



Oregon

Tina Kotek, Governor

Department of Environmental Quality

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November 20, 2023

via electronic delivery (email)

Deborah Taege
The Boeing Company
Environment, Health & Safety - Environmental Remediation
Bldg. 10-20, MC 9U4-26
800 N 6th Street
Renton WA 98055-1409

Re: **February 2023 Coolant Area Investigation,
LAI-8 LNAPL Evaluation and Recoverability Assessment, Boeing Portland
Gresham, Oregon. ECSI #13**

Dear Ms. Taege:

The Oregon Department of Environmental Quality (DEQ) has reviewed the document entitled *February 2023 Coolant Area Investigation, LAI-8 LNAPL Evaluation and Recoverability Assessment, Boeing Portland* dated June 30, 2023. The document was prepared on your behalf by Landau Associates.

A summary of the cutting oil/coolant release activities leading up to the February 2023 Coolant Area Investigation is as follows:

- September 2006: Identification of cutting oil/coolant release at Building 85-105.
- 2007 to 2017: Cleanup activities to address cutting oil/coolant release including treatment of fluids accumulating in building sump and subsurface *in situ* aerobic injection activities.
- 2018 to 2022: Dissolved Total Petroleum Hydrocarbons (TPH) identified in monitoring well LAI-8 above Site-specific cleanup levels.
- Feb. 2023 measurable thickness of Light Non-Aqueous Phase Liquids (LNAPL) was observed in LAI-8 and reported to DEQ.
- 2023: Additional investigation of TPH in well LAI-8 and vicinity to determine source.

DEQ has the following comments on the June 30, 2023, Landau report:

- Please resubmit the document signature page to include the Oregon RG stamp of the author in responsible charge of the work.
- Please change the second bullet text on page 1 to read “aerobic” not “anaerobic”.
- On page 2, first full paragraph, the text states that the 2006 cutting oil release was attributed to a faulty weld joint in the subgrade coolant flume system and a leaking coolant machine in Building 85-105.

It is presumed that Building 85-105 has a basement like that observed by DEQ in Building 85-120 in May 2023. The May 2023 cutting oil/coolant released from a ruptured hose released approximately 18,000 gallons of cutting oil/coolant to a subgrade storage area in Building 85-120. Some of this oil drained to the Troutdale Gravel Aquifer (TGA) through expansion joints in the basement floor.

The Landau report states that the 2006 release was found near the low-point sump at the northern margin of Building 85-105, yet the greatest cutting oil/coolant thicknesses were encountered in well LAI-4, located more than 100 feet south of the building sump. Is it possible that the 2006 cutting oil release entered the TGA at multiple expansion joints beneath Building 85-105 as it did in Building 85-120 and the cutting oil/coolant was released to the subsurface from a number of points? Please discuss.

- Monitoring well LAI-8 is located approximately 325 feet southwest of the low point sump at Building 85-105, in a cross-gradient position. Monitoring well LAI-8 is located approximately 375 feet west of coolant remediation monitoring well LAI-4 in a downgradient direction. This sump or LAI-4 are presumed to be close to the release point of cutting oil to the subsurface.

From the Landau report, the calculated transmissivity (Table 3) of the recovered LNAPL in LAI-8, indicates a low likelihood for product mobility and movement in the subsurface from LAI-8 into its surrounding area. This calculation is used to argue against active down-hole remediation as minimal product recovery would be anticipated. Conversely, this low transmissivity calculation does not support that the product in LAI-8 came from the presumed product release point beneath Building 105-85 to LAI-8. The hydraulic radius of influence of recovery well DP-1 is stated to be about 100 feet. This radius of influence appears to be insufficient to influence movement of oil from the release area to LAI-8. Please explain these apparently conflicting findings.

- The released Hocut 795B solution was treated in-situ using a commercially available solution to promote oxidation. This chemical oxidation remediation work beneath and near Building 85-105 occurred between 2008 and 2017 and was presumed to have adequately degraded the released Hocut solution in the subsurface. Could the LNAPL found in LAI-8 be explained as a rebound effect of incomplete chemical oxidation which may occur with in-situ remediation? Please discuss.
- The Hocut 795B product presumably contains emulsifiers, stabilizers and detergents that degrade or separate with time in the environment, allowing the observed separation of mineral oil (non-polar) and glycerin (polar) from the bulk solution, affecting solubility. The original Hocut 795B product is designed to be miscible in water and to form an emulsion for use as a coolant and lubricant for metal milling tools and is presumably polar to allow a 90% water to 10% product solution to remain stable during extended use. Following weathering since 2006, residual Hocut 795B sampled as LNAPL from well LAI-8 is found to be soluble in methylene chloride but not water which indicates substantial alteration of the Hocut 795B product during remediation and residence time in the subsurface, or a separate chemical release. Please discuss.
- The excerpt (below) taken from the product Safety Data Sheet, indicates several ingredient chemicals that were not analyzed in the current lab analyses. Detection of these additional chemicals may allow positive identification of the residual product in LAI-8 as weathered Hocut 795B.

Excerpt taken from the Safety Data Sheet for Hocut 795B published online by Quaker Houghton**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

This product is a mixture. Health hazard information is based on its ingredients.

Chemical name	CAS No	Weight-%
Highly refined, low viscosity mineral oils/hydrocarbons (Viscosity >7 - <20.5 cSt @40°C)	-	30% - 60%
Neutralised Dicyclohexylamine	101-83-7*	5% - 10%
1-Aminopropan-2-ol	78-96-6	1% - 5%
2,2',2''-Nitrilotriethanol	102-71-6	1% - 5%
Neutralised 1-Aminopropan-2-ol	78-96-6*	1% - 5%
Glycerol	56-81-5	1% - 5%
Neutralised boric acid	10043-35-3*	1% - 5%
1,2-Benzisothiazol-3(2H)-one	2634-33-5	0.1% - 1%

The exact percentage (concentration) of composition has been withheld as a trade secret.

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346. See Section 15 for additional information on base oils.

CAS Numbers marked with * indicate that the substance is neutralized during the manufacturing process. The substance is present as part of a complex mixture, usually called "ionic mixture", which is intended to facilitate the process/application of the product in use.

- From the Hocut product Safety Data Sheet, the percent weight of glycerin and mineral oil is 1-5% and 30-60%, respectively. Is there an indication of the relative proportion of glycerin to mineral oil found as LNAPL in LAI-8 is similar to the proportion in the original product, or could the glycerin be from reductive dechlorination remediation to treat trichloroethene also in progress at the Site? Please discuss.
- What is the screened interval of the wells used to evaluate the area of the 2006 cooling oil release? Is perched groundwater found in this area? A fence diagram of wells of interest and their screened intervals in the 2006 cutting oil release is requested.
- At LAI-8, the measurable product thickness is possibly attributed to oil previously observed in vadose soil at 20 to 21 feet bgs during monitoring well drilling and is now draining to the water table. The water table in LAI-8 in February 2023 was reported to DEQ to be about 25 feet bgs. Previously, LAI-8 was dry because of pumping from extraction well DP-1, located about 60 feet to the south of LAI-8. What is the source of the observed LAI-8 in vadose soil at the time of well drilling?
- The depth of in-situ reductive dechlorination remediation to treat trichloroethene in the area of LAI-8 was reported to be at about 50 feet bgs. The injected reductive dechlorination solution contains glycerin. Is this injected glycerin possibly what was found in LAI-8 and incorrectly attributed to the 2006 Hocut 795B release?

Please submit a response addressing these questions and comments. We will review your responses and consider whether additional measures, including investigation and/or product treatment/recovery are necessary. In accordance with DEQ regulations, residual product should be remediated to the extent practicable.

Please call me with questions.

Sincerely,

A handwritten signature in blue ink, appearing to read 'K. Thiessen', with a stylized, sweeping underline.

Kenneth Thiessen, R.G., C.E.G
Northwest Region Cleanup Section
(503) 887-7636

Cc: Erin Waibel, PG, Landau Associates
Sarah Fees, LG, Landau Associates
Daniel Hafley, RG, DEQ NWR Cleanup Section
Amber Lutey, RG, DEQ NWR Cleanup Section
Peter Donahower, Manager, Petroleum Cleanup Section
ECSI #13 File