

Appendix B

Cost Information for Groundwater Remediation Systems

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Appendix B -- Cost Information for Groundwater Remediation Systems

E.J. Freeman

This appendix summarizes the costs associated with the groundwater remediation systems. Previously, costs were reported on a calendar year (CY) basis for some of the groundwater operable units and on a fiscal year (FY) basis for others. The costs in this appendix include the entire 15-month reporting period (from October 1, 2008, through December 31, 2009). Future years will be reported on a CY basis.

The cost categories are described below:

- Design: Includes initial design activities to support system construction, permitting, aquifer response modeling, peer reviews, quality assurance, and all other design documentation. It also includes the design of system upgrades and modifications.
- Project support: Includes project coordination-related activities and technical consultation as required during the course of facility design, construction, acceptance testing, and operation. Adjustments are made to reported numbers to represent the actual amount that project support accrued from program/project management and project controls.
- Operations and maintenance: Includes facility supplies, labor, and craft supervision costs associated with operating and maintaining the facility. It also includes costs associated with routine field screening and engineering support as required during the course of operations and periodic maintenance.
- Performance monitoring: Includes system and groundwater sampling and sample analysis.
- Waste management: The estimated cost for the management of waste associated with groundwater remediation.
- Treatment system capital construction: Includes fees paid to the construction subcontractor for capital equipment, initial construction/construction of new wells, redevelopment of existing wells, and modifications to the remediation system. Includes labor required for oversight and support of initial well installation. For some of the remediation systems, this cost is not applicable during the reporting period.
- Field studies (100-NR-2): Includes (1) total petroleum hydrocarbon remediation to address dissolved oxygen near the Columbia River, and (2) a phytoremediation field test.
- Barrier maintenance: Includes maintenance of injection wells, costs to implement the passive reactive barrier enhancement and extension, field investigations, and supporting *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) document preparation.

B.1. 200-UP-1 Operable Unit Pump-and-Treat System Costs

For the 15-month reporting period, the total cost for the 200-UP-1 pump-and-treat system was \$285,300. The cost breakdown is presented in Table B-1 and Figure B-1. The cost per liter treated was \$0.003 per liter. The cost per mass removed for the contaminants treated was as follows:

- Uranium (2,861 grams removed) = \$95.1 per gram
- Technetium-99 (2.39 grams removed) = \$10,931.0 per gram
- Carbon tetrachloride (2,481 grams removed) = \$2,857.6 per gram
- Nitrate (5,805 kilograms removed) = \$0.01 per kilogram.

B.2. 200-ZP-1 Operable Unit Pump-and-Treat System Costs

The total cost for the 200-ZP-1 pump-and-treat system in the 15-month reporting period was \$2,903,100. The cost breakdown is presented in Table B-2 and Figure B-2. The cost of water treated was \$0.006 per liter. The cost per mass of carbon tetrachloride removed was \$5,332.6 per gram.

B.3. 100-KR-4 Operable Unit Pump-and-Treat System Costs

The total cost for the KR4 pump-and-treat system for the reporting period was \$9.8 million. The cost for the KW system was \$3.6 million. The cost breakdown is presented in Table B-3 and Figure B-3. Construction costs were high in FY 2009 due to system expansions. The cost of water treated for the KR4 system was \$0.008 per liter and the cost per mass removed was \$179 per gram. For the KW system, the cost of water treated was \$0.01 per liter and the cost per mass removed was \$69 per gram.

B.4. 100-NR-2 Permeable Reactive Barrier Costs

The total cost for 100-NR-2 groundwater remediation for the reporting period was \$3.031 million. The cost breakdown is presented in Table B-4 and Figure B-4.

B.5. 100-HR-3 Remediation Costs

The total cost for 100-HR-3 groundwater remediation (pump-and-treat and In Situ Redox Manipulation) for the reporting period was \$15.963 million. The cost breakdown is presented in Table B-5 and Figure B-5.

References

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601, et seq.

TPA-CN-256, 2008, *TPA Change Notice for Modifying Remedial Design Report/Remedial Action Work Plan for the 100-NR-2 Operable Unit, DOE/RL-2001-27; and Interim Action Waste Management Plan for the 100-NR-2 Operable Unit, DOE/RL-2000-41, Rev. 1*, Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Table B-1. Cost Breakdown for 200-UP-1 Interim Action, October 2008 Through December 2009.

Description	In Thousands
Design	\$35.1
Project support	\$18.9
Operations and maintenance	\$98.2
Performance monitoring	\$131.6
Waste management	\$1.5
Total	\$285.3

Table B-2. Cost Breakdown for 200-ZP-1 Interim Action, October 2008 Through December 2009.

Description	In Thousands
Design	\$210.6
Project support	\$368.5
Operations and maintenance	\$1,735.1
Performance monitoring	\$434.3
Waste management	\$154.5
Total	\$2,903.0

Table B-3. Costs Associated with 100-KR-4 Interim Action, October 2008 Through December 2009.

Description	KR4	KW
	In Thousands	
Design	\$158	\$78
Project support	\$174	\$174
Operations and maintenance	\$1,619	\$759
Performance monitoring	\$569	\$216
Waste management	\$600	\$95
Treatment system capital construction	\$6,651	\$2,302
Field studies	\$25	--
Totals	\$9,796	\$3,624

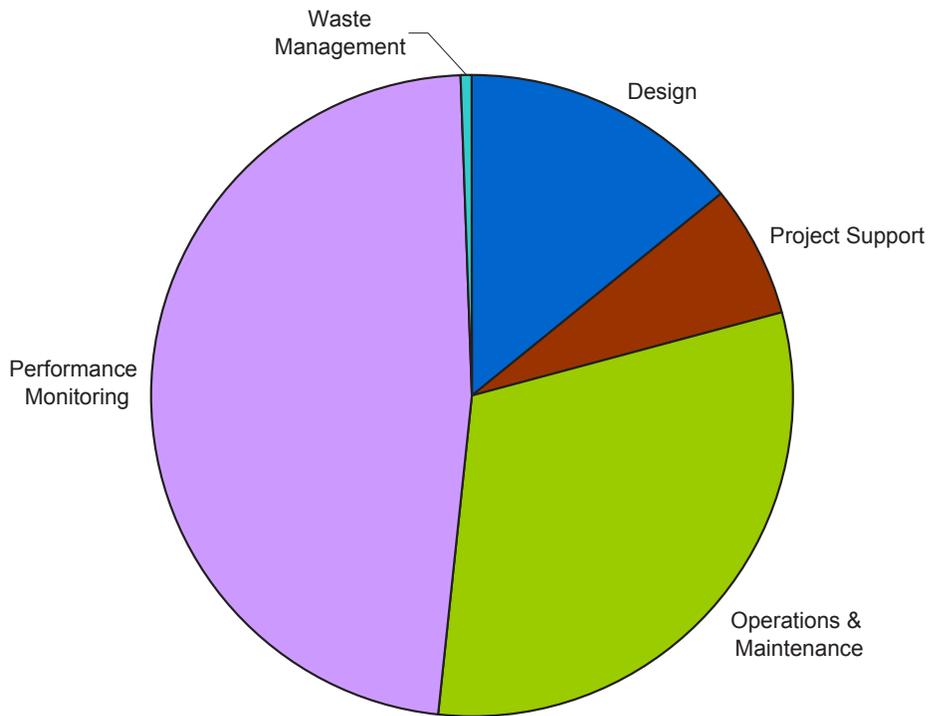
Table B-4. Costs Associated with 100-NR-2 Interim Action, October 2008 Through December 2009.

Description	In Thousands
Design	\$20.5
Project support	\$384.4
Operations and maintenance	\$62.4
Performance monitoring	\$412.3
Waste management	\$4.1
Treatment system capital construction	\$390.9
Field studies	\$1,009.2
Barrier maintenance	\$747.0
Total	\$3,031

Table B-5. Costs Associated with 100-HR-3 Interim Action, October 2008 Through December 2009.

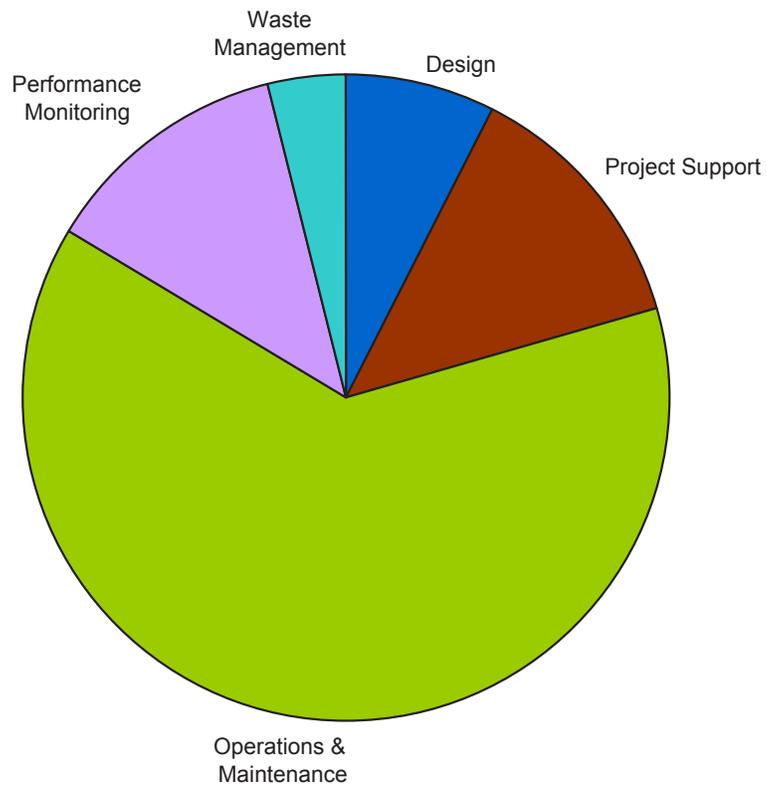
Description	In Thousands
Design	\$1,239
Project support	\$2,678
Operations and maintenance	\$2,516
Performance monitoring	\$2,436
Treatment system capital construction	\$7,094
Total	\$15,963

Figure B-1. Cost Breakdown for 200-UP-1 Interim Action, Fiscal Year 2009.



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Figure B-2. Cost Breakdown for 200-ZP-1 Interim Action, Fiscal Year 2009.



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Figure B-3. Cost Breakdown for 100-KR-4 Interim Action, October 2008 through December 2009.

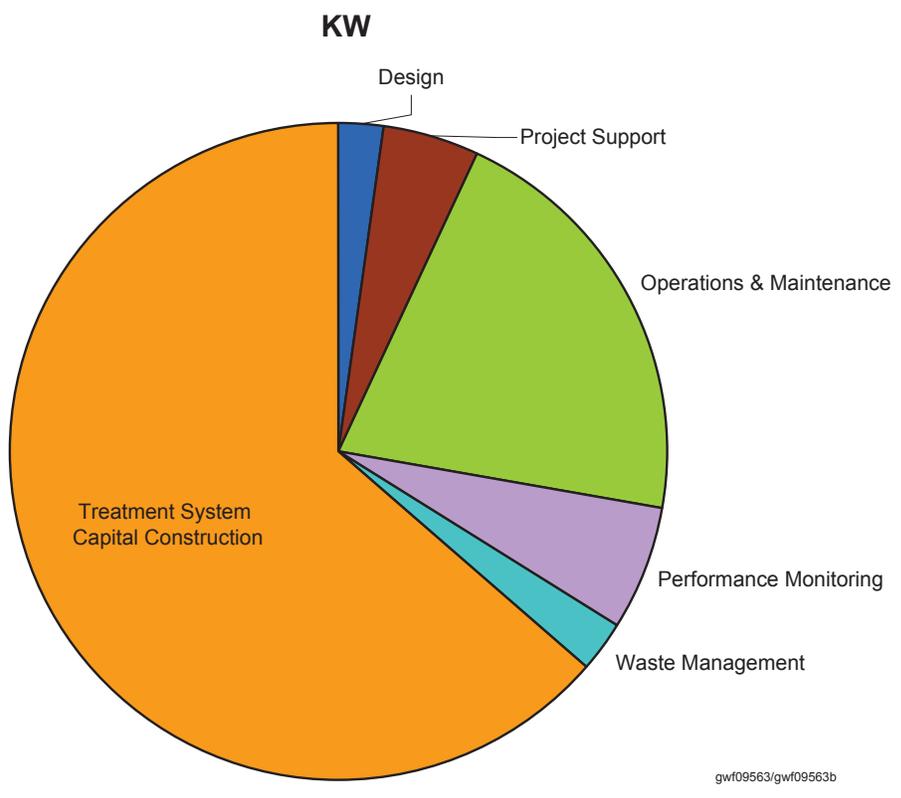
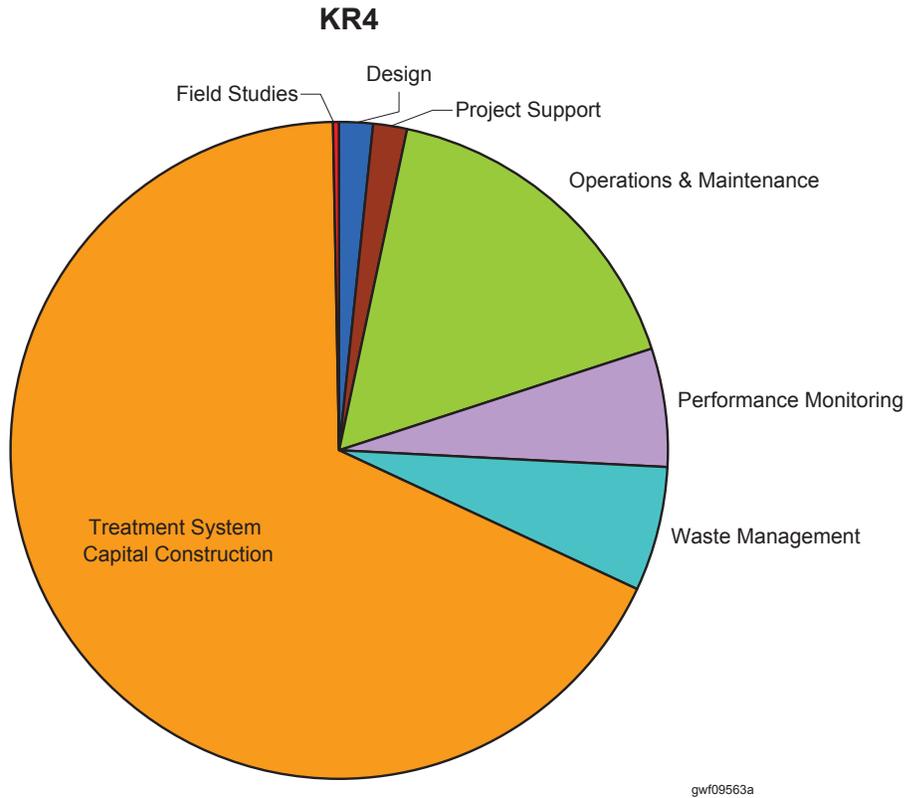
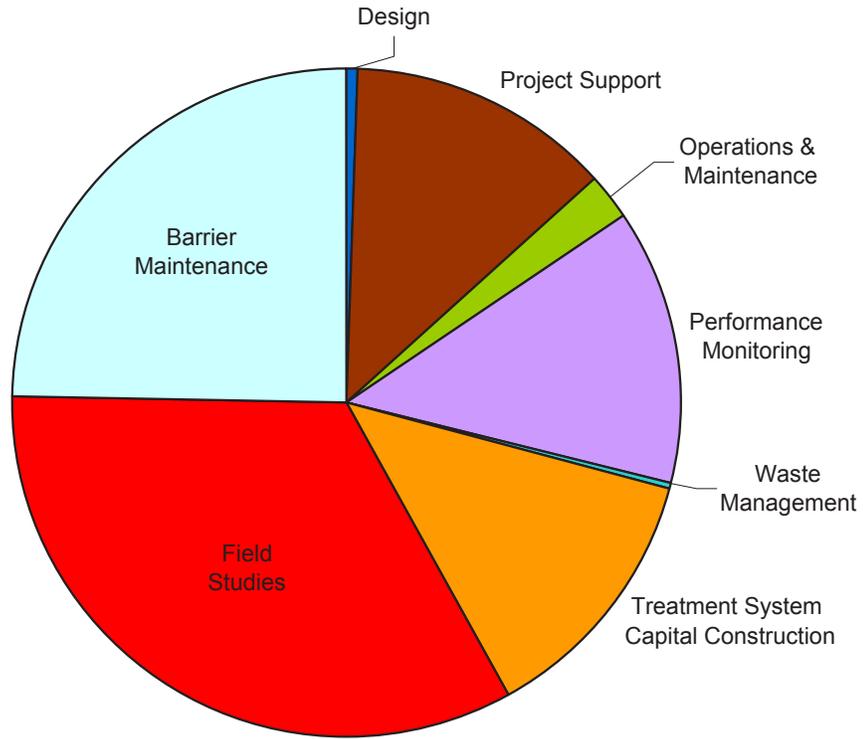
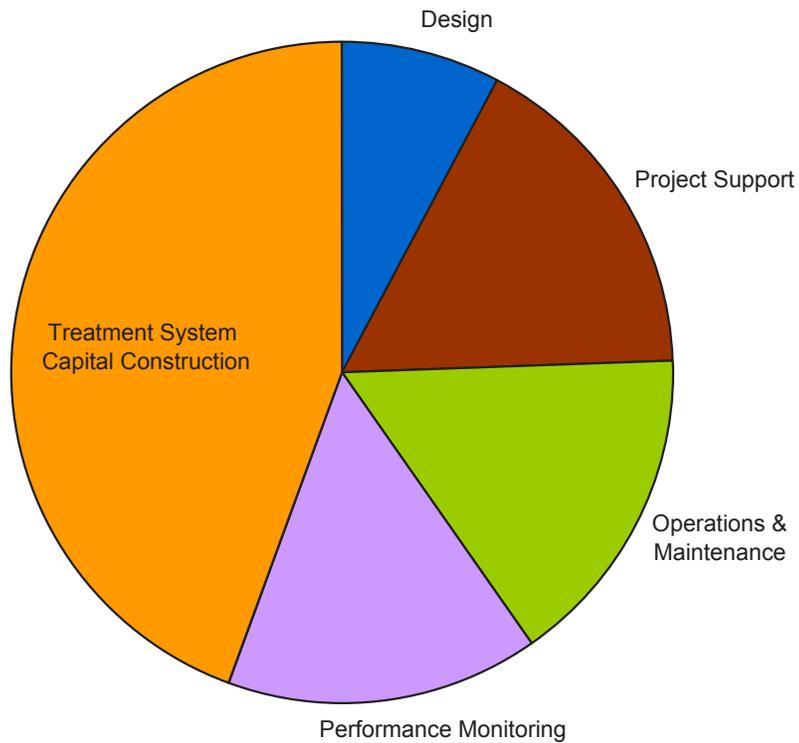


Figure B-4. Cost Breakdown for 100-NR-2 Interim Action, October 2008 through December 2009.



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Figure B-5. Costs Associated with 100-HR-3 Interim Action, October 2008 through December 2009.



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