

March 8, 2019 DAT-2019-009

Mr. Dean Yasuda
Environmental Engineer
Department of Ecology, NW Region Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Subject: Boeing Response to Ecology's Questions Regarding

the Supplemental Feasibility Study Cost Estimates

Dear Mr. Yasuda:

Thank you for your February 12, 2019 letter pertaining to the cost estimates provided in Appendix C of the Supplemental Feasibility Study (FS) report dated November 29, 2018. The following provides responses to each of Ecology's comments and questions provided in Attachment A of the letter.

1. General Comments

- Response to Comment 1.a. Please see attached revised Cost Estimate Tables C-1a through C-1f,
 which include the requested sources of unit costs and cost data for each line item cost for point of
 compliance Options 1 through 5 (Attachment 1).
- Response Comment 1.b. Please see attached estimated project schedule for point of compliance Options 1 through 5 (Attachment 2).

2. Alternative 5. Remedial Design, Planning, and General (Indirect Costs)

- Response Comment 2.a. Engineering/Remedial Design costs were assumed to be 8% of the capital/construction costs of the project based on the US Environmental Protection Agency (EPA) Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-8, and an estimated total construction cost between \$2M and \$10M.
- Response Comment 2.b. Construction Management costs were assumed to be 6% of the
 capital/construction costs of the project based on the EPA Guide to FS Cost Estimates (EPA 540-R00-002, July 2000), Exhibit 5-8, and an estimated total construction cost between \$2M and \$10M.
- Response Comment 2.c. Project Management costs were assumed to be 5% of the total project
 costs based on the EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-8, and
 an estimated total construction cost greater than \$2M.
- **Response Comment 2.d.** Ecology oversight costs were assumed to be similar to the project management costs (5% of the total project costs).



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- 3. Alternative 5. Dynamic Groundwater Recirculation and Source Area EISB Remedial Action Construction Dynamic Groundwater Recirculation and Source Area Electron Donor Injections (Direct Costs)
 - Response Comment 3a. The unit costs for Line Items 7 and 8 (unit cost for shallow and deep DGR injection well installation) were inadvertently switched in the original Appendix C cost estimate tables. This has been corrected in the revised cost estimate tables in Attachment 1 (highlighted cells indicate where changes were made from original¹).
 - **Response Comment 3b-3f.** Line Items 14 through 18 have been revised to include sources and design assumptions for each unit cost estimate (see Attachment 1).
- 4. Alternative 5 Options 1 5. Annual Operation, Maintenance, Monitoring, and Reporting.
 - Response Comment 4a. Unit costs for "Groundwater sampling (during DGR)" for Options 2a and 2b include sampling all the same monitoring wells as the other options, but also include additional sampling points based on the unique nature of the conditional points of compliance included in these options. Specifically, Option 2a also includes sampling of the creek pore water samplers or drive point wells that would be installed in or adjacent to the creek under this option (see line item #7); and Option 2b includes sampling the additional monitoring wells that would be installed upgradient of the creek under this option (see Remedial Action Construction line item #10).
 - **Response Comment 4b.** Requested details are provided in the revised cost estimate tables in Attachment 1.
- 5. Alternative 5. Non-Routine Operation, Maintenance, Monitoring, and Reporting.
 - Response Comment 5a. The non-routine equipment replacement costs assume an approximate lifespan of 15 to 20 years for major system equipment and components (e.g., blower, discharge pump, well pumps, GAC vessels, PLC and other electrical equipment). The \$200,000 "unit cost" for this line item represents the potential cost to replace one or more of these pieces of equipment if they fail during this approximate lifespan estimate (i.e. it is not based on a specific planned replacement schedule for any given piece of equipment). Therefore, the number of replacement "events" is estimated based on the total estimated project lifecycle under each Option (i.e. 1 event for Options 1, 2a, 2b, 3 [approximate 15- to 24-year project lifecycles]; 2 events for Option 4 [approximate 34-year project lifecycle]; 2.5 events for Option 5 [approximate 44-year project life cycle), and also takes into consideration that some of the GET system equipment will have already been in operation for approximately 6 to 10 years prior to DGR system implementation).
 - Response Comment 5b. Presumed discount rate of 0.6% is per the Office of Management and Budget, Circular A-94 Appendix C, Revised February 2018 (real interest rates/discount rates for 30year notes) consistent with Section 4.3 of the EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000).
 - **Response Comment 5c.** Requested details are provided in the revised cost estimate tables in Attachment 1.

¹ Note that other minor corrections/changes in the spreadsheets made from original are also identified by highlighting.



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• Response Comment 5d. As explained in Section 4.3.3 of the SFS, Options 4 and 5 cost estimates assume that the downgradient cleanup of groundwater on the Boeing property to the Surface Water Quality Standards (SWQS) will directly depend on completion of source area cleanup. Therefore, in order to minimize migration of TCE that may still be originating from the source area at concentrations over the SWQS, portions of the DGR system (e.g., GET system extraction wells) may need to continue to be operated until, and potentially several years after, the source area cleanup is completed (even after DGR has functionally cleaned up the downgradient portion of the plume) to achieve cleanup at the points of compliance for Options 4 and 5. Whereas, Options 1, 2a, 2b, and 3 would not be dependent upon achieving the SWQS in or immediately downgradient of the source area to achieve compliance at their respective (substantially farther downgradient) points of compliance and, therefore, it would not be necessary to continue operation of the GET system extraction wells for these Options after achieving the cleanup levels.

We hope that this letter and associated attachments provides Ecology with sufficient information to complete its review of the cost estimates.

Please contact me if you have any questions.

Sincerely,

Debbie Taege Project Manager

Boeing EHS Remediation deborah.a.taege@boeing.com

Cell phone (818) 720-5575

CC:

Raman Iyer, Christa Colouzis, Thea Levkovitz, Department of Ecology Ivy Anderson, Assistant Attorney General, Attorney for Department of Ecology

Katie Moxley, Stanley Alpert, the Boeing Company

Mike Dunning, Perkins Coie

Mike Palacios, Heather Griffin, Mark Sadler, Wendy McClure, City of Everett

Scott Lathrop, Exotic Tool Welding Inc.

Roger Hoot, Dianne Riter, BBNC

Edgar Wellbaum, Well Energy Corp

Greg Bertch, Bertch Capital Partners

Kristin Paul, Benjamin Hochron, PGIM Real Estate

Chuck Wiegman, JSH Properties

Robert List, MMA Environmental

Dr. Tong Li, Groundwater Solutions



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ATTACHMENTS

Attachment A – Revised Cost Estimate Tables C-1a through C-1f Attachment B – Estimated Project Schedule for Point of Compliance Options 1 through 5

REFERENCES

Ecology Questions Regarding the Supplemental Feasibility Study Report – Cost Estimate Tables. Letter from Dean Yasuda (Ecology) to Debbie Taege (Boeing), dated February 12, 2019.

Agency Review Draft, Supplemental Feasibility Study Report, BCA Everett Plant – Powder Mill Gulch, Everett, Washington, dated November 19, 2018.

Revised Cost Estimate Tables C-1a through C-1f

ALTERNATIVE 5 DYNAMIC GROUNDWATER RECIRCULATION AND SOURCE AREA EISB POINT OF COMPLIANCE OPTION: OPTION 1 - GROUNDWATER AND SURFACE WATER STANDARD POCS

Explanation of POC Option: Drinking water standard (4 μ g/L TCE) to be met in monitoring wells throughout the groundwater TCE plume and the SWQS (0.3 μ g/L TCE) to be met in creek water sampling points immediately above the creek bed.

POC Option 1 Existing monitoring well network sufficient for monitoring groundwater POC

 Specific
 2
 Existing surface water sampling locations will be used for monitoring surface water POC

 Assumptions
 3
 DGR system will be operated for 15 years for downgradient plume cleanup

			DETAILED COST ESTIMA	TE					COST	BASIS
	G .	T. "			***	TT. *	2.6.4	75.4.1	Source/Basis of Unit Costs and Cost Data	
<u> </u>	Category	Item#	Description	Quantity	•	Uni	it Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
		1 1	REMEDIAL DESIGN, PLANNING, AND GENE Engineering/Proj Mgmt/Const Mgmt/Reporting	KAL (Indired	t Costs)	1				
		2	Cleanup action plan	1	LS	S	30,000	\$ 30.0	00 Assumed level of effort based on prior experience	
		3	Permits	1	LS	\$	30,000	\$ 30,0		UIC permit, major modification to NPDES permit, access agreements
									1	construction permits
		4	Negotiate and implement institutional controls	0	LS	\$	10,000	\$ -		
		5	Contract documents and contractor bidding/procurement	1	LS	\$	20,000	\$ 20,0		
-		6	Cleanup action construction report/O&M manual Engineering/Remedial Design	8%	LS pct	\$ 6 4	30,000	\$ 30,0 \$ 328,4		Assume ~8% of capital costs
		8	Construction management/oversight	6%	pct		105,000	\$ 246.3		Assume ~8% of capital costs Assume ~6% of capital costs
		9	Project management	5%	pct		595,700	\$ 629,7		Assume ~5% of project costs
		10	Ecology oversight	5%	pct		595,700	\$ 629,7		Assume ~5% of project costs
			nning, and General Costs					\$ 1,944,3		
			ed Engineering Services (%)	15%	pct	\$1	,944,300			
TO	TAL INDIRECT	COST			ı	T		\$2,236,	000	
	Category	Item#	Description	Quantity	Unit	Uni	it Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
	REMED		ION CONSTRUCTION - DGR SYSTEM AND ELEC	TRON DONG		TIONS				
			Contractor mobilization/demobilization	1	LS	\$	30,000	\$ 30,0		
		2 [OGR pilot study	1	LS	\$	80,000	\$ 80,0	Assumed level of effort for 1 year pilot study (construction costs included below)	Assume 1 full time field tech, 10 hour days, plus travel/field equip
										(\$1,500/day), four days per month for 1 year, includes monitoring, s
		1	nstall injection and extraction wells/distribution system			+				reconfigurations, sampling, plus lab costs and data evaluation and re
		3	Utility locate	1	LS	\$	2,500	\$ 2,5	00 Local utility locator rates = \$85 - \$100/hr	Assume 3 days total for utility locates for drilling, trenching
		4	Site prep/clearing/grubbing	1	LS	\$	75,000	\$ 75,0	00 Assumed level of effort based on prior experience; prep roads/trails to well	Prep roads/trails to well drilling and other construction locations
		5	Driller mobilization/demobilization	1	LS	\$	3,000		00 Typical mobilization rate for local drillers	
		6	Drilling - DGR extraction well installation	4	well	\$	20,000	\$ 80,0	00 Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 extraction wells, 6" stainless steel, to average 50 ft. (15 ft screens)
		-	Dan Bobins and the control of	.		Φ.	15,000	A 50.0	wells	start card, drilling, well construction materials
		/	Drilling - DGR injection well installation (shallow)	4	well	\$	15,000	\$ 60,0	Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 injection wells, 4" carbon steel, to average 55 ft. (30 ft screens), in start card, drilling, well construction materials
		8	Drilling - DGR injection well installation (deep)	8	well	\$	26,000	\$ 208,0	O Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	Start card, drining, wen construction materials 8 injection wells ,4" carbon steel, to avg 140 ft. (30 ft screens), includered, drilling, well construction materials
		9	Drilling - monitoring wells for DGR monitoring	4	well	\$	12,000	\$ 48,0		4 monitoring wells, 2" pvc to average 55 ft (5 ft screens), includes st drilling, well construction materials
		10	IDW disposal	60	Drums	\$	200	\$ 12,0		Average per drum disposal cost plus labor
		11	Well vaults, pumps, air vac assemblies	1	LS		210,000	\$ 210,0		4 submersible pumps w/controls, 16 well vaults, 12 air-vac assembli
		12	Transfer tank, valving, and pump with controls	1	LS	\$	18,000	\$ 18,0		500-gallon double-walled poly tank; Tsurumi high volume/high hea
		13	Directional drilling for pipe/conduit up to ridge	1	LS	\$	100,000	\$ 100,0	00 Directed Technologies Drilling quote	Approx. 660 LF, elevation change of approx. 150 ft
		14	Water line, electrical, communications trenching	4200	LF	\$	16	\$ 67,2	J 1 0 11	Trenching, bedding, backfill, assumed trench length of 4200 ft
		15	Water piping	4200	LF	\$	60	\$ 252,0	J 1 0 11	HDR 11, includes connection to existing conveyance system
\vdash		16	District and other	2400	LF	\$	15	¢ 100.0	median cost for similar scope of work Glacier Environmental - approx. cost based on prior similar installations	Electrical forms around a second and a second as a second as
		10	Electrical conduit and cable	2400		Ť	45	\$ 108,0		Electrical from power drops and connections to existing power nea wells, and from existing panels to new extraction wells
		17	Communications conduit and cable	4200	LF	\$		\$ 273,0		Communications from control panel to injection wells and new extr wells
		18	Trench repaving/restoration	20000	SF	\$	5	\$ 100,0	00 WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx. median cost for similar scope of work	Assume approx. 4 ft width x 4200 LF, plus additional 3,000 SF arous ubsurface infrastructure; 18 inch paving and base cours sections
		19	Electrical equipment upgrades/transformer/electrician	1	LS	\$	70,000	\$ 70,0	00 Estimate based on original SnoPUD transformer installation	Install 1 new/replacement transformer
		20	Instrumentation and controls; control panels	1	LS	\$	150,000	\$ 150,0	OO Automation & Control/System's Interface - estimates	Level meters, flow meters, pressure meters, controls instrumentation installation, programming and startup for new injection and extraction
		21	GAC polishing vessels	2	each	\$	12,500	\$ 25,0	00 Pacific Coast Carbon - estimate	2 x 2,000 lb liquid phase GAC vessels plus concrete pad and plumb
		22	DGR system startup and testing	1	LS	\$	20,000	\$ 20,0	00 Assumed level of effort based on prior experience	
—			EISB injection well installation							
_		23	Utility locate/clearing	1	LS	\$	1,000		00 Local utility locator rates = \$85 - \$100/hr	
		24	Driller mobilization/demobilization	1	LS	\$	3,000	\$ 3,0	21 21	9 injection walls 2" steel enging to 70 ft 9 injection walls 50 ft
		25	Drilling - injection wells (detention basin hotspot)	24	wells	\$	4,000	\$ 96,0	00 Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	8 injection wells, 2" steel casing to 70 ft., 8 injection wells to 50 ft. 30 ft. (20 ft screens) Includes start card, drilling, well construction

Table C-1a Comparison of Point of Compliance Costs Boeing Everett - PMG SWMU

ost		1	DETAILED COST ESTIMAT	E	1	1			COST B	ASIS
pe pe	Category	Item#	Description	Quantity	Unit	Unit	Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
		27		70	Drums	\$	200	\$ 14,000	Stericycle - average per drum disposal cost plus labor	
		28	Injection of Electron Donor	75	,	•	3,000	¢ 225,000		Assume 3 injection events
		28	injection ere without	1	days LS	\$	25.000	\$ 225,000 \$ 25,000		Assume 2 to 3 FTE for 5 weeks (10 hrs/day) per injection event Pumps, mixing tanks, hoses, fittings, trailer
		30		3	event		20,000	\$ 60,000	Assumed level of effort based on prior experience	Water tank rental, other rental equipment and materials
		31	Water for injection events	285000	gal	\$	0.03	\$ 8,550	Assumed level of effort based on prior experience	Assume 95K gal per event at \$0.03/gal
		32		36000	lbs	\$	2	\$ 54,000	, , , , , , , , , , , , , , , , , , ,	Assume 12K lbs per event at \$1.50/lb
	Subtotal Remedial A		Site Restoration - slope/buffer plantings, general cleanup	1	LS	\$	25,000	\$ 25,000 \$ 2,527,300	Glacier Environmental - approx. cost based on prior similar work	
			Unlisted Engineering Services (%)	25%	pct	\$2,5	527,300	\$ 631,800	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5-7	Assumed bid contingency (10% - low end) and scope contingency (15 end groundwater treatmnet and soil excavation)
	Contractor Bond Fee			20%	pct	\$2,6	693,375	\$ 538,700	Standard	Applied to contractor and driller costs only (not injection related costs
	Washington State Sa		%)	9.2%	pct	\$ 3,2	32,075	\$297,400	City of Everett/State sales tax rate	Applied to contractor and driller costs
	TOTAL DIRECT (COST	I	ı	1			\$3,995,000		
	Category	Item #	Description	Quantity	Unit	Unit	Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			ANNUAL OPERATION, MAINTENANCE, MONITORI	NG, AND I	REPORTI					
		1	Electrical usage		yr		44,500	\$ 44,500		Approx. 98 hp of equip. (1743 kw*hr/day x \$0.07/kw-hr x 365 days/yr
		2	Cell phone/GET system remote access charges		mo	\$	369	\$ 4,428	Frontier commercial rate	\$369/month x 12 mo. service for autodialer, alarms, etc
		3	Carbon usage	1	yr	\$	9,600	\$ 9,600	Evoqua - estimate; assumed usage rate based on prior consumption	assume 1 changeout (3,000 lbs GAC) every other year at \$9600 per changeout, incl GAC profiling, plus disposal as haz waste
		4	System monitoring/NPDES reporting	1	vr	\$	20.000	\$ 20,000		Includes monthly air and water influent/effluent sampling and NPDES
		5	DGR system O&M labor and cost		yr		95,000	\$ 95,000	Assumed level of effort based on prior experience	Assume 1 FTE, 10 hour days, plus travel/field equip (\$1,500/day), for
									1 1	per month, includes general maintenance and monitoring, response to
										minor equipment repair and replacement, annual bridge crane inspecti
		6	NPDES annual renewal fee	1	yr	\$	20,137	\$ 20,137	Per WAC 173-224-040 fees - 2019 schedule	Per WAC 173-224-040 fee 2019 schedule (Non-LUST Hazardous Wa
										Cleanup Site; >2 contaminants)
		7	Groundwater sampling (during DGR)		yr	\$	65,000	\$ 65,000		Annual sampling for VOCs (155 wells)
		8	Groundwater elevation monitoring (during DGR) Surface water sampling (during DGR)		yr	\$	8,000	\$ 8,000		Annual water levels (155 wells)
		10			yr	\$	8,000	\$ 8,000	, , , , , , , , , , , , , , , , , , ,	Annual sampling for VOCs (17 surface water sampling points)
	Subtotal Annual O	10 M&M an	Reporting		yr	\$	15,000	\$ 15,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points)
	Subtotal Annual OM Annual Monitoring O	M&M an	Reporting						, , , , , , , , , , , , , , , , , , ,	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each)
		M&M an	Reporting d Reporting Cost	1	yr	\$2	15,000	\$ 15,000 \$ 289,700	Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on
	Annual Monitoring O	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST	20% 15	yr pct	\$2	15,000 289,700	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations)
	Annual Monitoring O	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring	20% 15	yr pct	\$2	15,000 289,700	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000	Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on
	Annual Monitoring O	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST	20% 15	yr pct yrs	\$2	15,000 289,700 347,600	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations)
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Presumed Discount Rate Description	20% 15 0.6% Quantity	pct yrs pct Unit	\$2 \$3 Unit	15,000 289,700 347,600	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Annual Reporting Cost Presumed Discount Rate	20% 15 0.6% Quantity ORING, AM	pct yrs pct Unit	\$2 \$3 Unit	15,000 289,700 347,600 Cost	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points)
Citation	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Annual Monitoring ND REPORTING COST Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO	20% 15 0.6% Quantity ORING, AN	pct yrs pct Unit	\$3 Unit	15,000 289,700 347,600 Cost	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST MAN AND REPORTING COST Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters)	20% 15 0.6% Quantity ORING, AN	pct yrs pct Unit D REPO	\$2 \$3 Unit RTING \$ \$ 2	15,000 289,700 347,600 Cost 73,000 00,000 95,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST EM and Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling	20% 15 0.6% Quantity ORING, AN	pct yrs pct Unit DREPO! event event yr event	Unit RTING \$ 20	15,000 289,700 347,600 Cost 73,000 00,000 95,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 780,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells)
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater elevation monitoring	20% 15 0.6% Quantity DRING, AN 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	pct yrs pct Unit D REPO event event yr event event	\$2 \$3 Unit RTING \$ \$ 2	289,700 347,600 Cost 73,000 00,000 95,000 8,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 780,000 \$ 96,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeline and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells)
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling Quarterly surface water sampling	20% 15 0.6% Quantity DRING, AN 1 1 1 21 12 12 12	pct yrs pct Unit D REPO event event yr event event event event	\$2 \$3 \$2 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4	15,000 289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 285,000 \$ 96,000 \$ 96,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points)
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater elevation monitoring	20% 15 0.6% Quantity DRING, AN 1 1 1 21 12 12 12	pct yrs pct Unit D REPO event event yr event event	\$2 \$3 \$2 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4	289,700 347,600 Cost 73,000 00,000 95,000 8,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 780,000 \$ 96,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M and Cost Cont OM&M A nual OM& Item #	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST EM and Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR	20% 15 0.6% Quantity ORING, AN 1 1 1 2 12 12 8	pct yrs pct Unit D REPO event event yr event event yrs	\$2 \$3 \$2 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 65,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 285,000 \$ 96,000 \$ 96,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells)
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	DM&M Anual OM&	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling Quarterly surface water sampling	20% 15 0.6% Quantity ORING, AN 1 1 1 2 12 12 8 8	pct yrs pct Unit D REPO event event yr event event event event	S2 S S S S S S S S S	15,000 289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 520,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO
	Annual Monitoring C TOTAL ANNUAL C Present-Worth Ann	M&M an- Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Mand Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling	20% 15 0.6% Quantity DRING, AN 1 1 1 20% 8 8 8	pct yrs pct Unit DREPOI event event yr event event event yrs	\$2 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	15,000 289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 8,000 73,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 520,000 \$ 44,000 \$ 44,000 \$ 44,000 \$ 44,000 \$ 44,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points)
	Annual Monitoring (TOTAL ANNUAL C Present-Worth Ann Category	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Mand Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly groundwater sampling (EISB parameters post DGR Annual groundwater sampling (EISB parameters post DGR Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report	20% 15 0.6% Quantity DRING, AN 1 1 1 20% 8 8 8	pct yrs pct Unit Unit Unit Unit Unit Unit Unit Uni	\$2 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 8,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 520,000 \$ 64,000 \$ 64,000 \$ 438,000 \$ 200,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells)
	Annual Monitoring (TOTAL ANNUAL C Present-Worth Ann Category Subtotal Non-Routi	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost	20% 15 0.6% Quantity DRING, AN 1 1 12 12 12 8 8 8 1 1	pct yrs pct Unit DREPOI event event event event event yr event yrs yrs event LS	\$2 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 73,000 20,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 64,000 \$ 64,000 \$ 438,000 \$ 20,000 \$ 2438,000 \$ 2438,000 \$ 2438,000 \$ 2438,000 \$ 2438,000 \$ 2438,000 \$ 2438,000 \$ 24,636,000 \$ 2,636,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeline and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 25)
	Annual Monitoring (TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring (M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Mand Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater sampling (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report Mand Reporting Cost ingency and Unlisted Items (%)	20% 15 0.6% Quantity DRING, AN 1 1 1 20% 8 8 8	pct yrs pct Unit Unit Unit Unit Unit Unit Unit Uni	\$2 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	15,000 289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 8,000 73,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 283,000 \$ 200,000 \$ 96,000 \$ 96,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 yrs annual sampling for VOCs (15 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points)
	Annual Monitoring (TOTAL ANNUAL C Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring (TOTAL NON-ROUT	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost	20% 20% 15 0.6% Quantity DRING, AN 1 1 1 20% 8 8 8 6 1 20%	pct yrs pct Unit DREPOI event event event event event yr event yrs yrs event LS	\$20 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 73,000 20,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 780,000 \$ 76,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 520,000 \$ 520,000 \$ 343,000 \$ 285,000 \$ 343,000 \$ 23,636,000 \$ 33,163,000	Assumed level of effort based on prior experience Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeline and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of operation 3 yrs qrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qrly sampling for VOCs after each injection event (155 wells) 3 yrs qrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 25)
	Annual Monitoring (TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring (TOTAL NON-ROUT) Present-Worth Non	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST RM and Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling Annual groundwater sampling (EISB parameters post DGR Annual groundwater sampling (EISB parameters post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost ingency and Unlisted Items (%) REM AND REPORTING COST OM&M and Reporting Cost Presumed Discount Rate	20% 20% 15 0.6% Quantity DRING, AN 1 1 1 20% 8 8 8 6 1 20%	pct yrs pct Unit D REPOle event event event yr event yr syrs yrs event LS	\$20 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 73,000 20,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 780,000 \$ 76,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 520,000 \$ 520,000 \$ 343,000 \$ 285,000 \$ 343,000 \$ 23,636,000 \$ 33,163,000	Assumed level of effort based on prior experience Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qrly sampling for VOCs after each injection event (155 wells) 3 yrs qrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 25) Assumed bid and scope contingency (10% each)
	Annual Monitoring (TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring (TOTAL NON-ROUT) Present-Worth Non ALTERNATIVE C	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Mand Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost ingency and Unlisted Items (%) IEM AND REPORTING COST OM&M and Reporting Cost Presumed Discount Rate	20% 20% 15 0.6% Quantity ORING, AN 1 1 12 12 12 12 12 20% 0.6%	pct pct yrs pct Unit D REPOl event event yr event yrs yrs yrs yrs event LS pct D REPOl event event yr event event yr event event yrs yrs yrs event LS	\$20 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 73,000 20,000	\$ 15,000 \$ 289,700 \$ 5,214,000 \$ 5,214,000 \$ 4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 520,000 \$ 3438,000 \$ 2,636,000 \$ 2,636,000 \$ 257,200 \$ 3,163,000 \$ 2,944,000	Assumed level of effort based on prior experience Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qrly sampling for VOCs after each injection event (155 wells) 3 yrs qrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 25) Assumed bid and scope contingency (10% each)
	Annual Monitoring (TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring (TOTAL NON-ROUT Present-Worth Non ALTERNATIVE C TOTAL PRESENT-	M&M and Cost Cont	Reporting d Reporting Cost ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST Mand Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly groundwater sampling (EISB parameters post DGR Annual groundwater sampling (EISB parameters post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost ingency and Unlisted Items (%) RM AND REPORTING COST OM&M and Reporting Cost Presumed Discount Rate	20% 20% 15 0.6% Quantity ORING, AN 1 1 12 12 12 12 12 20% 0.6%	pct pct yrs pct Unit D REPOl event event yr event yrs yrs yrs yrs event LS pct D REPOl event event yr event event yr event event yrs yrs yrs event LS	\$20 \$3 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4	289,700 347,600 Cost 73,000 00,000 95,000 8,000 8,000 8,000 8,000 8,000 73,000 20,000	\$ 15,000 \$ 289,700 \$ 57,900 \$ 5,214,000 \$4,972,000 Total \$ 73,000 \$ 200,000 \$ 285,000 \$ 780,000 \$ 76,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ 520,000 \$ 438,000 \$ 20,000 \$ 2,236,000 \$ 22,244,000	Assumed level of effort based on prior experience Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 years of oneration 3 yrs qrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qrly sampling for VOCs after each injection event (155 wells) 3 yrs qrly sampling for VOCs (17 surface water sampling points) 8 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 8 yrs annual groundwater level measurements (155 wells) 8 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 25) Assumed bid and scope contingency (10% each)
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ALTERNATIVE 5 DYNAMIC GROUNDWATER RECIRUCLATION AND SOURCE AREA EISB

POINT OF COMPLIANCE OPTION: OPTION 2A - GROUNDWATER CPOC IN TRANSITION ZONE BENEATH THE CREEK

Explanation of POC Option: SWQS (0.3 µg/L TCE) to be met in transition zone water sampling points below the creek bed or immediately adjacent to the creek (off property) and "within the surface water as close as technically possible to the point or points where groundwater flows into the surface water" (on Boeing property).

Drinking water standard (4 µg/L TCE) to be met in monitoring wells throughout the groundwater TCE plume.

POC Option Specific Assumptions

Pore water samplers or drive point wells will be installed at approximately 100-ft intervals in or adjacent to creek for groundwater CPOC (assume 23 locations). Existing monitoring well network sufficient for monitoring groundwater

- 2 Existing surface water sampling locations will be used for monitoring surface water POC
- 3 Pore water samplers or drive point wells must be replaced every 3 years due to damage from storms/creek meander
- DGR system will be operated for 16 years for downgradient plume cleanup

 FISB in source area will require 23 years for source area cleanup (including 3 injection

			DETAILED COST ESTIMAT	E					COST I	BASIS
Cost Type	Category	Item#	Description	Quantity	Unit	Uni	it Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			REMEDIAL DESIGN, PLANNING, AND GENER	AL (Indirec	t Costs)					
		1	Engineering/Proj Mgmt/Const Mgmt/Reporting	ì						
		2	Cleanup action plan	1	LS	\$	30,000	\$ 30,00		
		3	Permits	1	LS	\$	30,000	\$ 30,00	Assumed level of effort based on prior experience	UIC permit, major modification to NPDES permit, access agreements, construction permits
		4	Negotiate and implement institutional controls	0	LS	\$	10,000	\$ -		
		5	Contract documents and contractor bidding/procurement	1	LS	\$	20,000	\$ 20,00		
		6	Cleanup action construction report/O&M manual Engineering/Remedial Design	1 8%	LS pct	\$	30,000	\$ 30,00 \$ 328,40		Assume ~8% of capital costs
		8	Construction management/oversight	6%			,105,000	\$ 246,30		Assume ~8% of capital costs Assume ~6% of capital costs
		9	Project management	5%	pct		.088,700	\$ 654,43		Assume ~5% of project costs
		10	Ecology oversight	5%			088,700	\$ 654,43		Assume ~5% of project costs
	Subtotal Remedial	Design, Pl	anning, and General Costs					\$ 1,993,60	0	
			sted Engineering Services (%)	15%	pct	\$1	,993,600	\$ 299,00		
	TOTAL INDIREC			ı		_		\$2,293,00		
	Category	Item#	Description	Quantity	Unit	Uni	it Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
	REMEI	DIAL ACT	TION CONSTRUCTION - DGR SYSTEM AND ELECTION	RON DONO	R INJEC	TIONS	(Direct C	Costs)		
			Contractor mobilization/demobilization	1	LS	\$	30,000	\$ 30,00	O Glacier Environmental - approx. cost based on prior similar work	
		2	DGR pilot study	1	LS	\$	80,000	\$ 80,00		Assume 1 full time field tech, 10 hour days, plus travel/field equip (\$1,500/day), four days per month for 1 year, includes monitoring, system reconfigurations, sampling, plus lab costs and data evaluation and reportin
			Install injection and extraction wells/distribution system							
_		3	Utility locate	1	LS	\$	2,500	\$ 2,50		Assume 3 days total for utility locates for drilling, trenching
Ž		4	Site prep/clearing/grubbing	1	LS	\$	75,000	\$ 75,00	Assumed level of effort based on prior experience; prep roads/trails to well	Prep roads/trails to well drilling and other construction locations
IC		5	Driller mobilization/demobilization	1	LS	\$	3,000	\$ 3,00	O Typical mobilization rate for local drillers	
ľAT		6	Drilling - DGR extraction well installation	4	well	\$	20,000	\$ 80,00	O Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	4 extraction wells, 6" stainless steel, to average 50 ft. (15 ft screens), inclustant card, drilling, well construction materials
ENJ		7	Drilling - DGR injection well installation (shallow)	4	well	\$	15,000	\$ 60,00	Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	4 injection wells, 4" carbon steel, to average 55 ft. (30 ft screens), includes start card, drilling, well construction materials
EM		8	Drilling - DGR injection well installation (deep)	8	well	\$	26,000	\$ 208,00	wells	8 injection wells ,4" carbon steel, to avg 140 ft. (30 ft screens), includes stream, drilling, well construction materials
IMPLEMENTATION		9	Drilling - monitoring wells for DGR monitoring	4	well	\$	12,000	\$ 48,00	wells	4 monitoring wells, 2" pvc to average 55 ft (5 ft screens), includes start cardrilling, well construction materials
		10	IDW disposal	60	Drums	\$	200	\$ 12,00		Average per drum disposal cost plus labor
		11	Well vaults, pumps, air vac assemblies Transfer tank, valving, and pump with controls	1	LS LS	\$:	210,000 18,000	\$ 210,00 \$ 18,00		4 submersible pumps w/controls, 16 well vaults, 12 air-vac assemblies 500-gallon double-walled poly tank; Tsurumi high volume/high head sum
		13	Directional drilling for pipe/conduit up to ridge	1	LS	\$	100,000	\$ 100,00		Approx. 660 LF, elevation change of approx. 150 ft
		14	Water line, electrical, communications trenching	4200	LF	\$	16	\$ 67,20		Trenching, bedding, backfill, assumed trench length of 4200 ft
		15	Water piping	4200	LF	\$	60	\$ 252,00	*	HDR 11, includes connection to existing conveyance system
		16	Electrical conduit and cable	2400	LF	\$	45	\$ 108,00		Electrical from power drops and connections to existing power near injec-
		17	Communications conduit and cable	4200	LF	\$	65	\$ 273,00		Communications from control panel to injection wells and new extraction wells
		18	Trench repaving/restoration	20000	SF	\$	5	\$ 100,00	0 WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx. median cost for similar scope of work	Assume approx. 4 ft width x 4200 LF, plus additional 3,000 SF around of subsurface infrastructure; 18 inch paving and base cours sections
		19	Electrical equipment upgrades/transformer/electrician	1	LS	\$	70,000	\$ 70,00	1	Install 1 new/replacement transformer
		20	Instrumentation and controls; control panels	1	LS	\$	150,000	\$ 150,00		Level meters, flow meters, pressure meters, controls instrumentation, drive installation, programming and startup for new injection and extraction well
		21	GAC polishing vessels	2	each	\$	12,500	\$ 25,00	D Pacific Coast Carbon - estimate	2 x 2,000 lb liquid phase GAC vessels plus concrete pad and plumbing
		22	DGR system startup and testing	1	LS	\$	20,000	\$ 20,00		,
			EISB Injection Well Installation				,	.,,,,,		
		23	Utility locate/clearing	1	LS	\$	1,000	\$ 1,00	D Local utility locator rates = \$85 - \$100/hr	
		24	Driller mobilization/demobilization	1	LS	\$	3,000	\$ 3,00		
		25	Drilling - injection wells (detention basin hotspot)	24	wells	\$	4,000	\$ 96,00	O Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	8 injection wells, $2"$ steel casing to 70 ft., 8 injection wells to 50 ft., 8 wells 30 ft. (20 ft screens), includes start card, drilling, well construction materia

			DETAILED COST ESTIMAT	E				COST I	BASIS
ost	~ .					W 4.6. 4		G M CHILLO A LO ADA	
ype	Category	Item#	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
-		26 27	Wellhead preparation IDW disposal	24 70	wells Drums	\$ 1,000 \$ 200	\$ 24,000 \$ 14,000	Assumed level of effort based on prior experience Stericycle - average per drum disposal cost plus labor	Monuments/vaults, valves, fittings for injection well wellheads
-		21	Injection of Electron Donor	70	Diulis	\$ 200	\$ 14,000	Stericycle - average per drum disposar cost pius iaoor	Assume 3 injection events
5 [28	Injection crew/labor	75	days	\$ 3,000	\$ 225,000	Assumed level of effort based on prior experience	Assume 2 to 3 FTE for 5 weeks (10 hrs/day) per injection event
-		29	Purchase equipment/supplies for injection system setup	1	LS	\$ 25,000	\$ 25,000	Assumed level of effort based on prior experience	Pumps, mixing tanks, hoses, fittings, trailer
₹		30	Materials and rentals for injection events	3	event	\$ 20,000	\$ 60,000	Assumed level of effort based on prior experience	Water tank rental, other rental equipment and materials
•		31	Water for injection events	285,000	gal	\$ 0.03	\$ 8,550	Assumed level of effort based on prior experience	Assume 95K gal per event at \$0.03/gal
3		32	Donor for injection events	36000	lbs	\$ 2	\$ 54,000	Assumed level of effort based on prior experience	Assume 12K lbs per event at \$1.50/lb
			Site Restoration - slope/buffer plantings, general cleanup	1	LS	\$ 25,000		Glacier Environmental - approx. cost based on prior similar work	
IMFLEMENIALION	Subtotal Remedial . Direct Cost Continge		nstruction Costs inlisted Engineering Services (%)	25%	pct	\$2,527,300	\$ 2,527,300 \$ 631,800	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5	Assumed bid contingency (10% - low end) and scope contingency (15% end groundwater treatmnet and soil excavation)
i i	Contractor Bond Fee	e, Overhead	l, and Profit (%)	20%	pct	\$2,693,375	\$ 538,700	Standard	Applied to contractor and driller costs only (not injection related costs)
	Washington State Sa	ales Tax (%		9.2%	pct	\$ 3,232,075	\$297,400	City of Everett/State sales tax rate	Applied to contractor and driller costs
	TOTAL DIRECT	COST					\$3,995,000		
	Category	Item#	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			ANNUAL OPERATION, MAINTENANCE, MONITORI	NG, AND F	EPORTI	NG			
	•	1	Electrical usage			\$ 44,500			Approx. 98 hp of equip. (1743 kw*hr/day x \$0.07/kw-hr x 365 days/yr)
	·	2	Cell phone/GET system remote access charges		mo	\$ 369			\$369/month x 12 mo. service for autodialer, alarms, etc
		3	Carbon usage	1	yr	\$ 9,600	\$ 9,600	Evoqua - estimate; assumed usage rate based on prior consumption	Assume 1 changeout (3,000 lbs GAC) every other year at \$9600 per
ŀ		+ -	System monitoring/NPDES reporting	4		\$ 20,000	\$ 20,000	Assumed level of effort based on prior experience	changeout, incl GAC profiling, plus disposal as haz waste Includes monthly air and water influent/effluent sampling and NPDES DI
ŀ		4	DGR system O&M labor and cost	1	yr vr	\$ 20,000	\$ 20,000		Assume 1 FTE, 10 hour days, plus travel/field equip (\$1,500/day), four d
			DON system occivi labor and cost		y1	Ψ 25,000	φ 25,000	Assumed level of effort based on pilot experience	per month, includes general maintenance and monitoring, response to up
									minor equipment repair and replacement, annual bridge crane inspection
-		6	NPDES annual renewal fee	1	vr	\$ 20,137	\$ 20,137	Per WAC 173-224-040 fees - 2019 schedule	Per WAC 173-224-040 fee 2019 schedule (Non-LUST Hazardous Waste
					,	, , , , , ,			Cleanup Site; >2 contaminants)
		7	Install pore water samplers or drive point wells	23	unit	\$ 250	\$ 5,750	Approximate drive point well cost base on online vendors and assumed level of	Assume \$100/pore water sampler or drive point well approx every 100 ft
								effort for installation.	creek within plume limits and 1 hour labor for installation
		8	Groundwater sampling (during DGR)	1	yr	\$ 70,000	\$ 70,000	Assumed level of effort based on prior experience	Annual sampling for VOCs (155 wells + 23 pore water samples)
- 1		9	Groundwater elevation monitoring (during DGR)	1	yr	\$ 8,000			Annual water levels (155 wells)
•		10	Surface water sampling (during DGR)		yr yr	\$ 8,000	\$ 8,000	Assumed level of effort based on prior experience	Annual water levels (155 wells) Annual sampling for VOCs (17 surface water sampling points)
ļ	Subtotal Annual O	11	Surface water sampling (during DGR) Reporting		yr yr yr		\$ 8,000 \$ 15,000	Assumed level of effort based on prior experience	
	Subtotal Annual O	11 M&M and	Surface water sampling (during DGR) Reporting Reporting Cost		yr	\$ 8,000	\$ 8,000 \$ 15,000 \$ 300,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points)
	Annual Monitoring (11 M&M and Cost Contin	Surface water sampling (during DGR) Reporting Reporting Cost ngency and Unlisted Items (%) Years of Annual Monitoring	1	,-	\$ 8,000 \$ 15,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5	Annual sampling for VOCs (17 surface water sampling points)
	Annual Monitoring (11 M&M and Cost Contin	Surface water sampling (during DGR) Reporting Reporting Cost ngency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST	20%	yr pct yrs	\$ 8,000 \$ 15,000 \$300,400	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM&	Surface water sampling (during DGR) Reporting Reporting Cost Ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST M and Reporting Cost Presumed Discount Rate	20% 16	yr pct yrs	\$ 8,000 \$ 15,000 \$300,400 \$360,500	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,484,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
	Annual Monitoring (11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Reporting Cost Superior and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST M and Reporting Cost Description	20% 16 0.6% Quantity	pct yrs pct Unit	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description N-ROUTINE OPERATION, MAINTENANCE, MONITO	20% 16 0.6% Quantity	pct yrs pct pct Unit D REPOR	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,484,000 Total	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Reporting Cost Reporting Cost Reporting Cost Peers of Annual Monitoring ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling	20% 16 0.6% Quantity DRING, AN	pct yrs pct Unit D REPOR event	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost TING \$ 75,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,768,000 \$5,484,000 Total	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Ingency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description N-ROUTINE OPERATION, MAINTENANCE, MONITO	20% 16 0.6% Quantity DRING, AN	pct yrs pct pct Unit D REPOR	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,484,000 Total	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restor timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Presency and Unlisted Items (%) Years of Annual Monitoring NO REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells	20% 16 0.6% Quantity DRING, AN 1	pct yrs pct Unit D REPOR event event	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,768,000 \$5,484,000 Total \$ 75,000 \$ 200,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation.	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc.
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Reperting Cost Presumed Discount Rate Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters)	20% 16 0.6% Quantity PRING, AN 1 1 5	pct yrs pct Unit D REPOR event event event yr	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,484,000 Total \$ 75,000 \$ 200,000 \$ 28,750	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restor timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Presency and Unlisted Items (%) Years of Annual Monitoring NO REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling	20% 16 0.6% Quantity 1 1 1 5 3	pct Unit D REPOR event event yr event	\$ 8,000 \$ 15,000 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ \$5,768,000 \$ 75,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 840,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 19 years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Reporting Cost Reporting Cost Pears of Annual Monitoring VD REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater elevation monitoring	20% 16 0.6% Quantity RING, AN 1 1 5 3 12	pct Unit D REPOR event event yr	\$ 8,000 \$ 15,000 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,768,000 \$5,484,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 840,000 \$ 96,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 1 years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Reporting Cost Reporting Cost Presumed Discount Rate Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling Quarterly groundwater elevation monitoring Quarterly surface water sampling	20% 16 0.6% Quantity RING, AN 1 1 5 3 12 12 12	pct Unit D REPOR event e	\$ 8,000 \$ 15,000 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$5,768,000 \$5,484,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 840,000 \$ 96,000 \$ 96,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Pagency and Unlisted Items (%) Years of Annual Monitoring VD REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling Annual groundwater sampling (EISB parameters post DGR	20% 16 0.6% Quantity DRING, AN 1 1 1 1 1 7	pct yrs pct Unit D REPOR event event event event yr event event yr yr	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000 \$ 8,000 \$ 8,000 \$ 65,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000 Total \$ 75,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 840,000 \$ 96,000 \$ 96,000 \$ 455,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (19 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Presency and Unlisted Items (%) Years of Annual Monitoring NO REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (EISB parameters post DGR Annual groundwater elevation monitoring (post DGR)	20% 16 0.6% Quantity 1 1 1 5 3 12 12 7	pct Unit D REPOR event e	\$ 8,000 \$ 15,000 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000 \$ 75,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 96,000 \$ 96,000 \$ 455,000 \$ 56,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 19 years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann	11 M&M and Cost Contin OM&M AN nual OM& Item#	Surface water sampling (during DGR) Reporting Reporting Cost Presence and Unlisted Items (%) Years of Annual Monitoring NO REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR)	20% 16 0.6% Quantity PRING, AN 1 1 5 3 12 12 7 7 7 7	pct Unit D REPOR event event event event event event yr event event yrs yrs	\$ 8,000 \$ 15,000 \$360,500 \$360,500 \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000 \$ 8,000 \$ 8,000 \$ 65,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000 \$ 75,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 96,000 \$ 96,000 \$ 455,000 \$ 56,000 \$ 56,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (19 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann Category	11 11 12 12 12 12 12 12	Surface water sampling (during DGR) Reporting Reporting Cost Pagency and Unlisted Items (%) Years of Annual Monitoring VD REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (EISB parameters post DGR Annual groundwater elevation monitoring (post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report	20% 16 0.6% Quantity PRING, AN 1 1 5 3 12 7 7 7 6	pct yrs pct Unit D REPOR event event event event event event yr event event yrs yrs	\$ 8,000 \$ 15,000 \$360,500 \$360,500 \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000 \$ 75,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 96,000 \$ 96,000 \$ 455,000 \$ 56,000 \$ 450,000 \$ 450,000 \$ 20,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (19 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual groundwater level measurements (155 wells)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann Category	M&M and Cost Continual OM&M And Item# NO:	Surface water sampling (during DGR) Reporting Reporting Reporting Cost Presence and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (EISB parameters post DGR Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost	20% 16 0.6% Quantity PRING, AN 1 1 1 5 3 12 12 12 7 7 6 1 1	pct yrs pct Unit D REPOR event event event yr event event yrs yrs yrs yrs event LS	\$ 8,000 \$ 15,000 \$360,500 \$360,500 \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000 \$ 75,484,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 96,000 \$ 96,000 \$ 455,000 \$ 56,000 \$ 450,000 \$ 2,657,800	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (175 wells; 17 sw points) Final remediation completion report (year 25)
TIMINO	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann Category Subtotal Non-Routh Annual Monitoring (M&M and Cost Continual OM&M And OM&M And OM&M And OM&M And OM&M Item# NO:	Surface water sampling (during DGR) Reporting Reporting Cost Reporting Cost Reporting Cost Pears of Annual Monitoring VD REPORTING COST M and Reporting Cost Presumed Discount Rate Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater elevation monitoring Quarterly surface water sampling Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost Ingency and Unlisted Items (%)	20% 16 0.6% Quantity PRING, AN 1 1 5 3 12 12 7 7 7 6	pct yrs pct Unit D REPOR event event event event event yr event yrs yrs yrs yrs event	\$ 8,000 \$ 15,000 \$300,400 \$360,500 Unit Cost TING \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 70,000 \$ 8,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 75,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000 \$ 75,000 \$ 200,000 \$ 28,750 \$ 285,000 \$ 96,000 \$ 96,000 \$ 455,000 \$ 56,000 \$ 450,000 \$ 2,2657,800 \$ 2,2657,800 \$ 531,600	Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (175 wells; 17 sw points) Final remediation completion report (year 25)
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OM&M	Subtotal Non-Rout Annual Monitoring G Category Subtotal Non-Rout Annual Monitoring C TOTAL NON-ROU Present-Worth Nor CALTERNATISE OF	11 11 11 11 12 12 12 12	Surface water sampling (during DGR) Reporting Cost Presency and Unlisted Items (%) Years of Annual Monitoring VD REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system replacement cost Replace pore water samplers or drive point wells Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater sampling (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost Description N-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling (EISB parameters) Annual groundwater sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost Description Presumed Discount Rate MMARY EEMEDIAL DESIGN, PLANNING, AND GENERAL COST	20% 16 0.6% Quantity PRING, AN 1 1 5 3 12 12 7 7 7 6 1 20% 0.6%	pct yrs pct Unit D REPOR event event event event event event yr Event prs yrs yrs event LS pct	\$ 8,000 \$ 15,000 \$360,500 \$360,500 \$ 75,000 \$ 200,000 \$ 5,750 \$ 95,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 15,000 \$ 300,400 \$ 60,100 \$ 5,768,000 \$ 5,768,000	Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5 Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation Assume drive points/pore water samplers or drive point wells must all be replaced every 3 years due to damage from storms, creek meander, etc. 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells + 23 water samplers or drive point wells) 3 yrs qtrly groundwater level measurements (155 wells) 7 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 7 yrs annual groundwater level measurements (155 wells) 7 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (17 surface water sampling points) 7 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 25) Assumed bid and scope contingency (10% each)

ALTERNATIVE 5 DYNAMIC GROUNDWATER RECIRUCLATION AND SOURCE AREA EISB

POINT OF COMPLIANCE OPTION: OPTION 2B - GROUNDWATER CPOC IN MONITORING WELLS UPGRADIENT OF CREEK

Explanation of POC Option: SWQS (0.3 µg/L TCE) to be met in monitoring wells in "buffer zone" upgradient of the creek. Drinking water standard $(4 \,\mu\text{g/L} \, \text{TCE})$ to be met in monitoring wells throughout the groundwater TCE plume.

POC Option Specific

- Existing monitoring wells adjacent to creek, plus additional 7 wells requested by Ecology, sufficient for monitoring groundwater CPOC; existing monitoring well network sufficient for monitoring groundwater throughout plume.
- 2 Existing surface water sampling locations will be used for monitoring surface water POC Assumptions
 - 3 DGR system will be operated for 20 years for downgradient plume cleanup 4 EISB in source area will require 23 years for source area cleanup (including 3 injection events over 3-year period)
 - 5 Major equipment replacement for DGR system will be required during 20-year operational time frame

			DETAILED COST ESTIMATI	E					COST I	BASIS
Cost									00011	
Type	Category	Item #	Description	Quantity	Unit	Unit C	ost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			REMEDIAL DESIGN, PLANNING, AND GENERA	L (Indirect	Costs)					
		1	Engineering/Proj Mgmt/Const Mgmt/Reporting							
		2	Cleanup action plan	1	LS		,000 \$	\$ 30,000	Assumed level of effort based on prior experience	
		3	Permits	1	LS	,	,000 \$	\$ 30,000	Assumed level of effort based on prior experience	UIC permit, major modification to NPDES permit, access agreements, construction permits
		4	Negotiate and implement institutional controls	0	LS		,000	\$ -		
		5	Contract documents and contractor bidding/procurement	1	LS		,000 \$	\$ 20,000	Assumed level of effort based on prior experience	
		6	Cleanup action construction report/O&M manual	1	LS		,000 \$	\$ 30,000	Assumed level of effort based on prior experience	
		7	Engineering/Remedial Design	8%	pct	\$ 4,220		\$ 337,600		Assume ~8% of capital costs
		8	Construction management/oversight	6%	pct	\$ 4,220		\$ 253,200		Assume ~6% of capital costs
		9	Project management	5% 5%	pct	\$ 13,952 \$ 13,952		\$ 697,640 \$ 697,640	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-8	Assume ~5% of project costs
	C14-4-1 D 12-1	10	Ecology oversight	5%	pct	\$ 13,952	,800 3	\$ 697,640 \$ 2.096.100	Assume similar to project management value	Assume ~5% of project costs
			lanning, and General Costs sted Engineering Services (%)	15%	pct	\$2.09	100 9	\$ 2,096,100 \$ 314,400		
	TOTAL INDIREC		SECULE INGINEETING SERVICES (70)	15%	pct	\$2,09	5,100 3	\$ 314,400 \$ 2,411,00 0		
			TD + 4		TT *4	TI-4 C	-4			A
	Category	Item #	Description	Quantity	Unit	Unit C		Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
	REME		TION CONSTRUCTION - DGR SYSTEM AND ELECTRO	ON DONOR	RINJECT					
		1	Contractor mobilization/demobilization	1	LS		,000 \$	\$ 30,000		
		2	DGR pilot study	1	LS	\$ 80	,000 \$	\$ 80,000	Assumed level of effort for 1 year pilot study (construction costs included below)	Assume 1 full time field tech, 10 hour days, plus travel/field equip (\$1,500/day), four days per month for 1 year, includes monitoring, system
Z			Install injection and extraction wells/distribution system							reconfigurations, sampling, plus lab costs and data evaluation and reporting
9		3	Utility locate Utility locate	1	LS	\$ 2	500 \$	\$ 2,500	Local utility locator rates = \$85 - \$100/hr	Assume 3 days total for utility locates for drilling, trenching
		4	Site prep/clearing/grubbing	1	LS		.000	\$ 75,000		Prep roads/trails to well drilling and other construction locations
₹		5	Driller mobilization/demobilization	1	LS		,000	\$ 3,000		Trep rotats to well drilling and other construction rocations
NI		6	Drilling - DGR extraction well installation	4	well		,000	\$ 80,000		4 extraction wells, 6" stainless steel, to average 50 ft. (15 ft screens), include start card, drilling, well construction materials
[ME		7	Drilling - DGR injection well installation (shallow)	4	well	\$ 15	,000	\$ 60,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	4 injection wells, 4" carbon steel, to average 55 ft. (30 ft screens), includes start card, drilling, well construction materials
IMPLEMENTATION		8	Drilling - DGR injection well installation (deep)	8	well	\$ 26	,000	\$ 208,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	8 injection wells ,4" carbon steel, to avg 140 ft. (30 ft screens), includes star card, drilling, well construction materials
IM		9	Drilling - Monitoring wells for DGR monitoring	4	well	\$ 12	,000 \$	\$ 48,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	4 monitoring wells, 2" pvc to average 55 ft (5 ft screens), includes start card drilling, well construction materials
		10	Drilling - Monitoring wells for CPOC monitoring	7	well	\$ 10	,000 \$	\$ 70,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	7 monitoring wells, 2" pvc to average 20 ft (5 ft screens), includes start card drilling, well construction materials; and pre-drilling profiling
		11	IDW disposal	60	Drums	¢	200 5	\$ 12,000		Average per drum disposal cost plus labor
		11	Well vaults, pumps, air vac assemblies	1	LS		.000 5	\$ 12,000 \$ 210,000		4 submersible pumps w/controls, 16 well vaults, 12 air-vac assemblies
		12	Transfer tank, valving, and pump with controls	1	LS		.000 5	\$ 210,000		500-gallon double-walled poly tank; Tsurumi high volume/high head sump
		13	Directional drilling for pipe/conduit up to ridge	1	LS		.000 5	\$ 100,000	S \ // \ \ \ \ \ // \ \ \ \ \ // \ \ \ \	Approx. 660 LF, elevation change of approx. 150 ft
		15	Water line, electrical, communications trenching	4200	LF	\$,	\$ 67,200	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx. median cost for similar scope of work	Trenching, bedding, backfill, assumed trench length of 4200 ft
		16	Water piping	4200	LF	\$	60 \$	\$ 252,000		HDR 11, includes connection to existing conveyance system
		17	Electrical conduit and cable	2400	LF	\$	45 \$	\$ 108,000	Glacier Environmental - approx. cost based on prior similar installations	Electrical from power drops and connections to existing power near injectivells, and from existing panels to new extraction wells
		18	Communications conduit and cable	4200	LF	\$	65 \$	\$ 273,000	Systems Interface - estimate	Communications from control panel to injection wells and new extraction w
		19	Trench repaving/restoration	20000	SF	\$	5 5	\$ 100,000	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx. median cost for similar scope of work	Assume approx. 4 ft width x 4200 LF, plus additional 3,000 SF around othe subsurface infrastructure; 18 inch paving and base cours sections
		20	Electrical equipment upgrades/transformer/electrician	1	LS	\$ 70	.000 5	\$ 70,000	Estimate based on original SnoPUD transformer installation	Install 1 new/replacement transformer
		20	Instrumentation and controls; control panels	1	LS		,000 \$	\$ 70,000 \$ 150,000	Automation & Control/System's Interface - estimates	Level meters, flow meters, pressure meters, controls instrumentation, drive(
		22		2	each		.500 \$	\$ 25,000		2 x 2,000 lb liquid phase GAC vessels plus concrete pad and plumbing
		23	GITE pensing resens	1	LS		.000 5			2 x 2,000 to figure phase GAC vessels plus concrete pad and pittifibling
1		23	DGR system startup and testing	1	LS	S 20	,000 [\$	\$ 20,000	Assumed level of effort based on prior experience	

Table C-1c

Table C-1c Comparison of Point of Compliance Costs Boeing Everett - PMG SWMU

			DETAILED COST ESTIMATI	E				COST B	SASIS
Cost	G.4	T			T T **	Unit Ct	m · ·		
Туре	Category	Item #	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
		24	EISB Injection Well Installation Utility locate/clearing	1	LS	\$ 1,000	\$ 1,000	I1	
		25	Driller mobilization/demobilization	1	LS	\$ 1,000 \$ 3,000		Local utility locator rates = \$85 - \$100/hr Typical mobilization rate for local drillers	
_		26	Drilling - injection wells (detention basin hotspot)	24		\$ 4,000	\$ 96,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar	8 injection wells, 2" steel casing to 70 ft., 8 injection wells to 50 ft., 8 wel
Z		17	Wellhead preparation	24		\$ 1,000		Assumed level of effort based on prior experience	Monuments/vaults, valves, fittings for injection well wellheads
\simeq		28		70		\$ 200	, , , , , , , , , , , , , , , , , , , ,	Stericycle - average per drum disposal cost plus labor	8
5			Injection of Electron Donor				Í		Assume 3 injection events
Y		30	Injection crew/labor	75	days	\$ 3,000	,	Assumed level of effort based on prior experience	Assume 2 to 3 FTE for 5 weeks (10 hrs/day) per injection event
Z		31	Turenase equipment supplies for injection system setup	1	LS	\$ 25,000	\$ 25,000	Assumed level of effort based on prior experience	Pumps, mixing tanks, hoses, fittings, trailer
Ξ		32	Traterials and remain for injection events	305.000	event	\$ 20,000		Assumed level of effort based on prior experience	Water tank rental, other rental equipment and materials
ξ		32	Water for injection events Donor for injection events	285,000 36000		\$ 0.03	\$ 8,550 \$ 54,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Assume 95K gal per event at \$0.03/gal Assume 12K lbs per event at \$1.50/lb
띡			Site Restoration - slope/buffer plantings, general cleanup	30000	LS	\$ 25,000		Glacier Environmental - approx. cost based on prior similar work	Assume 12K los per event at \$1.50/lo
园	Subtotal Remedial A				. 1.5	\$ 25,000	\$ 2.597.300	Glaciel Environmental - approx. cost based on prior similar work	
IMPLEMENTATION			Unlisted Engineering Services (%)	25%	pct	\$2,597,300	\$ 649,300	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5-7	Assumed bid contingency (10% - low end) and scope contingency (15% lend groundwater treatmnet and soil excavation)
	Contractor Bond Fee,	, Overhea	d, and Profit (%)	20%	pct	\$2,780,875	\$ 556,200	Standard	Applied to contractor and driller costs only (not injection related costs)
	Washington State Sale		6)	9.2%	pct	\$ 3,337,075	\$307,000	City of Everett/State sales tax rate	Applied to contractor and driller costs
	TOTAL DIRECT C	COST					\$4,110,000		
	Category	Item #	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			ANNUAL OPERATION, MAINTENANCE, MONITORIN	NG, AND R	REPORTIN	G			
		1	Electrical usage	1	yr	\$ 44,500	\$ 44,500	SnoPUD commercial electrical rate	Approx. 98 hp of equip. (1743 kw*hr/day x \$0.07/kw-hr x 365 days/yr)
		2	Cell phone/GET system remote access charges	12	2 mo	\$ 369		Frontier commercial rate	\$369/month x 12 mo. service for autodialer, alarms, etc
		3	Carbon usage	1	yr	\$ 9,600	\$ 9,600	Evoqua - estimate; assumed usage rate based on prior consumption	Assume 1 changeout (3,000 lbs GAC) every other year at \$9600 per
									changeout, incl GAC profiling, plus disposal as haz waste
		4	System monitoring/NPDES reporting		yr	\$ 20,000	\$ 20,000	Assumed level of effort based on prior experience	Includes monthly air and water influent/effluent sampling and NPDES DM
		5	DGR system O&M labor and cost	1	yr	\$ 95,000	\$ 95,000	Assumed level of effort based on prior experience	Assume 1 FTE, 10 hour days, plus travel/field equip (\$1,500/day), four d
									per month, includes general maintenance and monitoring, response to up
			AMDDEG 1 16	1		\$ 20,137	\$ 20.137	D. WAG 172 224 040 C. 2010 1 1 1	minor equipment repair and replacement, annual bridge crane inspections
		0	NPDES annual renewal fee	1	yr	\$ 20,137	\$ 20,137	Per WAC 173-224-040 fees - 2019 schedule	Per WAC 173-224-040 fee 2019 schedule (Non-LUST Hazardous Waste Cleanup Site; >2 contaminants)
		7	Groundwater sampling (during DGR)	1	vr	\$ 67,000	\$ 67,000	Assumed level of effort based on prior experience	Annual sampling for VOCs (162 wells)
		8	Groundwater sampling (during BGR) Groundwater elevation monitoring (during DGR)		, , .	\$ 8,000		Assumed level of effort based on prior experience	Annual water levels (162 wells)
		9	Surface water sampling (during DGR)		vr	\$ 8,000		Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points)
		10			yr	\$ 15,000		Assumed level of effort based on prior experience	
		# O 3 #	ID C C I				\$ 291,700		
	Subtotal Annual OM	1&M and	a Reporting Cost						
			ngency and Unlisted Items (%) Years of Annual Monitoring	20% 20	pct yrs	\$291,700 \$350,000		EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5-	Total estimated operation timeframe to remediation level (based on restora
Z	Annual Monitoring Co	ost Conti	ngency and Unlisted Items (%) Years of Annual Monitoring				\$ 7,000,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5-	Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations)
&M	Annual Monitoring Co	ost Conti	ngency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST	20	yrs		\$ 7,000,000 \$7,000,000		Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations)
M&M	Annual Monitoring Control of Cont	M&M A.	ngency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST EM and Reporting Cost Presumed Discount Rate	0.6%	yrs	\$350,000	\$ 7,000,000 \$7,000,000 \$6,578,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
OM&M	Annual Monitoring Co	ost Conti	ngency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST	20	yrs		\$ 7,000,000 \$7,000,000		Total estimated operation timeframe to remediation level (based on restor- timeframe modeling and calculations)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ngency and Unlisted Items (%) Years of Annual Monitoring ND REPORTING COST EM and Reporting Cost Presumed Discount Rate	0.6% Quantity	yrs pet Unit	\$350,000 Unit Cost	\$ 7,000,000 \$7,000,000 \$6,578,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Total estimated operation timeframe to remediation level (based on restor- timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST WM and Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling	0.6% Quantity RING, AN	yrs pct Unit D REPOR	\$350,000 Unit Cost FING \$ 75,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restor timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST Wars of Annual Monitoring ND REPORTING COST The Mand Reporting Cost Description ON-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost	0.6% Quantity RING, AN	pct Unit D REPORT event event	\$350,000 Unit Cost FING \$ 75,000 \$ 200,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan.	Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST WM and Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters)	0.6% Quantity RING, AN	pct Unit D REPOR' event event yr	\$350,000 Unit Cost TING \$ 75,000 \$ 200,000 \$ 95,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling	20 0.6% Quantity RING, AN 1 1 1 1 1 12	pct Unit D REPOR' event event yr	\$350,000 Unit Cost FING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 804,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST Wars of Annual Monitoring ND REPORTING COST The Mand Reporting Cost Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater elevation monitoring	20 0.6% Quantity RING, AN 1 1 1 12 12	pct Unit D REPOR' event event yr	\$350,000 Unit Cost FING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 804,000 \$ 96,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following FISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells) 3 yrs qtrly groundwater level measurements (162 wells)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling	20 0.6% Quantity RING, AN 1 1 1 1 12 12 12	pct Unit D REPOR' event event yr	\$350,000 Unit Cost FING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restotimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following FISB (45 wells) 3 yrs qtrly gampling for VOCs after each injection event (162 wells) 3 yrs qtrly gampling for VOCs (17 surface water sampling points) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST Mand Reporting Cost Presumed Discount Rate Description ON-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly surface water sampling Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR)	20 0.6% Quantity RING, AN 1 1 1 12 12 12 12	pct Unit D REPOR' event event yr event g yr event event yr event g yr event g event	\$350,000 Unit Cost FING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 65,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 804,000 \$ 96,000 \$ 195,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restotimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells) 3 yrs qtrly groundwater level measurements (162 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR)	20 0.6% Quantity RING, AN 1 1 1 1 2 12 12 3 3	pct Unit D REPOR' event event yr event event event event event event event event gr yr	\$350,000 Unit Cost TING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 195,000 \$ 24,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells) 3 yrs qtrly groundwater level measurements (162 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual groundwater level measurements (168 wells)
OM&M	Annual Monitoring Control of Cont	M&M A. ual OM& Item #	ND REPORTING COST Mand Reporting Cost Presumed Discount Rate Description ON-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Quarterly surface water sampling Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR)	20 0.6% Quantity RING, AN 1 1 1 2 12 12 3 3 3 3	pct Unit D REPOR' event event yr event g yr event event yr event g yr event g event	\$350,000 Unit Cost FING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 65,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 195,000 \$ 24,000 \$ 24,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (10 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells) 3 yrs qtrly groundwater level measurements (162 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
OM&M	Annual Monitoring Control of the Con	No. No.	ND REPORTING COST Mand Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report	20 0.6% Quantity RING, AN 1 1 1 2 12 12 3 3 3 3	pct Unit D REPOR' event event yr event event event event yr yr yrs	\$350,000 Unit Cost TING \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000 \$ 8,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 195,000 \$ 24,000 \$ 24,000 \$ 24,000 \$ 450,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (10 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual groundwater level measurements (168 wells) 3 yrs annual sampling for VOCs (17 surface water sampling points)
OM&M	Annual Monitoring Co	M&M A	ND REPORTING COST Mand Reporting Cost Description NN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost	20 0.6% Quantity RING, AN 1 1 1 3 12 12 12 12 12 12 12	pct Unit D REPOR' event event yr event event yr event event yr event event event in the property of the proper	\$350,000 **Unit Cost** **TING** \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 75,000 \$ 20,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 195,000 \$ 24,000 \$ 24,000 \$ 24,000 \$ 22,000 \$ 22,000 \$ 22,269,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resto timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (10 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following FISB (45 wells) 3 yrs qtrly gampling for VOCs after each injection event (162 wells) 3 yrs qtrly gampling for VOCs (17 surface water sampling points) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (162 wells; 17 sw points) Final remediation completion report (year 25)
OM&M	Annual Monitoring Control of Cont	No. No.	ND REPORTING COST M and Reporting Cost Presumed Discount Rate Description DN-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater elevation monitoring Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater elevation monitoring (post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report M and Reporting Cost ngency and Unlisted Items (%)	20 0.6% Quantity RING, AN 1 1 1 2 12 12 3 3 3 3	pct Unit D REPOR' event event yr event event event event yr yr yr yrs	\$350,000 **Unit Cost **TING** \$ 75,000 \$ 200,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 75,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 95,000 \$ 24,000 \$ 24,000 \$ 450,000 \$ 22,000 \$ 22,269,000 \$ 453,800	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restotimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (10 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following FISB (45 wells) 3 yrs qtrly gampling for VOCs after each injection event (162 wells) 3 yrs qtrly gampling for VOCs (17 surface water sampling points) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual groundwater level measurements (168 wells) 3 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (162 wells; 17 sw points) Final remediation completion report (year 25)
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TOTAL OM&M	Annual Monitoring Control of the Con	M&M A	ND REPORTING COST The Mand Reporting Cost Presumed Discount Rate Description ND-ROUTINE OPERATION, MAINTENANCE, MONITO Baseline groundwater/surface water sampling DGR system equipment replacement cost Quarterly groundwater sampling (EISB parameters) Quarterly groundwater sampling Quarterly surface water sampling Quarterly surface water sampling Annual groundwater sampling (EISB parameters post DGR) Annual groundwater sampling (EISB parameters post DGR) Annual groundwater sampling (EISB parameters post DGR) Annual surface water sampling (post DGR) 1.5 years quarterly confirmation sampling Cleanup completion report Mand Reporting Cost ngency and Unlisted Items (%) I&M AND REPORTING COST OM&M and Reporting Cost Presumed Discount Rate ALTERNATIVE COST SUMMARY REMEDIAL DESIGN, PLANNING, AND GENERAL COST (I	20 0.6% Quantity RING, AN 1 1 1 3 12 12 12 12 20% 0.6%	pct Unit D REPOR' event event yr event event yr event event yr event event to event	\$350,000 **Unit Cost** **TING** \$ 75,000 \$ 200,000 \$ 95,000 \$ 67,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 75,000 \$ 20,000	\$ 7,000,000 \$7,000,000 \$6,578,000 Total \$ 75,000 \$ 200,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 24,000 \$ 24,000 \$ 24,000 \$ 24,000 \$ 22,269,000 \$ 453,800 \$2,723,000 \$2,564,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 5-	Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (16 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC followins EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (162 wells) 3 yrs qtrly groundwater level measurements (162 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 3 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs annual groundwater level measurements (168 wells) 3 yrs annual groundwater level measurements (168 wells) 3 yrs annual sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (162 wells; 17 sw points) Final remediation completion report (year 25) Assumed bid and scope contingency (10% each)

DYNAMIC GROUNDWATER RECIRUCLATION AND SOURCE AREA EISB ALTERNATIVE 5

POINT OF COMPLIANCE OPTION: OPTION 3 - GROUNDWATER CPOC AT PROPERTY LINE/UPGRADIENT OF CREEK ON BOEING PROPERTY

Explanation of POC Option: SWQS (0.3 µg/L TCE) to be met in monitoring wells along Boeing Property Line (and all points downgradient) and

in "buffer zone" upgradient (or in transition zone as allowable by MTCA for properties abutting surface water) of the creek on Boeing property. Drinking water standard (4 µg/L TCE) to be met in monitoring wells throughout the

groundwater TCE plume on Boeing property.

1 Existing monitoring wells along property line and adjacent to creek sufficient for monitoring groundwater CPOC; existing monitoring well network sufficient for monitoring groundwater throughout plume. POC Option

Specific 2 Existing surface water sampling locations will be used for monitoring surface water POC

3 DGR system will be operated for 24 years for downgradient plume cleanup

4 EISB in source area will require 23 years for source area cleanup (including 3 injection events over 3-year period)

5 Major and minor equipment replacements for DGR system will be required during 24-year operational time frame

			DETAILED COST ESTIMAT			,		COST I	RASIS
Cost				_				COST	
Type	Category	Item #	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			REMEDIAL DESIGN, PLANNING, AND GENER	AL (Indirect	t Costs)				
			ngineering/Proj Mgmt/Const Mgmt/Reporting						
		2 (Cleanup action plan	1	LS	\$ 30,000	\$ 30,000		
								Assumed level of effort based on prior experience	UIC permit, major modification to NPDES permit, access agreements,
			Permits	0	LS	\$ 30,000 \$ 10,000	\$ 30,000		construction permits
			Negotiate and implement institutional controls Contract documents and contractor bidding/procurement	1	LS LS	\$ 10,000	\$ - \$ 20,000	A 11	
			Cleanup action construction report/O&M manual	1		\$ 20,000	\$ 20,000		
			Engineering/Remedial Design	8%		\$ 4.105,000	\$ 328,400		Assume ~8% of capital costs
			Construction management/oversight	6%	pct	\$ 4,105,000	\$ 246,300		Assume ~6% of capital costs
			Project management	5%	pct	\$ 15,004,700	\$ 750,235		Assume ~5% of project costs
		10 1	Ecology oversight	5%		\$ 15,004,700	\$ 750,235		Assume ~5% of project costs
	Subtotal Remedial	Design, Plan	ning, and General Costs	•			\$ 2,185,200		
			Engineering Services (%)	15%	pct	\$2,185,200			
	TOTAL INDIREC	CT COST					\$2,513,000		
	Category	Item #	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			ON CONSTRUCTION - DGR SYSTEM AND ELECTE	<u> </u>					
	KENIE		ontractor mobilization/demobilization	KON DONO	LS	\$ 30.000		Glacier Environmental - approx, cost based on prior similar work	
		1 (0	omractor modulzation/demodulzation	1	LS	\$ 30,000	\$ 30,000	Assumed level of effort for 1 year pilot study (construction costs included below)	Assume 1 full time field tech, 10 hour days, plus travel/field equip
								Assumed level of effort for 1 year phot study (construction costs included below)	(\$1,500/day), four days per month for 1 year, includes monitoring, system
		2 D	GR pilot study	1	LS	\$ 80,000	\$ 80,000		reconfigurations, sampling, plus lab costs and data evaluation and reporting
7			stall injection and extraction wells/distribution system			- 00,000			recommediations, sampling, blus lab costs and data evaluation and reporting
5		3	Utility locate	1	LS	\$ 2,500	\$ 2,500	Local utility locator rates = \$85 - \$100/hr	Assume 3 days total for utility locates for drilling, trenching
=		4	Site prep/clearing/grubbing	1	LS	\$ 75,000	\$ 75,000	Assumed level of effort based on prior experience; prep roads/trails to well	Prep roads/trails to well drilling and other construction locations
7		5	Driller mobilization/demobilization	1	LS	\$ 3,000	\$ 3,000		
-								Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 extraction wells, 6" stainless steel, to average 50 ft. (15 ft screens), inclu
Z		6	Drilling - DGR extraction well installation	4	well	\$ 20,000	\$ 80,000	Wells	start card, drilling, well construction materials
IMPLEMENTATION		-	Dilli DODIII da illi alla (LIII.)		.,,	A 15 000	¢ 60,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 injection wells, 4" carbon steel, to average 55 ft. (30 ft screens), includes
≥		/	Drilling - DGR injection well installation (shallow)	4	well	\$ 15,000	\$ 60,000	wells Cascade Drilling - built up per well cost based on quoted unit rates for similar	start card, drilling, well construction materials 8 injection wells ,4" carbon steel, to avg 140 ft. (30 ft screens), includes st
퓍			Dilli DODITI Z. HILLING (I.)		.,	a a c a a a	200 000	· · · · · · · · · · · · · · · · · · ·	card, drilling, well construction materials
\mathbf{z}		8	Drilling - DGR injection well installation (deep)	8	well	\$ 26,000	\$ 208,000	wells	
₹								Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 monitoring wells, 2" pvc to average 55 ft (5 ft screens), includes start ca
=		9	Drilling - monitoring wells for DGR monitoring	4	well	\$ 12,000	\$ 48,000		drilling, well construction materials
		10	IDW disposal	60		\$ 200			Average per drum disposal cost plus labor
	<u> </u>	11	Well vaults, pumps, air vac assemblies Transfer tank, valving, and pump with controls	1	LS LS	\$ 210,000 \$ 18,000			4 submersible pumps w/controls, 16 well vaults, 12 air-vac assemblies 500-gallon double-walled poly tank; Tsurumi high volume/high head sum
	-	13	Directional drilling for pipe/conduit up to ridge	1	LS	\$ 18,000	\$ 18,000		Approx. 660 LF, elevation change of approx. 150 ft
		15	Directional drifting for pipe/conduit up to ridge	1	LS	\$ 100,000	э 100,000	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	Trenching, bedding, backfill, assumed trench length of 4200 ft
		14	Water line, electrical, communications trenching	4200	LF	\$ 16	\$ 67,200		Trenening, bedding, backtin, assumed trenen rength of 4200 ft
			······································			7		WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	HDR 11, includes connection to existing conveyance system
		15	Water piping	4200	LF	\$ 60	\$ 252,000		
			11 2				,	Glacier Environmental - approx. cost based on prior similar installations	Electrical from power drops and connections to existing power near injec-
		16	Electrical conduit and cable	2400	LF	\$ 45	\$ 108,000		wells, and from existing panels to new extraction wells
								Systems Interface - estimate	Communications from control panel to injection wells and new extraction
		17	Communications conduit and cable	4200	LF	\$ 65	\$ 273,000		wells
								WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	Assume approx. 4 ft width x 4200 LF, plus additional 3,000 SF around ot
	<u> </u>	18	Trench repaying/restoration	20000	SF	\$ 5	\$ 100,000	median cost for similar scope of work	subsurface infrastructure; 18 inch paving and base cours sections
	ļ	19	Electrical equipment upgrades/transformer/electrician	1	LS	\$ 70,000	\$ 70,000		Install 1 new/replacement transformer
		20	Instrumentation and controls; control panels	1	L	\$ 150,000	\$ 150,000	Automation & Control/System's Interface - estimates	Level meters, flow meters, pressure meters, controls instrumentation, driv
	ļ	21	GAC polishing vessels	2	each	\$ 12,500	\$ 25,000		2 x 2,000 lb liquid phase GAC vessels plus concrete pad and plumbing
		22	DGR system startup and testing	1	LS	\$ 20,000	\$ 20,000	Assumed level of effort based on prior experience	
	<u> </u>		SB Injection Well Installation		1.0	¢ 1000	e 1000	T 1 27 1 4 4 695 61004	
	<u> </u>	23	Utility locate/clearing	1	LS LS	\$ 1,000 \$ 3,000	\$ 1,000 \$ 3,000		
	<u> </u>	24	Driller mobilization/demobilization	24		\$ 3,000	Ψ 5,000	Typical modification rate for focal armers	Quinication wells 2" stal assistate 70 ft Quinication will a 50 ft Qui
		25	Drilling - injection wells (detention basin hotspot)	24	wells	a 4,000	\$ 96,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar	8 injection wells, 2" steel casing to 70 ft., 8 injection wells to 50 ft., 8 well

		, ,	DETAILED COST ESTIMAT	E		1	Γ	COST I	BASIS
ost 7pe	Category	Item #	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			llhead preparation	24		\$ 1,000		Assumed level of effort based on prior experience	Monuments/vaults, valves, fittings for injection well wellheads
z			W disposal ion of Electron Donor	70	Drums	\$ 200	\$ 14,000	Stericycle - average per drum disposal cost plus labor	
			ection crew/labor	75	days	\$ 3,000	\$ 225,000	Assumed level of effort based on prior experience	Assume 3 injection events Assume 2 to 3 FTE for 5 weeks (10 hrs/day) per injection event
∃ ⊦			chase equipment/supplies for injection system setup	1	LS	\$ 25,000	\$ 25,000	Assumed level of effort based on prior experience	Pumps, mixing tanks, hoses, fittings, trailer
₹ [terials and rentals for injection events	3	event	\$ 20,000	\$ 60,000	Assumed level of effort based on prior experience	Water tank rental, other rental equipment and materials
2			ter for injection events	285,000	gal	\$ 0.03		Assumed level of effort based on prior experience	Assume 95K gal per event at \$0.03/gal
<u> </u>			nor for injection events estoration - slope/buffer plantings, general cleanup	36000	lbs LS	\$ 2 \$ 25,000	\$ 54,000 \$ 25,000	Assumed level of effort based on prior experience	Assume 12K lbs per event at \$1.50/lb
Į .	Subtotal Remedial		1 1 0 0 1	1	LS	\$ 25,000	\$ 2,527,300	Glacier Environmental - approx. cost based on prior similar work	
3 ;				250/		\$2.527.200	2,527,500	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Assumed bid contingency (10% - low end) and scope contingency (15% l
ין בּ			l Engineering Services (%)	25%	pct	\$2,527,300	\$ 631,800	5-7	end groundwater treatmnet and soil excavation)
3	Contractor Bond Fee		Profit (%)	20%	pct	\$2,693,375			Applied to contractor and driller costs only (not injection related costs)
. 12	Washington State Sal			9.2%	pct	\$ 3,232,075	\$297,400 \$3,995,00 0	City of Everett/State sales tax rate	Applied to contractor and driller costs
- 1	TOTAL DIRECT O	T I		I			,,,,,,,,,		
	Category	Item #	Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
L			JAL OPERATION, MAINTENANCE, MONITORI				т.		
			ctrical usage		yr	\$ 44,500			Approx. 98 hp of equip. (1743 kw*hr/day x \$0.07/kw-hr x 365 days/yr)
⊢		2 Cell	l phone/GET system remote access charges	12	mo	\$ 369	\$ 4,428	Frontier commercial rate Evoqua - estimate; assumed usage rate based on prior consumption	\$369/month x 12 mo. service for autodialer, alarms, etc assume 1 changeout (3,000 lbs GAC) every other year at \$9600 per chang
		3 Carl	bon usage	1	vr	\$ 9,600	\$ 9,600	Dvoqua - Commate, assumed usage rate based on prior consumption	incl GAC profiling, plus disposal as haz waste
<u> </u>			tem monitoring/NPDES reporting		yr	\$ 20,000	\$ 20,000		Includes monthly air and water influent/effluent sampling and NPDES DM
							,	Assumed level of effort based on prior experience	Assume 1 FTE, 10 hour days, plus travel/field equip (\$1,500/day), four days
									per month, includes general maintenance and monitoring, response to ups
		5 DG	R system O&M labor and cost	1	yr	\$ 95,000	\$ 95,000		minor equipment repair and replacement, annual bridge crane inspections,
		c ND	DEG 1 16			A 20.127	A 20.127	Per WAC 173-224-040 fees - 2019 schedule	Per WAC 173-224-040 fee 2019 schedule (Non-LUST Hazardous Waste
F			DES annual renewal fee oundwater sampling (during DGR)		yr yrs	\$ 20,137 \$ 65,000	\$ 20,137 \$ 65,000	Assumed level of effort based on prior experience	Cleanup Site; >2 contaminants) Annual sampling for VOCs (155 wells)
-			oundwater elevation monitoring (during DGR)		vrs	\$ 8,000	\$ 8,000	Assumed level of effort based on prior experience	Annual water levels (155 wells)
			face water sampling (during DGR)		yrs	\$ 8,000		Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points)
			oorting	1	yr	\$ 15,000		Assumed level of effort based on prior experience	
18									
	Subtotal Annual Ol			200/		\$290.700	\$ 289,700	EDA C 11 (ES C (E 2) ((EDA 540 D 00 002 L 1 2000) E 131/5 (0	A
			and Unlisted Items (%)	20%	pct	\$289,700		EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	
I				20%	pct yrs	\$289,700 \$347,600		EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on restora
I	Annual Monitoring C	Cost Contingency OM&M AND RE	and Unlisted Items (%) Years of Annual Monitoring PORTING COST	24			\$ 57,900 \$ 8,342,400 \$8,342,000		Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restora timeframe modeling and calculations)
I	Annual Monitoring C	Cost Contingency OM&M AND RE	and Unlisted Items (%) Years of Annual Monitoring PORTING COST	24			\$ 57,900 \$ 8,342,400		Total estimated operation timeframe to remediation level (based on restora
I	Annual Monitoring C	Cost Contingency OM&M AND RE	and Unlisted Items (%) Years of Annual Monitoring PORTING COST	24	yrs		\$ 57,900 \$ 8,342,400 \$8,342,000		Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations)
IM:	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE	Years of Annual Monitoring SPORTING COST d Reporting Cost Description	0.6% Quantity	yrs pct Unit	\$347,600 Unit Cost	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE	Years of Annual Monitoring PORTING COST d Reporting Cost Presumed Discount Rate	0.6% Quantity	yrs pct Unit	\$347,600 Unit Cost	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE nual OM&M and Item #	Years of Annual Monitoring SPORTING COST d Reporting Cost Description	0.6% Quantity ORING, AN	yrs pct Unit	\$347,600 Unit Cost	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE nual OM&M and Item #	Years of Annual Monitoring SPORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO	0.6% Quantity ORING, AN	yrs pct Unit D REPOR	\$347,600 Unit Cost	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15, wells, 17 sw points)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE mual OM&M and Item # NON-RO	Years of Annual Monitoring SPORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO	0.6% Quantity ORING, AN	yrs pct Unit D REPOR	\$347,600 Unit Cost	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan.	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 20 years of operation
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE mual OM&M and Item # NON-RO 1 Base 2 DGF	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost	0.6% Quantity ORING, AN	yrs pct Unit D REPOR event	\$347,600 Unit Cost ETING \$ 73,000 \$ 200,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 20 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE nual OM&M and Item # NON-ROI 1 Base 2 DGF	Years of Annual Monitoring PORTING COST d Reporting Cost Presumed Discount Rate Description UTINE OPERATION, MAINTENANCE, MONITO Poline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters)	24 0.6% Quantity ORING, AN 1 1.5	yrs pct Unit D REPOR event event	\$347,600 Unit Cost ETING \$ 73,000 \$ 200,000 \$ 95,000	\$ 57,900 \$ 8,342,400 \$ 8,342,000 \$ 7,748,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (155 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 20 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE mual OM&M and Item # NON-RO 1 Base 2 DGF 3 Quau 4 Quai	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling	24 0.6% Quantity ORING, AN 1 1.5 3 12	yrs pct Unit D REPOR event event yr event	\$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000	\$ 57,900 \$ 8,342,400 \$8,342,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 20 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE mual OM&M and Item # NON-RO 1 Base 2 DGF 3 Qual 4 Qual 5 Qual	Years of Annual Monitoring PORTING COST d Reporting Cost Presumed Discount Rate Description UTINE OPERATION, MAINTENANCE, MONITO Poline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters)	24 0.6% Quantity DRING, AN 1.5 3 12 12 12	yrs pct Unit D REPOR event event	\$347,600 Unit Cost ETING \$ 73,000 \$ 200,000 \$ 95,000	\$ 57,900 \$ 8,342,400 \$ 8,342,000 \$ 7,748,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE mual OM&M and Item # NON-RO 1 Base 2 DGH 3 Qual 4 Qual 5 Qual 6 Qual	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling reterly groundwater elevation monitoring	24 0.6% Quantity ORING, AN 1 1.5 3 12 12 12 12	yrs pct Unit D REPOR event event yr event event event	\$347,600 Unit Cost STING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000 \$ 8,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restore timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE THEM # NON-RO 1 Base 2 DGF 3 Quar 4 Quar 5 Quar 6 Quar 7 Ann 8 Ann	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling reterly groundwater elevation monitoring reterly surface water sampling ual groundwater sampling (EISB parameters post DGR ual groundwater sampling (EISB parameters post DGR ual groundwater elevation monitoring (post DGR)	24 0.6% Quantity DRING, AN 1 1.5 3 12 12 12 10 0 0	yrs pct Unit D REPOR event event yr event event event event yrs yrs	\$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 96,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restoratimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE THEM # NON-RO 1 Base 2 DGF 3 Qual 4 Qual 5 Qual 6 Qual 7 Ann 8 Ann 9 Ann	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling retrly groundwater sampling retrly groundwater sampling ual groundwater sampling (EISB parameters post DGR ual groundwater sampling (EISB parameters post DGR) ual surface water sampling (post DGR)	24 0.6% Quantity DRING, AN 1 1.5 3 12 12 12 0 0 0 0	yrs pct Unit D REPOR event event yr event event event event yrs yrs yrs	\$347,600 Unit Cost \$TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ - \$ - \$ -	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restort timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points)
I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling reterly groundwater sampling reterly groundwater elevation monitoring reterly surface water sampling ual groundwater elevation monitoring reterly surface water sampling (EISB parameters post DGR) ual surface water sampling (post DGR) years quarterly confirmation sampling years quarterly confirmation sampling	24 0.6% Quantity DRING, AN 1.5 3 12 12 12 0 0 0 6	pct Unit D REPOR event event yr event event event event yrs yrs yrs event	\$347,600 Unit Cost TING \$ 73,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 73,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ - \$ \$ - \$ \$ - \$ \$ 438,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restort timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points)
OMRA	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann	OM&M AND RE	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost retrly groundwater sampling (EISB parameters) retrly groundwater sampling retrly groundwater sampling retrly groundwater sampling ual groundwater sampling (EISB parameters post DGR) ual surface water sampling (post DGR) ual surface water sampling (post DGR) ual surface water sampling (post DGR) vears quarterly confirmation sampling unup completion report	24 0.6% Quantity DRING, AN 1.5 3 12 12 12 0 0 0 6	yrs pct Unit D REPOR event event yr event event event event yrs yrs yrs	\$347,600 Unit Cost \$TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ - \$ - \$ -	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points)
	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring C	OM&M AND RE THEM # NON-RO 1 Base 2 DGF 3 Quar 4 Quar 5 Quar 6 Quar 7 Ann 9 Ann 10 1.5 y 11 Clean 10 1.5 y 11 Clean 11	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling retrly groundwater sampling retrly groundwater sampling ual groundwater sampling ual groundwater sampling (EISB parameters post DGR) ual surface water sampling (post DGR) Reporting Cost and Unlisted Items (%)	24 0.6% Quantity DRING, AN 1.5 3 12 12 12 0 0 0 6	pct Unit D REPOR event event yr event event event event yrs yrs yrs event	\$347,600 Unit Cost TING \$ 73,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 73,000	\$ 57,900 \$ 8,342,400 \$ 8,342,000 \$ 7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ - \$ - \$ - \$ 438,000 \$ 2,088,000 \$ 417,600	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience ENSUMED LEVEL OF SCOST Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on restort timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 26)
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MIXINO I I I I I I I I I I I I I I I I I I	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring C	OM&M AND RE NON-RO	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling retrly groundwater sampling retrly groundwater sampling ual groundwater sampling ual groundwater sampling (EISB parameters post DGR) ual surface water sampling (post DGR) Reporting Cost and Unlisted Items (%)	24 0.6% Quantity DRING, AN 1.5 1.5 1.0 0.0 0.0 0.0 1.0 1.0	pct Unit D REPOR event event event yr event event yrs yrs yrs yrs LS	\$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 73,000 \$ 73,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ \$ \$ \$ 438,000 \$ 2,088,000 \$ 2,088,000 \$ 2,586,000 \$ \$2,566,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience ENSUMED LEVEL OF SCOST Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on restortimeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 26)
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	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring C TOTAL NON-ROUT Present-Worth Non	OM&M AND RE NON-RO	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling reterly groundwater elevation monitoring reterly surface water sampling ual groundwater elevation monitoring ual groundwater elevation monitoring reterly surface water sampling (EISB parameters post DGR) ual surface water sampling (post DGR) years quarterly confirmation sampling nup completion report Reporting Cost and Unlisted Items (%) ND REPORTING COST M and Reporting Cost Presumed Discount Rate ALTERNATIVE COST SUMMAR	24 0.6% Quantity DRING, AN 1.5 3 12 12 12 0 0 0 6 1 1 20%	yrs pct Unit D REPOR event event event event event event tevent yrs yrs yrs yrs prs event LS pct	\$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 73,000 \$ 73,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 96,000 \$ \$ \$ \$ 438,000 \$ 2,088,000 \$ 2,088,000 \$ 2,586,000 \$ \$2,566,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience ESSUMED LEVEL OF SOURCE STATE O	Total estimated operation timeframe to remediation level (based on restor timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 26) Assumed bid and scope contingency (10% each)
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	Annual Monitoring C TOTAL ANNUAL O Present-Worth Ann Category Subtotal Non-Routi Annual Monitoring C TOTAL NON-ROUT Present-Worth Non	OM&M AND RE THEM HOLD THE	Years of Annual Monitoring PORTING COST d Reporting Cost Description UTINE OPERATION, MAINTENANCE, MONITO eline groundwater/surface water sampling R system equipment replacement cost reterly groundwater sampling (EISB parameters) reterly groundwater sampling retrly groundwater sampling retrly groundwater sampling uterly groundwater sampling retrly groundwater sampling uterly groundwater sampling post DGR) vears quarterly confirmation sampling und completion report Reporting Cost and Unlisted Items (%) ND REPORTING COST M and Reporting Cost Presumed Discount Rate ALTERNATIVE COST SUMMAS DIATION IMPLEMENTATION COST (DIRECT) 4 COST (ANNUAL & NON-ROUTINE)	24 0.6% Quantity DRING, AN 1.5 3 12 12 12 0 0 0 6 1 1 20%	yrs pct Unit D REPOR event event event event event event tevent yrs yrs yrs yrs prs event LS pct	\$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 73,000 \$ 73,000	\$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total \$ 73,000 \$ 300,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 2,088,000 \$ 2,088,000 \$ 417,600 \$ 2,577,000	Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Total estimated operation timeframe to remediation level (based on restort timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to 2 years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (155 wells) 3 yrs qtrly groundwater level measurements (155 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 qtrs sampling for VOCs (155 wells; 17 sw points) Final remediation completion report (year 26) Assumed bid and scope contingency (10% each)

ALTERNATIVE 5 DYNAMIC GROUNDWATER RECIRCULATION AND SOURCE AREA EISB

POINT OF COMPLIANCE OPTION: OPTION 4 - GROUNDWATER CPOC IMMEDIATELY DOWNGRADIENT OF SOURCE AREA

Explanation of POC Option: SWQS $(0.3 \,\mu\text{g/L}\ TCE)$ to be met in monitoring wells downgradient of source area/detention basin (and all points downgradient). Drinking water standard $(4\,\mu\text{g/L}\ TCE)$ to be met in monitoring wells throughout the groundwater TCE

plume on Boeing property.

POC Option Specific

Assumptions

1 New monitoring wells (assume 3) will be necessary downgradient of detention basin to monitor groundwater CPOC;

monitoring well network sufficient for monitoring groundwater throughout plume.

2 Existing surface water sampling locations will be used for monitoring surface water POC

- 3 DGR system will be operated for 24 years for downgradient plume cleanup
- 4 EISB in source area will require 30 years for source area cleanup (including 3 injection events over 3-year period)
- Phase 1 area GET system will continue to be operated until compliance at groundwater CPOC (10 years after DGR)

 Major and minor equipment replacements for DGR/GET system will be required during 24-year operational time frame

			DETAILED COST ESTIMAT	E					COST I	BASIS
Cost	Category	Item#	Description	Quantity	Unit	Unit Cos	st	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
Type										
			REMEDIAL DESIGN, PLANNING, AND GENERA	L (Indirect	Costs)					
		1	Engineering/Proj Mgmt/Const Mgmt/Reporting							
		2	Cleanup action plan	1	LS	\$ 30,0		\$ 30,000		
		3	Permits	1	LS	\$ 30,0	000 \$	\$ 30,000	Assumed level of effort based on prior experience	UIC permit, major modification to NPDES permit, access agreements,
								*		construction permits
		4	Negotiate and implement institutional controls	0	LS	\$ 10,0 \$ 20,0		\$ - \$ 20.000	Assumed level of effort based on prior experience	
		3	Contract documents and contractor bidding/procurement Cleanup action construction report/O&M manual	1	LS LS	\$ 20,0		\$ 20,000 \$ 30.000	The state of the s	
		7	Engineering/Remedial Design	8%	pct	\$ 4,167,0		\$ 333,360	Assumed level of errort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-8	Assume ~8% of capital costs
		/	<u> </u>						· · · · · · · · · · · · · · · · · · ·	*
		8	Construction management/oversight	6%	pct	\$ 4,167,0		\$ 250,020	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-8	Assume ~6% of capital costs
		9	Project management	5%	pct	\$ 17,369,3		\$ 868,469	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-8	Assume ~5% of project costs
		10		5%	pct	\$ 17,369,3	880 \$	\$ 868,469	Assume similar to project management value	Assume ~5% of project costs
			lanning, and General Costs	4 = 0 /		\$2.120	200 0	\$ 2,430,300		
	TOTAL INDIRECT		sted Engineering Services (%)	15%	pct	\$2,430	300 \$	\$ 364,500 \$2,795,00		
	TOTAL INDIRECT	COST			1	1	_	\$2,795,00	U _I	
	Category	Item #	Description	Quantity	Unit	Unit Co	st	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
	REMEI		TION CONSTRUCTION - DGR SYSTEM AND ELECTRO	ON DONOR						
			Contractor mobilization/demobilization	1	LS	\$ 30,0		\$ 30,000		
7.		2	DGR pilot study	1	LS	\$ 80,0	000 \$	\$ 80,000	Assumed level of effort for 1 year pilot study (construction costs included below)	Assume 1 full time field tech, 10 hour days, plus travel/field equip
										(\$1,500/day), four days per month for 1 year, includes monitoring, system
Ė										reconfigurations, sampling, plus lab costs and data evaluation and reporting
			Install injection and extraction wells/distribution system							
Ĺ		3	Utility locate	1	LS		500 \$	\$ 2,500		Assume 3 days total for utility locates for drilling, trenching
Z		4	Site prep/clearing/grubbing Driller mobilization/demobilization	1	LS LS	\$ 75,0	000 \$	\$ 75,000 \$ 3,000		Prep roads/trails to well drilling and other construction locations
		5	Drilling - DGR extraction well installation	1	well	\$ 20,0		\$ 3,000 \$ 80,000		4 extraction wells, 6" stainless steel, to average 50 ft. (15 ft screens), includes
		U	Diffilling - DOK extraction well histaliation	4	well	\$ 20,0	JUU \$	5 60,000	wells	start card, drilling, well construction materials
		7	Drilling - DGR injection well installation (shallow)	1	well	\$ 15,0	000 \$	\$ 60,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 injection wells, 4" carbon steel, to average 55 ft. (30 ft screens), includes
			Dinning Dok injection wen instantation (shanow)		WCII	Ψ 15,0	,00	00,000	wells	start card, drilling, well construction materials
IMPLEMENTATION		8	Drilling - DGR injection well installation (deep)	8	well	\$ 26,0	000 \$	\$ 208,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar	8 injection wells ,4" carbon steel, to avg 140 ft. (30 ft screens), includes start
		9	Drilling - monitoring wells for DGR and CPOC monitoring	7	well	\$ 12,0		\$ 84,000		4 wells for DGR monitoring, 3 wells for CPOC monitoring, 2" pvc to average
								,	wells	55 ft (5 ft screens), includes start card, drilling, well construction materials
		10	IDW disposal	70	Drums	\$ 2	200 \$	\$ 14,000	Stericycle - approx. cost based on prior similar disposal costs	Average per drum disposal cost plus labor
		11	Well vaults, pumps, air vac assemblies	1	LS	\$ 210,0		\$ 210,000		4 submersible pumps w/controls, 16 well vaults, 12 air-vac assemblies
		12	Transfer tank, valving, and pump with controls	1	LS	\$ 18,0	000 \$	\$ 18,000	Grainger (tank), Tsurumi (pump)	500-gallon double-walled poly tank; Tsurumi high volume/high head sump
		13	Directional drilling for pipe/conduit up to ridge	1	LS	\$ 100,0	000 \$	\$ 100,000	Directed Technologies Drilling quote	Approx. 660 LF, elevation change of approx. 150 ft
		14	Water line, electrical, communications trenching	4200	LF	\$	16 \$	\$ 67,200	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	Trenching, bedding, backfill, assumed trench length of 4200 ft
				<u> </u>		<u> </u>			median cost for similar scope of work	
		15	Water piping	4200	LF	\$	60 \$	\$ 252,000	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	HDR 11, includes connection to existing conveyance system
									median cost for similar scope of work	
		16	Electrical conduit and cable	2400	LF	\$	45 \$	\$ 108,000	Glacier Environmental - approx. cost based on prior similar installations	Electrical from power drops and connections to existing power near injection
						1	_			wells, and from existing panels to new extraction wells
		17	Communications conduit and cable	4200	LF	\$	65 \$	\$ 273,000	Systems Interface - estimate	Communications from control panel to injection wells and new extraction wells
		18	Trench repaying/restoration	20000	SF	\$	5 \$	\$ 100,000	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	Assume approx. 4 ft width x 4200 LF, plus additional 3,000 SF around other
									median cost for similar scope of work	subsurface infrastructure; 18 inch paving and base cours sections
		19	Electrical equipment upgrades/transformer/electrician	1	LS	\$ 70,0		\$ 70,000	Estimate based on original SnoPUD transformer installation	Install 1 new/replacement transformer
		20	Instrumentation and controls; control panels	1	LS	\$ 150,0		\$ 150,000		Level meters, flow meters, pressure meters, controls instrumentation, drive(s)
		21	GAC polishing vessels	2	each	\$ 12,5		\$ 25,000	Tuente Coust Curton Committee	2 x 2,000 lb liquid phase GAC vessels plus concrete pad and plumbing
1 [22	DGR system startup and testing	1	LS	\$ 20,0	000 \$	\$ 20,000	Assumed level of effort based on prior experience	

Table C-1e Comparison of Point of Compliance Costs Boeing Everett - PMG SWMU

		DETAILED COST EST	TIMATE				COST	RASIS
Cost Type	Category	Item # Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
		EISB Injection Well Installation						
		23 Utility locate/clearing	1	LS LS	\$ 1,000	\$ 1,000	Local utility locator rates = \$85 - \$100/hr	
		24 Driller mobilization/demobilization 25 Drilling - injection wells (detention basin hotspo	ot) 24	LS wells	\$ 3,000 \$ 4,000	\$ 3,000 \$ 96,000	Typical mobilization rate for local drillers Cascade Drilling - built up per well cost based on quoted unit rates for similar	8 injection wells, 2" steel casing to 70 ft., 8 injection wells to 50 ft., 8 wel
7.		23 Drining - injection wens (detention basin notspo	2-	+ wens	\$ 4,000	\$ 90,000	wells	30 ft. (20 ft screens) Includes start card, drilling, well construction mate
IMPLEMENTATION		26 Wellhead preparation	24	1 wells	\$ 1,000	\$ 24,000	Assumed level of effort based on prior experience	Monuments/vaults, valves, fittings for injection well wellheads
Ē		27 IDW disposal	7(\$ 200	\$ 14,000	Stericycle - average per drum disposal cost plus labor	
¥		Injection of Electron Donor						Assume 3 injection events
		28 Injection crew/labor	75		\$ 3,000	\$ 225,000	Assumed level of effort based on prior experience	Assume 2 to 3 FTE for 5 weeks (10 hrs/day) per injection event
		29 Purchase equipment/supplies for injection system	n setup 1	LS LS	\$ 25,000	\$ 25,000	Assumed level of effort based on prior experience	Pumps, mixing tanks, hoses, fittings, trailer
₹		30 Materials and rentals for injection events 31 Water for injection events	285,000	gal event	\$ 20,000 \$ 0.03	\$ 60,000 \$ 8,550	Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Water tank rental, other rental equipment and materials Assume 95K gal per event at \$0.03/gal
圍		32 Donor for injection events	36000		\$ 0.03	\$ 54.000	Assumed level of effort based on prior experience	Assume 12K lbs per event at \$1.50/lb
Ξ		33 Site Restoration - slope/buffer plantings, general cl		l LS	\$ 25,000	\$ 25,000	Glacier Environmental - approx. cost based on prior similar work	135 dille 1211 105 per event at \$1.00/10
¥	Subtotal Remedial	Action Construction Costs	•			\$ 2,565,300		
		gency and Unlisted Engineering Services (%)	25%	pct	, =,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	\$ 641,300	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & 7	end groundwater treatmnet and soil excavation)
		ee, Overhead, and Profit (%)	20%	pct	\$2,740,875	\$ 548,200	Standard	Applied to contractor and driller costs only (not injection related costs)
	Washington State Sa		9.2%	pct	\$ 3,289,075	\$302,600	City of Everett/State sales tax rate	Applied to contractor and driller costs
	TOTAL DIRECT (COST	<u> </u>			\$4,057,000		
	Category	Item # Description	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
		ANNUAL OPERATION, MAINTENANCE, M						
		1 Electrical usage		l yr 2 mo	\$ 44,500 \$ 369	\$ 44,500 \$ 4,428	SnoPUD commercial electrical rate Frontier commercial rate	Approx. 98 hp of equip. (1743 kw*hr/day x \$0.07/kw-hr x 365 days/yr)
		2 Cell phone/GET system remote access charges 3 Carbon usage		l yr	_	\$ 4,428	Evoqua - estimate; assumed usage rate based on prior consumption	\$369/month x 12 mo. service for autodialer, alarms, etc Assume 1 changeout (3,000 lbs GAC) every other year at \$9600 per
		4 System monitoring/NPDES reporting	1	l vr	\$ 20,000	\$ 20,000	Assumed level of effort based on prior experience	changeout, incl GAC profiling, plus disposal as haz waste Includes monthly air and water influent/effluent sampling and NPDES D
		5 DGR system O&M labor and cost		l yr	,	\$ 95,000	Assumed level of effort based on prior experience	Assume 1 FTE, 10 hour days, plus travel/field equip (\$1,500/day), four d
					, ,	,		per month, includes general maintenance and monitoring, response to up minor equipment repair and replacement, annual bridge crane inspection
		6 NPDES annual renewal fee	1	l yr	\$ 20,137	\$ 20,137	Per WAC 173-224-040 fees - 2019 schedule	Per WAC 173-224-040 fee 2019 schedule (Non-LUST Hazardous Waste
		7 Groundwater sampling (during DGR)	1	l yrs	\$ 65,000	\$ 65,000	Assumed level of effort based on prior experience	Cleanup Site: >2 contaminants) Annual sampling for VOCs (158 wells)
				1 913				
		8 Groundwater elevation monitoring (during DGR)) 1	l vrs	\$ 8.000	\$ 8,000		
		8 Groundwater elevation monitoring (during DGR 9 Surface water sampling (during DGR)		l yrs l yrs			Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points)
		9 Surface water sampling (during DGR) 10 Reporting	1		\$ 8,000	\$ 8,000 \$ 8,000 \$ 15,000	Assumed level of effort based on prior experience	Annual water levels (158 wells)
		9 Surface water sampling (during DGR) 10 Reporting 0M&M and Reporting Cost	1	l yrs l yr	\$ 8,000 \$ 8,000 \$ 15,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points)
		9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%)	20%	l yrs l yr	\$ 8,000 \$ 8,000 \$ 15,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900	Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) Assumed bid and scope contingency (10% each)
	Annual Monitoring	9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual 1	20%	l yrs l yr	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points)
7	Annual Monitoring (9 Surface water sampling (during DGR) 10 Reporting M&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual 1 OM&M AND REPORTING COST	20% Monitoring 24	pct yrs	\$ 8,000 \$ 8,000 \$ 15,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5-Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations)
&M	Annual Monitoring (TOTAL ANNUAL (Present-Worth Annual (9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Inual OM&M and Reporting Cost Presumed Di	20% Monitoring 24 scount Rate 0.6%	pct yrs	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 347,600	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5- Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
M&M	Annual Monitoring (9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Intual OM&M and Reporting Cost Item # Description	20%	yrs yr pct yrs pct Unit	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 347,600 Unit Cost	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5-Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations)
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OM&M	Annual Monitoring (TOTAL ANNUAL (Present-Worth Annual (9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Intual OM&M and Reporting Cost Item # Description NON-ROUTINE OPERATION, MAINTENANCE	20% Monitoring 24 scount Rate 0.6% Quantity , MONITORING, AN	pct yrs pct Unit D REPORT	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 347,600 Unit Cost TING \$ 73,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000 Total	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5. Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (15
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OM&M	Annual Monitoring (TOTAL ANNUAL (Present-Worth Annual (9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Inual OM&M and Reporting Cost Item # Description NON-ROUTINE OPERATION, MAINTENANCE 1 Baseline groundwater/surface water sampling 2 DGR/GET system equipment replacement cost 3 Quarterly groundwater sampling (EISB paramete) 4 Quarterly groundwater sampling 5 Quarterly groundwater sampling 6 Quarterly surface water sampling 7 Annual groundwater sampling (EISB parameters) 8 Annual groundwater elevation monitoring (post I	20% 24	pct pct yrs pct Unit D REPORT l event 2 event 2 event 2 event 5 yrs	\$ 8,000 \$ 8,000 \$ 15,000 \$ 347,600 \$ 347,600 \$ 73,000 \$ 200,000 \$ 200,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 287,900 \$ 8,342,400 Total \$ 73,000 \$ 400,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 80,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5. Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells)
OM&M	Annual Monitoring (TOTAL ANNUAL (Present-Worth Annual (9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Inual OM&M and Reporting Cost Presumed Di Item # Description NON-ROUTINE OPERATION, MAINTENANCE 1 Baseline groundwater/surface water sampling 2 DGR/GET system equipment replacement cost 3 Quarterly groundwater sampling (EISB paramete 4 Quarterly groundwater sampling 5 Quarterly groundwater sampling 6 Quarterly surface water sampling 7 Annual groundwater sampling (EISB parameters) 8 Annual groundwater elevation monitoring (post I 9 Annual surface water sampling (post DGR)	20%	pct pct yrs pct Unit D REPORT event 2 event 2 event 2 event 2 event 5 yrs) yrs	\$ 8,000 \$ 8,000 \$ 15,000 \$ 15,000 \$ 347,600 \$ 347,600 \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 287,790 \$ 8,342,400 Total \$ 73,000 \$ 400,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 390,000 \$ 80,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5. Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1 wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 10 yrs annual groundwater level measurements (158 wells) 10 yrs annual groundwater level measurements (158 wells)
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	Annual Monitoring (TOTAL ANNUAL (Present-Worth And Category Subtotal Non-Rout Annual Monitoring (TOTAL NON-ROU Present-Worth Non-Rout)	9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Vears of Annual I OM&M AND REPORTING COST Inual OM&M and Reporting Cost NON-ROUTINE OPERATION, MAINTENANCE 1 Baseline groundwater/surface water sampling 2 DGR/GET system equipment replacement cost 3 Quarterly groundwater sampling (EISB paramete) 4 Quarterly groundwater sampling 5 Quarterly groundwater sampling 6 Quarterly surface water sampling 7 Annual groundwater sampling (EISB parameters) 8 Annual groundwater elevation monitoring (post I 9 Annual surface water sampling (post DGR) 10 Annual operation of Phase 1 area GET system (p 11 1.5 years quarterly confirmation sampling 12 Cleanup completion report tine OM&M and Reporting Cost Cost Contingency and Unlisted Items (%) ITINE OM&M AND REPORTING COST In-Routine OM&M and Reporting Cost Presumed Di ALTERNATIVE COST	20%	pct pct pct pct Unit D REPORT l event event event event l pet l event l pct pct	\$ 8,000 \$ 8,000 \$ 15,000 \$ 15,000 \$ 347,600 \$ 347,600 \$ 73,000 \$ 200,000 \$ 95,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 185,000 \$ 185,000 \$ 73,000 \$ 185,000 \$ 185,000 \$ 20,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5 Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 10 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs Q&M, NPDES compliance sampling, permit renewal fees, GAC u 6 qtrs sampling for VOCs (158 wells; 17 sw points) Final remediation completion report (year 36)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Annual Category Subtotal Non-Routh Annual Monitoring (TOTAL NON-ROUTH ANNUAL (Present-Worth Notation (TOTAL PRESENT-	9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Intention NON-ROUTINE OPERATION, MAINTENANCE 1 Baseline groundwater/surface water sampling 2 DGR/GET system equipment replacement cost 3 Quarterly groundwater sampling (EISB paramete) 4 Quarterly groundwater sampling 5 Quarterly groundwater sampling 6 Quarterly groundwater sampling 7 Annual groundwater sampling (EISB parameters) 8 Annual groundwater sampling (EISB parameters) 8 Annual groundwater elevation monitoring (post I government) 9 Annual surface water sampling (post DGR) 10 Annual operation of Phase I area GET system (public Intention Inte	20% 24	pct pct pct pct Unit D REPORT l event event event event l pet l event l pct pct	\$ 8,000 \$ 8,000 \$ 15,000 \$ 15,000 \$ 347,600 \$ 347,600 \$ 73,000 \$ 200,000 \$ 95,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 185,000 \$ 185,000 \$ 73,000 \$ 185,000 \$ 185,000 \$ 20,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5 Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (1: wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 6 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 10 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs annual sampling for VOCs (17 surface water sampling points) 1 10 yrs Q&M, NPDES compliance sampling, permit renewal fees, GAC u 6 qtrs sampling for VOCs (158 wells; 17 sw points) Final remediation completion report (year 36)
	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann Category Subtotal Non-Rout Annual Monitoring (TOTAL NON-ROU Present-Worth Nor TOTAL PRESENT- TOTAL PRESENT-	9 Surface water sampling (during DGR) Reporting Cost Contingency and Unlisted Items (%) Wears of Annual I OM&M AND REPORTING COST Inual OM&M and Reporting Cost ON-ROUTINE OPERATION, MAINTENANCE 1 Baseline groundwater/surface water sampling 2 DGR/GET system equipment replacement cost 3 Quarterly groundwater sampling (EISB paramete) 4 Quarterly groundwater sampling 5 Quarterly groundwater sampling 6 Quarterly groundwater sampling 7 Annual groundwater sampling (EISB parameters) 8 Annual groundwater sampling (EISB parameters) 8 Annual groundwater elevation monitoring (post I government) 9 Annual operation of Phase I area GET system (post I system of the contingency and Unlisted Items (%) ITINE OM&M and Reporting Cost ONACH PEPORTING COST ONACH REMEDIAL DESIGN, PLANNING, AND GENERA WORTH REMEDIAL DESIGN, PLA	20% 24	pct pct pct pct Unit D REPORT l event event event event l pet l event l pct pct	\$ 8,000 \$ 8,000 \$ 15,000 \$ 15,000 \$ 347,600 \$ 347,600 \$ 73,000 \$ 200,000 \$ 95,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 185,000 \$ 185,000 \$ 73,000 \$ 185,000 \$ 185,000 \$ 20,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 15,000 \$ 289,700 \$ 8,342,400 \$ 7,748,000 \$ 400,000 \$ 400,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 390,000 \$ 1,850,000 \$ 438,000 \$ 1,850,000 \$ 438,000 \$ 448,000 \$ 917,600 \$ 5,506,000 \$ \$4,057,000 \$ \$4,057,000	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5 Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note
TOTAL OM&M	Annual Monitoring (TOTAL ANNUAL (Present-Worth Ann Category Subtotal Non-Rout Annual Monitoring (TOTAL NON-ROU Present-Worth Nor TOTAL PRESENT- TOTAL PRESENT- TOTAL PRESENT-	9 Surface water sampling (during DGR) 10 Reporting DM&M and Reporting Cost Cost Contingency and Unlisted Items (%) Years of Annual I OM&M AND REPORTING COST Intention NON-ROUTINE OPERATION, MAINTENANCE 1 Baseline groundwater/surface water sampling 2 DGR/GET system equipment replacement cost 3 Quarterly groundwater sampling (EISB paramete) 4 Quarterly groundwater sampling 5 Quarterly groundwater sampling 6 Quarterly groundwater sampling 7 Annual groundwater sampling (EISB parameters) 8 Annual groundwater sampling (EISB parameters) 8 Annual groundwater elevation monitoring (post I government) 9 Annual surface water sampling (post DGR) 10 Annual operation of Phase I area GET system (public Intention Inte	20% 24	pct pct pct pct Unit D REPORT l event event event event l pet l event l pct pct	\$ 8,000 \$ 8,000 \$ 15,000 \$ 347,600 \$ 347,600 \$ 347,600 \$ 73,000 \$ 200,000 \$ 95,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 185,000 \$ 73,000 \$ 73,000 \$ 73,000 \$ 20,000	\$ 8,000 \$ 8,000 \$ 15,000 \$ 289,700 \$ 57,900 \$ 8,342,400	Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Annual water levels (158 wells) Annual sampling for VOCs (17 surface water sampling points) 5 Assumed bid and scope contingency (10% each) Total estimated operation timeframe to remediation level (based on restoration timeframe modeling and calculations) Discount Rate is 0.6% percent (real discount rate - 30 year note

ALTERNATIVE 5 DYNAMIC GROUNDWATER RECIRUCLATION AND SOURCE AREA EISB

POINT OF COMPLIANCE OPTION: OPTION 5 - GROUNDWATER STANDARD POC USING SWOS

 $\textbf{Explanation of POC Option: $SWQS (0.3 \ \mu g/L \ TCE)$ to be met in monitoring wells throughout the groundwater TCE plume (and surface water). }$

POC Option

- Existing monitoring well network sufficient for monitoring groundwater POC; however, new monitoring wells (assume 3) will be necessary to monitor EISB performance downgradient of detention basin.
 Existing surface water sampling locations will be used for monitoring surface water POC
- Specific
 - 3 DGR system will be operated for 24 years for downgradient plume cleanup

 - EISB in source area will require 38 years for source area cleanup (including 3 injection events over 3-year period)

 Phase 1 area GET system extraction wells will continue to be operated until compliance at groundwater CPOC (20 years after DGR)
 - 6 Major and minor equipment replacements for DGR/GET system will be required during 24-year operational time frame

				DETAILED (COST ESTIMAT						BASIS
Cost Type	Cate	egory	Item#	Descripti	on	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
				REMEDIAL DESIGN, PL	ANNING, AND GENERA	AL (Indirect	Costs)				
			1	Engineering/Proj Mgmt/Const Mg	mt/Reporting						
			2	Cleanup action plan		1	LS	\$ 30,000	\$ 30,00		
			3	Permits		1	LS	\$ 30,000	\$ 30,00	Assumed level of effort based on prior experience	UIC permit, major modification to NPDES permit, access agreements,
											construction permits
	\vdash		4	Negotiate and implement institu		0	LS	\$ 10,000	\$ -		
	-		5	Contract documents and contract		1	LS	\$ 20,000			
			6	Cleanup action construction repo	ort/O&M manual	1	LS	\$ 30,000 \$ 4167,000			A 00/ 6 '41 4
			/	Engineering/Remedial Design	. 1.	8%	pct	Ψ 1,107,000	\$ 333,36 \$ 250.02		Assume ~8% of capital costs
			8	Construction management/overs	ignt	6%	pct	Ψ 1,107,000			Assume ~6% of capital costs
			10	Project management		5%	pct	\$ 19,935,380	\$ 996,76		Assume ~5% of project costs
	0.14 (17)	2 11 12	10	Ecology oversight		5%	pct	\$ 19,935,380			Assume ~5% of project costs
				anning, and General Costs ted Engineering Services (%)		15%		\$2,686,900	\$ 2,686,90		
		NDIRECT		ted Engineering Services (%)		15%	pct	\$2,080,900	\$3,090.0		
			Item#	Descripti		Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
	Cate	0 .								Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
	—	REMEDI		TION CONSTRUCTION - DGR		ON DONOL					
				Contractor mobilization/demobiliz	ation	1	LS	\$ 30,000 \$ 80,000			16116 6116 101 1 1 1 1 1/611
			2	DGR pilot study		1	LS	\$ 80,000	\$ 80,00	Assumed level of effort for 1 year pilot study (construction costs included below	
											(\$1,500/day), four days per month for 1 year, includes monitoring, system reconfigurations, sampling, plus lab costs and data evaluation and reporting
				Install injection and extraction v	colle/dietribution exetom						reconfigurations, sampling, plus lab costs and data evaluation and reporting
Z			3	Utility locate	vens/distribution system	1	LS	\$ 2,500	\$ 2.50	Local utility locator rates = \$85 - \$100/hr	Assume 3 days total for utility locates for drilling, trenching
2			4	Site prep/clearing/grubbing		1	LS	\$ 75,000			Prep roads/trails to well drilling and other construction locations
			5	Driller mobilization/demobiliza	ation	1	LS	\$ 3,000			
⋖			6	Drilling - DGR extraction well	installation	4	well	\$ 20,000	\$ 80,00	Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 extraction wells, 6" stainless steel, to average 50 ft. (15 ft screens), include
										wells	start card, drilling, well construction materials
IMPLEMENTATION			7	Drilling - DGR injection well i	nstallation (shallow)	4	well	\$ 15,000	\$ 60,00	Cascade Drilling - built up per well cost based on quoted unit rates for similar	4 injection wells, 4" carbon steel, to average 55 ft. (30 ft screens), includes
₹	\vdash					_				wells	start card, drilling, well construction materials
			8	Drilling - DGR injection well i	nstallation (deep)	8	well	\$ 26,000	\$ 208,00	5 11	8 injection wells ,4" carbon steel, to avg 140 ft. (30 ft screens), includes star
Ä			0	Drilling - monitoring wells for	DCD and CDOC manitania	7	well	\$ 12,000	\$ 84,00	wells	card, drilling, well construction materials 4 wells for DGR monitoring, 3 wells for CPOC monitoring, 2" pvc to average
			9	Drilling - monitoring wens for	DGR and CPOC monitoring	′	wen	\$ 12,000	\$ 84,00	Cascade Drilling - built up per well cost based on quoted unit rates for similar	55 ft (5 ft screens), includes start card, drilling, well construction materials
	 		10	IDW disposal		70	Drums	\$ 200	\$ 14,00	O Stericycle - approx. cost based on prior similar disposal costs	Average per drum disposal cost plus labor
			11	Well vaults, pumps, air vac ass	emblies	1	LS	\$ 210,000	\$ 210,00		4 submersible pumps w/controls, 16 well vaults, 12 air-vac assemblies
			12	Transfer tank, valving, and pun		1	LS	\$ 18,000	\$ 18,00		500-gallon double-walled poly tank; Tsurumi high volume/high head sump
			12	Transfer tank, varving, and pan	np with controls	-	2.0	Ψ 10,000	Ψ 10,00	Grainger (tank), Tsurum (pump)	pump
			13	Directional drilling for pipe/co	nduit un to ridge	1	LS	\$ 100,000	\$ 100.00	Directed Technologies Drilling quote	Approx. 660 LF, elevation change of approx. 150 ft
			14	Water line, electrical, commun		4200	LF	\$ 16			
			1	,,,	6			1		median cost for similar scope of work	<u> </u>
			15	Water piping		4200	LF	\$ 60	\$ 252,00		HDR 11, includes connection to existing conveyance system
				11 0						median cost for similar scope of work	,
			16	Electrical conduit and cable		2400	LF	\$ 45	\$ 108,00		Electrical from power drops and connections to existing power near injection
											wells, and from existing panels to new extraction wells
			17	Communications conduit and c	able	4200	LF	\$ 65	\$ 273,00	Systems Interface - estimate	Communications from control panel to injection wells and new extraction
											wells
			18	Trench repaving/restoration		20000	SF	\$ 5	\$ 100,00	WSDOT Unit Bid Analysis - http://www.wsdot.wa.gov/biz/contaa/uba/; approx.	Assume approx. 4 ft width x 4200 LF, plus additional 3,000 SF around other
										median cost for similar scope of work	subsurface infrastructure; 18 inch paving and base cours sections
			19	Electrical equipment upgrades/		1	LS	\$ 70,000			Install 1 new/replacement transformer
			20	Instrumentation and controls; c	ontrol panels	1	LS	\$ 150,000	\$ 150,00	Automation & Control/System's Interface - estimates	Level meters, flow meters, pressure meters, controls instrumentation, drive(s
											installation, programming and startup for new injection and extraction wells.
			21	GAC polishing vessels		2	each	\$ 12,500	\$ 25,00		2 x 2,000 lb liquid phase GAC vessels plus concrete pad and plumbing
			22	DGR system startup and testing		1	LS	\$ 20,000	\$ 20,00	Assumed level of effort based on prior experience	
				EISB Injection Well Installation					ļ	1	
			23	Utility locate/clearing	<u> </u>	1	LS	\$ 1,000	\$ 1,00		
1	1		24	Driller mobilization/demobilization	ation	1	LS	\$ 3,000	\$ 3,00	Typical mobilization rate for local drillers	

			, ,	DETAILED (COST ESTIMAT	E	1	<u> </u>		COST	BASIS
ost ype	C	ategory	Item #	Description	on	Quantity	Unit	Unit Cost	Total	Source/Basis of Unit Costs and Cost Data	Assumptions, Comments, and/or Notes
			25	Drilling - injection wells (deten	tion basin hotspot)	24	wells	\$ 4,000	\$ 96,000	Cascade Drilling - built up per well cost based on quoted unit rates for similar wells	8 injection wells, 2" steel casing to 70 ft., 8 injection wells to 50 ft., 8 wel 30 ft. (20 ft screens) Includes start card, drilling, well construction mater
_			26	Wellhead preparation		24	wells	\$ 1,000	\$ 24,000	Assumed level of effort based on prior experience	Monuments/vaults, valves, fittings for injection well wellheads
4			27			70		\$ 200	\$ 14,000		<u>g</u>
				Injection of Electron Donor					,		Assume 3 injection events
7			28	Injection crew/labor		75	days	\$ 3,000	\$ 225,000	Assumed level of effort based on prior experience	Assume 2 to 3 FTE for 5 weeks (10 hrs/day) per injection event
Ŋ			29	Purchase equipment/supplies for	injection system setup	1	LS	\$ 25,000	\$ 25,000		Pumps, mixing tanks, hoses, fittings, trailer
-			30	Materials and rentals for injection	on events	3	event	\$ 20,000	\$ 60,000	Assumed level of effort based on prior experience	Water tank rental, other rental equipment and materials
Ξ			31			285,000	gal	\$ 0.03	\$ 8,550		Assume 95K gal per event at \$0.03/gal
Z			32			36000		\$ 2	\$ 54,000		Assume 12K lbs per event at \$1.50/lb
\bar{z}				Site Restoration - slope/buffer plan	tings, general cleanup	1	LS	\$ 25,000	\$ 25,000		
1				nstruction Costs					\$ 2,565,300		
IMPLEMENTATION				Unlisted Engineering Services (%)		25%	pct	\$2,565,300	\$ 641,300	5-7	end groundwater treatmnet and soil excavation)
				d, and Profit (%)		20%	pct	\$2,740,875	\$ 548,200		Applied to contractor and driller costs only (not injection related costs)
		igton State Sa		ó)		9.2%	pct	\$ 3,289,075	\$302,600		Applied to contractor and driller costs
	TOTAL	L DIRECT	COST						\$4,057,000		
	C	ategory	Item#	Description	on	Quantity	Unit	Unit Cost	Total		
	,			ANNUAL OPERATION, MAIN							
		ı	1 .1	Electrical usage	LENANCE, MUNITURI			\$ 44.500	\$ 44,500	Ca-DUD assumption of all attitudents	A 00 by -f (1742 by 1/1
		1	1	Cell phone/GET system remote	accass charges		yr mo	\$ 44,500	\$ 44,500 \$ 4,428		Approx. 98 hp of equip. (1743 kw*hr/day x \$0.07/kw-hr x 365 days/yr) \$369/month x 12 mo. service for autodialer, alarms, etc
		 	2	Carbon usage	access charges		mo yr	\$ 9,600	\$ 4,428 \$ 9,600		Assume 1 changeout (3,000 lbs GAC) every other year at \$9600 per
			3	,						1 1	changeout, incl GAC profiling, plus disposal as haz waste
			4	System monitoring/NPDES repo			yr	\$ 20,000	\$ 20,000		Includes monthly air and water influent/effluent sampling and NPDES
			5	DGR system O&M labor and co	st	1	yr	\$ 95,000	\$ 95,000	Assumed level of effort based on prior experience	Assume 1 FTE, 10 hour days, plus travel/field equip (\$1,500/day), four
											per month, includes general maintenance and monitoring, response to u
											minor equipment repair and replacement, annual bridge crane inspectio
			6	NPDES annual renewal fee		1	yr	\$ 20,137	\$ 20,137	Per WAC 173-224-040 fees - 2019 schedule	Per WAC 173-224-040 fee 2019 schedule (Non-LUST Hazardous Was
							Ť				Cleanup Site; >2 contaminants)
			7	Groundwater sampling (during I	OGR)	1	yrs	\$ 65,000	\$ 65,000	Assumed level of effort based on prior experience	Annual sampling for VOCs (158 wells)
			8	Groundwater elevation monitori	ng (during DGR)	1	yrs	\$ 8,000	\$ 8,000	Assumed level of effort based on prior experience	Annual water levels (158 wells)
			9	Surface water sampling (during)	DGR)	1	yrs	\$ 8,000	\$ 8,000	Assumed level of effort based on prior experience	Annual sampling for VOCs (17 surface water sampling points)
			10	Reporting		1	vr	\$ 15,000	\$ 15,000	Assumed level of effort based on prior experience	
								Ψ 15,000	Ψ 15,000	Tissumed level of circle sused on prior experience	
				Reporting Cost					\$ 289,700	, , , , , , , , , , , , , , , , , , , ,	
				ngency and Unlisted Items (%)		20%	pct	\$289,700	\$ 289,700 \$ 57,900	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	
	Annual	Monitoring	Cost Conti	ngency and Unlisted Items (%) Yea	urs of Annual Monitoring	20% 24	pct yrs		\$ 289,700 \$ 57,900 \$ 8,342,400	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	
	Annual TOTAL	Monitoring (Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST		24	yrs	\$289,700	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on resto
	Annual TOTAL	Monitoring (Cost Conti	ngency and Unlisted Items (%) Yea	urs of Annual Monitoring Presumed Discount Rate			\$289,700	\$ 289,700 \$ 57,900 \$ 8,342,400	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	
	Annual TOTAL Present	Monitoring (Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST	Presumed Discount Rate	24	yrs	\$289,700	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on resto
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost	Presumed Discount Rate	24 0.6% Quantity	yrs pct Unit	\$289,700 \$347,600 Unit Cost	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Total estimated operation timeframe to remediation level (based on resternistic properties). Discount Rate is 0.6% percent (real discount rate - 30 year note).
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yet ND REPORTING COST M and Reporting Cost Description	Presumed Discount Rate on AINTENANCE, MONITO	24 0.6% Quantity PRING, AN	yrs pct Unit	\$289,700 \$347,600 Unit Cost	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data	Total estimated operation timeframe to remediation level (based on restorm Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes I complete sampling event prior to remedy implementation for VOCs (1)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA	Presumed Discount Rate on INTENANCE, MONITO tter sampling	24 0.6% Quantity PRING, AN	yrs pct Unit D REPOR	\$289,700 \$347,600 Unit Cost	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Der Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on restormation of the control o
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface wa	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost	24 0.6% Quantity PRING, AN 1 2.5	pct Unit D REPOR event	\$289,700 \$347,600 Unit Cost TING \$ 73,000	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 Total	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of	Total estimated operation timeframe to remediation level (based on rest Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (in wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Descriptio N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost	24 0.6% Quantity PRING, AN 1 2.5	pct Unit D REPOR event event yr	\$289,700 \$347,600 **Unit Cost **TING ** 73,000 ** 200,000 ** 95,000	\$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000 Total \$ 73,000 \$ 500,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation.	Total estimated operation timeframe to remediation level (based on rest Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters)	24 0.6% Quantity PRING, AN 1 2.5 3	pct Unit D REPOR event event yr	\$289,700 \$347,600 \$Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 780,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on rest Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring	24 0.6% Quantity PRING, AN 1 2.5 3 12 12	pct Unit D REPOR event event yr event event event	\$289,700 \$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 95,000 \$ 65,000 \$ 8,000	\$ 289,700 \$ 57,900 \$ 8,342,000 \$7,748,000 Total \$ 73,000 \$ 500,000 \$ 285,000 \$ 780,000 \$ 96,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on residual policy) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring	24 0.6% Quantity RING, AN 1 2.5 3 12 12 12 12	pct Unit D REPOR event event yr	\$289,700 \$347,600 \$Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 \$7,748,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 780,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on rest Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TO
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Descriptio N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater elevation Quarterly surface water sampling Quarterly surface water sampling	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring g IISB parameters post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 12 14	pct Unit D REPOR event event yr event event event event event	\$289,700 \$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 8,000	\$ 289,700 \$ 57,900 \$ 8,342,400 \$8,342,000 Total \$ 73,000 \$ 500,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 910,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience Assumed level of effort based on prior experience Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on residual policy) Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Descriptio N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly surface water sampling Annual groundwater sampling (E Annual groundwater elevation m Annual surface water sampling (f)	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring ZISB parameters post DGR) onitoring (post DGR) post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 12 14 20	yrs pct Unit D REPOR event event yr event event event yrs	\$289,700 \$347,600 \$347,600 Unit Cost TING \$ 73,000 \$ 200,000 \$ 95,000 \$ 65,000 \$ 8,000 \$ 65,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000	\$ 289,700 \$ 57,900 \$ 8,342,000 \$7,748,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 160,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on residual points) Assumptions, Comments, and/or Notes I complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 20 yrs annual groundwater level measurements (158 wells) 20 yrs annual sampling for VOCs (17 surface water sampling points)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Descriptio N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (E Annual groundwater sampling (E Annual groundwater sampling (I Annual operation of Phase I area	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring g ISB parameters post DGR) onitoring (post DGR) post DGR) IGET system (post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20	pct Unit D REPOR event event yr event event event yrs yrs	\$289,700 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 160,000 \$ 3,700,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resingular contents) and the sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 tyears of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 20 yrs annual groundwater level measurements (158 wells) 20 yrs annual sampling for VOCs (17 surface water sampling points)
	Annual TOTAL Present	Monitoring (LANNUAL (t-Worth Ann	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface was DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater elevation Quarterly groundwater sampling Annual groundwater sampling (E Annual groundwater elevation m Annual surface water sampling (I Annual operation of Phase 1 area 1.5 years quarterly confirmation	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring g ISB parameters post DGR) onitoring (post DGR) post DGR) IGET system (post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 20 6	yrs pct Unit D REPOR event event yr event event yrs yrs yrs yrs yrs event	\$289,700 \$347,600 \$1,000 \$1,000 \$200,000 \$200,000 \$95,000 \$95,000 \$8,000 \$8,000 \$65,000 \$8,000 \$8,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,000 \$1,00	\$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000 \$7,748,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 160,000 \$ 3,700,000 \$ 438,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on residual country of the count
OM	Annual TOTAL Present C:	Monitoring	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (E Annual groundwater sampling (E Annual operation of Phase I area 1.5 years quarterly confirmation Cleanup completion report	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring g ISB parameters post DGR) onitoring (post DGR) post DGR) IGET system (post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 20 6	yrs pct Unit D REPOR event event yr event event yrs yrs yrs yrs	\$289,700 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,000 \$7,748,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 160,000 \$ 3,700,000 \$ 3,700,000 \$ 285,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on resingular contents) and the sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 tyears of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 20 yrs annual groundwater level measurements (158 wells) 20 yrs annual sampling for VOCs (17 surface water sampling points)
OM&M	Annual TOTAL Present C:	Monitoring LANNUAL 0 t-Worth Am ategory	Cost Conti OM&M ANA NO	ngency and Unlisted Items (%) Yea YOREPORTING COST M and Reporting Cost Descriptio N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (E Annual groundwater sampling (E Annual proundwater elevation m Annual surface water sampling (I Annual operation of Phase 1 area 1.5 years quarterly confirmation Cleanup completion report M and Reporting Cost	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring g ISB parameters post DGR) onitoring (post DGR) post DGR) IGET system (post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 20 6 1	pct Unit D REPOR event event event event event yr yrs yrs yrs yrs event LS	\$289,700 \$347,600 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,000 \$7,748,000 Total \$ 73,000 \$ 285,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 160,000 \$ 1,700,000 \$ 1,700,00	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience	Total estimated operation timeframe to remediation level (based on rest Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 20 yrs annual groundwater level measurements (158 wells) 20 yrs annual sampling for VOCs (17 surface water sampling points) 120 yrs O&M, NPDES compliance sampling, permit renewal fees, GAC 6 qtrs sampling for VOCs (158 wells; 17 sw points) Final remediation completion report (year 46)
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OM&M	Annual TOTAL Present C: Subtota Annual TOTAL	Monitoring LANNUAL (LAN	Cost Conti	ngency and Unlisted Items (%) Yea YOR REPORTING COST M and Reporting Cost Descriptio N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (E Annual groundwat	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring g ISB parameters post DGR) onitoring (post DGR) post DGR) IGET system (post DGR)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 6 1 20%	pct Unit D REPOR event event event event event yr yrs yrs yrs yrs event LS	\$289,700 \$347,600 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 3,700,000 \$ 3,700,000 \$ 1,443,600 \$ 7,218,000 \$ 1,443,600 \$ 8,662,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on residual process) Assumptions, Comments, and/or Notes I complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 3 yrs qtrly sampling for VOCs (17 surface water sampling points) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TOC following EISB (45 wells) 20 yrs annual groundwater level measurements (158 wells) 20 yrs annual sampling for VOCs (17 surface water sampling points) 120 yrs O&M, NPDES compliance sampling, permit renewal fees, GAC 6 qtrs sampling for VOCs (158 wells; 17 sw points) Final remediation completion report (year 46)
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OM&M	Annual TOTAL Present C: Subtota Annual TOTAL Present	Monitoring	Cost Conti	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface was DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater elevation Quarterly groundwater elevation Quarterly surface water sampling Annual groundwater elevation meanual groundwater elevation of Quarterly surface water sampling (In Annual groundwater elevation meanual surface water sampling (In Annual surface water sampling (In Annual surface water sampling (In Annual operation of Phase 1 area 1.5 years quarterly confirmation Cleanup completion report M and Reporting Cost negency and Unlisted Items (%) &M AND REPORTING COST OM&M and Reporting Cost	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring EISB parameters post DGR) onitoring (post DGR) onitoring (post DGR) a GET system (post DGR) sampling Presumed Discount Rate	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 6 1 20% 0.6%	yrs pct Unit D REPOR event event event event yr syrs yrs yrs yrs pct pct pct	\$289,700 \$347,600 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,400 \$7,748,000 Total \$ 73,000 \$ 285,000 \$ 780,000 \$ 96,000 \$ 96,000 \$ 910,000 \$ 160,000 \$ 3,700,000 \$ 3,700,000 \$ 1,443,600 \$ 7,218,000 \$ 8,662,006 \$ 7,437,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on residual country of the count
OM&M	Annual TOTAL Present Subtota Annual TOTAL Present ALTER	Monitoring (LANNUAL (LAN)A))))))))))))	Cost Continue	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Descriptic N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (F Annual groundwater sampling (I Annual proundwater elevation of Phase 1 area 1.5 years quarterly confirmation Cleanup completion report M and Reporting Cost ngency and Unlisted Items (%) &M AND REPORTING COST OM&M and Reporting Cost MMARY REMEDIAL DESIGN, PLANNING	Presumed Discount Rate on INTENANCE, MONITO tter sampling blacement cost (EISB parameters) monitoring EISB parameters post DGR) onitoring (post DGR) onitoring (post DGR) sampling Presumed Discount Rate F, AND GENERAL COST	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 6 1 20% 0.6%	yrs pct Unit D REPOR event event event event yr syrs yrs yrs yrs pct pct pct	\$289,700 \$347,600 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,000 \$ 73,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 160,000 \$ 160,000 \$ 1,443,600 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 3,700,000 \$ 1,443,600 \$ 3,700,000 \$ 1,443,600 \$ 3,743,7000 \$ 3,7437,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on rest Discount Rate is 0.6% percent (real discount rate - 30 year note Assumptions, Comments, and/or Notes 1 complete sampling event prior to remedy implementation for VOCs (wells, 17 sw points) Replace failed major equipment (blower, well pumps, labor) after 15 to years of operation 3 yrs qtrly sampling for Metals, Dissolved Gases, TOC following EISB wells) 3 yrs qtrly sampling for VOCs after each injection event (158 wells) 3 yrs qtrly groundwater level measurements (158 wells) 14 yrs annual sampling in source area for Metals, Dissolved Gases, TO following EISB (45 wells) 20 yrs annual sampling for VOCs (17 surface water sampling points) 120 yrs O&M, NPDES compliance sampling, permit renewal fees, GAC 6 qtrs sampling for VOCs (158 wells; 17 sw points) Final remediation completion report (year 46) Assumed bid and scope contingency (10% each)
OM&M	Subtota Annual TOTAL Present Subtota Annual TOTAL Present ALTER TOTAL	Monitoring LANNUAL (t-Worth Am ategory al Non-Routi Monitoring LNON-ROU t-Worth Nor	Cost Conti	ngency and Unlisted Items (%) Yea YOR REPORTING COST M and Reporting Cost Description N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment reported in the system equipment in	Presumed Discount Rate On INTENANCE, MONITO Iter sampling Diacement cost (EISB parameters) monitoring ZISB parameters post DGR) conitoring (post DGR) post DGR) GET system (post DGR) sampling Presumed Discount Rate The presumed Discount Rate AND GENERAL COST ON COST (DIRECT)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 6 1 20% 0.6%	yrs pct Unit D REPOR event event event event yr syrs yrs yrs yrs pct pct pct	\$289,700 \$347,600 \$347,600 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$	\$ 289,700 \$ 57,900 \$ 8,342,000 \$ 73,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 160,000 \$ 160,000 \$ 1438,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 &	Total estimated operation timeframe to remediation level (based on response of the control of th
OM&M	Annual TOTAL Present Subtota Annual TOTAL Present ALTER TOTAL TOTAL TOTAL	Monitoring (LANNUAL (LAN	NO	ngency and Unlisted Items (%) Yea ND REPORTING COST M and Reporting Cost Descriptic N-ROUTINE OPERATION, MA Baseline groundwater/surface wa DGR/GET system equipment rep Quarterly groundwater sampling Quarterly groundwater sampling Quarterly groundwater sampling Annual groundwater sampling (F Annual groundwater sampling (I Annual proundwater elevation or Annual surface water sampling (I Annual operation of Phase 1 area 1.5 years quarterly confirmation Cleanup completion report M and Reporting Cost ngency and Unlisted Items (%) &M AND REPORTING COST OM&M and Reporting Cost MMARY REMEDIAL DESIGN, PLANNING	Presumed Discount Rate On INTENANCE, MONITO Iter sampling Diacement cost (EISB parameters) monitoring ZISB parameters post DGR) conitoring (post DGR) post DGR) GET system (post DGR) sampling Presumed Discount Rate The presumed Discount Rate AND GENERAL COST ON COST (DIRECT)	24 0.6% Quantity RING, AN 1 2.5 3 12 12 14 20 20 6 1 20% 0.6%	yrs pct Unit D REPOR event event event event yr syrs yrs yrs yrs pct pct pct	\$289,700 \$347,600 \$1347,600 \$1347,600 \$13,000 \$13,000 \$13,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000 \$14,000	\$ 289,700 \$ 57,900 \$ 8,342,000 \$ 73,000 \$ 73,000 \$ 500,000 \$ 285,000 \$ 96,000 \$ 96,000 \$ 160,000 \$ 160,000 \$ 1,443,600 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 7,218,000 \$ 3,700,000 \$ 1,443,600 \$ 3,700,000 \$ 1,443,600 \$ 3,743,7000 \$ 3,7437,000	EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb. Source/Basis of Unit Costs and Cost Data Assumed level of effort based on prior experience Assumed major equipment replacement after typical lifespan. Approximate drive point well cost base on online vendors and assumed level of effort for installation. Assumed level of effort based on prior experience EPA Guide to FS Cost Estimates (EPA 540-R-00-002, July 2000), Exhibit 5-6 & Per Office of Management and Budget, Circular A-94 Appendix C, Revised Feb.	Total estimated operation timeframe to remediation level (based on response of the control of th

Estimated Project Schedule for Point of Compliance Options 1 through 5

Point of Compliance Options 1 thorugh 5 **Boeing Everett - PMG SWMU**

YEAR 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 **REMEDIATION YEAR** 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 TASK Cleanup Action Plan/Engineering Design Final Cleanup Action Plan Issued Prepare Engineering Design Report **Bidding and Procurement Downgradient Plume DGR Remediation DGR Pilot Test Construction** DGR Pilot Test Implementation Full Scale DGR System Construction Full Scale DGR System Operation **Source Area Bioremediation** Injection Well Installation Donor Injection Event #1 Donor Injection Event #2 Donor Injection Event #3 **Option Compliance Monitoring Schedule** Opt 1 DGR Operations/ Monitoring for POC #1 Source Area Monitoring for POC #1 Final Compliance Sampling for POC #1 Opt 2a DGR Operations/ Monitoring for CPOC #2a Source Area Monitoring for CPOC #2a Final Compliance Sampling for CPOC #2a Opt 2b DGR Operations/ Monitoring for CPOC #2b Source Area Monitoring for CPOC #2b Final Compliance Sampling for CPOC #2a Opt 3 DGR Operations/ Monitoring for CPOC #3 Source Area Monitoring for CPOC #3 Final Compliance Sampling for CPOC #3 qtr(4) qtr (2) Opt 4 DGR Operations/ Monitoring for CPOC #4 GETS Operations/Monitoring for CPOC #4 Source Area Monitoring for CPOC #4 Final Compliance Sampling for CPOC #4 qtr(4) qtr (2) DGR Operations/ Monitoring for POC #5 GETS Operations/Monitoring for POC #5 Source Area Monitoring for POC #5

Final Compliance Sampling for POC #5