Summary of Boeing Auburn Facility Feasibility Study and Supplemental Feasibility Study

The Boeing Company (Boeing) prepared a Feasibility Study evaluating cleanup alternatives (also known as remedies) for contamination from the Boeing Auburn property (Site). Boeing and the Washington State Department of Ecology (Ecology) had many discussions about the Feasibility Study. This document summarizes the draft Feasibility Study report (FS; 2019), draft Supplemental Feasibility Study report (SFS; 2020), and the letters between Boeing and Ecology about those reports. Boeing submitted the [draft FS report](https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=98746) for the Site on October 30, 2019. Based on discussions between Ecology and Boeing and additional analyses, Boeing submitted a [draft SFS report](https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=98743) to Ecology on December 11, 2020. Ecology then provided [formal comments](https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=100287) on both reports on February 1, 2021.

Using the Feasibility Study process, Ecology and Boeing have agreed on the remedies for each area of the Site needing cleanup (called Areas of Concern or AOCs). However, Boeing and Ecology have not yet agreed on the cleanup standard that applies at each AOC. To resolve this disagreement, Boeing invoked informal dispute resolution on February 12, 2021. Boeing documented their dispute in a [letter on March 17, 2021](https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=99482). The issues under dispute do not change the remedies selected for Site cleanup. In addition, Boeing and Ecology agree that the draft FS and SFS documents do not need to be updated before the public comment period. However, the disputed issues must be resolved to prepare the cleanup action plan (CAP), and design and implement the cleanup actions at the Site.

Background information on the Site and the Areas of Concern are included here. It is helpful to have details about the specific areas to understand the overall Site final remedy. The final remedy combines the remedies for the different areas into one Site cleanup action.

# Site History and background

Boeing’s Auburn Fabrication Division Plant (Boeing Auburn) has made aircraft parts in Auburn, Washington since 1966. Past manufacturing practices at Boeing Auburn led to accidental releases of chemicals. Trichloroethlyene (TCE) is a chemical that was previously used to clean parts. TCE and its breakdown products are present at low concentrations in groundwater on and off Boeing property. Small areas on the Boeing Auburn property are also contaminated with metals and petroleum hydrocarbons.

Boeing studied the nature and extent of contamination in soil, groundwater, air, stormwater and surface water throughout the Site. The investigation (called a remedial investigation or RI) was completed in 2015 and Boeing sent the final RI report to Ecology in 2017. The remedial investigation identified five AOCs to consider for cleanup actions in the Feasibility Study.

#### Geology and Hydrogeology

Soil beneath the Site is made up of ancient river deposits of sand and gravel with layers of finer grained soils (silts). Groundwater occupies the space between the soil grains; the zone where groundwater occupies all of the space between the soil grains is called an aquifer. Groundwater in the uppermost aquifer flows towards the north/northwest at the Site, driven by groundwater discharge zones associated with stormwater features, wetlands, and Mill Creek to the northwest of the Boeing property. The bottom of the uppermost aquifer is set by a layer of mostly fine-grained soil called the Osceola Mudflow. Water cannot flow freely through this layer so it serves as a barrier between the uppermost aquifer and deeper aquifers.

Former releases from the Facility resulted in two main areas of TCE- and vinyl chloride (VC)-contaminated groundwater in the uppermost aquifer. These two areas are called the “Area 1 Plume” and the “Western Plume”. The plumes extend more than one mile northwest of the Facility and are dilute, meaning the contamination concentrations are low. The maximum TCE concentration was about 10 micrograms per liter (µg/L) in June 2018. Most of the plume has TCE concentrations less than 4 µg/L. 4 µg/L is the safe drinking water standard for TCE.

Contaminant distribution (TCE and VC) within the plumes is complicated because the aquifer has different soil layers that each hold contamination differently. Also, TCE and VC are broken down in the groundwater by bacteria and other natural processes, but these processes occur at different rates in different areas of the aquifer. Most of the TCE and VC in groundwater is currently located downgradient from Boeing Auburn property. The groundwater plumes also affect the water quality of the Chicago Avenue ditch and the Auburn 400 stormwater basins northwest of Boeing property. The stormwater features eventually discharge to wetlands associated with Mill Creek. TCE has not been detected in Mill Creek above cleanup levels and VC has not been detected in Mill Creek since 2016.

#### Exposure to Contaminants and Potential Site Risks

Just because a contaminant is in the environment does not mean it poses a risk to humans or other organisms. The remedial investigation studied the contamination and evaluated the risk to humans and organisms. During the remedial investigation Boeing, Ecology, and the Washington State Department of Health found that humans and organisms are not being exposed to harmful concentrations of contaminants from the Boeing Auburn Site. Specifically, the investigation concluded the following:

* Contaminated soil is located only in limited areas at the Boeing Facility. All of these areas are covered by pavement or buildings; therefore, people would only come into contact with the contaminated soil during construction or other below ground investigation. Notifying workers and providing them with training and protective equipment is an effective means to prevent them from being exposed to contamination if digging is required at the Facility.
* Contaminated groundwater at the Site is not used for drinking water. All drinking water is from a municipal drinking water system that draws water from uncontaminated aquifers and is tested regularly to make sure it is safe.
* Although contaminants are present in some stormwater features, such as ditches and stormwater ponds, the concentrations are low enough that they are not harmful if they get on people’s skin or even if water were to accidentally get into someone’s mouth. Even though the TCE/ VC contaminant levels are not at harmful levels, there are other safety and health reasons to avoid water in ditches and ponds. Surface water monitoring since 2016 has not found TCE or VC contamination in Mill Creek.
* People are not breathing air contaminated by chemicals from Site groundwater. When concentrations of TCE and VC are high enough in groundwater, the chemicals can vaporize and make their way into buildings. Boeing did indoor air testing in commercial buildings and residential homes that were over the contaminated groundwater. No harmful levels of TCE or VC were found in indoor air.

# proposed Cleanup standards

During remediation, it is often not possible to remove all of the chemicals. A cleanup removes enough of the chemicals so that people are not harmed now or in the future. For example, when cleaning up groundwater, it needs to be cleaned to a level safe enough for people to drink, even if no one is drinking it now. The concentration targets are called cleanup levels. In the FS report, Boeing proposed cleanup levels for soil, groundwater, and surface water at the Site.

Following this logic, Boeing proposed groundwater cleanup levels that would make the groundwater safe to drink. At Ecology’s request, surface water quality standards (SWQS) were also evaluated in the FS for use as groundwater cleanup levels. SWQS for TCE and VC are more stringent than drinking water standards because they consider that people may be both drinking the water and eating fish and shellfish from the water. The FS evaluated remedies considering both drinking water standards and SWQS. The final selection of groundwater cleanup levels is undergoing dispute resolution.

Where surface water cleanup levels are applied is also under dispute because Ecology applied surface water quality standards to stormwater management features such as the Chicago Avenue ditch and Auburn 400 stormwater ponds. Boeing’s position is that surface water quality standards do not apply to stormwater features because people are not, and would never be allowed to, drink water or eat fish from them. However, Ecology considers the ditch and ponds surface waters of the state.

Part of determining cleanup standards for the Site is also determining where cleanup levels must be met (called a point of compliance or POC). The final decision on points of compliance is made during the Cleanup Action Plan.

# Areas of concern Evaluated and Recommended cleanup action alternatives

The FS process evaluates different cleanup actions for each Area of Concern (AOC) and selects a cleanup action to recommend based on careful evaluation. During the evaluation, each cleanup action is graded to determine which action(s) are most beneficial. You can read more about the cleanup technologies selected for the Boeing Auburn site in these fact sheets:

* [Enhanced Bioremediation Fact Sheet](https://apps.ecology.wa.gov/publications/SummaryPages/2104019.html)
* [Monitored Natural Attenuation Fact Sheet](https://apps.ecology.wa.gov/publications/SummaryPages/2104020.html)

An important part of cleanup is that, besides decreasing the harmful chemicals in the environment, a cleanup action can also include measures to keep people from being exposed to chemicals. These measures (called institutional controls) can involve restrictions (called environmental covenants) on how people can use the land or water. The final cleanup action and the institutional controls and environmental covenants will be described in the upcoming cleanup action plans.

Three Areas of Concern at the Site (AOC A-01, A-09, and A-14) require cleanup. Another Area of Concern (AOC A-13) does not require cleanup since contaminant concentrations do not exceed cleanup levels. The cleanup actions selected and agreed to by Boeing and Ecology for each of the three AOCs requiring cleanup are as follows:

* **AOC A-01 (Former underground storage tanks [USTs] northwest of Building 17-06):** The underground storage tanks and most of the contaminated soil (caused by these tanks leaking) have already been removed. However, petroleum hydrocarbon concentrations in a very localized area of groundwater are still above cleanup levels and there are some small areas of contamination left in the soil. The cleanup action will remove the remaining contaminated soil and put an oxidant (a chemical) in the excavation that will break down the remaining contamination in the groundwater.
* **AOC A-09 (Building 17-07 Acid Scrubber Drain Line Leak):** The soil and groundwater in a small area at the south end of Building 17-07 was contaminated with metals when an underground pipe from an acid scrubber leaked. An excavation removed most of the contaminated soil, but some of the contaminated soil is under the building and cannot be removed without damaging the building. There is also a limited area where the metals in the soil are affecting the groundwater quality. The contaminated groundwater is currently contained under pavement and by the building foundation; groundwater contamination is not moving downgradient and concentrations of contaminants are decreasing over time. The pavement and building currently protect people from being exposed to the contamination and serve as an institutional control. This institutional control will stay in place until the contamination is no longer present. If Boeing decides to demolish the building, any contaminated soil above cleanup levels will be excavated, which is also expected to clean up the groundwater.
* **AOC A-14 (Site-wide trichloroethylene [TCE] and vinyl chloride [VC] Groundwater Contamination and TCE in limited soil areas at the Facility):** Historical releases of TCE from the Facility have created a small area of soil contamination at the Boeing property and areas of contaminated groundwater (groundwater plumes) that extend off the Boeing property. The groundwater plumes consist of TCE and VC (VC is a chemical formed as TCE is broken down by bacteria in the groundwater). The vinyl chloride is also broken down into non-toxic components by bacteria in the groundwater. This natural breakdown process is called natural attenuation. Boeing has done extensive monitoring to determine how this process is progressing and will continue to monitor this process until the concentrations meet the cleanup standards. As groundwater cleans up, the concentrations of TCE and VC in associated stormwater features (called AOC A-15 in the FS) will also cleanup.

The cleanup action for soil will consist of an environmental covenant and institutional controls to limit exposure at the Boeing property. The cleanup action for groundwater will consist of monitored natural attenuation and injection of additional food for bacteria (called enhanced *in situ* bioremediation) in an area of Algona to help cleanup groundwater faster.