About the Boeing Fabrication Auburn site

- Facility owned and operated by The Boeing Company (Boeing)
- Past practices resulted in chemical contamination of the groundwater with volatile organic compounds (VOCs)
- Investigations have found that contaminated groundwater (called a plume) has moved beyond the Boeing property boundary
- Site includes the facility and the plume

Groundwater contamination

- Chemicals found in the contaminated groundwater include trichloroethene (TCE), a degreasing solvent commonly used to clean metal parts in the past
- Two plumes are under investigation north and northwest of the Boeing property in Algona and Auburn
- TCE concentrations in groundwater range from less than 0.2 parts per billion (ppb) to 13 ppb. The state standard for protecting drinking water is 4 ppb
- Due to the area's high water table, groundwater contamination can enter surface water or affect indoor air quality

Trichloroethene (TCE) is:

- A type of volatile organic compound (VOC) also found in common household products like paints, glues, spot removers and pepper spray
- Able to break down into other chemicals, such as vinyl chloride (VC) and less toxic by-products

Investigation process to date

- To protect human health and the environment, Ecology is directing Boeing to investigate and clean up the site in compliance with state and federal cleanup regulations
- Remedial Investigation work to date:
  - Ongoing investigation of groundwater, surface water, soil gas and indoor air
  - Consultation with Washington State Department of Health (Department of Health) on potential health risks
  - Investigation and Interim Action Cleanup of one plume source area

Groundwater direct-push sampling in action

Investigation timeline

1966 – mid-1980s	TCE used at Boeing facility as a degreasing solvent to clean metal parts
Late 1980s – early 1990s	Use of TCE in vapor degreasers is phased out
1990s	Boeing conducts investigation of soil and groundwater, installs monitoring wells, and conducts soil cleanup work in specific areas at the facility
2002	Ecology and Boeing sign Agreed Order to conduct investigations for groundwater contamination; Ecology issues Public Notice and holds public comment period
2004 – 2005	• Ecology issues Public Notice and holds public comment period for a proposed interim action cleanup • Successful cleanup of the original TCE release area under the former 17-05 Building
2006 – 2009	• Agreed Order amended; Ecology issues Public Notice and holds public comment period • AMB Distribution Center constructed replacing Building 17-05 • Continued *onsite* groundwater investigation

Investigation timeline

2009 – 2011

- Second TCE plume and offsite groundwater impacts discovered
- Ecology directs Boeing to conduct groundwater investigations to study contamination beyond the Boeing property boundary
- Ecology notifies the cities of Algona, Auburn and Pacific, as well as water districts, of groundwater contamination (Nov. 2011)

2012

- Department of Health completes Health Consultation and confirms public drinking water in Algona, Auburn and Pacific is safe
- Vapor intrusion was not detected at five commercial buildings beyond the Boeing property
- Discovery of VOCs in surface water in Chicago Avenue Ditch and groundwater monitoring wells near Algona neighborhood
- Ecology provides quarterly updates to jurisdictions

2013

- Public meeting with Algona residents about investigations and groundwater contamination in northeastern Algona (February)
- Groundwater sampling in Algona completed (April)
- Vapor intrusion study begins with testing indoor air at 23 residences in Algona (June)

What we're doing now

Given the high water table in Algona, Ecology has directed Boeing to conduct:

- Vapor intrusion testing of selected buildings located above the plumes to determine if residents are at risk
- Groundwater sampling to verify the extent of the contamination
- Sampling in ditches and ponds in yards to understand the potential risk from exposure to surface water
- Research on historical facility operations to identify the additional source(s) of VOC contamination contributing to the plume

Indoor air monitoring canister (approximately 18 inches tall) used for vapor intrusion testing

Cleanup and community commitments

- Ecology will direct and independently review the results of Boeing investigations
- Ecology will ensure the contamination is cleaned to state standards
- Ecology is committed to keeping the community informed of the investigation results and cleanup process
- Boeing will conduct and pay for investigations and subsequent cleanups

Is the public drinking water safe?

YES

- Algona, Auburn and Pacific public drinking water systems are regularly monitored to make sure they are safe
- Monitoring data collected since 1970 has not shown any contaminants above standards set to protect public health
- *Private wells are not monitored like public drinking water. Please call Ecology if you have a private well within the area of contaminated groundwater*

Chicago Avenue Ditch

- Children might occasionally wade in the ditch and get water on their feet, legs and hands or accidentally ingest the water
- Based on limited sampling, Department of Health found that touching and accidentally ingesting Chicago Avenue ditch water would result in low-level exposure to trichloroethene (TCE), perchloroethene (PCE), cis-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE) and vinyl chloride (VC)
- This low-level exposure is not expected to result in harmful health effects to children
- Ditches are not safe places to play and may contain contaminants unrelated to the Boeing site (e.g., fecal contamination from animals and contaminated stormwater)
- To avoid these types of exposures, parents should not allow children to go in this ditch

Is my home's indoor air safe?

- Whether the indoor air in your home or basement is affected depends on a few things
  - The type and amount of chemicals in shallow groundwater near your home
  - The type and condition of your home's foundation
- Boeing will be testing indoor air at specific homes in northeastern Algona, under Ecology oversight
- Ecology and Department of Health will evaluate the data to see if chemicals are found in indoor air and if it is a problem

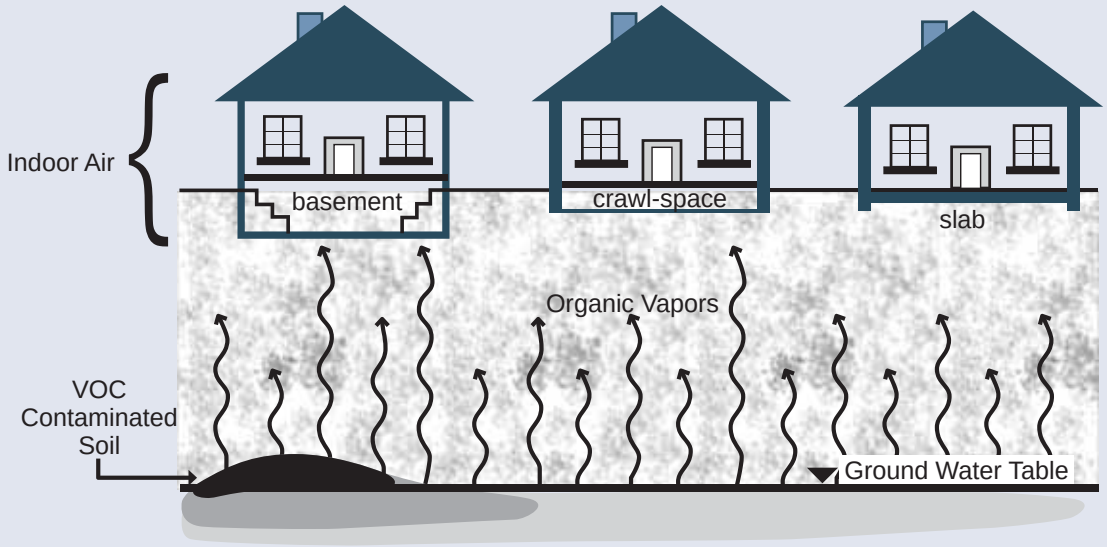


Diagram adapted from USEPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway. from *Ground Water and Soils, November 2002*

Can I eat fruits and vegetables from my garden?

YES

- Studies have been done on gardens at contaminated sites with the same chemicals found at the Boeing site but at higher levels
- Those studies suggest fruit and vegetables from gardens using well or groundwater containing low levels of these chemicals are safe for adults and children
- Those studies suggest the chemicals do not build up in the plant or fruit tissue

Healthy actions to reduce your exposure to chemicals associated with the Boeing site

- Be aware of contamination and studies being done around your home
- Avoid or limit time spent in the Chicago Avenue ditch north of 7th Avenue
- Keep your crawl space vents open to reduce potential air quality problems from chemicals evaporating from the shallow groundwater

2013 groundwater investigation in Algona

- Boeing conducted a direct-push probe groundwater investigation in Algona in April 2013
- Investigation did not detect TCE and VC at the majority of probe locations
- TCE and VC were detected in residential areas in northeastern Algona
- Given the high water table and potential for vapor intrusion, Ecology has directed Boeing to conduct residential air testing and additional monitoring of groundwater

Core sample from probe location

About vapor intrusion

- When present in the shallowest groundwater (water table), VOCs can potentially evaporate and move through the air spaces in soil as vapor
- These vapors can enter nearby buildings through cracks or other openings in the foundation and can potentially impact indoor air quality

- Vapor intrusion is dependent on a variety of factors, including:
  - Level of contamination at the water table
  - Building foundation (e.g., slab, crawl space or basement)
  - Building ventilation
  - Soil conditions

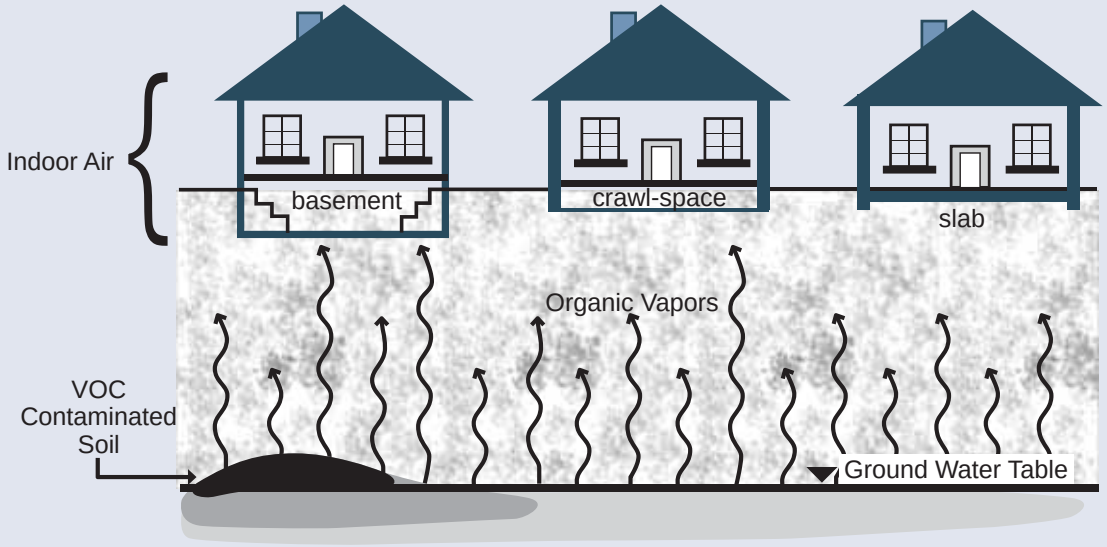
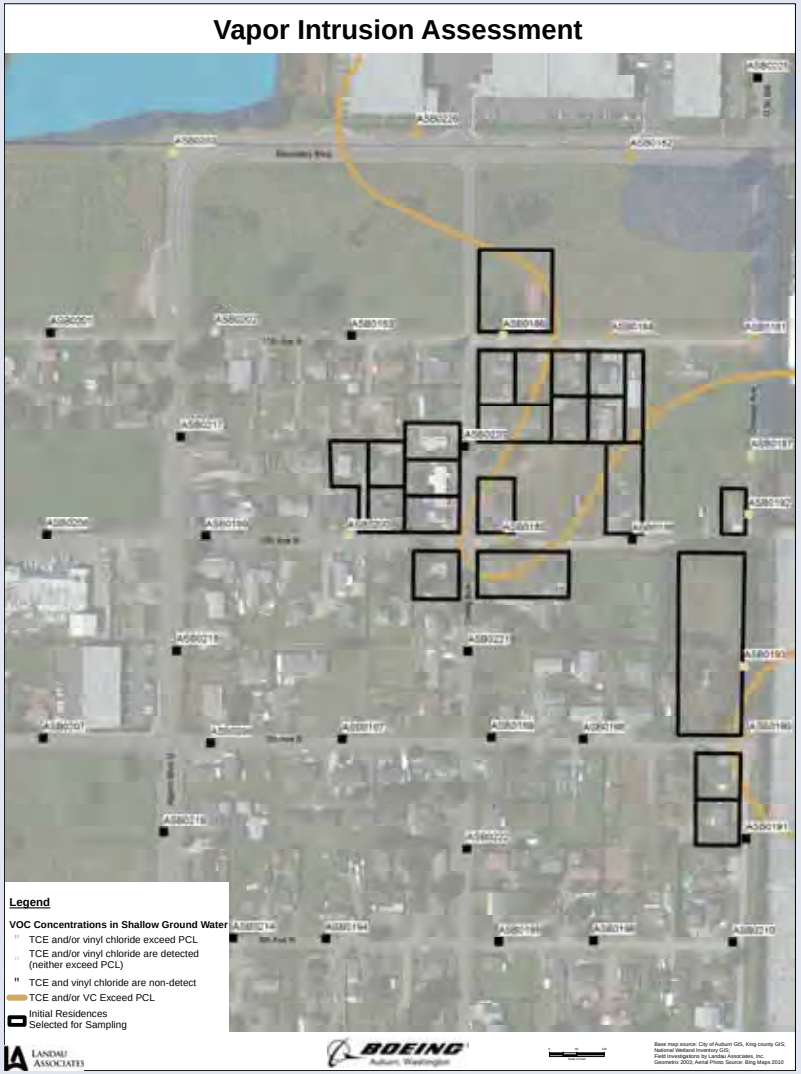


Diagram adapted from USEPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway. from *Ground Water and Soils, November 2002*

Vapor intrusion testing underway now

- Ecology, in consultation with Department of Health, identified 23 homes near the plume of contaminated groundwater in northeastern Algona that will be included in the initial study
- Testing includes physical inspection of the building followed by indoor air sampling for TCE and breakdown products like VC
- Depending on the results of the initial study, additional homes may be recommended for testing



Vapor intrusion study area

- Homes identified for the initial study:
  - Overlie contamination in shallow groundwater (water table)
  - Are near where concentrations of TCE and VC in groundwater are above the preliminary concern levels
  - Includes those with basements

Testing for vapor intrusion

- Preliminary Concern Levels (PCLs) are precautionary pollution levels for initial testing
- PCLs were used to identify the homes to test
- Based on results of the vapor intrusion study, the PCLs may be adjusted to ensure the cleanup is protective of human health and the environment

	PCLs for indoor air quality (*specific to neighborhood in Algona*)
Trichloroethene (TCE)	1 ppb
Vinyl chloride (VC)	0.23 ppb

Next steps following initial study

- Ecology will share the results of the vapor intrusion study with homeowners and present a summary to the community
- If concentrations of target VOCs are not of concern during summer sampling, confirmation sampling will be conducted in the winter
- If vapor intrusion is causing potentially harmful air quality conditions, then:
  - Ecology and Boeing will identify a building-specific action to minimize vapor intrusion and improve indoor air quality to acceptable levels
  - Boeing will work with homeowners to implement solutions, such as non-invasive ventilation systems and ducting
- The need for additional testing will be evaluated based on initial study results and continued water table studies

Ventilation system on a home

Upcoming investigations and activities

All work is approved and directed by Ecology and implemented by Boeing

Summer 2013

- Summer vapor intrusion study in Algona
- Planned surface water investigation in Algona and Auburn
  - Study whether contamination in the shallow groundwater is entering surface water
  - Sampling locations will include city drainage ditches and standing water in backyards

Fall 2013

- Potential interim action proposals to cleanup groundwater in northeastern Algona thereby minimizing vapor intrusion to acceptable levels

2014 – 2016

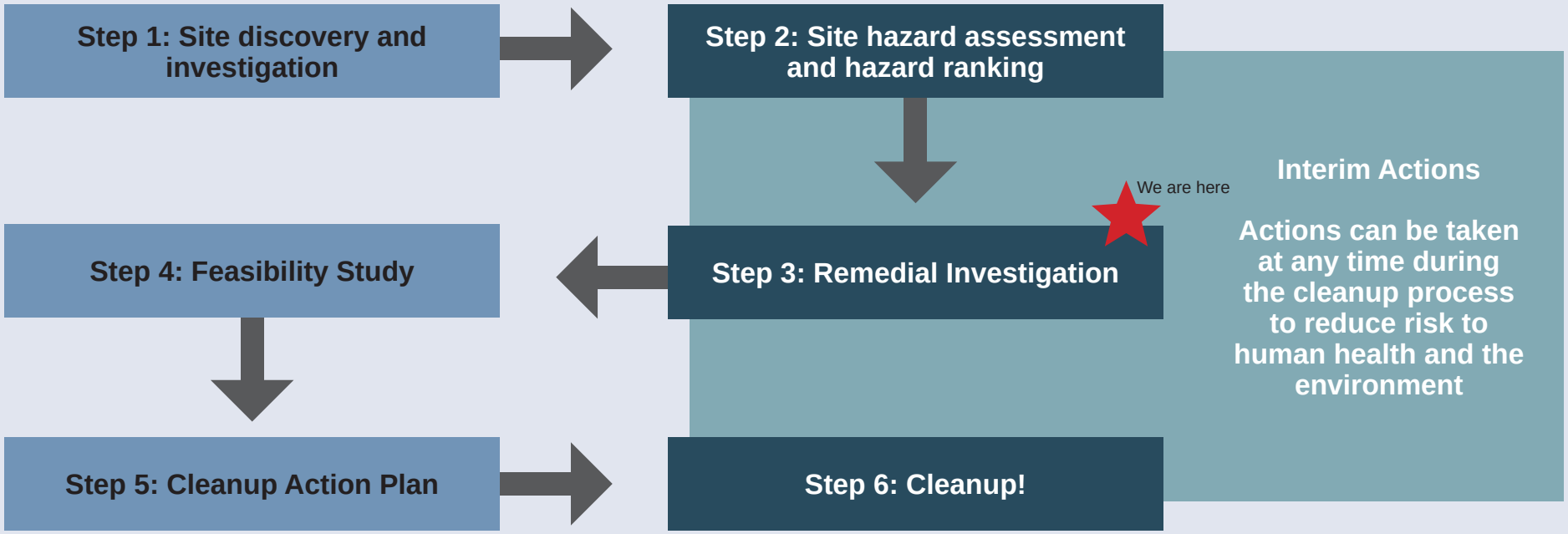
- Investigations and interim actions focused on Algona (currently planned for Winter 2014)
  - Vapor intrusion study in northeastern Algona (confirmation samples from initial study, and possible expanded study area)
  - Additional “rainy season” surface water sampling
- Investigations and interim actions focused on Auburn
  - Additional groundwater and surface water characterization and sampling
  - Vapor intrusion assessments for commercial business district and industrial properties

2017 – 2020

- Remedial Investigation and Feasibility Study
- Cleanup Action Plan
- Boeing implements the Cleanup Action Plan

State cleanup process – Model Toxics Control Act

Ecology is committed to keeping the community informed of investigations and the cleanup process



DEPARTMENT OF ECOLOGY State of Washington

Health