Table 1-1
Soil Proposed Cleanup Levels
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Analyte	RI Soil SL (mg/kg)	Method A	Method B		Constituent Exceeds pCUL in Groundwater	Soil Protective of Groundwater Vadose at 13°C	Method C		Background Soil Metals Concentration (a)	Soil pCUL (mg/kg)	Basis for pCUL
		Method A Industrial Properties	Method B Non-Cancer Direct Contact	Method B Cancer Direct Contact			Method C Non-Cancer Direct Contact	Method C Cancer Direct Contact			
VOLATILES											
Trichloroethene	0.00357	N/A	40	12	X	0.025	1,800	2,800	N/A	0.025/1,800	Soil protective of groundwater. Once groundwater pCUL is met, cleanup level will be adjusted to Method C non-cancer direct contact.
TOTAL PETROLEUM HYDROCARBONS AND ASSOCIATED VOLATILES											
AOC A-01											
Benzene	0.00448	N/A	320	18			14,000	2,400	N/A	2,400	Method C cancer direct contact.
Ethylbenzene	6.05	N/A	8,000	--	X	5.9	350,000	--	N/A	5.9/350,000	Soil protective of groundwater. Once groundwater pCUL is met, cleanup level will be adjusted to Method C non-cancer direct contact.
Toluene	0.00465	N/A	6,400	--			280,000	--	N/A	280,000	Method C non-cancer direct contact.
Total Xylenes	14.6	NA	16,000	--	X	14	700,000	--	N/A	14/350,000	Soil protective of groundwater. Once groundwater pCUL is met, cleanup level will be adjusted to Method C non-cancer direct contact.
Diesel-Range Organics	2,000	2,000	(b)	--			(b)	--	N/A	2,000	Method A
Oil-Range Organics	2,000	2,000	(b)	--			(b)	--	N/A	2,000	Method A
Gasoline-Range Organics (c)	30/100	30/100	(b)	--	X	(b)	(b)	--	N/A	30/100	Method A
AOC A-13											
Total Petroleum Hydrocarbons	2,000	N/A	16,000	--		71,000	190,000	--	N/A	71,000	100% NAPL based on ASB0160R Hydrocarbon workbook as documented in *Guidance for Remediation of Petroleum Contaminated Sites, Ecology 2016.*
METALS AND CYANIDE											
Antimony	5.4	N/A	32	--			1,400	--	N/A	1,400	Method C non-cancer based on direct contact. Eliminated as a COC (no detections above the pCUL and not associated with an AOC evaluated as part of the FS).
Cadmium	1.0	N/A	80	--	X	0.69	3,500	--	1.0	1.0/3,500	Protection of groundwater adjusted for natural background. Once groundwater pCUL is met, cleanup level will be adjusted to Method C non-cancer direct contact.
Copper	284	N/A	3,200	--	X	280	140,000	--	36	280/140,000	Soil protective of groundwater. Once groundwater pCUL is met, cleanup level will be adjusted to Method C non-cancer direct contact.
Nickel	130	N/A	1,600	--			70,000	--	48	70,000	Method C non-cancer direct contact.
Cyanide (d)	48	N/A	50	--	X	--	2,200	--	N/A	2,200	Method C non-cancer direct contact.

Abbreviations and Acronyms:

-- = not listed
% = percent
°C = degrees Celsius
CLARC = Cleanup Levels and Risk Calculation
COC = constituent of concern
FS = feasibility study
mg/kg = milligrams per kilogram
N/A = not applicable
NAPL = non-aqueous-phase liquid
pCUL = proposed cleanup level
RI = remedial investigation
SL = screening level

Notes:

A cleanup level for vinyl chloride in soil is not provided because it has never been detected in soil at the site.
Grey Shading = contaminant eliminated as a COC in media identified

(a) Puget Sound Region 90th percentile value (Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State. Publication #94-115.Washington State Department of Ecology. October. https://fortress.wa.gov/ecy/publications/documents/94115.pdf.)
(b) Method B/Method C values were not calculated.
(c) 30 mg/kg is used if benzene is detected; 100 mg/kg is used if benzene is not detected.
(d) CLARC calculations are evaluated based on free cyanide.

Table 1-2
Groundwater Proposed Cleanup Levels
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Analyte	RI GW SL	Cleanup Levels Protective of Drinking Water									Surface Water Quality Standards in Groundwater (µg/L)
		ARAR Federal MCL	ARAR WA State MCL	Method A	Method B (Non-Cancer)	Method B (Cancer)	Adjusted 10-5	Background (a)	Groundwater pCUL (µg/L)	Basis	
VOLATILES											
Trichloroethene	0.54	5.0	5.0	N/A	4.0	0.54	5.4	N/A	4	Method B Non-Cancer	0.38 (b)
Vinyl Chloride	0.029	2.0	2.0	N/A	24	0.029	0.29	N/A	0.29	Method B Cancer, adjusted to cancer risk 10^{-5} based on MCL rule.	0.02 (b)
TOTAL PETROLEUM HYDROCARBONS AND ASSOCIATED VOLATILES											
AOC A-01											
Benzene	0.795	5.0	5.0	N/A	32	0.8	8.0	N/A	5.0	Federal/State MCL	N/A
Ethylbenzene	700	700	700	N/A	800	--	N/A	N/A	700	Federal/State MCL	N/A
Toluene	640	1,000	1,000	N/A	640	--	N/A	N/A	640	Method B Non-Cancer	N/A
Total Xylenes	1,600	10,000	10,000	N/A	1,600	--	N/A	N/A	1,600	Method B Non-Cancer	N/A
Diesel-Range Organics	500	--	--	500	(c)	(c)	N/A	N/A	500	Method A	N/A
Oil-Range Organics	500	--	--	500	(c)	(c)	N/A	N/A	500	Method A	N/A
Gasoline-Range Organics (d)	800	--	--	800/1,000	(c)	(c)	N/A	N/A	800/1,000	Method A	N/A
AOC A-13											
Total Petroleum Hydrocarbons	N/A	--	--	N/A	20,000 (e)	--	N/A	N/A	20,000	Method B cleanup level (calculated at AGW128 and AGW281 and used median value as indicated in G*uidance for Remediation of Petroleum Contaminated Sites, Ecology 2016*).	N/A
METALS AND CYANIDE											
Arsenic	8.0	10	10	N/A	4.8	0.058	0.58	8.0	8.0	Background; Eliminated as a COC (no history of use, no history of release, natural occurrence).	N/A
Cadmium	5.0	5.0	5.0	NA	8.0	--	--	N/A	5.0	Federal/State MCL	N/A
Copper	640	1,300	1,300	NA	640	--	--	N/A	640	Method B non-cancer	N/A
Nickel	100	--	100	N/A	320	--	--	N/A	100	Federal/State MCL.	N/A
Cyanide	9.6	200	200	N/A	10	--	--	N/A	10 (f)	Method B non-cancer	N/A

Abbreviations and Acronyms:

-- = not Listed
µg/L = micrograms per liter
ARARs = applicable or relevant and appropriate requirements
CLARC = Cleanup Levels and Risk Calculation
COC = constituent of concern
GW = groundwater
MCL = maximum contaminant level
N/A = not applicable
pCUL = proposed cleanup level
RI = remedial investigation
SL = screening level
TPH = total petroleum hydrocarbon
WA = Washington
WAC = Washington Administrative Code

Notes:

Grey shading = Contaminant eliminated as a COC in media identified.

(a) PTI. 1989. Draft report Sections 1-7, Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State. PTI Environmental Services. April.
(b) Human Health Fresh Water WAC 173-201A. Added to the groundwater table based on Ecology comments.
(c) Method B values were not calculated.
(d) 800 µg/L is used if benzene is detected; 1,000 µg/L is used if benzene is not detected.
(e)Method B values were calculated for groundwater collected from wells AGW128 (TPH Method B = 7,000 µg/L) and AGW281 (TPH Method B = 32,000 µg/L). The mean value (20,000) is used for the pCUL.
(f) CLARC evaluated based on free cyanide.

Table 1-3
Surface Water Proposed Cleanup Levels
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

	RI GW SL (a)	Federal ARAR Human Health - Fresh Water CWA 304	WA State ARAR Human Health - Fresh Water WAC 173-201A	Method B Non-cancer	Method B Cancer	Surface Water pCUL	Basis
VOLATILES							
Trichloroethene	0.3	0.6	0.38	120	13	0.38	WA State ARAR WAC 173-201A
Vinyl Chloride	0.02	0.022	0.02	6,600	3.7	0.02	WA State ARAR WAC 173-201A

Notes:

(a) SLs were provided for different areas in the RI report. The most conservative SLs are presented here.

Abbreviations and Acronyms:

ARAR = applicable or relevant and appropriate requirement
CWA = Clean Water Act
GW = groundwater
pCUL = proposed cleanup level
RI = remedial investigation
SL = screening level
WA = Washington
WAC = Washington Administrative Code

Table 2-1
AOC A-13 Drilling and Well Installation Matrix
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Location ID	Location Description	Date of Installation	Total Exploration Depth (ft bgs)	Soil Sample Depth (ft bgs)	Screened Interval (ft bgs)	Groundwater Zone	Horizontal Coordinates		Vertical Coordinates	
							Northing	Easting	Well Rim Elevation (ft)	Top of Casing Elevation (ft)
Conventional Monitoring Well										
AGW284	North of ASB0294; near ASB0028	6/12/2020	25.5	11, 17.5, 22.5	10.5 to 25.5	S(WT)	107430.08	1291928.86	86.7822	86.1349
Temporary Boring										
ASB0294 (a)	Southwest of Monitoring Well AGW042; near ASB0025	6/12/2020	25	12, 16, 23	N/A	N/A	107354.79	1291932.67	86.7047	N/A

Notes:

1. Coordinate System and Zone: Washington State Plane, North Zone Coordinates
2. Horizontal Datum: North American Datum of 1983 (91), North Zone, US Feet
3. Vertical Datum: National Geodetic Vertical Datum of 1929, US Feet

(a) Existing monitoring well AGW042 was sampled for TPH and VOCs, rather than collecting any groundwater samples from ASB0294.
Soil and groundwater samples collected were analyzed for diesel-range and oil-range organics by NWTPH-Dx. Groundwater samples were also analyzed for VOCs by EPA 8260D SIM.
Water table is a subset of the shallow zone. Wells are identified as water table when the screened interval crosses the water table
Conventional = well with a single screen located in either the shallow, intermediate, or deep zone.

Abbreviations and Acronyms:

bgs = below ground surface
EPA = US Environmental Protection Agency
ft = feet
ID = identification
N/A = not applicable
NWTPH-Dx = Northwest total petroleum hydrocarbon diesel-range extended
S = shallow
SIM = selected ion monitoring
VOC = volatile organic compound
WT = water table

Table 2-2
AOC A-13 Soil Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Sample Depth (ft)	Sample Date	Petroleum Hydrocarbons (mg/kg) (a)		
			Total Petroleum Hydrocarbons	Diesel-Range Organics	Oil-Range Organics
		Soil pCUL	71,000	N/A	N/A
AGW127	15.0	9/8/2008	**5.3**	**5.3**	11 U
AGW128	18.5	9/12/2008	**5,280**	**880**	**4,400**
AGW129	12.5	9/11/2008	**12**	5.7 U	**12**
AGW130	14.0	9/11/2008	**5.6**	**5.6**	11 U
AGW277	8.0	8/12/2017	ND	51 U	51 U
	17.0	8/12/2017	**15,200**	**2,200**	**13,000**
	21.0	8/13/2017	**1,500**	500 U	**1,500**
	24.5	8/13/2017	ND	51 U	51 U
	26.0	8/13/2017	**110**	56 U	**110**
	29.5	8/13/2017	ND	69 U	69 U
AGW279	12.5	12/27/2017	ND	54 U	54 U
	22.0	12/27/2017	ND	51 U	51 U
AGW280	13.0	12/28/2017	ND	53 U	53 U
	23.5	12/28/2017	ND	57 U	57 U
AGW281	13.0	12/29/2017	ND	56 U	56 U
	16.0	12/29/2017	**170**	52 U	**170**
	18.5	12/29/2017	**18,100**	**3,100**	**15,000**
	21.0	12/29/2017	**770**	**140**	**630**
	25.5	12/29/2017	**496**	**96**	**400**
	26.5	12/29/2017	**170**	50 U	**170**
	27.5	12/29/2017	ND	59 U	59 U
AGW282	11.5	12/29/2017	**95**	49 U	**95**
	16.0	12/29/2017	ND	53 U	53 U
	17.0	12/29/2017	ND	58 U	58 U
	21.0	12/29/2017	ND	50 U	50 U
	22.5	12/29/2017	ND	60 U	60 U
AGW284	11.0	6/12/2020	ND	5.35 U	10.7 U
	17.5	6/12/2020	ND	5.53 U	11.1 U
	22.5	6/12/2020	ND	5.48 U	11 U
ASB0159	16.0	8/30/2004	ND	5 U	10 U
ASB0160	17.5	9/7/2004	**36,800**	**4,800**	**32,000**
ASB0167	5.0	9/7/2004	ND	--	--
	20.0	9/7/2004	ND	5 U	10 U
ASB0168	15.0	9/8/2004	**1,570**	**170**	**1,400**
	17.5	9/8/2004	**268**	**28**	**240**
ASB0169	15.0	9/8/2004	**2,420**	**320**	**2,100**
	17.5	9/8/2004	**3,360**	**460**	**2,900**
ASB0170	15.0	9/9/2004	**23,900**	**3,900**	**20,000**
	17.5	9/9/2004	**15,200**	**2,200**	**13,000**
ASB0171	15.0	9/9/2004	**11,100**	**1,600**	**9,500**
	17.5	9/9/2004	**8,200**	**1,200**	**7,000**
ASB0271	11.0	8/12/2017	ND	51 U	51 U
	18.0	8/12/2017	**9,100**	**1,600**	**7,500**
	24.0	8/12/2017	**1,290**	**290**	**1,000**
ASB0272	11.0	8/12/2017	ND	50 U	50 U
	17.0	8/12/2017	**13,300**	**2,300**	**11,000**
	19.0	8/12/2017	**18,500**	**3,500**	**15,000**

Table 2-2
AOC A-13 Soil Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Sample Depth (ft)	Sample Date	Petroleum Hydrocarbons (mg/kg) (a)		
			Total Petroleum Hydrocarbons	Diesel-Range Organics	Oil-Range Organics
		Soil pCUL	71,000	N/A	N/A
ASB0274	10.0	8/12/2017	**92**	49 U	**92**
	16.0	8/12/2017	ND	55 U	55 U
	19.0	8/12/2017	ND	49 U	49 U
ASB0275	8.0	8/13/2017	ND	50 U	50 U
	10.0	8/13/2017	**62**	51 U	**62**
	20.0	8/13/2017	ND	68 U	68 U
	23.0	8/13/2017	ND	50 U	50 U
ASB0286	11.0	12/27/2017	ND	51 U	51 U
	16.0	12/27/2017	**326**	**56**	**270**
	18.0	12/27/2017	**13,600**	**2,600**	**11,000**
	22.0	12/27/2017	ND	51 U	51 U
ASB0287	12.0	12/28/2017	ND	50 U	50 U
	22.0	12/28/2017	ND	56 U	56 U
ASB0288	10.5	12/28/2017	**120**	50 U	**120**
	12.0	12/28/2017	**5,630**	**930**	**4,700**
	13.5	12/28/2017	**3,960**	**660**	**3,300**
	18.0	12/28/2017	**19,500**	**3,500**	**16,000**
	22.5	12/28/2017	**2,090**	**390**	**1,700**
	25.0	12/28/2017	ND	52 U	52 U
	29.0	12/28/2017	ND	60 U	60 U
ASB0289	12.0	12/29/2017	ND	52 U	52 U
	17.0	12/29/2017	**120**	53 U	**120**
	20.5	12/29/2017	**423**	**93**	**330**
	22.0	12/29/2017	**100**	56 U	**100**
	25.0	12/29/2017	ND	52 U	52 U
	27.0	12/29/2017	ND	58 U	58 U
ASB0294	12.0	6/12/2020	ND	5.37 U	10.7 U
	16.0	6/12/2020	**194.7**	**20.7**	**174**
	23.0	6/12/2020	ND	5.85 U	11.7 U

Notes:

Bold text indicates detected analyte

Blue border indicates data was collected as part of the 2020 SFS field investigation.

(a) Petroleum hydrocarbons analyzed by NWTPH-Dx.
Total petroleum hydrocarbons were calculated by summing detections of diesel range and oil range organics.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

Abbreviations and Acronyms:

-- = not analyzed
ft = feet
mg/kg = milligrams per kilogram
N/A = not applicable
ND = not detected
NWTPH-Dx = Northwest total petroleum hydrocarbons diesel-range extended
pCUL = proposed cleanup level
SFS = supplemental feasibility study

Table 2-3
AOC A-13 Groundwater Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Sample Date	Petroleum Hydrocarbons (µg/L) (a)		
		Total Petroleum Hydrocarbons (b)	Diesel-Range Organics	Oil-Range Organics
	Groundwater pCUL	20,000	N/A	N/A
AGW041	6/13/2013	ND	95 U	240 U
AGW042	7/2/2020	ND	100 U	200 U
AGW043	1/15/2009	ND	250 U	500 U
AGW044	6/20/2016	**2,530**	**1,800**	**730**
	5/31/2017	**180**	**180**	240 U
	6/8/2018	**1,300**	**1,300**	350 U
AGW115	12/11/2013	ND	94 U	230 U
AGW116	12/11/2013	ND	95 U	240 U
AGW117	12/10/2013	ND	94 U	240 U
AGW118	12/11/2013	ND	94 U	230 U
AGW127	12/10/2013	ND	95 U	240 U
AGW128	6/17/2016	**1,450**	**1,100**	**350**
	12/1/2016	**3,400 J**	**2,200 J**	**1,200**
	5/31/2017	**2,400**	**1,100**	**1,300**
	12/5/2017	**7,600**	**1,800**	**5,800**
	6/7/2018	**3,400 J**	**1,500 J**	**1,900 J**
	12/11/2018	**2,885**	**455**	**2,430**
AGW129	12/11/2013	ND	95 U	240 U
AGW130	6/20/2016	ND	94 U	230 U
	12/1/2016	ND	95 U	240 U
	5/31/2017	ND	98 U	240 U
	12/5/2017	**290**	100 U	**290**
	6/8/2018	ND	110 U	350 U
	12/12/2018	ND	100 U	200 U
AGW277	9/6/2017	**1,430 J**	**450 J**	**980 J**
	12/5/2017	**1,810**	**310**	**1,500**
	3/14/2018	**140**	**140**	350 U
	6/7/2018	**230**	**230**	350 U
	9/4/2018	**200**	**200**	350 U
	12/11/2018	ND	100 U	200 U
AGW279	3/14/2018	ND	110 U	350 U
	6/7/2018	ND	110 U	350 U
	9/4/2018	ND	110 U	350 U
	12/11/2018	ND	100 U	200 U
AGW280	3/14/2018	ND	110 U	350 U
	6/7/2018	ND	110 U	350 U
	9/5/2018	ND	110 U	350 U
	12/12/2018	ND	100 U	200 U
AGW281	3/13/2018	**690**	**150**	**540**
	6/7/2018	**190**	**190**	350 U
	9/5/2018	**890**	**190**	**700**
	12/12/2018	**250**	100 U	**250**

Table 2-3
AOC A-13 Groundwater Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Sample Date	Petroleum Hydrocarbons (µg/L) (a)		
		Total Petroleum Hydrocarbons (b)	Diesel-Range Organics	Oil-Range Organics
	Groundwater pCUL	20,000	N/A	N/A
AGW282	3/13/2018	**4,260**	**660**	3,600
	6/7/2018	**490**	**490**	350 U
	9/5/2018	ND	110 U	350 U
	12/12/2018	ND	100 U	200 U
AGW284	7/2/2020	ND	100 U	200 U
AGW277-20	8/12/2017	**891,000 J**	**21,000 J**	**870,000**
ASB0159-19	8/30/2004	ND	250 U	500 U
ASB0160R-18	9/7/2004	**11,500**	**1,500**	**10,000**
ASB0167-18	9/7/2004	ND	250 U	500 U
ASB0168-18	9/8/2004	**2,120**	**320**	**1,800**
ASB0169-18	9/8/2004	**3,160**	**460**	**2,700**
ASB0170-18	9/9/2004	**4,390**	**690**	**3,700**
ASB0171-18	9/9/2004	**4,010**	**610**	**3,400**
ASB0271-20	8/12/2017	**248,000**	**38,000**	**210,000**
ASB0272-20	8/12/2017	**352,000**	**62,000**	**290,000**
ASB0274-18	8/12/2017	**520**	**110**	**410**
ASB0275-19	8/13/2017	ND	100 U	250 U
ASB0286-16	12/27/2017	**25,600 J**	**4,600 J**	**21,000**
ASB0287-17.5	12/28/2017	ND	100 U	250 U
ASB0288-16	12/28/2017	**49,900 J**	**9,900 J**	**40,000 J**
ASB0289-16	12/29/2017	**3,900**	**1,100**	**2,800**

Notes:

Bold text indicates detected analyte

Blue border indicates data was collected as part of the 2020 SFS field investigation.

Groundwater monitoring locations are identified by the AGW prefix.

Boring sample designations include the location name followed by the depth at which the sample was collected. Groundwater concentrations from temporary boring grab samples are not considered a reliable estimate of actual groundwater concentrations and are, therefore, not compared to pCULs.

(a) Petroleum hydrocarbons were analyzed by NWTPH-Dx.

(b) Total petroleum hydrocarbons were calculated by summing detections of diesel-range and oil-range organics.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

Abbreviations and Acronyms:

µg/L = micrograms per liter

N/A = not applicable

ND = not detected

NWTPH-Dx = Northwest total petroleum hydrocarbon diesel-range extended

pCUL = proposed cleanup level

SFS = supplemental feasibility study

Table 2-4
AOC A-14 Former Building 17-03 Release Area Drilling and Sampling Matrix
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Location ID	Monitoring Well Type	Location Description	Date of Installation	Total Exploration Depth (ft bgs)	Soil Sample Depth (ft bgs)	Groundwater Zone	Screened Interval (ft bgs)	Horizontal Coordinates		Vertical Coordinates	
								Northing	Easting	Well Rim Elevation (ft)	Top of Casing Elevation (ft)
AGW283	Multilevel (a)	Adjacent to Boring ASB0277	6/11/2020	110	14 and 16			108196.32	1292164.02	88.603	
AGW283-1						S (WT)	18.5 to 21				88.116
AGW283-2						S	29 to 30				88.124
AGW283-3						I	39 to 40				88.179
AGW283-4						I	52 to 53				88.179
AGW283-5						I	65 to 66				88.13
AGW283-6						D	87 to 88				88.147
AGW283-7						D	99.8 to 100				88.107

Notes:

1. Coordinate System and Zone: Washington State Plane, North Zone Coordinates
2. Horizontal Datum: North American Datum of 1983 (91), North Zone, US Feet
3. Vertical Datum: National Geodetic Vertical Datum of 1929, US Feet

(a) Multilevel = Well with up to seven separate screens, which are located in the shallow, intermediate, and deep zones
Water table is a subset of the shallow zone. Wells are identified as water table when the screened interval crosses the water table
Soil and groundwater samples collected were analyzed for VOCs by EPA 8260D SIM.

Abbreviations and Acronyms:

bgs = below ground surface
D = deep
EPA = US Environmental Protection Agency
ft = feet
I = intermediate
ID = identification
N/A = not applicable
S = shallow
SIM = selected ion monitoring
VOC = volatile organic compound
WT = water table

Table 2-5
AOC A-14 Former Building 17-03 Release Area Soil Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Sample Depth (ft)	Sample Date	Volatile Organic Compounds (mg/kg) (a)	
			Trichloroethene	Vinyl Chloride
		Soil pCUL	0.025	N/A
AGW097	16	12/3/2003	ND	ND
AGW099	16	12/9/2003	ND	ND
AGW283	14	6/9/2020	**0.00628**	0.00112 U
	16	6/9/2020	**0.0560**	0.00107 U
ASB0290	12	12/17/2018	**0.0445**	0.00092 U
	16	12/17/2018	**0.0653**	0.00092 U
ASB0291	12	12/18/2018	0.00117 U	0.00117 U
	17.5	12/18/2018	0.00118 U	0.00118 U
ASB0293	11	12/20/2018	0.00113 U	0.00113 U
	15	12/20/2018	0.00105 U	0.00105 U
ASB0276	7.5	8/28/2017	0.0020 UJ	0.0020 UJ
	9.5	8/28/2017	0.0023 UJ	0.0023 UJ
	17.9	8/28/2017	0.0019 UJ	0.0019 UJ
ASB0277	6.2	8/28/2017	0.0024 U	0.0024 U
	11	8/28/2017	**0.0038**	0.0019 U
ASB0278	7.5	8/28/2017	0.0020 U	0.0020 U
	9	8/28/2017	0.0020 U	0.0020 U
ASB0282	9	9/1/2017	0.0018 U	0.0018 U
	16.5	9/1/2017	**0.0080**	0.0016 U
ASB0283	16.5	9/8/2017	0.0016 U	0.0016 U
ASB0284	6.5	9/8/2017	0.0017 U	0.0017 U
	8.5	9/8/2017	0.0023 U	0.0023 U
ASB0285	2.5	9/11/2017	0.0018 U	0.0018 U
	9.7	9/11/2017	0.0020 U	0.0020 U
ASB0279	6.5	8/30/2017	0.0019 U	0.0019 U
	12.5	8/30/2017	**0.0017**	0.0016 U
	18.5	8/30/2017	0.0015 U	0.0015 U
SS-26	8.5	10/28/1992	ND	ND
SS-27	8.5	10/28/1992	ND	ND
SS-28	8.5	10/28/1992	ND	ND
SS-29	8.5	10/28/1992	ND	ND

Notes:

Bold text indicates detected analyte

Green shading indicates detected analyte exceeds applicable soil pCUL

Blue border indicates data was collected as part of the 2020 SFS field investigation.

(a) VOCs were analyzed by SW-846 8260 and 8260 selected ion monitoring.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Abbreviations and Acronyms:

ft = feet
mg/kg = milligrams per kilogram
N/A = not applicable
ND = not detected
pCUL = proposed cleanup level
SFS = supplemental feasibility study
VOC = volatile organic compound

Table 2-6
AOC A-14 Former Building 17-03 Release Area Groundwater Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Groundwater Zone	Sample Date	Volatile Organic Compounds (µg/L) (a)	
			Trichloroethene	Vinyl Chloride
		Groundwater pCUL	4.0	0.29
		SWQS in Groundwater	0.38	0.02
AGW001R	SZ	6/22/2016	**1.9**	0.020 U
		11/30/2016	**2.2**	0.2 U
		6/7/2017	**1.2**	0.020 U
		11/29/2017	**1.6**	0.020 U
		6/6/2018	**1.1**	0.020 U
		12/5/2018	**1.51**	0.0200 U
AGW097	IZ	12/7/2004	0.2 U	0.02 U
AGW099	DZ	12/7/2004	0.2 U	0.02 U
AGW283-1	SZ(WT)	7/2/2020	**3.92**	0.0200 U
AGW283-2	SZ	7/2/2020	**0.588**	0.0200 U
AGW283-3	IZ	7/2/2020	0.200 U	0.0200 U
AGW283-4	IZ	7/2/2020	0.200 U	0.0200 U
AGW283-5	IZ	7/2/2020	0.200 U	0.0200 U
AGW283-6	DZ	7/2/2020	0.200 U	0.0200 U
AGW283-7	DZ	7/2/2020	0.200 U	0.0200 U
ASB0276-20	SZ (WT)	8/28/2017	**4.44**	0.0200 U
ASB0276-30	SZ	8/28/2017	**1.43**	0.0200 U
ASB0276-40	IZ	8/29/2017	**0.39 J**	0.0200 U
ASB0277-20	SZ (WT)	8/28/2017	**9.21**	0.0200 U
ASB0277-30	SZ	8/29/2017	**1.48**	0.0200 U
ASB0277-40	IZ	8/29/2017	**11.0**	0.0200 U
ASB0278-20	SZ (WT)	8/30/2017	**7.19**	0.0200 U
ASB0278-30	SZ	8/30/2017	**3.46**	0.0200 U
ASB0278-40	IZ	8/30/2017	**2.17**	0.0200 U
ASB0278-50	IZ	8/30/2017	**0.46**	0.0200 U
ASB0279-20	SZ (WT)	8/30/2017	**0.40**	0.0200 U
ASB0279-30	SZ	8/31/2017	0.20 U	0.0200 U
ASB0279-40	IZ	8/31/2017	0.20 U	0.0200 U
ASB0279-50	IZ	8/31/2017	0.20 U	0.0200 U
ASB0282-20	SZ (WT)	9/1/2017	**3.85 J**	0.0200 U
ASB0282-30	SZ	9/1/2017	**3.75 J**	0.0200 U
ASB0282-40	IZ	9/1/2017	**3.68 J**	0.0200 U
ASB0282-50	IZ	9/1/2017	**0.78**	0.020 UJ
ASB0283-21	SZ (WT)	9/8/2017	**1.2**	0.020 U
ASB0283-30	SZ	9/8/2017	**1.4**	0.020 U
ASB0283-40	IZ	9/8/2017	**0.56**	0.020 U
ASB0283-50	IZ	9/8/2017	**0.45**	0.020 U
ASB0284-20	SZ (WT)	9/8/2017	**1.9**	0.020 U
ASB0284-30	SZ	9/11/2017	**2.8**	0.020 U
ASB0284-40	IZ	9/11/2017	**0.69**	0.020 U
ASB0284-50	IZ	9/11/2017	**2.3**	0.020 U
ASB0285-20	SZ (WT)	9/11/2017	**0.45**	0.020 U

Table 2-6
AOC A-14 Former Building 17-03 Release Area Groundwater Results
Boeing Auburn Supplemental Feasibility Study
Auburn, Washington

Sample Location	Groundwater Zone	Sample Date	Volatile Organic Compounds (µg/L) (a)	
			Trichloroethene	Vinyl Chloride
		Groundwater pCUL	4.0	0.29
		SWQS in Groundwater	0.38	0.02
ASB0285-30	SZ	9/11/2017	**1.6**	0.020 U
ASB0285-40	IZ	9/11/2017	**1.0**	0.020 U
ASB0290-20	SZ (WT)	12/17/2018	**5.61**	0.0200 U
ASB0290-30	SZ	12/17/2018	**1.40**	0.0200 U
ASB0290-40	IZ	12/18/2018	**0.879**	0.0200 U
ASB0291-20	SZ (WT)	12/18/2018	**1.17**	0.0200 U
ASB0291-30	SZ	12/18/2018	**0.950**	0.0200 U
ASB0291-40	IZ	12/19/2018	**0.689 J**	0.0200 UJ
ASB0292-20	SZ (WT)	12/19/2018	**1.96**	0.0200 U
ASB0292-29.5	SZ	12/19/2018	**3.24 J**	0.0200 UJ
ASB0292-40	IZ	12/20/2018	**1.30 J**	0.0200 UJ
ASB0293-20	SZ (WT)	12/20/2018	**0.370**	0.0200 U
ASB0293-30	SZ	12/20/2018	**0.471**	0.0200 U
ASB0293-40	IZ	12/20/2018	0.646 UJ	0.0200 UJ

Notes:

Bold text indicates detected analyte

Green shading indicates detected analyte exceeds applicable groundwater pCUL (based on drinking water).

Blue shading indicates concentrations above SWQS in groundwater.

Blue border indicates data was collected as part of the 2020 SFS field investigation.

Groundwater monitoring locations are identified by the AGW prefix.

Boring sample designations include the location name followed by the depth at which the sample was collected.

(a) VOCs were analyzed by SW-846 8260 and 8260 selected ion monitoring.

U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Abbreviations and Acronyms:

µg/L = micrograms per liter
DZ = deep zone
IZ = intermediate zone
pCUL = proposed cleanup level
SFS = supplemental feasibility study
SWQS = surface water quality standards
SZ = shallow zone
VOC = volatile organic compound
WT = water table

Table 4-1
AOC A-14 Supplemental Feasibility Study Remedial Action Alternatives
Boeing Auburn Site
Auburn, Washington

Alternative Number:	Alternative D1	Alternative D6	Alternative D7	Alternative D8
Alternative Name:	**Site-Wide Monitored Natural Attenuation (MNA)**	**Enhanced *In Situ* Bioremediation (EISB) at Algona Focus Area and MNA**	**EISB at Algona and 17-07 Property Boundary Focus Areas and MNA**	**EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and MNA**
Alternative Description:	Containment of soil and MNA for the entire plume: • Continue containment of contaminated soil site-wide with pavement and buildings acting as a cap. • Remediation of groundwater through naturally occurring biotic and abiotic degradation and other attenuation processes (MNA). Continued monitoring with routine groundwater sampling. • Institutional controls consisting of an environmental covenant to limit activities that could result in exposure to soil, and which outlines the required continued maintenance for the cap for soil concentrations exceeding protection of groundwater.	Enhanced *in situ* bioremediation injection at Algona focus area and MNA for the entire plume: • Continue containment of contaminated soil site-wide with pavement and buildings acting as a cap. • Institutional controls consisting of an environmental covenant to limit activities that could result in exposure to soil, and which outlines the required continued maintenance for the cap to soil concentrations exceeding protection of groundwater. • *In situ* groundwater treatment using EISB in the Algona Focus Area *(conceptual design: 980-foot long injection row adding on to the pilot test injection row [5 wells] for a total of 29 wells targeting the shallow groundwater zone will consist of 5 injection events performed every 4 years over a span of 20 years of active treatment followed by 10 years of sustained treatment due to endogenous decay and donor back diffusion).* • Remediation of groundwater through naturally occurring biotic and abiotic degradation and other attenuation processes (MNA). Continued monitoring with routine groundwater sampling.	Enhanced *in situ* bioremediation injection at Algona and Property Boundary focus areas and MNA for the entire plume: The Algona focus area treatment in Alternative D6 plus: • Continue containment of contaminated soil site-wide with pavement and buildings acting as a cap. • Institutional controls consisting of an environmental covenant to limit activities that could result in exposure to soil, and which outlines the required continued maintenance for the cap to soil concentrations exceeding protection of groundwater. • *In situ* groundwater treatment using EISB at the Building 17-07 Property Boundary focus area *(conceptual design: 1,120-foot long injection row with 33 injection well clusters [35-foot centers] targeting all groundwater zones [SZ, IZ, DZ] will consist of 5 injection events performed every 4 years over a span of 20 years of active treatment followed by 10 years of sustained treatment due to endogenous decay and donor back diffusion).* • Remediation of groundwater through naturally occurring biotic and abiotic degradation and other attenuation processes (MNA). Continued monitoring with routine groundwater sampling.	Enhanced *in situ* bioremediation injection at Algona, Property Boundary, and Outlet Collection focus areas and MNA for the entire plume: The Algona and 17-07 Property Boundary treatments in Alternative D7 plus: • Continue containment of contaminated soil site-wide with pavement and buildings acting as a cap. • Institutional controls consisting of an environmental covenant to limit activities that could result in exposure to soil, and which outlines the required continued maintenance for the cap to soil concentrations exceeding protection of groundwater. • *In situ* groundwater treatment using EISB in The Outlet Collection Focus Area *(conceptual design: 6 injection rows surrounding the building; one 385-foot long injection row on the west side of the building including 12 injection well clusters [35-foot centers] targeting all groundwater zones [SZ, IZ, DZ]; three 980-foot long injection rows located on the south side of the building including 29 injection well clusters for each row [35-foot centers] targeting all groundwater zones [SZ, IZ, DZ]; two 700-foot long rows on the north side of the building including 21 injection well clusters for each row [35-foot centers] targeting all groundwater zones [SZ, IZ, DZ]; will consist of 5 injection events performed over a span of 10 to 20 years of active treatment followed by 10 years of sustained treatment due to endogenous decay and donor back diffusion).* • Remediation of groundwater through naturally occurring biotic and abiotic degradation and other attenuation processes (MNA). Continued monitoring with routine groundwater sampling.
Point of Compliance - Soil:	Standard; Site-Wide (with institutional controls for residual soil contamination)	Standard; Site-Wide (with institutional controls for residual soil contamination)	Standard; Site-Wide (with institutional controls for residual soil contamination)	Standard; Site-Wide (with institutional controls for residual soil contamination)
Point of Compliance - Groundwater (a):	Standard; Site-Wide	Standard; Site-Wide	Standard; Site-Wide	Standard; Site-Wide

Notes:
(a) Although a standard site-wide point of compliance is currently included for each alternative; Boeing may seek Ecology approval for a CPOC downgradient of the release areas and possibly within the transition zone near Mill Creek. The final determination for a CPOC will be made during the development of the cleanup action plan.

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Table 5-1
AOC A-14 Summary of Supplemental Feasibility Study Remedial Alternatives Compliance with MTCA Threshold Requirements
Boeing Auburn Site
Auburn, Washington

SFS Alternative Number:	Alternative D1	Alternative D6	Alternative D7	Alternative D8
Description:	Site-Wide MNA	EISB at Algona Focus Area and MNA	EISB at Algona and 17-07 Property Boundary Focus Areas and MNA	EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and MNA
Compliance with MTCA Threshold Criteria (WAC 173-340-360[2][a])				
- Protect human health and the environment.	**Yes** - Alternative will protect human health and the environment through containment of contaminated soil and MNA of groundwater. No current concentrations exceeding site-specific health based risk thresholds.	**Yes** - Alternative will protect human health and the environment through containment of contaminated soil, treatment of groundwater in the Algona focus area, and MNA of groundwater. No current concentrations exceeding site-specific health based risk thresholds.	**Yes** - Alternative will protect human health and the environment through containment of contaminated soil, treatment of groundwater in the Algona and 17-07 Property Boundary focus areas, and MNA of groundwater. No current concentrations exceeding site-specific health based risk thresholds.	**Yes** - Alternative will protect human health and the environment through containment of contaminated soil, treatment of groundwater in the Algona, 17-07 Property Boundary, and Outlet Collection focus areas, and MNA of groundwater. No current concentrations exceeding site-specific health based risk thresholds.
- Comply with cleanup standards (WAC 173-360-700 through 760).	**Yes** - Containment and ICs used for soil not complying with pCULs; groundwater complies with pCULs after cleanup remedy is completed.			
- Comply with applicable state/federal laws (WAC 173-360-710).	**Yes** - Alternative complies with applicable laws (see Section 5.0 of this SFS report).			
- Provide for compliance monitoring (WAC 173-360-410).	**Yes** - Alternative includes provisions for compliance monitoring (soil cap monitoring for ICs and long-term routine groundwater monitoring during MNA and confirmation sampling).	**Yes** - Alternative includes provisions for compliance monitoring (soil cap monitoring for ICs and long-term routine groundwater monitoring during MNA and confirmation sampling).	**Yes** - Alternative includes provisions for compliance monitoring (soil cap monitoring for ICs and long-term routine groundwater monitoring during MNA and confirmation sampling).	**Yes** - Alternative includes provisions for compliance monitoring (soil cap monitoring for ICs and long-term routine groundwater monitoring during MNA and confirmation sampling).
Compliance with Other Requirements (WAC 173-340-360[2][b])				
Permanent Solutions to the Maximum Extent Practicable (WAC 173-340-360[3])				
- Permanent to the Maximum Extent Practicable.	**Yes** - See Disproportionate Cost Analysis (see Table 5-3).	**No** - See Disproportionate Cost Analysis (see Table 5-3).	**No** - See Disproportionate Cost Analysis (see Table 5-3).	**No** - See Disproportionate Cost Analysis (see Table 5-3).
Reasonable Restoration Time Frame (WAC 173-340-360[4][b])				
- Provide for a reasonable restoration time frame.	**Yes (Groundwater pCULs)** - Restoration time frame is approximately **30 years** to meet groundwater pCULs. **No (SWQS in groundwater)** - Long-restoration time frame is approximately **100 years** to meet SWQS in groundwater.	**Yes (Groundwater pCULs)** - Restoration time frame is approximately **30 years** to meet groundwater pCULs. **No (SWQS in groundwater)** - Long-restoration time frame is approximately **100 years** to meet SWQS in groundwater.	**Yes (Groundwater pCULs)** - Restoration time frame is approximately **29 years** to meet groundwater pCULs. **No (SWQS in groundwater)** - Long-restoration time frame is approximately **97 years** to meet SWQS in groundwater.	**Yes (Groundwater pCULs)** - Restoration time frame is approximately **25 years** to meet groundwater pCULs. **No (SWQS in groundwater)** - Long-restoration time frame is approximately **85 years** to meet SWQS in groundwater.
- Potential risk to human health and environment (1).	**Low**. Contaminated soil concentrations do not exceed direct-contact CULs. Contaminated stormwater and groundwater are not being used as drinking water. There are no current risks to human health and the environment from the contaminants present at the site.	**Low/Moderate.** Contaminated soil concentrations do not exceed direct-contact CULs. Contaminated stormwater and groundwater are not being used as drinking water. There are no current risks to human health and the environment from the contaminants present at the site. Implementation of groundwater cleanup activities and the large amount of injected donor needed to treat the downgradient focus areas could cause electron donor to enter stormwater piping or come to the surface.	**Low/Moderate.** Contaminated soil concentrations do not exceed direct-contact CULs. Contaminated stormwater and groundwater are not being used as drinking water. There are no current risks to human health and the environment from the contaminants present at the site. Implementation of groundwater cleanup activities and the large amount of injected donor needed to treat the downgradient focus areas could cause electron donor to enter stormwater piping or come to the surface.	**Low/Moderate.** Contaminated soil concentrations do not exceed direct-contact CULs. Contaminated stormwater and groundwater are not being used as drinking water. There are no current risks to human health and the environment from the contaminants present at the site. Implementation of groundwater cleanup activities and the large amount of injected donor needed to treat the downgradient focus areas could cause electron donor to enter stormwater piping or come to the surface.
- Practicability of achieving shorter restoration time frame.	No practicable alternatives allow for significant reduction in restoration time frame because of heterogeneity of aquifer/saturated soil matrix and life stage of the CVOC plumes. CVOC plume concentrations primarily driven by back-diffusion.			
- Current use of Site, surrounding area, and associated resources that are, or may be affected by releases from the Site.	Onsite: Industrial Surrounding areas: Industrial, Commercial, Residential Resources: Stormwater (2)			

Table 5-1
AOC A-14 Summary of Supplemental Feasibility Study Remedial Alternatives Compliance with MTCA Threshold Requirements
Boeing Auburn Site
Auburn, Washington

SFS Alternative Number:	Alternative D1	Alternative D6	Alternative D7	Alternative D8
Description:	Site-Wide MNA	EISB at Algona Focus Area and MNA	EISB at Algona and 17-07 Property Boundary Focus Areas and MNA	EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and MNA
- **Potential future use of Site, surrounding area, and resources that are, or may be, affected by releases from the Site.**	Onsite: Industrial Surrounding areas: Industrial, Commercial, Residential Resources: Groundwater as drinking water and surface water as drinking water			
- **Availability of alternative water supplies.**	**Yes**. The Site is located within the Auburn/Algona/Pacific city limits, which are supplied by municipal water supplies.			
- **Likely effectiveness/reliability of institutional controls. (1)**	**High**. Site is fenced and access-controlled industrial site.			
- **Ability to monitor migration of hazardous substances. (1)**	**High**. Appropriate groundwater monitoring network is present and will be supplemented, as necessary, to adequately monitor groundwater after implementation.	**Moderate**. Appropriate groundwater monitoring network is present and will be supplemented, as necessary, to adequately monitor groundwater after implementation. However, remediation activities closer to stormwater/surface water features could cause increases of TOC to migrate to stormwater/surface water bodies and be difficult to monitor.	**Moderate**. Appropriate groundwater monitoring network is present and will be supplemented, as necessary, to adequately monitor groundwater after implementation. However, remediation activities closer to stormwater/surface water features could cause increases of TOC to migrate to stormwater/surface water bodies and be difficult to monitor.	**Moderate**. Appropriate groundwater monitoring network is present and will be supplemented, as necessary, to adequately monitor groundwater after implementation. However, remediation activities closer to stormwater/surface water features could cause increases of TOC and naturally occurring metals to migrate to stormwater/surface water bodies and be difficult to monitor.
- **Toxicity of hazardous substances at the site. (1)**	Contaminant and media dependent - Soil (dermal contact): L**ow** Water (drinking water/surface water beneficial uses): L**ow to moderate**			
- **Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Site or under similar conditions.**	**High**; natural attenuation has been proven to be an active natural process that reduces concentrations of TCE and reductive dechlorination breakdown products at the site.			
Consider Public Concerns (WAC 173-340-600[13])				
- Consider public concerns.	**Yes** - Public notice and public comment period will be provided for review of the FS/CAP. No comments from public with concerns about site cleanup alternatives have been received. However, assumptions about public concerns are taken into account in the Disproportionate Cost Analysis (See Table 5-3)			

Notes:
(1) Ratings used: Low, Moderate, or High.
(2) Stormwater is not required to meet pCULs until the final discharge point of the stormwater into surface water bodies.

Abbreviations and Acronyms:
CAP = cleanup action plan
CULs = cleanup levels (specifically referencing general MTCA cleanup levels rather than proposed cleanup levels developed as part of the feasibility study)
CVOC = chlorinated volatile organic compound
EISB = enhanced *in situ* bioremediation
ICs = institutional controls
FS = feasibility study
MNA = monitored natural attenuation
MTCA = Model Toxics Control Act
pCUL = proposed cleanup level
SFS = supplemental feasibility study
SWQS = surface water quality standards
TCE = trichloroethene
TOC = total organic carbon
WAC = Washington Administrative Code

Table 5-2
AOC A-14 Supplemental Feasibility Study Disproportionate Cost Analysis Relative Benefits Ranking Considerations
Boeing Auburn Site
Auburn, Washington

SFS Alternative Number:		Alternative D1		Alternative D6		Alternative D7		Alternative D8	
SFS Alternative Name:		Site-wide MNA		EISB at Algona Focus Area and MNA		EISB at Algona and 17-07 Property Boundary Focus Areas and MNA		EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and MNA	
Relative Benefits Ranking for DCA									
Evaluation Criteria: WAC 173-340-360(3)(f)	Weighting Factor	Benefit Score	Ranking Considerations (1)	Benefit Score	Ranking Considerations (1)	Benefit Score	Ranking Considerations (1)	Benefit Score	Ranking Considerations (1)
- Overall Protectiveness *(subsection [i])*	30%	5	**Good** • ICs and containment to limit infiltration of water and direct human contact with contaminated soil. • Current risks to human health and the environment do not exceed site-specific health based thresholds; therefore, protectiveness is not appreciably greater through remedy implementation. • Time required to meet SWQS in groundwater is extensive.	5	**Good** • ICs and containment to limit infiltration of water and direct human contact with contaminated soil. • Current risks to human health and the environment do not exceed site-specific health based thresholds; therefore, protectiveness is not appreciably greater through remedy implementation. • Time required to meet SWQS in groundwater is extensive.	5	**Good** • ICs and containment to limit infiltration of water and direct human contact with contaminated soil. • Current risks to human health and the environment do not exceed site-specific health based thresholds; therefore, protectiveness is not appreciably greater through remedy implementation. • Time required to meet SWQS in groundwater is extensive.	5	**Good** • ICs and containment to limit infiltration of water and direct human contact with contaminated soil. • Current risks to human health and the environment do not exceed site-specific health based thresholds; therefore, protectiveness is not appreciably greater through remedy implementation. • Time required to meet SWQS in groundwater is extensive.
- Permanence *(subsection [ii])*	20%	7.5	**Excellent** • Contaminated soil left in place at the Facility; however, no concentrations above direct-contact CULs. • MNA will result in site-wide contaminant mass destruction; routine groundwater monitoring conducted until pCULs are met. • Treatment is actively taking place via natural processes and the effectiveness of those natural processes will be monitored during implementation of the cleanup.	8	**Excellent** • Contaminated soil left in place at the Facility; however, no concentrations above direct-contact CULs. • Implementation of EISB at Algona focus area will remove impacts of contaminated groundwater in those areas; however, other areas still affect site restoration time frames. • Contaminant mass is more rapidly decreased in limited areas with treatment, but does not result in decreased site-wide restoration time frames. • MNA will result in site-wide contaminant mass destruction; routine groundwater monitoring conducted until pCULs are met.	8.5	**Excellent/Superior** • Contaminated soil left in place at the Facility; however, no concentrations above direct-contact CULs. • Implementation of EISB at Algona and 17-07 Property Boundary focus areas will remove impacts of contaminated groundwater in those areas; however, other areas still affect site restoration time frames. • Contaminant mass is more rapidly decreased in limited areas with treatment, but does not result in significantly decreased restoration time frames. • MNA will result in site-wide contaminant mass destruction; routine groundwater monitoring conducted until pCULs are met.	9	**Superior** • Contaminated soil left in place at the Facility; however, no concentrations above direct-contact CULs. • Implementation of EISB at Algona, 17-07 Property Boundary, and Outlet Collection focus areas will remove impacts of contaminated groundwater in those areas; however, other areas still affect site restoration time frames. • Contaminant mass is more rapidly decreased in limited areas with treatment, but does not result in significantly decreased restoration time frames. • MNA will result in site-wide contaminant mass destruction; routine groundwater monitoring conducted until pCULs are met.
- Long-Term Effectiveness *(subsection [iv])*	20%	7	**Excellent/ (3) Fair if SWQS required** • ICs and cap will be effective in minimizing leaching to groundwater from and direct human contact with contaminated soil. • Long-term groundwater treatment effectiveness relies on natural degradation and attenuation processes for *in situ* destruction and detoxification of contaminants to reach pCULs in groundwater. MNA is proven to be effective at the Site; many wells are below pCULs and concentrations throughout the site are decreasing. • Technical ability for any treatment to approach SWQS in groundwater very uncertain; however, MNA may achieve after extensive time frame.	7	**Excellent/ (3) Fair if SWQS required** • ICs and cap will be effective in minimizing leaching to groundwater from and direct human contact with contaminated soil. • Long-term groundwater treatment effectiveness relies on natural degradation and attenuation processes for *in situ* destruction and detoxification of contaminants to reach pCULs in groundwater. MNA is proven to be effective at the Site; many wells are below pCULs and concentrations throughout the site are decreasing. • Technical ability of EISB to approach SWQS in groundwater very uncertain and not probable for site-wide groundwater; however, MNA may achieve after extensive time frame.	7	**Excellent/ (3) Fair if SWQS required** • ICs and cap will be effective in minimizing leaching to groundwater from and direct human contact with contaminated soil. • Long-term groundwater treatment effectiveness relies on natural degradation and attenuation processes for *in situ* destruction and detoxification of contaminants to reach pCULs in groundwater. MNA is proven to be effective at the Site; many wells are below pCULs and concentrations throughout the site are decreasing. • Technical ability of EISB to approach SWQS in groundwater very uncertain and not probable for site-wide groundwater; however, MNA may achieve after extensive time frame.	7	**Excellent/ (3) Fair if SWQS required** • ICs and cap will be effective in minimizing leaching to groundwater from and direct human contact with contaminated soil. • Long-term groundwater treatment effectiveness relies on natural degradation and attenuation processes for *in situ* destruction and detoxification of contaminants to reach pCULs in groundwater. MNA is proven to be effective at the Site; many wells are below pCULs and concentrations throughout the site are decreasing. • Technical ability of EISB to approach SWQS in groundwater very uncertain and not probable for site-wide groundwater; however, MNA may achieve after extensive time frame.

Table 5-2
AOC A-14 Supplemental Feasibility Study Disproportionate Cost Analysis Relative Benefits Ranking Considerations
Boeing Auburn Site
Auburn, Washington

SFS Alternative Number:			Alternative D1		Alternative D6		Alternative D7		Alternative D8	
SFS Alternative Name:			**Site-wide MNA**		**EISB at Algona Focus Area and MNA**		**EISB at Algona and 17-07 Property Boundary Focus Areas and MNA**		**EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and MNA**	
Relative Benefits Ranking for DCA										
- Manageability of Short-Term Risk *(subsection [v])*	**10%**	**10**	**Superior** • Minimal worker health risk from contact with contaminated media during ongoing groundwater sampling.	**4**	**Fair** • Minor worker health and safety risk for drilling equipment operation and from contact with contaminated media during drilling and installation of EISB systems; will be completed by HAZWOPER-certified drillers and contractors. • Operation of pumps and equipment for time during bio-injection events (each event in the Algona focus area is anticipated to last 6 weeks) present additional risks to workers. • Minimal worker health risk from contact with contaminated media during ongoing groundwater sampling. • Moderate short-term risks from implementation of groundwater remediation closer to stormwater features causing possible TOC addition to Chicago Avenue ditch.	**3.5**	**Fair** • Minor worker health and safety risk for drilling equipment operation and from contact with contaminated media during drilling and installation of EISB systems; will be completed by HAZWOPER-certified drillers and contractors. • Operation of pumps and equipment for time during bio-injection events (each event in the 17-07 property boundary focus area is anticipated to last 18 weeks) present additional risks to workers. • Minimal worker health risk from contact with contaminated media during ongoing groundwater sampling. • Moderate short-term risks from implementation of groundwater remediation closer to stormwater features causing possible TOC addition to Chicago Avenue ditch. • Moderate short-term risks from implementation near the 17-07 property boundary (work will occur in high-traffic area near active facility).	**1**	**Poor** • Minor worker health and safety risk for drilling equipment operation and from contact with contaminated media during drilling and installation of EISB systems; will be completed by HAZWOPER-certified drillers and contractors. • Operation of pumps and equipment for long periods of time during extensive bio-injection events (each event in The Outlet Collection focus area is anticipated to last 1.5 years) present additional risks to workers. • Minimal worker health risk from contact with contaminated media during ongoing groundwater sampling. • Moderate short-term risks from implementation of groundwater remediation closer to stormwater features causing possible TOC addition to Chicago Avenue ditch. • Moderate short-term risks from implementation near the 17-07 property boundary and Outlet Collection Mall (work will occur in high-traffic area near active facility or active commercial area). • Moderate short-term risks from implementation of groundwater remediation closer to stormwater/surface water features that could create reduced water conditions and cause higher concentrations of naturally occurring metals (iron, manganese, and arsenic) and migrate to stormwater/surface water features.
- Implementability *(subsection [vi])*	**10%**	**10**	**Superior** • Technical implementation uncomplicated; continued routine groundwater monitoring until pCULs are met. • Administration implementation includes filing ICs.	**6**	**Good** • Technical implementation challenges: - complicated at active buildings and other actively used properties due to installation of injection wells and the area required for mixing and injection of EISB materials. - Needed locations for injection wells may not be accessible due to location of buildings, infrastructure, off-property access restrictions. - Proper treatment of groundwater provides technical challenges (achieving adequate distribution and contact of injectate, difficulties to inject in low-permeability zones, and challenges with injection solution mounding and entering subsurface utilities). - Long- term O&M of injection wells and treatment system may present challenges such as rehabilitation of injection/extraction wells. • Administration implementation challenges include permitting for injection (UIC permit), and off-property site access/access agreements.	**5**	**Good** • Technical implementation challenges: - complicated at active buildings and other actively used properties due to installation of injection wells and the area required for mixing and injection of EISB materials. - Needed locations for injection wells may not be accessible due to location of buildings, infrastructure, off-property access restrictions. - Proper treatment of groundwater provides technical challenges (achieving adequate distribution and contact of injectate, difficulties to inject in low-permeability zones, and challenges with injection solution mounding and entering subsurface utilities). - Long- term O&M of injection wells and treatment system may present challenges such as rehabilitation of injection/extraction wells. • Administration implementation challenges include permitting for injection (UIC permit), and off-property site access/access agreements.	**1**	**Poor** • Technical implementation challenges: - complicated at active buildings and other actively used properties due to installation of injection wells and the area required for mixing and injection of EISB materials. - Drilling and injection activities in publicly used parking areas and active areas around The Outlet Collection extremely difficult. - Needed locations for injection wells may not be accessible due to location of buildings, infrastructure, off-property access restrictions. - Proper treatment of groundwater provides technical challenges (achieving adequate distribution and contact of injectate, difficulties to inject in low-permeability zones, and challenges with injection solution mounding and entering subsurface utilities). - Long- term O&M of injection wells and treatment system may present challenges such as rehabilitation of injection/extraction wells. - Planned injection locations are closer to stormwater/surface water features and could cause water quality concerns due to increased solubility of natural metals (e.g., arsenic, iron, and manganese). • Administration implementation challenges include permitting for injection (UIC permit), and off-property site access/access agreements.

Table 5-2
AOC A-14 Supplemental Feasibility Study Disproportionate Cost Analysis Relative Benefits Ranking Considerations
Boeing Auburn Site
Auburn, Washington

SFS Alternative Number:		Alternative D1		Alternative D6		Alternative D7		Alternative D8	
SFS Alternative Name:		**Site-wide MNA**		**EISB at Algona Focus Area and MNA**		**EISB at Algona and 17-07 Property Boundary Focus Areas and MNA**		**EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and MNA**	
Relative Benefits Ranking for DCA									
- Consideration of Public Concerns *(subsection [vii])*	**10%**	**4**	**Fair** • Protective of human health and the environment. • Public may not understand that MNA is an active and protective treatment remedy. • Public comments/concerns will be addressed during FS/CAP public comment period(s).	**8**	**Excellent** • Protective of human health and the environment. • Public may appreciate that Algona focus area treatment is occurring, but not understand that MNA is an active and protective treatment remedy. • Additional public concerns may be created by extensive activity in public and commercial areas and near residential areas for Algona focus area treatments. • Public comments/concerns will be addressed during FS/CAP public comment period(s).	**8**	**Excellent** • Protective of human health and the environment. • Public may appreciate that Algona and Property Boundary focus area treatments are occurring, but not understand that MNA is an active and protective treatment remedy. • Additional public concerns may be created by extensive activity in public and commercial areas and near residential areas for Algona focus area treatments. • Public comments/concerns will be addressed during FS/CAP public comment period(s).	**6**	**Good** • Protective of human health and the environment. • Public may appreciate that Algona, 17-07 Property Boundary, and Outlet Collection focus area treatments are occurring, but not understand that MNA is an active and protective treatment remedy. • Additional public concerns may be created by extensive activity in public and commercial areas and near residential areas for Algona and Outlet Collection focus area treatments. • Public perception of risk at focus areas (Algona and The Outlet Collection) could cause false perception of environmental risk and create lost revenue for commercial businesses (within The Outlet Collection) impacted by treatment of focus areas. • Public comments/concerns will be addressed during FS/CAP public comment period(s).
Estimated Present Value Cost ($) *(subsection [iii])*	**pCULs**	**$2,300,000**		**$4,740,000**		**$11,200,000**		**$39,800,000**	
	SWQS in GW	**$9,610,000**		**$11,800,000**		**$18,100,000**		**$46,000,000**	
Overall Weighted Benefit Score		**6.8**	**Good/Excellent**	**6.3**	**Good/Excellent**	**6.25**	**Good/Excellent**	**5.5**	**Good**
Comparative Overall Benefit/Cost GW pCULs (2)		**6.8**		**3.1**		**1.3**		**0.3**	
Comparative Overall Benefit/Cost SWQS in GW (2)		**6.8**		**5.1**		**3.3**		**1.1**	

Notes:
(1) Ratings used: Poor (1-2), Fair (3-4), Good (5-6), Excellent (7-8), and Superior (9-10).
(2) Benefit/Cost Ratio calculated by dividing the overall weighted benefit score by the estimated remedy cost and scaled (multiplied) by lowest cost alternative cost in order to compare ranges similar in scale to comparative overall benefit, as presented on Figure 6-1 of this FS report.

Abbreviations and Acronyms:
% = percent
CAP = cleanup action plan
CULs = cleanup levels (specifically referencing general MTCA cleanup levels rather than proposed cleanup levels developed as part of the feasibility study)
DCA = disproportionate cost analysis
EISB = enhanced *in situ* bioremediation
FS = feasibility study
GW = groundwater
HAZWOPER = hazardous waste operations and emergency response
ICs = institutional controls
MNA = monitored natural attenuation
MTCA = Model Toxics Control Act
O&M = operation and maintenance
pCUL = proposed cleanup level
SWQS = surface water quality standards
TOC = total organic carbon
UIC = Underground Injection Control
WAC = Washington Administrative Code

Table 5-3
AOC A-14 Summary of Supplemental Feasibility Study Alternatives MTCA Relative Benefits Ranking
Boeing Auburn Site
Auburn, Washington

SFS Alternative Number and Name	Alternative D1				Alternative D6				Alternative D7				Alternative D8			
	Site-Wide MNA				EISB at Algona Focus Area and MNA				EISB at Algona and 17-07 Property Boundary Focus Area and MNA				EISB at Algona, 17-07 Property Boundary, and The Outlet Collection Focus Area and MNA			
Relative Benefits Ranking for Disproportionate Cost Analysis WAC 173-340-360(2)(b)(i) and WAC 173-340-36093)(f)																
Comparative Overall Benefit **(1)**		Score	Weighting Factor	Weighted Score		Score	Weighting Factor	Weighted Score		Score	Weighting Factor	Weighted Score		Score	Weighting Factor	Weighted Score
- Overall Protectiveness	Good	5	0.3	1.5	Good	5	0.3	1.5	Good	5	0.3	1.5	Good	5	0.3	1.5
- Permanence	Excellent	7.5	0.2	1.5	Superior	8	0.2	1.6	Superior	8.5	0.2	1.7	Superior	9	0.2	1.8
- Long-Term Effectiveness (3)	Excellent	7	0.2	1.4	Excellent	7	0.2	1.4	Excellent	7	0.2	1.4	Excellent	7	0.2	1.4
- Manageability of Short-Term Risk	Superior	10	0.1	1	Fair	4	0.1	0.4	Fair	3.5	0.1	0.35	Poor	1	0.1	0.1
- Implementability	Superior	10	0.1	1	Fair	6	0.1	0.6	Poor	5	0.1	0.5	Poor	1	0.1	0.1
- Consideration of Public Concerns	Fair	4	0.1	0.4	Excellent	8	0.1	0.8	Excellent	8	0.1	0.8	Good	6	0.1	0.6
Overall Weighted Benefit Score				**6.8**				**6.3**				**6.3**				**5.5**

Disproportionate Cost Analysis - Quantitative Evaluation

Overall Weighted Benefit Score	6.8	6.3	6.3	5.5
Estimated Remedy Present Value Cost to meet **GW pCULs**	$2,300,000	$4,740,000	$11,200,000	$39,800,000
Estimated Remedy Total Cost (Undiscounted) to meet **GW pCULs**	$2,460,000	$4,980,000	$12,100,000	$41,500,000
Relative Benefit/Cost Ratio (2) for **GW pCULs**	6.8	3.1	1.3	0.3
Estimated Remedy Present Value Cost to meet **SWQS in GW**	$9,610,000	$11,800,000	$18,100,000	$46,000,000
Estimated Remedy Total Cost (Undiscounted) to meet **SWQS in GW**	$11,700,000	$14,000,000	$20,900,000	$49,100,000
Relative Benefit/Cost Ratio (2) for **SWQS in GW**	6.8	5.1	3.3	1.1
Most Permanent Solution	No	No	No	No
Lowest Cost Alternative	**Yes**	No	No	No
Costs Disproportionate to Incremental Benefits	No	Yes	Yes	Yes
Remedy Permanent to the Maximum Extent Practicable?	**Yes**	No	No	No
Preferred Alternative	**Yes**	**No**	**No**	**No**

Cost of Lowest Present Value Cost Alternative (pCUL)	**$2,300,000**	**Cost of Lowest Present Value Cost Alternative (SWQS)**	**$9,610,000**
Benefit Score of Highest Ranked Alternative (pCUL)	**6.8**	**Benefit Score of Highest Ranked Alternative (SWQS)**	**6.8**
Cost of Highest Present Value Cost Alternative (pCUL)	**$39,800,000**	**Cost of Highest Present Value Cost Alternative (SWQS)**	**$46,000,000**

Notes:

(1) Ratings used: Poor (1-2), Fair (3-4), Good (5-6), Excellent (7-8), and Superior (9-10).

(2) Benefit/Cost Ratio calculated by dividing the overall weighted benefit score by the estimated remedy cost and scaled (multiplied) by lowest cost alternative cost in order to compare ranges similar in scale to comparative overall benefit, as presented on Figures 5-1 and 5-2 of this SFS report.

(3) The values provided in this section are assuming drinking water pCULs. If surface water standards are required in groundwater, this ranking would drop to 3 due to the uncertainty of meeting SWQS site-wide in groundwater with any treatment option.

Abbreviations and Acronyms:

EISB = enhanced *in situ* bioremediation
GW = groundwater
MNA = monitored natural attenuation
pCUL = proposed cleanup level
SFS = supplemental feasibility study
SWQS = surface water quality standards
WAC = Washington Administrative Code

Table 5-4
AOC A-14 Supplemental Feasibility Study Remedial Alternatives Cost Estimate Summary
Boeing Auburn Site
Auburn, Washington

SFS Alternative	Technology	Treatment to Meet Groundwater pCULs			Treatment to Meet SWQS in Groundwater		
		Length of Treatment (Years)	Total Cost (undiscounted)	Present Value Total Cost (a)	Length of Treatment (Years)	Total Cost (undiscounted)	Present Value Total Cost (1)
Alternative D1: Site-Wide MNA	MNA	30	$ 2,460,000	$ 2,300,000	100	$ 11,700,000	$ 9,610,000
	Total Cost		**$ 2,460,000**	**$ 2,300,000**		**$ 11,700,000**	**$ 9,610,000**
Alternative D6: EISB Algona Focus Area and Site-Wide MNA	Algona EISB	20 (b)	$ 2,740,000	$ 2,650,000	20 (b)	$ 2,740,000	$ 2,650,000
	MNA	30 (c)	$ 2,240,000	$ 2,090,000	100 (c)	$ 11,300,000	$ 9,170,000
	Total Cost		**$ 4,980,000**	**$ 4,740,000**		**$ 14,000,000**	**$ 11,800,000**
Alternative D7: EISB Algona and 17-07 Property Boundary Focus Areas and Site-Wide MNA	Algona EISB	20 (b)	$ 2,740,000	$ 2,650,000	20 (b)	$ 2,740,000	$ 2,650,000
	17-07 Property Boundary EISB	20 (b)	$ 7,220,000	$ 6,540,000	20 (b)	$ 7,220,000	$ 6,540,000
	MNA	29 (c)	$ 2,170,000	$ 2,030,000	97 (c)	$ 10,900,000	$ 8,940,000
	Total Cost		**$ 12,100,000**	**$ 11,200,000**		**$ 20,900,000**	**$ 18,100,000**
Alternative D8: EISB Algona, 17-07 Property Boundary, and The Outlet Collection Focus Areas and Site-Wide MNA	Algona EISB	20 (b)	$ 2,740,000	$ 2,650,000	20 (b)	$ 2,740,000	$ 2,650,000
	17-07 Property Boundary EISB	20 (b)	$ 7,220,000	$ 6,540,000	20 (b)	$ 7,220,000	$ 6,540,000
	The Outlet Collection EISB	10 to 20 (d)	$ 29,600,000	$ 28,800,000	10 to 20 (d)	$ 29,600,000	$ 28,800,000
	MNA	25 (c)	$ 1,890,000	$ 1,780,000	85 (c)	$ 9,550,000	$ 8,000,000
	Total Cost		**$ 41,500,000**	**$ 39,800,000**		**$ 49,100,000**	**$ 46,000,000**

Notes:

(a) Present value project costs for long-term operations, maintenance, and monitoring.
(Assume 0.4% discount rate - real discount, 30-year note, per Office of Management and Budget, Circular A-94 Appendix C, Revised Dec. 2019)
(b) Length of active treatment is assumed to last for 20 years, followed by 10 years of sustained treatment
(c) MNA timeframe is shown as the time expected to meet pCULs or SWQS; however, MNA parameter monitoring will begin after the EISB treatment is completed
(d) Length of active treatment is assumed to last for 10 to 20 years, followed by 10 years of sustained treatment
Detailed cost estimates are provided in Appendix F of this SFS.
Detailed information about assumed length of treatment is provided in Appendices C and D of this SFS

Abbreviations and Acronyms:

% = percent
EISB = enhanced *in situ* bioremediation
MNA = monitored natural attenuation
pCULS = proposed cleanup levels
SFS = supplemental feasibility study
SWQS = surface water quality standards