STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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April 25, 2019

Debbie Taege
The Boeing Company
EHS Remediation Group
P.O. Box 3707, M/C 9U4-26
Seattle, WA 98124-2207

RE: Ecology Request for the Feasibility Study (FS) Report; and approval of the FS Work Plan; prepared for The Boeing Company by Landau Associates; October 23, 2018; FS #2018; CS #5049; EPA WAD041337130

Dear Debbie Taege:

The Department of Ecology (Ecology) has reviewed the latest version of the ***Feasibility Study Work Plan, Boeing Auburn Facility***; dated October 23, 2018, and prepared for The Boeing Company by Landau Associates. The FS Work Plan is now substantially complete, and Ecology with this letter approves the FS Work Plan with the following edits to the report, as summarized in Table 16:

Area of Concern	Treatment Category	Technologies	
		Retain	Screened Out
AOC A-13: Building 17-06 Hydrocarbon Release	In Situ Chemical/Physical Treatment	• Surfactant • Pump and Treat (various ex situ options) – to treat and prevent migration of TPH	Air Sparge Chemical Oxidation Thermal Treatment

AOC A-14: Building 17-07, Source Area to the Western plume	In Situ Chemical/Physical Treatment	• Chemical Treatment (reductive): Bio wall or ZVI - near building and source area SVE (soil only)	Air Sparge Chemical Treatment (oxidative) Thermal Treatment
Area of Concern	Treatment Category	Technologies	
		Retain	Screened Out
AOC A-14: Building 17-03, (SWMU 12a) Source Area to the Area 1 plume	In Situ Chemical/Physical Treatment	• Chemical Treatment (reductive): ZVI SVE (soil only)	

Our rationale regarding the retention of these technologies are as follows:

AOC A-13:
Building 17-06 Hydrocarbon Release
Boeing is proposing: 1) continued monitoring of natural attenuation in groundwater; 2) use of a sorbent sock to remove NAPL; 3) continued reliance on the building floor and foundation as a cap-in-place mechanism to prevent exposure and migration of contaminants in groundwater; and 4) monitoring until final excavation of soils occurs at the time of building closure.

Since the excavation of the contaminated soils will take place years from implementation of the CAP, and may not fully address the contamination located below the water table, the currently retained technologies in the FS Work Plan do not meet the MTCA requirements for cleanup alternatives to be "permanent solutions to the maximum extent practicable," [see WAC173-340-360(2)(b)(i)]. Also, the timing for the removal of the soils at closure of the building (which is likely to be over a decade from now) does not meet the requirement for a reasonable restoration timeframe [see WAC 173-340-360(2)(b)(ii)]. Finally, the proposed technologies rely on monitoring and institutional controls where it may be technically possible to implement active measures for all or a portion of the site. More permanent solutions must be evaluated for their technical feasibility when institutional controls are part of the cleanup action. [See WAC173-340-440(6)].

For the reasons cited above, Ecology is requiring Boeing to retain and evaluate the use of surfactant and pump and treat technologies in the FS Report. Boeing is not limited to the number or type of other permanent treatment technologies they may evaluate as part of the FS Report.

AOC A-14:
Building 17-07, Source Area to the Western plume
Boeing is proposing soil vapor extraction (SVE) for the contaminated soil and enhanced bioremediation with monitored natural attenuation to address the TCE and VC contamination at the source area in and near Building 17-07.

As part of the FS Report, Ecology is also requiring consideration and evaluation of a permeable reactive barrier using zero valent iron, and/or a biowall which can be installed downgradient and outside Building 17-07. This technology could be effective in combination with enhanced bioremediation to treat degradation products before they move off property.

AOC A-14:
Building 17-03, Source Area (TCE, VC), Former Degreasers, Tank Line, and Waste Piping
Boeing is proposing enhanced bioremediation, and monitored natural attenuation for this secondary source area to the Area 1 Plume.

As part of the FS Report, Ecology is also requiring evaluation of reductive chemical treatment using zero valent iron (ZVI) either on its own or in combination with enhanced bioremediation. Chemical treatment using zero valent iron (ZVI) can be designed to be injected into the aquifer creating reducing conditions and rapid reduction of TCE and vinyl chloride. It can be paired with enhanced bioremediation to achieve optimum degradation rates and shortened restoration timeframes. Use of ZVI can have a stronger degradation effect on vinyl chloride, reducing the number of re-injections that might be required with enhanced bioremediation alone.

With the addition of these technologies, Ecology approves the FS Work Plan and requests that Boeing submit the FS Report in sixty days. The permit requires that Boeing submit the FS Report as provided in the approved FS work plan schedule (see Section VI. 7.), but there is no schedule for submittal of the FS Report included in the FS Work Plan. Ecology is therefore calling for submittal of the FS Report on June 24, 2019.

Ecology is awaiting completion of the Natural Attenuation Assessment report, but does not believe this will hold up preparation of the FS Report. By separate letters, Ecology has also finalized our review and comment on the final data summary reports for: AOC A-13, Building 17-06 petroleum hydrocarbons; AOC A-14, former Building 17-03 Source Area for TCE and VC. In addition, Ecology expects to receive and review the final data summary report for the Acid Scrubber Drain Line leak, AOC A-09 in Building 17-07.

Ecology is also working toward coming to agreement on the Cleanup Standards for the site. This may take some time and make it difficult to complete a disproportionate cost analysis (DCA) if one is required to determine whether a cleanup action is permanent to the maximum extent practicable for any area, WAC 173-303-360(3)(b). In this case, Boeing may submit a request for extension of time to finalize the FS Report. However, Ecology requests that Boeing prepare and share with Ecology the suite of cleanup action alternatives that Boeing plans to include in the FS Report by May 30, 2019.

Ecology anticipates that we can come to agreement on these issues and still make progress on components of the FS Report until the final Cleanup Standards are approved for the site.

Sincerely,

Robin Harrover

Robin Harrover, LHG
Hazardous Waste and Toxics Reduction Program

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