



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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December 30, 2014

Mr. James Bet
Environmental Affairs
The Boeing Company
PO Box 3707, M/C 1W-12
Seattle, WA 98124-2207

Re: Ecology Approval of the document: ***Technical Memorandum, Phase VI, Interim Groundwater Monitoring Program***; prepared for the Boeing Company by Landau Associates; December 11, 2014; FS #2018; CS #5049; EPA WAD041337130

Dear Mr. Bet:

The Department of Ecology (Ecology) has completed review of the groundwater monitoring program described in the document: ***Technical Memorandum, Phase VI, Interim Groundwater Monitoring Program***; prepared for the Boeing Company by Landau Associates and dated December 11, 2014. The list of the well locations included in the Phase VI monitoring program, the monitoring zones, the frequency of sampling, the sampling constituents, and the analytical methods are incorporated into Table 1 of the memorandum. A figure is also attached to the memorandum showing the current monitoring well network and locations of the wells included in the network.

Ecology reviewed and commented on the proposed draft groundwater monitoring program by letter dated October 16, 2014. Ecology revised its review based on comments provided by Boeing and Landau and sent requested revisions by email dated November 26, 2014. With this letter, Ecology approves the December 11th Technical Memorandum of the Phase VI Interim Groundwater Monitoring Program with no further requests for changes.

Boeing has asked for a rationale from Ecology for those wells where Ecology did not accept Boeing's proposed modifications to the groundwater monitoring program. In Attachment A to this letter, Ecology includes Table A that lists those wells, in numerical order, and provides the reasoning behind Ecology's decisions.



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The Phase VI Interim Groundwater Monitoring Program is in effect as of the December, 2014 semi-annual sampling and analysis event. If there are any further questions or comments regarding this approval, feel free to contact Robin Harrover by phone at (425) 649-7232 or by email: rhar461@ecy.wa.gov.

Sincerely,



Robin Harrover, LHG
Hazardous Waste and Toxics Reduction Program

Enclosure: Attachment A, Table A

By certified mail: 7013 2250 0000 3614 6758

cc: Jim Swartz, Boeing, Auburn Plant
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**ATTACHMENT A
TABLE A**

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(Note: Acronyms found in this table are defined on the last page)

Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW069(S)	A	SA			Well AGW069(S) monitors the extent of the trichloroethene (TCE) in shallow groundwater (gw) proximal to the YMCA and laterally upgradient (Southwest) of the Junior Achievement (JA) Building. TCE is present in the wells south of the YMCA and the JA. Well AGW069(S) supports the monitoring of gw to demonstrate protection of the YMCA and JA from vapor intrusion. Sampling target VOCs on a semi-annual (SA) frequency is needed to demonstrate protection of the vapor intrusion (VI) pathway since this well is approximately 450 feet upgradient of the JA and gw flow rates can vary in this area. Well AGW069 is also important for developing the volatile organic compound (VOC) concentration contour figure of the shallow-zone gw that takes place on a SA basis.

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW136(S)			A	SA	<p>This is the shallow zone well that monitors the extent of target VOCs in gw south of the YMCA. Levels of TCE have been present in gw above the commercial screening levels (SLs) approximately 550 feet upgradient (south) of well AGW136(S) as recently as December, 2013. TCE is detected in gw samples from AGW136(S). TCE degrades to VC. This well provides early detection of low-level VC through use of SIM analysis. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reasons:</p> <ul style="list-style-type: none"> • Early detection of degradation of TCE to VC • Early warning of migration of VC with gw flow to the north • Demonstration of continued protection of the vapor intrusion pathway at the YMCA • Accurate determination of meeting the risk level requirements of MTCA at a location where there are multiple contaminants
AGW143(D)	A	SA			<p>This is a deep zone well that bounds the southern extent of the TCE, cis-1, 2-DCE, and VC along the Interurban Trail. Well AGW143(D) is important to the contouring of the VOC contaminant concentrations in the deep-zone gw that takes place on a SA basis.</p>
AGW176(I)			A	SA	<p>This is an intermediate zone well that bounds the extent of VC to the northeast of the Outlet Collection building. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reason:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation of TCE or to migration north below the Outlet Collection building.

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW183(D)	A	Q	A	SA	<p>This is a deep zone well that demonstrates that the TCE, cis-1,2-Dichloroethene (cis-1,2-DCE), and vinyl chloride (VC) are bounded at this well location in the deep zone. Well AGW183(D) is important to the contouring of the target VOC concentrations in the deep-zone gw that takes place on a SA basis. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reason:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation of TCE or to migration of VC with gw flow from the Boeing Auburn Plant Property to the northwest.
AGW191(I)	A	Q	A	SA	<p>This is an intermediate zone well that demonstrates that the TCE, cis-1,2-DCE, and VC are bounded at this well location in the intermediate zone. Well AGW191(I) is important to the contouring of the contaminant concentrations in the intermediate-zone gw that takes place on a SA basis. This well is part of the residential Algona gw monitoring network. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reason:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation of TCE or to migration of VC with gw flow from the Boeing Auburn Plant Property to the northwest.

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW192(D)	A	Q	A	SA	<p>This is a deep zone well that demonstrates that the TCE, cis-1,2-DCE, and VC are bounded at this location in the deep zone. Well AGW192(D) is important to the contouring of the contaminant concentrations in the deep-zone gw that takes place on a SA basis. This well is part of the residential Algona gw monitoring network. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reason:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation of TCE or to migration of VC with gw flow from the Boeing Auburn Plant Property to the northwest.
AGW198(I)			A	SA	<p>This is an intermediate zone well that has TCE concentrations consistently between 9 and 10 µg/L. This well had low-level VC concentrations in 2012 (below 0.20 µg/L). This well provides early detection of low-level VC through use of SIM analysis. Early detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reasons:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation of TCE or to migration north below the Outlet Collection building. • Accurate determination of meeting the risk level requirements of MTCA at a location where there are multiple contaminants.

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW211-5(I)			A	SA	<p>This is an intermediate zone well that bounds the extent of VC to the southeast of the Outlet Collection building. TCE is present in gw samples from this location above 4.0 µg/L. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reasons:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation of TCE or to migration of VC to the northwest from the former Boeing Auburn Plant property. • Early detection of VC in an area where Ecology allowed other nearby wells to revert to an annual SIM analysis schedule [see AGW149(I), AGW150(I), AGW160(I), AGW172(I), AGW212-5(I)]
AGW215(I)	A	Q	A	SA	<p>This is an intermediate zone well that currently bounds the extent of TCE and cis-1,2-DCE to the northwest at the intersection of Highway 167 and west Main St. Well AGW215(I) is important for the contouring of the contaminant concentrations in the intermediate-zone gw that takes place on a semi-annual basis. It is also important for demonstrating the current known extent of the plume at this location on a quarterly basis. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reasons:</p> <ul style="list-style-type: none"> • Early detection of VC due to degradation and migration of TCE

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW219(I)	A	SA	A	SA	<p>This is an intermediate zone well that currently bounds the extent of TCE to the north near the end of Clay St. Well AGW219(I) is important for the contouring of the contaminant concentrations in the intermediate-zone gw that takes place on a semi-annual basis. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reasons:</p> <ul style="list-style-type: none"> • Early detection of VC due to downgradient migration and degradation of TCE
AGW220(I)			A	SA	<p>This is an intermediate zone well that currently bounds the extent of TCE to the northwest near the end of Western Ave. Well AGW220(I) is important for the contouring of the contaminant concentrations in the intermediate-zone gw that takes place on a SA basis. Detection of VC (below 0.20 µg/L) needs to occur on a SA frequency at this well location for the following reasons:</p> <ul style="list-style-type: none"> • Early detection of VC due to downgradient migration and degradation of TCE
AGW225(S)	A	Q			<p>This is a shallow zone well that is part of the gw well monitoring network for northeast residential Algona along Chicago Ave. This well provides data for decision-making regarding the gw to soil vapor and surface water exposure pathways. Well AGW225(S) is important for the contouring of the contaminant concentrations in the shallow-zone gw that takes place on a SA basis. Quarterly monitoring is needed to provide additional seasonal data for showing trends in TCE, and breakdown chemicals, at this well location.</p>

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW226(S)	A	Q			This is a shallow zone well that is part of the gw well monitoring network for northeast residential Algona. This well provides data for decision-making regarding the gw to soil vapor and surface water exposure pathways. Well AGW226(S) is important for the contouring of the contaminant concentrations in the shallow-zone gw that takes place on a SA basis. Quarterly monitoring is needed to provide additional seasonal data for showing trends in TCE, and breakdown chemicals, at this well location.
AGW227(I)	A	Q			This is an intermediate zone well that is part of the gw well monitoring network for northeast residential Algona and southwest commercial Auburn. Well AGW227(I) is important for the contouring of the contaminant concentrations in the intermediate-zone gw that takes place on a SA basis. Quarterly monitoring is needed to provide additional seasonal data for showing trends in TCE concentration and degradation at this well location.
AGW228(S)	A	Q			This is a shallow zone well that is part of the gw well monitoring network for northeast residential Algona and southwest commercial Auburn. This well provides data for decision-making regarding the gw to soil vapor and surface water exposure pathways. Well AGW228(S) is important for the contouring of the contaminant concentrations in the shallow-zone gw that takes place on a SA basis. Quarterly monitoring is needed to provide additional seasonal data for showing trends in TCE concentration and degradation at this well location.
AGW233(D)	A	SA			This is a deep zone well that currently bounds the extent of TCE to the north at the intersection of Highway 18 and the Interurban Trail. Well AGW233(D) is important for the contouring of TCE and cis-1,2-DCE concentrations in the deep-zone gw that takes place on a semi-annual basis.

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Well ID	VOC Sample Frequency		VC SIM Analysis		Ecology Rationale
	Proposed	Ecology-Approved	Proposed	Ecology-Approved	
AGW235-2(S)	A	Q			This is a shallow zone well that currently bounds the extent of TCE at this location. This well also monitors concentrations of VC and cis-1,2-DCE at this location. This well is important for characterizing the seasonal discharge of gw to surface water or potential recharge of gw from surface water. Well AGW235-2(S) is important for the contouring of the contaminant concentrations in the shallow-zone gw that takes place on a SA basis. Quarterly monitoring is needed to provide additional seasonal data for showing trends in TCE and breakdown chemical concentrations and degradation at this well location.
AGW235-4(I)	A	Q			This is an intermediate zone well that is currently the farthest downgradient well monitoring TCE in the Western Plume. This well does not define the full extent of TCE in the intermediate zone, as required by the MTCA regulations. Also, this well has detections of cis-1,2-DCE and VC. Well AGW235-4(I) is important for characterizing the upward or downward vertical gradient of gw. Well AGW235-2(I) is important for the contouring of the contaminant concentrations in the intermediate-zone gw that takes place on a SA basis. Quarterly monitoring is needed to provide additional seasonal data for showing trends in TCE and breakdown chemical concentrations and degradation at this well location.

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Acronyms

A	Annual
cis-1,2-DCE	cis-1,2-Dichloroethene
gw	groundwater
JA	Junior Achievement
MTCA	Model Toxics Control Act
Q	Quarterly
SA	Semi-annual
TCE	Trichloroethene
VC	Vinyl Chloride
VI	Vapor Intrusion
VOC	Volatile Organic Compound