LMS/MNT/S08399

Five-Year Review Report

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

June 2012

U.S. DEPARTMENT OF ENERGY | Legacy Management

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for
Monticello Mill Tailings (USDOE) Site
San Juan County
Monticello, Utah

June 2012

Prepared by
U.S. Department of Energy
Office of Legacy Management
Grand Junction, Colorado

Approved by:

Jalena Dayvault
Monticello Site Manager
U.S. Department of Energy, Office of Legacy Management

Date: 6/7/2012

Concurrence Letter Enclosed
U.S. Environmental Protection Agency

June 18, 2012

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

JUN 18 2012

Ref: 8 EPR-FF

Jalena Dayvault
Monticello Site Manager
US Department of Energy, Office of Legacy Management
2597 Legacy Way
Grand Junction, Colorado 81503

Re: Five Year Review Report for Monticello Mill Tailings US DOE Site, San Juan County, Utah

Dear Ms. Dayvault:

Thank you for submitting the Five Year Review Report for Monticello Mill Tailings (MMTS) US DOE Site, San Juan County, Utah. The US Environmental Protection Agency (EPA) in consultation with the State of Utah concurs with your assessment that the remedies for OU I (former millsite and onsite repository), OU II (peripheral properties), and OU III (groundwater) are protective of human health and the environment. We agree with your determination in the sitewide protectiveness statement that the remedy is protective of human health and the environment. This information will be included in the EPA's annual Superfund Five-Year Review Report to Congress.

No issues or recommendations relating to this Five Year Review will be tracked in the EPA's Superfund tracking system, CERCLIS. The environmental indicator for this site is "current human exposure is controlled and a protective remedy is in place." Environmental indicators include site wide human exposure control and contaminated groundwater migration.

The due date for the next five year review report will be June 20, 2017.

Sincerely,

Martin Hestmark

Martin Hestmark
Acting Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

cc. Michael Storck, UDEQ

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Contents

Figures

Tables

Attachments

Abbreviations

AEC	U.S. Atomic Energy Commission
ARAR	applicable or relevant and appropriate requirement
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
DOE	U.S. Department of Energy
DRCP	deed restriction City property
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
ET	evapotranspiration
FFA	Federal Facility Agreement
ft	feet
HDPE	high density polyethylene
IRA	interim remedial action
LM	Office of Legacy Management
LTSM	Long-Term Surveillance and Maintenance
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MMTS	Monticello Mill Tailings Site
MNA	monitored natural attenuation
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
RAO	remedial action objective
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
UDEQ	Utah Department of Environmental Quality
UMTRCA	Uranium Mill Tailings Radiation Control Act
VCA	Vanadium Corporation of America

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Executive Summary

This report documents the fourth five-year review for the U.S. Department of Energy's (DOE's) Monticello Mill Tailings Site (MMTS), which is located in Monticello, Utah. The MMTS includes three operable units (OUs). The first, OU I, consists of (1) the approximately 78-acre former uranium and vanadium ore mill (mill site) that was contaminated with radioactive mill tailings and milling-related byproduct materials, and (2) the 90-acre repository used for permanent disposal of MMTS remediation wastes. OU II consists of mill site peripheral properties covering approximately 1,700 acres that were contaminated with mill-derived radioactive soil and sediment. OU III consists of surface water and groundwater contaminated as a result of mill activities.

The period for this five-year review is July 2007 through June 2012. The MMTS was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) on November 21, 1989. The remedy for MMTS OUs I and II was selected in the *Monticello Mill Tailings Site Declaration for the Record of Decision and Record of Decision Summary* (MMTS ROD) (August 1990). The MMTS ROD was based on the results of the *Final Remedial Investigation/Feasibility Study–Environmental Assessment for the Monticello, Utah, Uranium Mill Tailings Site* (January 1990). The remedy for MMTS OU III was selected in the *Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Groundwater, Monticello, Utah* (OU III ROD) (May 2004). The OU III ROD was based on the *Monticello Mill Tailings Site Operable Unit III Final Remedial Investigation Addendum/Focused Feasibility Study* (January 2004). The OU III ROD was modified by the *Explanation of Significant Difference for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah* (January 2009).

The Federal Facility Agreement (FFA), agreed to by the U.S. Environmental Protection Agency (EPA), the Utah Department of Environmental Quality (UDEQ), and DOE and signed in December 1988, provides the regulatory framework for implementing the RODs through a consultative process between the parties. DOE is the lead agency for remediation, with oversight provided by EPA and UDEQ. The MMTS is related to the Monticello Radioactively Contaminated Properties NPL site (also known as the Monticello Vicinity Properties [MVP] site), which is subject to a separate, concurrent five-year review.

Five-year reviews are conducted for the MMTS as mandated by CERCLA because contamination remains in place that prevents unlimited use and unrestricted exposure for portions of the site. This review was conducted by DOE as the CERCLA lead agency under Executive Order 12580, with assistance from EPA and UDEQ, in accordance with guidance provided by EPA in *Comprehensive Five-Year Review Guidance* (June 2001) and in *Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance"* (September 2011). This review assesses the performance of the final remedies in relation to remedy objectives and implementation requirements.

The primary purpose of MMTS remedial action was to limit exposure to contamination in the land, surface water, and groundwater. Remedial action was conducted, or is still being conducted for contaminated surface water and groundwater, to achieve levels that are protective of human health and the environment. Those levels are specified in Title 40 *Code of Federal Regulations* Part 192.12 (40 CFR 192.12) and in DOE Surplus Facilities Management Program guidance as

cleanup standards for radium, radon and radon daughters, and gamma exposure rates in land and buildings. Cleanup standards for contamination in surface water and groundwater are obtained from drinking water standards specified in the Safe Drinking Water Act, groundwater standards specified in 40 CFR 192, Utah water quality standards, and standards established in a site-specific human health risk assessment for OU III. Following is a summary of the cleanup standards applicable to MMTS remedial action, which also represent the remedial action objectives (RAOs) for the MMTS.

Table ES-1. MMTS Remedial Action Objectives for OU I and OU II

Contaminated Area	Cleanup Standard	Source of Cleanup Standard
Land	• Ra-226 concentrations in soil shall not exceed the background level by more than 5 picocuries per gram (pCi/g) in the top 15 centimeters (cm)* • Ra-226 concentrations in soil shall not exceed the background level by more than 15 pCi/g in successively deeper 15 cm layers*	40 CFR 192.12(a)
Habitable Structures	• Average concentration of radon decay products (daughters) in air shall not exceed 0.02 working level to the extent practicable, and in no case 0.03 working level** • Exposure rates to gamma radiation shall not exceed background by more than 20 microroentgens per hour (μR/h)	40 CFR 92.12(b)

* When averaged over 100 meters squared (m^2)

** A "working level" is a specific amount of alpha energy (1.3×10^5 mega electron volts) associated with the decay of radon daughters in air. The energy associated with a concentration of 4 picocuries per liter (pCi/L) of radon in air is equivalent to 0.02 working level.

Table ES-2. MMTS Remedial Action Objectives for OU III

Contaminant of Concern[a]	Groundwater 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]	30 pCi/L[c]
Gross alpha activity	15 pCi/L[d, g]	15 pCi/L[h]
Gross beta activity[i]	-------	-------

[a] Source: OU III ROD (May 2004).
[b] μg/L = micrograms per liter; pCi/L = picocuries per liter.
[c] State of Utah standard for surface water (Utah uranium standard post-dates OU III ROD). 30 pCi/L converts to approximately 44 μg/L.
[d] EPA maximum contaminant level.
[e] Based on OU III human health risk assessment.
[f] Uranium Mill Tailings Radiation Control Act (UMTRCA) maximum concentration limit.
[g] Excluding uranium and radon.
[h] Excluding uranium and radon for MMTS OU III.
[i] 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.

The remedy selected for OUs I and II in the MMTS ROD required removal of radioactively contaminated soils, mill tailings, and processing materials for disposal in the onsite DOE repository (also located within OU I), which is engineered with a double liner, radon barrier, synthetic moisture barrier and a vegetated cover. Radioactive materials remediated from the MVP were also disposed in the repository. The 40 CFR 192.12 cleanup standards for radium, radon and radon daughters, and gamma exposure rates were achieved at the former mill site within OU I and at most of the peripheral properties comprising OU II.

Contamination remains in the soil at certain OU II peripheral properties at levels above the 40 CFR 192.12 cleanup standards. As allowed under 40 CFR 192.21 and 192.22, alternate cleanup standards (supplemental standards) have been applied to the OU II properties where contamination remains. There is variation in the supplemental standards, based on property-specific circumstances. In conjunction with the supplemental standards applied to those OU II properties, DOE has implemented institutional controls to minimize exposure to and dispersal of the soil contamination that remains.

Removal actions were completed on OU I and OU II properties by August 1999, and permanent waste encapsulation within the onsite repository was completed in May 2000. The remedy for OUs I and II is protective of human health and the environment. The remedy is functioning as intended; exposure assumptions, clean-up levels, and RAOs remain valid; and no new information or changing site conditions compromise the protectiveness of the remedy.

The remedy selected for OU III in the OU III ROD was monitored natural attenuation with institutional controls to restrict groundwater use. Water quality remediation goals were predicted to be attained by 2045. However, by 2007 DOE recognized restoration progress lagged behind groundwater model predictions and OU III ROD performance criteria. Therefore, as set forth in the OU III ROD, a contingency remedy, as described in the January 2009 Explanation of Significant Difference, was implemented in 2009 to evaluate the feasibility of active groundwater remediation in meeting RAOs.

The contingency remedy incorporates a pump-and-treat groundwater enhancement system previously installed as a treatability study, an in situ permeable reactive barrier, and two ex situ treatment cells. The contingency remedy requires that the in situ permeable reactive barrier either (1) remain in place or (2) if removed by DOE, be replaced by a containment system that allows for continued treatment of the contaminant plume. The contingency remedy also modifies the OU III RAOs to include the State of Utah's uranium standard of 30 picocuries per liter (pCi/L) for domestic-use surface water; (this standard did not exist when the OU III ROD was issued). DOE was required to evaluate the contingency remedy during the 2007–2012 five-year review period to determine whether the contingency remedy of pump-and-treat groundwater enhancement, together with monitored natural attenuation, is a viable remedy at the surface water and groundwater operable unit. Evaluation of the contingency remedy will continue through the next five-year review period (2012–2017).

Although groundwater restoration is progressing more slowly than predicted, the OU III remedy remains protective of human health because institutional controls administered by the Utah State Engineer and the City of Monticello preclude extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes.

The OU III remedy is also protective of the environment. Selenium levels at Wetlands 1, 2, and 3 and the Sediment Pond do not exceed specified trigger levels for sediment, surface water, and macroinvertebrates. Additional biomonitoring for selenium will be conducted in Wetland 3 in 2012 to provide confirmatory data that the OU III remedy is protective of the environment. Selenium levels in surface water and groundwater are currently trending downward. No threatened, endangered, or sensitive bird species nest within OU III wetlands.

Unlimited use and unrestricted exposure apply only at properties where (1) contamination in the land has been remediated to meet the cleanup standards specified in 40 CFR 192.12, and (2) contaminated surface water and groundwater do not exist; there are 21 such OU II properties (deleted from the NPL as described below). Unlimited use and unrestricted exposure do not apply at the OU I properties – the former mill site and the DOE repository – because contaminated surface water or groundwater or contaminated soil is present. Unlimited use and unrestricted exposure do not apply at OU II supplemental standards properties because soil is present that exceeds the 40 CFR 192.12 cleanup standards; there are 11 such OU II supplemental standards properties. Unlimited use and unrestricted exposure do not apply at OU II properties where contaminated surface water or groundwater is present; there are 12 such OU II properties.

The MMTS was partially deleted from the NPL on October 14, 2003 (OU II properties without surface water or groundwater contamination). MMTS OU I and OU II properties underlain by contaminated groundwater have not been deleted from the NPL. OU III has not been deleted from the NPL because water quality remediation goals for contaminated surface water and groundwater have not been achieved. DOE's onsite repository (part of OU I) also has not been deleted from the NPL.

The institutional controls associated with the MMTS that restrict land and groundwater use were implemented in concurrence with EPA and UDEQ as follows: by the Quit Claim Deed that transferred DOE properties to the City of Monticello; by Monticello Zoning Ordinance 2003-2; by DOE's *Application for Supplemental Standards for Upper, Middle, and Lower Montezuma Creek* (May 1999) and *Application for Supplemental Standards for Government-Owned Properties in Monticello, Utah, DOE ID Nos. MP-00391-VL, MP-01041-VL, and MP-01077-VL* (May 1999); and by the Utah State Engineer's *Ground Water Management Policy for the Monticello Mill Tailings Site and Adjacent Areas* (May 1999).

DOE's Office of Legacy Management (LM) administers the MMTS to ensure that institutional controls remain relevant and effective in preventing exposure to contamination left in place, to ensure that changing site conditions do not compromise remedy protectiveness, and to track the progress of water quality restoration. This is accomplished by adhering to requirements documented in the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* (LTSM Plan) (revision 0, June 2007) and the *Monticello Mill Tailings Site Operable Unit III Post-Record of Decision Monitoring Plan* (OU III Post-ROD Monitoring Plan) (August 2004). Under the LTSM Plan, LM maintains radiological control at properties where contamination has been left in place (supplemental standards properties), conducts monthly and quarterly inspections of affected properties, conducts annual site inspections, and maintains and operates site infrastructure such as the LM disposal cell. The OU III Post-ROD Monitoring Plan directs monitoring of water quality. LTSM and water monitoring activities and findings for the MMTS are reported to EPA and UDEQ on a quarterly basis and in annual site inspection reports and annual water quality monitoring reports.

MMTS Remedy Protectiveness

The MMTS five-year review addresses three questions posed in the EPA five-year review guidance to assess the protectiveness of the selected remedies, with the following approach and conclusions:

Question A: Is the remedy functioning as intended?

The answer to this question is "yes," based on the review of technical documents and the findings of remedy surveillance and maintenance activities implemented by DOE.

- Institutional controls are in place to prevent exposure to residual contamination left in place at certain OU II peripheral properties, as documented in *Application for Supplemental Standards for Upper, Middle, and Lower Montezuma Creek* (May 1999) and *Application for Supplemental Standards for Government-Owned Properties in Monticello, Utah, DOE ID Nos. MP-00391-VL, MP-01041-VL, and MP-01077-VL* (May 1999).
- DOE procedures are in place for proper operation, maintenance, and implementation of institutional controls in accordance with the LTSM Plan.
- DOE procedures are in place for proper operation, monitoring, maintenance, and reporting for the pump-and-treat groundwater treatment enhancement. All treated groundwater that is discharged to Montezuma Creek meets discharge allowances approved by the Utah Division of Water Quality.
- All LTSM monitoring, inspection, and reporting activities were completed in accordance with required scope and schedule. No items were found that would call into question the protectiveness of the remedies. Findings of LTSM activities are documented quarterly for review by EPA and UDEQ.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs still valid?

The answer to this question is "yes," based on the following:

- The exposure scenarios and parameters for OUs I and II have not changed since the MMTS ROD was signed, and they remain valid. Toxicological data in the form of risk-based concentrations (RBCs) used to establish site-specific cleanup standards for uranium and vanadium in soil at one OU II property were lowered but remain valid.
- There were no changes during the five-year review period that would invalidate the exposure assumptions or toxicity data for OU III. The OU III contingency remedy adopted a new UDEQ cleanup standard of 30 pCi/L for uranium in domestic surface water, but this change does not affect the selected OU III remedy.
- The remedy RAOs for OUs I, II, and III remain valid, and there was no information found during the review that suggests changes are needed to assure adequate protection.
- It was determined during the five-year review period that the biomonitoring criteria specified in the OU III ROD have been met indicating that ecological receptors are not adversely affected by contamination resulting from site remediation.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The answer to this question is "no."

- Information was not identified that could call into question the protectiveness of the remedies.

Based on the answers to Questions A, B, and C above, this five-year review assessment concludes that the MMTS remedies continue to be protective of human health and the environment. The following Five-Year Review Summary Form further summarizes information related to the review, including issues, recommendations, and follow-up actions.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Monticello Mill Tailings (USDOE)		
EPA ID: UT3890090035		
Region: 8	**State:** Utah	**City/County:** Monticello/San Juan

SITE STATUS	
NPL Status: Partially deleted: OU II properties without surface water or groundwater contamination, October 14, 2003. OU I, OU II properties underlain by contaminated groundwater and OU III have not been deleted from the NPL.	
Multiple OUs? Yes; OU I, OU II, OU III	**Has the site achieved construction completion?** Yes; September 2004

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** United States Department of Energy (DOE)
Author name (Federal or State Project Manager): Jalena Dayvault
Author affiliation: DOE Office of Legacy Management (LM)
Review period: September 27, 2011 (the start of the CERCLA five-year review site inspection) through June 30, 2012 (the end of the current five-year period of review)
Date of site inspection: September 27 and 28, 2011
Type of review: Statutory
Review number: Four
Triggering action date: June 30, 2007 (end of third MMTS five-year review period)
Due date *(five years after triggering action date)*: June 30, 2012

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:

OU I, OU II, and OU III: There are no issues/recommendations for OU I, OU II, and OU III. Current LTSM practices are effective and will be maintained to ensure remedy protectiveness. The OU III contingency remedy to evaluate the feasibility of monitored natural attenuation combined with pump-and-treat groundwater enhancement, implemented in 2009, will continue during the next five-year review period.

Issues and Recommendations Identified in the Five-Year Review:

OU(s): No issues/recommendations for MMTS OU I, OU II, or OU III.	**Issue Category:** Not applicable			
	Issue: Not applicable			
	Recommendation: Not applicable			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	Not applicable	Not applicable	Not applicable

Protectiveness Statement(s)

OU I:
The remedy for MMTS OU I, the former mill site area, 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 by LM ensures that the remedy remains protective.

The remedy for MMTS OU I, the onsite DOE repository, is protective of human health and the environment. Radioactive waste is encapsulated and effectively isolated within the repository. The cover system is highly effective in limiting the infiltration of precipitation to underlying layers and waste. The integrity of the cover system remains protective by mitigating the release of radon to the atmosphere. The integrity of the basal liner system remains protective by preventing the release of waste pore fluid to the environment. LM monitors, operates, and maintains the repository to ensure it remains protective.

OU II:
The remedy for MMTS 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 by LM ensures that the remedy remains protective.

OU III:
The remedy for MMTS OU III is protective of human health and the environment. Institutional controls administered by the Utah State Engineer and City of Monticello preclude extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes. In

addition, the affected aquifer has no current or historical use because of poor yield, and alternate sources of potable water are readily available. Biomonitoring criteria specified in the OU III ROD have been met.

Sitewide Protectiveness Statement (if applicable)

The MMTS remedies for OUs I, II, and III are protective of human health and the environment. Institutional controls have been implemented to prevent exposure to contamination left in place.

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1.0 Introduction

1.1 Purpose

The U.S. Department of Energy (DOE), in consultation with the U.S. Environmental Protection Agency (EPA) and the Utah Department of Environmental Quality (UDEQ), conducted this five-year review for the DOE's Monticello Mill Tailings Site (MMTS), located in Monticello, Utah, to determine whether the MMTS remedial action remedies continue to be protective of human health and the environment. The methods, findings, conclusions, and recommended follow-up actions of the five-year review are documented in this report. This five-year review of the MMTS was conducted based on current guidance provided by EPA.[1]

This review addresses the three operable units (OUs) that comprise the MMTS:

- **OU I:** Includes (1) the 78-acre former uranium and vanadium ore mill (mill site) near Monticello, Utah, that was contaminated with radioactive mill tailings and milling-related byproduct materials, and (2) the 90-acre DOE onsite repository used for permanent disposal of MMTS remediation wastes, located approximately 1 mile south of the former mill site.
- **OU II:** Includes mill site peripheral properties covering approximately 1,700 acres that were contaminated primarily by mill-derived radioactive soil and sediment.
- **OU III:** Includes surface water and groundwater contaminated as a result of mill activities.

1.1.1 Period of Review

This report documents the results of the fourth five-year review for the MMTS remedies, covering the period July 2007 through June 2012. The period of review commenced with the start of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) five-year review site inspection on September 27, 2011, and ended June 30, 2012, which is the end of the fourth five-year review period.

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 remedies, contamination remains at the site above levels that allow for unlimited use and unrestricted exposure. 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

[1] Comprehensive Five-Year Review Guidance, USEPA, Office of Emergency and Remedial Response, EPA 540-R-01-007, OSWER No. 9355.7-03B-P, June 2001.

Recommended Evaluation of Institutional Controls: Supplement to the 'Comprehensive Five-Year Review Guidance'. USEPA OSWER 9355.7-18., September 13, 2011.

Five-Year Review Summary form. USEPA OSWER-9200.2-105, December 9, 2011.

> 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 that prevents unlimited use and unrestricted exposure at the DOE repository, in soil along parts of Montezuma Creek, and in soil on some OU II properties with mature stands of piñon and juniper trees (referred to as piñon/juniper properties). Five-year reviews are required for MMTS OU III because contaminated groundwater in the shallow alluvial aquifer prevents unlimited use and unrestricted exposure. Additional information regarding remedial action and institutional controls implemented at these properties is provided in Section 4.2. Figure 1 is a reference map that identifies the boundaries and affected properties comprising the MMTS.

1.3 Five-Year Review Team and Schedule

The DOE Office of Legacy Management (LM) site manager conducted the review with the assistance of DOE contractor personnel and oversight by EPA and UDEQ. A separate but concurrent five-year review was conducted for the Monticello Radioactively Contaminated Properties site, also known as the Monticello Vicinity Properties (MVP) site, the companion National Priorities List (NPL) site in Monticello.

1.3.1 Report Contents

The format of this report is based directly on EPA guidance provided in *Comprehensive Five-Year Review Guidance* (June 2001).

- Sections 2, 3, and 4 summarize site background information and describe selection and implementation of the MMTS remedies.
- Sections 5 and 6 describe relevant activities that were implemented since the previous MMTS five-year review and the process of conducting the current five-year review.
- Sections 7 to 10 present a technical assessment of MMTS remedy protectiveness and identify issues and follow-up actions.
- Section 11 documents that the next five-year review is due in June 2017.

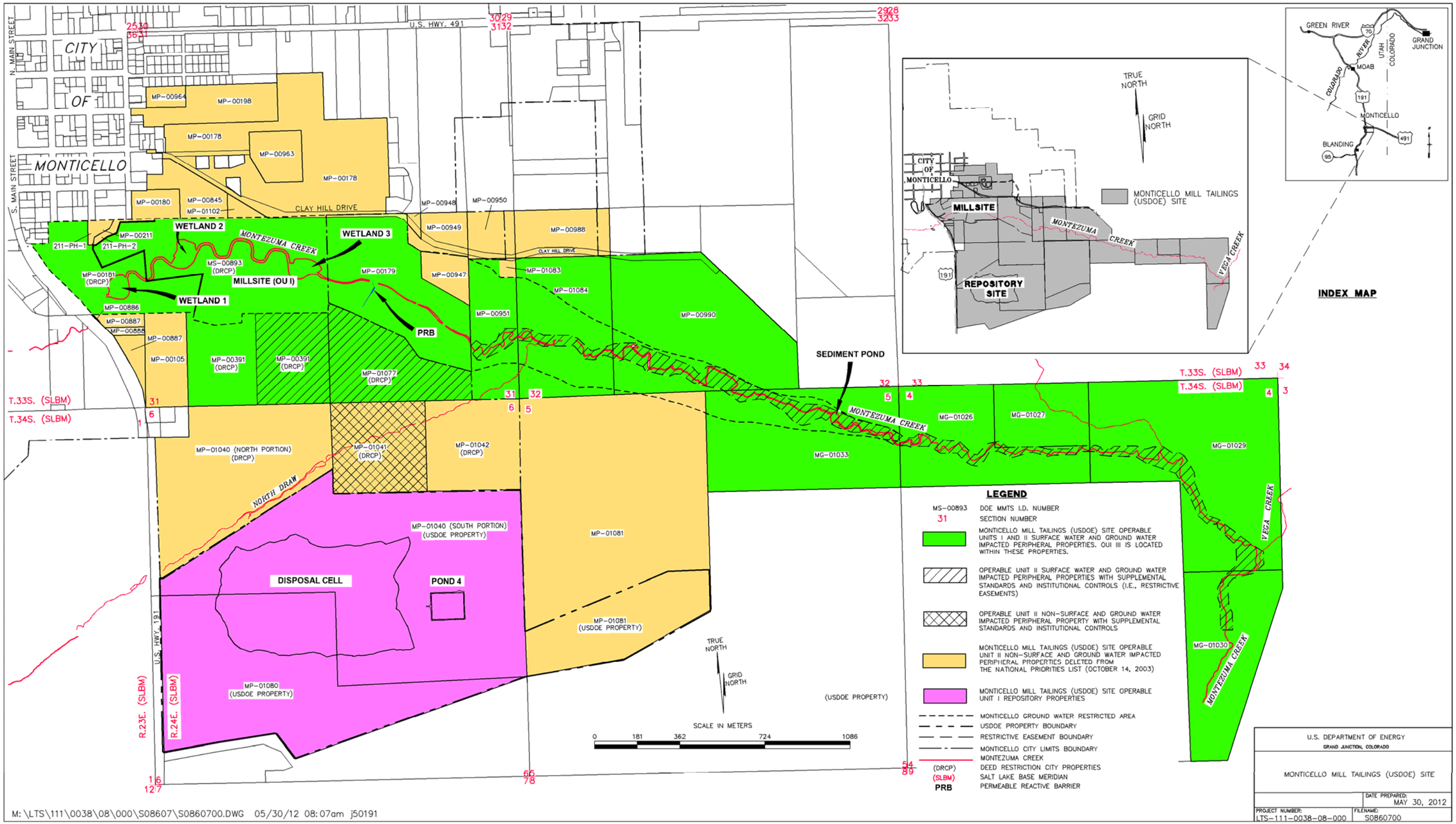

Figure 1. Monticello Mill Tailings Site

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2.0 Site Chronology

The main events leading to the formation, remediation, and significant following activities 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 groundwater, and contaminated peripheral properties.	1941–1960
The U.S. Atomic Energy Commission (AEC), a predecessor agency of DOE, 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
AEC began radiological surveys of Monticello properties.	1971
Monticello mill accepted into the Surplus Facilities Management Program to ensure safe caretaking and decommissioning of government facilities retired from service but still containing radioactive contamination.	1980
Monticello Remedial Action Project (MRAP), which included the mill site, mill site peripheral properties, and vicinity properties, was established.	1980
Removal actions initiated for first two vicinity properties (completed in 1984).	1983
Remedial activities for vicinity properties were separated from MRAP. The Monticello Radioactively Contaminated Properties site, also known as Monticello Vicinities Properties (MVP) site, was established. The remaining properties under MRAP (mill site and peripheral properties) were designated the Monticello Mill Tailings Site (MMTS).	1983
The MVP was placed on the National Priorities List (NPL).	June 10, 1986
Federal Facility Agreement (FFA) signed by EPA, Utah Department of Health, and DOE.	December 1988
The MMTS was placed on the NPL.	November 21, 1989
Remedial Investigation/Feasibility Study–Environmental Assessment (RI/FS-EA) for MMTS completed.	January 1990
MMTS Record of Decision (ROD) signed (OU I and OU II remedies selected, OU III is designated).	September 1990
MMTS OU I and OU II remedial actions initiated.	1992
MMTS OU III RI/FS initiated.	1992
Selection of the onsite disposal alternative is finalized by DOE.	December 22,1994
Explanation of Significant Difference (ESD) issued to explain increased scope and costs of remediation for MMTS OU I.	April 1995
Pre-Final Design and Specification Package for Mill Site Remediation completed.	April 28, 1995
EPA notification of stipulated penalty against DOE (in accordance with the FFA) for non-compliant discharges into Montezuma Creek.	May 1995
Repository construction initiated.	October 27, 1995
First CERCLA Five-Year Review report completed.	February 13, 1997
Remediation of the mill site started.	May 1997
MMTS OU III RI/FS completed & Interim ROD for OU III signed.	September 1998
ESD issued to provide rationale for applying supplemental standards to MMTS properties in which contamination was left in place.	February 1999
Groundwater Management Policy for the MMTS and Adjacent Areas issued by the Utah State Engineer; (serves as an institutional control to prohibit the use of contaminated groundwater for domestic purposes).	May 21, 1999
Cooperative Agreement between DOE and City of Monticello signed.	June 1999
Permeable reactive barrier treatability study started for OU III.	June 1999

Table 1 (continued). Chronology of MMTS Events

Event	Date
Memorandum of understanding between DOE and Utah Department of Transportation signed to establish roles and responsibilities for managing radioactive material located in the right-of-way and embankment areas of Utah State Highways 191 and 666 (now 491) within Monticello City limits; (serves as an institutional control for managing contamination that remains in these areas).	August 1999
Tailings removal completed from OUs I and II.	August 1999
Covenant Deferral Request allowing transfer of federal property prior to completion of cleanup activities signed.	February 6, 2000
Deletion of MVP site from NPL completed.	February 28, 2000
Transfer of mill site and other peripheral properties from DOE to the City of Monticello completed through the Quit Claim Deed; (also serves as an institutional control to restrict land and groundwater use where contamination remains on these properties).	June 28, 2000
Repository construction completed (OU I).	July 30, 2000
Remedial Action Report for MMTS Operable Unit II Non-Surface and Groundwater Impacted Peripheral Properties issued. Established construction complete status for 22 OU II properties where surface water and groundwater contamination do not exist.	April 2001
Mill site restoration completed (OU I).	August 2001
MVP and MMTS transferred to Long-Term Surveillance and Maintenance (LTSM) Program.	October 1, 2001
Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites (LTSM Plan) issued.	April 2002
Second CERCLA Five-Year Review report completed.	June 2002
MMTS OU II Non-Surface and Groundwater Impacted Peripheral Properties deleted from the NPL.	October 14, 2003
MVP and MMTS transferred to LM.	December 2003
MMTS OU III RI/FS Interim Action implemented.	September 1998-January 2004
MMTS OU III Remedial Investigation Addendum/Focused Feasibility Study finalized.	January 2004
MMTS OU III ROD signed.	May 2004
Remedial Action Report for MMTS Operable Units I and II Surface and Groundwater Impacted Properties (Soil and Sediment Remediation) issued.	August 2004
Remedial Action Report for MMTS Repository issued.	August 2004
MMTS OU III Interim Remedial Action Report issued.	September 2004
Preliminary Close Out Report, MMTS (USDOE) Site, OUs I, II, and III issued. Established construction complete status for OU I properties, 12 OU II properties where contaminated surface water or groundwater is present, and OU III.	September 29, 2004
Cooperative Agreement between DOE and City of Monticello extended to December 31, 2016.	April 2007
Third CERCLA Five-Year Review report completed.	June 2007
LTSM Plan updated (consolidated from volumes I–IV, April 2002).	June 2007
MMTS OU III Analysis of Uranium Trends in Groundwater issued.	August 2007
ESD issued to implement a contingency remedy for MMTS OU III.	January 2009
MMTS OU III Water Quality Compliance Strategy issued.	December 2009

Abbreviations:
AEC = U.S. Atomic Energy Commission
ESD = Explanation of Significant Difference
FFA = Federal Facility Agreement
LTSM = Long-Term Surveillance and Maintenance
MRAP = Monticello Remedial Action Project
RI/FS = Remedial Investigation/Feasibility Study
ROD = Record of Decision

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 (see Figure 1). The population of Monticello is about 2,100 permanent residents (U.S. Census 2000). The 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, which rise 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. The western part of the MMTS contains the site of the former uranium and vanadium ore mill (mill site), which comprises 110 acres at an average elevation of about 7,000 ft. Eastward, the valley transitions to a steep canyon. 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 rabbitbrush. Dense willows line much of the riparian zone of Montezuma Creek.

3.2 Land and Resource Use

Monticello is the seat of San Juan County and also the location of U.S. Bureau of Land Management, U.S. Forest Service, and Natural Resources 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 and from groundwater in a bedrock aquifer. Local groundwater use includes rural drinking water and limited farmland irrigation from a bedrock aquifer. Contaminated groundwater in MMTS OU III does not impact groundwater in the bedrock aquifer used by the City and area residents. Surface water is used for irrigation. MMTS wetlands are located in open-space recreation areas and provide wildlife habitat. No mineral or timber extraction exists within the MMTS. Land use within the MMTS includes ranching, farming, residential, and recreational. Much of the land surrounding Monticello and the MMTS is open range or ranchland, or is cultivated for dry-land farming.

Ownership of the mill site 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 (DRCPs). DOE completed remedial actions on those and all remaining MMTS properties by the end of 1999. The mill site 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).

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), a 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 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 the mill operated, some tailings were removed to properties in Monticello for use in construction projects and as fill for open land. The MVP site, which is addressed in a separate five-year review report, included these affected properties. Some mill tailings were also dispersed from the mill site by wind and water erosion to contaminate surrounding and downstream properties. Eventually these affected properties, known as peripheral properties, were included in MMTS OU II. The total combined in-place volume of the four tailings piles and related byproduct material (OU I), contaminated soil and sediment located on OU II peripheral properties, and contaminated materials located on the MVP site, 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 Montezuma Creek.

Figure 2 depicts the extent of uranium contamination in groundwater associated with MMTS OU III. Uranium is the most pervasive groundwater contaminant at the MMTS and contributes most to potential risk to human health. Figure 3 shows the locations of MMTS OU III groundwater monitoring wells.

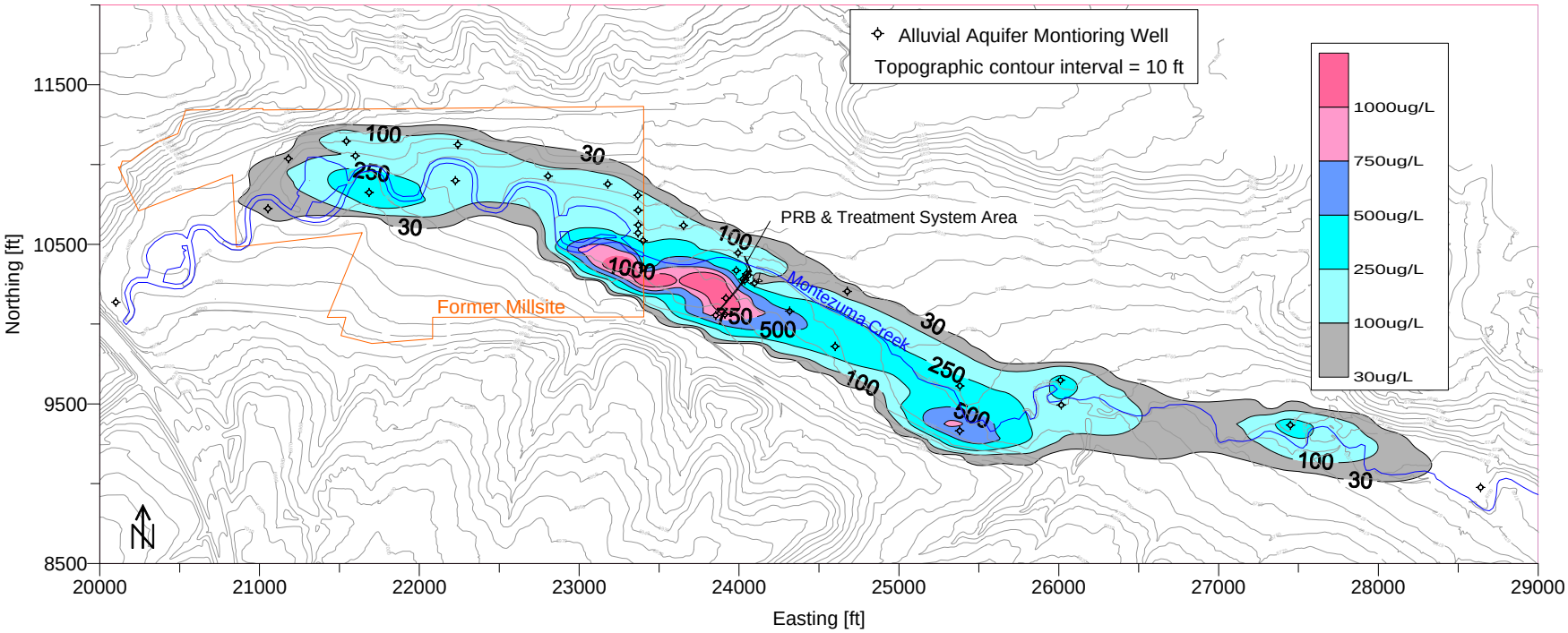

Figure 2. Uranium Contaminant Plume in MMTS OU III Alluvial Aquifer

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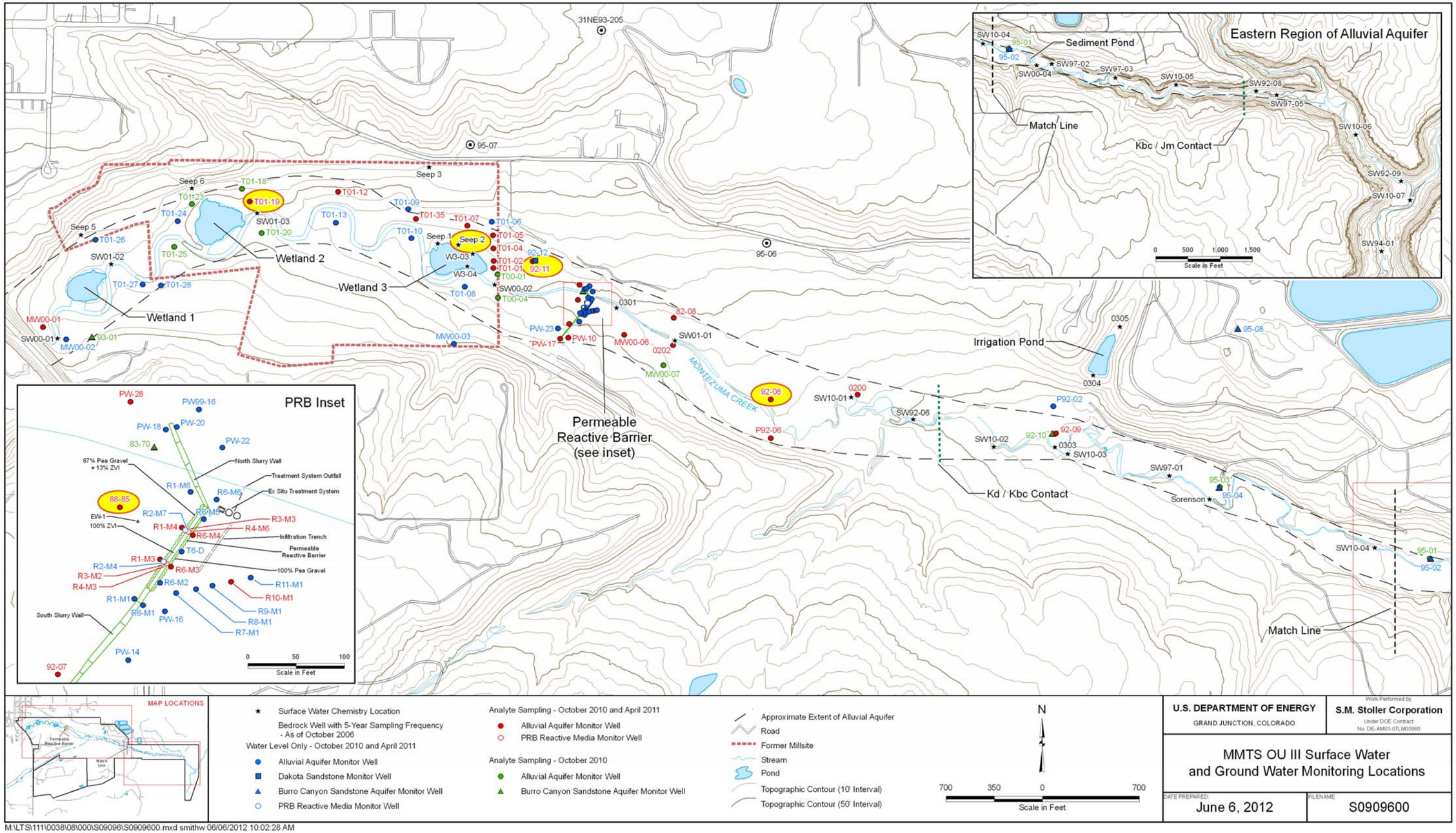

Figure 3. MMTS OU III Surface Water and Groundwater Monitoring Locations

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3.4 Remedial Action History Summary

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 environmental health concerns, the AEC initiated radiological surveys in 1971 to identify the nature and extent of radiological contamination associated with mill tailings originating from the Monticello mill site. These initial surveys identified 98 contaminated "vicinity" properties. Continued surveys ultimately identified 424 contaminated vicinity properties in the residential and commercial area of Monticello, designated as the MVP site, and 34 contaminated properties on rural land surrounding and downstream of the mill site, designated as the MMTS OU II peripheral properties.

Because these contaminated properties, including the former mill site, did not meet the legislative requirements for cleanup under the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), 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 and the MVP (vicinity properties) and the MMTS (former mill site and peripheral properties) were established. The first removal actions were initiated by EPA in 1983 on two vicinity properties. The MVP was listed on the NPL on June 10, 1986, and the remaining vicinity properties were remediated pursuant to *MVP Project Declaration for the Record of Decision 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. Prior to that, a Federal Facility Agreement (FFA) among the EPA, UDEQ, and DOE, signed in December 1988, provided the regulatory framework and established roles and responsibilities for conducting remedial action at the MMTS through a consultative process between the parties. DOE was designated as the lead agency for remediation, with oversight provided by EPA and UDEQ.

In January 1990, DOE completed the Remedial Investigation/Feasibility Study–Environmental Assessment (RI/FS-EA) for the mill site. 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 *Monticello Mill Tailings Site Declaration for the Record of Decision and Record of Decision Summary* (MMTS ROD) (August 1990) was signed into effect in September 1990. The MMTS ROD selected the remedy for remediation of OU I

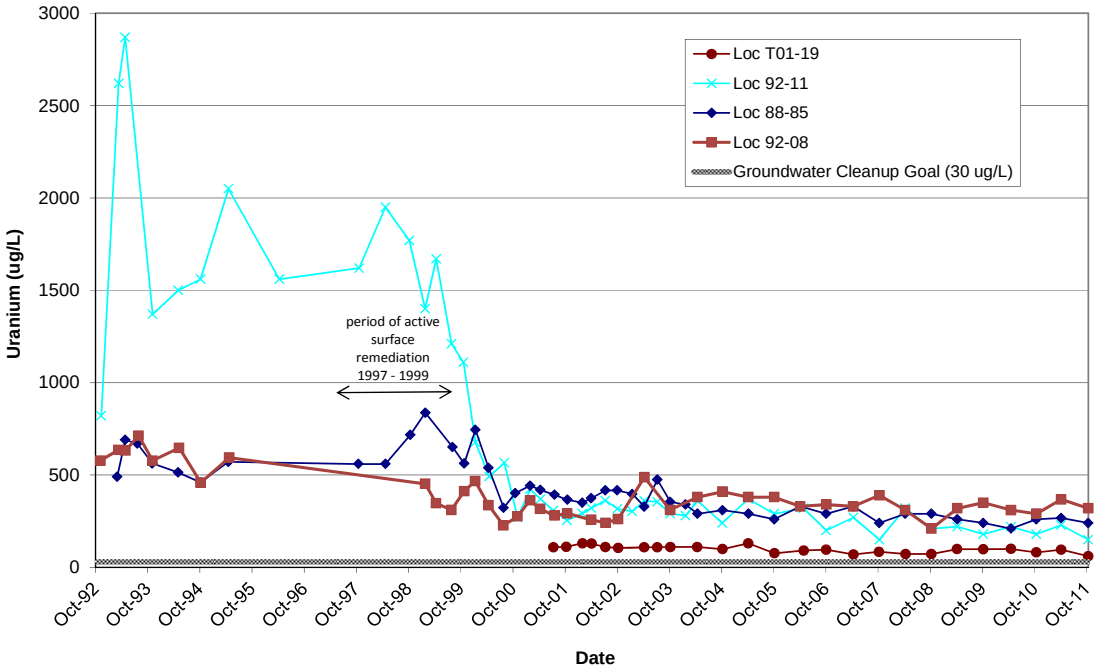
and OU II (remove contaminated soil and sediment and place in a permanent onsite repository [2]) and designated OU III (contaminated surface water and groundwater) but deferred selecting the OU III remedy until removal of contaminated soil and sediment from OUs I and II was completed. Sections 3.5 and 4.1.1 describe the selected remedy and basis for remedial action for OUs I and II; Sections 3.6 and 4.1.2 describe the selected remedy and basis for remedial action for OU III.

MMTS remedial actions for OUs I and II conducted under CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), began in 1992 and continued through closure of the repository in August 1999 (see Figure 1 for locations of OU I, OU II, and the repository). Groundwater remedial actions began with source control accomplished under OUs I and II removal actions. Between May 1998 and May 1999, groundwater remediation was also accomplished by onsite treatment of groundwater removed from the tailings excavations. Passive groundwater 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 in situ permeable reactive barrier (PRB) technology using zero-valent iron as the reactive medium (see Figure 1 for the location of the PRB). The treatability study was enhanced with the addition of two auxiliary ex situ treatment cells in 2005 and 2007, which addressed the decreasing treatment capacity of the PRB.

The remedy selected by the ROD for OU III (*Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah* [May 2004]) for remediation of contaminated surface water and groundwater was monitored natural attenuation (MNA) with institutional controls. Water quality remediation goals were predicted to be attained by 2045. However, DOE recognized by 2007 that water quality restoration was progressing more slowly than predicted by the groundwater model.

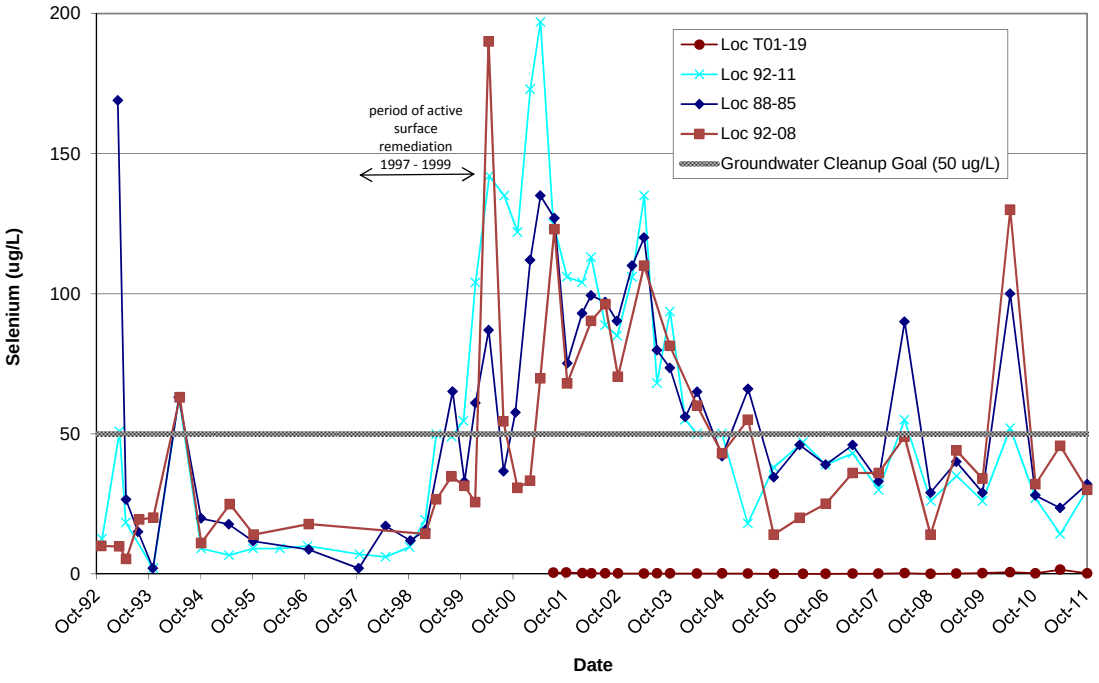
Figure 4 illustrates uranium concentrations in groundwater at selected monitoring wells that are located in the central portion of the alluvial aquifer parallel to groundwater flow and along the axis of the uranium plume (see Figure 2 for a depiction of the uranium plume and Figure 3 for monitoring well locations). Concentrations of other contaminants of concern (COCs) in groundwater (arsenic, manganese, molybdenum, nitrate, selenium, and vanadium) have decreased to levels near or below remediation goals. Figure 5 shows selenium concentrations in groundwater at selected monitoring wells.

[2] Soil and sediment contamination in the narrow floodplain in the Montezuma Creek canyon, originally part of OU III, was later incorporated into the OU II remedy for more efficient management.



Note: See Figure 3 for MMTS OU III groundwater sampling locations.

Figure 4. Uranium Concentrations in Groundwater at the MMTS



Note: See Figure 3 for MMTS OU III groundwater sampling locations.

Figure 5. Selenium Concentrations in Groundwater at the MMTS

Because water quality restoration was progressing more slowly than predicted, and as set forth in the OU III ROD, a contingency remedy was implemented in 2009 to evaluate the feasibility of active groundwater remediation in meeting remedial action objectives (RAOs).The contingency remedy was implemented using the *Explanation of Significant Difference for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah* (January 2009). The contingency remedy incorporates the pump-and-treat groundwater enhancement system previously installed as a treatability study, including the in situ PRB and two ex situ treatment cells. The contingency remedy requires that the in situ PRB either (1) remain in place or (2) if removed by DOE, be replaced by a containment system that allows for continued treatment of the contaminant plume. The contingency remedy also modifies the OU III RAOs to include the State of Utah's uranium standard of 30 picocuries per liter (pCi/L) for domestic-use surface water:; (this standard did not exist when the OU III ROD was issued). Also, DOE was to evaluate the contingency remedy during the 2007–2012 five-year review period to determine whether the contingency remedy of pump-and-treat groundwater enhancement, together with MNA, is a viable remedy for OU III groundwater. Evaluation of the contingency remedy will continue through the next five-year review period (2012–2017).

The MMTS was partially deleted from the NPL on October 14, 2003. The partial deletion pertained to 22 OU II peripheral properties where contamination in the land was remediated to pertinent cleanup standards in 40 CFR 192 and where surface water or groundwater contamination does not exist. One of the 22 deleted properties was a supplemental standards property. MMTS OU I (the former mill site) and 12 OU II properties are underlain by contaminated groundwater and have not been deleted from the NPL. Ten of the OU II properties underlain by contaminated groundwater are also supplemental standards properties. DOE's onsite repository (OU I) also has not been deleted from the NPL. OU III has not been deleted from the NPL because water quality remediation goals for contaminated surface water and groundwater have not been achieved.

3.4.1 Regulatory Framework for Remedial Action

Below is a summary of the regulatory framework implemented to conduct remedial action at the MMTS.

- Federal Facility Agreement (FFA), signed December 1988—Established roles and responsibilities among EPA, UDEQ, and DOE for conducting remedial action at the MMTS.
- *Monticello Mill Tailings Site Declaration for the Record of Decision and Record of Decision Summary* (MMTS ROD), signed September 1990—Presented the selected remedy for remediation of MMTS OUs I and II.
- *Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah* (OU III ROD), signed June 2004—Presented the selected remedy for remediation of MMTS OU III.
- Explanation of Significant Difference (ESD), January 2009—Implemented the contingency remedy for remediation of MMTS OU III.

- *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* (LTSM Plan) (June 2007)—Established procedures for conducting long-term surveillance and maintenance at the MMTS to ensure the remedy remains protective.
- *Monticello Site Management Plan* (SMP), Section 5.0, "Project Schedules and Milestones," updated annually—Establishes annual schedules and milestones for MMTS remedial actions.

3.5 Basis for Remedial Action for OU I and OU II and Cleanup Levels

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

- Inhalation of Ra-222 and its daughters, which emit alpha radiation;
- External whole-body exposure to radionuclides (such as Ra-226) that emit gamma radiation; and
- Inhalation and ingestion of dust containing Th-230 and Ra-226, which emit alpha and gamma radiation.

Table 2 provides a summary of the primary cleanup standards that were determined to be relevant and appropriate for MMTS OUs I and II. These cleanup standards, developed pursuant to UMTRCA, pertain to the predominant radionuclides found in uranium mill tailings.

Table 2. Primary Cleanup Standards for MMTS OUs I and II

Contaminated Area	Cleanup Standard	Source of Cleanup Standard
Land	• Ra-226 concentrations in soil shall not exceed the background level by more than 5 picocuries per gram (pCi/g) in the top 15 centimeters (cm)* • Ra-226 concentrations in soil shall not exceed the background level by more than 15 pCi/g in successively deeper 15 cm layers*	40 CFR 192.12(a)
Occupied or Habitable Structures	• Average concentration of radon decay products (daughters) in air shall not exceed 0.02 working level to the extent practicable, and in no case 0.03 working level** • Exposure rates to gamma radiation shall not exceed background by more than 20 microroentgens per hour	40 CFR 192.12(b)

* When averaged over 100 m^2

** A "working level" is a specific amount of alpha energy (1.3×10^5 mega electron volts) associated with the decay of radon daughters in air. The energy associated with a concentration of 4 picocuries per liter of radon in air is equivalent to 0.02 working level.

pCi/g = picocuries per gram

MMTS OU I (the former mill site) was remediated to meet the 40 CFR 192.12 cleanup standards specified in Table 2. However, this area was not released for unlimited use and unrestricted exposure because it is underlain by contaminated groundwater.

OU II properties remediated to meet the 40 CFR 192.12 cleanup standards were released for unlimited use and unrestricted exposure only if those properties were also not underlain by contaminated groundwater; there are 21 such OU II properties.

In accordance with 40 CFR 192.21 and 192.22, if certain criteria existed, radiological contamination that exceeded the 5 picocuries per gram (pCi/g) or 15 pCi/g Ra-226 cleanup standard could be left in place and an alternate cleanup standard (supplemental standard) applied. The supplemental standards that were implemented varied, based on property-specific circumstances. OU II properties where supplemental standards were applied were not released for unlimited use and unrestricted exposure, and institutional controls were implemented to prevent exposure to or dispersal of contamination left in place; there are 11 such OU II supplemental standards properties.

In addition to the Ra-226 cleanup standards for soil described above, property-specific cleanup standards for Th-230 and uranium in soil were adopted for the former mill site (OU I, property MS−00893−OT). The Th-230 and uranium cleanup standards for this property were specified in 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 cleanup standard was necessary to ensure long-term attainment of the Ra-226 cleanup standard. The uranium cleanup standard for soil (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 in soil were adopted for OU II property MP−00211−VL because of the presence of refined uranium product ("yellow cake") and the property's proximity to the former processing area. The Th-230 cleanup standard (15 pCi/g) used for MP−00211−VL Phase I (northwest half of property) was derived from the DOE Formerly Utilized Sites Remedial Action Program/SFMP. Uranium and vanadium cleanup standards (6,100 milligrams per kilogram [mg/kg] and 14,000 mg/kg, respectively) for MP−00211−VL Phase I were derived from U.S. EPA Region III Risk-Based Concentration Table (first Quarter 1995), Soil Ingestion, Industrial Setting. The uranium cleanup standard (300 pCi/g) used for MP−00211−VL Phase II (southeast half of the property) specified in *Monticello Remedial Action Project, Radiological Sampling and Verification Procedures for Operable Unit I*, was the same as the uranium cleanup standard used for the adjacent former mill site.

3.6 Basis for Remedial Action for OU III and Cleanup Levels

Numerous radiological and non-radiological inorganic constituents in groundwater and surface water that exceeded applicable or relevant and appropriate water quality or risk-based standards were identified during site investigations (*Monticello Mill Tailings Site, Operable Unit III*

Remedial Investigation Addendum/Focused Feasibility Study [January 2004]). These investigations identified contamination solely within the shallow alluvial aquifer; underlying bedrock aquifers are not affected. The saturated thickness of the alluvial aquifer ranges from 1 to 2 feet to approximately 10 feet. It is assumed that the entire saturated thickness is contaminated within the plume boundary.

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) were exceeded for short-term and future domestic-use groundwater consumption exposure scenarios. OU III COCs and the corresponding remediation goal and rationale for groundwater and surface water are presented in Table 3. Institutional controls to preclude extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes were implemented in 1999 and 2000 because groundwater RAOs were exceeded to the extent that a potentially unacceptable risk was possible under a domestic drinking-water use scenario. The institutional controls ensure that the groundwater ingestion pathway remains incomplete by prohibiting the appropriation of water from and the installation of wells in the shallow alluvial aquifer.

MNA with institutional controls was selected as the OU III remedy because groundwater model predictions indicated a favorable restoration period to meet RAOs. (Groundwater modeling to support the OU III remedy selection is documented in the *Monticello Mill Tailings Site Operable Unit III Final Remedial Investigation Addendum/Focused Feasibility Study* [January 2004]). Additional remedial action, as implemented under the January 2009 ESD, was warranted by ROD-specified response action in the event that the initial remedy did not meet performance objectives.

Table 3. OU III Contaminants of Concern and Water Quality Remediation Goals

COC[a]	Groundwater 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]	30 pCi/L[c]
Gross alpha activity	15 pCi/L[d, g]	15 pCi/L[h]
Gross beta activity[i]	-----	-----

[a] Source: OU III ROD (May 2004).
[b] µg/L = micrograms per liter; pCi/L = picocuries per liter.
[c] State of Utah standard for surface water (Utah uranium standard post-dates OU III ROD). 30 pCi/L converts to approximately 44 µg/L.
[d] EPA maximum contaminant level.
[e] Based on OU III human health risk assessment.
[f] UMTRA maximum concentration limit.
[g] Excluding uranium and radon.
[h] Excluding uranium and radon for MMTS OU III.
[i] 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.

Unlimited use and unrestricted exposure do not apply at OU I (the former mill site) and OU II properties where contaminated surface water or groundwater (OU III) is present; there are 12 such OU II properties.

4.0 Remedial Actions

4.1 Remedy Selection and Remedial Action Objectives

Remedial action alternatives for MMTS OUs I and II were analyzed in the *Final Remedial Investigation/Feasibility Study–Environmental Assessment for the Monticello, Utah, Uranium Mill Tailings Site* (January 1990). Alternatives ranged from no action to removal and disposal of MMTS remediation wastes in an offsite licensed repository. The final remedy for OUs I and II, removal and disposal of MMTS wastes in an onsite repository, was selected in the MMTS ROD. Remedy selection for OUs I and II is further discussed in Section 4.1.1.

Remedial action alternatives for MMTS OU III were analyzed in the *Monticello Mill Tailings Site Operable Unit III Final Remedial Investigation Addendum/Focused Feasibility Study* (January 2004). Alternatives ranged from no action with institutional controls to groundwater plume extraction and evaporative treatment with institutional controls, PRB, and MNA. The final remedy for OU III, MNA with institutional controls, was selected in the OU III ROD. Remedy selection for OU III is further discussed in Section 4.1.2.

The RAOs achieved for MMTS OUs I and II are the cleanup standards summarized in Table 2 and in subsequent text within Section 3.5. The RAOs in progress for MMTS OU III are the water quality remediation goals summarized in Table 3 within Section 3.6.

4.1.1 OU I and OU II Remedy Selection

The remedy selected in the MMTS ROD for OU I was to excavate and remove all radiologically contaminated material and other hazardous substances from the mill site to levels protective of human health and the environment and to dispose of the materials in an engineered, lined and capped onsite repository located within OU I for permanent isolation from the environment. The remedy selected for OU II was to remove contaminated soil and sediment from the affected properties and place the material in the OU I repository to thereby eliminate exposure pathways. The MMTS ROD allowed supplemental standards to be applied where it was necessary to leave contamination in the soil**;** the ROD also allowed institutional controls to be implemented to control the use of the land to prevent exposure to contamination left in place.

4.1.2 OU III Remedy Selection

The MMTS ROD defined OU III as contaminated groundwater and surface water but deferred selecting the OUIII remedy until completion of surface remedial actions (removal of contaminated soil, sediment, debris) and until completion of a separate RI/FS for groundwater and surface water. In 1998, an interim remedial action (IRA) for OU III was implemented (*Record of Decision for an Interim Remedial Action at the MMTS OU III–Surface Water and Ground Water, Monticello, Utah* [August 1998]), which again deferred the OU III remedy

selection because the full impact of ongoing surface remediation on the groundwater system remained uncertain.

Interim actions implemented under the IRA included continued dewatering and treatment of the alluvial aquifer on the mill site, implementation of groundwater institutional controls to preclude extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes, implementing the PRB treatability study, continued monitoring and data collection, groundwater 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 remedy selected by the OU III ROD (May 2004) was (1) monitored natural attenuation of contaminated surface water and groundwater, including biomonitoring to assess the potential for ecological receptors to be affected adversely at wetlands from selenium, and (2) continued implementation of the institutional control that precludes extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes.[3] Several mitigating factors offset the potential risk associated with ingestion of contaminated groundwater:

- 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 (municipal supply and bedrock aquifer sources).
- Groundwater 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 that time, the groundwater use restriction precludes extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes. Required annual monitoring and data evaluation tracks the progress of aquifer restoration.

Contingency actions were specified in the OU III ROD in the event that the progress of aquifer restoration failed to meet established performance criteria. It was determined by 2007 that water quality restoration was progressing more slowly than predicted and that it was unlikely remediation goals for water quality would be achieved during the 42-year performance period. Therefore, as set forth in the OU III ROD, a contingency remedy was selected in 2009 to evaluate the feasibility of active groundwater remediation in meeting RAOs. The contingency remedy incorporates the pump-and-treat groundwater enhancement system previously installed as a treatability study, including the in situ PRB and two ex situ treatment cells. . DOE met Utah Division of Water Quality substantive requirements allowing discharge of treated water from the two ex situ treatment cells into Montezuma Creek at a rate of up to 10 gallons per minute. The pump-and-treat groundwater enhancement continues to operate as intended Implementation of the contingency remedy is discussed in Section 4.2.5.

[3] The extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes is prohibited by the *Ground Water Management Policy for the Monticello Mill Tailings Site and Adjacent Areas* (May 1999), issued by the Utah State Engineer at the request of DOE.

4.2 Remedy Implementation

4.2.1 OU I and OU II Remedy Implementation: Surface Remediation/Removal Actions

An FFA agreed to by DOE, EPA, and UDEQ, pursuant to Section 120 of CERCLA/SARA, became effective December 1988. DOE, with concurrence from 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 mill site. 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. As removal actions proceeded on the various OU I and OU II properties, attainment of cleanup standards was verified by radiological surveys of the properties and laboratory confirmation of soil samples.

Most MMTS OU I and II properties were remediated to meet the cleanup standards for Ra-226 specified in 40 CFR 192.12 (see Section 3.5). However, it was necessary to leave some contamination in place at certain MMTS OU II properties and apply property-specific supplemental standards to those locations. This was justified under 40 CFR 192.21 and 192.22 because:

- Remedial action would result in excessive environmental harm compared to the health and environmental benefits (40 CFR 192.21[b]).
- The cost of remedial action is unreasonably high relative to long-term benefits, and the radioactive materials do not pose a clear present or future hazard (40 CFR 192.21[c]).

Supplemental standards were applied to certain DOE-owned properties (later transferred to the City) where windblown contamination was dispersed among mature piñon/juniper stands in gullies and on hillsides south of the mill site. In conjunction with the supplemental standards application, institutional controls were implemented to limit use of these properties to day-use recreation with no overnight camping, and removal of soil is prohibited without prior written approval from EPA and UDEQ.

For the same reasons cited above (excessive environmental harm, unreasonable cost, low hazard radioactive materials), 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 by the creek and deposited along its narrow floodplain. Limited “hot-spot” remediation of contaminated soils and sediment had been conducted previously in the Montezuma Creek canyon in 1998 following a detailed analysis of cleanup alternatives; DOE documented the decision for the canyon cleanup in an Action Memorandum dated June 22, 1998.

The rationale for applying supplemental standards to MMTS properties was provided in an ESD in February 1999. As part of the remedy implementation for OU II (*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. See Figure 1 for location of OU I and OU II supplemental standards properties.

Contaminated material removed from the peripheral properties (and MVP) was managed at an interim stockpile area on the mill site. Remediation of the mill site began in 1997. Mill tailings and the stockpile were excavated and loaded into large trucks and hauled to the permanent DOE onsite repository by way of a dedicated haul road constructed on DOE property. 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 mill site. Removal of these saturated materials necessitated the construction of various drainage controls and groundwater interception trenches and rerouting Montezuma Creek. Between April 1998 and May 1999, groundwater was pumped from the tailings excavations and treated onsite prior to permitted discharge to Montezuma Creek. The temporary water treatment plant constructed onsite for this purpose successfully treated over 50 million gallons prior to being dismantled in May 1999. All removal actions for MMTS were completed by August 1999.

All radiologically contaminated material removed from OU I and OU II was ultimately disposed in the DOE onsite repository, constructed on DOE property within OU I approximately 1 mile south of the former mill site. 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 was designed to meet protective standards specified in 40 CFR 192.02 for the control of residual radioactive materials. The repository was also designed to be functionally equivalent to a Resource Conservation and Recovery Act Subtitle C hazardous waste landfill because of the variety of other-than-radioactive contaminants disposed, such as asbestos, petroleum products, and laboratory wastes. The design features that made the repository functionally equivalent to a hazardous waste landfill include a double lined base and a lined, multi-layered cover system.

The double lined base of the repository has a leak detection system constructed above the lower liner, and a leachate collection system constructed above the upper liner. Leachate from the repository is pumped to a triple-lined solar evaporation pond (Pond 4). Pond 4 has a storage 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 onsite 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 transmits data to a central database at the LM office in Grand Junction, Colorado, for real-time data analysis and response action, if necessary. Performance of the disposal cell is monitored by the quantity of leachate that is captured in the leak detection system. This quantity remains at zero, indicating protectiveness of the repository.

The repository cover, about 90 acres in area, is composed of multiple layers, including a compacted soil radon barrier, a high density polyethylene (HDPE) geomembrane moisture barrier, and a vegetated evapotranspiration (ET) soil layer on the surface. The vegetated cover

was designed and constructed under the EPA's Alternative Covers Assessment Program. More details about the repository cover design are provided in Section 3.1 of the LTSM Plan.

Unlimited use and unrestricted exposure do not apply at the OU I DOE repository because of the presence of radioactively contaminated materials.

4.2.2 Restoration and Institutional Controls on OU I and OU II 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 from DOE to the City. The agreement required the City to restore the mill site 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 383.2 acres of land to the City of Monticello through the Federal Lands-to-Parks Program. Transferred lands, which include the former mill site and certain peripheral properties, are identified in Figure 1 as the deed restricted City properties (DRCPs). 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 (i.e. institutional controls) were included in the Quit Claim Deed that transferred the properties:

- Property shall be maintained solely as a public park for public recreation purposes in perpetuity.
- Property use shall be restricted to public, day-use recreation with no overnight camping.
- 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 cannot be used for residential purposes, and no habitable structures can be constructed.
- No soils can be removed and no activities can be conducted that could lead to unacceptable soil erosion on supplemental standards properties.

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

Figure 1 shows City-owned OU I and OU II properties with institutional controls; Table 4 summarizes those institutional controls.

4.2.3 Restoration and Institutional Controls on Privately Owned OU II Peripheral Properties

Restrictive easements (i.e. institutional controls) 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 restrictive easements. The restrictive easements were applied to the portion of each property where, after hot-spot remediation was completed, contaminated soil and sediment were 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 restrictive easement area is prohibited. Authorized representatives of DOE, EPA, and UDEQ are permitted right of access to the restrictive easement area for purposes of inspection. The restrictive easements are filed with the deed of each 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. Figure 1 shows privately owned OU II properties with institutional controls; Table 4 summarizes those institutional controls.

4.2.4 Other OU II Land Use Institutional Controls

Property MP−00211−VL is City-owned property adjoining the northern boundary of the former mill site. It is not a supplemental standards property; however, at one location on MP−00211−VL Phase I, uranium in soil exceeded the EPA uranium 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 (i.e. institutional control) (Zoning Ordinance 2003-2) in 2003 for this property to prevent construction of a habitable structure where uranium exceeds the residential use standard. 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 residential use standard, and the Ra-226 standard is also achieved, a building permit may be issued. Figure 1 shows the location of property MP−00211−VL; Table 4 summarizes MP–00211–VL institutional controls.

4.2.5 OU III Remedy Implementation: Water Quality Restoration and Institutional Controls

The remedy for OU III, including the contingency remedy established in 2009, is implemented as follows:

- Continued implementation of the institutional controls that prevent consumption of the contaminated groundwater:
  - The institutional control that, at the request of DOE, was implemented in 1999 by the Utah State Engineer as a groundwater management policy - Applications to appropriate water for domestic purposes from the shallow alluvial aquifer in the "groundwater restricted area" will not be approved; construction of a suitable well into the deeper bedrock aquifer may be approved only if contaminated groundwater can be prevented from flowing into the deeper bedrock aquifer. There are no known wells meeting these conditions. The groundwater restricted area, delineated on a map by the State as part of the policy, encompasses all properties underlain by contaminated groundwater.

— The institutional control that was implemented in 2000 under the Quit Claim Deed that transferred DOE properties to the City of Monticello - No wells for domestic groundwater use can be constructed into the Montezuma Creek alluvial aquifer underlying certain transferred properties.

Figure 1 shows properties with contaminated groundwater that have institutional controls, including the groundwater restricted area properties and properties transferred from DOE to the City of Monticello (deed restriction City properties), which generally consist of rural, open space land occupied variously by piñon/juniper slopes, ravines, wildlife habitat, wetlands, and Montezuma Creek. Table 4 summarizes the institutional controls in effect on properties underlain by contaminated groundwater and supplemental standards properties:

- 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* (LTSM Plan) (June 2007), *MMTS OU III Post-ROD Monitoring Plan* (August 2004), and *MMTS OU III Water Quality Compliance Strategy* (December 2009). These documents provide the site-specific scope, rationale, and procedural information for OU III monitoring and surveillance and to ensure compliance with institutional controls. The OU III ROD and these plans provide specific procedures and performance criteria for evaluating and annually reporting the progress of groundwater and surface water restoration.
- Contingency remedy implementation through the January 2009 ESD: The contingency remedy is being implemented by:
  - — Incorporation of the pump-and-treat groundwater enhancement system previously installed as a treatability study, including the in situ PRB and two ex situ treatment cells.
  - — Requiring the in situ PRB to remain in place; or, if removed by DOE, requiring replacement by a containment system that allows for continued treatment of the contaminant plume.
  - — Modifying the OU III RAOs to include the State of Utah's uranium standard of 30 picocuries per liter (pCi/L) for domestic-use surface water, which did not exist when the OU III ROD was issued.
  - — Evaluation of the contingency remedy during the five-year review period (2007–2012) to determine whether the contingency remedy of pump-and-treat groundwater enhancement, together with monitored natural attenuation (MNA), will achieve RAOs within a reasonable time-frame.

The original OU III remedy of MNA with institutional controls remains in effect under the contingency remedy. As part of the contingency remedy, DOE met Utah Division of Water Quality substantive requirements allowing discharge of treated water from the two ex situ treatment cells into Montezuma Creek at a rate of up to 10 gallons per minute. The pump-and-treat groundwater enhancement continues to be operational. The contingency remedy is being evaluated in accordance with currently approved plans pursuant to the January 2009 ESD.

Table 4. MMTS Institutional Controls

DOE Property ID	Type of Property				Institutional Control								Institutional Control Confirmation[a]
	Transferred from DOE to City of Monticello (Quit Claim Deed)	Supplemental Standards Properties	Within Montezuma Creek Restrictive Easement	Within Groundwater Restricted Area (Established by Utah State Engineer)	Public day-use recreation	No construction of habitable structures	No habitable structures within easement areas	No overnight camping	No soil removal from supplemental standards or easement areas	Water appropriation from shallow alluvial aquifer for domestic use prohibited	No wells in alluvial aquifer	Special Zoning Restrictions	
MP-00179				X						X			2
MP-00181	X			X	X	X		X		X	X		1, 2, 3
MP-00211				X						X		X	1, 2, 4
MP-00391	X	X			X	X		X	X		X		1, 3
MS-00893[b]	X			X	X	X		X		X	X		1, 2, 3
MP-00947				X						X			2
MG-00951		X	X	X			X		X	X			1, 2, 3
MG-00990		X	X	X			X		X	X			1, 2, 3
MG-01026		X	X				X		X				1, 3
MG-01027		X	X				X		X				1, 3
MG-01029		X	X				X		X				1, 3
MG-01030		X	X				X		X				1, 3
MG-01033		X	X	X			X		X	X			1, 2, 3
MP-01040 (North Portion)	X				X	X		X					1, 3
MP-01041	X	X			X	X		X	X				1, 3
MP-01042	X				X	X		X					1, 3
MP-01077	X	X			X	X		X	X		X		1, 3
MG-01084		X	X	X			X		X	X			1, 2, 3

[a] 1 = Routine and/or annual LTSM inspections.
2 = Contact Utah State Division of Water Rights regarding water appropriation applications.
3 = Review property deeds during annual LTSM inspection, verify that annotations transfer with deeds.
4 = Radiological control performed on excavations.
[b] Former mill site property.

4.2.6 OU III Remedy Implementation: Biomonitoring

As part of the restoration of the former mill site, three wetlands were designed and created to provide wildlife habitat. A biomonitoring program for the mill site wetlands (Wetlands 1, 2, and 3) and a downstream sediment retention pond (Sediment Pond) was initiated in conjunction with establishment of the wetlands. The OU III ROD states that "the main objective of the biomonitoring is to determine if selenium levels are present in environmental media at concentrations that could cause adverse effects on environmental receptors."

The biomonitoring program specified in the OU III ROD establishes trigger levels for selenium concentrations in surface water (5 µg/L) and sediment (4 mg/kg) to determine the need for macroinvertebrate sampling.[4] The biomonitoring program also establishes a trigger level for selenium concentrations in macroinvertebrate tissue (7 mg/kg) to determine the need for avian egg sampling.[5] In addition, the OU III ROD establishes criteria for discontinuing the biomonitoring program: "If no consistent increases in selenium are observed in water or sediment and if biota concentrations remain below trigger levels (if biota sampling is required) for 3 consecutive years, biomonitoring can be discontinued."

Initial water quality sampling conducted shortly after mill site remediation (1999) indicated an increase in selenium concentrations. This temporary rise in selenium is attributed to remedial action and restoration activities that disturbed native rock that is naturally abundant in selenium. Subsequent surface water and sediment sampling indicated that the trigger level for selenium in surface water was exceeded at one wetland in 2004; the trigger level for selenium in sediment was not exceeded at any location. The elevated selenium in surface water prompted initial sampling of macroinvertebrates for selenium in 2005.

Since implementing the biomonitoring program, sediment has been sampled 7 times, surface water locations have been sampled 12 times, and macroinvertebrates have been sampled 5 times in the Monticello wetlands. In addition, 3 sets of avian surveys (16 surveys each) have been performed. Two macroinvertebrate sampling events, two surface water sampling events, one sediment sampling event, and one avian survey have occurred since the last five-year review. Biomonitoring data are reported to EPA and UDEQ through independent reports as necessary. DOE, EPA, and UDEQ, in consultation with each agency's respective Biological Technical Assistance Group (BTAG) members, discuss results at FFA meetings or as needed.

Biomonitoring was discontinued at Wetlands 1 and 2 in 2007 because OU III ROD specified trigger levels for selenium in surface water, sediment, and macroinvertebrates were never exceeded, and monitoring did not indicate any apparent trending. Sampling conducted at Wetland 3 and the Sediment Pond between 2005 and 2010 indicated that average concentrations of selenium in macroinvertebrate tissue did not exceed the trigger level; therefore, avian eggs were not sampled. DOE is conducting an expanded sampling effort at Wetland 3 in 2012 to confirm these earlier findings.[6]

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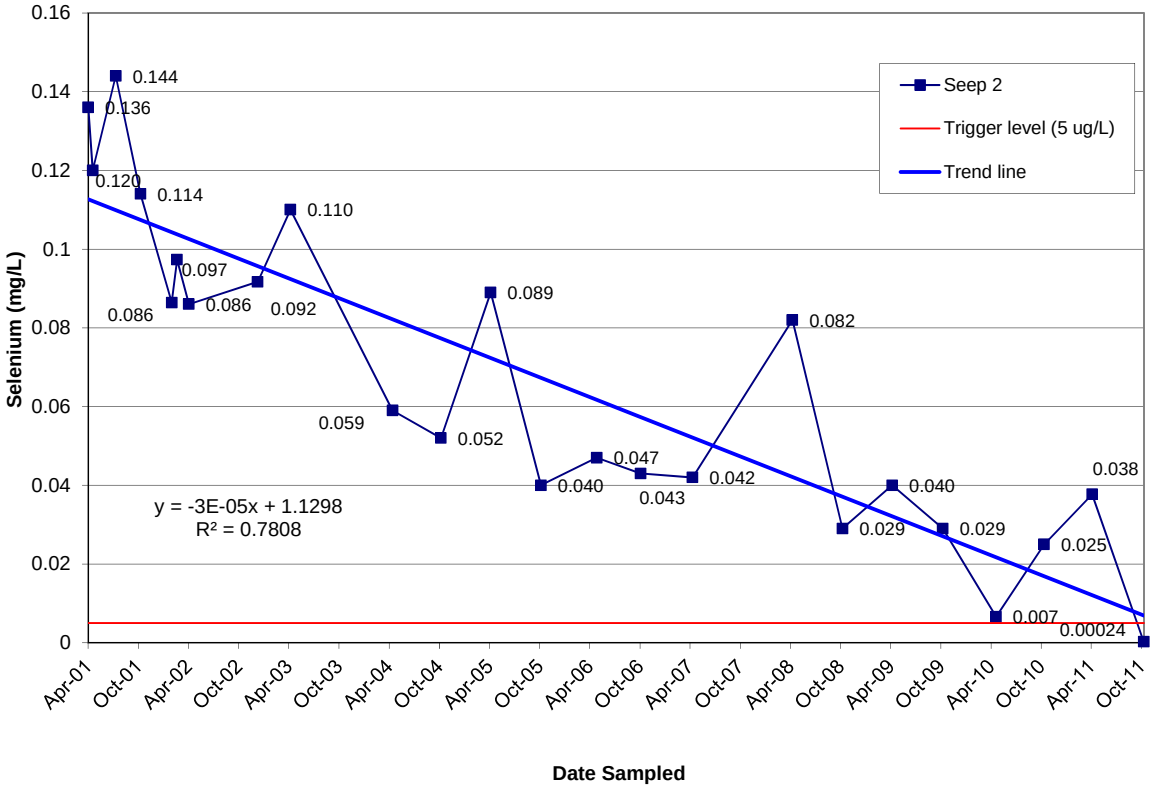
[4] The OU III ROD states: "If the average total recoverable surface water concentration of selenium for a given stratum exceeds 5 micrograms per liter (µg/L) or average selenium sediment concentrations exceeds 4 milligrams per kilogram (mg/kg), macroinvertebrate sampling of that stratum will be required."

[5] The OU III ROD states: "If concentrations of selenium in macroinvertebrate tissue for any stratum exceed 7 mg/kg (http://sacramento.fws.gov/ec/GBP/Table1.htm), the Biological Technical Assistance Group will be consulted to determine the need for sampling of avian eggs."

[6] Comprehensive statistical analysis of biomonitoring data is documented in the *MMTS OU III Biomonitoring Program Status and Analytical Update* (March 2011).

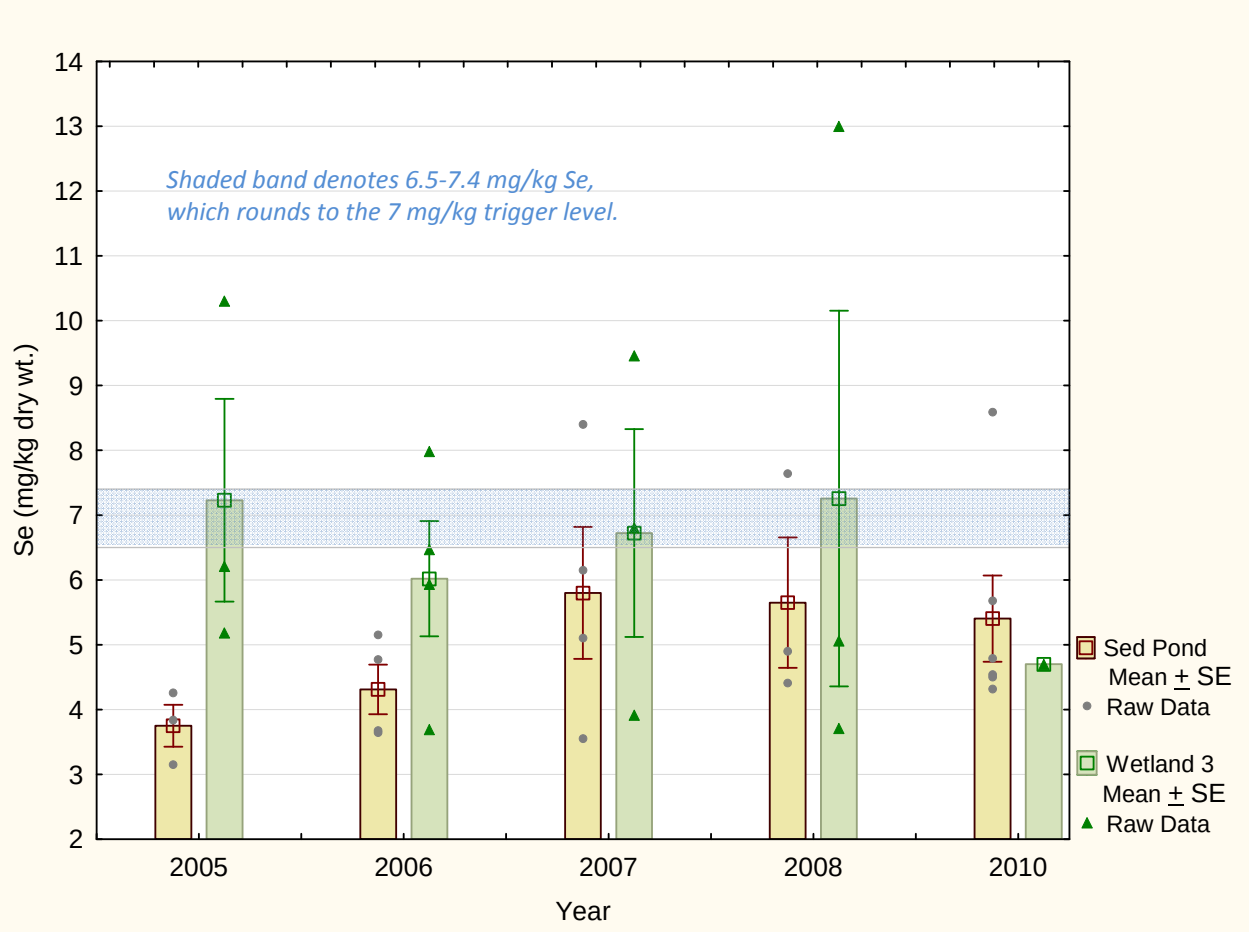
Average selenium concentrations in sediment at Wetlands 1, 2, and 3 and the Sediment Pond have never exceeded OU III ROD specified trigger levels (although individual data points have), and no consistent increases in selenium are observed. Data collected between 2001 and 2011 indicate that selenium concentrations are decreasing in surface water, particularly in the seeps affected by remediation and restoration activities which flow into Wetland 3 (see Figure 6). Selenium concentrations are also decreasing in groundwater (see Figure 5). These data demonstrate that one of the OU III ROD criteria for discontinuing biomonitoring has been met: "no consistent increases in selenium are observed in water or sediment."



Notes: See Figure 3 for location of Seep 2 on the MMTS.
Surface remedial actions completed in 1997 through 1999.

Figure 6. Selenium Concentrations at Seep 2 of the MMTS

Selenium concentrations in macroinvertebrate tissue for the Sediment Pond and Wetland 3 are shown in Figure 7. This figure presents a summary of all tissue data collected since 2005 and demonstrates that the second OU III ROD criterion for discontinuing biomonitoring has also been met: "if biota concentrations remain below trigger levels (if biota sampling is required) for 3 consecutive years."



Notes:

1. The OU III ROD trigger level for selenium in macroinvertebrate tissue is specified to one significant digit—7 mg/kg. The shaded band shows concentrations ranging from 6.5 to 7.4 mg/kg, which rounds to 7 mg/kg at one significant digit. Tissue concentration averages (arithmetic means) are calculated to the level of significance provided by the analytical laboratory and then rounded to one digit for comparison with 7 mg/kg.
2. The highest data point in 2008 in Wetland 3 was intentionally biased high.
3. See Figure 3 for location of the Sediment Pond and Wetland 3 on the MMTS.

Figure 7. Selenium Concentrations in Macroinvertebrate Tissue at the Sediment Pond and Wetland 3 of the MMTS

It is noted that in some of the previous years (2007-2010), sample sizes in Wetland 3 were small due to low water levels, drought, and other factors affecting habitat conditions. Because of the small sample sizes, the statistical power of the analyses for Wetland 3 is limited. DOE is conducting an expanded sampling effort at Wetland 3 in 2012 to confirm the above findings with greater statistical power.

In the years since completion of remedial actions, the site has been fully restored and surface conditions have stabilized. Selenium data collected from surface water, groundwater, sediment, and macroinvertebrates indicate that the OU III ROD criteria for conducting biomonitoring have been satisfied and that the OU III remedy is protective of the environment.

4.2.7 Status of Remedial Action for OUs I, II, and III

As noted in other parts of this report, the MMTS was partially deleted from the NPL on October 14, 2003. The partial deletion pertained to 22 OU II peripheral properties where contamination in the land was remediated to pertinent cleanup standards in 40 CFR 192 and where surface water or groundwater contamination does not exist. MMTS OU I (the former mill site and DOE's onsite repository) and OU II peripheral properties underlain by contaminated groundwater have not been deleted from the NPL. MMTS OU III has not been deleted from the NPL because water quality remediation goals for contaminated surface water and groundwater have not been achieved. The *Preliminary Close Out Report Monticello Mill Tailings (USDOE) Site Operable Units I, II, and III*, signed on September 29, 2004, documents that the MMTS properties that have not been deleted from the NPL have achieved "construction complete" status in accordance with *Close Out Procedures for National Priorities List Sites* (January 2000).

4.3 Long-Term Surveillance and Maintenance

DOE LTSM activities at the Monticello sites began October 1, 2001, under the DOE Grand Junction Office LTSM Program. That 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 at Monticello through the LTSM Program in accordance with the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (April 2002).

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 Office of Legacy Management (LM). LM administers the MMTS to ensure that institutional controls remain relevant and effective in preventing exposure to contamination left in place, to ensure that changing site conditions do not compromise remedy protectiveness, and to track the progress of water quality restoration. This is accomplished by adhering to requirements documented in the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* (LTSM Plan) (revision 0, June 2007), and the *Monticello Mill Tailings Site Operable Unit III Post-Record of Decision Monitoring Plan* (OU III Post-ROD Monitoring Plan) (August 2004) and *MMTS OU III Water Quality Compliance Strategy* (December 2009). These documents provide the site-specific scope, rationale, and procedural information for OU III monitoring and surveillance and to ensure compliance with institutional controls. The OU III ROD and these plans provide specific procedures and performance criteria for evaluating and annually reporting the progress of groundwater and surface water quality restoration.

The major LTSM activities conducted during this five-year review period were:

- Inspection, operation, and maintenance of the onsite permanent disposal cell and associated leachate detection and management system and other site infrastructure.
- Inspection of all properties affected by land and water use restrictions (institutional controls) that were implemented to prevent exposure to residual contamination in soil and groundwater.
- Surveillance of supplemental standards properties for evidence of unauthorized excavation or severe soil erosion.

- Radiological monitoring of earthwork beneath city streets and utility corridors and management of recovered radiologically contaminated material in the onsite temporary storage facility.
- Semi-annual monitoring of groundwater and surface water and annual evaluation and reporting of the progress of water quality restoration.
- Responding to public and municipal inquiries.
- Documentation, record-keeping, and reporting of LTSM activities.
- Annual site inspections.

Most of the LTSM activities were conducted during the current review period by full-time employees stationed at the site. The projected LTSM budget for fiscal year 2012 (October 1, 2011, through September 30, 2012), including the MMTS and MVP, is $750,000. Similar funding and scope are forecast at least through 2017 when the next five-year review will occur.

Activities that have occurred at the MMTS since the last five-year review period are presented in Section 5.0.

4.4 Land Reuse

Twenty-two OU II peripheral properties totaling 610 acres, including 3 properties transferred from DOE to the City, 18 private properties, and 1 property formerly owned by DOE (MP−01081), are not underlain by contaminated groundwater and have been deleted from the NPL as a partial deletion of the MMTS. These deleted properties are known as the "Operable Unit II Non-Surface and Groundwater Impacted Peripheral Properties" (see Figure 1). The partial deletion became effective October 14, 2003. These deleted properties can be reused as follows:

- The three deleted City-owned properties are designated as a public park in perpetuity. Use is limited to public, day-use recreation with no overnight camping. The properties cannot be used for residential purposes, and no habitable structures can be constructed.
- One of the three deleted City-owned properties is a supplemental standards property with the following additional land use restrictions: No soils can be removed and no activities can be conducted that could lead to soil erosion.
- The remaining deleted privately owned properties, including the property formerly owned by DOE, are allowed unrestricted use.

The former mill site (OU I) and remaining OU II peripheral properties, totaling 826 acres, comprise 13 properties that are underlain by contaminated groundwater and have not been deleted from the NPL. These undeleted properties are known as the "Operable Units I and II Surface and Groundwater Impacted Properties" (see Figure 1). Supplemental standards have been applied to 8 of the 13 undeleted properties (the 8 properties are privately owned) where soil and sediment contamination remains in the floodplain of Montezuma Creek. Supplemental standards also have been applied to 2 of the 13 undeleted properties (both transferred from DOE to the City) where soil contamination remains in mature piñon/juniper stands. The remaining undeleted properties are a mixture of City-owned and private properties.

The 13 undeleted OU I and OU II properties can be reused as follows:

- Undeleted City-owned properties, one of which is the former mill site property, are designated as a public park in perpetuity. Use is limited to public, day-use recreation with no overnight camping. The properties cannot be used for residential purposes, and no habitable structures can be constructed. In addition, the undeleted City-owned properties have the groundwater use restrictions (i.e. institutional controls) described in Section 4.2.5.
- Undeleted privately owned properties have land and groundwater use restrictions as described in Sections 4.2.3 and 4.2.5, respectively. Otherwise, these properties are returned to their original use including agricultural, residential, and open space/recreational.

The DOE onsite repository, located within OU I, contains mill tailings and radioactively contaminated soil sediment, and debris that will remain permanently stored within its confines. The repository is owned and operated by DOE and is closed to the general public. The repository has not been deleted from the NPL. The repository property covers approximately 365 acres, with 90 of those acres occupied by the repository cover. The repository cover and surrounding areas are aesthetically contoured and restored in native vegetation and provide habitat for local wildlife.

5.0 Progress Since the Last Five-Year Review

Since 2007, the major MMTS activities other than routine LTSM have focused on implementing the January 2009 ESD (contingency remedy) for OU III, evaluating the progress of OU III water quality restoration by passive and active processes, and performing biomonitoring at Wetland 3 to evaluate the potential for ecological receptors to be affected adversely by naturally occurring selenium resulting from site remediation.

LTSM findings, semi-annual water quality monitoring results, biomonitoring results, and water quality restoration progress were reported to EPA and UDEQ in quarterly FFA reports and in annual water quality reports.

Table 5 summarizes the actions that have been taken for issues identified in the previous five-year review.

Table 5. Actions Taken for Issues Identified in the Previous Five-Year Review

Issue from Previous Five-Year Review	Issue Status	Action Taken	Date and Evidence of Action
DOE/City of Monticello Cooperative Agreement expired June 2005.	Complete	Cooperative Agreement extended to December 31, 2016.	New Cooperative Agreement negotiated in April 2007.
Minor repair of erosion needed at several locations on City property.	Complete	Erosion repairs completed.	The 2008 Annual Site Inspection Report states that there are no major erosion issues and no repair or maintenance issues to report to the City of Monticello.
Repository vegetation performance criteria not achieved.	Complete	Quantitative vegetation monitoring on the repository cover was determined not to be a remedy performance metric. DOE, EPA and UDEQ adopted an alternative annual monitoring protocol that tracks the ecological health of the repository's plant community over time. The annual inspection checklist was revised accordingly	The alternative vegetation monitoring protocol for the repository cover was first used in September 2009, as documented in the 2009 Annual Site Inspection Report.
Aquifer restoration shows improvement but current rates are less than expected.	Complete	OU III contingency remedy implemented to evaluate the feasibility of active groundwater remediation. As part of the contingency remedy, DOE met Utah Division of Water Quality substantive requirements allowing discharge of treated water from the two ex situ treatment cells into Montezuma Creek at a rate of up to 10 gallons per minute. The pump-and-treat groundwater enhancement is operational and functioning as intended.	ESD issued in January 2009.
Selenium concentrations sometimes exceed toxicity benchmark levels in surface water, sediment, and aquatic insects at constructed wetlands.	Complete	Biomonitoring criteria specified in the OU III ROD have been met	June 2010 (see Section 4.2.6)

Other activities that have occurred since the last five-year review include:

- LTSM activities were conducted under the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* (LTSM Plan) (June 2007), to supersede previous LTSM documents.
- Raptor poles were installed within the repository boundary to assist with controlling the vole population.

- DOE provided a Property Certification Letter to the City of Monticello in May 2008 for City-owned peripheral properties MP–00391, MP–01077, and MP–00181 and the City-owned former mill site property, MS–00893. The letter certifies to the City that radioactive materials were removed from the properties to the protective levels specified in the MMTS ROD.
- DOE prepared the Monticello Mill Tailings Site Operable Unit III Analysis of Uranium Trends in Ground Water (August 2007).
- Utah Division of Water Quality approved the discharge of treated groundwater from the 2 ex situ treatment cells into Montezuma Creek at a rate of up to 10 gallons per minute.
- DOE prepared the Monticello Mill Tailings Site Operable Unit III Water Quality Compliance Strategy, December 2009.
- The General Services Administration facilitated the sale of the majority of DOE-owned OU II peripheral property MP-01081, which was deleted from the NPL as part of the MMTS OU II partial deletion that occurred in October 2003, to a private party; DOE retained a small section at the southern end of the property. In association with the sale, DOE granted an easement inside the southern boundary of DOE repository property MP 01080 to enable the new owner of MP-01081 easier access to that property. See Figure 1 for the locations of OU II properties MP-01080 and MP-01081.
- DOE submitted "proof of beneficial use" to the Utah Division of Water Rights for DOE water right 09-2120, which is located on OU II property MP-00179.
- Utah Division of Water Rights granted DOE fixed time water right 09-2347, which, if necessary, enables DOE to evaporate OU III contaminated groundwater from Pond 4.
- DOE conducted annual site inspections September 2007 through September 2011.
- Biomonitoring – Two macroinvertebrate sampling events, two surface water sampling events, one sediment sampling event, and one avian survey were conducted. 2007 data collected at the end of the previous five-year review period were analyzed (sediment, surface water, and macroinvertebrates).

6.0 Five-Year Review Process

6.1 Site Inspection

Comprehensive site inspections of the MMTS (and MVP) are conducted annually to assess site conditions, to confirm that routine LTSM activities are properly implemented, to confirm that institutional controls are effective, and to ensure that the MMTS remedies remain protective of human health and the environment. In addition, there are administrative components to the annual site inspection, including:

- Checking the following site documents for accuracy, completeness, and timeliness
  - radiological as-built drawings and survey records
  - record books for the repository, City-owned properties, private property restricted areas, and public roads and utilities

- — inspection checklists and access logs for the temporary storage facility and Pond 4
- — monitoring records for the repository and Pond 4 leachate collection system and leak detection system

- Checking that the following site documents are available to the public and current: LTSM Plan, *Health and Safety Manual* (LMS/POL/S04321), and the *Quality Assurance Manual* (LMS/POL/S04320).
- Checking the condition of the onsite Information Repository and OU III Administrative Record.
- Checking the deeds of certain MMTS private properties in the San Juan County Recorder's Office to ensure deed annotations regarding restrictions (institutional controls) remain in effect.

The 2011 MVP and MMTS annual site inspections were conducted on September 27 and 28, 2011, by LM and LM contractor personnel. In 2006, DOE, EPA, and UDEQ agreed that the annual MVP and MMTS site inspections in the year preceding the five-year reviews would serve as both the annual inspections and the CERCLA five-year review site inspections. Results and details of the inspection are reported in the *2011 Annual Inspection of the Monticello Mill Tailings (USDOE) and Monticello Radioactively Contaminated Properties Sites* (November 2011) (see Attachment 1). Relevant MMTS site inspection observations are summarized in Table 6. No conditions were observed that represent a compromise of remedy protectiveness.

Table 6. 2011 MMTS Annual Inspection Observations

Observation
There was no evidence of prohibited use of groundwater, as confirmed by field inspection and through contact with Utah State Engineer's Office.
There was no evidence of soil removal, excessive erosion, or improper land use on supplemental standards properties, property MP−00211−VL, and the former mill site.
Repository was well maintained, vegetation community remained healthy.
There were several patches of noxious weeds on the repository site, but not on the vegetated cover of the repository. These areas were treated with herbicide in October 2011.
Deed annotations were properly filed at the County Courthouse.
Onsite record-keeping/documentation of LTSM activities was adequate.
Information Repository and OU III Administrative Record were in good condition.
The LTSM Plan was available but portions need to be updated.
Minor errors in the temporary storage facility record book were corrected by onsite personnel

6.2 Community Notification

Announcements were published in two local weekly newspapers, the *San Juan Record* and the *Blue Mountain Panorama*, on November 30 and December 1, 2011, respectively, describing the CERCLA five-year review process and objectives, and informing the public on how to contact DOE and onsite LM representatives for additional information or to provide comments. Copies of the announcements are provided in Attachment 2 of this report. DOE received no public comment regarding the MMTS remedies other than that solicited in the interviews with stakeholders (see Section 6.3). In June or July 2012, 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 LM contractor interviewed local property owners and stakeholders to gather information about the site's effect on the community. The interviews were conducted during January 2012 in Monticello and by telephone. Interviewees and their relation to the sites are listed below.

Steve Young, Victims of Mill Tailings Exposure
Kedric Somerville, peripheral property owner
John and Charlotte Johnson, peripheral property owner
Jackie and Pete Steele and their daughter, Stacey, peripheral property owner
Chet Johnson, Utah Department of Transportation, Monticello office
Barbara Pipkin, Victims of Mill Tailings Exposure
Doug Allen, Mayor of Monticello
Kelly Pehrson, Monticello City Manager

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 onsite LM contractor representatives provided sufficient response and support in maintaining these controls.

Specific interview questions and responses are provided in Attachment 3 of this report. Interview responses are summarized as follows:

- Public and municipal perception generally regards the remedial actions and subsequent safeguards as adequate in protecting human health. Several residents expressed the opposite concern however.
- Representatives of the City of Monticello and UDOT expressed no concern in their ability to comply with institutional controls that restrict land use and groundwater use.
- Interviewees were in general not aware of specific institutional controls affecting their properties.
- Onsite LM contractor representatives are effective in communicating with private, municipal, and UDOT interests, maintaining radiological control at supplemental standards properties, in coordinating activities involving private property, and responding to information requests by citizens and private interests.
- Concern was raised regarding a perceived lack of communication between DOE and the community regarding past and present site activities. Some criticisms regarding post-remediation activities that are City responsibilities were misdirected to DOE.
- Several criticisms to the effect that remedial actions were perceived as insufficient may be attributable to a misunderstanding of the implementation process, including community involvement, for those actions.

- One interviewee expressed concern that a house had been built within the OU III groundwater restricted area adjacent to Montezuma Creek. DOE has confirmed that there is no evidence of building construction within the groundwater restricted area.
- One interviewee expressed concern about an alfalfa field being located adjacent to a contaminated portion of Montezuma Creek (presumably because of concern about alfalfa being irrigated with contaminated surface water). As explained in Section 7.2, DOE, in consultation with EPA and UDEQ, determined that contaminant levels in irrigation water from Montezuma Creek were too low to be of concern.

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 were 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, February 1997 (first MMTS five-year review)
- Cooperative Agreement DE-FC13-99GJ79485 between the City of Monticello and the U.S. Department of Energy, 1998
- Application for Supplemental Standards for Upper, Middle, and Lower Montezuma Creek, May 1999
- Application for Supplemental Standards for Government-Owned Properties in Monticello, Utah, DOE ID Nos. MP-00391-VL, MP-01041-VL, and MP-01077-VL, May 1999
- *Ground Water Management Policy for the Monticello Mill Tailings Site and Adjacent Areas,* May 1999
- *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites,* June 2007
- *Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Groundwater,* Monticello, Utah, May 2004
- *Monticello Mill Tailings Site, Operable Unit III Post-Record of Decision Monitoring Plan,* August 2004
- *Remedial Action Report for Monticello Mill Tailings (USDOE) Site Repository,* August 2004
- *U.S. Department of Energy Office of Legacy Management Sampling and Analysis Plan, 2006* (includes MMTS-specific sampling and analysis requirements; updated annually)
- MMTS/MVP annual inspection reports for 2007 through 2011
- Annual updates to Monticello Site Management Plan, Section 5.0, for 2007 through 2011

- *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
- *Third Five-Year Review Report for Monticello Mill Tailings (USDOE) Site, City of Monticello, San Juan County, Utah,* June 2007
- *Monticello Mill Tailings Site, Operable Unit III Annual Ground Water Report* (reports span October 2007 through 2011)
- Biomonitoring reports: *Final Report MMTS Macroinvertebrate Sampling for 2005* (September 2005); *Final Report 2005 Avian Wetland Surveys at the MMTS* (October 2005); *Office of Legacy Management 2006 Avian Wetland Surveys MMTS* (September 2006); *MMTS Macroinvertebrate Sampling for 2006* (February 2007); *MMTS Macroinvertebrate Sampling for 2007* (February 2008); *Final Report Avian Wetland Surveys at MMTS, 2008* (November 2008); *MMTS Macroinvertebrate Sampling for 2008 and Summary of Biomonitoring Studies* (December 2008); and *MMTS OU III Biomonitoring Program Status and Analytical Update* (March 2011).
- *Monticello Mill Tailings Site–Operable Unit III Analysis of Uranium Trends in Ground Water*, May 2007
- *Explanation of Significant Difference (ESD) for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello Utah,* January 2009
- *Monticello Mill Tailings Site Operable Unit III Water Quality Compliance Strategy,* December 2009
- Annotated deeds for the OU II supplemental standards properties.
- Record field books and associated drawings for MMTS LTSM activities:
  - Repository site record book: contains meteorological monitoring data and results of monthly and quarterly site inspections performed by onsite personnel according to Section 3.2 of the LTSM Plan
  - Pond 4 record book
  - City-Owned piñon/juniper /properties record book
  - OU II Montezuma Creek soil and sediment properties record book
  - Temporary storage facility record book
  - Radiological "as-built" drawings (mapped locations of radiological contamination encountered; continuous field updates and annual computer database updates)
- Water production data from the repository and Pond 4 Leachate Collection and Removal Systems were reviewed (reported in FFA quarterly reports).

- Surface water and groundwater monitoring data for OU III were reviewed for trends in contaminant concentrations and to evaluate restoration progress.
- Updated applicable or relevant and appropriate requirements (ARARs) and environmental guidance documents were routinely reviewed by Environmental Compliance personnel during the current five-year period. Also, in preparation for the five-year review, current ARARs and updated environmental guidance were verified with electronic searches.

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.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The answer to Question A is "Yes", with rationale provided below.

OU I and OU II Soil Remediation

The remedy for OU I and OU II, removal of radiologically contaminated material from the former mill site and placement in an onsite repository, has been completed and is functioning as intended by the following decision documents: *Monticello Mill Tailings Site Declaration for the Record of Decision and Record of Decision Summary* (August 1990); *Application for Supplemental Standards for Upper, Middle, and Lower Montezuma Creek* (May 1999); *Application for Supplemental Standards for Government-Owned Properties in Monticello, Utah, DOE ID Nos. MP-00391-VL, MP-01041-VL, and MP-01077-VL* (May 1999).

The cleanup standards at 40 CFR 192.12 were achieved where practical. Where not practical, and as permitted by statute, the application of supplemental standards (40 CFR 192.21 and 192.22) and land use institutional controls allowed some radioactively contaminated soil to remain in place in mature piñon/juniper stands and along the narrow floodplain of Montezuma Creek canyon. Land use institutional controls are described in Sections 4.2.1 through 4.2.4. Affected properties were reconstructed following removal actions. Annual inspections and LTSM activities confirm that the institutional controls are relevant, effective, and adequate, and that there are no violations of the restrictions. There have been no breaches in the remedy that would compromise protecting human health and the environment.

Unlimited use and unrestricted exposure applies to 21 OU II peripheral properties where contamination in the land has been remediated to meet the cleanup standards specified at 40 CFR 192.12 and where contaminated surface water and groundwater also do not exist.

OU I Repository

DOE's onsite repository located within OU I is engineered with a double HDPE liner and leachate and leak detection systems. Encapsulation of wastes from OUs I and II (and MVP) in the 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 for evaporation. LTSM monitoring indicates 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, as specified in the LTSM Plan, have never been exceeded; therefore, no response action has been needed.

Routine monthly inspections indicate no evidence to suspect compromise of the repository cover (slumping, settlement, erosion, biointrusion) in preventing precipitation infiltration and radon emission. Although not a compliance component, the vegetated cover layers provide an added measure of protectiveness.

OU III Surface Water and Groundwater

The remedy for OU III is functioning as intended, as all treated groundwater discharged to Montezuma Creek from the two ex situ treatment cells meets discharge allowances approved by the Utah Division of Water Quality.

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), a groundwater use restriction that has been implemented will prohibit use of the alluvial aquifer. The restriction is functioning as intended. LTSM surveillance confirms that no prohibited water use or well installation has occurred. The human-health groundwater exposure pathway remains incomplete.

Contaminant (uranium) concentrations were first recognized in 2006 to be significantly greater than the corresponding model-predicted values over three consecutive semiannual sampling events (*Monticello Mill Tailings Site Operable Unit III Annual Ground Water Report October 2005 through April 2006* [September 2006]). Therefore, in accordance with requirements of the OU III ROD, data were reanalyzed in 2007 using an alternate approved statistical method. The reanalysis confirmed that OU III ROD-specified performance criteria were not being met and that it was unlikely remediation goals for water quality would be achieved during the allowed 42-year period. Therefore, as set forth in the OU III ROD, a contingency remedy was implemented in 2009 to evaluate the feasibility of active groundwater remediation in meeting RAOs. The contingency remedy is implemented by:

- Modifying the OU III RAOs to include the State of Utah's uranium standard of 30 pCi/L for domestic-use surface water, which did not exist when the OU III ROD was issued.
- Incorporating into the OU III remedy the previously installed in situ PRB wall and two ex situ groundwater treatment cells, which initially were part of a treatability study. The PRB wall may be left in place or may be removed and replaced by another facility to capture contaminated groundwater for active treatment. The two ex situ groundwater treatment cells will be used as an active pump-and-treat groundwater enhancement system to the MNA remedy for OU III. Operation of the ex situ groundwater treatment cells will continue as part of the contingency remedy during the next five-year review period to determine whether pump-and-treat groundwater enhancement, with MNA, is a viable remedy and if OU III ROD-specified RAOs can be achieved. DOE has the option to consider enhancements to the PRB wall and ex situ treatment cells during the next five-year review period.

Performance of the contingency remedy in reducing contaminant concentrations in the OU III shallow alluvial aquifer will continue to be evaluated through monitoring, data analysis, and reporting during the next five-year review period.

The contingency remedy was implemented because MNA alone was not meeting OU III ROD-specified performance criteria in reducing uranium concentrations in groundwater, not because of any change in actual or perceived risk from ingestion of contaminated groundwater. Though groundwater restoration is progressing more slowly than predicted, the OU III remedy of MNA with institutional controls remains protective of human health. Institutional controls administered by the State of Utah and City of Monticello preclude extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes. In addition, ingestion of contaminated groundwater is unexpected because the affected shallow alluvial aquifer has no current or historical use because of poor yield, and alternate sources of potable water are readily available.

OU III Biomonitoring

Biomonitoring for ecological receptors has been implemented as directed by the OU III ROD. Between 2004 and 2010, biomonitoring data were gathered for selenium in surface water, sediment, and macroinvertebrates in wetlands affected by remediation and in background areas. Naturally occurring selenium is present in the Monticello area, and data show that background selenium is elevated in macroinvertebrate tissues.

During this five-year review period, selenium concentrations in surface water, sediment, and macroinvertebrates did not exceed trigger levels specified in the OU III ROD (see Section 4.2.6). DOE is conducting confirmatory sampling in 2012.

In addition to identifying avian species that may be adversely affected by selenium through the food chain in the wetlands, avian surveys demonstrated that no threatened, endangered, or sensitive bird species nest within Monticello wetlands.

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?

The answer to Question B is "Yes", with rationale provided below.

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]), RAOs, and cleanup levels have not changed since the MMTS ROD was signed and are still valid.

As reported in the 2007 five-year review, toxicological data in the form of risk-based concentrations (RBCs) used to establish cleanup standards for uranium and vanadium in soil at OU II property MP−00211−VL Phase I have been lowered since remediation of that property was completed in 1998. The property's uranium and vanadium levels after remediation was completed did not exceed the lower RBCs. There have been no other pertinent changes

in toxicity data since the MMTS ROD was signed that would impact the remedy for OU I and OU II.

OU III

The exposure assumptions, toxicity data, cleanup levels, and RAOs for OU III are still valid. 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). As reported in the 2007 five-year review, the updated human health risk assessment incorporated new surface water and groundwater 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 groundwater as the primary source of drinking water would 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 groundwater use restrictions described in Sections 4.2.1 through 4.2.5.

Since the risk assessment update, there have been no changes in toxicity data, exposure assumptions, RAOs, 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 groundwater within OU III.

The contingency remedy-adopted UDEQ standard of 30 pCi/L 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 a minor pathway (domestic or recreational ingestion) in any of the exposure scenarios evaluated.

A private land use change in 2008 prompted DOE, in consultation with EPA and UDEQ, to determine if irrigation water, derived from a contaminated reach of Montezuma Creek and applied to alfalfa, represented a potential exposure pathway for human ingestion of uranium through the food chain. The results concluded that contaminant levels in the irrigation water were too low to be of concern.

Federal regulations have been promulgated that lowered the primary drinking water standard for arsenic to 10 micrograms per liter (µg/L) (effective January 2006) and finalized the standard for uranium at 30 µg/L (effective December 2003). Preparation of the OU III ROD anticipated and incorporated the new maximum contaminant level for arsenic as the remediation goal. Treated groundwater discharged to Montezuma Creek from the two ex situ treatment cells meets discharge allowances approved by the Utah Division of Water Quality. The OU III ROD also

adopted the federal 30 µg/L uranium standard as the groundwater goal. The new standards, therefore, do not invalidate the remedy.

With respect to ecological receptors, it has been determined during this five-year review period that the biomonitoring criteria specified in the OU III ROD have been met indicating that ecological receptors are not adversely affected by contamination resulting from site remediation.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The answer to Question C is "No". The OU III remedy of MNA with institutional controls and implementation of the pump-and-treat groundwater enhancement system are protective. 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 MMTS 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. ARARs cited in the MMTS ROD have been met. There have been no changes in the toxicity factors for the COCs since the last five-year review, 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, effective, and appropriately implemented.

Mill tailings and radioactively contaminated soil, sediment, and debris are encapsulated and effectively isolated from the environment. The leachate collection and leak detection systems continue to perform as designed. Leachate originating from residual construction water applied while placing radioactive wastes in the repository continues to drain from the encapsulated materials in decreasing quantities. Water is collected as intended in the leachate collection system (upper system) and no water has been found to collect in the leak detection system (lower system). The ET cover system continues to effectively limit the infiltration of precipitation into underlying materials.

The 2011 annual inspection report did not identify any conditions that could potentially impact the protectiveness of the remedy for OU I and OU II.

OU III

The remedy for OU III is functioning as intended. All treated groundwater discharged to Montezuma Creek from the two ex situ treatment cells meets discharge allowances approved by the Utah Division of Water Quality. 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 groundwater consumption is not complete because the groundwater use restrictions have proven effective. Multiple factors that likely are affecting the rate of water quality restoration have been identified in annual reports. A contingency remedy has been implemented to determine whether MNA combined with the existing pump-and-treat groundwater enhancement system is a viable remedy.

The biomonitoring has been implemented as directed by the OU III ROD. Biomonitoring has determined levels of selenium present in various media associated with wetlands, identified potential avian ecological receptors, and assessed background levels of selenium in the Monticello area. It was determined during the five-year review period that the biomonitoring criteria specified in the OU III ROD have been met.

8.0 Issues

This five-year review of the MMTS did not identify any issues that threaten the protectiveness of the remedy for MMTS OU I and OU II. Contamination removed from OU I and OU II properties remains effectively isolated from the public and the environment in the permanent onsite repository. Exposure to and dispersal of contamination left in place on certain OU II supplemental standards properties is adequately prevented through continued implementation of pertinent institutional controls that restrict land use. No conditions were identified that indicate the integrity of the repository's cover or liner systems have been compromised.

Similarly, no issues were identified that indicate the protectiveness of the remedy for MMTS OU III is threatened. OU III water quality restoration continues as stipulated by the OU III remedy. The OU III remedy and contingency remedy are being implemented in accordance with the OU III ROD and January 2009 ESD. Evaluation of the contingency remedy will continue during the next five-year review period. Institutional controls that prevent consumption of contaminated groundwater continue to be implemented and are effective. It was determined during the five-year review period that the biomonitoring criteria specified in the OU III ROD have been met indicating that ecological receptors are not adversely affected by contamination resulting from site remediation.

9.0 Recommendations and Follow-up Actions

No recommendations or follow-up actions are required based on this five-year review for the MMTS. The five-year review inspection (i.e., 2011 annual inspection) did not identify any issues that require follow-up actions. The remedies for OU I, OU II, and OU III are being implemented and are functioning as intended by the MMTS ROD and MMTS OU III ROD.

All issues identified in the previous five-year review were resolved:

- The Cooperative Agreement between DOE and City of Monticello has been extended to December 31, 2016.
- The City of Monticello repaired minor erosion problems identified by DOE on City property.

- Quantitative vegetation monitoring on the repository cover was discontinued because it was determined not to be a remedy performance metric; an alternative vegetation monitoring protocol was implemented with EPA and UDEQ concurrence to track the ecological health of the repository's plant cover.
- A contingency remedy was implemented for OU III because water quality restoration is progressing more slowly than predicted.
- Biomonitoring criteria specified in the OU III ROD have been met.

DOE continues to manage the MMTS and maintain an onsite presence in a manner that ensures required monitoring, surveillance, and maintenance activities are properly performed to sustain the protectiveness of the remedies.

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 Mill Site and DOE Repository

The remedy for MMTS OU I, the former mill site area, is protective of human health and the environment. Mill site 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 mill site 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 remedy for MMTS OU I, the onsite repository, is protective of human health and the environment. 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 remedy 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 for MMTS OU II is protective of human health and the environment. Property completion reports demonstrate that soil and sediment contamination was removed to numeric standards set forth in the primary ARAR (40 CFR 192.12) 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. The rationale for applying supplemental standards was documented in an ESD in February 1999. Land use restrictions (institutional controls) and LTSM activities at the 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 Water and Groundwater

The remedy for MMTS OU III is protective of human health and the environment. All treated groundwater discharged to Montezuma Creek from the two ex situ treatment cells meets discharge allowances approved by the Utah Division of Water Quality. Institutional controls administered by the Utah State Engineer and City of Monticello have been implemented to preclude extraction of contaminated groundwater from the shallow alluvial aquifer for domestic purposes groundwater during water quality restoration. 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 contingency remedy was implemented in 2009 to evaluate the feasibility of active groundwater remediation using MNA combined with pump-and-treat groundwater enhancement to meet RAOs. The OU III contingency remedy was implemented and the pump-and-treat groundwater enhancement is operational and functioning as intended. DOE met Utah Division of Water Quality substantive requirements allowing discharge of treated water from the two ex situ treatment cells into Montezuma Creek at a rate of up to 10 gallons per minute. Since the last five-year review, biomonitoring criteria specified in the OU III ROD have been met indicating that ecological receptors are not adversely affected by contamination resulting from site remediation. No threatened, endangered, or sensitive bird species nest within MMTS wetlands. Since the last five-year review, selenium levels in groundwater are trending downward.

10.2 Comprehensive Protectiveness Statement for MMTS

The MMTS remedies for OUs I, II, and III are protective of human health and the environment. Institutional controls have been implemented at the MMTS to prevent exposure to contamination left in place.

11.0 Next Review

The next five-year review for the MMTS is due June 20, 2017.

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Attachment 1

2011 MMTS and MVP Annual Inspection Report

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LMS/MNT/S08313

2011 Annual Inspection of the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties

November 2011

U.S. DEPARTMENT OF ENERGY | Legacy Management

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LMS/MNT/S08313

2011 Annual Inspection of the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties

November 2011

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Contents

Figures

Appendix

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Executive Summary

The annual inspection of the U.S. Department of Energy (DOE) Monticello Mill Tailings Site (MMTS) and Monticello Vicinity Properties (MVP) was conducted on September 27 and 28, 2011. DOE inspects these sites annually to ensure that the selected remedies remain protective of human health and the environment. Under those remedies, contamination remains in place at some locations where use is restricted and exposure is limited. Annual inspections (1) verify that DOE long-term surveillance and maintenance (LTS&M) activities implemented throughout the year are effective and appropriate, (2) confirm that the institutional controls restricting land and water use under the MMTS and MVP remedies remain effective, and (3) identify deficiencies and recommend corrective actions as needed. This report summarizes the results of the 2011 annual inspection.

Repository Findings

The repository is well maintained and well managed. No remedy-related maintenance items were identified. Most site features and support structures were in good to excellent condition. The repository perimeter fence was in good condition, although several areas were identified that require minor repairs, including a broken gate in the northeast corner of the site near perimeter sign P18. Minor repairs are also required in the Pond 4 fence and interior wildlife fence. "No Hunting" signs at perimeter gates have become illegible and will be replaced. Two tumbleweed accumulations along the perimeter fence were large enough to require removal. No new erosion or gullies were apparent at the repository site. A deep gully along the western boundary continues to fill in with sediment over time. Increasing numbers of vole burrows were found across the site. Site vegetation was healthy and composed primarily of desirable species. Several patches of noxious weeds were found onsite and herbicide treatment is planned in October 2011. The vegetation on the repository cover remained ecologically healthy and diverse.

City Property Findings

No violations of institutional controls restricting land and water use were evident during the 2011 annual inspection. Drainage and runoff control structures were in good condition. There were no remedy-related repair or maintenance items requiring action by the City of Monticello. Construction on Properties MP–00211 and MP–00181, on the western portion of the former mill site, has been properly monitored for radiological control by on-site LTS&M personnel. The construction work includes placing fill materials from off-site, and it involves no soil excavation below the fill. Bicycle/walking trails had been graded recently. No areas of new erosion were identified.

City Streets and Utility Corridor Findings

No unplanned or unmonitored excavations were evident during the 2011 annual inspection. No new erosion of highway shoulders and along the Highway 191 embankment at Montezuma Creek was apparent. On-site representatives confirmed that construction projects involving City and State infrastructure upgrades were appropriately monitored for radiological control.

Private Property Findings

No violation of any land or water use restriction was evident during the 2011 annual inspection. In 2008, a land use change occurred on Property MP–00990 when water from Montezuma Creek was diverted to a pond for irrigation, but which does not affect original site risk assumptions. No other land use changes on restricted properties were apparent. No well drilling occurred in 2011 in or near the Groundwater Restricted Area.

Records Findings

No major deficiencies were noted in radiological as-built drawings, site record books, or surveillance checklists. Some excavations, appropriately recorded in the record book(s), did not appear on maps because the excavations were located outside the map boundaries. LTS&M documents were available electronically from the field office. The Information Repository and Operable Unit III Administrative Record were present and in good condition. Updating the Information Repository is planned for November 2011. Deed restrictions were verified at the San Juan County Recorder's Office, including those associated with the sale of properties. Annotations were in place for properties sold or divided, and deed restrictions were attached.

1.0 Introduction

The annual inspection of the U.S. Department of Energy (DOE) Monticello Mill Tailings Site (MMTS) and Monticello Vicinity Properties (MVP) was conducted on September 27 and 28, 2011. DOE inspects these sites annually to ensure that the selected remedies remain protective of human health and the environment. Under those remedies, contamination remains in place at some locations where use is restricted and exposure is limited. Annual inspections (1) verify that DOE long-term surveillance and maintenance (LTS&M) activities implemented throughout the year are effective and appropriate, (2) confirm that the institutional controls restricting land and water use under the MMTS and MVP remedies remain effective, and (3) identify deficiencies and recommend corrective actions as needed. This report summarizes the results of the 2011 annual inspection to identify site conditions that may compromise remedy protectiveness and therefore warrant corrective action by DOE. Results of this annual inspection will also be incorporated into the compulsory five-year reviews of the MMTS and MVP, due in June 2012, as mandated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

1.1 Monticello Site Background Information

Between the early 1940s and 1960, uranium and vanadium ore was intermittently processed at the mill and ore-buying station in Monticello, Utah. Mill tailings with low-level radioactivity were impounded at the former mill, and some were dispersed over time to nearby properties by wind and water or used for construction in Monticello. Drainage of liquids from the impounded tailings contaminated groundwater in the underlying shallow alluvial aquifer.

The MVP and MMTS projects were placed on the National Priorities List (NPL) in 1986 and 1989, respectively, to address mill-related contamination. Figure 1 shows the locations of the Monticello NPL sites. DOE, in accordance with CERCLA, as implemented through a Federal Facilities Agreement, completed remediation of soil contamination at the MMTS and MVP in August 1999. Radiologically contaminated materials were placed in an engineered disposal cell about 1 mile south of the former mill site. The disposal cell, completed in October 1999, and associated support facilities are known collectively as the repository site (see Figure 2). The repository site includes a temporary storage facility (TSF), where newly excavated radiologically contaminated materials are stored before eventual disposal off site.

In some locations, radiologically contaminated material was left in place in compliance with supplemental standards, as codified at Title 40 *Code of Federal Regulations* Part 192.21. These locations, referred to as supplemental standards areas (see Figures 3 and 4), occur on City and private property, beneath City streets, and in utility corridors. Land use restrictions are applied to these properties and to the former mill site. Restrictions are also applied to properties overlying contaminated groundwater. The former mill site property and several adjacent properties that include supplemental standards areas were transferred to the City of Monticello in 2000 for use as a public park. City and private properties are described in more detail in Section 1.3.

In the following summary of the annual site inspection, many of the inspection items refer to a specific property identification, such as MP-00177. These identifications were assigned during remedial actions for the purpose of tracking the scope and progress of remedial actions on individual land holdings. Figure 3 identifies the locations of the Monticello properties affected by

the remedial actions and that are subject to annual inspection, as referenced in the following sections of this report.

1.2 Long-Term Surveillance and Maintenance

The DOE Office of Legacy Management (LM) administers the long-term stewardship of the Monticello NPL sites to ensure that the selected remedies continue to be protective of human health and the environment. The U.S. Environmental Protection Agency (EPA) Region 8 and the Utah Department of Environmental Quality (UDEQ) provide oversight. Annual inspections are one component of LTS&M at Monticello. Other primary components include routinely inspecting, operating, and maintaining the on-site permanent disposal cell and leachate management system; routinely inspecting all properties affected by land and water use controls to ensure compliance with the controls; and monitoring and managing radiologically contaminated soil encountered at City and Utah Department of Transportation (UDOT) excavations in Monticello. Activities associated with Operable Unit III, including groundwater treatment, are not LTS&M activities. In association with Operable Unit III, groundwater and surface water quality are monitored and results are reported annually. CERCLA 5-year reviews (begun in 1997) are also conducted to monitor and document the protectiveness of the MMTS and MVP remedies.

LTS&M activities, including the annual inspection and reporting, are conducted by on-site and off-site personnel in accordance with the procedures provided in the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* (LTS&M Plan).

1.3 Annual Site Inspection Scope

Annual inspections of the MMTS and MVP focus on four general topics: Recordkeeping and Administrative Review, DOE Repository Site, City and Private Properties, and City Streets and Utility Corridors. The Annual Inspection Checklist records the items inspected; Appendix A includes the completed checklist for the 2011 annual inspection. Revised in 2009, this checklist format was approved by EPA and UDEQ through Federal Facilities Agreement meetings. The checklist supersedes Appendix K of the LTS&M Plan.

Recordkeeping and Administrative Review

Recordkeeping by the on-site LM contractor staff is reviewed for proper documentation of day-to-day activities and recorded in Section II of the Annual Inspection Checklist. On-site record books, surveillance checklists, and radiological as-built maps are verified (radiological as-built maps, in addition to on-site record books, document the location and findings of radiological control measures provided by on-site LM contractor staff during municipal construction activities conducted in Monticello).

The inspection also confirms that deed annotations applicable to the supplemental standards areas remain accurately filed at the County Courthouse; that the Information Repository and Operable Unit III (OU III) Administrative Record documents are complete and current; that updated copies of relevant LTS&M documents are available to the on-site staff; and that workers accessing the TSF are appropriately trained or escorted. The inspection no longer includes a review of the MMTS and MVP Administrative Record because these files were sent to the Federal Records Center in Denver, Colorado, per CERCLA guidelines, in 2008.

DOE Repository Site

The repository site is inspected for the integrity of constructed features and support facilities (e.g., signs, buildings, fences, gates) and the integrity of the disposal cell cover, including the health of the plant community. Observations are recorded in Section III of the Annual Inspection Checklist. Areas needing maintenance or repair are noted, as are areas of soil erosion or siltation. The repository site inspection also includes the management and operation of the TSF and the management and operation of the disposal cell leachate collection system including Pond 4 (an engineered pond for evaporation of disposal cell leachate). Because control of noxious weeds on Federal properties is required by law, infestations of noxious weeds are also identified during the inspection.

City and Private Properties

City and private properties are inspected annually to confirm that institutional controls, as described in the LTS&M Plan, remain effective, and to document any change in site conditions that may affect the protectiveness of the remedies. Properties are inspected for evidence of violations of applicable restrictions, and findings are recorded in Sections IV, V, VI, VII, and VIII-C of the Annual Inspection Checklist.

Land and water use restrictions apply to the following City and private properties (see Figure 3 for locations):

- City-owned properties transferred from DOE: MP-00181, MP-00391, MS-00893, MP-01040 (north), MP-01041, MP-01042, and MP-01077. All of these properties are restricted to recreational day use. Overnight camping and the building of habitable structures are prohibited.
- Piñon/Juniper properties supplemental standards areas (a subset of the City-owned properties): MP-00391, MP-01041, and MP-01077. These properties have an added restriction of no soil removal.
- Former mill site (a subset of the City-owned properties): MP-00181 and MS-00893. In addition to other restrictions, damage to wetlands is prohibited in these areas.
- Groundwater Management Area (also known as the Groundwater Restricted Area [GWRA]; includes both City-owned and private properties): MP-00179, MP-00181, MP-00211, MS-00893, MP-00947, MP-00951, MP-00990, MG-01026, MG-01027, MG-01029, MG-01030, MG-01033, MP-01077, MP-01083, and MP-01084. Domestic use of groundwater from the alluvial aquifer is prohibited on these properties. This institutional control is administered by the State Engineer's Office through the well permitting process.
- Montezuma Creek Soil and Sediment Properties (also known as the Montezuma Creek Restrictive Easement Area; privately owned): MP-00951, MP-00990, MG-01026, MG-01027, MG-01029, MG-01030, MG-01033, and MP-01084. Portions of these properties have restrictive easements to prohibit soil removal or the construction of habitable structures.
- Properties MP-00211 (City-owned but not transferred from DOE) and MS-00176 (privately owned). Special zoning ordinances, which require radiological scanning for certain ground-disturbing activities, affect these properties.

Surface components of the OU III groundwater treatment system and inactive monitoring well surface completions, located on private property MP-00179, are also inspected annually. Inspectors also note any evidence of standing water, saturated soil, surface disturbance, or stressed vegetation in the area of the groundwater treatment system.

City Streets and Utility Corridors

During the annual inspection, City streets, utility corridors, and Highway 191 and 491 rights-of-way are inspected for evidence of unmonitored excavations or soil movement. Results are recorded in Sections VIII-A and VIII-B of the Annual Inspection Checklist.

Radiologically contaminated soil remains in some places beneath streets and utility corridors in Monticello, in the Highway 191 embankment over Montezuma Creek, and UDOT rights-of-way along Highways 191 and 491. Supplemental standards have been applied to these areas. Through a cooperative agreement with the City, the on-site LM contractor staff monitors all excavations in these areas for radiologically contaminated material, and the City transports any such material to the TSF under direction of the on-site staff. On-site staff also monitors all excavations of Highways 191 and 491. Through a Memorandum of Understanding between UDOT and DOE, UDOT has the option of returning contaminated material to the excavation as backfill or having City workers, under the direction of on-site staff, haul the material to the TSF.

1.4 2011 Annual Site Inspection Participants and Schedule

Inspection team members and affiliations are listed on page 1 of the Annual Inspection Checklist (Appendix A). L. Sheader and P. Wetherstein conducted the physical site inspection on September 27 and 28, 2011. J. Dayvault and J. Nguyen of DOE participated in portions of the inspection. M. Stilson, of the Utah Department of Natural Resources Division of Water Rights, was also contacted on October 6, 2011, to verify that no prohibited well permits were sought within restricted areas.

Tuesday, September 27, 2011
Inspection team members convened at the Monticello field office in the morning, and P. Wetherstein reviewed health and safety documents with the inspection team. In the afternoon, L. Sheader and P. Wetherstein inspected repository features, including Pond 4, the repository cover, cover penetrations, wildlife fence, drain ditches and toe trenches, and the field office. City-owned properties also were inspected. J. Dayvault and J. Nguyen accompanied the inspectors for portions of the inspection.

Wednesday, September 28, 2011
The repository perimeter fence, perimeter signs, and boundary markers were inspected in the morning along with privately owned property MS-00176 and City-owned property MP-00211. In the afternoon, the administrative and records inspection was conducted, the TSF was inspected, and institutional controls at the Montezuma Creek Soil and Sediment Properties and Groundwater Management Area were verified.

2.0 Site Inspection Results

2.1 DOE Repository Site and Disposal Cell

The repository site consists of the access area (support buildings and the TSF), the repository perimeter, run-on and runoff drainage controls, Pond 4, the disposal cell cover, and cover penetrations (manholes, settlement monuments, and structures associated with the embedded lysimeter). Results of the repository inspection are summarized below and in Appendix A, Section III.

2.1.1 Access Area

The Monticello field office buildings and associated structures were in excellent condition. Site access signs displaying contact information were current and visible. Infestations of two noxious weed species (Russian knapweed [*Acroptilon repens*] and spotted knapweed [*Centaurea diffusa*]) were identified and flagged prior to the annual inspection near the field office buildings and entrance gate; herbicide treatment in October 2011 is planned. The site's paved access road was in good condition, with vegetation mowed along the margins.

2.1.2 Temporary Storage Facility

The TSF is a restricted-access, gravel-surfaced area enclosed by an 8-foot-high chain link fence. The fence was appropriately posted with access control signs, and there was no evidence of vandalism or trespassing. Within the fence, the TSF bin and lay-down area for potential mixed waste were in good working order. At the time of the inspection, the bin contained about 6 cubic yards of low-level radiologically contaminated soil and debris derived from city street and utility excavations. There was no mixed waste stored in the TSF.

2.1.3 Repository Perimeter

A barbed-wire stock fence, containing several gates, marks the repository site boundary and discourages human trespass and livestock entry. Forty numbered location-reference signs (E and P1–P39) are fixed to the fence or on separate posts nearby. The site entrance gate is locked at night and at other times when on-site personnel are not present.

Perimeter Fence

The perimeter fence along the south edge of the repository site was rebuilt in November 2010. Repaired sections of the fence were in very good condition. Other sections of fence were in need of minor repair, as some wires were broken or slack. One gate at the northeast corner of the site near P18 was broken and was found partially open during the inspection. No evidence of vandalism was present.

Location-Reference Signs

All perimeter signs were legible and in good condition, although perimeter signs P12 and P15 (Photo 1) were scratched. "No Hunting" signs, posted at all gates along the perimeter fence, were weathered and largely illegible. "No Hunting" signs may be particularly important along the eastern site boundary, where land use changes are likely to occur with the recent sale of the property. No evidence of bullet holes or other vandalism was present.

Boundary Markers
All six boundary markers were located and were in good condition.

Erosion and Gullies
No new erosion was apparent during the 2011 inspection. Previous inspection reports describe a gully between perimeter signs E and P2, which threatened portions of the fence line along the west boundary of the site. Because sources of water to the gully have been rerouted or repaired by UDOT, no action was taken by DOE to fill the gully or to move the perimeter fence. As in 2010, the gully was still present in 2011. Deposition has continued, slowly filling in washout areas (Photo 2). This process will likely continue to fill the gully over time.

Perimeter Vegetation
Vegetation between the perimeter fence and the wildlife fence (inner fence) is healthy and composed primarily of desirable species. One large patch of spotted knapweed was located in the southeastern portion of the site and will be treated with herbicide in October 2011. A small patch of mullein (*Verbascum thapsus*), which can be locally invasive, was found near perimeter sign P30 and also will be treated to prevent its spread. Field bindweed (*Convolvulus arvensis*), a Category C noxious weed species, also was present in places; because it is not spreading, it does not require control. Two areas of tumbleweed accumulation—near perimeter signs P15 and P18—were identified during the inspection.

Maintenance Item: Treat infestations of noxious weeds near the access area, front gate, and perimeter fence with herbicide.

Maintenance Item: Repair weather-damaged sections of the perimeter fence.

Maintenance Item: Repair the stock gate at the northeast corner of the site near perimeter sign P18.

Maintenance Item: Replace "No Hunting" signs at all gates in the perimeter fence with sturdy metal signs.

Maintenance Item: Remove tumbleweed accumulations near perimeter signs P15 and P18.

2.1.4 Repository Run-on and Runoff Controls

Engineered rock-lined drainage controls that collect and direct runoff from the disposal cell are the West Drain Ditch, South Drain Ditch, East Toe Trench, and North Toe Trench. These features are designed to prevent gully erosion of the disposal cell. Some areas of siltation, the result of natural processes where rock channels are filled in slowly over time, were observed within the ditches and trenches. All ditches and trenches are in good condition and do not contain excessive vegetation.

West Drain Ditch
In 2002, eroded areas in the West Drain Ditch channel immediately north of the inner fence were repaired, and the channel was lined with rock all the way to North Draw. Erosion was also observed in a small gully connected to the West Drain Ditch during the 2008 inspection. No evidence of additional erosion in either area was apparent in 2011 (Photos 3 and 4). One small

elm tree has become established in the West Drain Ditch, and it will continue to be monitored. If the tree has the potential to block flow, it will be removed.

South Drain Ditch
Stabilized erosion rills were present on the South Drain Ditch's north side in places and had not changed. Shrubs were observed in portions of the South Drain Ditch but do not block potential flow.

East Toe Trench and North Toe Trench
Some rock at the surface of the East Toe Trench and North Toe Trench has degraded in the past, but no new degradation was noted. Erosion or bypass of these trenches is not evident. Soils and vegetation have accumulated in the drainage downgradient of the East Toe Trench, but flows are not impeded. Soils and vegetation have also accumulated in the drainage downgradient of the North Toe Trench; no new erosion was noted in this area.

2.1.5 Pond 4

Pond 4 is a lined solar evaporation pond that collects water pumped from the disposal cell leachate collection and recovery system (LCRS). Pond 4 also collects a small amount of precipitation. Pond 4 is constructed with an LCRS and leak detection system (LDS). In the past, when Pond 4 was used to store construction water or during times of increased precipitation, the pond's LCRS infrequently collected water. The Pond 4 LDS has never collected water. An 8-foot-high security fence surrounds Pond 4, and a rope barrier surrounds the pond within the security fence. Locked chain link gates are present at the northeast and southwest corners of the security fence, and a locked vehicle access gate is in the west fence. Water rescue equipment is stored in weatherproof metal cabinets on the berm near the northeast corner of Pond 4 and near the vehicle entrance gate.

Gate, Fence, Entrance, and Perimeter Signs
All gates were in good working condition. Warning signs on the perimeter fence were easily visible and legible. The following warning signs were posted on the perimeter fence: "Danger Do Not Enter," "Controlled Area, Enter at Designated Access Only," "Contaminated Water, Do Not Discharge," and a sign posting current contact information, which included a "No Trespassing" warning. There was no evidence of vandalism or trespass, but damage to the security fence from snowmelt was apparent. Most damaged sections have been repaired by on-site personnel, but two additional holes, large enough to allow human or animal access, were discovered during the inspection (Photo 5). These holes require repair.

Pond Perimeter and Berm
The pond's rope barrier was intact, and warning signs—"Contamination Area" postings and notices that life jackets are required—were visible and legible. Animal burrows, primarily made by voles, were visible on and below the pond berm on all sides (Photo 6). No large burrows, which might threaten the berm's integrity, were found. Animal burrows will continue to be monitored during routine Pond 4 inspections. Vegetation on the slopes of the berm was well established and primarily composed of non-weedy species.

Lifesaving Equipment
The cabinets containing the water rescue equipment were highly visible, adequately labeled, and in good condition. The contents of the cabinets (throw buoys, rope, rope ladders, personal flotation devices) were easily accessible and in good condition.

Pond 4 LCRS/LDS Control Cabinet
The LCRS/LDS control cabinet was in good condition. No evidence of insects or rodent damage was present, and the cabinet remained weatherproof. Operation of the Pond 4 LCRS and LDS is reported under Section 2.1.6, "Cover Penetrations."

Liner, Anchors, and Pond Interior
Although no visible evidence of holes in the pond liner was observed, repairs to known holes in the pond liner are planned in October 2011. Liner anchors, consisting of sand-filled polyethylene pipe installed in 2007, were in good condition. Less than 1 foot of water was standing in the northeast corner of the pond. The pond contained silt and vegetation, including saltcedar (*Tamarisk ramosissima*, a noxious species), but this vegetation was later removed during liner repairs (Photo 7).

Maintenance Item: Repair holes in the security fence around Pond 4.

2.1.6 Disposal Cell Cover

The repository cover inspection includes the disposal cell cover and other features within the inner wildlife fence, including roads, riprap areas, and site monuments. The wildlife fence is a 6-foot-high wire-mesh fence that contains a vehicle access gate on the west end, a Pond 4 access gate on the east end, and five narrow gate apertures that allow wildlife to pass through.

Roads, Wildlife Fence, Site Monuments, and Raptor Perches
The unpaved road surrounding the disposal cell and the road to Pond 4 was recently graded and in very good condition (Photo 8). One hole was discovered in the wildlife fence in its northeast section (Photo 9). The hole, probably caused by snow damage, may present a hazard to wildlife and will be repaired. Other sections of the wildlife fence and gates, open at the time of the inspection, were in acceptable condition and showed no evidence of vandalism. Both site monuments, one at the west access gate through the wildlife fence (Photo 10) and one at the apex of the repository, were present and intact. Six raptor perches, installed near the disposal cell cover in 2007, were in good condition.

Vegetation
Desirable plants remained well established on the cover, and no significant barren areas, eroded areas, or phreatophyte shrubs were identified (Photo 11). Some dead sagebrush (*Artemisia tridentata*) and rabbitbrush (*Ericameria nauseosa*) plants—killed from a 2006 vole infestation—were still scattered across the cover. As in 2010, a large number of healthy, desirable shrub seedlings were apparent. Small quantities of field bindweed were found on the cover; because it is not spreading, control is not necessary.

The Repository Cover Vegetation Index, developed in 2009 for use during annual inspections (pages A-11 and A-12 in Appendix A), indicates that the cover vegetation remains healthy. A vegetation condition score of 3.67 out of 5.00 was assigned to the cover. An average score is considered to be 3.00. The vegetation condition score is used to detect trends in the health of the

vegetation community; no significant upward or downward trends were apparent. Dominant species identified on the cover in 2011 include sagebrush, western wheatgrass (*Pascopyrum smithii*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and smooth brome (*Bromus inermis*). None of these species are weedy.

Vegetation on the repository's soil-covered side slopes and outlying areas is also in good condition. Plants also have established on portions of the rock riprap armoring (Photo 12), mainly rabbitbrush, yarrow (*Achillea millefolium*), and grass species with occasional patches of oak brush (*Quercus gambelii*). Because none of this vegetation overlies tailings or threatens the integrity of the side slopes, it is not of concern.

Burrowing

More active burrows (Photo 13) were observed during the 2011 inspection than in 2010, indicating that vole populations may be cyclically increasing at the site. However, the increased presence of raptors and recent decreases in standing dead vegetation due to heavy snowfall are expected to prevent widespread damage to the cover shrubs in 2011. There is no evidence that burrows penetrate beneath the cover's biointrusion layer.

Stability

No area of the cover indicated settling, slumping, fracturing, seepage, ponding, or significant erosion. The steep, rock-lined slopes showed no evidence of rock movement or degradation, settling, slumping, or erosion (Photo 14).

Maintenance Item: Repair the hole in the wildlife fence in its northeast section.

2.1.7 Cover Penetrations

Cover penetrations include five manholes, two video ports, nine settlement monuments, and structures associated with a large lysimeter, which measures water flow, embedded in the eastern portion of the disposal cell (see Figure 2).

Manholes and Video Ports

Manholes 1 and 3 enclose equipment for the disposal cell LCRS and LDS. They were not entered during the annual inspection, but the exteriors were in good condition. On-site personnel reported that equipment in Manholes 1 and 3 remained in good condition. All five manhole covers were secure and operable, appropriate safety warnings and entry procedures were posted, the exterior pump access ports were undamaged, telemetry surface installations were in good condition, and no leakage or drainage was evident. Covers of the inoperable video ports on MH–1 and MH–2 were locked and secure.

Settlement Monuments

Nine settlement monuments, identified by the letters A through I, are on the disposal cell. The outer protective casings (12-inch PVC pipe) and the inner plates were intact and undamaged. Data from elevation surveys of the settlement monuments in 2006 indicate no evidence of settlement. Settlement monument elevations are planned in conjunction with the upcoming CERCLA five-year review.

Embedded Lysimeter
External features of the embedded lysimeter were inspected, and no drainage or seepage was detected at the outlet or along cover penetrations. Instrumentation installations were in good condition.

Operation of Repository and Pond 4 LCRS and LDS
Monitoring of leachate production is performed automatically via the repository telemetry system. Upgraded in 2007, the telemetry system relays data to the LM Systems Operation and Analysis at Remote Sites (SOARS) system, for off-site viewing, evaluation, and management. On-site personnel routinely monitor leachate production in accordance with specifications in the LTS&M plan. Leachate production rates are presented in quarterly reports to DOE, EPA, and UDEQ. Annual inspection of the repository telemetry system is conducted through interviews with the on-site staff and through reviews of the quarterly reports. The Repository and Pond 4 LCRS and LDS are operating properly with no anomalous readings or conditions.

2.2 City-Owned Properties

City-owned properties MP-00181, MP-00391, MS-00893, MP-01040 (north), MP-01041, MP-01042, and MP-01077 were transferred from DOE to the City of Monticello in 2000. Specific restrictions on these properties are summarized in Section 1.3 (City and Private Properties). Photos 15 through 17 show the wetlands, creek, and southern slope of the former mill site during the 2011 inspection.

Property MP-00211 was always City-owned and is subject only to zoning restrictions on excavation and construction.

Results of the 2011 annual inspection are summarized below and in Section IV of Appendix A.

Recreational Use
The City-owned properties transferred from DOE are accessible to the public. In 2007, these properties were annexed by the City of Monticello. Hunting with firearms is not allowed within city limits, but bow hunting was authorized in 2009. Walking and mountain bike trails are used throughout the properties. During the annual inspection, the City had recently re-graded the surface of the walking trails (Photo 18).

Overnight camping is not allowed on these properties. No evidence of past or present overnight camping was observed during the 2011 inspection.

Construction of Habitable Structures
Construction of habitable structures is prohibited on these properties. The construction of any habitable structures was not observed during the 2011 inspection.

Supplemental Standards Areas on Piñon/Juniper Properties
No evidence of new soil removal by human activity or natural processes was noted on any of the Piñon/Juniper properties supplemental standards areas. The supplemental standards areas are physically delineated by four-strand wire fence. The City of Monticello breached sections of this fence to accommodate mountain bike trails, and other sections of the fence have degenerated due

to age. Past radiological scans of the bike trails indicated no concerns, and survey records are available at the Monticello field office. DOE will continue to monitor these areas regularly.

Soil Movement, Drainage, and Runoff Controls

Construction on properties MP-00211 and MP-00181, on the western portion of the former mill site, was apparent at the time of the inspection. The construction work includes the placement of fill materials from off-site, and it involves no soil excavation below the fill (Photo 19).

All riprap-armored structures, dams, check dams, berms, and runoff control drainages (see Figure 4) are intact and functional. One structure, Deer Draw Dam, is shown in Photo 20. No major erosion issues or evidence of recent erosion were noted during the 2011 inspection.

Wetlands

Wetlands on the former mill site were constructed according to EPA-specific criteria, and these wetlands are protected by cooperative agreement. Under this agreement, the City will not disturb these areas without prior approval from appropriate State and federal agencies and is not responsible for repairing damage to these areas by natural causes. Montezuma Creek and three constructed marsh wetlands on the City-owned properties are ecologically healthy, and no evidence of damage by human activity or natural causes was observed during the 2011 inspection.

Groundwater Use

No evidence of groundwater use or water-well drilling on City-owned properties with groundwater restrictions was observed during the 2011 inspection or through the year. No applications to drill were filed with the Utah Department of Natural Resources Division of Water Rights for these areas (see Section 2.6 below).

2.3 City Streets and Utility Corridors, and UDOT Rights-of-Way

Results of the 2011 annual inspection of City streets and utility corridors, and UDOT rights-of-way are found in Appendix A, Section VIII. No unmonitored or unplanned excavations were identified. On-site LM contractor personnel were aware of all planned excavations, which include natural gas pipeline upgrades, improvements to the state's Port-of-Entry facility east of Monticello, construction of a gasoline station/convenience store along Highway 491, excavations associated with the construction of a new outdoor school at 4th and Main, construction of a sewer line adjacent to Highway 191 north of the city limits, and City street resurfacing. Excavations related to natural gas pipeline upgrades have been completed south of Main Street, and no new excavations are planned in this area in the near future. Natural gas pipeline upgrades north of Main Street are planned for 2012. Along the shoulders of Highway 191 and 491 or at the Highway 191 embankment at Montezuma Creek, no new erosion was evident.

2.4 Private Property MS–00176–VL

Before a habitable structure is constructed on this property, Monticello zoning ordinance requires that a special building permit, based on radiological scanning results, be obtained. There is no evidence of erosion, soil removal, or construction of habitable structures (see Appendix A, Section VIII-C). A portion of this property was sold in 2006. The portion that was sold does not

have supplemental standards areas, but the new owner did not remove the land use restriction annotated to the deed.

2.5 Properties in the Montezuma Creek Restrictive Easement Area

There was no evidence of significant erosion or soil removal from the restricted areas of these properties during the 2011 inspection (see Appendix A, Section V).

In 2006, a new residence was constructed on property MP-00990 outside the supplemental standards area. At that time, on-site personnel helped the landowner delineate the restricted area of this property. Portions of this property and Property MG-01033, including the residence, were sold in 2010 to a new landowner. No land use changes are apparent.

A portion of property MP-00990 is cultivated in the easement area in compliance with the land use restriction. In 2008, the landowner changed the land use by diverting water from Montezuma Creek near monitoring well 92-09 to an irrigation pond to apply to cultivated areas. DOE evaluated this land use change and found no significant associated risk.

2.6 Groundwater Restricted Area

There has been no evidence of well-drilling activity in or near the GWRA (Appendix A, Section VI). On October 6, 2011, M. Stilson of the State Engineer's Office confirmed the lack of well-drilling activity and indicated that there were no applications filed in the past year for shallow or deep water wells in or near the Monticello GWRA.

2.7 Operable Unit III

Permeable Reactive Barrier (PRB) and Auxiliary Treatment System
A groundwater treatment system comprising the PRB and treatment cells is on property MP-00179 (private property) east of the former mill site. Features of these systems are inspected each year to ensure that the current land use, ranching, is not adversely affected. Due to access restrictions, this property was not inspected during the annual inspection. However, in October, 2011, groundwater was sampled and a change-out of treatment cell media was performed on the property. No anomalies were reported during these activities.

Water Quality Monitoring Well Inspection
OU III water quality is monitored at an established network of active groundwater monitoring wells and surface water monitoring sites. Active wells are inspected during sampling in April and October of each year, and field personnel noted no deficiencies during routine well inspections in 2011.

2.8 Administrative and Records Inspection

The following documents and records, recorded by the on-site staff, were inspected for completeness and accuracy of information (see Appendix A, Section II):

- Radiological as-built drawings (residential and utility maps that document the location and results of radiological control provided by on-site LM contractor personnel).

- Site record books, which include the repository, the TSF, City-owned properties, private property restricted areas, and public roads and utilities.
- Surveillance checklists, which include meteorological monitoring data; TSF access/security logs; and monthly, quarterly, and Pond 4 surveillance checklists. Pond 4 and repository LCRS and LDS monitoring records are maintained electronically.

The following categories of documents and records were inspected to ensure that pertinent information for implementing LTS&M activities is readily available to the on-site staff and the general public:

- LTS&M Plan (including site-specific emergency response information), the *Health and Safety Manual* (LMS/POL/S04321), and the *Quality Assurance Manual* (LMS/POL/S04320). These documents are available electronically.
- Information Repository and OU III Administrative Record.
- LTS&M Training Records (applicable to on-site and unescorted City employees accessing the TSF).

Deed restrictions (verified in the San Juan County Recorder's Office) were inspected to ensure that administrative controls remain in effect with the City and County.

No major deficiencies were noted in any of the above administrative categories. However, the Information Repository collection was not updated in April 2011; an update is scheduled for November 2011. LTS&M documents were available electronically from the field office. Although the most current version of the LTS&M Plan was available, portions of the plan require update. The Information Repository and Operable Unit III Administrative Record were present and in good condition. Deed restrictions were verified at the San Juan County Recorder's Office, including those associated with the sale of properties. Annotations were in place for properties sold or divided, and deed restrictions were attached. The site record books were correct and complete. Minor errors in the TSF record book were corrected by on-site personnel during the inspection. Some excavations, appropriately recorded in the record book(s), did not appear on maps because the excavations were located outside the map boundaries.

3.0 Conclusions and Recommendations

The 2011 annual inspection confirmed that DOE LTS&M activities implemented throughout the year remain effective and appropriate, and institutional controls restricting land and water use as part of the MMTS and MVP remedies remain effective. No corrective actions are necessary.

The following maintenance issues were identified during the 2011 annual inspection and are scheduled to be resolved between April and June 2012, or sooner if possible:

- Treat infestations of noxious weeds near the access area, front gate, and perimeter fence with herbicide.
- Replace weather-damaged sections of the perimeter fence.
- Repair the stock gate at the northeast corner of the site near perimeter sign P18.

- Replace “No Hunting” signs at all gates in the perimeter fence. Replace with sturdy metal signs.
- Remove tumbleweed accumulations near perimeter signs P15 and P18.
- Repair holes in the security fence around Pond 4.
- Repair the hole in the wildlife fence in its northeast section.

4.0 Photograph Log and Photographs

Photographs were taken to document findings of the 2011 annual inspection. The location and orientation of the photographs included below are identified in Figures 2, 3, and 4. A Field Photograph Log associated with all photographs taken during the 2011 annual inspection is included as Appendix A, Section IX.

1. Perimeter sign P15, scratched but legible.

2. Gully along western perimeter fence.

3. Rock-lined drainage between the West Drain Ditch and North Draw.

4. Stabilized erosion area near the West Drain Ditch.

5. One of two holes discovered in the Pond 4 security fence.

6. Animal burrows on and below the Pond 4 berm.

7. Pond 4 showing siltation, vegetation, and standing water.

8. Repository cover and recently graded perimeter road.

9. Hole in northeast section of wildlife fence.

10. Site Monument at west access gate through wildlife fence.

11. Vegetated disposal cell cover, view to the west from center monument.

12. Vegetation on rock side slope of repository.

13. Animal burrow on repository cover.

14. Rock side slope of repository and North Toe Trench.

15. Wetland 1 at former mill site, view to the south.

16. Wetland 2 at former mill site, view to the south.

17. Wetland 3 and Montezuma Creek at former mill site, view to the southeast.

18. Recently graded bike path at former mill site.

19. Fill materials at City-Owned Property MP–00211.

20. Runoff/drainage control structure, Deer Draw Dam.

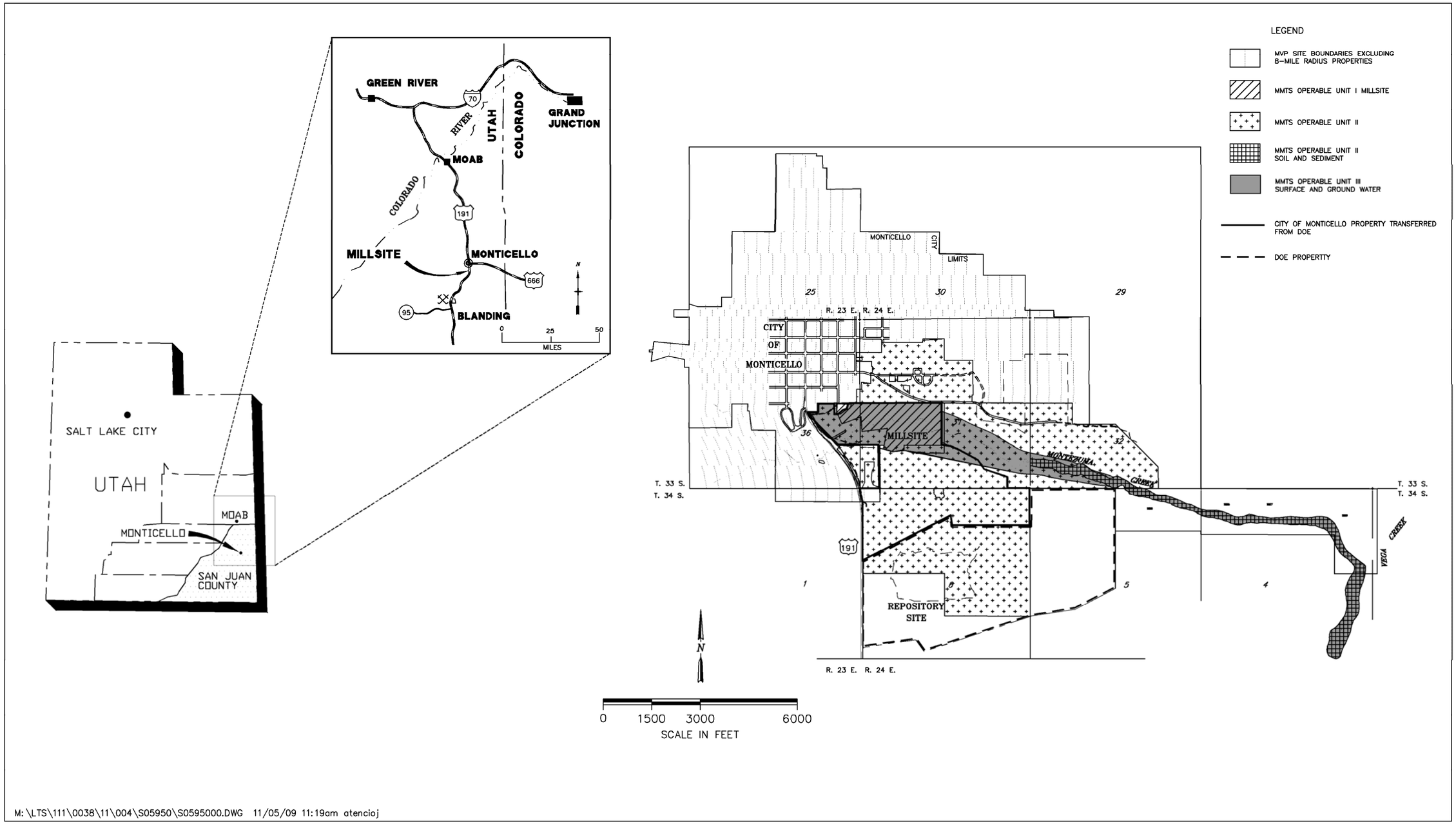

Figure 1. Location and Features of Monticello MMTS and MVP Sites

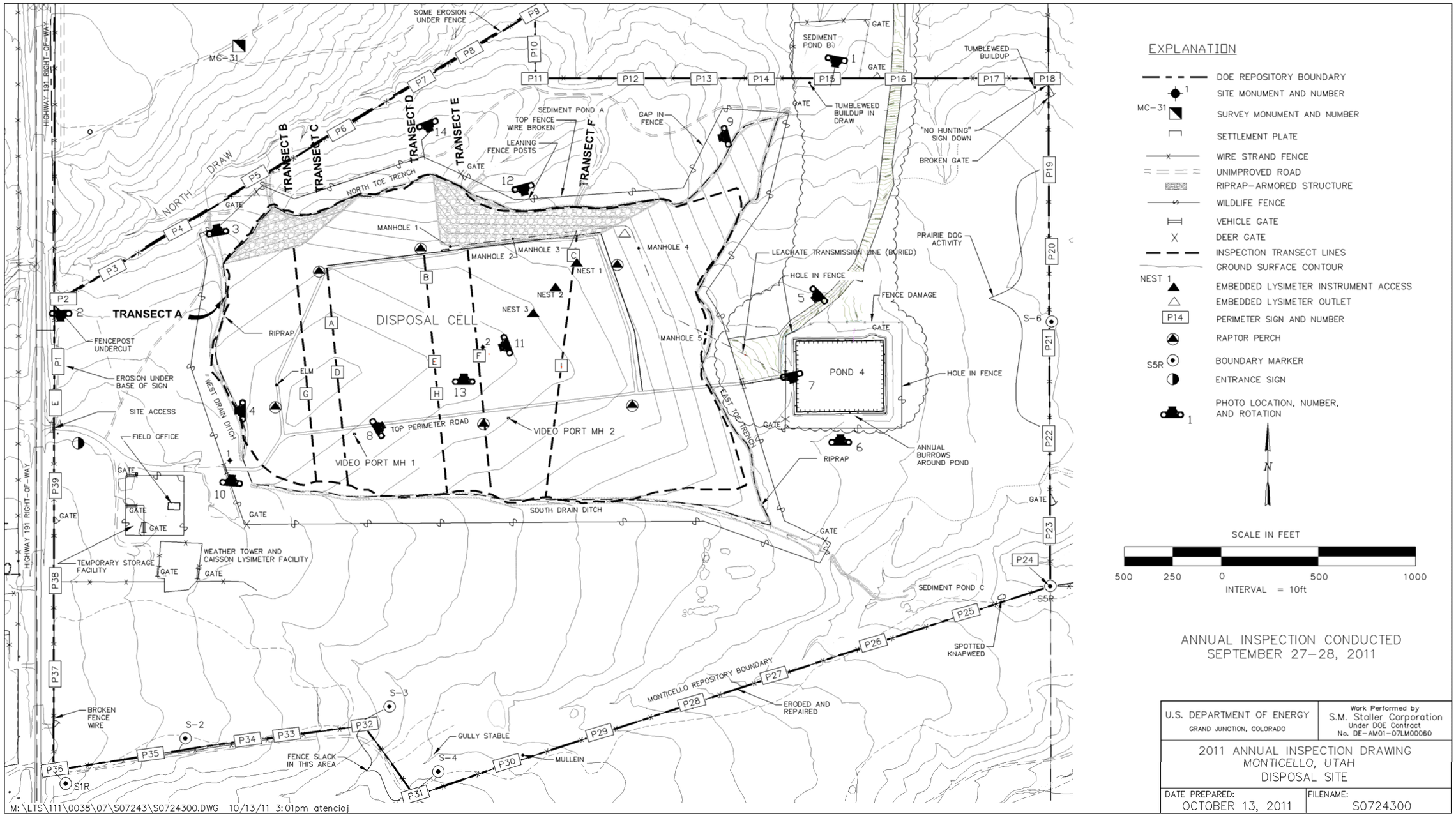

Figure 2. Monticello, Utah, Repository Site

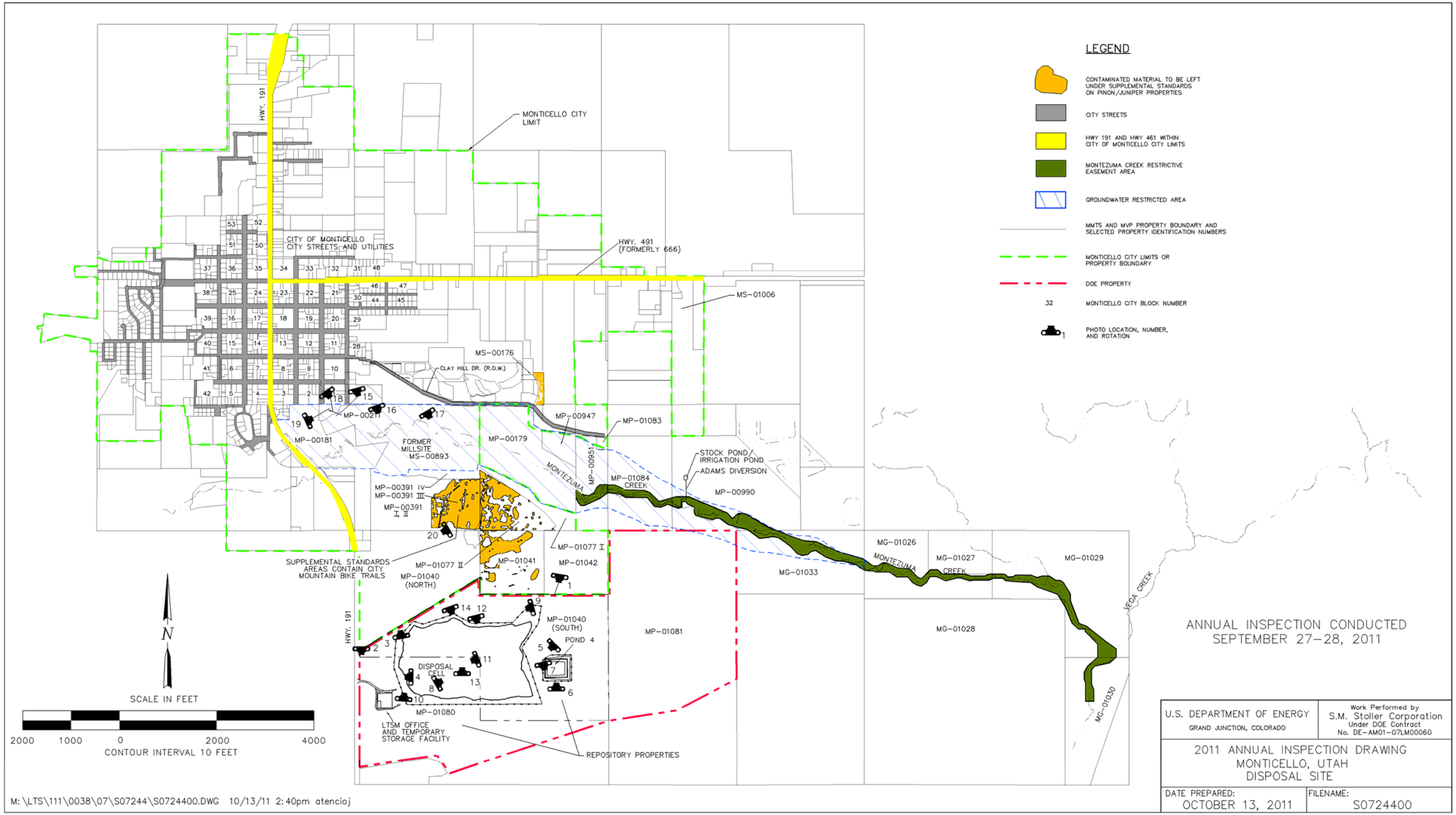

Figure 3. MMTS and MVP Supplemental Standards and Groundwater Restricted Areas

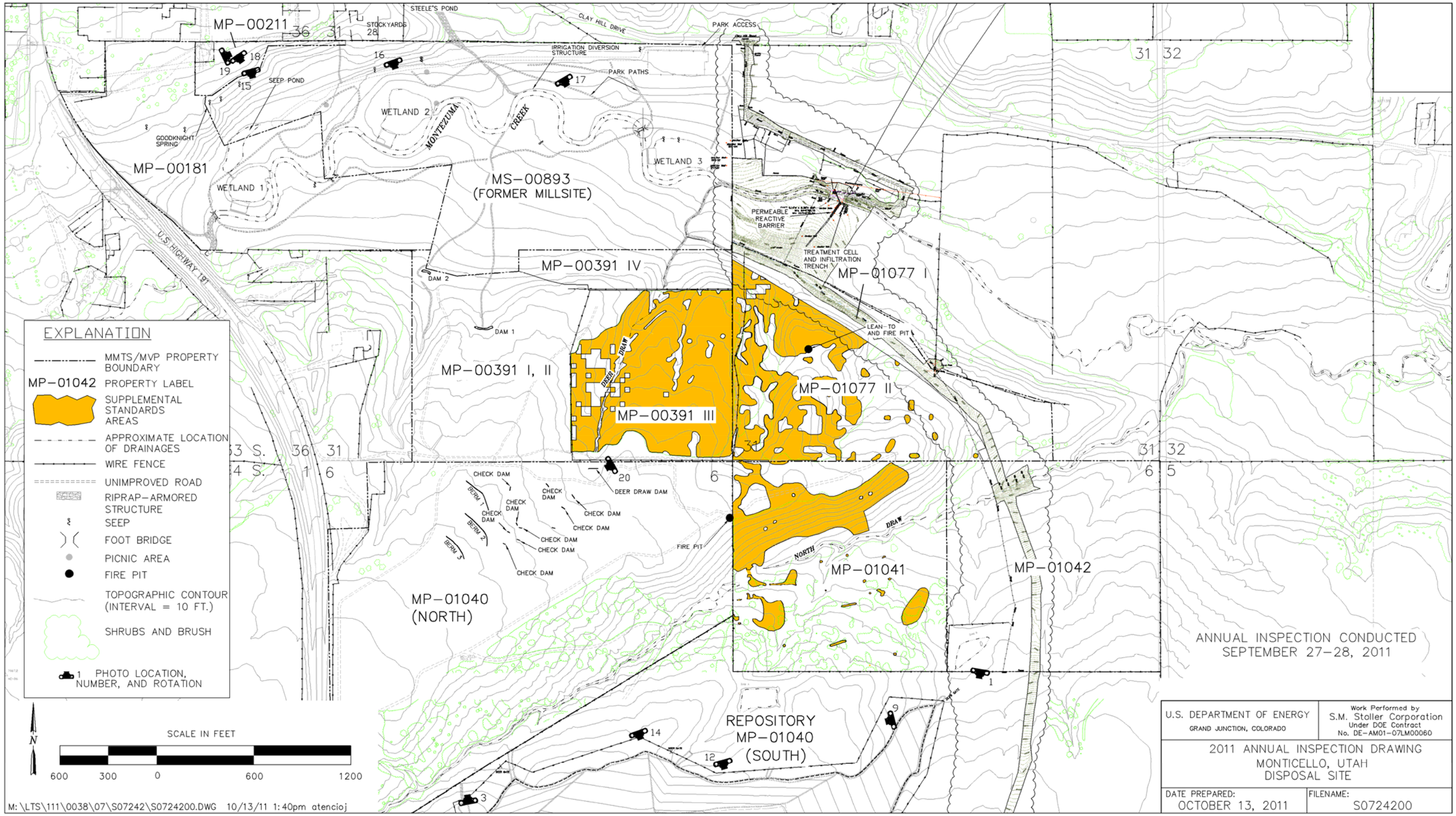

Figure 4. Monticello, Utah, Former Mill Site and Surrounding Area

Appendix A

MMTS & MVP Annual Inspection Checklist

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MMTS: Monticello Mill Tailings (USDOE) Site; Operable Units I, II, and III (UT 3890090035)
MVP: Monticello Radioactively Contaminated Properties (Monticello Vicinity Properties) (UTD 980667208)
Location: Monticello, Utah: EPA Region 8

Note: Section 6.1 of the Long-Term Surveillance and Maintenance Plan contains detailed inspection procedures. See attached maps for the location of site inspection features identified in this checklist.

Annual Inspection Preparation:

The following tasks were completed in preparation for the current MMTS and MVP annual inspection:

	Y	N
Review annual inspection requirements outlined in Section 6.1 of the LTS&M Plan	☒	☐
Schedule site inspection and appoint chief inspector	☒	☐
Review previous reports and records as outlined in Section 6.1.2 of LTS&M Plan	☒	☐
Notes:		
Review OU III water quality data for contaminant trends and distribution	☒	☐
Provide team members with background information, maps, and inspection checklists	☒	☐
Notify EPA and UDEQ at least 2 weeks prior to site visit and invite them to participate	☒	☐
Notify representatives from other agencies as necessary and invite them to participate	☒	☐
Verify names and telephone numbers of parties with access or notification agreements	☒	☐
Verify key contact information listed in Section 6.1.2 of the LTS&M Plan	☒	☐
Contact State Engineer's Office for water well permit applications in/near GWMA	☒	☐
Verify annual contact with UDOT re: planned highway projects for current year	☒	☐
Verify regular contact with City of Monticello re: planned or unplanned excavations	☒	☐

Date(s) of Annual Inspection: 9/27/11–9/28/11

Inspection Team Members

Name	Affiliation	Phone Number	E-mail
Linda Sheader	S.M. Stoller Corp. (Plant Ecologist and curator of Information Repository records and the OU III Administrative Record)	970-248-6711	Linda.Sheader@lm.doe.gov
Paul Wetherstein	S.M. Stoller Corp. (Environmental Compliance)	970-248-6645	Paul.Wetherstein@lm.doe.gov
Jalena Dayvault	U.S. Department of Energy (Site Manager)	970-248-6016	Jalena.Dayvault@lm.doe.gov
Jason Nguyen	U.S. Department of Energy	970-248-6707	Jason.Nguyen@lm.doe.gov

Note: attach additional sheets as needed for any of the following sections.

I. Interviews		
Name of Individual Interviewed	**Affiliation**	**Date Interviewed**
Todd Moon	On-Site LM Representative	September 28, 2011

Notes:
Property 1081 has transferred to a new owner; land use may change to hunting (guest ranch). A very small portion of the property may have groundwater restrictions in place. (Note: no deed restrictions were ever in place for 1081; verified by LS at county recorder's office).

Todd Moon and Montana Carr visited pinyon-juniper properties and inspected day camp area found last year. The lean-to has collapsed, and no new activity was evident.

The City has a grant to gravel the pathways at the former mill site; recently graded. (Note: City Streets and Utilities activities are recorded under Section VIII-A of the checklist.)

Name of Individual Interviewed	**Affiliation**	**Date Interviewed**
	City of Monticello	

Notes:
Individuals from the City of Monticello were not interviewed during the 2011 inspection.

Name of Individual Interviewed	**Affiliation**	**Date Interviewed**
Mark Stilson	State Engineer	October 6, 2011

Notes:
P. Wetherstein contacted M. Stilson by phone to verify that no well drilling permits were issued in restricted areas. No well drilling permits were requested or issued in restricted areas in 2011 for shallow or deep water wells.

Name of Individual Interviewed	**Affiliation**	**Date Interviewed**
Training Department (J. Blanck)	S.M. Stoller	e-mail 9/29/11

Notes:
Training confirmed that rad-related training requirements are up-to-date for T. Moon and M. Carr. No other unescorted personnel entered the TSF since the 2010 inspection.

II. Administrative and Records Inspection

	Readily Available		Current	
1. General LTS&M Documents	**Y**	**N**	**Y**	**N**
Ready access from field office to online manuals (Long-Term Surveillance and Maintenance Plan, Health and Safety Manual, QA Manual)	☒	☐	☒	☐
2. LTS&M Training Records *(ID names in TSF log; verify with Training dept.)*				
On-site employees			☒	☐
City workers *(unescorted workers must have current training)*			☒	☐
3. Public Records *(verify records are present and in order)*				
OU III Administrative Record	☒	☐	☒	☐
Information Repository (Monticello)	☒	☐	☐	☒
Information Repository (Grand Junction)	☒	☐	☐	☒
4. Record Books *(Note: Inspection guidelines are listed inside covers of record books; LTS&M Plan Appendix B contains record book management and entry protocol)*				
Record book entries/documentation	☒ *satisfactory*	☐ *unsatisfactory*		
Repository Site Record Book	☒	☐	☐	☐
TSF Record Book *(see LTS&M Plan Section 3.4)*	☒	☐	☐	☐
City-owned properties *(see LTS&M Plan Section 4.4)*	☒	☐	☐	☐
Private Property Restricted Areas *(see LTS&M Sec. 4.4)*	☒	☐	☐	☐
Public Roads and Utilities Record Book	☒	☐	☐	☐
Documentation/recordkeeping requirements met	☒ *satisfactory*	☐ *unsatisfactory*		
Information readily traced to updated drawings	☒ *satisfactory*	☐ *unsatisfactory*		
Rad scan info for eroded/excavated material	☒ *satisfactory*	☐ *unsatisfactory*		
Entries include TSF transfers	☒ *satisfactory*	☐ *unsatisfactory*	☐ *N/A*	
Entries include info on stockpiled material and follow-up scan results	☒ *satisfactory*	☐ *unsatisfactory*	☐ *N/A*	
Hwy 191/491 entries include information on scan Results and material returned to excavation	☒ *satisfactory*	☐ *unsatisfactory*	☐ *N/A*	
Storm event surveys documented	☐ *satisfactory*	☐ *unsatisfactory*	☒ *N/A*	

Notes for Record Books Inspection:

Update for the Information Repository is overdue; scheduled for October. M. Carr current on Rad Worker II (6/29/11); T. Moon current on Rad Control Tech (7/1/11). Record book entries are not all recorded on as-built maps in some areas north and east of the city; these areas lie beyond the map boundary.

5. Radiological As-Built Drawings		
Drawing updated annually	☒ *satisfactory*	☐ *unsatisfactory*
Documentation/recordkeeping requirements met	☒ *satisfactory*	☐ *unsatisfactory*
Radiological scan information recorded	☒ *satisfactory*	☐ *unsatisfactory*

	Readily Available		Current	
6. Surveillance Checklists and Records				
(Note: Repository and Pond 4 LCRS and LDS monitoring records are sent electronically on a regular basis.)				
TSF Access/Security Logs	☒	☐	☒	☐
Meteorological Monitoring Data, Monthly and Quarterly Repository Surveillance Checklists, and Monthly Pond 4 Surveillance Checklists	☒	☐	☒	☐

Notes for checklist and records inspection:

TSF record book had complete logs, but some entries were not recorded in the entry log. This was corrected. Met data and some quarterly checklists filed out of order; this was also corrected.

7. Agreements *(Note: verify inclusion in Information Repository)*		
DOE/City Cooperative Agreement	☒	☐
DOE/UDOT Memorandum of Understanding	☒	☐
8. Zoning Restriction—Overlay Zone OL-1		
Restriction is verified as current through City for property MP−00211−VL	☒	☐
Restriction is verified as current through City for property MP−00176−VL	☒	☐

9. Deed Restrictions *(verify at San Juan County Recorder's Office, 117 S. Main)*

Properties Transferred from DOE to City of Monticello — **IC Annotations in Place**

DOE ID	Parcel	Document	Book	Page	Y	N
MP−00181−OT	A33230367201& 33S23E367204	E061691	B788	100−113	×	☐
	A34240063004		electronic record		×	☐
MP−00391−VL	33S24E316001	E061691	B788	100−113	×	☐
MS−00893−OT	33S24E315400	E061691	B788	100−113	×	☐
MP−01040−VL (N)	34S24E061200	E061691	B788	100−113	×	☐
MP−01041−VL	34S24E060600	E061691	B788	100−113	×	☐
MP−01042−VL	34S24E060000	E061691	B788	100−113	×	☐
MP−01077−VL	33S24E318400	E061691	B788	100−113	×	☐

Note: Correction to quitclaim deed for properties transferred to City recorded as E062130, B789, P450–452.

Montezuma Creek Soil and Sediment Properties

DOE ID	Parcel	Document	Book	Page		
MP−00990−CS	33S24E324800	E063343	B793	831−852	×	☐
	33S24E328400		B921	474-476	×	☐
	33S24E324802		electronic record		×	☐
MG−01033−VL	34S24E050000	E063343	B793	831−852	×	☐
MS−01026−VL	34S24E043000	E063343	B793	831−852	×	☐
MS−01027−VL	34S24E042400	E063343	B793	831−852	×	☐
MG−01030−VL	34S24E047200	E063255	B793	526−538	×	☐
MG−01029−VL	34S24E040000	E063219	B793	390−404	×	☐
	34S24E040001		electronic record		×	☐
MP−00951−VL	33S24E317200	E063926	B796	188−202	×	☐
	33S24E317204		electronic record		×	☐
MP−01084−VL	33S24E326000	E063926	B796	188−202	×	☐

Note: Correction to warranty deed for MP−01084−VL recorded as E073394, B830, P611.

Utah Department of Transportation Properties

DOE ID	Parcel	Document	Book	Page		
MS−00895−OT	A33230367811	E068703	B814	533	×	☐
	A33230367825		electronic record		×	☐
MS−00892−OT	A33230367202	E068704	B814	534	×	☐
MS−01021−OT	A33230367812	E068705	B814	535−536	×	☐
MS−01020−OT	A33230369001	E068706	B814	537−538	×	☐

Notes for deed restriction inspection:

New records added to above table to reflect properties sold or divided. Oil and gas leases are in effect for Properties MP-00951-VL and MP-01084-VL.

III. Repository Inspection

A. Access Area

1.	**Site Access Sign/Emergency Information**	×	Satisfactory	☐ Repairs/Maintenance Needed
2.	**Field Office**	×	Satisfactory	☐ Repairs/Maintenance Needed
3.	**Temporary Storage Facility**	×	Satisfactory	☐ Repairs/Maintenance Needed
	Bin cover	×	Functional	☐ Not Functional
	Approximate volume of bin contents (cubic yards) 6			
	Health and safety/rad postings	×	Appropriate	☐ Inadequate
	Drums and secondary containment	×	Good condition	☐ Unavailable/not good condition
	Vandalism/trespassing	×	Not evident	☐ Evident (locate on map)

Describe access area repairs/maintenance needed:

Drums and secondary containment stored in shed; on-site personnel reported condition. Noxious weed, Russian knapweed, found along fence and in fenced lot; treatment planned in October 2011.

B. Repository Perimeter *(Note locations of erosion, noxious weeds, vandalism, or excessive vegetation on map)*

1. Outer Fencing and Gates ☐ Satisfactory ☒ Repairs/Maintenance Needed

2. Signs *(Note condition of 40 numbered reference signs and posts)*
Signs damaged but legible, requiring monitoring: P12, P15 (scratched but legible)
Signs requiring replacement: none

3. South Boundary Markers ☒ All six markers located ☐ Marker(s) _____ not located

4. Erosion/Gullying ☒ Not evident ☐ Evident

5. Vegetation ☒ Not excessive ☐ Excessive growth
☐ Noxious weeds absent ☒ Noxious weeds present

6. Land use changes on adjoining property ☒ No change ☐ Change

7. Vandalism/trespassing ☒ Not evident ☐ Evident

Notes for condition of repository perimeter (e.g., repairs needed, erosion areas, vandalism):
Minor repairs needed for outer fencing and gates, especially broken gate near P18. No new erosion. Noxious weeds found – spotted knapweed near entrance gate and between P24 and P25; field bindweed does not require control; will spray mullein near P30.

C. Repository Runoff/Run-On Controls *(North and East Toe Drains; South and West Drain Ditches)*

1. Settlement ☒ Not evident ☐ Evident

2. Material Degradation ☒ Not evident ☐ Evident

3. Erosion/gullies ☒ Not evident ☐ Evident

4. Siltation ☒ Not evident ☐ Evident

5. Obstructions ☒ Not evident ☐ Evident

6. Excessive Vegetation ☒ Not evident ☐ Evident

Notes for condition of repository runoff and run-on controls *(Note: locate all areas of concern on map)*:
No changes observed since 2010. Elm tree in West Drain Ditch not currently obstructing flow, but should probably be removed in future. Shrubs in ditches not obstructing flow.

D. Pond 4 *(Note: locate all areas of concern on map)*

1. Perimeter Fence and Access Gate ☐ Satisfactory ☒ Unsatisfactory

2. Erosion/Biointrusion of Pond Berm ☐ Not evident ☒ Evident

3. Safety Equipment
Pond barrier rope intact ☒ Yes ☐ No
Personal floatation device posting present and visible ☒ Yes ☐ No
PFD storage containers appropriately marked and in good condition ☒ Yes ☐ No
PFDs accessible, in good condition, and appropriately sized ☒ Yes ☐ No

4. Pond 4 LCRS and LDS Electrical Housing/Surface Installations
Physical condition is: ☒ Satisfactory ☐ Unsatisfactory

5. Liner—Holes/Cracks/Tears ☒ Not Evident ☐ Evident

6. Liner Anchors ☒ Intact ☐ Not intact

7. Siltation and Vegetation in Pond 4 ☐ Not evident ☒ Evident

8. Pond 4 Water Level Estimated water depth is < 1 ft.

9. Vandalism ☒ Not evident ☐ Evident

Notes for condition of Pond 4 features:

Security fence was damaged in many places by drifting and melting snow. Most broken areas repaired in spring 2011 by on-site personnel. Two additional holes have developed in the fence that could allow human or animal access and require repair. The pond liner is scheduled to be repaired. Animal burrows, chiefly from voles, occur on and below the pond berm on all sides. These burrows are shallow and do not threaten the integrity of the berm.

E. Repository Cover Inspection

1.	**Top Perimeter Road and Road to Pond 4**	☒ Satisfactory	☐ Unsatisfactory
2.	**Interior Wildlife Fence and Wildlife Gates**		
	Physical condition is:	☐ Satisfactory	☒ Unsatisfactory
	Wildlife gates are:	☒ Open	☐ Closed
3.	**Cover Vegetation**		
	See attached Repository Cover Vegetation Index form; note areas of concern on map		
4.	**Rip-Rap Armoring**		
	☒ Slumping/sliding not evident	☐ Slumping/sliding evident (locate on map)	
	☒ Rock deterioration not evident	☐ Rock deterioration evident (locate on map)	
5.	**Settlement/Desiccation/Erosion/Gullies**		
	☒ Settlement depressions not evident	☐ Settlement depressions evident (locate on map)	
	☒ Desiccation cracking not evident	☐ Desiccation cracking evident (locate on map)	
	☒ Erosion/gullies not evident	☐ Erosion/gullies evident (locate on map)	
6.	**Holes/Burrows/Biointrusion**		
	☐ Holes/burrows/biointrusion not evident	☒ Holes/burrows/biointrusion evident (locate on map)	
7.	**Seepage/Ponding**		
	☒ Seepage not evident	☐ Seepage evident (locate on map)	
	☒ Ponding not evident	☐ Ponding evident (locate on map)	
	☒ Soft subgrade not evident	☐ Soft subgrade evident (locate on map)	
	☒ Phreatophytes not present	☐ Phreatophytes present (locate on map)	
8.	**Site Monument at apex of cover**	☒ Satisfactory	☐ Repairs/maintenance needed
	Site Monument at boundary gate	☒ Satisfactory	☐ Repairs/maintenance needed

Notes for repository cover inspection:

Hole in northeast portion of wildlife fence requires repair; location noted on map. An increased number of animal burrows, mostly by voles, found on cover. Burrows along surface water exclosure for lysimeter may affect functioning of exclosure.

F. Cover Penetrations *(Caution: confined space entry requirements in effect for all manholes)*

1.	**Manholes 1 and 3 (LCRS and LDS access vaults)**		
	Covers secure and operable	☒ Yes	☐ No
	Exterior pump access ports are undamaged	☒ Yes	☐ No
	Evidence of leakage into vaults	☐ Yes	☒ No
	Evidence of drainage through cover penetrations	☐ Yes	☒ No
	Telemetry surface installations in good condition	☒ Yes	☐ No
	Vaults are posted as confined-spaces	☒ Yes	☐ No
2.	**Manholes 2, 4, and 5**		
	Covers secure and operable	☒ Yes	☐ No
	Evidence of drainage through cover penetrations	☐ Yes	☒ No
	Manholes are posted as confined-spaces	☒ Yes	☐ No

Notes for condition of manholes:

3.	**LCR Video Ports (check covers only; ports are inoperable)**		
	Covers secure and operable	☒ Yes	☐ No
	Evidence of drainage through cover penetrations	☐ Yes	☒ No
4.	**Settlement Monuments (A to I)** *(Note: plates surveyed during 5-year reviews only)*		
	Surface completions undamaged	☒ Yes	☐ No
	Inner plates undamaged	☒ Yes	☐ No
5.	**Embedded Lysimeter**		
	Evidence of seepage at outlet	☐ Yes	☒ No
	Instrumentation installations undamaged	☒ Yes	☐ No
	Evidence of drainage along cover penetrations	☐ Yes	☒ No
	Telemetry surface installations in good condition	☒ Yes	☐ No

6. Operation of Repository and Pond 4 LCRS and LDS (interview on-site LM operator)

LCRS and LDS pumps, water level sensors, and flow meters are fully operational	☒ Yes	☐ No
Telemetry system is fully operational	☒ Yes	☐ No
Leachate production is below action levels	☒ Yes	☐ No
Leachate production rates are stable	☒ Yes	☐ No
Water levels do not exceed top of sumps	☒ Yes	☐ No
Monitoring data are managed through SOARS	☒ Yes	☐ No

Pumping rates (gallons/week): LCRS 1 < 1000 LCRS 2 < 1000 LDS 1 0
LDS 2 0 Pond 4 LCRS 1 0 Pond 4 LDS 1 0

Notes for cover penetrations inspection and operation of LCRS/LDS:
Information summarized from quarterly reports. No anomalies reported.

IV. City-Owned Properties Inspection

A. City-Owned Properties Transferred from DOE

(MP–00181, MP–00391, MS–00893, MP–01040 (North Portion), MP–01041, MP–01042, and MP–01077)

Property	181		391		893		1040		1041		1042		1077	
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Accessible to public	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Evidence of camping	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Habitable structure(s)	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Gullies/erosion	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Runoff/drainage controls intact and in good repair (ditches, riprap structures, dams, check dams, berms)	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Land use changes	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Evidence of vandalism	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Soil removal evident	n/a		☐	☒	n/a		n/a		☐	☒	n/a		☐	☒
Water well installation	☐	☒	n/a		☐	☒	n/a		n/a		n/a		☐	☒
Wetland/creek damage	☐	☒	n/a		☐	☒	n/a		n/a		n/a		n/a	
Supp. Stds. fence intact	n/a		☐	☒	n/a		n/a		☒	☐	n/a		☐	☒

Describe any violations of institutional controls and/or repair/maintenance issues (locate on map):
Supplemental standards fence was cut in several places to access mountain bike trails. No significant new erosion or gullies observed in 2011. Construction continues on Properties MP–00211 and MP–00181, but no excavation is involved. City has graded paths and will probably gravel the surface. Supplemental standards areas were inspected by on-site personnel in early September 2011; no new disturbance was found.

B. City-Owned Property MP−00211

	Yes	No	N/A
Evidence of excavation or construction	☒	☐	
If yes, confirm the following with on-site LM representative:			
In accordance with Monticello zoning district Overlay Zone (OL-1)	☐	☐	☒
Violation has been reported	☐	☐	☒
Radiological contamination was encountered	☐	☐	☒
Radiological contamination was appropriately managed	☐	☐	☒
Corrective action required	☐	☒	

Notes for City-owned property MP–00211 inspection:
Construction in filled areas only

V. Montezuma Creek Soil and Sediment Properties

(Note: Refer to Plates 2 and 3 in the LTS&M Plan for boundary of restricted areas on these properties: MP–00951, MP–00990, MP–01084, MG–01026, MG–01027, MG–01029, MG–01030, and MG–01033)

Evidence of habitable structures within the restricted area	☐ Yes	☒ No	
Evidence of soil removal from the restricted area	☐ Yes	☒ No	
Land use/ownership has changed *	☒ Yes	☐ No	
Land owners are aware of use restrictions *	☒ Yes	☐ No	
Violations have been reported *	☐ Yes	☐ No	☒ N/A
Corrective action required	☐ Yes	☒ No	

Notes for Soil and Sediment Properties inspection:

* *confirm with on-site LM representative*

VI. Groundwater Management Area

(Note: the boundary of the Groundwater Management Area [GWMA] is shown in Plate 4 of the LTS&M Plan and includes the following properties: MP–00181, MS–00893, MP−00211, MP−00179, MP−00947, MG−00951, MG−01084, MG−00990, and MG−01033)

Evidence of water well installation within the restricted area *	☐ Yes	☒ No	
No permits for water well installation within the restricted area †	☒ Yes	☐ No	
Violations have been reported *	☐ Yes	☐ No	☒ N/A
Land ownership has changed *	☐ Yes	☒ No	
Landowners are aware of water use restriction*	☒ Yes	☐ No	
Corrective action required	☐ Yes	☒ No	

Notes for Groundwater Management Area inspection:

* *confirm with on-site LM representative*
† *confirm with State Engineer's Office*

VII. OU III Monitoring Wells and Water Treatment Systems

A. Monitoring well surface completions *(Note: active wells are inspected and maintained twice annually during sampling events. Inactive wells are inspected during the annual inspection [see attached map for locations])*

	Yes	No
Active wells in working condition (verify with sampling teams)	☒	☐
Outer casing or flush mount vault intact	☐	☐
Wells are locked/flush mount well lids secured	☐	☐

Notes for inactive monitoring well inspection (note location of any maintenance issues on map):

Inactive wells were not inspected during annual inspection due to restricted land access. Inspected by well sampling crew in October 2011. No anomalies found.

B. Permeable Reactive Barrier (PRB) and Auxiliary Treatment Cells and Infiltration Trench

	Yes	No
Electrical panel, antenna, fence, and vault access in satisfactory condition	☒	☐
Evidence of ponded water or saturated soil	☐	☒
Evidence of surface disturbance	☐	☒
Evidence of stressed vegetation	☐	☐

Notes for PRB and treatment cells inspection:

Structures not inspected during annual inspection due to land access. Structures maintained by Environmental Sciences personnel. No problems reported.

VIII. MVP Field Inspection

A. City Streets and Utilities

Roads/Utilities under Construction	Y	N
Unmonitored excavations observed during inspection	☐	☒
Planned excavations are identified by on-site LM representative	☒	☐
Radiological material is properly controlled and managed	☒	☐
The utility locator service is contacted regularly by the on-site LM representative	☒	☐

Notes for city streets and utilities inspection:

Gas lines south of Main Street finished; no new excavations are planned. In 2012, construction will begin north of Main Street. Street excavations related to a new Maverick gas station on Highway 491 are underway. Excavations related to upgrades at the Port-of-Entry on 491 east of city are also ongoing; no rad-contaminated soils returned to excavations. Excavations related to sewer line north of Monticello along 191 are ongoing. City is resurfacing streets, including milling, but activities do not penetrate to underlying soils. Excavations related to new Outdoor school at 4th and Main also ongoing. All construction areas are monitored.

B. UDOT Highways 191 and 491 Rights-of-Way

1. Roads under Construction	Y	N
Unmonitored excavations observed during inspection	☐	☒
Planned excavations are identified by on-site LM representative	☒	☐
Radiological material is properly controlled and managed	☒	☐
The local UDOT official is contacted periodically by the on-site LM representative	☒	☐

Notes for UDOT highways inspection:

See above.

2. Erosion *(highway shoulders and Highway 191 embankment at Montezuma Creek)*

☐ New erosion evident ☒ Previous erosion evident; unchanged ☐ No erosion evident

Eroded material scanned for radiological contamination and properly managed

☐ Yes ☐ No ☒ N/A

Describe erosion noted on UDOT highways:

C. Property MS−00176 *(Note: observations and activities for MS−00176−VL are recorded by the on-site LM representative in the Private Properties Restricted Areas Record Book)*

Monticello zoning district Overlay Zone (OL-1) requires radiological scanning of the footprint of new habitable structures. Radiologically contaminated material is removed under the direction of the on-site LM representative.

	Y	N
Unmonitored excavations observed during inspection	☐	☒
Planned excavations are identified by on-site LM representative	☒	☐
Site conditions indicate ICs properly implemented	☒	☐

Notes for Property MS–00176 inspection:

IX. Photo Log *(attach additional pages as necessary)*		
Photo No.	**Feature Photographed**	**Description** (include photo location on map)
Note: numbers in parentheses indicate the photo number used in this report		
1	Pond 4	Entrance signs
2 (6)	Pond 4	Animal burrows on south berm and below
3	Pond 4	Close-up of animal burrow on southeast berm
4	Pond 4	Hole in east fence
5 (5)	Pond 4	Hole in north fence
6 (7)	Pond 4	Water, silt and vegetation (including *Tamarix*) in pond
7 (10)	Repository Cover	Monument at west access gate through wildlife fence
8	Repository Cover	Cell top from southwest corner, looking northeast
9 (8)	Repository Cover	Cell top from access road, south central portion
10 (13)	Repository Cover	Animal burrow on cover
11 (11)	Repository Cover	Cover vegetation, view west from monument
12	Repository Cover	Burrows on lysimeter surface runoff structure
13	Repository Cover	Drainage below East and North Toe Trenches
14 (9)	Repository Cover	Gap in wildlife fence at northeast area
15 (12)	Repository Cover	Cell side slope showing vegetation
16 (14)	Repository Cover	Cell north side slope
17	Repository Cover	West Drain Ditch, view north-northwest
18 (4)	Repository Cover	Former erosion area near West Drain Ditch
19	City-Owned Properties	Wetland 2
20 (16)	City-Owned Properties	Wetland 2 and hillside (south side of mill site)
21 (17)	City-Owned Properties	View toward Wetland 3 and south hillside
22	Repository Perimeter	Gully along west fence, filling in
23	Repository Perimeter	Gully with rock fill near P1
24 (2)	Repository Perimeter	Posts in gully, filling in over time
25	Repository Perimeter	Posts in gully
26	Repository Perimeter	Northwest site perimeter fence
27 (3)	Repository Perimeter	Drainage from West Drain Ditch offsite to North Draw
28	Repository Perimeter	Drainage near P7 showing no new erosion
29	Repository Perimeter	Sign P12, scratched but legible
30 (1)	Repository Perimeter	Sign P15, scratched but legible
31	Repository Perimeter	East perimeter fence, view to the north
32	Repository Perimeter	Draw near Sign P27 showing no new erosion
33	Repository Perimeter	Stable gully between P31 and P32
34 (20)	City-Owned Properties	Deer Draw Dam
35 (19)	City-Owned Properties	Stockpiled materials (MP–00211)
36	City-Owned Properties	Stockpiled materials
37	City-Owned Properties	Fill material
38 (18)	City-Owned Properties	Newly graded bike/walking path on former mill site
39 (15)	City-Owned Properties	Wetland 1

Repository Cover Vegetation Index
Monticello, Utah

Date inspected: __9/27/11___ Inspected by: __L. Sheader, J. Dayvault, J. Nguyen_____

Dominant species present on the repository cover at time of inspection (Note: dominant species make up an estimated 10% or more of the vegetative cover):

Species Name	Growth Form			Life Cycle		Vegetation Type		
	Shrub	Grass	Other	Annual	Perennial	Native	Weedy	Other
Artemisia tridentata	x				x	x		
Pascopyrum smithii		x			x	x		
Agropyron cristatum		x			x			x
Pseudoroegneria spicata		x			x	x		
Bromus inermis		x			x			x
Thinopyrum intermedium		x			x			x

Less common species present on repository cover: _*Medicago sativa*, *Helianthus annuus*, *Machaeranthera* sp., *Bromus tectorum*, *Tragopon dubius*, *Gutierrezia sarothrae*, *Elymus trachycaulus*, *Astragalus cicer*, *Salsola tragus*, *Viguiera multiflora*, *Sphaeralcea coccinea*, *Sphaeralcea parviflora*, *Sphaeralcea grossulariifolia*, *Sisymbrium altissimum*, *Lactuca serriola*, *Krascheninnikovia lanata*,

Noxious weed species present (record locations on map or GPS): _*Convolvulus arvensis* (scattered in small populations in places on cover; not spreading)

Additional notes: _

Vegetation Condition Score (see reverse): _3.67__

Notes:
(Has the composition of vegetation changed, including plant diversity? If so, how? Describe any evidence of vegetation disturbance or relevant climate factors. If the vegetation score is less than 3.0, provide explanation and/or recommendation(s).)

Many sagebrush seedlings observed; some fresh vole burrows; several old burrows from larger animals. Vegetative cover condition score has fluctuated slightly down from 2010 but remains high. Cover in very good condition.

Condition of Vegetative Cover (indicate number in each row that best represents current conditions):

Indicator	1	2	3	4	5
Composition of Plant Cover (estimated visually)	Annual weeds dominant; non-weedy perennial species <20% of total cover	Annual weeds abundant and expanding; non-weedy perennial species 20–40% of total cover	Annual weeds present and expanding; non-weedy perennial species 40–60% of total cover	Some weeds present; non-weedy perennial species 60–80% of total cover	No obvious weeds; non-weedy perennial species exceeding 80% of total cover
Total Plant Cover (visual estimate)	Canopy cover less than 30%	Canopy cover 30–50%	Canopy cover 50–70%	Canopy cover 70–90%	Canopy cover over 90%
Bare Soil	Mostly bare soil	Large areas of bare soil	Moderate areas of bare soil	Few areas of bare soil	No obvious areas of bare soil
Diversity of Dominant Species	One species dominant across site	2–3 species dominant across site, one or both of which are weedy; species occur in patches	2–3 species dominant across site, both of which are non-weedy; species evenly distributed with some monoculture patches	More than 3 species dominant across site, at least 2 of which are non-weedy perennials; few patches of monocultures	More than 4 non-weedy perennial species dominant across site; few to no patches of monocultures
Diversity of Trace Species	0–1 non-weedy trace species observed on cover	2 non-weedy trace species observed	3–4 non-weedy trace species observed	5–6 non-weedy trace species observed	7 or more non-weedy trace species observed
Plant Residue	No plant residue on soil surface	1–10% of soil surface covered with plant residue	10–20% of soil surface covered with plant residue	20–30% of soil surface covered with plant residue	30–70% plant residue on soil surface
Standing dead vegetation (visual estimate)	Standing dead >25%	Standing dead 15–25%	Standing dead 5–15%	Standing dead <5%	No obvious standing dead
Erosion	Sheet erosion visible; rills/gullies present OR blowouts or dunes forming	Sheet erosion visible; some small rills present OR soil swept from on site causing burial or abrasion of vegetation	Sheet erosion not obvious; no visible rills or rills stabilized OR soil swept from off site causing burial or abrasion	No obvious sheet erosion; rills not present or fully stabilized OR some soil deposition from off site without burial or abrasion	No visible signs of current or past sheet or wind erosion.
Disturbance	Evidence of mass disturbance to several species of vegetation (fire, animal damage, etc.)	Evidence of some disturbance to several species of vegetation OR major disturbance to one species	Evidence of minor disturbance to one or two species of vegetation; localized to individual patches	Evidence of minor damage to individual plants only; disturbance not sitewide	No evidence of disturbance to any plant species or individual plants
Total each column	0	1	1	5	2

Add up all columns for total condition score:

0 (Column 1) × 1 = 0
2 (Column 2) × 2 = 4
1 (Column 3) × 3 = 3
4 (Column 4) × 4 = 16
\+ 2 (Column 5) × 5 = 10
33 Total

Divide total by 9 to calculate vegetative cover condition score = 3.67

Attachment 2

CERCLA Five-Year Review Announcements

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U.S. DEPARTMENT OF ENERGY | Legacy Management

Notice of CERCLA Five-Year Review for the Monticello Mill Tailings Site and the Monticello Vicinity Properties

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is conducting the fourth Five-Year Review of the remediation remedies for the Monticello Mill Tailings Site (MMTS) and the Monticello Vicinity Properties (MVP) in Monticello, Utah, being conducted under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The purpose of the review is to ensure the CERCLA remedies remain protective of human health and the environment.

The remedies included removing and relocating approximately 2.5 million cubic yards of uranium mill tailings and radiologically contaminated soil and debris from the mill site, adjacent properties, and vicinity properties to a permanent repository constructed south of Monticello. Land use restrictions, in conjunction with alternate cleanup 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.

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 land owners, local government, and State of Utah officials for comments and concerns regarding remedy effectiveness and administration of the sites. The review will begin in November 2011 and conclude in June 2012. A Five-Year Review Report will be prepared at the conclusion of the review to document and present the findings. The final report will be available on the LM website at **http://www.lm.doe.gov/monticello/Sites.aspx**.

Results of the last Five-Year Review, conducted in 2007, are available at **www.lm.doe.gov/Monticello/5yr_mmts2007.pdf**. For more information, visit the LM website located at **www.lm.doe.gov/monticello/Sites.aspx**, or contact:

Jalena Dayvault
Monticello Site Manager
DOE Legacy Management
(970) 248-6016
jalena.dayvault@lm.doe.gov

or

Judy Miller
Monticello Site Public Affairs
S.M. Stoller Corporation
(970) 248-6363
judy.miller@lm.doe.gov

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Attachment 3

CERCLA Five-Year Review Interviews

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Interviews for the MMTS and MVP 2012 CERCLA Five-Year Reviews

As part of the five-year reviews for the MMTS and MVP, a public affairs 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 during January 2012 in Monticello and by telephone.

Interviewees and their relation to the sites are listed below.

Steve Young, Victims of Mill Tailings Exposure
Kedric Somerville, peripheral property owner
John and Charlotte Johnson, peripheral property owner
Jackie and Pete Steele and their daughter, Stacey, peripheral property owner
Chet Johnson, Utah Department of Transportation, Monticello office
Barbara Pipkin, Victims of Mill Tailings Exposure
Doug Allen, Mayor of Monticello
Kelly Pehrson, Monticello City Manager

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

Steve Young, Victims of Mill Tailings Exposure
Date of Interview: January 23, 2012
Location: Telephone

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: I haven't really had any dealings with management of the site. I'm discouraged with what they're doing as far as following through on the concerns I have with the community. As far as the management, I haven't had any dealings with DOE. I don't think they care about the people of the community. I don't know who's overseeing it anymore.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: I don't have any property around the site.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: Yes. I'm definitely concerned about the past. I don't know what the safety level is now or not.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: There's concern in the community about if it was cleaned-up right and if it's safe now. I know when we did all the tree planting down there everyone's concern was that this is terrible soil; is it safe?

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

Response: On the soil I would say so. I'm not sure on the groundwater, what's being done on it.

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

Response: There are probably concerns and I think it's mainly trust-level. I don't think they trust the DOE. I think that's just the history of DOE and Monticello. What they say and what they do is not the same.

Question: Is there adequate communication, response, involvement, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: I don't have any involvement.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: DOE should be more involved in making the area a park instead of just a covered wasteland. So people can go down there and enjoy the paths. DOE should have a part of that. The site should be developed more as a park.

Question: How do you keep informed about site activities?

Response: I usually ask the City or I hear things through word-of-mouth in the community. I also get the LM Program Update. That helps.

Question: Can you suggest anyone else we should talk to?

Response: My son, Reed Young. He has property near the site and he has concerns.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: Yes.

Question: Any other comments?

Response: My concerns are health issues and DOE walking away from them. It's their responsibility to help with health issues and find a solution. Because they're real.

Kedric Somerville, peripheral property owner
Date of Interview: January 25, 2012
Location: Monticello DOE Office

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: I don't really have any objections to anything. It's being managed just fine. I think it's very good.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: No.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: No.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: I don't know of any. Sometimes information leaks out but I haven't heard anything negative.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: No. Once in a while there's some activity with motorcycles and wheelers. There was a situation once when two City employees got out there and we reported it. That sort of thing comes along occasionally. I used to monitor that because at one time the City asked me to but I don't continue.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

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 don't think so.

Question: Is there adequate communication, response, involvement, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: I don't think there have been any problems at all. They've been very good about informing me about site activities. Excellent.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: Hunting on the mill site has been a real sore issue but there's been a lot of progress made with the City finally taking some responsibility. They established a plan allowing archery on the mill site and no firearms, which was a good decision. I still don't think they have the mill

site properly signed. They have some small signs prohibiting ATV use and a little sign with icons so small that you can't see them. I've talked to the City and DOE about it. A sign that's big enough for people to read should be posted at both entrances to show people what they can and can't do on the mill site. Nobody knows what they can and can't do because it's not posted.

Question: How do you keep informed about site activities?

Response: If it involves me, they contact me by phone and let me know the day and time and if they want me to be available. I receive the LM Program Update. I read it to see if there's anything about the Monticello site.

Question: Can you suggest anyone else we should talk to?

Response: Tim Young. He bought the property from Rye and Diane Nielson.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: Yes.

Question: Any other comments?

Response: I have a question about reimbursement for electricity. I will ask DOE. I think everything's going really well.

John and Charlotte Johnson, peripheral property owner
Date of Interview: January 25, 2012
Location: Their home

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: I don't think they've been doing a lot. No different than five years ago. I don't like how they sold parcel 1081.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: We're aware of the restrictions. We're restricted from building on the property next to the mill site. The restrictions are effective in meeting their intended objective.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: No.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: No.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: No. Not so far.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

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. I think everyone's forgotten it's even there.

Question: Is there adequate communication, response, involvement, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: They're doing all right as far as I know.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: No. Seems to be going okay.

Question: How do you keep informed about site activities?

Response: They send us the LM Program Update. You can take us off that mailing list. They let us know what's going on at the Monticello office. If I want something I go up there and talk to them. I can't get anyone from Grand Junction to return my calls but we haven't called in a while. The onsite personnel do a good job.

Question: Can you suggest anyone else we should talk to?

Response: No.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: DOE – yes. UDEQ – no. EPA – no.

Question: Any other comments?

Response: No. They ought to allow grazing around the buffer zone.

Jackie and Pete Steele and their daughter Stacey, peripheral property owner
Date of Interview: January 25, 2012
Location: Monticello DOE Office

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: I don't think it's changed too much over the years. We don't have a positive feeling about DOE. The DOE insisted on cleaning up their property. We didn't agree with their assessment of the property. The follow-up with supplemental standards has been lax. They only cleaned up certain hot areas. I don't think DOE was consistent on cleanup. I don't think they did a good job of cleaning up the town. For the current management, the supplemental standards property has been left alone and the property adjacent to the mill site has been left alone. As far as the mill site itself, I believe it was turned over to the City and so I doubt that the DOE has any management of it except I do believe the City was supposed to follow certain regulations on erosion and that is not being followed. DOE has double standards. We must adhere to DOE regulations but they don't adhere to their own.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: We are aware of it verbally but it may not be attached to the deed. The restrictions are not effective because we're not supposed to build in the bottom of the property and we know there are certain restrictions on that land. However, someone else grew alfalfa there.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: Yes. I don't think it was adequate. I think that everything on the bottom of that creek is still as hot as it was before. In all fairness, I need to tell you that I worked on the cleanup. I was on the assessment team and the verification team and I was working in the creek and when I was working down there that was the whole reason I quit. I tried to be a whistle blower and nothing came of it. There is still contamination down there. When they did the creek, they just took out the hottest of the hottest and the worst of the worst.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: No. Except there are concerns about the ongoing cleanup.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: Yes. The alfalfa field down by the creek and they built a house down there. At the mill site, there's a lack of erosion control and vegetation and trees.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

Response: No, because there's still contamination in and around Monticello. At the mill site there's maybe groundwater contamination.

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

Response: Yes. The City isn't doing erosion control. The City is not following supplemental standards.

Question: Is there adequate communication, response, involvement, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: We don't have any involvement.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: No.

Question: How do you keep informed about site activities?

Response: We live right next to the site. Newspaper.

Question: Can you suggest anyone else we should talk to?

Response: Doug and Colleen Eldridge and Clay Pehrson.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: Yes.

Question: Any other comments?

Response: No.

Chet Johnson, Utah Department of Transportation, Monticello office
Date of Interview: January 26, 2012
Location: UDOT Monticello Office

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: I think it's good.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: No.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: No.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: I have not.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

Response: I do.

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, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: There's plenty. They're good.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: Keep on the way things are. I think they're good.

Question: How do you keep informed about site activities?

Response: Personal contact with Todd and Montana.

Question: Can you suggest anyone else we should talk to?

Response: No.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: Yes.

Question: Any other comments?

Response: Working well down there. No issues that I've heard of.

Question: Are there specific problems in complying with the terms of the memorandum of understanding?

Response: No.

Question: Do you have any concerns regarding possible mill tailings contamination in UDOT rights-of-way on Highways 191 and 491?

Response: No concerns at all.

Barbara Pipkin, Victims of Mill Tailings Exposure
Date of Interview: January 26, 2012
Location: Her home

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: They've seemed to do a good job post-cleanup. I'm disappointed that the DOE site manager didn't know much about the history of Monticello and the mission of VMTE. Two years ago VMTE planted the first trees down there and I was appalled at the condition of the soil that was used to cover the site. It was boulders and rocks. It wasn't topsoil. After we planted trees at the mill site, we lost two trees and the Rotary Club lost quite a few.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: No.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: I guess I am. People ask us all the time is it clean, is the community safe and we tell them it's probably safer than downtown Salt Lake City, but it's always a factor in the back of your mind. The thyroid issues in the community are rampant.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: I have had people call me. There's always concern in the community and we really try hard to stress that it's safe. I also got a call from a local realtor who said we, VMTE, are ruining her business by calling attention to issues created by the mill. Everything we do publicly, we say the mill site's safe. But still in the community's eyes, they're wondering. We put up a display in the Visitor's Center with instructions on how to get to the mill site, and it was taken down because people thought it was negative publicity.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: Kids are climbing the hills with motorized vehicles.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

Response: I can't comment on groundwater because I don't know how thorough that is. We understand that they're still monitoring the groundwater. The soil, yes, I'm sure that was put in a safe place and they've done all they can do to protect us from it.

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 think so.

Question: Is there adequate communication, response, involvement, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: I don't know. I've never spoken to them.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: Not that the DOE has anything to do with. We have good communication with the City and they're good at addressing our concerns.

Question: How do you keep informed about site activities?

Response: For anything that has to do with DOE, we get the LM Program Update newsletter. Other than that, it's a small town.

Question: Can you suggest anyone else we should talk to?

Response: Mike and Julie Bailey. They live right on the edge of the mill site.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: DOE - Yes. UDEQ - Yes. EPA – No, not since Paul left.

Question: Any other comments?

Response: I don't think so.

Doug Allen, Mayor of Monticello
Date of Interview: January 26, 2012
Location: His office

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: I think they did a good job.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: I'm aware of them. There are certain things you can't build on the site. Meeting their objectives? I think so. I think there's still some confusion. At the Four Corners School, we found they were less restrictive than we thought.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: Not really. There's some in the community who still may have concerns. One of our council members has expressed concerns.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: Just slightly. I think there's still concern that they're still monitoring levels of contamination in the stream and the blackbird study. There is some real concern that it still could be hazardous. Not a great deal, though. Most people think that it's safe and cleaned up. There is some real concern amongst realtors. They'll tell you that when people find out that we had a Superfund site, some people don't want to move here. It does lose business. There's a riff in the community between people helping with the cancer studies and others. There's probably more controversy over that than anything. The VMTE feel it's been cleaned up and they're always touting that it's safe now.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: No.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

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, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: Yes. I think we have a relationship with them and the City group.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: No. I think we're doing fine as far as managing it. We're planting more trees in May. We planted 80 trees last year and hope to do almost that many this year.

Question: How do you keep informed about site activities?

Response: Mostly through City manager and the Public Works crew. I get the LM Program Update and occasionally look at it.

Question: Can you suggest anyone else we should talk to?

Response: Nate Langston, Public Works Supervisor.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: Yes.

Question: Any other comments?

Response: No.

Question: Does DOE maintain adequate communication and support in controlling residual radioactive contamination at utility excavations and other supplemental standards properties?

Response: I believe so. I think we work well and call before we dig.

Question: Are there any plans to change the recreational use of the former mill site?

Response: Not at this time.

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

Response: Tree planting and we redid the paths last year.

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

Response: Not that I'm aware of.

Question: Are there general or specific community concerns regarding the conduct of long-term surveillance and maintenance activities at the MVP supplemental standards properties? If so, please give details.

Response: The blackbird study. We brought that up to DOE saying that we should get the same amount of money for our cancer study.

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

Response: There was correspondence about the irrigation pipeline that blew just above the site about three years ago.

Question: What documents/procedures do you rely on to implement your activities/responsibilities?

Response: Site plan.

Question: What additional assistance would be helpful?

Response: To direct Congress to fund our cancer study.

Kelly Pehrson, Monticello City Manager
Date of Interview: January 31, 2012
Location: Telephone

Question: What is your general impression of the DOE management (remediation and post remediation) of the Monticello Mill Tailings Site (repository, former mill site, supplemental standards properties, groundwater restricted area)?

Response: Overall, really good. I've never had any issues. I don't remember a lot when they cleaned it up but since I've been in this position they've always been in contact with me and kept me up-to-date on everything. The local DOE people are helpful to us.

Question: Are you aware of any restrictions placed on your property regarding land use or groundwater use following remedial actions by DOE?

Response: No, I don't. We were looking to build a City shop down in that area and we were told we could not but I don't know the reasoning. I just know not much building can happen on that property. So, I do not know what the restrictions are on it.

Question: Are you concerned about the level of safety provided by the remedial actions?

Response: No. Not at all.

Question: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response: No.

Question: Have you noticed any unusual activities on the mill site or surrounding properties that may affect the level of protection provided by the remedial actions?

Response: I know that we've had issues with people riding four-wheelers down on the site. We've put up signage but it's hard to keep four-wheelers out of there.

Question: Do you feel the safeguards provided by the site remedy are adequate in protecting the public from contaminated soil? From contaminated groundwater?

Response: Yes. Yes.

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

Response: Our concern is having the DOE help us on those who have cancer. We have a Victims of Mill Tailings Exposure committee who obtained grant money in the past for cancer screening for people who lived here when the mill site was here and that money will run out in September. Screening has helped find many cases of cancer and we have tried many options with DOE and legislators to help us find more funding.

Question: Is there adequate communication, response, involvement, and cooperation with DOE onsite personnel (Todd Moon, Montana Carr) regarding site operations?

Response: Yes. I think it's almost daily with our Public Works staff.

Question: Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or current activities?

Response: No.

Question: How do you keep informed about site activities?

Response: I get a lot of mail and also from local staff.

Question: Can you suggest anyone else we should talk to?

Response: No.

Question: If you had questions or concerns, would you know how to contact DOE/UDEQ/EPA?

Response: Yes.

Question: Any other comments?

Response: No.

Question: Does DOE maintain adequate communication and support in controlling residual radioactive contamination at utility excavations and other supplemental standards properties?

Response: Yes. With all the projects that I've done here since I've been here, they've always been onsite studying the soil as we bring it up.

Question: Are there any plans to change the recreational use of the former mill site?

Response: No. We've talked about ideas like Frisbee golf but we've never moved forward on that.

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

Response: No, not since I've been here. We had a big tree planting project that we did last year where the Rotary club and the VMTE got together. The planted about 100 to 150 trees last year and we put a water system down there. We plan to do that every year.

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 long-term surveillance and maintenance activities at the MVP supplemental standards properties? If so, please give details.

Response: No. I've never heard anything.

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

Response: No.

Question: What documents/procedures do you rely on to implement your activities/responsibilities?

Response: I've never had to document anything. I've never had a problem to document.

Question: What additional assistance would be helpful?

Response: None.

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