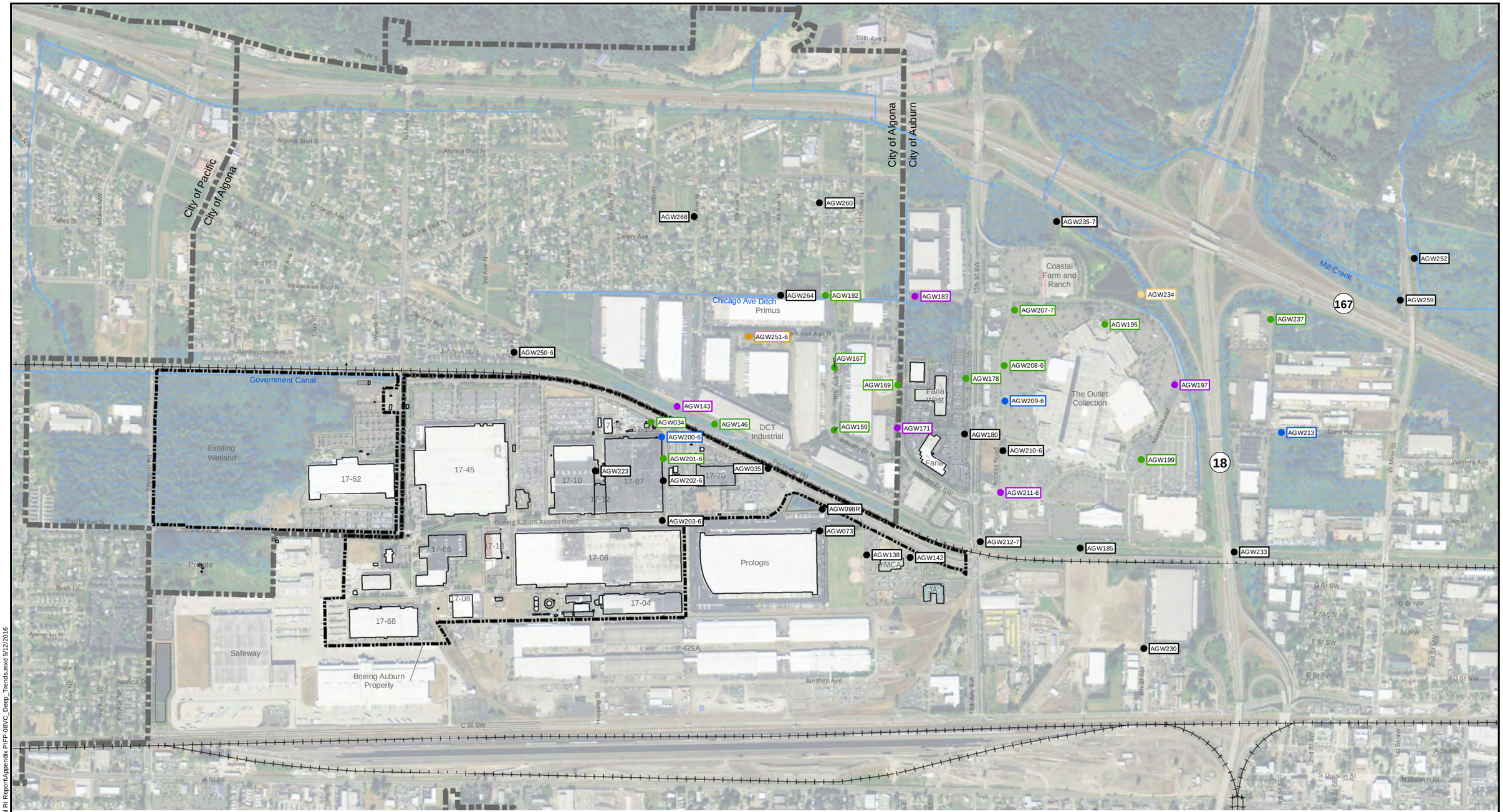
Boeing Auburn
Remedial Investigation
Auburn, Washington

Deep Zone
TCE Concentration Trends

Figure
P-7

G:\Projects\023\16413\011\Final RI Report\Appendix P\FP-07TCE_Deep_Trends.mxd 5/12/2016



Notes

1. TCE and VC concentration trends were determined using the Mann-Kendall test and a trend criterion established by Monitoring and Remediation Optimization System (MAROS) Software.
2. TCE and VC data collected between (Water table and Shallow Zone -Aug 1990; Intermediate Zone - Oct 1996; Deep Zone - Dec 1995) and Jun 2015.
3. Multilevel wells have multiple channels. Channel designations are included in the well ID (ex: AGW208-2).
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Increasing
- Probably Increasing
- Stable
- Probably Decreasing
- Decreasing
- No Trend
- Non-Detect; All Samples Collected Non-Detect
- Insufficient Data, <4 Sampling Events
- Waterways
- Wetland Areas
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

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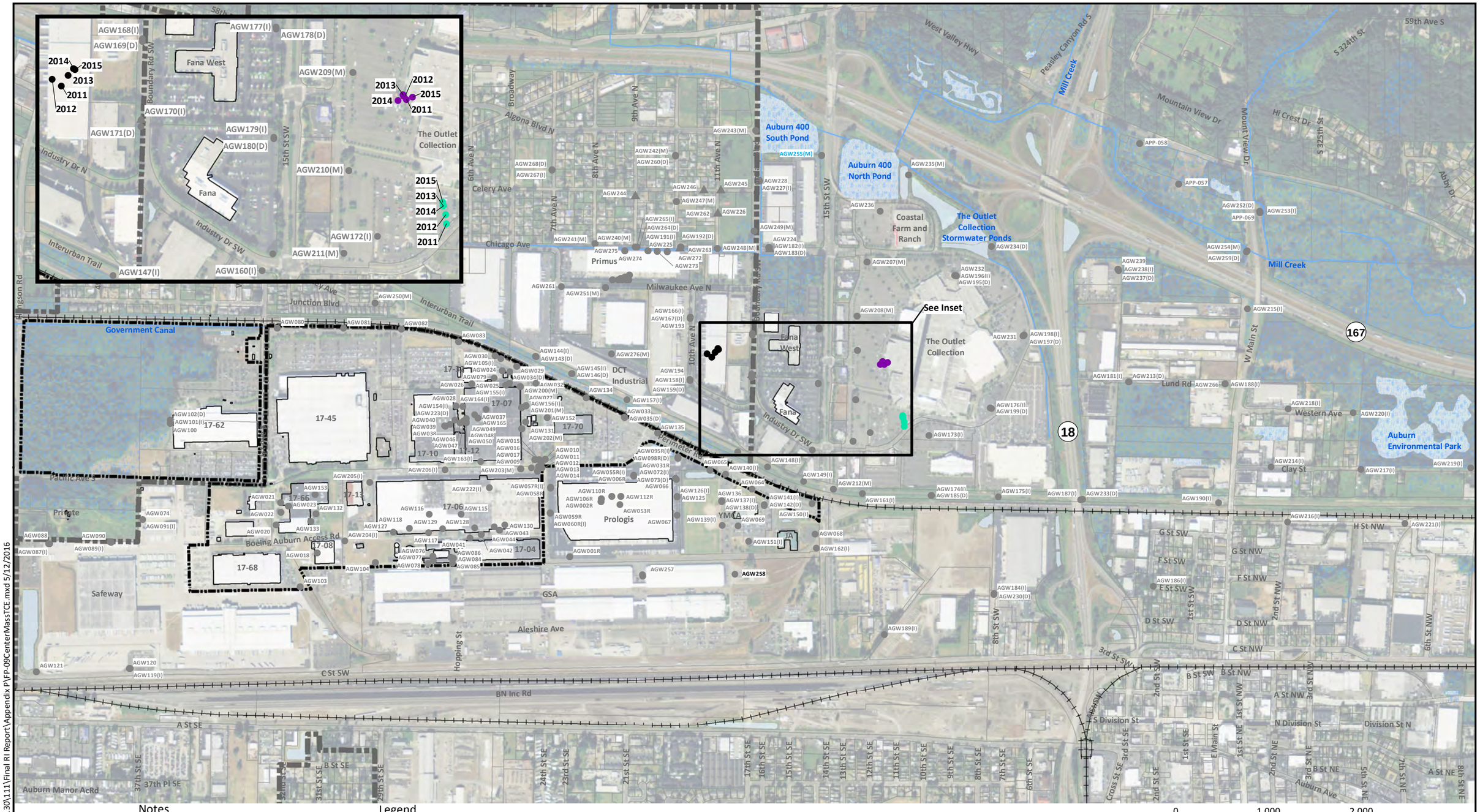
Boeing Auburn Remedial Investigation Auburn, Washington	**Deep Zone VC Concentration Trends**	Figure P-8

G:\Projects\023\16413\011\Final RI Report\Appendix P\FP-08\VC_Deep_Trends.mxd 5/12/2016



Notes

1. Center of Mass locations were calculated using Monitoring and Remediation Optimization System (MAROS) software.
2. Well designations beginning with APP are installed and owned by WSDOT.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Shallow Zone Center of Mass
- Intermediate Zone Center of Mass
- Deep Zone Center of Mass
- Offsite Water Table Well
- Monitoring Well
- (I) Intermediate Monitoring Well (40 to 60 ft BGS)
- (D) Deep Monitoring Well (80 to 100 ft BGS)
- (M) Multi-Level Well
- Wetland Areas
- Water Bodies
- Waterways

N

0 1,000 2,000

Scale in Feet

Base Map Source: Geometrix 2003; Parcel Data Source: King County 2015; Aerial Photo Source: Esri World Imagery.

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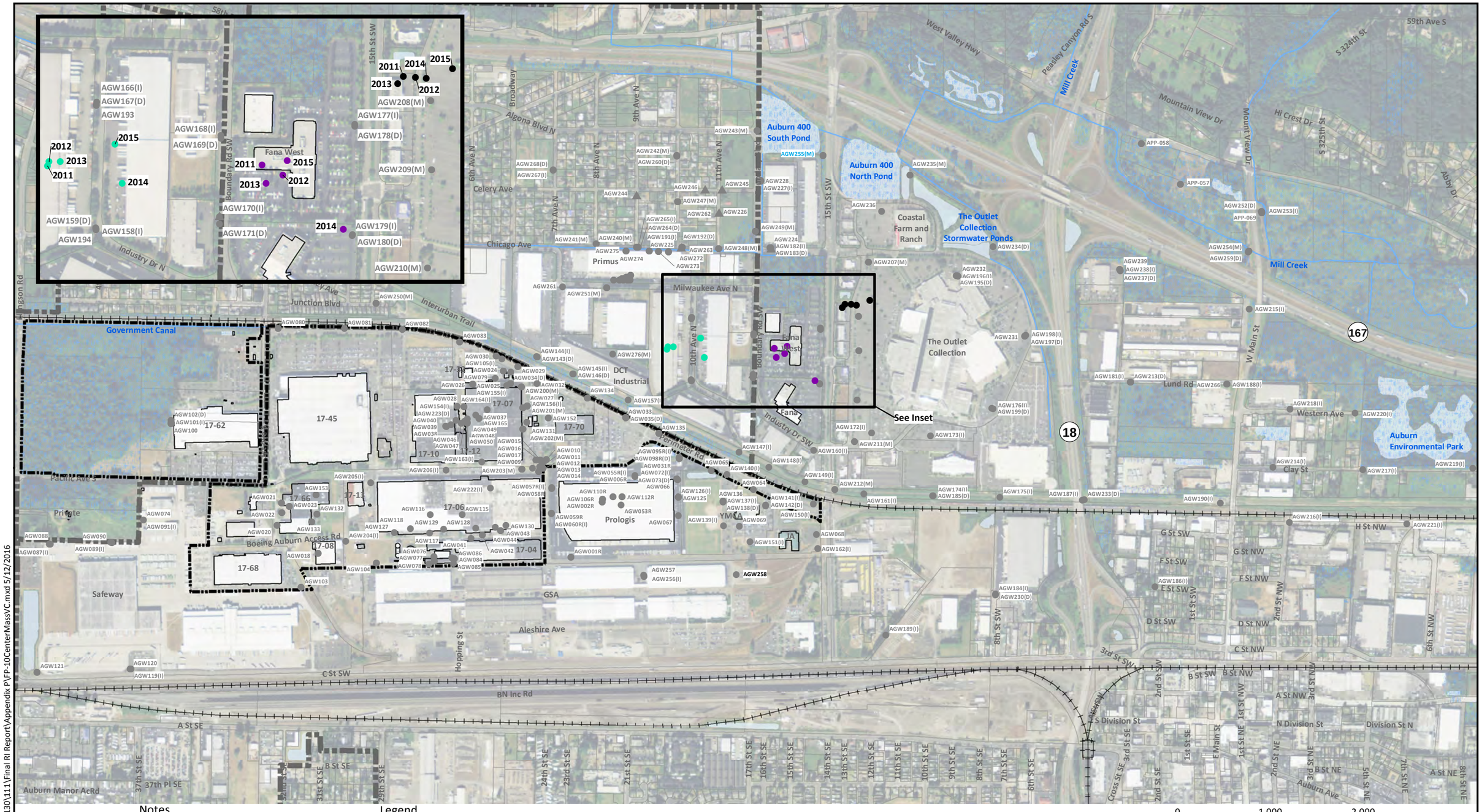
Boeing Auburn
Remedial Investigation
Auburn, Washington

Estimated TCE Center of Mass Location by Groundwater Zone 2011-2015

Figure
P-9



Notes

1. Center of Mass locations were calculated using Monitoring and Remediation Optimization System (MAROS) software.
2. Well designations beginning with APP are installed and owned by WSDOT.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Shallow Zone Center of Mass
- Intermediate Zone Center of Mass
- Deep Zone Center of Mass
- Offsite Water Table Well
- Monitoring Well
- (I) Intermediate Monitoring Well (40 to 60 ft BGS)
- (D) Deep Monitoring Well (80 to 100 ft BGS)
- (M) Multi-Level Well
- Wetland Areas
- Water Bodies
- Waterways

N

0 1,000 2,000

Scale in Feet

Base Map Source: Geometrix 2003; Parcel Data Source: King County 2015; Aerial Photo Source: Esri World Imagery.

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Boeing Auburn
Remedial Investigation
Auburn, Washington

Estimated VC Center of Mass Location by Groundwater Zone 2011-2015

Figure
P-10

G:\Projects\025\164\130\111\Final RI Report\Appendix P\FP-10CenterMassVC.mxd 5/12/2016

Table P-1
Monitoring Wells Used in MAROS
Boeing Auburn Remedial Investigation
Auburn, Washington

Groundwater Zone	Well ID	Date Installed
Water Table	AGW009	8/22/1990
	AGW010	8/23/1990
	AGW032	9/8/1994
	AGW033	12/15/1994
	AGW037	1/8/1996
	AGW039	4/29/1996
	AGW040	4/30/1996
	AGW041	5/30/1996
	AGW044	5/30/1996
	AGW053R	9/25/2006
	AGW058R	4/10/2007
	AGW064	12/2/1996
	AGW065	12/2/1996
	AGW066	12/2/1996
	AGW067	12/3/1996
	AGW068	12/3/1996
	AGW069	12/3/1996
	AGW074	12/14/1996
	AGW078	3/24/1997
	AGW079	5/15/1997
	AGW081	6/12/1997
	AGW085	4/14/1999
	AGW115	10/6/2004
	AGW116	10/6/2004
	AGW117	10/7/2004
	AGW118	10/7/2004
	AGW127	9/8/2008
	AGW128	9/12/2008
	AGW129	9/11/2008
	AGW130	9/11/2008
	AGW224	12/5/2012
	AGW229	12/7/2012
	AGW240-1	6/10/2014
	AGW241-1	6/11/2014
	AGW242-1	6/13/2014
	AGW243-1	6/17/2014
	AGW244	6/16/2014
	AGW245	6/16/2014
	AGW246	6/16/2014
	AGW247-1	6/18/2014
	AGW248-1	6/19/2014
	AGW249-1	6/20/2014
	AGW250-1	6/23/2014
	AGW251-1	6/27/2015
	AGW254-1	11/12/2014
	AGW255-1	11/13/2014
	AGW262	3/24/2015
	AGW263	3/24/2015

Table P-1
Monitoring Wells Used in MAROS
Boeing Auburn Remedial Investigation
Auburn, Washington

Groundwater Zone	Well ID	Date Installed
Shallow	AGW001R	4/9/2007
	AGW002R	9/28/2006
	AGW006R	3/19/2007
	AGW009	8/22/1990
	AGW010	8/23/1990
	AGW020	12/29/1992
	AGW024	10/15/1992
	AGW025	10/15/1992
	AGW026	10/14/1992
	AGW027	11/9/1992
	AGW029	11/9/1992
	AGW030	11/11/1992
	AGW031R	3/20/2007
	AGW032	9/8/1994
	AGW033	12/15/1994
	AGW037	1/8/1996
	AGW038	4/29/1996
	AGW039	4/29/1996
	AGW040	4/30/1996
	AGW041	5/30/1996
	AGW044	5/30/1996
	AGW053R	9/25/2006
	AGW058R	4/10/2007
	AGW059R	4/10/2007
	AGW064	12/2/1996
	AGW065	12/2/1996
	AGW066	12/2/1996
	AGW067	12/3/1996
	AGW068	12/3/1996
	AGW069	12/3/1996
	AGW074	35413
	AGW078	3/24/1997
	AGW079	5/15/1997
	AGW081	6/12/1997
	AGW085	4/14/1999
	AGW088	10/22/2001
	AGW090	10/23/2001
	AGW103	3/30/2004
	AGW104	3/29/2004
	AGW106R	9/28/2006
	AGW110R	9/25/2006
	AGW112R	9/25/2006
	AGW115	10/6/2004
	AGW116	10/6/2004
	AGW117	10/7/2004
	AGW118	10/7/2004
	AGW120	12/2/2004
	AGW125	3/20/2007

Table P-1
Monitoring Wells Used in MAROS
Boeing Auburn Remedial Investigation
Auburn, Washington

Groundwater Zone	Well ID	Date Installed
	AGW127	9/8/2008
	AGW128	9/12/2008
	AGW129	9/11/2008
	AGW130	9/11/2008
	AGW131	9/12/2008
	AGW133	9/9/2008
	AGW134	9/10/2008
	AGW135	9/10/2008
	AGW136	9/9/2008
	AGW152	9/30/2009
	AGW153	10/2/2009
	AGW165	8/25/2010
	AGW193	8/31/2011
	AGW194	9/1/2011
	AGW200-2	10/18/2011
	AGW201-2	10/20/2011
	AGW202-2	10/24/2011
	AGW203-2	10/26/2011
	AGW207-2	11/1/2011
	AGW208-2	11/2/2011
	AGW209-2	11/3/2011
	AGW210-2	11/7/2011
	AGW211-2	11/9/2011
	AGW212-2	11/11/2011
	AGW225	12/5/2012
	AGW226	12/5/2012
	AGW228	12/6/2012
	AGW231	5/19/2013
	AGW232	5/20/2013
	AGW235-2	5/24/2013
	AGW236	5/28/2013
	AGW239	9/25/2013
	AGW240-3	6/10/2014
	AGW240-5	6/10/2014
	AGW241-3	6/11/2014
	AGW241-5	6/11/2014
	AGW242-2	6/13/2014
	AGW243-3	6/17/2014
	AGW247-3	6/18/2014
	AGW247-5	6/18/2014
	AGW248-3	6/19/2014
	AGW248-5	6/19/2014
	AGW249-3	6/20/2014
	AGW249-5	6/20/2014
	AGW250-2	6/24/2014
	AGW251-2	6/27/2014
	AGW254-2	11/13/2014
	AGW254-3	11/13/2014
	AGW255-3	11/14/2014
	AGW257	11/17/2014
	AGW258	11/18/2014
	AGW261	3/24/2015
	AGW266	3/26/2015

Table P-1
Monitoring Wells Used in MAROS
Boeing Auburn Remedial Investigation
Auburn, Washington

Groundwater Zone	Well ID	Date Installed
Intermediate	AGW055R	3/19/2007
	AGW057R	4/10/2007
	AGW060R	4/9/2007
	AGW072	3/20/2007
	AGW087	10/21/2001
	AGW089	10/23/2001
	AGW091	10/26/2001
	AGW095R	3/20/2007
	AGW105	3/31/2004
	AGW119	12/2/2004
	AGW126	3/19/2007
	AGW137	10/30/2008
	AGW139	2/9/2009
	AGW140	2/11/2009
	AGW141	2/11/2009
	AGW144	10/8/2009
	AGW145	10/12/2009
	AGW147	10/13/2009
	AGW148	10/12/2009
	AGW149	10/14/2009
	AGW150	10/5/2009
	AGW151	10/14/2009
	AGW154	2/23/2010
	AGW155	2/23/2010
	AGW156	2/22/2010
	AGW157	3/1/2010
	AGW158	2/24/2010
	AGW160	2/25/2010
	AGW161	3/2/2010
	AGW162	2/24/2010
	AGW163	8/26/2010
	AGW164	8/25/2010
	AGW166	10/26/2010
	AGW168	10/28/2010
	AGW170	11/1/2010
	AGW172	9/2/2010
	AGW173	9/1/2010
	AGW174	8/23/2010
	AGW175	8/27/2010
	AGW176	9/3/2010
	AGW177	9/21/2010
	AGW179	9/23/2010
	AGW181	4/25/2011
	AGW182	4/29/2011
	AGW184	4/26/2011
	AGW186	4/28/2011
	AGW187	5/3/2011
	AGW188	5/4/2011
	AGW189	5/5/2011
	AGW190	5/6/2011
	AGW191	8/29/2011
	AGW196	10/4/2011
	AGW198	10/5/2011

Table P-1
Monitoring Wells Used in MAROS
Boeing Auburn Remedial Investigation
Auburn, Washington

Groundwater Zone	Well ID	Date Installed
	AGW200-5	10/18/2011
	AGW201-5	10/20/2011
	AGW202-4	10/24/2011
	AGW203-4	10/26/2011
	AGW204	10/27/2011
	AGW205	10/27/2011
	AGW206	10/28/2011
	AGW207-4	11/1/2011
	AGW208-4	11/2/2011
	AGW209-5	11/3/2011
	AGW210-5	11/7/2011
	AGW211-5	11/9/2011
	AGW212-5	11/11/2011
	AGW214	11/15/2011
	AGW215	11/16/2011
	AGW216	11/17/2011
	AGW217	11/18/2011
	AGW218	11/21/2011
	AGW219	11/22/2011
	AGW220	11/28/2011
	AGW221	11/29/2011
	AGW222	12/2/2012
	AGW227	12/6/2012
	AGW235-4	5/24/2013
	AGW238	9/24/2013
	AGW242-5	6/13/2014
	AGW243-5	6/17/2014
	AGW250-3	6/24/2014
	AGW251-3	6/27/2014
	AGW253	11/11/2014
	AGW254-4	11/13/2014
	AGW254-5	11/13/2014
	AGW254-6	11/13/2014
	AGW255-5	11/14/2014
	AGW256	11/17/2014
	AGW265	3/26/2015
	AGW267	3/27/2015

Table P-1
Monitoring Wells Used in MAROS
Boeing Auburn Remedial Investigation
Auburn, Washington

Groundwater Zone	Well ID	Date Installed
Deep	AGW034	1/18/1995
	AGW035	1/19/1995
	AGW073	3/20/2007
	AGW098R	3/19/2007
	AGW138	2/12/2009
	AGW142	2/10/2009
	AGW143	10/6/2009
	AGW146	10/7/2009
	AGW159	3/23/2010
	AGW167	10/27/2010
	AGW169	10/29/2010
	AGW171	11/2/2010
	AGW178	9/22/2010
	AGW180	9/23/2010
	AGW183	5/2/2011
	AGW185	4/27/2011
	AGW192	8/30/2011
	AGW195	10/3/2011
	AGW197	10/5/2011
	AGW199	10/6/2011
	AGW200-6	10/18/2011
	AGW201-6	10/20/2011
	AGW202-6	10/24/2011
	AGW203-6	10/26/2011
	AGW207-7	11/1/2011
	AGW208-6	11/2/2011
	AGW209-6	11/3/2011
	AGW210-6	11/7/2011
	AGW211-6	11/9/2011
	AGW212-7	11/11/2011
	AGW213	11/15/2011
	AGW223	12/4/2012
	AGW230	12/10/2012
	AGW233	5/21/2013
	AGW234	5/22/2013
	AGW235-7	5/24/2013
	AGW237	9/23/2013
	AGW250-6	6/24/2014
	AGW251-6	6/27/2014
	AGW252	11/10/2014
	AGW259	2/23/2015
	AGW260	3/23/2015
	AGW264	3/25/2015
	AGW268	3/30/2015

Notes:

1. Well IDs that end with the letter "R" are replacement wells. For these wells, data from the original well was also used.
2. Water table wells are wells with screens across the water table and are a subset of the shallow zone.

Table P-2
MAROS Trend Decision Matrix
Boeing Auburn Remedial Investigation
Auburn, Washington

Concentration Trend	Mann-Kendall Statistic (S)	Confidence in Trend
Increasing	S > 0	> 95%
Probabaly Increasing	S > 0	90 - 95%
No Trend	S > 0	< 90%
No Trend	S ≤ 0	< 90% and COV ≥ 1
Stable	S ≤ 0	< 90% and COV < 1
Probably Decreasing	S < 0	90 - 95%
Decreasing	S < 0	95%

COV = Covariance

Notes:

1. Concentration trends of "non-detect" and "not-applicable" are also assigned by MAROS for wells where all samples were below the laboratory reporting limit and for wells with fewer than four samples, respectively.
2. MAROS trend matrix created by GSI Environmental Inc. for the Air Force Center for Environmental Excellence (AFCEE).
3. Table adapted from AFCEE (2012).

Table P-3
Wells Omitted from MAROS Spatial Moment Analysis
Boeing Auburn Remedial Investigation
Auburn, Washington

Well Name	Zone	All Samples ND?
AGW074	Shallow	Y
AGW087	Intermediate	Y
AGW088	Shallow	Y
AGW089	Intermediate	Y
AGW090	Shallow	Y
AGW091	Intermediate	Y
AGW119	Intermediate	Y
AGW120	Shallow	Y
AGW204	Intermediate	Y
AGW242-5	Intermediate	Y
AGW250-6	Deep	Y
AGW252	Deep	Y
AGW253	Intermediate	Y
AGW254-2	Shallow	Y
AGW254-5	Intermediate	Y
AGW258	Shallow	Y
AGW260	Deep	Y
AGW267	Intermediate	Y
AGW268	Deep	Y

ND = Non-detect for TCE and VC

Note:

These wells were excluded from the MAROS Spatial Moment Analysis because they were

1. Always Non-Detect for TCE and VC
2. Did not contribute to the spatial delineation of the extent of Site contamination in their respective aquifer zone (i.e., were spatially removed from areas with contamination).

Table P-4
Consolidated Shallow Zone Wells
Boeing Auburn Remedial Investigation
Auburn, Washington

Well Name	Aquifer Zone
AGW001R	Shallow
AGW002R	Shallow
AGW006R	Shallow
AGW009	Shallow/Water Table
AGW010	Shallow/Water Table
AGW024	Shallow
AGW025	Shallow
AGW026	Shallow
AGW027	Shallow
AGW029	Shallow
AGW030	Shallow
AGW031R	Shallow
AGW032	Shallow/Water Table
AGW033	Shallow/Water Table
AGW037	Shallow/Water Table
AGW039	Shallow/Water Table
AGW040	Shallow/Water Table
AGW041	Shallow/Water Table
AGW044	Shallow/Water Table
AGW053R	Shallow/Water Table
AGW058R	Shallow/Water Table
AGW059R	Shallow
AGW064	Shallow/Water Table
AGW065	Shallow/Water Table
AGW066	Shallow
AGW067	Shallow/Water Table
AGW068	Shallow/Water Table
AGW069	Shallow/Water Table
AGW074	Shallow/Water Table
AGW078	Shallow/Water Table
AGW079	Shallow/Water Table
AGW081	Shallow/Water Table
AGW085	Shallow/Water Table
AGW088	Shallow
AGW090	Shallow
AGW104	Shallow
AGW106R	Shallow
AGW110R	Shallow
AGW112R	Shallow
AGW115	Shallow/Water Table

Table P-4
Consolidated Shallow Zone Wells
Boeing Auburn Remedial Investigation
Auburn, Washington

Well Name	Aquifer Zone
AGW116	Shallow/Water Table
AGW117	Shallow/Water Table
AGW118	Shallow/Water Table
AGW120	Shallow
AGW125	Shallow
AGW127	Shallow/Water Table
AGW128	Shallow/Water Table
AGW129	Shallow/Water Table
AGW130	Shallow/Water Table
AGW131	Shallow
AGW133	Shallow
AGW134	Shallow
AGW135	Shallow
AGW136	Shallow
AGW152	Shallow
AGW153	Shallow
AGW165	Shallow
AGW193	Shallow
AGW194	Shallow
AGW200-2	Shallow
AGW201-2	Shallow
AGW202-2	Shallow
AGW203-2	Shallow
AGW207-2	Shallow
AGW208-2	Shallow
AGW209-2	Shallow
AGW210-2	Shallow
AGW211-2	Shallow
AGW212-2	Shallow
AGW224	Water Table
AGW225	Shallow
AGW226	Shallow
AGW228	Shallow
AGW229	Water Table
AGW231	Shallow
AGW232	Shallow
AGW235-2	Shallow
AGW236	Shallow
AGW239	Shallow
AGW240-5	Shallow

Table P-4
Consolidated Shallow Zone Wells
Boeing Auburn Remedial Investigation
Auburn, Washington

Well Name	Aquifer Zone
AGW241-5	Shallow
AGW242-2	Shallow
AGW243-3	Shallow
AGW244	Water Table
AGW245	Water Table
AGW246	Water Table
AGW247-5	Shallow
AGW248-3	Shallow
AGW249-3	Shallow
AGW249-5	Shallow
AGW250-2	Shallow
AGW251-2	Shallow
AGW254-2	Shallow
AGW255-3	Shallow
AGW257	Shallow
AGW258	Shallow
AGW261	Shallow
AGW266	Shallow

Table P-5
Results of Mann-Kendall Trend Analysis - Water Table
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
TCE									
	AGW009	21	16	1.05	-146	100.0%	No	D	Water Table
	AGW010	29	6	1.74	-170	99.9%	No	D	Water Table
	AGW032	41	7	0.9	-377	100.0%	No	D	Water Table
	AGW033	42	37	0.62	-403	100.0%	No	D	Water Table
	AGW037	19	19	0.32	-64	98.7%	No	D	Water Table
	AGW039	15	15	0.38	-65	100.0%	No	D	Water Table
	AGW040	14	14	0.43	-50	99.8%	No	D	Water Table
	AGW041	21	20	0.61	-152	100.0%	No	D	Water Table
	AGW044	20	2	1.12	-78	99.4%	No	D	Water Table
	AGW053R	43	43	0.76	-753	100.0%	No	D	Water Table
	AGW058R	36	35	0.84	-443	100.0%	No	D	Water Table
	AGW064	38	15	0.84	-132	95.0%	No	D	Water Table
	AGW065	39	22	1.17	-430	100.0%	No	D	Water Table
	AGW066	48	48	0.48	-930	100.0%	No	D	Water Table
	AGW067	49	49	0.38	-896	100.0%	No	D	Water Table
	AGW068	37	1	1.15	-119	93.9%	No	PD	Water Table
	AGW069	32	1	1.22	-61	83.3%	No	NT	Water Table
	AGW074	39	0	0.87	-124	93.2%	Yes	ND	Water Table
	AGW078	20	11	0.88	-106	100.0%	No	D	Water Table
	AGW079	14	0	0	0	47.8%	Yes	ND	Water Table
	AGW081	30	9	0.72	-102	96.5%	No	D	Water Table
	AGW085	31	23	0.88	-188	99.9%	No	D	Water Table
	AGW115	22	3	0.87	-38	85.0%	No	S	Water Table
	AGW116	22	20	0.33	-118	100.0%	No	D	Water Table
	AGW117	22	21	0.42	-126	100.0%	No	D	Water Table
	AGW118	22	22	0.26	-173	100.0%	No	D	Water Table
	AGW127	14	2	0.48	-25	90.4%	No	PD	Water Table
	AGW128	15	7	0.63	-25	88.0%	No	S	Water Table
	AGW129	15	15	0.43	-74	100.0%	No	D	Water Table
	AGW130	15	15	0.21	-60	99.9%	No	D	Water Table
	AGW224	8	0	0.45	1	50.0%	Yes	ND	Water Table
	AGW229	9	9	0.2	5	65.7%	No	NT	Water Table
	AGW240-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW241-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW242-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW243-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW244	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW245	5	1	0.99	-4	75.8%	No	S	Water Table
	AGW246	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW247-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW248-1	5	1	0.37	-2	59.2%	No	S	Water Table

Table P-5
Results of Mann-Kendall Trend Analysis - Water Table
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW249-1	5	4	0.74	-8	95.8%	No	D	Water Table
	AGW250-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW251-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW254-1	3	0	0	0	0.0%	Yes	ND	Water Table
	AGW255-1	3	3	0	0	0.0%	No	NA	Water Table
	AGW262	2	0	0	0	0.0%	Yes	ND	Water Table
	AGW263	2	2	0	0	0.0%	No	NA	Water Table
VC									
	AGW009	15	1	1.34	-57	99.8%	No	D	Water Table
	AGW010	27	1	2.23	-192	100.0%	No	D	Water Table
	AGW032	43	38	0.93	-454	100.0%	No	D	Water Table
	AGW033	41	29	0.8	-411	100.0%	No	D	Water Table
	AGW037	19	14	1.41	-50	95.7%	No	D	Water Table
	AGW039	15	12	1.67	-65	100.0%	No	D	Water Table
	AGW040	14	8	1.67	-43	99.0%	No	D	Water Table
	AGW041	21	1	1.86	-105	99.9%	No	D	Water Table
	AGW044	20	1	2.07	-88	99.8%	No	D	Water Table
	AGW053R	43	12	1.79	-552	100.0%	No	D	Water Table
	AGW058R	36	0	1.66	-341	100.0%	Yes	ND	Water Table
	AGW064	38	1	2.41	-278	100.0%	No	D	Water Table
	AGW065	39	1	2.48	-315	100.0%	No	D	Water Table
	AGW066	48	7	2.23	-559	100.0%	No	D	Water Table
	AGW067	49	8	2.27	-586	100.0%	No	D	Water Table
	AGW068	37	1	2.42	-291	100.0%	No	D	Water Table
	AGW069	32	1	2.85	-138	98.7%	No	D	Water Table
	AGW074	39	0	2.13	-392	100.0%	Yes	ND	Water Table
	AGW078	20	0	1.37	-82	99.6%	Yes	ND	Water Table
	AGW079	14	14	0.39	-18	82.1%	No	S	Water Table
	AGW081	30	4	1.6	-192	100.0%	No	D	Water Table
	AGW085	31	0	1.87	-197	100.0%	Yes	ND	Water Table
	AGW115	22	21	0.67	150	100.0%	No	I	Water Table
	AGW116	22	1	1.39	-15	65.2%	No	NT	Water Table
	AGW117	22	1	1.37	-13	63.1%	No	NT	Water Table
	AGW118	22	1	1.37	-15	65.2%	No	NT	Water Table
	AGW127	14	0	1.46	-13	74.1%	Yes	ND	Water Table
	AGW128	15	1	2.28	-7	61.5%	No	NT	Water Table
	AGW129	15	0	1.44	-2	52.0%	Yes	ND	Water Table
	AGW130	15	0	1.44	-2	52.0%	Yes	ND	Water Table
	AGW224	8	0	0	0	45.2%	Yes	ND	Water Table
	AGW229	9	9	0.21	3	58.0%	No	NT	Water Table
	AGW240-1	5	5	0.55	-4	75.8%	No	S	Water Table
	AGW241-1	5	0	0	0	40.8%	Yes	ND	Water Table

Table P-5
Results of Mann-Kendall Trend Analysis - Water Table
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW242-1	5	5	0.76	0	40.8%	No	S	Water Table
	AGW243-1	5	4	1.09	-2	59.2%	No	NT	Water Table
	AGW244	5	2	1.5	-7	92.1%	No	PD	Water Table
	AGW245	5	5	1.26	-8	95.8%	No	D	Water Table
	AGW246	5	2	1.63	-7	92.1%	No	PD	Water Table
	AGW247-1	5	5	0.29	5	82.1%	No	NT	Water Table
	AGW248-1	5	3	0.85	-2	59.2%	No	S	Water Table
	AGW249-1	5	5	0.65	4	75.8%	No	NT	Water Table
	AGW250-1	5	0	0	0	40.8%	Yes	ND	Water Table
	AGW251-1	5	5	0.43	3	67.5%	No	NT	Water Table
	AGW254-1	3	0	0	0	0.0%	Yes	ND	Water Table
	AGW255-1	3	3	0	0	0.0%	No	NA	Water Table
	AGW262	2	2	0	0	0.0%	No	NA	Water Table
	AGW263	2	2	0	0	0.0%	No	NA	Water Table

D = decreasing
I = increasing
NA = not applicable (due to insufficient data, <4 sampling events).
ND = non-detect (all samples collected non-detect).
NT = no trend
PD = probably decreasing
PI = probably increasing
S = stable
TCE = trichloroethene
VC = vinyl chloride

Table P-6
Results of Mann-Kendall Trend Analysis - Shallow Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
TCE									
	AGW001R	48	48	0.25	-238	100.0%	No	D	Shallow
	AGW002R	66	39	5.51	-1465	100.0%	No	D	Shallow
	AGW006R	37	34	1.19	-449	100.0%	No	D	Shallow
	AGW009	21	16	1.05	-146	100.0%	No	D	Shallow
	AGW010	29	6	1.74	-170	99.9%	No	D	Shallow
	AGW024	26	1	0.98	-125	99.7%	No	D	Shallow
	AGW025	34	3	1.14	-173	99.5%	No	D	Shallow
	AGW026	24	23	0.64	-124	99.9%	No	D	Shallow
	AGW027	36	12	1.51	-255	100.0%	No	D	Shallow
	AGW029	39	1	1.06	-191	99.0%	No	D	Shallow
	AGW030	35	1	1.14	-112	94.3%	No	PD	Shallow
	AGW031R	45	45	0.73	-570	100.0%	No	D	Shallow
	AGW032	41	7	0.9	-377	100.0%	No	D	Shallow
	AGW033	42	37	0.62	-403	100.0%	No	D	Shallow
	AGW037	19	19	0.32	-64	98.7%	No	D	Shallow
	AGW039	15	15	0.38	-65	100.0%	No	D	Shallow
	AGW040	14	14	0.43	-50	99.8%	No	D	Shallow
	AGW041	21	20	0.61	-152	100.0%	No	D	Shallow
	AGW044	20	2	1.12	-78	99.4%	No	D	Shallow
	AGW053R	43	43	0.76	-753	100.0%	No	D	Shallow
	AGW058R	36	35	0.84	-443	100.0%	No	D	Shallow
	AGW059R	22	21	0.89	-177	100.0%	No	D	Shallow
	AGW064	38	15	0.84	-132	95.0%	No	D	Shallow
	AGW065	39	22	1.17	-430	100.0%	No	D	Shallow
	AGW066	48	48	0.48	-930	100.0%	No	D	Shallow
	AGW067	49	49	0.38	-896	100.0%	No	D	Shallow
	AGW068	37	1	1.15	-119	93.9%	No	PD	Shallow
	AGW069	32	1	1.22	-61	83.3%	No	NT	Shallow
	AGW074	39	0	0.87	-124	93.2%	Yes	ND	Shallow
	AGW078	20	11	0.88	-106	100.0%	No	D	Shallow
	AGW079	14	0	0	0	47.8%	Yes	ND	Shallow
	AGW081	30	9	0.72	-102	96.5%	No	D	Shallow
	AGW085	31	23	0.88	-188	99.9%	No	D	Shallow
	AGW088	29	0	0	0	49.3%	Yes	ND	Shallow
	AGW090	29	0	0	0	49.3%	Yes	ND	Shallow
	AGW104	10	1	1.05	-7	70.0%	No	NT	Shallow
	AGW106R	43	27	4.6	-442	100.0%	No	D	Shallow
	AGW110R	43	16	5.02	-424	100.0%	No	D	Shallow
	AGW112R	43	43	0.35	-256	100.0%	No	D	Shallow
	AGW115	22	3	0.87	-38	85.0%	No	S	Shallow
	AGW116	22	20	0.33	-118	100.0%	No	D	Shallow

Table P-6
Results of Mann-Kendall Trend Analysis - Shallow Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW117	22	21	0.42	-126	100.0%	No	D	Shallow
	AGW118	22	22	0.26	-173	100.0%	No	D	Shallow
	AGW120	21	0	0	0	48.8%	Yes	ND	Shallow
	AGW125	22	22	0.2	-135	100.0%	No	D	Shallow
	AGW127	14	2	0.48	-25	90.4%	No	PD	Shallow
	AGW128	15	7	0.63	-25	88.0%	No	S	Shallow
	AGW129	15	15	0.43	-74	100.0%	No	D	Shallow
	AGW130	15	15	0.21	-60	99.9%	No	D	Shallow
	AGW131	15	11	0.59	-35	95.4%	No	D	Shallow
	AGW133	11	0	0	0	46.9%	Yes	ND	Shallow
	AGW134	15	0	0	0	48.0%	Yes	ND	Shallow
	AGW135	15	15	0.34	-71	100.0%	No	D	Shallow
	AGW136	17	17	0.35	-42	95.4%	No	D	Shallow
	AGW152	13	0	0	0	47.6%	Yes	ND	Shallow
	AGW153	9	0	0	0	46.0%	Yes	ND	Shallow
	AGW165	18	18	0.1	83	99.9%	No	I	Shallow
	AGW193	14	14	0.08	7	62.6%	No	NT	Shallow
	AGW194	14	14	0.09	-21	86.0%	No	S	Shallow
	AGW200-2	13	12	0.23	-13	76.4%	No	S	Shallow
	AGW201-2	13	13	0.14	-19	86.1%	No	S	Shallow
	AGW202-2	13	13	0.12	-10	70.5%	No	S	Shallow
	AGW203-2	13	13	0.14	-18	84.7%	No	S	Shallow
	AGW207-2	13	13	0.05	-52	100.0%	No	D	Shallow
	AGW208-2	13	13	0.11	-23	90.8%	No	PD	Shallow
	AGW209-2	13	0	0	0	47.6%	Yes	ND	Shallow
	AGW210-2	12	0	0	0	47.3%	Yes	ND	Shallow
	AGW211-2	12	2	0.5	-11	74.9%	No	S	Shallow
	AGW212-2	12	0	0.38	5	60.6%	Yes	ND	Shallow
	AGW225	11	11	0.15	32	99.4%	No	I	Shallow
	AGW226	12	12	0.09	3	55.4%	No	NT	Shallow
	AGW228	12	12	0.12	33	98.7%	No	I	Shallow
	AGW231	7	7	0.23	-12	94.9%	No	PD	Shallow
	AGW232	7	0	0.47	-2	55.7%	Yes	ND	Shallow
	AGW235-2	9	0	0.43	-4	61.9%	Yes	ND	Shallow
	AGW236	7	7	0.09	9	88.1%	No	NT	Shallow
	AGW239	8	0	0	0	45.2%	Yes	ND	Shallow
	AGW240-3	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW240-5	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW241-3	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW241-5	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW242-2	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW243-3	5	0	0	0	40.8%	Yes	ND	Shallow

Table P-6
Results of Mann-Kendall Trend Analysis - Shallow Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW247-3	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW247-5	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW248-3	5	5	0.04	0	40.8%	No	S	Shallow
	AGW248-5	5	5	0.11	3	67.5%	No	NT	Shallow
	AGW249-3	5	5	0.05	-2	59.2%	No	S	Shallow
	AGW249-5	5	5	0.07	0	40.8%	No	S	Shallow
	AGW250-2	5	5	0.21	4	75.8%	No	NT	Shallow
	AGW251-2	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW254-2	3	0	0	0	0.0%	Yes	ND	Shallow
	AGW254-3	3	0	0	0	0.0%	Yes	ND	Shallow
	AGW255-3	3	0	0	0	0	Yes	ND	Shallow
	AGW257	3	1	0	0	0	No	NA	Shallow
	AGW258	3	0	0	0	0	Yes	ND	Shallow
	AGW261	2	2	0	0	0	No	NA	Shallow
	AGW266	2	0	0	0	0	Yes	ND	Shallow
VC									
	AGW001R	45	1	1.82	-533	100.0%	No	D	Shallow
	AGW002R	63	59	1.27	-1435	100.0%	No	D	Shallow
	AGW006R	33	14	1.73	-203	99.9%	No	D	Shallow
	AGW009	15	1	1.34	-57	99.8%	No	D	Shallow
	AGW010	27	1	2.23	-192	100.0%	No	D	Shallow
	AGW024	31	31	1.25	-272	100.0%	No	D	Shallow
	AGW025	39	39	0.72	-578	100.0%	No	D	Shallow
	AGW026	19	14	1.69	-58	97.7%	No	D	Shallow
	AGW027	39	37	1.45	-451	100.0%	No	D	Shallow
	AGW029	39	17	1.53	-510	100.0%	No	D	Shallow
	AGW030	35	4	1.79	-360	100.0%	No	D	Shallow
	AGW031R	43	10	1.64	-537	100.0%	No	D	Shallow
	AGW032	43	38	0.93	-454	100.0%	No	D	Shallow
	AGW033	41	29	0.8	-411	100.0%	No	D	Shallow
	AGW037	19	14	1.41	-50	95.7%	No	D	Shallow
	AGW039	15	12	1.67	-65	100.0%	No	D	Shallow
	AGW040	14	8	1.67	-43	99.0%	No	D	Shallow
	AGW041	21	1	1.86	-105	99.9%	No	D	Shallow
	AGW044	20	1	2.07	-88	99.8%	No	D	Shallow
	AGW053R	43	11	1.81	-566	100.0%	No	D	Shallow
	AGW058R	36	0	1.66	-341	100.0%	Yes	ND	Shallow
	AGW059R	22	0	1.85	-147	100.0%	Yes	ND	Shallow
	AGW064	38	1	2.41	-278	100.0%	No	D	Shallow
	AGW065	39	1	2.48	-315	100.0%	No	D	Shallow
	AGW066	48	7	2.26	-558	100.0%	No	D	Shallow
	AGW067	49	8	2.27	-586	100.0%	No	D	Shallow

Table P-6
Results of Mann-Kendall Trend Analysis - Shallow Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW068	37	1	2.42	-291	100.0%	No	D	Shallow
	AGW069	32	1	2.85	-138	98.7%	No	D	Shallow
	AGW074	39	0	2.13	-392	100.0%	Yes	ND	Shallow
	AGW078	20	0	1.37	-82	99.6%	Yes	ND	Shallow
	AGW079	14	14	0.39	-18	82.1%	No	S	Shallow
	AGW081	30	4	1.6	-192	100.0%	No	D	Shallow
	AGW085	31	0	1.87	-197	100.0%	Yes	ND	Shallow
	AGW088	29	0	1.41	-92	95.6%	Yes	ND	Shallow
	AGW090	29	0	1.41	-100	96.9%	Yes	ND	Shallow
	AGW104	10	0	1.36	6	66.8%	Yes	ND	Shallow
	AGW106R	43	14	3.71	-557	100.0%	No	D	Shallow
	AGW110R	43	35	2.27	-582	100.0%	No	D	Shallow
	AGW112R	43	12	1.03	-424	100.0%	No	D	Shallow
	AGW115	22	21	0.67	150	100.0%	No	I	Shallow
	AGW116	22	1	1.39	-15	65.2%	No	NT	Shallow
	AGW117	22	1	1.37	-13	63.1%	No	NT	Shallow
	AGW118	22	1	1.37	-15	65.2%	No	NT	Shallow
	AGW120	21	0	0.11	-10	60.6%	Yes	ND	Shallow
	AGW125	22	13	0.63	-110	99.9%	No	D	Shallow
	AGW127	14	0	1.46	-13	74.1%	Yes	ND	Shallow
	AGW128	15	1	2.28	-7	61.5%	No	NT	Shallow
	AGW129	15	0	1.44	-2	52.0%	Yes	ND	Shallow
	AGW130	15	0	1.44	-2	52.0%	Yes	ND	Shallow
	AGW131	15	15	0.4	-47	99.0%	No	D	Shallow
	AGW133	11	3	1.15	-22	94.9%	No	PD	Shallow
	AGW134	15	9	1.13	-18	79.6%	No	NT	Shallow
	AGW135	15	9	0.99	-63	99.9%	No	D	Shallow
	AGW136	17	2	1.32	-47	97.1%	No	D	Shallow
	AGW152	13	13	0.21	-27	94.3%	No	PD	Shallow
	AGW153	9	2	1.53	-13	89.0%	No	NT	Shallow
	AGW165	18	18	0.4	45	95.2%	No	I	Shallow
	AGW193	14	14	0.19	-44	99.2%	No	D	Shallow
	AGW194	14	14	0.29	-59	100.0%	No	D	Shallow
	AGW200-2	13	13	0.18	-9	68.4%	No	S	Shallow
	AGW201-2	13	13	0.19	-5	59.4%	No	S	Shallow
	AGW202-2	13	13	0.74	3	54.8%	No	NT	Shallow
	AGW203-2	13	0	1.47	10	70.5%	Yes	ND	Shallow
	AGW207-2	13	13	0.16	-36	98.5%	No	D	Shallow
	AGW208-2	13	13	0.39	22	89.8%	No	NT	Shallow
	AGW209-2	13	13	0.19	-2	52.4%	No	S	Shallow
	AGW210-2	12	0	0	0	47.3%	Yes	ND	Shallow
	AGW211-2	12	0	0	0	47.3%	Yes	ND	Shallow

Table P-6
Results of Mann-Kendall Trend Analysis - Shallow Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW212-2	12	0	0	0	47.3%	Yes	ND	Shallow
	AGW225	11	11	0.1	-33	99.5%	No	D	Shallow
	AGW226	12	12	0.12	-38	99.6%	No	D	Shallow
	AGW228	12	12	0.11	-29	97.4%	No	D	Shallow
	AGW231	7	7	0.09	2	55.7%	No	NT	Shallow
	AGW232	7	7	0.25	11	93.2%	No	PI	Shallow
	AGW235-2	9	9	0.54	23	99.1%	No	I	Shallow
	AGW236	7	7	0.17	-14	97.5%	No	D	Shallow
	AGW239	8	8	0.2	-13	92.9%	No	PD	Shallow
	AGW240-3	5	5	0.41	-4	75.8%	No	S	Shallow
	AGW240-5	5	5	0.35	0	40.8%	No	S	Shallow
	AGW241-3	5	5	0.18	-3	67.5%	No	S	Shallow
	AGW241-5	5	3	0.54	-3	67.5%	No	S	Shallow
	AGW242-2	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW243-3	5	0	0	0	40.8%	Yes	ND	Shallow
	AGW247-3	5	5	0.16	-8	95.8%	No	D	Shallow
	AGW247-5	5	5	0.28	6	88.3%	No	NT	Shallow
	AGW248-3	5	5	0.12	-1	50.0%	No	S	Shallow
	AGW248-5	5	5	0.06	3	67.5%	No	NT	Shallow
	AGW249-3	5	5	0.19	3	67.5%	No	NT	Shallow
	AGW249-5	5	5	0.32	-4	75.8%	No	S	Shallow
	AGW250-2	5	5	0.08	-3	67.5%	No	S	Shallow
	AGW251-2	5	5	0.58	8	95.8%	No	I	Shallow
	AGW254-2	3	3	0	0	0.0%	No	NA	Shallow
	AGW254-3	3	0	0	0	0.0%	Yes	ND	Shallow
	AGW255-3	3	3	0	0	0.0%	No	NA	Shallow
	AGW257	3	0	0	0	0.0%	Yes	ND	Shallow
	AGW258	3	0	0	0	0.0%	Yes	ND	Shallow
	AGW261	2	2	0	0	0.0%	No	NA	Shallow
	AGW266	2	0	0	0	0.0%	Yes	ND	Shallow

D = decreasing
I = increasing
NA = not applicable (due to insufficient data, <4 sampling events).
ND = non-detect (all samples collected non-detect).
NT = no trend
PD = probably decreasing
PI = probably increasing
S = stable
TCE = trichloroethene
VC = vinyl chloride

Table P-7
Results of Mann-Kendall Trend Analysis - Intermediate Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
TCE									
	AGW055R	28	28	1.38	-310	100.0%	No	D	Intermediate
	AGW057R	42	42	0.59	-753	100.0%	No	D	Intermediate
	AGW060R	26	26	0.54	-268	100.0%	No	D	Intermediate
	AGW072	34	34	0.36	-455	100.0%	No	D	Intermediate
	AGW087	29	0	0	0	49.3%	Yes	ND	Intermediate
	AGW089	29	2	0.24	-44	78.8%	No	S	Intermediate
	AGW091	29	0	0	0	49.3%	Yes	ND	Intermediate
	AGW095R	27	27	0.29	-194	100.0%	No	D	Intermediate
	AGW105	23	23	0.23	60	94.0%	No	PI	Intermediate
	AGW119	22	0	0	0	48.9%	Yes	ND	Intermediate
	AGW126	22	22	0.25	-93	99.6%	No	D	Intermediate
	AGW137	17	17	0.19	-65	99.7%	No	D	Intermediate
	AGW139	16	16	0.17	-29	89.5%	No	S	Intermediate
	AGW140	19	19	0.22	-111	100.0%	No	D	Intermediate
	AGW141	16	16	0.11	-76	100.0%	No	D	Intermediate
	AGW144	16	16	0.27	73	100.0%	No	I	Intermediate
	AGW145	16	16	0.12	34	93.0%	No	PI	Intermediate
	AGW147	16	0	0	0	48.2%	Yes	ND	Intermediate
	AGW148	17	17	0.11	-87	100.0%	No	D	Intermediate
	AGW149	16	16	0.12	-14	71.8%	No	S	Intermediate
	AGW150	16	16	0.31	-107	100.0%	No	D	Intermediate
	AGW151	16	16	0.36	-82	100.0%	No	D	Intermediate
	AGW154	14	14	0.14	4	56.4%	No	NT	Intermediate
	AGW155	14	8	0.69	-69	100.0%	No	D	Intermediate
	AGW156	14	14	0.82	-72	100.0%	No	D	Intermediate
	AGW157	15	15	0.27	16	76.7%	No	NT	Intermediate
	AGW158	16	16	0.17	-53	99.1%	No	D	Intermediate
	AGW160	16	15	0.29	-62	99.8%	No	D	Intermediate
	AGW161	16	15	0.34	-68	99.9%	No	D	Intermediate
	AGW162	16	15	0.29	-61	99.8%	No	D	Intermediate
	AGW163	18	18	0.09	77	99.9%	No	I	Intermediate
	AGW164	18	18	0.1	19	75.0%	No	NT	Intermediate
	AGW166	18	0	0	0	48.5%	Yes	ND	Intermediate
	AGW168	18	18	0.09	81	99.9%	No	I	Intermediate
	AGW170	18	18	0.1	-76	99.9%	No	D	Intermediate
	AGW172	18	18	0.32	1	50.0%	No	NT	Intermediate
	AGW173	19	16	0.95	19	73.3%	No	NT	Intermediate
	AGW174	18	18	0.19	-136	100.0%	No	D	Intermediate
	AGW175	18	18	0.12	-96	100.0%	No	D	Intermediate
	AGW176	19	19	0.1	-89	99.9%	No	D	Intermediate
	AGW177	18	18	0.06	26	82.6%	No	NT	Intermediate

Table P-7
Results of Mann-Kendall Trend Analysis - Intermediate Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW179	18	15	0.66	-76	99.9%	No	D	Intermediate
	AGW181	17	17	0.11	32	89.8%	No	NT	Intermediate
	AGW182	17	17	0.39	100	100.0%	No	I	Intermediate
	AGW184	16	16	0.19	-65	99.9%	No	D	Intermediate
	AGW186	16	16	0.16	-76	100.0%	No	D	Intermediate
	AGW187	17	17	0.15	-57	99.0%	No	D	Intermediate
	AGW188	16	16	0.05	-40	96.1%	No	D	Intermediate
	AGW189	16	16	0.24	-21	81.3%	No	S	Intermediate
	AGW190	16	16	0.1	-79	100.0%	No	D	Intermediate
	AGW191	16	0	0	0	48.2%	Yes	ND	Intermediate
	AGW196	14	0	0.36	5	58.5%	Yes	ND	Intermediate
	AGW198	14	14	0.09	-41	98.7%	No	D	Intermediate
	AGW200-5	13	13	0.11	-22	89.8%	No	S	Intermediate
	AGW201-5	13	13	0.06	7	64.0%	No	NT	Intermediate
	AGW202-4	13	13	0.16	-44	99.7%	No	D	Intermediate
	AGW203-4	13	13	0.11	-45	99.8%	No	D	Intermediate
	AGW204	13	0	0	0	47.6%	Yes	ND	Intermediate
	AGW205	13	0	0	0	47.6%	Yes	ND	Intermediate
	AGW206	13	13	0.31	1	50.0%	No	NT	Intermediate
	AGW207-4	13	13	0.06	-25	92.7%	No	PD	Intermediate
	AGW208-4	13	13	0.21	-18	84.7%	No	S	Intermediate
	AGW209-5	13	13	0.22	64	100.0%	No	I	Intermediate
	AGW210-5	13	13	0.44	-3	54.8%	No	S	Intermediate
	AGW211-5	13	13	0.06	-21	88.6%	No	S	Intermediate
	AGW212-5	13	13	0.2	-27	94.3%	No	PD	Intermediate
	AGW214	14	14	0.07	-45	99.3%	No	D	Intermediate
	AGW215	15	0	0	0	48.0%	Yes	ND	Intermediate
	AGW216	13	13	0.07	-16	81.6%	No	S	Intermediate
	AGW217	14	14	0.04	-5	58.5%	No	S	Intermediate
	AGW218	14	14	0.1	-18	82.1%	No	S	Intermediate
	AGW219	13	0	0.37	4	57.1%	Yes	ND	Intermediate
	AGW220	13	12	0.27	-1	50.0%	No	S	Intermediate
	AGW221	13	0	0	0	47.6%	Yes	ND	Intermediate
	AGW222	9	9	0.28	-25	99.6%	No	D	Intermediate
	AGW227	11	11	0.11	-33	99.5%	No	D	Intermediate
	AGW235-4	9	9	0.13	-19	97.0%	No	D	Intermediate
	AGW238	8	0	0	0	45.2%	Yes	ND	Intermediate
	AGW242-5	5	0	0	0	40.8%	Yes	ND	Intermediate
	AGW243-5	5	0	0	0	40.8%	Yes	ND	Intermediate
	AGW250-3	5	5	0.27	1	50.0%	No	NT	Intermediate
	AGW251-3	5	0	0	0	40.8%	Yes	ND	Intermediate
	AGW253	3	0	0	0	0.0%	Yes	ND	Intermediate

Table P-7
Results of Mann-Kendall Trend Analysis - Intermediate Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW254-4	3	0	0	0	0.0%	Yes	ND	Intermediate
	AGW254-5	3	0	0	0	0.0%	Yes	ND	Intermediate
	AGW254-6	2	0	0	0	0.0%	Yes	ND	Intermediate
	AGW255-5	3	0	0	0	0.0%	Yes	ND	Intermediate
	AGW256	3	3	0	0	0.0%	No	NA	Intermediate
	AGW265	2	0	0	0	0.0%	Yes	ND	Intermediate
	AGW267	2	0	0	0	0.0%	Yes	ND	Intermediate
VC									
	AGW055R	28	19	1.13	-133	0.996	No	D	Intermediate
	AGW057R	42	1	1.74	-436	100.0%	No	D	Intermediate
	AGW060R	26	14	1.58	-224	100.0%	No	D	Intermediate
	AGW072	33	0	0.89	-158	99.3%	Yes	ND	Intermediate
	AGW087	29	0	1.36	-120	98.8%	Yes	ND	Intermediate
	AGW089	29	0	1.36	-120	98.8%	Yes	ND	Intermediate
	AGW091	29	0	1.36	-120	0.988	Yes	ND	Intermediate
	AGW095R	27	4	0.99	-88	0.966	No	D	Intermediate
	AGW105	23	23	0.67	-99	0.996	No	D	Intermediate
	AGW119	22	0	0.1	-11	0.61	Yes	ND	Intermediate
	AGW126	22	16	0.47	-76	0.984	No	D	Intermediate
	AGW137	17	11	0.86	-75	0.999	No	D	Intermediate
	AGW139	16	0	1.35	-11	0.671	Yes	ND	Intermediate
	AGW140	19	19	0.83	-107	1	No	D	Intermediate
	AGW141	16	0	1.35	-11	0.671	Yes	ND	Intermediate
	AGW144	16	16	0.22	68	0.999	No	I	Intermediate
	AGW145	16	16	0.21	-50	0.987	No	D	Intermediate
	AGW147	16	10	0.92	-44	0.974	No	D	Intermediate
	AGW148	17	17	0.44	-102	1	No	D	Intermediate
	AGW149	16	1	1.36	5	0.571	No	NT	Intermediate
	AGW150	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW151	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW154	14	14	0.25	-29	0.937	No	PD	Intermediate
	AGW155	14	14	0.4	24	0.894	No	NT	Intermediate
	AGW156	14	14	0.17	31	0.95	No	I	Intermediate
	AGW157	15	15	0.53	-60	0.999	No	D	Intermediate
	AGW158	16	16	0.49	-92	1	No	D	Intermediate
	AGW160	16	3	1.22	-12	0.687	No	NT	Intermediate
	AGW161	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW162	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW163	18	14	0.38	-46	0.956	No	D	Intermediate
	AGW164	18	13	1.77	-30	0.862	No	NT	Intermediate
	AGW166	18	17	0.25	4	0.545	No	NT	Intermediate
	AGW168	18	18	0.4	-133	1	No	D	Intermediate

Table P-7
Results of Mann-Kendall Trend Analysis - Intermediate Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW170	18	11	0.81	-89	1	No	D	Intermediate
	AGW172	18	1	1.36	3	0.53	No	NT	Intermediate
	AGW173	19	6	0.41	-12	0.648	No	S	Intermediate
	AGW174	18	0	1.41	15	0.7	Yes	ND	Intermediate
	AGW175	18	0	1.41	15	0.7	Yes	ND	Intermediate
	AGW176	19	1	0.24	-14	0.674	No	S	Intermediate
	AGW177	18	15	0.49	-102	1	No	D	Intermediate
	AGW179	18	18	0.14	-64	0.992	No	D	Intermediate
	AGW181	17	16	0.41	-28	0.865	No	S	Intermediate
	AGW182	17	17	0.2	-88	1	No	D	Intermediate
	AGW184	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW186	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW187	17	2	1.35	-11	0.657	No	NT	Intermediate
	AGW188	16	16	0.14	-35	0.936	No	PD	Intermediate
	AGW189	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW190	16	2	1.32	6	0.588	No	NT	Intermediate
	AGW191	16	0	1.44	13	0.703	Yes	ND	Intermediate
	AGW196	14	14	0.8	76	1	No	I	Intermediate
	AGW198	14	5	0.45	-31	0.95	No	D	Intermediate
	AGW200-5	13	13	0.09	-7	0.64	No	S	Intermediate
	AGW201-5	13	12	0.43	1	0.5	No	NT	Intermediate
	AGW202-4	13	13	0.7	-11	0.725	No	S	Intermediate
	AGW203-4	13	0	1.47	10	0.705	Yes	ND	Intermediate
	AGW204	13	0	0	0	0.476	Yes	ND	Intermediate
	AGW205	13	0	0	0	0.476	Yes	ND	Intermediate
	AGW206	13	0	1.47	10	0.705	Yes	ND	Intermediate
	AGW207-4	13	13	0.25	-12	0.745	No	S	Intermediate
	AGW208-4	13	8	0.57	-15	0.799	No	S	Intermediate
	AGW209-5	13	13	0.4	64	1	No	I	Intermediate
	AGW210-5	13	13	0.18	-29	0.956	No	D	Intermediate
	AGW211-5	13	0	0	0	0.476	Yes	ND	Intermediate
	AGW212-5	13	0	1.47	10	0.705	Yes	ND	Intermediate
	AGW214	14	10	0.9	-30	0.944	No	PD	Intermediate
	AGW215	15	0	1.45	12	0.704	Yes	ND	Intermediate
	AGW216	13	4	1.22	-7	0.64	No	NT	Intermediate
	AGW217	14	11	0.8	-51	0.998	No	D	Intermediate
	AGW218	14	12	0.78	-19	0.835	No	S	Intermediate
	AGW219	13	2	0.36	-5	0.594	No	S	Intermediate
	AGW220	13	0	0	0	0.476	Yes	ND	Intermediate
	AGW221	13	3	0.38	-4	0.571	No	S	Intermediate
	AGW222	9	0	1.5	6	0.694	Yes	ND	Intermediate
	AGW227	11	11	0.1	-13	0.821	No	S	Intermediate

Table P-7
Results of Mann-Kendall Trend Analysis - Intermediate Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend	Zone
	AGW235-4	9	8	0.19	-26	0.997	No	D	Intermediate
	AGW238	8	0	0	0	0.452	Yes	ND	Intermediate
	AGW242-5	5	0	0	0	0.408	Yes	ND	Intermediate
	AGW243-5	5	0	0	0	0.408	Yes	ND	Intermediate
	AGW250-3	5	5	0.09	-5	0.821	No	S	Intermediate
	AGW251-3	5	5	0.31	8	0.958	No	I	Intermediate
	AGW253	3	0	0	0	0	Yes	ND	Intermediate
	AGW254-4	3	0	0	0	0	Yes	ND	Intermediate
	AGW254-5	3	0	0	0	0	Yes	ND	Intermediate
	AGW254-6	2	0	0	0	0	Yes	ND	Intermediate
	AGW255-5	3	3	0	0	0	No	NA	Intermediate
	AGW256	3	0	0	0	0	Yes	ND	Intermediate
	AGW265	2	1	0	0	0	No	NA	Intermediate
	AGW267	2	0	0	0	0	Yes	ND	Intermediate

D = decreasing
I = increasing
NA = not applicable (due to insufficient data, <4 sampling events).
ND = non-detect (all samples collected non-detect).
NT = no trend
PD = probably decreasing
PI = probably increasing
S = stable
TCE = trichloroethene
VC = vinyl chloride

Table P-8
Results of Mann-Kendall Trend Analysis - Deep Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend (a)	Zone
TCE									
	AGW034	21	21	0.43	-104	99.9%	No	D	Deep
	AGW035	27	26	0.65	-258	100.0%	No	D	Deep
	AGW073	34	34	0.51	-407	100.0%	No	D	Deep
	AGW098R	27	27	0.34	-241	100.0%	No	D	Deep
	AGW138	16	16	0.12	-61	99.8%	No	D	Deep
	AGW142	16	15	0.5	-70	99.9%	No	D	Deep
	AGW143	16	0	0	0	48.2%	Yes	ND	Deep
	AGW146	16	16	0.13	68	99.9%	No	I	Deep
	AGW159	15	15	0.09	-28	90.8%	No	PD	Deep
	AGW167	18	18	0.13	91	100.0%	No	I	Deep
	AGW169	18	18	0.1	79	99.9%	No	I	Deep
	AGW171	18	18	0.16	-78	99.9%	No	D	Deep
	AGW178	18	18	0.09	-23	79.5%	No	S	Deep
	AGW180	18	18	0.09	-80	99.9%	No	D	Deep
	AGW183	19	0	0.32	6	56.9%	Yes	ND	Deep
	AGW185	16	16	0.15	-18	77.5%	No	S	Deep
	AGW192	16	0	0	0	48.2%	Yes	ND	Deep
	AGW195	14	14	0.1	-1	50.0%	No	S	Deep
	AGW197	14	14	0.18	-25	90.4%	No	PD	Deep
	AGW199	14	14	0.35	27	92.1%	No	PI	Deep
	AGW200-6	13	13	0.17	-15	79.9%	No	S	Deep
	AGW201-6	13	13	0.09	-42	99.5%	No	D	Deep
	AGW202-6	13	13	0.08	-13	76.4%	No	S	Deep
	AGW203-6	13	11	0.36	-46	99.8%	No	D	Deep
	AGW207-7	13	13	0.05	-30	96.2%	No	D	Deep
	AGW208-6	13	13	0.06	-52	100.0%	No	D	Deep
	AGW209-6	13	13	0.06	-34	97.9%	No	D	Deep
	AGW210-6	13	13	0.07	-23	90.8%	No	PD	Deep
	AGW211-6	13	13	0.12	-37	98.7%	No	D	Deep
	AGW212-7	13	13	0.06	10	70.5%	No	NT	Deep
	AGW213	14	0	0	0	47.8%	Yes	ND	Deep
	AGW223	8	0	0	0	45.2%	Yes	ND	Deep
	AGW230	9	9	0.09	17	95.1%	No	I	Deep
	AGW233	7	0	0	0	43.7%	Yes	ND	Deep
	AGW234	7	7	0.15	19	99.9%	No	I	Deep
	AGW235-7	7	0	0.47	-2	55.7%	Yes	ND	Deep
	AGW237	8	8	0.65	-20	99.3%	No	D	Deep
	AGW250-6	5	0	0	0	40.8%	Yes	ND	Deep
	AGW251-6	5	0	0	0	40.8%	Yes	ND	Deep
	AGW252	3	0	0	0	0.0%	Yes	ND	Deep
	AGW259	2	0	0	0	0.0%	Yes	ND	Deep

Table P-8
Results of Mann-Kendall Trend Analysis - Deep Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend (a)	Zone
	AGW260	2	0	0	0	0.0%	Yes	ND	Deep
	AGW264	2	0	0	0	0.0%	Yes	ND	Deep
	AGW268	2	0	0	0	0.0%	Yes	ND	Deep
VC									
	AGW034	21	3	1.57	-144	1	No	D	Deep
	AGW035	27	0	1.42	-233	100.0%	Yes	ND	Deep
	AGW073	34	0	0.79	-130	97.2%	Yes	ND	Deep
	AGW098R	27	0	1.08	-58	88.1%	Yes	ND	Deep
	AGW138	16	0	1.03	4	55.3%	Yes	ND	Deep
	AGW142	16	0	1.03	4	55.3%	Yes	ND	Deep
	AGW143	16	1	1.63	21	0.813	No	NT	Deep
	AGW146	16	16	0.34	-84	1	No	D	Deep
	AGW159	15	15	0.53	-65	1	No	D	Deep
	AGW167	18	18	0.2	-111	1	No	D	Deep
	AGW169	18	18	0.43	-140	1	No	D	Deep
	AGW171	18	1	1.39	-17	0.725	No	NT	Deep
	AGW178	18	15	0.64	-132	1	No	D	Deep
	AGW180	18	0	1.41	15	0.7	Yes	ND	Deep
	AGW183	19	2	1.31	-23	0.777	No	NT	Deep
	AGW185	16	0	1.44	13	0.703	Yes	ND	Deep
	AGW192	16	5	1.07	-45	0.977	No	D	Deep
	AGW195	14	10	0.35	-63	1	No	D	Deep
	AGW197	14	4	1.18	-21	0.86	No	NT	Deep
	AGW199	14	14	0.17	-34	0.965	No	D	Deep
	AGW200-6	13	13	0.21	-6	0.617	No	S	Deep
	AGW201-6	13	13	0.22	-59	1	No	D	Deep
	AGW202-6	13	0	1.47	10	0.705	Yes	ND	Deep
	AGW203-6	13	0	1.47	10	0.705	Yes	ND	Deep
	AGW207-7	13	12	0.35	-64	1	No	D	Deep
	AGW208-6	13	7	0.92	-39	0.991	No	D	Deep
	AGW209-6	13	5	0.43	-6	0.617	No	S	Deep
	AGW210-6	13	0	1.47	10	0.705	Yes	ND	Deep
	AGW211-6	13	1	1.82	3	0.548	No	NT	Deep
	AGW212-7	13	0	1.47	10	0.705	Yes	ND	Deep
	AGW213	14	13	0.63	-20	0.848	No	S	Deep
	AGW223	8	0	0	0	0.452	Yes	ND	Deep
	AGW230	9	0	1.5	6	0.694	Yes	ND	Deep
	AGW233	7	0	1.49	4	0.667	Yes	ND	Deep
	AGW234	7	7	0.26	11	0.932	No	PI	Deep
	AGW235-7	7	0	1.49	4	0.667	Yes	ND	Deep
	AGW237	8	8	0.37	-22	0.998	No	D	Deep
	AGW250-6	5	0	0	0	0.408	Yes	ND	Deep

Table P-8
Results of Mann-Kendall Trend Analysis - Deep Zone
Boeing Auburn Remedial Investigation
Auburn, Washington

Constituent	Well Name	Number of Samples	Number of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND"?	Concentration Trend (a)	Zone
	AGW251-6	5	5	0.35	8	0.958	No	I	Deep
	AGW252	3	0	0	0	0	Yes	ND	Deep
	AGW259	2	0	0	0	0	Yes	ND	Deep
	AGW260	2	0	0	0	0	Yes	ND	Deep
	AGW264	2	0	0	0	0	Yes	ND	Deep
	AGW268	2	0	0	0	0	Yes	ND	Deep

D = decreasing
I = increasing
NA = not applicable (due to insufficient data, <4 sampling events).
ND = non-detect (all samples collected non-detect).
NT = no trend
PD = probably decreasing
PI = probably increasing
S = stable
TCE = trichloroethene
VC = vinyl chloride

Table P-9
MAROS Spatial Moment Results
Boeing Auburn Remedial Investigation
Auburn, Washington

Shallow Zone	Trichloroethene					Vinyl Chloride				
	0th Moment		1st Moment			0th Moment		1st Moment		
Year	Est. Mass (kilograms)	Est. Mass (pounds)	X (feet)	Y (feet)	Source Distance (a)	Est. Mass (kilograms)	Est. Equiv. Mass TCE (pounds)	X (feet)	Y (feet)	Source Distance (a)
2011	4.3	9.5	1,290,036	109,853	2,120	1.7	7.88	1,289,463	111,272	3,643
2012	4.3	9.5	1,290,001	109,803	2,081	1.8	8.34	1,289,466	111,337	3,704
2013	4.5	9.9	1,289,981	109,889	2,169	1.8	8.34	1,289,501	111,242	3,603
2014	4.1	9.0	1,289,942	109,918	2,208	1.8	8.34	1,289,473	111,395	3,757
2015	3.8	8.4	1,289,950	109,925	2,212	1.8	8.34	1,289,422	111,537	3,908
Coefficient of Variation	0.06		0.03			0.02		0.03		
Mann-Kendall Statistic	-6		8			0		6		
Confidence in Trend	88.3%		95.8%			40.8%		88.3%		
Moment Trend	Stable		Increasing			Stable		No Trend		

Note:

a. AGW201 selected as arbirtary facility source location for analysis purposes.

Table P-9
MAROS Spatial Moment Results
Boeing Auburn Remedial Investigation
Auburn, Washington

Intermediate Zone	Trichloroethene					Vinyl Chloride				
	0th Moment		1st Moment			0th Moment		1st Moment		
Year	Est. Mass (kilograms)	Est. Mass (pounds)	X (feet)	Y (feet)	Source Distance (a)	Est. Mass (kilograms)	Est. Equiv. Mass TCE (pounds)	X (feet)	Y (feet)	Source Distance (a)
2011	22.0	48.5	1,290,780	111,926	4,127	1.6	7.4	1,289,945	109,356	1,676
2012	24.0	52.9	1,290,731	111,924	4,123	1.5	7.0	1,289,921	109,365	1,694
2013	22.0	48.5	1,290,681	111,909	4,106	1.4	6.5	1,289,922	109,424	1,748
2014	22.0	48.5	1,290,683	111,912	4,109	1.5	7.0	1,290,038	109,758	2,027
2015	20.0	44.1	1,290,663	111,907	4,103	1.3	6.0	1,289,827	109,719	2,056
Coefficient of Variation	0.06		0.00			0.07		0.10		
Mann-Kendall Statistic	-8		-8			-6		10		
Confidence in Trend	95.8%		95.8%			88.3%		99.2%		
Moment Trend	Decreasing		Decreasing			Stable		Increasing		

Note:
a. AGW201 selected as arbitrary facility source location for analysis purposes.

Table P-9
MAROS Spatial Moment Results
Boeing Auburn Remedial Investigation
Auburn, Washington

Deep Zone	Trichloroethene					Vinyl Chloride				
	0th Moment		1st Moment			0th Moment		1st Moment		
Year	Est. Mass (kilograms)	Est. Mass (pounds)	X (feet)	Y (feet)	Source Distance (a)	Est. Mass (kilograms)	Est. Equiv. Mass TCE (pounds)	X (feet)	Y (feet)	Source Distance (a)
2011	14.0	30.9	1,290,110	111,712	3,936	0.24	1.1	1,289,938	110,512	2,783
2012	15.0	33.1	1,290,093	111,697	3,923	0.20	0.9	1,289,995	110,623	2,879
2013	15.0	33.1	1,290,085	111,693	3,920	0.18	0.8	1,290,038	110,533	2,782
2014	14.0	30.9	1,290,114	111,667	3,891	0.24	1.1	1,290,286	110,948	3,158
2015	14.0	30.9	1,290,096	111,745	3,970	0.15	0.7	1,289,916	110,647	2,919
Coefficient of Variation	0.02		0.01			0.2		0.05		
Mann-Kendall Statistic	0		-2			-6		4		
Confidence in Trend	40.8%		59.2%			88.3%		75.8%		
Moment Trend	Stable		Stable			Stable		No Trend		

Note:

a. AGW201 selected as arbirtary facility source location for analysis purposes.