



# Interim Remedial Action Report

## Monticello Mill Tailings (USDOE) National Priorities List Site

### EPA CERCLIS Identification UT 3890090035

### OU III – Surface Water and Ground Water Monitored Natural Attenuation Remedy

September 2004



U.S. Department  
of Energy



**Office of Legacy Management**

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Work performed by S.M. Stoller Corporation for the  
U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado  
DOE Contract No. DE-AC01-02GJ79491

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**Monitored Natural Attenuation Remedy**

**Approval and Concurrence**

Approved by: Terry L. Anderson 9/28/04  
Terry L. Anderson, Director Date  
Federal Facilities Program, Region 8  
U.S. Environmental Protection Agency

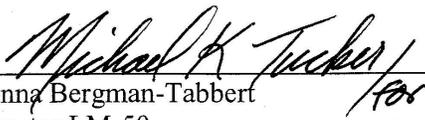
Concurrence by: Brent H. Everett 9/28/04  
Brent H. Everett, CERCLA Branch Manager Date  
Division of Environmental Response and Remediation  
Utah Department of Environmental Quality

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**Certification of Interim Remedial Action Completion  
for Monitored Natural Attenuation  
at the Monticello Mill Tailings (USDOE) Site  
Operable Unit III – Surface Water and Ground Water**

The interim remedial action for the selected remedy at Operable Unit III, Surface Water and Ground Water, of the Monticello Mill Tailings (USDOE) Site was implemented in accordance with approved project plans and procedures, and unless otherwise noted in this report, is complete. The necessary monitoring network is in place to evaluate the performance of the monitored natural attenuation remedy. Institutional controls are also in place and will remain in effect until remediation goals are met. Radioactive materials and other contaminants of concern (arsenic, manganese, molybdenum, nitrate, selenium, uranium, radium-226, vanadium, and gross alpha) remain in surface water and ground water. It is anticipated that remediation goals will be met by the year 2045.

Interim remedial action completion certified by:

  
\_\_\_\_\_  
Donna Bergman-Tabbert  
Director LM-50  
U.S Department of Energy  
Office of Legacy Management

*Sept 21, 2004*  
Date

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## Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>U.S. Code of Federal Regulations</i>
COR	Close Out Report
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
FFA	Federal Facility Agreement
ft	foot (feet)
IC	institutional control
IRA/ROD	Interim Remedial Action Record of Decision
IRAR	Interim Remedial Action Report
LM	Legacy Management
LTS&M	Long-Term Surveillance and Maintenance
mg	milligram(s)
MMTS	Monticello Mill Tailings (USDOE) Site
MNA	monitored natural attenuation
NPL	National Priorities List
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
pCi/g	picocurie(s) per gram
PRB	permeable reactive barrier
PRP	potentially responsible party
Ra-226	radium-226
RAC	Remedial Action Contractor
RAR	Remedial Action Report
RIA/FFS	remedial investigation addendum/focused feasibility study
RI	remedial investigation
RD/RA	remedial design/remedial action
ROD	Record of Decision
RVZ	residual vadose zone
SARA	Superfund Amendments and Reauthorization Act (1986)
SDWA	Safe Drinking Water Act
SFMP	Surplus Facilities Management Program
UDEQ	Utah Department of Environmental Quality
UMTRCA	Uranium Mill Tailings Radiation Control Act (1978)
USWS	Utah Surface Water Standards
yd <sup>3</sup>	cubic yard(s)
ZVI	zero-valent iron

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## Executive Summary

This Interim Remedial Action Report (IRAR) documents that the U.S. Department of Energy (DOE), the potentially responsible party (PRP), with oversight by the U.S. Environmental Protection Agency (EPA) and the Utah Department of Environmental Quality (UDEQ), has completed construction activities at Operable Unit (OU) III of the Monticello Mill Tailings (USDOE) Site (MMTS). The MMTS is a National Priorities List (NPL) site and is being remediated in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The MMTS is located in and near the City of Monticello in San Juan County, Utah. This IRAR has been prepared in accordance with the EPA guidance *Close Out Procedures for National Priorities List Sites*.

Subsequent to the completion of OU III site characterization activities and evaluation of remedial alternatives, the Record of Decision (ROD) for OU III, signed on June 2, 2004, presented as the selected remedy monitored natural attenuation (MNA) with institutional controls (ICs). The construction of additional monitoring wells to complete the monitoring network necessary for evaluating the performance requirements of the final remedy is addressed in this IRAR. Two of three proposed wells were constructed on August 24 and 25, 2004. The third well was not constructed as planned and was abandoned when it was unable to provide a sufficient sample for analysis. After further field investigations and analysis of the overall monitoring well network and the Post-ROD Monitoring Plan, it was determined that the third well was not necessary. A final inspection of the site was conducted by EPA and UDEQ on September 15, 16, and 17, 2004, and it was determined that all aspects of the remedy were implemented in accordance with applicable enforcement documents and the ROD for OU III.

The constructed remedy conforms to the DOE selected remedy, concurred upon by UDEQ and approved by EPA in the ROD for OU III. EPA and UDEQ conducted inspections during well installation activities and agree that DOE constructed the remedy in accordance with remedial design plans and specifications.

The monitoring activities and implementation and enforcement of the ICs will continue until the remediation goals are met. EPA does not believe that the use of a contingency remedy will be necessary at the MMTS. However, if the selected remedy does not remain protective of human health and the environment or results of the monitoring program do not indicate that the remediation goals can be achieved within 42 years from October 2002, contingency remedies will be evaluated and implemented if determined necessary.

The selected remedy is expected to achieve site remediation goals by the year 2045 through natural hydrological and geochemical processes identified in the OU III alluvial ground water system. When OU III site remediation goals are met, a final RAR will be prepared and the MMTS will become eligible for final close out and deletion from the NPL. Because hazardous substances will remain at the site above health based levels after the completion of remedial action, the site is subject to statutory Five-Year Reviews. The next CERCLA Five-Year Review is scheduled for completion in the year 2007.

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## I. Introduction

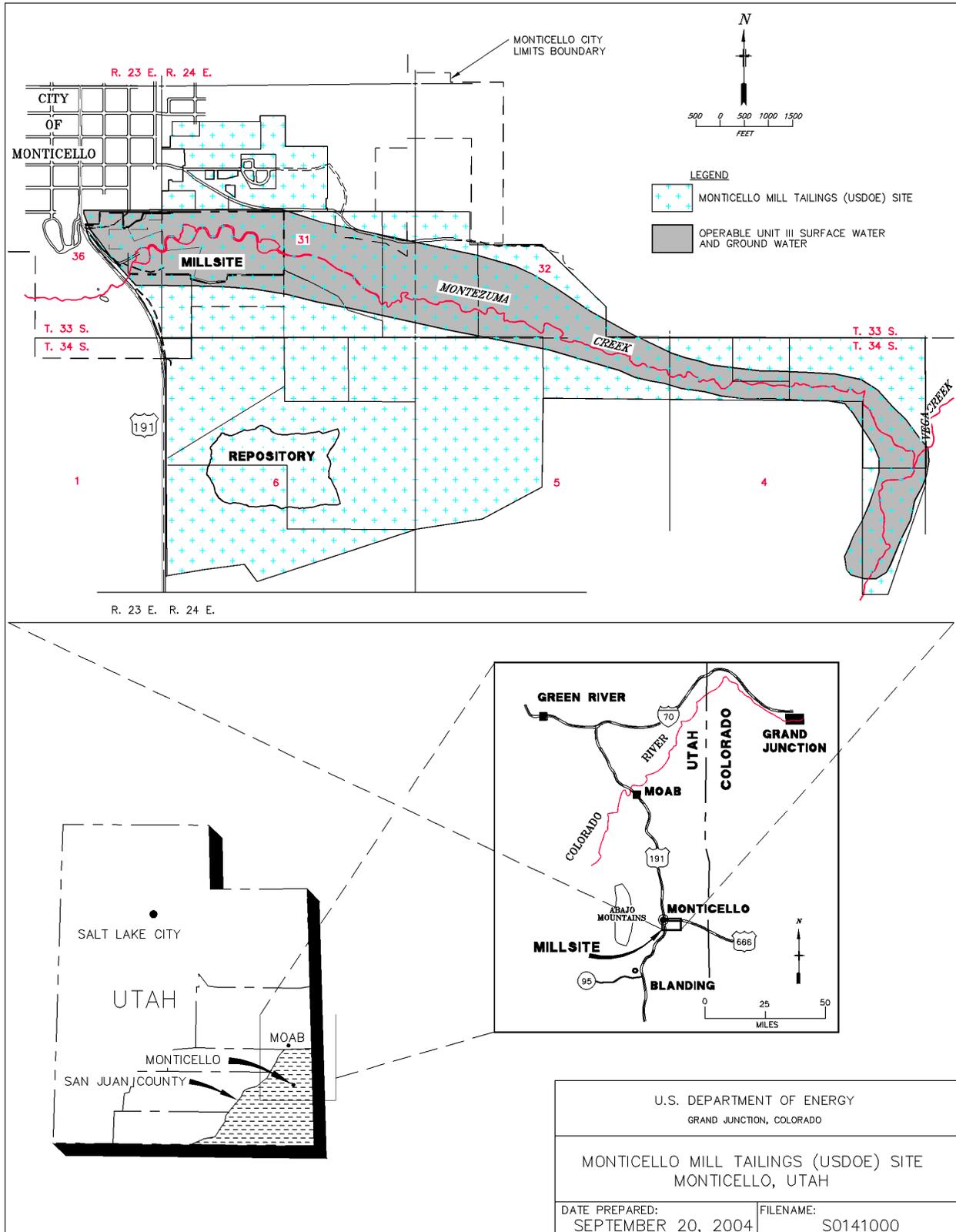
The Monticello Mill Tailings (USDOE) Site (MMTS) is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) Superfund Site (CERCLIS Identification Number UT3890090035), located in and near the City of Monticello (City), San Juan County, Utah (Figure 1). The MMTS is comprised of a 78-acre tract within the City limits that included a former uranium and vanadium ore processing mill, and surrounding peripheral properties covering approximately 1,700 additional acres. Properties within the MMTS are variously owned by the City, the U.S. Department of Energy (DOE), and private parties. Montezuma Creek, a small perennial stream with headwaters in the Abajo Mountains west of the City, flows through the former millsite and certain peripheral properties downstream of the former millsite.

The former mill, operated by and for the U.S. Government, processed approximately one million tons of vanadium and uranium ore between 1942 and 1960. By-products of the ore milling process and other wastes containing radioactive and non-radioactive metals and other inorganic compounds remained on the site subsequent to the mill closure in 1960. Four tailings impoundment areas covered approximately 68 acres of the site. As a result of the ore processing activities, the former millsite and the peripheral properties became contaminated by dispersed mill tailings, residues from ore stockpiles, and other by-product materials. The tailings, which constituted the majority of the waste material, were transported primarily by the wind from the former millsite onto adjacent peripheral properties. Tailings also were transported to downstream properties via Montezuma Creek and, to a limited extent, were incorporated as fill on local residential properties and/or used as aggregate in brick mortar and concrete.

In addition to MMTS soil and sediment contamination, surface water and ground water located on certain properties became contaminated with radioactive substances and other constituents associated with the mill tailings. The extent of contamination in ground water is limited to the thin alluvial aquifer (generally less than 10 feet [ft] thick) comprised of unconsolidated alluvium in the Montezuma Creek valley. Contaminants found in the soils and in surface water and ground water included arsenic, manganese, molybdenum, nitrate, selenium, uranium (and uranium isotopes), radium-226 (Ra-226), vanadium, and gross alpha.

The MMTS was divided into three operable units (OUs), as described below:

- OU I – Consists of the former millsite and tailings impoundment area covering approximately 78 acres (a former mill area covering approximately 10 acres and the tailings impoundment area covering approximately 68 acres). In 1992, OU I was expanded to include the on-site repository and the two peripheral properties upon which the repository is located.



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Figure 1. Monticello Mill Tailings (USDOE) Site, Monticello, Utah

- OU II – Includes 34 peripheral properties totaling approximately 1,700 acres. These properties were subsequently categorized into 12 properties that exhibited surface water and ground water contamination as well as soil and sediment contamination, and 22 properties with only windblown surface soil contamination.
- OU III – OU III was identified in 1990 and includes contaminated surface water and ground water located on the former millsite and 12 of 34 peripheral properties in OU II that exhibited surface water and ground water contamination.

Figure 2 depicts the various OUs at the MMTS.

Section II provides a brief background description for OUs I and II of the MMTS. The remainder of Section II and subsequent sections of this IRAR describe the completion of interim remedial action for the monitored natural attenuation (MNA) remedy for OU III. Once the final remedial action objectives for OU III surface water and ground water contamination are achieved, a final RAR will be prepared and the MMTS will become eligible for final close out and deletion from the NPL.

## II. Operable Unit Background

The Record of Decision (ROD) for OU I and OU II (MMTS ROD), signed in September 1990 (DOE 1990), stipulated that contaminated tailings, soil, sediment, and debris from OUs I and II would be excavated and placed in a permanent on-site repository. The MMTS ROD designated OU III to address contaminated surface water and ground water. The MMTS ROD deferred the final remedy for OU III until the effects of remedial action (source removal from OUs I and II) on surface water and ground water could be determined.

Radioactive material removed from MMTS peripheral properties was transferred to the former millsite for interim storage, and then permanently disposed of in the on-site repository constructed approximately one mile south of the former millsite. Excavation for the repository was initiated in November 1995 and completed in November 1996. The tailings haul, consisting of the removal of 2.84 million cubic yards (yd<sup>3</sup>) of contaminated tailings, soil, and debris, was initiated in June 1997 and completed in September 1999. Construction of the repository cover (a water balancing evapo-transpiration cover) was initiated in May 1999 and was substantially completed by February 2000.

In September 1998, following the completion of a focused Remedial Investigation (DOE 1998a) and a draft Feasibility Study (DOE 1998b), an Interim Remedial Action Record of Decision (IRA/ROD) for OU III was signed (DOE 1998c). It was determined at that time that the potential effects of the removal of source material (tailings piles) on surface water and ground water could not be determined with any degree of certainty because the source material had not yet been completely removed from the former millsite.

Accomplishments and findings of the interim remedial action for OU III, as well as other MMTS and OU III activities relevant to OU III surface water and ground water contamination, were documented in a Remedial Investigation Addendum and Focused Feasibility Study (RIA/FFS) completed in January 2004 (DOE 2004a). The RIA/FFS provided the revised site conceptual model for surface water and ground water, updated the assessment of human health and ecological risk, and evaluated in detail alternatives for a final surface water and ground water

remedy. The RIA/FFS, along with the proposed plan, provided the rationale and supporting data for selecting MNA as the final remedy for OU III.

The ROD for OU III, signed on June 2, 2004 (DOE 2004b), specifies MNA with institutional controls (ICs) as the final remedy for OU III contaminated surface water and ground water. The selected remedy includes:

- MNA, including comprehensive monitoring to evaluate its effectiveness to meet remediation goals within the 42-year time frame set in the ROD. Specifically included as part of the MNA remedy is an evaluation of selenium concentration trends in wetland soil and sediment and surface water and the potential impacts of selenium concentrations on ecological receptors.
- Continued implementation and enforcement of the ICs that prohibit the use of the contaminated alluvial aquifer and the restrictive easement that prohibits removal of contaminated sediments from the Montezuma Creek floodplain.
- Decommissioning (removal) of the permeable reactive barrier (PRB), constructed as a full-scale treatability study in 1999 as part of the IRA/ROD (DOE 1998c), when the PRB ceases to be effective in removing contaminants from the ground water.

### **Operable Unit III Monitoring Activities**

Evaluation of the existing monitoring well network identified a gap in the downgradient ground water monitoring system. The Remedial Design/Remedial Action Work Plan for OU III (RD/RA) (DOE 2004d) identified the need to replace one monitoring well and construct two new monitoring wells to improve monitoring capability and to assess the performance of the remedy in attaining remediation goals.

### **Operable Unit III Institutional Controls**

Three ICs remain in effect within the OU III contaminated surface water and ground water area. These ICs were implemented during the OU III interim remedial action and will continue until remediation goals are met.

Two land use ICs (a Ground Water Management Area and a Quitclaim Deed) prohibit consumption of contaminated ground water from the alluvial aquifer. The first IC defines a Ground Water Management Area, placed in effect in May 1999 by the Utah State Engineer. Well drilling into the alluvial aquifer or diverting alluvial ground water for domestic use is prohibited in the Ground Water Management Area (DOE 2004b). The DOE periodically monitors for any well development activity in the Ground Water Management Area and informs the U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality (UDEQ) of any activity. Enforcement, if necessary, is the responsibility of the State of Utah, Department of Natural Resources, Division of Water Rights. The Ground Water Management Area is depicted on Figure 2.

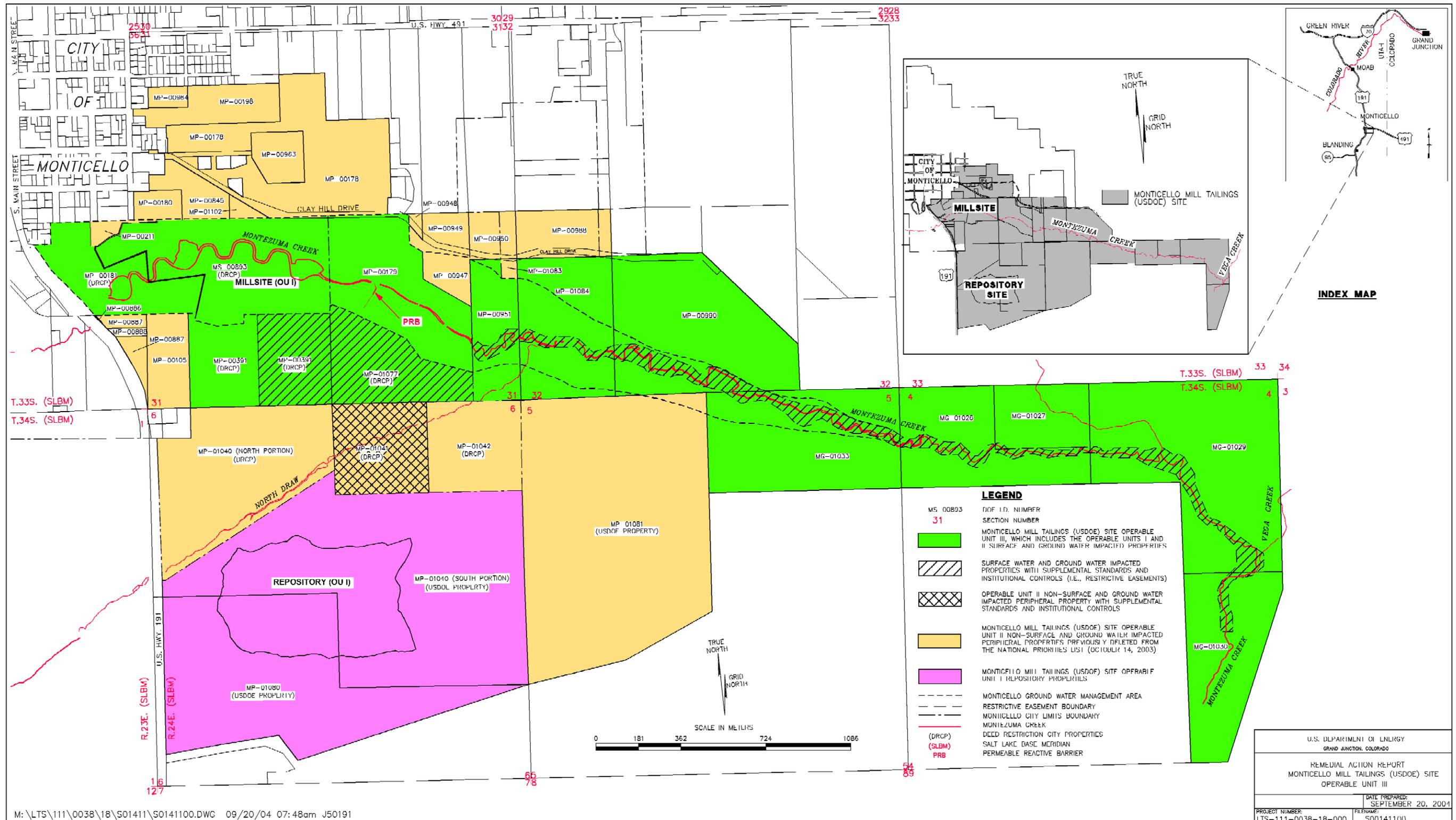


Figure 2. Monticello Mill Tailings (USDOE) Site Operable Unit III

The second land use IC was included in the Quitclaim Deed that transferred ownership of the former millsite and adjacent peripheral properties from the U.S. National Park Service to the City for use as a public park in 2000 (City 2000). The Quitclaim Deed prohibits construction of domestic wells in the alluvial aquifer underlying the properties. The Quitclaim Deed restrictions also stipulate that the properties are to be used as public open space in perpetuity. There are additional restrictions that prohibit activities that would increase the likelihood of exposure, such as overnight camping. The supplemental standards areas also have been fenced off and have limited access. Pursuant to the quit claim deed, changes to land use must be approved by the National Park Service, EPA and UDEQ. DOE monitors activities on these properties on a quarterly basis to make certain the restrictions are implemented. The City is responsible for ensuring that no restricted activities occur. If necessary, enforcement action can be taken by the National Park Service.

Before the Ground Water Management Area and Quitclaim Deed ICs were implemented, the alluvial aquifer was not used for any domestic purpose, and future domestic use, in the absence of the ICs, is not considered likely because the alluvial aquifer is not a reliable or prolific source of ground water. Alternate domestic water supplies (municipal water and ground water from an underlying bedrock formation) are also available to current and future residences in the Ground Water Management Area. Predominantly agricultural land use in the Ground Water Management Area, both current and planned, provides additional likelihood that exposure to contaminated ground water will be minimal.

The third and final IC, which applies to peripheral properties downgradient from the former millsite, is a restrictive easement that prohibits the removal of contaminated soils and sediments from the Montezuma Creek floodplain and the construction of habitable structures within the restrictive easement area. The restrictive easement, which extends from a point 1/3 mile downgradient from the former millsite boundary to a point downgradient from the confluence of Montezuma Creek and Vega Creek, can generally be described as the area within 50 ft of the centerline of Montezuma Creek. DOE monitors land use activity on these properties on a quarterly basis and is responsible for enforcement of the restrictive easement. The restrictive easement area is depicted on Figure 2.

### **III. Construction Activities**

#### **Construction Activities Specific to the Record of Decision for Operable Unit III**

The relatively minor construction activities specific to the ROD for OU III, outlined below, are inconsequential in achieving site remediation goals for surface water and ground water within the prescribed time. Construction activities to fulfill the ROD for OU III were:

- Install three monitoring wells into the alluvial aquifer at specified locations in order to better evaluate the progress of MNA, and
- Decommission the PRB when it is no longer effective.

The draft-final RD/RA, submitted to EPA and UDEQ on August 20, 2004 (DOE 2004d), specified the installation methods, proposed locations, and construction details of the new monitoring wells necessary to monitor the performance of MNA. As proposed in the RD/RA,

two monitoring wells necessary for completing the monitoring network were constructed on August 24 and 25, 2004. EPA and UDEQ were present during construction of the monitoring wells. A third well was not constructed as originally planned because field observations during drilling activities indicated that a bedrock ledge was present at the proposed well location and insufficient ground water was available to develop the well. A field decision was made by DOE and concurred upon by EPA that, based on the lateral extent of the alluvial ground water system, a single well would be adequate to conduct the performance monitoring at that location. There are more than 40 other monitoring wells to conduct performance monitoring of MNA. This change to the selected remedy has been recorded in the project files and documented in a letter to DOE (DOE 2004e).

This IRAR confirms that well construction is complete and the performance monitoring plan is fully operational. Performance evaluation will be documented in annual reports and in subsequent CERCLA Five-Year Reviews (see Section VII).

Decommissioning the PRB Treatability Study will follow a separate work plan. The selected remedy requires that the PRB reactive media (Zero-valent iron [ZVI]) be excavated and disposed in an appropriate facility as determined by the hazardous or radiological properties of the waste ZVI at that time. The effective lifespan of the PRB is estimated to be between 10 and 20 years from the date of its construction. It is presently planned that the PRB will be decommissioned in the year 2019. Confirmation of PRB decommissioning will be documented in the appropriate annual report, in the subsequent CERCLA Five-Year Review, and in the final close out report (COR) for OU III (see Section VII).

### **Remedy Performance Standards for Operable Unit III**

It is expected that the remedial action objectives for OU III surface water and ground water will be achieved by year 2045. Ground water use restrictions that are already in place will continue throughout that period. The remediation goals for the contaminants of concern are presented in [Table 1](#). After remediation goals are achieved, use of ground water will be permitted pursuant to existing State regulations.

Monitoring will be conducted in accordance with the draft-final *Monticello Mill Tailings Site Operable Unit III—Post-Record of Decision Monitoring Plan* (DOE 2004c), submitted to EPA and UDEQ on August 27, 2004, to verify that remediation goals will be met within the acceptable time frame. The existing monitoring network includes in excess of 40 ground water monitoring wells and 15 surface water monitoring locations that will be monitored in October of each year. Approximately three-fourths of the monitoring locations will also be monitored in April of each year. The progress of MNA is assessed by the methods and criteria presented in Appendix B of the ROD for OU III. Annual reports are prepared to present the monitoring results and progress of aquifer restoration according to specific evaluation criteria defined in the ROD for OU III. The biomonitoring approach presented in the ROD for OU III ensures that the ecologically sensitive wetland areas in OU III will develop as designed and will remain protective of wildlife.

Table 1. Maximum Concentrations of Contaminants of Concern and Remediation Goals

Contaminant of Concern	Maximum Concentration <sup>a</sup>	Remediation Goal	Basis
<b>Ground Water</b>			
Arsenic	18.8 µg/L	10 µg/L	SDWA
Manganese	14,200 µg/L	880 µg/L	Risk based HH
Molybdenum	230 µg/L	100 µg/L	UMTRCA
Nitrate	14.5 mg/L	10 mg/L	SDWA
Selenium	237 µg/L	50 µg/L	SDWA
Uranium	929 µg/L	30 µg/L	SDWA
Vanadium	731 µg/L	330 µg/L	Risk based HH
U-234/-238	637 <sup>b</sup> pCi/L	30 pCi/L	UMTRCA
Gross alpha	68 <sup>c</sup> pCi/L	15 pCi/L	SDWA
<b>Surface Water</b>			
Arsenic	10 µg/L	10 µg/L	USWS
Nitrate (as nitrogen)	52 mg/L	4 mg/L	USWS
Selenium	112 µg/L	5 µg/L	USWS
Gross alpha	5 <sup>c</sup> pCi/L	15 pCi/L	USWS

µg/L = micrograms per liter; mg/L = milligrams per liter; pCi/L = picocuries per liter; UMTRCA = Uranium Mill Tailings Radiation Control Act; SDWA = Safe Drinking Water Act; USWS = Utah Surface Water Standards; HH = Human Health

<sup>a</sup> Maximum concentration detected in the October 2002 sampling round.

<sup>b</sup> Calculated, assumes equilibrium.

<sup>c</sup> Excluding uranium.

## IV. Chronology of Events

Table 2 identifies the chronology of significant events leading to the completion of interim remedial action at OU III, Surface Water and Ground Water.

Table 2. Operable Unit III - Chronology of Significant Events

Date	Event
September 28, 1998	IRA/ROD signed for OU III
June 1999	Completed construction of PRB
January 2004	RIA/FFS
June 2, 2004	ROD for OU III – Surface Water and Ground Water signed by EPA
August 20, 2004	Final RD/RA Work Plan
August 24 and 25, 2004	Construction of monitoring wells
August 27, 2004	Draft-final Post-ROD Monitoring Plan completed
September 15 – 17, 2004	Pre-final site inspection for OU III and site-wide Annual Inspection
September 21, 2004	DOE certifies IRAR for construction completion of OU III MNA remedy
By September 30, 2004	EPA and UDEQ concurrence on IRAR

## V. Performance Standards and Construction Quality Control

The interim remedial action for the selected MNA remedy was completed through the addition of the two new monitoring wells to the OU III monitoring network. The additional wells will improve the monitoring capability for assessing the success of MNA in achieving remediation goals. The two monitoring wells were installed at proposed locations according to approved well construction procedures and specifications detailed in the RD/RA Work Plan (DOE 2004d). A

direct-push coring technology using a Geoprobe rig, successfully used on approximately 100 other alluvial wells at the MMTS, was used for installing the two wells. The wells were constructed using the required 1-inch PVC casing, # 10 slotted screen, silica sand filter pack, bentonite materials, concrete pad, and flush mounted steel vault housing. After installation, the wells were surged and pumped in accordance with the prescribed procedures. Water quality parameters (pH, temperature, electrical conductivity, and turbidity) will be documented during the October 2004 sampling event.

The two new monitoring wells were constructed in accordance with the requirements of the *Quality Assurance Manual* (DOE 2004f). This manual identifies and implements the specific requirements and philosophy of DOE Order 414.1A, *Quality Assurance*. The manual also includes the requirements of 10 CFR 830 Subpart A, *Quality Assurance Requirements*, ANSI/ASQC E4-1994, *Quality Assurance Program Requirements for Environmental Data Collection and Environmental Technology Programs*, ISO 9001-2000, *Quality Management Systems – Requirements*, and ISO 14001-96, *Environmental Management Systems*. All these standards are similar in content.

## VI. Final Inspection and Certification

The pre-final inspection for the installation of OU III monitoring wells was held on September 15, 16, and 17, 2004. DOE and its sub-contractor, EPA, and UDEQ were present. During this inspection, well installation was verified; however, a concrete pad needs to be poured around the base of well # 0202. DOE, EPA, and UDEQ also conducted an annual inspection for the MMTS and the Monticello Radioactively Contaminated Properties site. This is the fourth such inspection of the site.

### Health and Safety

No health and safety problems were encountered during construction of the monitoring wells. Work was performed in accordance with the requirements of the *Health and Safety Manual* (DOE 2004g). Personal protective equipment worn by site personnel installing the wells included Tyvek coveralls, ear and eye protection, safety boots, and leather gloves.

When the PRB is decommissioned, a work-specific health and safety plan will be prepared for the excavation and disposal of the ZVI.

### Certification

The selected remedy for OU III is fully implemented, is operational and functioning as designed, is protective of human health and the environment, and meets the criteria established in the ROD for OU III. The performance monitoring activities and implementation and enforcement of the ICs will continue until the surface water and ground water remediation goals are met. EPA does not believe that the use of a contingency remedy will be necessary at the MMTS. However, if the selected remedy does not remain protective of human health and the environment or results from the monitoring program do not indicate that the remediation goals can be achieved within 42 years of October 2002, contingency remedies will be evaluated and will be implemented if determined necessary.

## VII. Operation and Maintenance

Site-wide surveillance and maintenance requirements are documented in the Monticello Long-Term Surveillance and Maintenance (LTS&M) documents. These documents, first completed in April 2002, include an administrative manual and four volumes that address the LTS&M operating procedures for the Site Repository and Millsite, Supplemental Standards, OU III (to be written), and Annual Inspections and Five-Year Reviews, respectively.

Operation and maintenance activities associated with the OU III remedy involve semi-annual surface water and ground water monitoring, periodic maintenance of ground water monitoring wells, routine inspections, and continued implementation and enforcement of the ICs. Specific data collection tasks, methods, and rationale are provided in the Post-ROD Monitoring Plan (DOE 2004c). This document addresses performance evaluation criteria for MNA. It also addresses post-ROD monitoring for selenium including, if and when necessary, bio-monitoring. Ground water monitoring wells are inspected on a regular basis for performance and integrity, and are re-conditioned, repaired, or replaced as needed. Abandonment procedures for OU III monitoring wells, as well as decommissioning of the PRB, are also addressed in the document. When such activities are achieved, they will be documented in the appropriate annual report, CERCLA Five-Year Review, and the final COR.

### CERCLA Five-Year Reviews

MMTS OU III is not eligible for deletion from the NPL until EPA and UDEQ determine that remediation goals for OU III surface water and ground water have been achieved. The ROD for OU III specifies MNA with ICs as the final remedy for contaminated surface water and ground water. The selected remedy is expected to achieve site remediation goals by the year 2045 through the natural hydrological and geochemical processes identified in the OU III ground water system (DOE 2004b).

Radioactive contaminants (including Ra-226) remain on several OU II peripheral properties, and hazardous substances are also present in OU III Surface Water and Ground Water properties. Because hazardous substances will remain at the site above health-based levels that allow unlimited use and unrestricted exposure after the completion of the remedial action and because the ROD for the site was signed after October 17, 1986 and the remedial action was selected under CERCLA Section 121(c) as provided in OSWER Directive 9355.7-03B-P Comprehensive Five-Year Review Guidance (June) and Executive Order 12580, DOE must conduct statutory CERCLA Five-Year Reviews. CERCLA Five-Year Reviews were conducted for the MMTS in 1997 and 2002. The next CERCLA Five-Year Review will be completed prior to September 2007.

## VIII. Summary of Project Costs

The primary costs for the selected remedy for OU III are associated with annual monitoring. The only capital costs are for construction of the monitoring wells and decommissioning of the PRB after it is no longer effective. [Table 3](#) provides a cost breakdown of these items.

Table 3. Cost Estimate for Operable Unit III Remedy

Capital cost (decommission PRB and install new monitoring wells)	\$ 45,112
Annual monitoring and indirect costs: years 1 through 10	\$ 123,580
Annual monitoring and indirect costs: years 11 through 40	\$ 113,980
Annual LTS&M costs	\$ 10,400
Annual monitoring well maintenance	\$ 500
<b>Approximate Net Present Value</b>	<b>\$1,489,000</b>

The capital cost for constructing the OU III remedy is estimated to be a total of \$45,112. Approximately \$13,000 was spent to construct the monitoring wells. The remaining \$32,000 is the estimated cost for decommissioning the PRB. Presently, it is believed that the PRB will remain in operation until the year 2019, at which time the PRB will be excavated and the ZVI will be tested and disposed of in an appropriately licensed facility.

Annual monitoring costs, including laboratory analyses, are estimated to be approximately \$123,000 for the initial years and are expected to decrease by approximately \$10,000 when the PRB and the associated monitoring wells are decommissioned. Approximately \$10,000 annually is estimated for LTS&M activities.

## IX. Observations and Lessons Learned

The construction of the monitoring wells provided further insight into the lateral extent of the contaminated alluvial aquifer downgradient of the millsite. The saturated alluvial aquifer appears to be confined in a bedrock-controlled channel in the Dakota Sandstone that is significantly narrower than what was previously believed (approximately 100 ft wide rather than the previously estimated 200 ft wide).

## X. Contact Information

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