



Third Five-Year Review Report for Monticello Mill Tailings (USDOE) Site City of Monticello San Juan County, Utah

June 2007



U.S. Department
of Energy

Office of Legacy Management

Five-Year Review Report

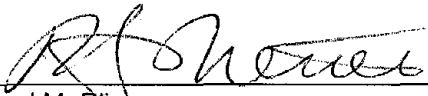
Third Five-Year Review Report
For
Monticello Mill Tailings (USDOE) Site
City of Monticello
San Juan County, Utah

June 2007

Prepared by
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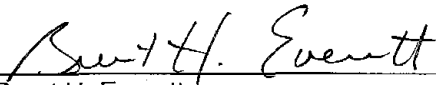
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List of Acronyms

AEC	Atomic Energy Commission
ARAR	applicable or relevant and appropriate requirement
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
cm	centimeter
COC	contaminants of concern
DOE	U.S. Department of Energy
DRCP	deed restriction City properties
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
FFA	Federal Facility Agreement
ft	feet
IRA	interim remedial action
LM	Office of Legacy Management
LTSM	Long-Term Surveillance and Maintenance
µg/L	micrograms per liter
mg/kg	milligram per kilogram
MMTS	Monticello Mill Tailings Site
MRAP	Monticello Remedial Action Project
MVP	Monticello Vicinity Properties
NPL	National Priorities List
OU	operable unit
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PRB	permeable reactive barrier
RBC	risk-based concentration
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SFMP	Surplus Facilities Management Program
SOARS	System Operations and Analysis at Remote Site
TSF	temporary storage facility
UDEQ	Utah Department of Environmental Quality
VCA	Vanadium Corporation of America
ZVI	zero-valent iron

End of current text

Executive Summary

The Monticello Mill Tailings Site (MMTS) has been remediated by the U.S. Department of Energy (DOE) in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986. The MMTS includes the site of a former uranium and vanadium mill near Monticello, Utah (Operable Unit [OU] I), rural peripheral properties (OU II) contaminated by mill-derived materials, and surface water and ground water (OU III) also contaminated as a result of mill activities. This is the third five-year review for the MMTS. The MMTS is interrelated with the Monticello Radioactively Contaminated Properties site (also known as the Monticello Vicinity Properties [MVP] site), comprising contaminated residential and commercial properties in Monticello. The MMTS and MVP undergo separate but concurrent five-year reviews.

The remedy for OUs I and II included removal of radioactively contaminated soils, mill tailings, and processing materials to the on-site DOE repository, constructed and operated under OU I, for permanent disposal. The primary purpose of the MMTS remedial action was to limit exposure to radioactive material to levels protective of human health and the environment. These levels are specified as standards for radium, radon and radon daughters, and gamma exposure rates in Title 40, *Code of Federal Regulations*, Part 192 and in DOE Surplus Facilities Management Program guidance. OU I, and most of the properties comprising OU II, were remediated to levels that allow for unlimited use and unrestricted exposure. Contamination remains in soil at some properties comprising OU II above these levels. In conjunction with alternate cleanup standards for these OU II properties, as allowed under the Uranium Mill Tailings Radiation Control Act of 1978, DOE has implemented institutional controls to minimize exposure to and dispersal of the soil contamination left in place. Removal actions were completed by August 1999. Waste encapsulation was completed in May 2000.

The MMTS was partially deleted from the National Priorities List (NPL) on October 14, 2003. The remaining MMTS properties are not eligible for deletion from the NPL until ground water and surface water meet OU III remediation goals for water quality. The remedy for OU III, monitored natural attenuation with institutional controls, allows 42 years (since 2002) to attain water quality remediation goals. During that time, use of contaminated ground water is restricted. The ROD for OU III was signed into effect in June 2004.

The remedies for OUs I and II are protective of human health and the environment. The remedy is functioning as intended, exposure assumptions, clean-up levels, and remedial action objectives remain valid, and no new information or changing site conditions compromise the protectiveness of the remedy. Toxicity data for uranium and vanadium in soil have changed; however, the changes do not affect remedy protectiveness. The final component of the OU I remedy was implemented as a municipal zoning ordinance in 2003 to address a limited area of residual uranium contamination in soil. Vegetation performance criteria for the repository cover have not been met; however, this condition does not presently affect the protectiveness of the OU I remedy.

An overall protectiveness determination of the OU III remedy cannot be made until further information regarding ecological risk from selenium in wetlands habitat is obtained. Biomonitoring activities are in progress that will enable this determination by the next 5-year

review. Although the progress of ground water restoration is less than expected, the OU III remedy is protective of human health because ground water use is prevented through the State of Utah water well permitting process. The affected aquifer has no current or historical use because of poor yield and alternate sources of potable water are readily available.

The DOE Office of Legacy Management (LM) administers the MMTS. The MMTS is routinely monitored under DOE-LM to ensure that the institutional controls remain relevant and effective in preventing exposure to contamination left in place, that changing site conditions do not compromise remedy protectiveness, and to track the progress of water quality restoration.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Monticello Mill Tailings (USDOE)

EPA ID (from WasteLAN): UT3890090035

Region: 8

State: Utah

City/County: Monticello/San Juan

SITE STATUS

NPL status: Final Deleted Other (specify) Partial deletion

Remediation status (choose all that apply): Under Construction Operating Complete

Multiple OUs?* YES NO

Construction completion date: September 2004

Has site been put into reuse? YES NO Public park; private residential and agricultural

REVIEW STATUS

Lead agency: EPA State Tribe Other Federal Agency U. S Department of Energy

Author name: Jalena Maestas

Author title: LM Site Manager

Author affiliation: U.S. Department of Energy
Office of Legacy Management (LM)

Review period:** 6/21/2002 to 6/20/2007

Date(s) of site inspection: 9/27 /2006 to 9/29/2006

Type of review: Post-SARA Pre-SARA NPL-Removal only
 Non-NPL Remedial Action Site NPL State/Tribe lead
 Regional Discretion

Review number: 1 (first) 2 (second) 3 (third) Other (specify) _____

Triggering action:

Actual RA Onsite Construction at OU # _____ Actual RA Start at OU # _____
 Construction Completion Previous Five-Year Review Report
 Other (specify) _____

Triggering action date (from WasteLAN): 06/20/2002

Due date (five years after triggering action date): 6/20/2007

* ["OU" refers to operable Unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd

Issues:

Minor maintenance and repair is needed at eroded areas on City-owned properties.

Ground water clean up by natural attenuation is progressing at a slower rate than expected in certain regions of the aquifer.

Selenium accumulation in wetland habitat may pose elevated risk to certain ecological receptors; however, no threatened or endangered species have been identified at the MMTS.

Vegetation performance criteria for the repository cover remain unattained. This condition does not presently affect the overall performance of the cover in minimizing infiltration of precipitation.

Recommendations and Follow-up Actions:

DOE will notify the City of outstanding maintenance issues.

DOE will continue to monitor water quality and evaluate site conditions that effect restoration progress, and continue to enforce the ground water use restriction. DOE in conjunction with EPA will continue to operate ground water remediation treatability studies at the site to expedite water quality restoration. Current systems in operation at the site evaluate ground water treatment technology using zero-valent iron. Annual reports will assess ground water and surface water restoration progress. Ground water performance measures or contingency actions will be reassessed, as necessary, as part of the next 5-year review.

Selenium accumulation and associated ecological risk are currently under investigation by DOE.

DOE is implementing corrective action by replanting shrub species on the repository cover and conducting additional investigations to ensure continued performance of the repository cover in limiting the infiltration of precipitation.

Protectiveness Statements:

The remedy at OU I (the repository and former millsite) and OU II (peripheral properties) is protective of human health and the environment. Exposure pathways have been eliminated by removal of soil contamination, and/or institutional controls have been implemented at supplemental standards properties to prevent exposure to or dispersal of contamination left in place. Long-term surveillance and maintenance conducted under DOE-LM ensures that the remedy remains protective.

The on-site DOE repository isolates waste from the environment. The repository is operated and maintained under DOE-LM.

A protectiveness determination of the OU III remedy cannot be made until obtaining further information regarding ecological risk. Data collection activities to enable that determination are ongoing through the biomonitoring task. The OU III remedy is protective of human health because use of contaminated ground water is prevented by a restriction on water well drilling administered through the state permitting process. The affected aquifer has no current or historical use, and alternate sources of domestic water are readily available within OU III.

Five-Year Review Summary Form, cont'd

Other Comments:

The Cooperative Agreement between DOE and City of Monticello expired June 27, 2005, but by mutual agreement was extended to December 31, 2006. By April 2007, DOE and the City had negotiated a new Cooperative Agreement extending to December 31, 2016.

Zoning Ordinance 2003-2 was enacted in April 2003 by the Monticello planning department as an institutional control to minimize exposure to and dispersal of residual uranium contamination in soil at property MP-00211-VL. This action completed the remedy for and OUs I and II.

The ROD for OU III (May 2004) was signed into effect since the last five-year review. The selected remedy is monitored natural attenuation with institutional controls. An institutional control prevents exposure to contaminated ground water through a water well drilling restriction administered by the Utah State Engineer's Office. Biomonitoring is required by the ROD to address potential ecological risk associated with selenium exposure.

Water quality and hydrologic monitoring requirements, and biomonitoring requirements for the OU III remedy are set forth in *Monticello Mill Tailings Site Operable Unit III Post-Record of Decision Monitoring Plan*, August 2004.

The *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites*, June 2007, has been developed to update and direct activities to monitor site conditions and ensure that institutional controls remain relevant, adequate, and effective.

End of current text

1.0 Introduction

1.1 Purpose

The U.S. Department of Energy (DOE), in consultation with the U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality (UDEQ) conducts five-year reviews to determine whether the remedy at the Monticello Mill Tailings (USDOE) Site (MMTS) is protective of human health and the environment. The methods, findings, and conclusions of the current review are documented in this five-year review report. In addition, the report identifies issues found during the review and provides recommendations for resolution. This review addresses each of the three operable units (OUs) comprising the MMTS (OU I, II, and III). Each OU contains properties where contamination was left in place above levels that allow for unlimited use and unrestricted exposure.

1.2 Authority for Conducting MMTS Five-Year Reviews

The five-year review is a statutory requirement for the MMTS site because, as part of the remedy, contamination remains at the site above levels that allow for unlimited use and unrestricted exposure. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 (c) states the following:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such review, and any actions taken as a result of such reviews.

EPA interpreted this requirement further in the National Contingency Plan [Title 40 *Code of Federal Regulations* (CFR) Part 300.430(f)(4)(ii)] which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Five-year reviews are required for MMTS OUs I and II because contamination remains in place at the DOE repository and in contaminated soil along parts of Montezuma Creek and in piñon/juniper properties that prevents unlimited use and unrestricted exposure. Five-year reviews are required for MMTS OU III because contaminated ground water in the alluvial aquifer prevents unlimited use and unrestricted exposure.

1.3 Five-Year Review Team and Schedule

The DOE Office of Legacy Management (LM) Site Manager conducted the review of the MMTS remedy between September 2006 and May 2007 with the assistance of DOE contractor personnel and oversight by EPA and UDEQ. This report documents the results of the latest and third five-year review for the MMTS, covering the period June 2002 through May 2007. Separate but concurrent five-year reviews are conducted for the companion National Priorities List (NPL) site in Monticello (the Monticello Radioactively Contaminated Properties site, also known as the Monticello Vicinity Properties (MVP)).

2.0 Site Chronology

The main events leading to the formation and eventual remediation of the MMTS are summarized chronologically in Table 1.

Table 1. Chronology of MMTS Events

Event	Date
Vanadium and uranium ore milling at the Monticello mill resulted in four tailings piles, contaminated soils, contaminated buildings, contaminated processing equipment, contaminated surface water and ground water, and contaminated peripheral properties.	1941 - 1960
The Atomic Energy Commission regraded and stabilized the tailings piles. Fill dirt and rock were spread over the tops and sides of all tailings piles.	1964
Contaminated soils were removed from surrounding ore-storage areas and used as fill material to partially bury the mill foundations.	1965
Radiological surveys of Monticello properties begin by DOE.	1971
Monticello mill accepted into the Surplus Facilities Management Program to ensure safe caretaking and decommissioning of government facilities retired from service but still contained radioactive contamination. Monticello Remedial Action Project (MRAP) was established.	1980
First two vicinity property removal actions initiated (completed in 1984).	1983
Remedial activities for vicinity properties were separated from MRAP and the Monticello Radioactively Contaminated Properties [also known as Monticello Vicinities Properties (MVP)] were established. The remaining properties under MRAP (millsite and peripheral properties) established the Monticello Mill Tailings Site (MMTS).	1983
The MVP was placed on the National Priorities List (NPL).	June 10, 1986
Federal Facility Agreement signed.	December 1988
The MMTS was placed on the NPL.	November 21, 1989
Inclusion of proposed repository site in on-site determination.	1990
Remedial Investigation/Feasibility Study (RI/FS) – Environmental Assessment for MMTS completed.	January 1990
MMTS Record of Decision (ROD) signed (OU I and OU II remedies selected, OU III is designated).	September 1990
OU I and OU II remedial actions initiated.	1992
OU III RI/FS initiated.	1992
Conceptual repository liner design completed (later revised).	April 1993
Selection of the on-site disposal alternative is finalized by DOE.	December 22, 1994
Enforcement action against DOE for unpermitted discharge to Montezuma Creek.	March 1995
Pre-Final Design and Specification Package for Millsite Remediation.	April 28, 1995
Repository construction initiated.	October 27, 1995

Table 1 (continued). Chronology of MMTS Events

Event	Date
First CERCLA 5-Year Review.	February 13, 1997
Remediation of the millsite begins.	May 1997
OU III RI/FS completed & Interim ROD for OU III signed.	September 1998
Explanation of Significant Difference issued to provide rationale for applying supplemental standards to MVP and MMTS properties in which contamination was left in place.	February 1999
Permeable reactive barrier treatability study begins.	June 1999
Tailings removal completed.	August 1999
Covenant Deferral Request allowing transfer of federal property prior to completion of cleanup activities.	February 6, 2000
Repository construction completed.	July 30, 2000
Transfer of millsite and other peripheral properties from DOE to the city of Monticello.	June 28, 2000
Millsite restoration complete.	August 2001
MVP and MMTS transferred to LTSM Program.	October 1, 2001
Second CERCLA 5-Year Review.	June 2002
MMTS non-surface and ground water impacted peripheral properties deleted from the NPL.	October 14, 2003
MVP and MMTS transferred to DOE Office of Legacy Management.	December 2003
OU III RI/FS Interim Action.	September 1998- January 2004
OU III Remedial Investigation Addendum/Focused Feasibility Study finalized.	January 2004
OU III ROD signed.	May 2004
OU III Interim Remedial Action Report	September 2004
Preliminary Close-Out Report, MMTS (USDOE) Site, OUs I, II, and III	September 29, 2004

3.0 Background

3.1 Physical Characteristics

The MMTS is located in rural San Juan County, in and near the city of Monticello in southeastern Utah. The population of Monticello is about 2,000 permanent residents. MMTS is located in and along the valley of Montezuma Creek, a small perennial stream that flows eastward from its origins in the Abajo Mountains, rising to 11,000 feet (ft) about 5 miles west of the site. In the western part of MMTS, the valley is relatively broad and gentle. Eastward, the valley transitions to a steep canyon. The site of the former uranium and vanadium ore mill (millsite) comprises 110 acres at an average elevation of about 7,000 ft. The climate is semi-arid with four distinct seasons. Precipitation occurs mainly during late-summer and spring storms. Native woody vegetation is dominated by oak brush, piñon/juniper, sagebrush, and rabbit brush. Dense willows line much of the riparian zone of Montezuma Creek. Figure 1 shows the features of MMTS.

3.2 Land and Resource Use

Land use within MMTS is ranching, farming, residential, and recreational. Monticello is the seat of San Juan County and also the location of Bureau of Land Management, National Forest Service, and Soil Conservation Service branch offices. Natural resource use in the area includes

domestic water provided by the city of Monticello from its origins in the Abajo Mountains. Local ground water usage includes rural drinking water and limited farmland irrigation from bedrock aquifers. A small amount of surface water is used for crop irrigation. No mineral or timber extraction exists within the MMTS. Much of the land surrounding Monticello and the MMTS is open range or ranchland, or is cultivated for dry-land crops.

Ownership of the millsite and several adjacent peripheral properties was transferred from DOE to the city of Monticello in June 2000 through the Federal Lands-to-Parks Program. Transferred lands are identified in Figure 1 as the deed restriction City properties (DRCP). DOE completed remedial actions on those and all remaining MMTS properties by the end of 1999. The millsite was restored by the City as a public park as a condition of the land transfer. As an additional condition, the City maintains the park and surrounding transferred properties for low-impact recreational use (excluding camping).

Except for the former millsite (OU I), the transferred properties, several other private properties, and one DOE-owned property (MP-01081), have been deleted from the NPL as a partial deletion of the MMTS for OU II properties not underlain by contaminated ground water. The deleted properties are known as the “Operable Unit II Ground-Water Impacted Peripheral Properties.” The partial deletion, effective October 14, 2003, affected 22 properties totaling 610 acres (see Figure 1 for deleted properties). Supplemental standards were applied to three of the properties transferred to the City (see Figure 1 for supplemental standards areas). The deleted private properties were remediated to levels that allowed unrestricted use and unlimited exposure.

The remaining OU II properties and the former millsite comprise 12 properties totaling 826 acres. These properties, known as the “Operable Units I and II Surface and Ground-Water Impacted Properties” (see Figure 1 for location of these properties) are not eligible for deletion from the NPL until ground water restoration in the underlying alluvial is achieved. Supplemental standards have been applied to eight of these properties where soil and sediment contamination remains in the floodplain of Montezuma Creek (see Figure 1 for location of supplemental standards areas on surface and ground water impacted properties). The privately owned, undeleted OU II properties have land and ground water use restrictions but are otherwise returned to their original use including agricultural, residential, and open space/recreational.

The repository, which is part of OU I, will not be deleted from the NPL because radioactive waste materials will remain permanently stored within the confines of the onsite disposal cell. The disposal cell occupies approximately 90 acres of the 365 acres comprising the repository properties (see Figure 1 for repository properties and disposal cell location). The cover of the disposal cell and surrounding areas are restored in native vegetation and afford habitat for local wildlife. The repository is owned and operated by DOE and remains closed to the general public. DOE-owned property adjacent to the repository (property MP-01081, 221 acres) is vacant although about 90 acres of the parcel had previously been cultivated by a local rancher under agreement with DOE.

3.3 History of Contamination

Uranium and vanadium ore milling began at the site in 1941 with the construction of the Monticello mill on undeveloped land along Montezuma Creek immediately south of the town.

The original mill, constructed with government assistance by the Vanadium Corporation of America (VCA), provided vanadium during World War II. VCA operated the mill until early 1944, and again from 1945 through 1946 to also extract uranium. In 1948, the U.S. Atomic Energy Commission (AEC), the predecessor agency of DOE, purchased the site and resumed uranium and vanadium ore milling in 1949. Vanadium processing ceased in 1955 but uranium milling continued until 1960 when the mill was permanently closed.

Mill tailings are the pulverized remnants of the processed ore and contain potentially hazardous radiological and non-radiological constituents. The mill tailings were impounded at four locations at the former Monticello mill during and after operation. The tailings piles were commonly known as the Carbonate Pile, the Vanadium Pile, the Acid Pile, and the East Pile. The Carbonate and Vanadium Tailings Piles received wastes from a salt-roast and carbonate-leach milling process until approximately 1955. The Acid and East Tailings Piles were then constructed to receive the wastes from the acid leach and carbonate-leach process. Approximately 1 million tons of ore were processed at the mill.

While in operation, some tailings were removed to properties in Monticello for use as fill for open land; backfill around water, sewer, and electrical utilities; sub-base for driveways, sidewalks, and concrete slabs; backfill against basement foundations; and as sand mix in concrete, plaster, and mortar. These affected properties generally comprise the MVP site. As much as 135,000 tons of tailings from the Monticello mill may have been used for such purposes until August 1975 when a fence was erected to prevent unauthorized access to the millsite.

Some mill tailings were also dispersed from the millsite by wind and water erosion to contaminate many surrounding and downstream properties (peripheral properties). The total combined in-place volume of the four tailings piles and surrounding contaminated soils and related by-product material was approximately 2.2 million cubic yards. In addition to contamination of soil and sediment by dispersed tailings, radiological and non-radiological constituents were mobilized from the tailings piles by residual process water and percolating rainwater to contaminate the underlying alluvial aquifer and Montezuma Creek. The alluvial aquifer is shallow and thin (depth to water and saturated thickness averages about 5 to 10 feet), and flow is confined to the narrow valley of Montzeuma Creek. The alluvial aquifer has no history of use because of low yield and because alternate sources for potable use are readily available.

3.4 Remedial Action History

In 1961, the AEC graded and vegetated the tailing piles to stabilize the surfaces from erosion and prevent ponding. In 1964, the mill was dismantled and in 1965, approximately 6 to 12 inches of topsoil were removed from the ore-storage areas and used as fill to partially bury the mill foundations. Contaminated soil was again removed from the former ore-storage areas in 1974 and 1975 and placed on the previously stabilized surface of the East Pile. In response to growing environmental health concerns, DOE initiated radiological surveys in 1971 to identify the nature and extent of radiological contamination associated with mill tailings originating from the Monticello millsite. Continued surveys ultimately identified 424 contaminated properties in the residential and commercial area of Monticello (“vicinity” properties) and 34 properties on rural land surrounding and downstream of the millsite (“peripheral” properties).

DOE, under the authority of the Atomic Energy Act of 1954, initiated the Surplus Facilities Management Program (SFMP) in 1978 to ensure safe caretaking and decommissioning of government facilities that had been retired from service but still contained radioactive contamination. In 1980, the Monticello project was accepted into the SFMP for remedial action, and the Monticello Remedial Action Project (MRAP) was established to conduct those remedial actions. As owner and past operator of the site, DOE was identified as the potentially responsible party and tasked with funding and performing the remedial actions necessary to ensure protection of human health and the environment into the future.

In 1983, remedial activities for the vicinity properties were separated from MRAP with the establishment of the MVP (vicinity properties) and the MMTS (former millsite and peripheral properties). The first two vicinity property removal actions were initiated by EPA in 1983 and completed in 1984. The MVP was listed on the NPL on June 10, 1986, and the remaining properties were remediated pursuant to *MVP Project Declaration for the Record of Decision (ROD) and Record of Decision Summary*, November 1989. Remediation of the MVP site was completed in 1999 and deletion from the NPL became effective February 28, 2000.

The MMTS was placed on the NPL on November 21, 1989. In January 1990, DOE completed the Remedial Investigation/Feasibility Study (RI/FS)-Environmental Assessment (EA) for the millsite. Information provided in the RI/FS-EA enabled DOE to assess the impacts of the remedial action alternatives as required under the National Environmental Policy Act. Consequently, the MMTS ROD (*Monticello Mill Tailings Site Declaration for the Record of Decision and Decision Summary for the Record of Decision*, August 1990) was signed into effect in September 1990, selecting the remedy for remediation of OU I and OU II; and, designating OU III to address contaminated surface water and ground water, and soil contamination in the narrow floodplain in the Montezuma Creek canyon. OU III soil and sediment contamination was later incorporated into the OU II remedy for more efficient management. MMTS remedial actions for OUs I and II conducted under CERCLA began in 1992 and continued through closure of the repository in July 1999. The MMTS was partially deleted from the NPL in October 2003. The remaining MMTS properties are not eligible for deletion from the NPL until the contaminated ground water meets the OU III remediation goals for water quality.

Ground water remedial actions began with source control accomplished under OUs I and II removal actions. Between May 1998 and May 1999 ground water remediation was also accomplished by on-site treatment of ground water removed from the tailings excavations. Passive ground water treatment was then initiated in June 1999 under an interim action for OU III (*Record of Decision for an Interim Remedial Action at the Monticello Mill Tailings Site, Operable Unit III—Surface Water and Ground Water, Monticello, Utah*, August 1998). This action implemented a full-scale treatability study of permeable reactive barrier (PRB) technology using zero-valent iron (ZVI) as the reactive medium. This treatability study remains ongoing, with the recent addition of two auxiliary ex situ treatment cells.

Currently, the remedy for ground water and surface water remediation is monitored natural attenuation with institutional controls as selected by the ROD for OU III, May 2004 (*Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah*, May 2004). Construction complete status of the OU III remedy became effective September 2004 (in *Interim Remedial Action Report, Monticello Mill Tailings (USDOE) National Priorities List Site, OU III—Surface Water and Ground Water Monitored*

Natural Attenuation Remedy, September 2004). The ex situ treatment cells installed near the PRB in 2005 and 2007 are operated and monitored under a separate DOE-LM program to evaluate the performance of passive and active ZVI treatment technology. These systems, and the PRB, are not required as functional components of the remedy under the ROD for OU III.

3.5 Basis for Remedial Action for OU I and OU II

The basis for remedial action at MMTS OU I and OU II was to reduce exposure to ionizing radiation from by-product material of the Monticello mill to acceptable levels. The primary ore- and tailings-borne contaminants of concern (COCs) in soil are radionuclides in the uranium decay series, particularly thorium-230, radium-226, radon-222, and daughters of radon-222. Significant exposure pathways affecting human health include:

- Inhalation of radon-222 and its daughters, which emit alpha radiation;
- External whole-body exposure to radionuclides that emit gamma radiation; and
- Inhalation and ingestion of dust containing thorium-230 and radium-226, which emit alpha and gamma radiation.

For radionuclides in by-product material (as defined in the Atomic Energy Act), the cleanup standards for uranium mill tailings in 40 CFR 192 are relevant and appropriate to the MMTS. These standards require that average radium-226 concentrations in soil not exceed the background level by more than 5 picocuries per gram (pCi/g) in the top 15 centimeters (cm), or by more than 15 pCi/g in successively deeper 15 cm layers, averaged over 100 square meters. If these cleanup standards are met, the property concerned can be released for unlimited use and unrestricted exposure.

Property-specific cleanup standards for thorium-230 (Th-230) and uranium were adopted for the former millsite (OU I; property MS-00893-OT). The Th-230 and uranium cleanup standards for this property were derived from the *Monticello Remedial Action Project, Radiological Sampling and Verification Procedures for Operable Unit I* (June 1998). The Th-230 standard (typically about 5 to 15 pCi/g) is a sliding scale based on the Ra-226 content of the soil remaining in place. If Th-230 and Ra-226 are in equilibrium in soil, then cleanup to the Ra-226 standard ensures the removal of Th-230. However, Th-230 in the tailings piles may have mobilized by meteoric water independent of Ra-226 to the underlying soil. Because Th-230 undergoes radioactive decay to produce Ra-226, the Th-230 was necessary to ensure long-term attainment of the Ra-226. The uranium standard (300 pCi/g), determined from property-specific risk analysis for a recreational use, was adopted because of possible contamination by the refined uranium product that does not contain Ra-226.

Additional property-specific cleanup standards for Th-230, uranium, and vanadium were adopted for OU II property MP-00211-VL Phase I (northwest half of property) because of the presence of refined uranium product (“yellow cake”) and the property’s proximity to the former processing area. Uranium and vanadium cleanup standards (6,100 milligrams per kilogram [mg/kg] and 14,000 mg/kg, respectively) for Phase I were derived from U.S. EPA Region III Risk-Based Concentration Table (first Quarter 1995), Soil Ingestion, Industrial Setting. The Phase I Th-230 cleanup standard (15 pCi/g) was derived from the DOE FUSRAP/SFMP. A separate uranium standard (300 pCi/g) was adopted for MP-00211-VL Phase II (southeast half

of the property), as derived in *Monticello Remedial Action Project, Radiological Sampling and Verification Procedures for Operable Unit I* (June 1998).

3.6 Basis for Remedial Action for OU III

Numerous radiological and non-radiological inorganic constituents in ground water and surface water were identified during site investigations that exceeded applicable or relevant and appropriate water quality or risk-based standards (in *Monticello Mill Tailings Site, Operable Unit III Remedial Investigation Addendum/Focused Feasibility Study*, January 2004). Human health risk assessment identified that the established risk-management range for added cancer risk (10^{-4} to 10^{-6} probability) and the hazard index for non-carcinogenic risk (1.0) was exceeded for short-term and future, domestic-use, ground water consumption exposure scenarios.

OU III COCs and the corresponding remediation goal and rationale for ground water and surface water are presented in Table 2. Gross beta does not have a remediation goal because there is no activity-based standard for this constituent, and risk factors to derive a risk-based goal are radioisotope-specific.

Ground water contamination is most widespread for uranium. The uranium plume extends eastward approximately one-half mile from the center of the millsite. Ground water contamination by the remaining COCs is generally limited to the eastern portion of the millsite and the area upgradient of the PRB. Uranium is the greatest contributor to potential risk from ground water ingestion at the site. As the plume of uranium-contaminated ground water flows eastward, concentrations will decrease by hydrodynamic dispersion and by interaction at recognized hydrologic boundaries. Surface water concentrations will decrease as ground water quality improves because of the generally gaining condition of Montezuma Creek.

Table 2. OU III Contaminants of Concern and Water Quality Remediation Goals

COC ^a	Ground Water Remediation Goal ^{a,b}	Surface Water Remediation Goal ^{a,c}
Arsenic	10 µg/L ^d	10 µg/L
Manganese	880 µg/L ^e	-----
Molybdenum	100 µg/L ^f	-----
Nitrate (as N)	10,000 µg/L ^d	4,000 µg/L
Selenium	50 µg/L ^d	5 µg/L
Uranium - metal toxicity	30 µg/L ^d	-----
Vanadium	330 µg/L ^e	-----
Uranium-234/238 - radiological dose	30 pCi/L ^f	-----
Gross alpha activity	15 pCi/L ^{d,g}	15 pCi/L ^h
Gross beta activity	-----	-----

^aSource: *Monticello Mill Tailings Site, Operable Unit III Remedial Investigation Addendum/Focused Feasibility Study*, January 2004.

^bµg/L = micrograms per liter; pCi/L = picocuries per liter.

^cState of Utah standard for surface water.

^dEPA maximum contaminant level (MCL).

^eBased on OU III human health risk assessment.

^fUMTRA maximum concentration limit.

^gExcluding uranium and radon.

^hExcluding uranium and radon for MMTS OU III.

4.0 Remedial Actions

4.1 OU I and OU II Remedy Selection

The primary remedial action objective for OU I was to excavate and remove all radiologically contaminated material and other hazardous substances from the millsite to levels protective of human health and the environment, and to dispose of the materials in an engineered lined and capped on-site repository for permanent isolation from the environment. The remedial action objective for contaminated soil and sediment in OU II was to remove all such material from the affected properties and place the material in the OU I repository to thereby eliminate exposure pathways.

Although not part of the original ROD, it became necessary to leave some contamination in place and apply alternate cleanup levels (“supplemental standards”) to those locations. This was justified under 40 CFR 192.21 and 192.22 because the remedial actions on the affected properties would:

- Result in excessive environmental harm compared to the health and environmental benefits, and
- Have an unreasonably high cost relative to long-term benefits.

Supplemental standards were applied to selected properties where windblown contamination was dispersed among mature piñon/juniper groves in gullies and on hillsides south of the millsite. In conjunction with the supplemental standards application, institutional controls were implemented to limit use of these City-owned properties to non-invasive recreational activities, excluding overnight camping. For the same reasons cited above, supplemental standards were applied to certain private properties where contamination was left in place in the riparian zone of Montezuma Creek canyon where tailings had been transported in the creek and deposited along its narrow floodplain. These departures from the MMTS ROD were addressed in an explanation of significant difference (ESD), in February 1999. As part of the remedy selection for OU II (in *Application for Supplemental Standards for Upper, Middle, and Lower Montezuma Creek*, May 1999 and revised October 1999), soil and sediment contamination in the Montezuma Creek canyon, originally part of OU III, was transferred to OU II. This reorganization did not warrant an ESD.

4.2 OU III Remedy Selection

The MMTS ROD designated OU III but deferred selecting the remedy for ground water and surface water until completion of surface remedial actions (removal of contaminated soil, sediment, debris), and until completion of a separate RI/FS for ground water and surface water. In 1998, an interim remedial action (IRA) for OU III was implemented which again deferred the OU III remedy selection because the full impact of ongoing surface remediation on the ground water system remained uncertain.

Remedial actions under the IRA included continued dewatering and treatment of the alluvial aquifer on the millsite, initiation of a ground water management policy to prevent use of contaminated ground water, implementing the PRB treatability study, continued monitoring and

data collection, ground water modeling, and updating the human health and ecological risk assessments. The results of these interim actions, reported in *Monticello Mill Tailings Site, Operable Unit III Remedial Investigation Addendum/Feasibility Study*, January 2004, provided the remaining information necessary to select the OU III remedy.

The ROD for OU III selected monitored natural attenuation of surface water and ground water, including a phased dose-response evaluation of selenium in the environment (“biomonitoring”); and, continued implementation and enforcement of the institutional control that restricts use of the contaminated shallow alluvial aquifer. Several mitigating factors offset the potential risk associated with ingestion of contaminated ground water:

- An effective institutional control remains in place
- The affected aquifer has no current or historical use because of poor yield
- Alternate sources of domestic water are readily available within OU III
- Ground water modeling indicated that aquifer restoration could be accomplished in a reasonable time by natural processes identified at the site.

The OU III remedy allows 42 years (starting October 2002) for contaminant levels to reach the remediation goals. During this time, the ground water use restriction prevents exposure to the contamination. Annual monitoring and data evaluation tracks the progress of aquifer restoration. Contingency actions are specified in the ROD in the event that the progress of aquifer restoration fails to meet established performance criteria.

4.3 Remedy Implementation

4.3.1 Surface Remediation/Removal Actions

A Federal Facility Agreement (FFA) among DOE, EPA, and UDEQ, pursuant to Section 120 of CERCLA/SARA, became effective December 1988. DOE, EPA, and UDEQ agreed to perform response actions at the MMTS and MVP sites in accordance with the FFA. DOE is the lead agency that provides the principal staff and resources to plan and implement response actions. EPA and UDEQ share oversight responsibility of activities performed under the FFA, with EPA retaining the lead role.

MMTS remedial actions started in 1992 with the construction of support facilities including access controls, health and safety and administrative support facilities, service roads, equipment staging areas, and decontamination facilities at the millsite. Cleanup of the peripheral properties was also initiated at that time using construction designs based on radiological surveys of the properties that delineated the extent of contamination. Contaminated material removed from the peripheral properties (and MVP) was managed at an interim stockpile area on the millsite. Remediation of the millsite began in 1997. Mill tailings and the stockpile were excavated and loaded into large trucks and hauled to the permanent DOE repository by way of a dedicated haul road constructed on DOE property. Limited “hot-spot” remediation of the Montezuma Creek canyon was conducted in 1998 following a detailed analysis of clean up alternatives; DOE documented the decision for the canyon cleanup in an Action Memorandum dated June 22, 1998. As removal actions proceeded on the various OU I and OU II properties, attainment of clean up standards was verified by radiological surveys of the properties and laboratory confirmation of soil samples. All removal actions were completed by August 1999.

Excavation of mill tailings and contaminated soil and sediment extended below the water table and to the bedrock surface over a large area of the millsite. Removal of these saturated materials necessitated the construction of various drainage controls, ground water interception trenches, and rerouting of Montezuma Creek. For about 1 year, ground water was pumped from the tailings excavations and treated on site prior to permitted discharge to Montezuma Creek. The temporary water treatment plant constructed on site for this purpose successfully treated over 50 million gallons prior to being dismantled in May 1999.

All radiologically contaminated material removed from OU I and OU II was ultimately disposed in the DOE repository, located on DOE property 1 mile south of the millsite. The repository was designed and built between 1993 and 1999; final placement of contaminated material and completion of the repository cover occurred in 1999 and 2000, respectively. Approximately 2.54 million cubic yards of contaminated materials were placed in the repository. The repository cap, about 90 acres in area, is constructed of a vegetated soil layer through which infiltration is inhibited by evapotranspiration. A synthetic liner and compacted-soil radon barrier underlies this “water balance” cover.

The base of the repository is double lined. A leak detection system was constructed above the lower liner, and a leachate collection system was constructed above the upper liner. Leachate from the repository is pumped to a triple-lined solar evaporation pond (Pond 4). Pond 4 has a capacity of 16 million gallons. The pond will be retained as a component of the OU I remedy until such time as drainage from the repository becomes minimal. Monitoring and operation of the leachate management system is provided by on site staff with the assistance of a computerized telemetry system, comprising automated water level sensors, pump controls, flow metering, and data collection and recording functions. The telemetry system was upgraded with new equipment and capabilities in May 2007. The new system transmits data to a central database at the DOE-LM office in Grand Junction, Colorado. The Monticello telemetry system is integrated with the DOE-LM SOARS (System Operations and Analysis at Remote Site) system. The SOARS system allows real-time desktop viewing of the data logging installations deployed at numerous DOE-LM facilities, including the Monticello site.

4.3.2 Restoration and Institutional Controls on City-Owned Properties

DOE and the city of Monticello signed a Cooperative Agreement in 1998 that established roles and responsibilities in restoring and maintaining properties that were to be transferred to the City from DOE (see Figure 1, “DRCP” properties). The agreement required the City to restore the to-be transferred millsite in accordance with DOE, EPA, and UDEQ approved design specifications including constructed wetlands, final grading, reconstruction and realignment of Montezuma Creek, re-vegetation, and erosion control on surrounding upland areas.

In June 2000, DOE completed the transfer of the 383.2-acres of land to the city of Monticello through the Federal Lands-to-Parks Program. Prior to the transfer, the National Park Service approved a plan for recreational open space use of the to-be transferred properties. As a condition of the transfer, the National Park Service must approve any future revisions or additions to the use plan. Also as a condition of the transfer, to maintain the integrity of the completed remedial actions, the following land use restrictions were placed on the Quit Claim Deed that transferred the properties:

- Property shall be maintained solely as a public park for public recreation purposes in perpetuity.
- The property shall not be sold or leased, except to another government agency.
- DOE, EPA, and UDEQ are granted access to the property to complete any necessary monitoring or remedial actions.
- The property will not be used for residential purposes, and no habitable structures can be constructed on the transferred property.
- No soils can be removed and no activities can be conducted on supplemental standards properties that could lead to soil erosion.
- No wells for domestic ground water use can be constructed into the Montezuma Creek alluvial aquifer underlying selected portions of the transferred property.

Restoration of the peripheral properties included in the land transfer, including the haul road, was completed by DOE between 1999 and 2001.

4.3.3 Restoration and Institutional Controls on Privately Owned Peripheral Properties

Restrictive easements were placed on eight private properties that are traversed by Montezuma Creek and were remediated to supplemental standards. By June 2001, the U.S. Army Corps of Engineers had negotiated settlement with the affected property owners regarding compensation for the easements. The easements were applied to the portion of each property where contaminated soil and sediment was left in place, generally within the 50 to 100 ft wide floodplain of Montezuma Creek. Construction of habitable structures within, and soil removal from, the easement area is prohibited. Authorized representatives of DOE, EPA, and UDEQ are recorded right of access to the easement areas for purposes of inspection. The easements are granted with the deed of the respective property at the San Juan County Recorder's Office in Monticello. Peripheral properties in the canyon that were affected by the hot-spot remediation were backfilled, graded, and re-seeded or re-planted to native conditions between 1999 and 2001.

4.3.4 Other Land Use Institutional Controls

Property MP-00211-VL is City property adjoining the northern boundary of the former millsite. It is not a supplemental standards property; however, at one location on Phase I, uranium in soil exceeded the EPA standard for residential use (230 mg/kg [EPA Region III Risk-Based Concentration Table, First Quarter 1995]). Although property use is more accurately described as industrial, at the request of DOE, the City enacted a special zoning restriction (Zoning Ordinance 2003-2) in 2003 for this property to prevent construction of a habitable structure where uranium exceeds this level. The ordinance designated the property to be within Overlay Zone OL-1 and requires DOE to conduct a radiological survey of any proposed footprint of a habitable structure and to notify the City of the results. If uranium concentrations do not exceed the standard, and the Ra-226 standard is also achieved, a building permit may be issued. The zoning restriction is filed with the property deed at the San Juan County Recorder's Office in Monticello.

4.3.5 OU III Remedy: Water Quality Restoration

The remedy for OU III is implemented through comprehensive, long-term monitoring to track the progress of water quality restoration by natural processes within the ROD-allotted time (42 years starting October 2002). During that time, the institutional control that was implemented under the IRA will continue to be enforced to prevent consumption of the contaminated ground water. Long-term monitoring for OU III is conducted in accordance with currently approved plans (*Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites*, June 2007; and, *MMTS OU III Post-ROD Monitoring Plan*, August 2004). These documents provide the site-specific scope, rationale, and procedural information for OU III monitoring.

The OU III institutional control to restrict ground water use is implemented through the Utah State Engineer's Office as a ground water management policy. The policy states that applications to appropriate water from the shallow alluvial aquifer in the ground water restricted area for domestic purposes will not be approved; construction of a suitable well into the deeper bedrock aquifer may be approved. The restricted area, delineated on a map as part of the policy, encompasses all property underlain by known ground water contamination. The effectiveness of the restriction is confirmed in annual field inspection and by contacting the State Engineer's Office for well permitting activity, in and near the restricted area.

The progress of ground water and surface water restoration is evaluated and reported annually in accordance with specific procedures and performance criteria defined in the ROD and the Long-Term Surveillance and Maintenance (LTSM) Plan. For these evaluations, the aquifer is subdivided into five regions, west to east, along the length of the uranium plume. For each region, the average uranium concentration is computed for each sampling event among a prescribed group of monitoring wells within the region. These values, with an associated uncertainty of ± 30 percent, are then compared to analogous values computed from concentrations predicted by the OU III ground water model. If contaminant concentrations for any region are significantly greater than the corresponding model-predicted values over three consecutive semiannual sampling events, the ROD requires reanalysis of the data by an approved alternate method. Once this second method is applied and evaluated, and if concentrations are persistently above model predictions, DOE, EPA, and UDEQ will evaluate the need for implementing a contingency action, including such remedial alternatives developed in *MMTS OU III Remedial Investigation Addendum/Focused Feasibility Study*, January 2004.

Because performance of aquifer restoration is presently less than expected, DOE has recently implemented the second statistical test; and, in concurrence with EPA and UDEQ, has developed a contingency ground water strategy for the next five-year review cycle. These topics are further discussed in Section 7.1.

4.3.6 OU III Remedy: Biomonitoring

The OU III ROD identified data gaps in the ecological risk assessment based on rising selenium concentrations in surface water and ground water to levels of potential concern to receptors at the new wetland habitats in OU III. The wetlands were constructed during site restoration and have been fully established for several years. The ROD was implemented with the provision that potential risk associated with the new conditions be evaluated. In response, DOE implemented biomonitoring in October 2004 to characterize selenium accumulation in biotic and abiotic media, and to identify potential receptors.

Biomonitoring is an ongoing task using a phased dose-response approach. DOE, EPA, UDEQ, and the U.S. Fish and Wildlife Service (agencies that constitute the Biological Technical Assistance Group [BTAG]) together established the trigger levels for selenium concentrations in sediment and surface water that prompted the sampling and analysis of aquatic insects in 2005, 2006, and 2007. These organisms may present risk to higher trophic level species, such as waterfowl and other wetland birds. Biomonitoring results are reviewed yearly by the BTAG to determine the need and scope of additional data collection phases (see Section 7.1 for current biomonitoring strategy).

4.4 Long-Term Surveillance and Maintenance

DOE LTSM activities at the Monticello sites began October 1, 2001, under the DOE Grand Junction Office LTSM Program. This program provided stewardship to DOE sites that contain low-level radioactive materials and have no ongoing mission. The LTSM Program was tasked with ensuring compliance with applicable regulations, licenses, and agreements, and ensuring disposal sites remain protective of human health and the environment. LTSM activities were implemented through the LTSM Program in accordance with the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* and associated four-volume set of operating procedures.

In December 2003, all activities formerly conducted under the LTSM Program, including those for the Monticello NPL sites, were transferred to the newly established DOE-LM. Administration of MVP and MMTS, and LTSM activities for these sites, are presently conducted in accordance with *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites*, June 2007, a single volume document that supersedes the previous five-volume LTSM manual.

The DOE contractor employs full-time staff at the Monticello site to conduct the LTSM activities. The major LTSM activities are:

- Monitoring the leachate collection and leak detection systems at the repository and Pond 4 to verify integrity of the liners.
- Monitoring the repository cover for erosion, deterioration, settlement, and plant health.
- Maintaining mechanical systems, monitoring instruments, equipment, fences, storm water controls, signage, and monuments.
- Responding to public and municipal inquiries.
- Providing radiological control at any work pertaining to street and utility excavations in the City, and managing the disposition of radiologically contaminated materials so encountered at the temporary storage facility (TSF) located at the DOE repository.
- Surveillance of supplemental standards properties for erosion or disturbance of soils and verifying no unauthorized construction or use.
- Conducting radiological surveys to support construction of habitable structures where allowed on property MP-00211.
- Surveillance of the former millsite to ensure compliance with the requirements of the land transfer to the city of Monticello.

- Surveillance of the ground water restricted area for evidence of water well drilling.
- Annual inspection by representatives of DOE, EPA, and UDEQ as an independent check that routine activities are effective, relevant, and adequate.

Currently, two full time employees with residence in the area are stationed at the site to conduct LTSM activities. The projected LTSM budget for fiscal year 2007 (October 1, 2006, through September 30, 2007), including the MMTS and MVP, is \$800,000. Similar funding and scope are forecast at least through 2012.

5.0 Progress Since the Last Five-Year Review

The previous five-year review of the MMTS was conducted in 2002. OU I and OU II had attained construction complete status by then. By that time, closeout reports documenting the completion of compliant remediation had also been approved by EPA and UDEQ for all OU I and OU II properties that did not have ground water contamination. Since 2002, the major MMTS activities other than routine LTSM have focused on selecting the OU III remedy, resolving millsite restoration concerns, and finalizing OU I and OU II remedy components.

Since the last review:

- MMTS non-ground water impacted properties were deleted from the NPL on October 14, 2003.
- MMTS and MVP are administered under DOE-LM as of October 1, 2003.
- Zoning Ordinance 2003-2 was enacted April 23, 2003, by the Monticello planning department as an institutional control to minimize exposure to and dispersal of residual uranium contamination in soil at property MP-00211-VL. This action completed the remedy for and OUs I and II.
- The ROD for OU III, surface water and ground water, was signed into effect in May 2004, selecting monitored natural attenuation with institutional controls as the remedy. Construction complete of the OU III remedy became effective September 2004.
- Active ground water treatment was implemented with the installation of two treatment cells in 2005 and 2007 as treatability studies of ZVI technology under the DOE-LM Applied Science and Technology task order.
- LTSM activities are conducted under the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites*, June 2007, to supersede previous LTSM documents.
- The Cooperative Agreement between DOE and city of Monticello has been extended to December 31, 2016.
- In some areas of the millsite, erosion had exposed deeper soil that was potentially remediated to a less stringent cleanup standard (15 pCi/g Ra-226) than the surface soil standard (5 pCi/g Ra-226). DOE and the City took corrective action by applying clean fill to affected areas and constructing erosion controls that have proven reliable and effective in preventing exposure of the subsurface soil.
- The repository and Pond 4 telemetry system for leachate management was upgraded in May 2007.

- Broadcast seeding of sparse areas of coverage on the repository was completed in April of 2005 and 2007.
- DOE corrected deficiencies in certain drainage controls associated with the repository perimeter drains and channels in 2002 and 2007.

6.0 Five-Year Review Process

6.1 Site Inspection

Site inspections of the MVP and MMTS are conducted annually to assess site conditions, to ensure routine LTSM activities are properly implemented, and to ensure institutional controls are effective. The 2006 annual site inspection was conducted on September 27 to 29, 2006, by DOE, EPA, UDEQ, and DOE-LM contractor site managers and designees. DOE, EPA, and UDEQ agreed that the physical inspection of the site would serve as both the CERCLA five-year review site inspection and the 2006 annual inspection. Results and details of the inspection are reported in *2006 Annual Inspection of the Monticello Mill Tailings (USDOE) and Monticello Radioactively Contaminated Properties Sites*, December 2006. Relevant MMTS site inspection observations are summarized in Table 3. A completed checklist for the 2006 annual inspection of MMTS is provided as Attachment 1.

Table 3. 2006 MMTS Annual Inspection Observations

Observation
No evidence of prohibited use of ground water; confirmed by field inspection and through contact with State Engineer's Office.
No evidence of soil removal, excessive erosion, or improper land use on supplemental standards properties, property MP-00211-VL, and the former millsite.
Repair of minor erosion is needed at several locations on City property.
Repository is well maintained; minor damage to desirable shrubs noted.
Deed annotations are properly filed at the County Courthouse.
On-site record-keeping/documentation of LTSM activities is adequate.

6.2 Community Notification

Announcements were published in two local weekly newspapers, the *San Juan Record* and the *Blue Mountain Panorama*, on February 21, 2007, describing the CERCLA five-year review process and objectives, and informing the public on how to contact DOE and on-site LM representatives for additional information or to provide comments. Copies of the announcements are provided in Attachment 2. DOE received no public comment regarding the MMTS remedy other than that solicited in the interviews with stakeholders (see Section 6.3). In June or July 2007, DOE will place the outcome of the five-year review, as determined in Sections 7.0 and 10.0 of this report, in these same newspapers, along with DOE contact information and the locations where copies of the final reports can be viewed.

6.3 Interviews

As part of the five-year reviews for the MMTS and MVP, a community relations specialist of the DOE-LM contractor interviewed local property owners and stakeholders to gather information about the site's effect on the community. The interviews were conducted in Monticello on February 13 and 14, 2007. Interviewees had been contacted the previous week to schedule the interviews. The owner or representative of each property affected by an institutional control (land or ground water use restriction) was interviewed. Two of the interviewees (Pete Steele and Brian Bowring) were not available for on-site interviews and were instead contacted later by telephone. Specific interview questions and responses are provided in Attachment 2 of this report. Interviewees and their relation to the sites are listed below.

Lisle Adams—MMTS peripheral property owner
Doug Allen—Monticello Mayor
Brian Bowring—MMTS peripheral property owner
Chet Johnson—Utah Department of Transportation, Monticello office
John Johnson—MMTS peripheral property owner
Rye Neilson—MMTS peripheral property owner
Sanford Randall—MVP peripheral property owner
Trent Schafer—Monticello City Manager
Kedrick Somerville—MMTS peripheral property owner
Pete Steele—MMTS peripheral property owner

Interviews were conducted to evaluate public and municipal perception of the effectiveness of the remedies implemented for MMTS and MVP in protecting human health and the environment. Interview questions were designed to determine if roles and responsibilities in maintaining the institutional controls were clearly defined, and whether the on-site DOE-LM contractor representatives provided sufficient response and support in maintaining these controls.

Mayor Allen indicated some dissatisfaction with certain City obligations and continued DOE oversight related to the properties transferred from DOE to the City. The current mayor was not in office when the transfer occurred. The current and then City Manager acknowledged some shortfall by the City in fulfilling its obligations to maintain the affected properties. No interviewee raised concern that the remedies were not protective, that the public was not adequately informed, or that DOE on-site presence through the LM contractor representatives was inadequate or misdirected.

6.4 Document and Data Review

Project documents and data were reviewed as part of the five-year review process to form the basis of the technical assessment of remedy protectiveness presented in Section 7.0. Documents and data are reviewed to compare actual site conditions to the protectiveness requirements set forth in the decision, design, and implementation phases of the project.

Documents and data reviewed in this five-year review were:

- Monticello Mill Tailings Site Declaration for the Record of Decision and Record of Decision Summary, August 1990

- U.S. Environmental Protection Agency Region VIII Hazardous Waste Management Division Five-Year Review (Type Ia), Monticello Mill Tailings Site (San Juan County, Utah) [first five-year review, 1997]
- Cooperative Agreement DE-FC13-99GJ79485 between the City of Monticello and the U.S. Department of Energy, 1998
- Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites, June 2007
- MMTS OU III Post-ROD Monitoring Plan, August 2004
- U.S. Department of Energy Office of Legacy Management Sampling and Analysis Plan, 2006
- Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah, May 2004
- MMTS annual inspection reports for 2004, 2005, and 2006
- Monticello Mill Tailings Site, Operable Unit III Remedial Investigation Addendum/Focused Feasibility Study, January 2004
- Second Five-Year Review Report for Monticello Mill Tailings (USDOE) Site, City of Monticello, San Juan County, Utah, June 2002
- Monticello Mill Tailings Site, Operable Unit III Annual Ground Water Report October 2005 through April 2006, September 2006
- Biomonitoring reports: 2005 Avian Wetland Surveys at the MMTS (October 2005); 2006 Avian Wetland Surveys at the MMTS (September 2006); Final Report MMTS Macroinvertebrate Sampling for 2005 (September 2005); and, Final Report MMTS Macroinvertebrate Sampling for 2006 (February 2007)
- 2006 Revegetation Monitoring of the Monticello, Utah, Repository Cover, December 2006; 2005 Revegetation Monitoring of the Monticello, Utah, Repository Cover, December 2005; and, 2006 Vole Damage Assessment of the Monticello, Utah Repository Cover, November 2006
- Monticello Mill Tailings Site–Operable Unit III Analysis of Uranium Trends in Ground Water, May 2007
- Record Field Books and for the Monticello LTSM Program:
 - Repository Record Book
 - Pond 4 Record Book
 - Government-Owned P/J Properties Record Book
 - OU II Montezuma Creek Soil and Sediment Properties Record Book
 - TSF Record Book
 - Radiological “as-built” drawings (maps of the locations of radiological contamination encountered)
- Water production data from the repository and Pond 4 Leachate Collection and Removal Systems were reviewed (reported in FFA quarterly reports).

- Results of radiological scanning of city streets and utilities in the field record books and on the radiological survey maps were reviewed for accuracy and completeness.
- Surface and ground water monitoring data for OU III were reviewed for trends in contaminant concentrations and to evaluate restoration progress.

7.0 Technical Assessment

EPA guidance on conducting CERCLA five-year reviews recommends that a technical assessment of remedy protectiveness be based upon the answers to the three specific questions posed in Sections 7.1, 7.2, and 7.3 that follow.

7.1 Question A: Is the remedy functioning as intended by the decision documents?

OU I and OU II Soil Remediation

The remedy for OU I and OU II, removal of radiologically contaminated material from the former millsite and placement in an on-site repository, has been completed and is functioning as intended. Appropriate clean-up levels were achieved where practical. Where not practical, and as permitted by statute, the application of supplemental standards and institutional controls allowed some radioactively contaminated soil to remain in place. Annual inspections and LTSM activities confirm that the institutional controls are relevant, effective, and adequate, and that there are no violations of the restrictions.

OU I Repository

Encapsulation of wastes from OUs I and II in the DOE repository prevents exposure to wastes, dispersal of wastes to the environment, and escape of radon gas, owing to safeguards built into the cover and basal liner systems. Residual construction water applied while hauling and placing the wastes in the repository continues to slowly drain but at decreasing rates. This water is collected in the leachate collection system sumps, and is pumped to Pond 4. Minor quantities of water were detected in the repository leak detection systems in the first year of completing the repository (2001) but has not since been detected. These outcomes indicate that infiltration of precipitation is minor or negligible and that the basal liner system is intact. The capacity of Pond 4 remains adequate in storing the repository leachate until the leachate evaporates. Repository and Pond 4 action levels for the leachate recovery and leak detection systems have never been exceeded; therefore, no response action has been needed. The telemetry system for the repository and Pond 4 leachate management system was modernized in May 2007. Back-up manual procedures are in place if automated controls should fail.

The repository cover performs as intended in eliminating infiltration of precipitation. A 7-acre portion of the 90-acre cover was constructed with an embedded drainage lysimeter. The lysimeter functions by utilizing the underlying HDPE cover liner to channel any water that infiltrates the vegetated soil zone to a tipping-bucket flow gauge. Continued monitoring of the gauge indicates negligible infiltration. Long-term performance of the cover is in part dependent on a healthy plant community to remove water stored in the soil layer during dormant seasons by

evapotranspiration during active growing seasons. The vegetation, originally planted in 2000, is well established although some areas continue to not meet revegetation performance criteria as determined through annual monitoring. Damage to shrubs by rodents is also occurring. These are not immediate or near-term threats to cover performance; however, DOE has undertaken studies to determine cause and effect of the poor initial establishment of shrubs and to assess recent rodent damage. To improve grass and forb coverage DOE conducted broadcast seeding in the spring of 2005 and 2007. DOE will conduct live plantings of shrubs during fall 2007 and will consider the use of controlled winter grazing in subsequent years. Raptor perches will be installed in 2007 to encourage predation on voles, the rodent primarily responsible for recent damage to shrubs.

Millsite Restoration

Corrective actions taken in 2004 and 2005 to restore and prevent future erosion damage on the millsite are effective. Areas where erosion had exposed deeper soil that was potentially remediated to a less stringent cleanup standard (15 pCi/g Ra-226) than the surface soil standard (5 pCi/g Ra-226) were covered with adequate clean fill and topsoil. Erosion control features were constructed to prevent future erosion of the affected areas and have since proven effective in doing so. In some areas, the erosion had been exacerbated by the lack of vegetation needed to stabilize the soil surface. Initial attempts to vegetate the site met with poor success because of drought; however, the vegetated coverage on the millsite has since improved significantly resulting in a reduction of barren areas.

OU III Surface Water and Ground Water

The selected remedy for OU III allows a 42-year period for natural processes to restore water quality to the remediation goals. During this period (starting October 2002), the ground water use restriction that has been implemented will prohibit use of the alluvial aquifer. The restriction is functioning as intended. To date, the State Engineer correctly responded to both applications received for ground water withdrawals within and near the OU III ground water restricted area. In each case, the applicant desired ground water from the underlying bedrock aquifer, further attesting to the limited value of the alluvial aquifer for water supply. LTSM surveillance confirms that no prohibited water well installation has occurred. The human-health ground water exposure pathway remains incomplete.

The progress of aquifer restoration is most recently reported in *Monticello Mill Tailings Site, Operable Unit III Annual Ground Water Report October 2005 through April 2006*, September 2006. The report shows that the remedy is generally functioning as intended because contaminant concentrations are decreasing at many monitoring locations and the plume is not advancing into new regions. However, by the specific performance criteria defined in the ROD for OU III, the progress of ground water restoration is presently less than predicted by the ground water model. This outcome required reanalysis of the data by DOE using an alternate approach. The alternate method and results are reported in *Monticello Mill Tailings Site—Operable Unit III Analysis of Uranium Trends in Ground Water*, May 2007 (draft).

The alternate analysis, using formal trend analysis of uranium concentrations, provided results very similar to those of the original evaluation while identifying through well-by-well tests some specific locations in the aquifer of potential concern. Current trends indicate that aquifer

restoration will be complete in one region clearly within the 42-year period. Current trends also indicate that at present rates of decline, aquifer restoration will not be met within the 42-year period for two other regions. One of these regions may be particularly sensitive to recent drought that interrupted an important source of ground water recharge. A return to climatic conditions more consistent with the ground water model may greatly improve the progress of ground water restoration in that area. For the two final regions, located farthest downgradient (east) of the millsite, present trending is not a reliable forecast of the clean-up period at this early stage of evaluation because concentrations are expected to yet reach maximum values as the plume moves eastward into these regions.

Discussion of these outcomes during the FFA for the Monticello sites held on April 10–12, 2007, lead to concurrence among DOE, EPA, and UDEQ of the following ground water strategy through the next 5-year CERCLA review period: 1) continue to implement and enforce the institutional controls that restrict ground water use, 2) continue semiannual ground water and surface water monitoring within the existing monitoring network and scope, 3) continue annual data analysis and reporting of concentration trends and hydrologic data, 4) apply parametric methods after the fourth year to determine if concentrations are statistically decreasing on a well by well basis, 5) using the data and statistical test, determine if recalibrating the site ground water model is warranted by any changed site conditions, 6) using the data and statistical test, determine if observed concentration decreases are acceptable, and 7) using the data and statistical test, evaluate the need for implementing additional remedial actions including the alternatives developed in *MMTS OU III Remedial Investigation Addendum/Focused Feasibility Study*, January 2004; and, review CERCLA Technical Impracticability allowances and UDEQ Alternate Concentration Limits at that time if necessary.

In addition to these components, DOE, in conjunction with EPA, will for the near future continue to operate the ZVI treatment cells and to conduct focused water quality and hydrologic monitoring to determine if the added treatment will improve long term water quality by containing and treating a “hot spot” of ground water contamination near the PRB. This work is presently conducted under the DOE-LM Applied Science and technology task order.

OU III Biomonitoring

With respect to the protection of ecological receptors, biomonitoring is ongoing as directed and intended in the OU III ROD. At the April 2007 FFA meeting, DOE presented and discussed results of ecological monitoring conducted through spring and early summer 2006. Selenium in aquatic insect samples collected at Wetland 3 and the Sediment Pond sometimes exceeded the toxicity threshold and so the organisms are a potential threat to higher trophic levels, particularly wetland birds. Results of bird and wildlife surveys conducted under the biomonitoring task and in the OU III baseline risk assessment did not identify any threatened or endangered species in the area.

An outcome of that meeting was BTAG concurrence on the following elements of biomonitoring through the next 5-year review period: 1) DOE will conduct aquatic insect sampling, and sediment and surface water sampling, in spring 2007 and spring 2008, 2) DOE may consider later confirmatory sediment and surface water sampling, 3) DOE will conduct a bird survey in spring 2008 by personnel qualified in the identification of local threatened and endangered species, 4) a decision of acceptable risk will be considered if such species are absent from the

exposure pathway and selenium concentration in the various media are not rising, 5) if such species are absent and selenium concentration in the various media are increasing, bird egg sampling may be required to confirm acceptable environmental risk, and 6) a new strategy will be developed if bird egg sampling indicates unacceptable risk or if a threatened and endangered species is present in the exposure pathway

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy still valid?

OU I and OU II

OU I and OU II exposure assumptions (identified in the *Final Remedial Investigation/Feasibility Study-Environmental Assessment for the Monticello, Utah Uranium Mill Tailings Site*, January 1990), remedial action objectives, and cleanup levels have not changed since the ROD was signed and are still valid.

Uranium toxicological data have changed for soil ingestion in industrial land use scenarios (EPA Region III Risk-Based Concentration Tables [10/31/2006]). Cleanup of property MP-00211-VL Phase I attained the adopted goal for industrial use of 6,100 mg/kg uranium. The updated risk-based concentration (RBC) is 3,100 mg/kg for industrial use. No soil sample collected from the property for cleanup verification purposes exceeded that value. The current risk-based uranium concentration for soil ingestion, residential land use (230 mg/kg), is unchanged from the initial assessment. As stated in Section 4.3.4, one sample from Phase I of this property (480 mg/kg) exceeded this level and was the basis for implementing the previously described institutional control (zoning ordinance) to minimize exposure to residual uranium contamination on this property.

The vanadium RBC for soil ingestion and industrial use has decreased from 14,000 mg/kg to the current value of 1,000 mg/kg (EPA Region III Risk-Based Concentration Tables [10/31/2006]). Residual vanadium contamination on property MP-00211-VL Phase I does not exceed this updated value.

The uranium cleanup goal for property MP-00211-VL Phase II and for the millsite (OU I) is insensitive to changes in the published RBC values. The uranium cleanup goal for these properties was determined using RESRAD, a computer model designed by DOE to estimate radiation doses and risks associated with residual radioactive material. A radiation dose limit is user-specified along with inputs that describe exposure duration and quantity, site geometry, and residual contamination concentration for the radionuclide(s) of concern. Site conditions, exposure assumptions, or the dose limit have not changed to warrant modifying the OU I RESRAD model.

OU III

The baseline human health and ecologic risk assessments for OU III were updated and reported in the January 2004 RI Addendum in response to changing site conditions since the baseline assessments were completed and documented in *Monticello Mill Tailings Site Operable Unit III Remedial Investigation*, September 1998. The updated human health risk assessment incorporated new surface water and ground water exposure point concentrations, and a refined

set of COCs. The update also incorporated changes in published toxicity values and a refined approach for estimating risk. No changes to the exposure pathways or scenarios were required. The updated human health risk assessment concluded that the improbable future use of contaminated ground water, as the primary source of drinking water, would by a large margin account for the majority of risk in each exposure scenario evaluated. The risk associated with exposure to contaminated soil and sediment only was within the EPA benchmark range of 10^{-4} to 10^{-6} incremental lifetime cancer risk, as specified in the National Contingency Plan, for each scenario evaluated (extended backyard, recreational, and agricultural). These conclusions were not different than those of the original assessment, which led to the selected remedy of “hot-spot” remediation to alternate cleanup levels in certain areas of the Montezuma Creek canyon, and to the implementation of the land use and ground water use restrictions described in Sections 4.3.3 and 4.3.5. Since the risk assessment update, there have been no changes in toxicity data, exposure assumptions, remedial action objectives, or site conditions that would warrant a reassessment of human health risk related to residual soil and sediment contamination in the Montezuma Creek canyon, or to contaminated ground water within OU III.

The newly adopted UDEQ standard of 30 picocuries per liter (as of June 1, 2005) for uranium in domestic surface water does not affect the selected OU III remedy. Surface water ingestion was determined in the baseline and updated human health risk assessments to be an unimportant pathway (domestic or recreational ingestion) in any of the exposure scenarios evaluated.

Federal regulations have been promulgated that lowered the primary drinking water standard for arsenic to 10 micrograms per liter ($\mu\text{g/L}$) (effective January 2006) and finalized the standard for uranium at 30 $\mu\text{g/L}$ (effective December 2003). Preparation of the OU III ROD anticipated and incorporated the new maximum contaminant level for arsenic as the remediation goal. The ROD for OU III also adopted the recently finalized uranium Maximum Contaminant Level as the ground water goal. The new standards, therefore, do not invalidate the remedy.

With respect to ecological risk, the conclusion of acceptable risk to ecological receptors reached in the baseline and updated risk assessments remains valid for all COCs except selenium. Potential risk associated with environmental selenium at OU III is currently under investigation in accordance with the biomonitoring task (see Sections 4.3.6 and 7.1) prescribed in the ROD for OU III.

7.3 Question C: Has any other information become available that could dispute the protectiveness of the remedy?

No anomalous conditions suggesting failure of the remedies were found during the site inspection, document and data review, or interviews for the MMTS OUs. LTSM activities related to the MMTS remain relevant and are appropriately implemented. LTSM monitoring and radiological surveying has not identified contamination inconsistent with what is known or expected. Review of the LTSM plan confirmed that adequate controls and procedures are in place.

7.4 Technical Assessment Summary

OU I and OU II

The remedy for OU I and OU II is functioning as intended by the ROD. There have been no changes in the physical conditions or the use of the supplemental standards areas or adjacent land that would adversely affect the protectiveness of the remedy. Applicable or relevant and appropriate requirements (ARARs) cited in the ROD have been met. There have been no changes in the toxicity factors for the COCs that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The institutional controls implemented for OU I and OU II remain relevant, adequate, and appropriately implemented.

The 2006 annual inspection report indicated that previous problems with erosion that could potentially impact the protectiveness of the OU I remedy on the former millsite were adequately addressed through repair and reconstruction. Some minor repair and maintenance obligations of the City were noted as needing attention. The report also indicated that previous repairs of erosion control features at the repository were adequate.

Although the repository cover does not meet revegetation performance criteria, drainage lysimeter monitoring data for the repository indicates that this is not likely a short or long-term problem. DOE will implement corrective actions (see Section 7.1) and, as an outcome of the April 2007 FFA meeting, has developed a cover management strategy to ensure that the cover remains functional in minimizing infiltration of precipitation. Continued monitoring of the embedded lysimeter remains a key component of the strategy.

OU III

The remedy for OU III is functioning as intended. There have been no changes in the factors affecting the human health risk assessment that would compromise the protectiveness of the remedy. The exposure pathway for ground water consumption is not complete because the aquifer is not a viable water supply source and because the ground water use restrictions have proven effective. Although contaminant concentrations in ground water have not declined as rapidly as expected at some locations, the remedy is functioning due to the fact that concentration trends indicate general improvement of water quality and the allotted restoration time has not expired.

The annual ground water reports identify that certain areas of the aquifer are sensitive to recognized sources of ground water recharge to flush contaminants from the aquifer. Recent drought has severely diminished these sources. A return to wetter conditions as represented in the site ground water model could restore water quality in these areas within the overall model-forecast restoration period. Other factors that likely are affecting the rate of water quality restoration include reduced flow through the PRB by mineral fouling. This has likely caused ground water to flow at slower rates in some areas, thus prolonging the attenuation process. Operation of the treatment cells may reverse this trend by removing contaminants from the system and by enhancing the flushing process by returning the treated effluent to the aquifer through the associated infiltration trench.

The biomonitoring task is proceeding as directed and intended by the ROD. Recent agreements among the BTAG have defined a strategy for data collection that will enable the determination of

ecological risk associated with selenium accumulation in the constructed wetlands and sediment pond within the next 5-year review period. Current data gaps are being adequately addressed. Risk managers also agreed to general conditions that if met through the defined scope of biomonitoring would allow biomonitoring to be discontinued.

8.0 Issues

Table 4 lists only the observations considered to have potential effect on future protectiveness of the remedy as indicated through site inspection, document and data review, and interviews.

Table 4. Issues

Issue	Currently Affects Protectiveness (Y/N)	Potentially Affects Future Protectiveness (Y/N)
The DOE/City of Monticello Cooperative Agreement expired June 27, 2005, but was extended to December 31, 2006.	N	N
Minor repair of erosion is needed at several locations on City property.	N	Y
Aquifer restoration shows improvement but current rates are less than expected.	N	Y
Selenium concentrations sometimes exceed toxicity benchmark levels in surface water, sediment, and aquatic insects at constructed wetlands.	Under investigation	Under investigation
Repository vegetation performance criteria are not achieved.	N	Y

9.0 Recommendations and Follow-up Actions

Table 5 lists the recommended follow-up actions and responsible party for the issues identified in the preceding section.

Table 5. Recommendations and Follow-up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency
DOE/City of Monticello Cooperative Agreement.	In April 2007, DOE and the City completed negotiations for a new cooperative agreement that extends to December 31, 2006.	DOE	None
Minor repair of erosion is needed at several locations on City property.	DOE to communicate repairs needed to the city of Monticello.	City of Monticello	DOE/EPA/ UDEQ
Aquifer restoration shows improvement but current rates are less than expected.	Continued water quality monitoring/evaluation as per current scope. Continued operation of passive and active ground water remediation treatability study systems.	DOE	EPA/UDEQ
Selenium concentrations sometimes exceed toxicity benchmark levels in surface water, sediment, and aquatic insects at constructed wetlands.	Continued water quality monitoring/evaluation as per current biomonitoring scope until definitive trends are apparent and evaluated.	DOE	EPA/UDEQ
Repository vegetation performance criteria are not achieved.	Erect raptor perches, conduct live shrub plantings as needed. Consider winter grazing. Continue to monitor 7-acre embedded lysimeter.	DOE	EPA/UDEQ

10.0 Protectiveness Statements

10.1 Protectiveness Statements for the Individual OUs of the MMTS

Protectiveness statements for the individual OUs of the MMTS are listed below:

OU I—Former Millsite and DOE Repository

The remedy at OU I is protective of human health and the environment. Millsite remediation has been completed in accordance with the ROD. Property completion reports demonstrate that soil remediation achieved the numeric standards set forth in the primary ARAR (40 CFR 192). Restoration of the millsite is now complete, including re-vegetation, wetlands establishment, and construction of erosion controls. All associated land use restrictions and LTSM activities are in place to ensure that the remedy remains protective. Exposure assumptions, toxicity data, and cleanup levels have not changed since the ROD was signed. Changed land use or site conditions are not significant.

The repository has been constructed according to ROD specification. The cover and liner systems are effectively isolating the wastes from the environment. LTSM activities have been implemented to ensure that the implemented disposal alternative remains protective of human health and the environment. LTSM activities include limiting public access, operating and monitoring the leachate management systems, and monitoring and maintaining physical attributes of the repository and all support facilities.

OU II—Peripheral Properties

The remedy at OU II is protective of human health and the environment. Soil and sediment contamination has been removed to the extent practicable; supplemental standards and institutional controls have been applied to those properties where contamination remains in place. Departures from the ROD were documented in an Explanation of Significant Difference.

Property completion reports demonstrate that contamination was removed to numeric levels set forth in the primary ARAR or that supplemental standards, in compliance with 40 CFR 192.21 and 192.22, were applied to the properties at which contamination was left in place. Land use restrictions and LTSM activities at those supplemental standards properties ensure that the remedy remains protective of human health and the environment. Exposure assumptions, toxicity data, and cleanup levels have not changed since the ROD was signed. Changed land use or site conditions are not significant.

OU III—Surface- and Ground-Water

The remedy at OU III is protective of human health. The selected remedy allows until 2044 for natural processes to restore water quality to remediation goals. An institutional control (Utah State Engineer Groundwater Management Area) has been implemented to prevent exposure to contaminated ground water during that time. The progress of water quality restoration is assessed through comprehensive monitoring. Because of poor yield,

the affected aquifer has no current or historical use. Alternate sources of domestic water are readily available within OU III.

A protectiveness determination of the OU III remedy for the environment (ecological receptors) cannot be made at this time until further information is obtained. Further information is being obtained under the post-ROD biomonitoring task. Biomonitoring is ongoing to evaluate potential risk to ecological receptors from recent increases of selenium in OU III surface water and ground water. Biomonitoring may require several additional years of data collection and evaluation. A protectiveness determination will be possible for the next five-year review.

10.2 Comprehensive Protectiveness Statement for MMTS

A comprehensive protectiveness statement for the MMTS cannot be made until the protectiveness of the OU III remedy for ecological receptors can be determined. Ecological studies are ongoing. All other aspects of the MMTS remedy are protective of human health and the environment.

11.0 Next Review

The next five-year review for the MMTS is due June 2012, five years from this review.

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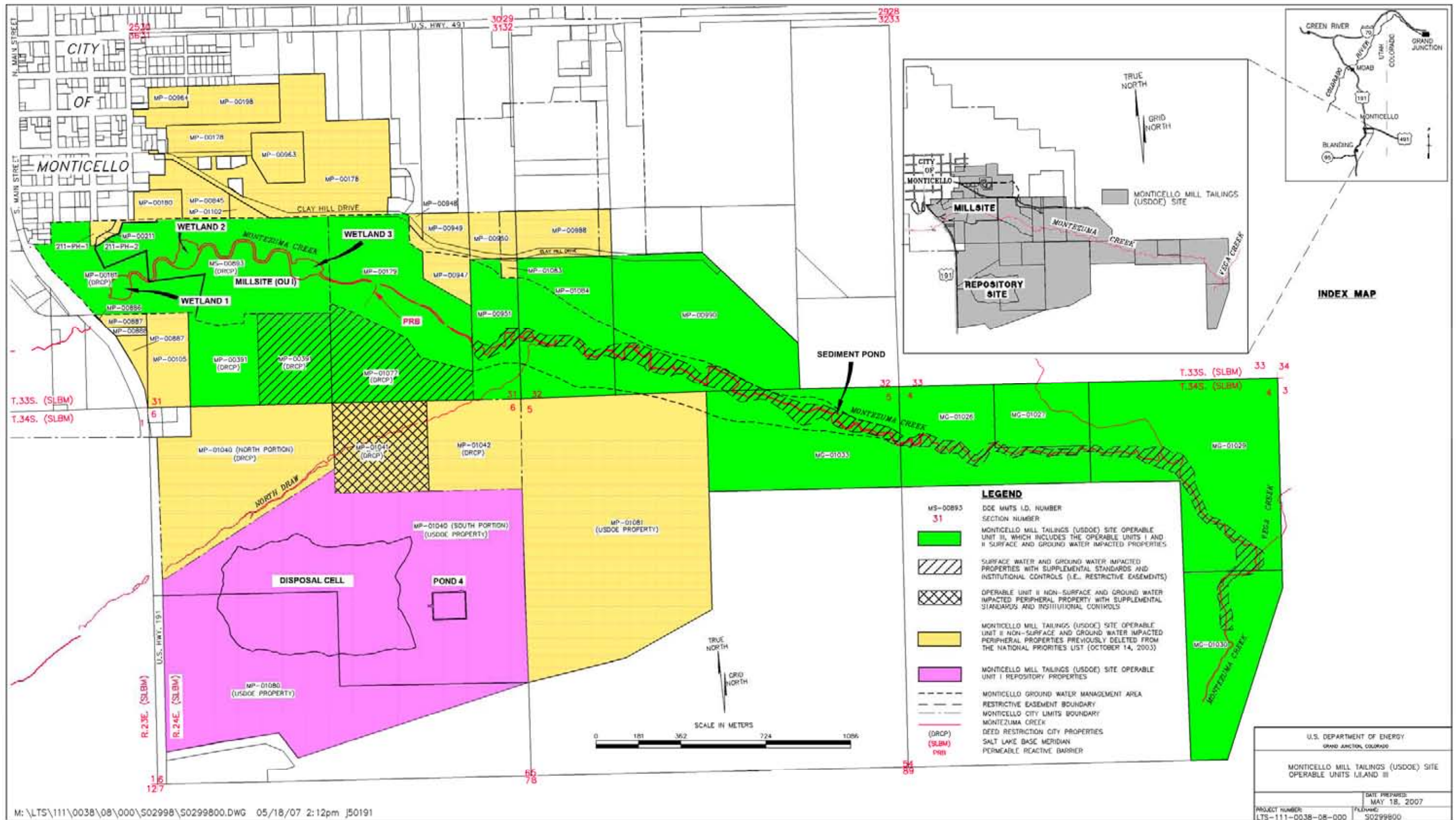


Figure 1. Monticello Mill Tailings (USDOE) Site Operable Units I, II, and III

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Attachment 1

2006 MMTS and MVP Annual Inspection Report

Attachment 2

CERCLA 5-Year Review Announcements



**The U.S. Department of Energy
Office of Legacy Management has initiated a
Five-Year Review for the Monticello Mill Tailings Site and
the Monticello Radioactively Contaminated Properties
(Monticello Vicinity Properties) Site**

Representatives from the U.S. Department of Energy (DOE) Office of Legacy Management (LM) are taking the lead in conducting five-year reviews required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the DOE Monticello Mill Tailings Site and the Monticello Radioactively Contaminated Properties (Monticello Vicinity Properties) Site, Monticello, Utah. These reviews serve as checkups to ensure that the selected remedies continue to protect human health and the environment. This will be the third such review for the sites since the start of remedial actions in 1987.

The remedies included removing and relocating approximately 2.5 million cubic yards of uranium mill tailings and radiologically contaminated soil and debris from the millsite, adjacent properties, and vicinity properties to a permanent repository constructed south of Monticello, Utah. Land use restrictions in conjunction with alternate clean up standards (supplemental standards), and ground water use restrictions, were implemented as part of the remedy to ensure that known contamination left in place is not further dispersed and does not adversely affect human health and the environment. Information on these two sites is available on the DOE LM website located at: www.LM.doe.gov/land/sites/ut/monticello/monticello.htm.

The review team will study site reports, past and present monitoring and inspection data, monitoring and surveillance practices, and conduct a physical inspection of the site. In addition, interviews will be conducted with selected local government and State officials for comments and concerns regarding remedy effectiveness and administration of the sites. The public is encouraged to contact the DOE LM Monticello site representative indicated below with suggestions or concerns regarding the site remedies or administration.

Art Kleinrath
U.S. Department of Energy
Office of Legacy Management
955 Mound Road
Miamisburg, Ohio 45342
Email: akleinrath@lm.doe.gov
(937) 847-8350, extension 318
(877) 695-5322 (toll free)

A Five-Year Review Report will be prepared at the conclusion of the review to document and present the findings. The final report is expected to be available for public review by July 2007 at the following locations:

Monticello Repository Office
7031 South Highway 191
Monticello, Utah 84535
(435) 587-2902 or (435) 587-3115

U.S. Department of Energy
Office of Legacy Management
Technical Library
2597 B $\frac{3}{4}$ Road
Grand Junction, Colorado 81503
(970) 248-6089

DOE Legacy Management website: www.LM.doe.gov/land/sites/ut/monticello/monticello.htm

Blue Mountain Panorama Blanding, Utah Wednesday, February 21, 2007



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Attachment 3

Interview Results

Interview Results for the MMTS and MVP Five-Year CERCLA Reviews

As part of the five-year reviews for the MMTS and MVP, a community relations specialist (Judy Miller) of the DOE LM contractor (S.M. Stoller) interviewed local property owners and stakeholders to gather information about the site's effect on the community. The interviews were conducted in Monticello during February 13 and 14, 2007. Interviewees were initially contacted the previous week to schedule the interviews. Two of the interviewees (Pete Steele and Brian Bowring) were not available for on-site interviews and were instead contacted later by telephone.

Interviewees and their relation to the sites are listed below.

Chet Johnson—Utah Department of Transportation, Monticello office
Trent Schafer—Monticello City Manager
Doug Allen—Monticello Mayor
Lisle Adams—MMTS peripheral property owner
Kedrick Somerville—MMTS peripheral property owner
Sanford Randall—MVP peripheral property owner
Rye Neilson—MMTS peripheral property owner
John Johnson—MMTS peripheral property owner
Pete Steele—MMTS peripheral property owner
Brian Bowring—MMTS peripheral property owner

Results of the interviews are provided below as noted by the S.M. Stoller community relations specialist.

Interviewee: Chet Johnson—Utah Department of Transportation

Date of Interview: February 14, 2007

Location: Utah Department of Transportation office

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: I think it's great. Joe and Todd are doing a great job. No problems.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: I think they're more than adequate. Everyone feels safe.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: I don't know of any.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: Yes. If there's any lack of communication it's my fault. They seem to be on top of things.

Question: What effect do site operations have on the surrounding community?

Response: Minimal if any that I'm aware of. It's always quiet out there.

Interviewee: Trent Schafer—City Manager

Date of Interview: February 14, 2007

Location: City of Monticello office

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: We work closely with the two Stoller employees. We do quite well with those guys. Art (Kleinrath, DOE) and Paul (Mushovic, EPA) stop in occasionally. We still have issues to resolve with Art about millsite maintenance. There are some places we're not in agreement about. For instance, the erosion. They think it's worse than we do. The City needs to put inspections and monitoring in place.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No, the wetland areas are well established. They turned out very nice.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: I do. We think they are very adequate.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: Not that I know of.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: Yes. I find it very easy to get a hold of Art and on-site personnel are here in a minute if we call them.

Question: What effect do site operations have on the surrounding community?

Response: None.

Question: Are there any plans to change the recreational use of the former millsite? If so, have these plans been submitted to the National Park Service?

Response: The City Parks and Beautification committee was formed last year and a subcommittee is discussing ways to improve the former millsite. They have discussed improving the trails and maybe paving the paths. It has also been discussed that part of the site could be used as the County Fairgrounds and there's also talk of a Science Center being located on the site.

Question: Have there been communications or activities (site visits, inspections, reporting activities, etc.) conducted by the City of Monticello regarding the millsite? If so, please give purpose and results.

Response: We're going down there quite a bit. We don't do any reporting unless there's something to address.

Question: Are there specific problems in complying with the terms of the cooperative agreement?

Response: No.

Question: Are there general or specific community concerns regarding the conduct of LTSM activities at the supplemental standards properties? If so, please give details.

Response: No.

Question: Have there been any complaints, violations, or other incidents related to the MMTS requiring an official response from your office? If so, please give details of the events and results of the responses.

Response: No.

General comments: We've got a good relationship with DOE. We need to bring up our level of inspections and erosion control on our part. We also need to use the space for other things/activities.

Interviewee: Doug Allen—City Mayor

Date of Interview: February 14, 2007

Location: City of Monticello office

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: I'm a little frustrated. What are DOE's responsibilities and what are the City's responsibilities? Are we going to have this oversight forever? It should be the City's, or not. I think the federal government should take it back. DOE is still retaining \$50,000 because they're not happy with how we're managing it. They should come to the City Council and explain exactly what they want from the City. They should explain their expectations. I don't see it as a good deal for the City of Monticello.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: I don't know of any problems but I'm not sure if I'm qualified to answer the question.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: Not from citizens. Not a great deal of concerns. People know to contact the City and DOE before digging.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: I think it's excellent.

Question: What effect do site operations have on the surrounding community?

Response: None. Don't know of any.

Question: Are there any plans to change the recreational use of the former millsite? If so, have these plans been submitted to the National Park Service?

Response: There are plans for a Science Center and the County is thinking of using the upper part of it for the County Fairgrounds, but no other plans that I'm aware of.

Question: Have there been communications or activities (site visits, inspections, reporting activities, etc.) conducted by the City of Monticello regarding the millsite? If so, please give purpose and results.

Response: Not that I'm aware of.

Question: Are there specific problems in complying with the terms of the cooperative agreement?

Response: Evidently, if they're not releasing the \$50,000. We've earmarked that money to go to the Victims of Mill Tailings Exposure group. There is constant nitpicking from DOE. We need to know their specific expectations. When does it end? Has the property been transferred to the City of Monticello? When will the DOE management end? I don't like the financial constraints. We should decide how much money we spend to maintain the property.

Question: Are there general or specific community concerns regarding the conduct of LTSM activities at the MVP supplemental standards properties? If so, please give details.

Response: I don't think so.

Question: Have there been any complaints, violations, or other incidents related to the MMTS requiring an official response from your office? If so, please give details of the events and results of the responses.

Response: Not that I'm aware of.

General comments: I don't like where DOE wants to put the Science Center. We all decided that another place would be better. The golf course issue is clouding DOE's judgment about the center. If we own the property, why do we need permission? The golf course decision is still affecting DOE's relationship with the City. I also want to comment about cancer in the community. Cancer and other health problems are a legacy of the millsite. We are upset with DOE and the Utah Department of Health.

Interviewee: Lisle Adams—Property owner

Date of Interview: February 13, 2007

Location: Lisle Adams' home

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: DOE did a good job. I bought the property after the cleanup. No criticisms.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: Yes.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: I can't see that they've done much since DOE finished the cleanup. It could be more aesthetically pleasing than it is. Maybe they could plant some trees that could withstand the drought. There could be more beautification of the site.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: They're all just really good to me. Joe does a great job. He's amazing and very helpful. I have confidence in them.

Question: What effect do site operations have on the surrounding community?

Response: I don't see anything.

General comments: DOE worked hard to get the cleanup done and they were conscientious in their work.

Interviewee: John Johnson—Property owner

Date of Interview: February 13, 2007

Location: John Johnson's home

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: Seems to be okay. They could have grown grass around the buffer zone for grazing. Looks fine.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: Yes, plenty good. No problems. The contamination was buried well and seeded. There's no radioactivity. Shouldn't be any worry to the public.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: No. Looks okay.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: Yes. If I need something they are very helpful.

Question: What effect do site operations have on the surrounding community?

Response: Haven't heard any complaints. I think the community wanted the City to have more walking paths. They could have put a recreation building on the site. There could be horse riding and other activities.

General comments: DOE interacts well with the community.

Interviewee: Rye Neilson—Property owner

Date of Interview: February 13, 2007

Location: Rye Neilson's home

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: They did a good job cleaning everything up. They kept us informed.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: Yes.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: No, except the condition of the road going down there (Clayhill Drive). I thought the City was going to repair it.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: Yes, they're very good – very helpful.

Question: What effect do site operations have on the surrounding community?

Response: I think they've (DOE) been very good.

Interviewee: Sanford Randall—Property owner

Date of Interview: February 14, 2007

Location: Sanford Randall's home

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: Fine. I don't have any dealings with them.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: Yes. I don't think there's that big of a threat anyway. I wouldn't be concerned.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: Not that I've heard of.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: I think so. It's easy to find them.

Question: What effect do site operations have on the surrounding community?

Response: None.

General comments: Pretty much a forgotten thing now. It was a big deal during cleanup but not now.

Interviewee: Kedrick Somerville—Property owner

Date of Interview: February 14, 2007

Location: DOE office

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: There hasn't been anything that I would call management. Taking care of road access, irrigation, etc. has been very good. They are very careful.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No. I don't think so. There's been some in the past but they were dealt with.

Question: Have you noticed any unusual activities on the millsite?

Response: No, except hunting on the millsite. I have told the City about this problem. The City needs to take a stand on whether there is or isn't hunting on the site. If not, they should lock the gates and post "No Hunting" signs. Otherwise, make it open. I would like to see some definite control regarding hunting. They need to consider liability on site if something happens to hunters.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: Yes, I really do.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: By the City it seems like it's non-existent. The paths are gravel and they wash away and weeds grow over the paths. The City needs to maintain the property.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: Yes, very much so. I have contact with Joe and Todd weekly or bi-weekly. They're very good about taking care of concerns that I have.

Question: What effect do site operations have on the surrounding community?

Response: Not much.

General comments: I have problems with eight or nine acres of mine that were cleared of topsoil and the soil was replaced with clean soil. Since then, the intake of water has reduced and there's a lot of runoff. It's not yielding the crops (hay) that I should have. It's been several years and the soil has not improved. When Marilyn (Kastens) did a soil study several years ago, there was serious compaction. We used a ripper and that helped, but even in that area, the roots grow down and then grow sideways when they reach the compacted soil. The yield has been reduced by 50% in some places. The topsoil is good and some acres are doing well but some are not. The rest of the project seems to be fine. When they started the cleanup they said they'd put it back the same or better but that just hasn't happened. I want to know what they can or can't do about that. I want to talk to someone about it.

Interviewee: Pete Steele – Property owner

Date of Interview: March 28, 2007

Location: Telephone interview

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: I don't think the whole project was managed well. When DOE talked to property owners, they would always quote the regulations and say this is how they have to do it. Some of the DOE managers were very good but others just wanted to placate the contractors and EPA. Land owners suffered. They would spend money cleaning under houses instead of just re-building. They would find that radiation was more extensive but they couldn't clean it all up because they couldn't prove the DOE caused the contamination. There were some properties in Monticello that were cleaned three times. EPA changed the rules. Contractors who did the work had to get blessings from DOE who had to report to EPA watch dogs. The last five years it hasn't been managed. DOE has been complying with EPA but they're not concerned about property owners. This property was only cleaned to supplemental standards.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No. I guess not.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: No. It was never cleaned up to begin with. People are still getting cancer.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: The City is catching a lot of flak by DOE but DOE isn't managing the site because of guidelines. The City has mismanaged the site. The City has to go through DOE to get permission to do anything. There were bad decisions made by the City. They mismanaged funds given by DOE.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: I think Joe does a good job communicating with property owners. The higher-ups do not come out here and talk with us. The people of Monticello need to be served by DOE.

Question: What effect do site operations have on the surrounding community?

Response: It has a great deal. The City of Monticello is going to bat to get assistance to help people with cancer. We are trying to get an early detection clinic. We would like to do a lot of things at the old millsite. Build a community center, a science center, rodeo grounds, a firing range, etc. We could do a lot with that area but we're still in limbo.

General comments: The general population is not happy about what happened here. The City of Monticello didn't gain anything. If DOE could help the Victims of Mill Tailings Exposure, that would help DOE's image in Monticello.

Interviewee: Brian Bowring – Property owner

Date of Interview: March 28, 2007

Location: Telephone interview

Question: What is your general impression of the DOE LM management of the MMTS site (repository, former millsite, supplemental standards properties, ground water restricted area)?

Response: I have mixed feelings on that. I think they have different guidelines for different properties.

Question: Are you aware of any projects or activities that could disturb the wetland areas along Montezuma Creek?

Response: No. Not that I'm aware of.

Question: Have you noticed any unusual activities on the millsite?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil at supplemental standards properties? From contaminated ground water?

Response: Yes.

Question: Are there general or specific community concerns regarding the administration or operation of the site by DOE? By the City?

Response: No.

Question: Is there adequate communication, response, involvement, cooperation with DOE LM on-site personnel regarding site operations?

Response: Yes. They do alright.

Question: What effect do site operations have on the surrounding community?

Response: I don't think it affects the community a lot.