

Vapor Intrusion Fact Sheet: plans for investigating vapor intrusion in Algona

Vapor intrusion occurs when gases from contaminated soil or groundwater enter buildings and affect indoor air quality. This fact sheet discusses how vapor intrusion will be investigated in the City of Algona, and includes general information regarding indoor air sampling. This effort is part of a larger investigation into groundwater contamination from past releases of solvent chemicals into the ground on property owned by The Boeing Company in Auburn.

Algona

In April of 2013, drilling and sampling of shallow groundwater took place in northern Algona. The results are available on the Boeing Fabrication Auburn website: <https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=5049>

This new groundwater data provides information needed to:

- locate areas where shallow groundwater is contaminated;
- determine how high the levels of contamination are; and
- decide if the measured levels are *potentially* high enough to pose an indoor air problem.

When we discover levels of contaminants in shallow groundwater that are high enough to potentially create an indoor air problem, we identify the homes that are located in those areas.

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**Facility Site ID #: 2018
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Currently, concentrations above the preliminary concern levels (PCLs) for trichloroethene (TCE) and vinyl chloride (VC) are found at the water table in the northeastern residential area of Algona. PCLs are chemical-specific groundwater concentrations intended to be protective of indoor air quality. They are based on data gathered by the U.S. Environmental Protection Agency (EPA). The PCL for TCE is 1 part per billion (ppb). The PCL for VC is 0.23 ppb.

Based on the data, Ecology has decided that the first phase of indoor air sampling should evaluate and test homes in areas located near the Chicago Ave. ditch and a little more than one block west of the ditch, between 11th Ave. N. and just south of 10th Ave. N. (See figure below.)

Building Visits in Northeastern Algona

The impacts to indoor air quality from vapor intrusion can vary greatly from building to building. Therefore, information about each building is needed to assess the best locations for sampling air. This is best done by in-person visits, in cooperation with building owners and occupants. We expect to start these visits in early to mid June.

Ecology will be sending homeowners (and tenants) at these locations a notification letter. This letter will be arriving within a few days of this fact sheet. It asks the homeowner for convenient days and times to meet with our representatives. The purpose of this visit is to determine the best locations for indoor air sampling in the home. Boeing will pay all the costs for the indoor air sampling.

Homeowners (and tenants) whose houses we select for indoor air sampling will be asked for permission on a written form to allow Boeing's contractor to do the air testing. The sampling will begin shortly thereafter, by arrangement with the owner or occupant.

If you do not receive a letter, we have not selected your property to visit and sample at this time. This is because your residence is outside the area where concentrations of TCE or VC at the water table exceed the PCLs for these chemicals. (See page 7).

Testing individual buildings for vapor intrusion

For the initial group of houses in northeastern Algona selected for sampling, Boeing's environmental consultant, Landau Associates, will conduct the indoor air testing. During this testing, sampling canisters (see photo below) are placed in the basement, first floor, crawl space, and/or other parts of the house. After 24 hours, the air canisters are picked up and sent to a certified laboratory to be analyzed. When the testing results are submitted to Ecology, a letter providing both the sampling results and the meaning of those results will also be mailed to each homeowner (and tenant) whose house was sampled.



An evacuated air-testing canister is shown to the left. The pressure inside the canister is initially set lower than the pressure in indoor air, causing air to flow into the canister when the valve is opened.

As Ecology and WDOH review the information from the groundwater study and from the first group of houses sampled for air quality, it may be necessary to test air quality in additional homes. Also, among the houses tested this spring, we plan to re-sample certain homes again in the wintertime depending on initial air quality results. This is because vapor intrusion affects to indoor air quality can vary with the season.

It is important to remember that air samples – by themselves – tell us which chemicals were in the air on the day sampled. They do not clearly tell us where those chemicals came from. Chemicals such as TCE and VC, if they are found in indoor air, may be due to vapor intrusion from the contaminated groundwater. However, many materials and substances commonly found in residential settings, such as paints, paint thinners, gasoline-powered machinery, certain building materials and cleaning products, dry cleaned clothing, and cigarette smoke contain volatile organic chemicals (VOCs) that may be detected by indoor air testing. VOCs in outdoor air, from various sources, can also contaminate indoor air. When VOCs from any of these sources are found during indoor air testing, they are referred to as **background contamination**. Even though samples of outdoor air will also be collected when indoor air is sampled, sometimes it can be difficult to determine whether certain VOCs detected inside a house are due to vapor intrusion, background contamination, or a combination of both.

If Ecology and the Department of Health determine that vapor intrusion is causing potentially harmful levels of contaminants to accumulate in the air inside a home, Boeing will be directed to propose an “interim action” to the affected property owner. The goal of this interim action will be to minimize vapor intrusion and reduce the indoor contaminant concentrations due to vapor intrusion to acceptable levels.

“**Mitigation**” is commonly the preferred form of interim action response. Most types of indoor air mitigation do not result in cleaning up the contamination *below* ground. Instead, typical mitigation systems limit the potential for vapors from entering the building by continuously re-routing them from beneath the basement or slab – or air within a crawl space – to the exterior of the building and above its roofline. Systems like these have been used to reduce radon gas levels inside buildings, and have also been used more recently at chemically-contaminated

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cleanup sites across the country to address vapor intrusion. They can be constructed quickly and are generally very effective. Once installed, they continue to operate as long as they are needed to protect indoor air quality.

A mitigation system will only be installed if the potential for vapor intrusion is identified at a residence and the property owner agrees to have the system installed. The owner's and tenant's participation in this and all parts of the vapor intrusion investigation are voluntary. Boeing will pay for all associated sampling and mitigation costs.

Next steps in Algona

We will use groundwater information collected in northern Algona, together with the indoor air sampling data discussed above, to decide if additional homes need to be sampled. If so, we will schedule visits and follow up with testing.

Questions about vapor intrusion

Plans for the vapor intrusion assessment in Algona (discussed above) are described in Boeing's April 30, 2013, *Vapor Intrusion Work Plan*. The US Environmental Protection Agency (EPA) has general information related to vapor intrusion at the following internet address:

<http://www.epa.gov/oswer/vaporintrusion/>. A number of states – such as California and New Jersey – also have very informative websites.

Algona residents with questions about the vapor intrusion investigation, about why certain homes were selected for the first indoor air sampling, or about vapor intrusion in general, may contact:

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Ecology will continue to keep you informed by updating the Boeing Auburn Fabrication website at: <https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=5049>

For questions regarding this site, please send an email to boeingauburnsite@ecy.wa.gov or call Robin Harrover at (425) 649-7232.

General information:

What are VOCs?

Volatile organic chemicals (VOCs) are a class of liquids that readily evaporate at room temperature. Gasoline, dry cleaning fluid, degreasing agents (solvents) and paint thinners are several examples of products that contain these compounds. VOCs may be found in soil and/or groundwater due to spillage onto the ground, leaks from underground storage tanks, and other types of discharges. At several locations in Algona, VOCs have been detected in shallow groundwater. The primary VOCs of concern are TCE, a solvent, and vinyl chloride, a chemical which forms in the environment as TCE biologically degrades.

How can VOCs in soil or groundwater affect indoor air?

Vapor intrusion occurs when gases from contaminated soil or ground water seep through cracks and holes in foundations or slabs of buildings and accumulate in basements, crawl spaces, or living areas, as shown below.

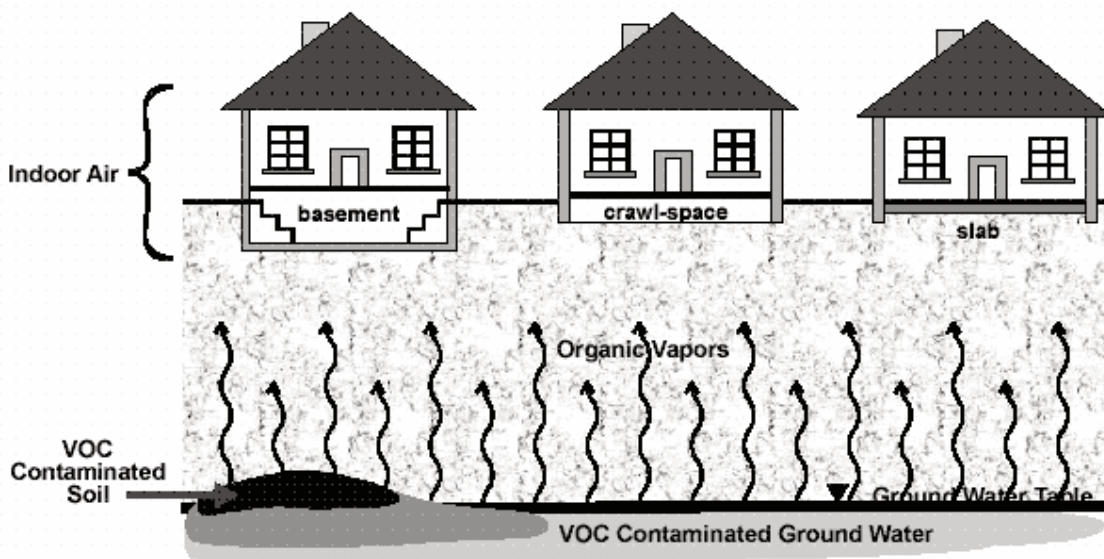


Diagram adapted from USEPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway. from *Ground Water and Soils*, November 2002

Why is it hard to predict how vapor intrusion might affect indoor air quality?

A variety of factors can influence whether vapor intrusion will occur at a building located near soil or groundwater contaminated with VOCs. These include, but are not limited to:

- the concentration of the contaminants in soils or groundwater,
- the type of soil and the depth to groundwater,
- the construction of the building, and the condition of the foundation, slab, or crawlspace, and
- the way the building is heated and ventilated.

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Testing of shallow groundwater, soil gas, and/or indoor air is usually required to determine whether vapor intrusion is occurring at a property. In Algona, however, where groundwater is very close to the ground surface, it may not be possible to utilize soil gas sampling.

If vapor intrusion is contaminating indoor air, what are the possible health implications?

Organic vapors can be present inside a building at potentially harmful levels without being detectable by odor. Breathing low levels of toxic VOC vapors over a long period of time may increase an individual's risk for respiratory ailments, cancer, and other health problems.

Breathing higher levels of toxic VOC vapors over a shorter period of time can also cause various health problems. In the "glossary" section below we have provided links to the Agency for Toxic Substances and Disease Registry's (ATSDR's) website for trichloroethene and vinyl chloride. The website contains detailed health information for both chemicals.

GLOSSARY

concentration: a measurement of how much (the mass) of a chemical is in water or air. Groundwater concentrations are commonly reported as micrograms per liter (or parts per billion).

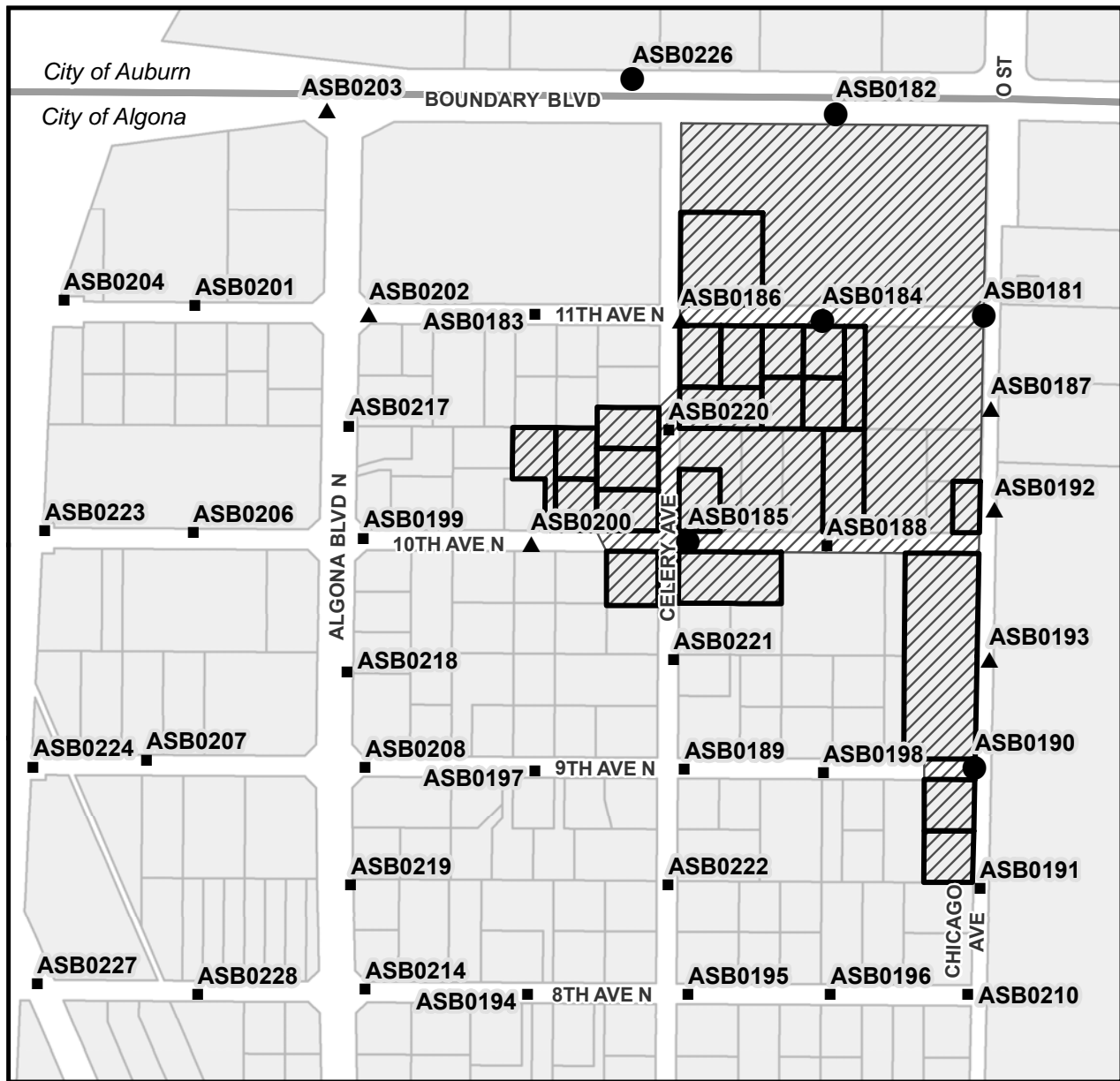
groundwater: water located below the ground surface (underground), as part of the aquifer. When groundwater discharges to the ground surface it is referred to as *surface water*. For more information visit: <http://pubs.usgs.gov/of/1993/ofr93-643/>

trichloroethene (TCE): a toxic chemical that may cause cancer. It is one of the most common contaminants at cleanup sites in the U.S. For more information about TCE see <http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=30>.

vinyl chloride: a toxic chemical that may cause cancer. Unlike TCE it is usually not "released" (spilled) into groundwater. Instead, it forms naturally from the biological breakdown of the TCE molecule. For more information about vinyl chloride see <http://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=281&tid=51>.

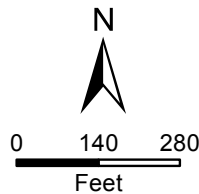
water table: the upper surface of groundwater in soil or rock. For more information visit: <http://pubs.usgs.gov/of/1993/ofr93-643/>

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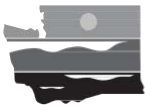


VOC Concentrations (for TCE & VC only) in Shallow Ground Water (sample depth ≤10')

- TCE or VC exceed PCL¹
- ▲ TCE or VC are detected (neither exceed PCL)
- TCE and VC are not detected
- Initial Residences Selected for Sampling
- ▨ Area Near Exceedance of Groundwater PCL



1. Groundwater Preliminary Concern Levels (PCL): trichloroethene (TCE) = 1 ppb, vinyl chloride (VC) = 0.23 ppb
 2. For more detailed information please refer to Ecology's web site listed in the Fact Sheet 5/21/2013 - Locations and Results from a Landau Associates' map. Parcel Data and Photo – King County 2011



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