

**Department of Energy, Office of Legacy Management  
Monticello Mill Tailings Site Operable Unit III (MMTS OU III)**

Summary of Program Directive #: MNT-08-01

Subject: Biomonitoring – sediment and surface water sampling from former mill site Wetland 3 and the sediment retention pond.

Directive/Task Changes: Conduct sediment and surface water sample collection and analysis for selenium in accordance with the requirements of the attached sampling plan.

Affected Program Documents: Monticello Mill Tailings Operable Unit III Post-Record of Decision Monitoring Plan

Justification: Selenium concentration data collected under Program Directive MNT-08-01 will support the biomonitoring task as required by the Record of Decision for OU III, signed in May 2004. Biomonitoring continues in 2008 because some sediment and surface water samples exceeded levels of concern or toxicity thresholds in 2007.

Effective Date: March 21, 2008

Expiration Date: September 30, 2008

# Sediment and Surface Water Sampling Plan 2008 Field Season

## I. Introduction

The U.S. Department of Energy (DOE) completed surface remediation at the Monticello Mill Tailings Site (MMTS), located near Monticello, Utah, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The remediated area currently supports three large manmade wetlands (Wetlands 1, 2, and 3) and a sediment retention pond, located approximately one mile east of the wetlands. The *MMTS Operable Unit III Post-Record of Decision Monitoring Plan* (DOE 2004) specifies post-remediation monitoring of groundwater, surface water, and sediment for selenium.

Increases in selenium concentrations in ground water and surface water were observed in April 1999 at many OUIII locations while surface remediation was underway. The increases are attributed to the mobilization of naturally occurring selenium abundant in Cretaceous marine shale common to the area. Remediation resulted in fresh exposures of such deposits in the eastern half of the former millsite, over which the alluvial aquifer was subsequently reconstructed. A major source of selenium in the reconstructed area is Seep 2, which discharges into Wetland 3. Selenium has the ability to accumulate in the aquatic food chain, remain for extended periods of time, and potentially harm organisms, particularly avian species that feed on macroinvertebrates with elevated levels. Therefore, biomonitoring has been conducted at the former MMTS since 2005, when selenium benchmark levels were exceeded for some surface water/sediment samples. The *Operable Unit III Remedial Investigation, Appendix M – Ecological Risk Assessment* (DOE 1998) discusses the potential receptors and exposure pathways in detail.

The locations and general approach for biomonitoring were determined in 2004 by the Biological Technical Assistance Group (BTAG), including representatives from DOE, the U.S. Environmental Protection Agency Region VIII, the U.S. Fish and Wildlife Service, and the Utah Department of Environmental Quality. Sediment and surface water sampling was accomplished at the site in October 2004, April and October 2005, April and October 2006, and April 2007. Macroinvertebrate sampling was done in 2005, 2006, and 2007, and avian surveys were done in 2005 and 2006. All types of biomonitoring will continue in 2008 for Wetland 3 and the sediment retention pond. Results from previous biomonitoring efforts exclude Wetland 1 and Wetland 2 from further sampling because selenium in surface water has remained below levels of concern in Wetland 1 since April 2005, and in Wetland 2 since sampling began in October 2004. Selenium levels in sediments have remained steady, well below levels of concern in Wetland 1 and Wetland 2 during the entire sampling period.

## II. Scope

Field sampling will be performed by S.M. Stoller personnel and will consist of procuring necessary field equipment, planning field activities, traveling to the field site, and collecting sediment and surface samples. Samples will be collected in April 2008 in three locations at Wetland 3 and three locations at the sediment retention pond. Samples will be preserved in the

field and sent to a contracted analytical laboratory for analysis of selenium. Results will be provided to Stoller in electronic format.

### III. Field Sampling Procedures

Sampling locations will correspond to the locations to be sampled for macroinvertebrates in 2008 and to locations sampled for sediment and surface water in 2007. These include three strata in Wetland 3 (at the outflow of Seep 2, halfway between Seep 2 and the outlet, and at the outlet) and three locations in the sediment retention pond (near the inlet, along the northern shore between the inlet and the outlet, and near the outlet).

The field sampling team will consist of two persons. Personnel will use hip-boots or chest waders to access the sampling locations. Applicable field practices or details not specifically addressed in this sampling plan, such as equipment decontamination, sample management, and field documentation will conform to the specifications in the *Sampling and Analysis Plan for U.S. Department of Energy Legacy Management Sites* (LM Sampling Plan [DOE 2007]).

#### *A. Surface Water Sample Collection*

Surface water samples will be collected in a given stratum before sediment samples are collected to minimize turbidity. One sample will be collected at each sample location in a new and certified pre-cleaned high-density polyethylene (HDPE) bottle. The sample will be obtained by directly immersing the bottle near the center of the water column. An unfiltered sample will be taken because it best represents exposure to macroinvertebrates. The sample volume will be a minimum of 500 milliliters (mL). Field parameters of temperature, pH, electrical conductivity and alkalinity will be determined at each sampling location. Field personnel will also record the approximate water depth and the general hydrological condition of the wetland or pond in the field logbook. Surface water samples will be identified with "W3" for Wetland 3, "P" for the sediment retention pond, the stratum (S1, S2 or S3, meaning the inlet, midpoint and outlet, respectively), and a suffix of "SW" for surface water. For example, W3-S1-SW will identify the surface water sample taken from the inlet area of Wetland 3.

Surface water samples will be preserved in the field by adding nitric acid to reduce the pH of the sample to <2 standard pH units.

#### *B. Sediment Sample Collection*

From each stratum in Wetland 3 and the sediment retention pond, a sample of sediment will be collected from three equally spaced locations, approximately 6 feet from the center of the sample point. Each sample will be collected from the upper 3 inches of sediment to obtain a minimum of 500 mL of sediment. Sampling devices may include a hand-scoop, a pre-cleaned HDPE bottle, or the samples may be taken by hand with Nitrile gloves. Excess water will be decanted from the sample and any coarse plant debris or gravel will be discarded. The three samples per stratum will be composited by combining in a disposable aluminum pan and thoroughly mixing by hand. A single composite sample, a minimum of 500-mL in size, will be obtained from the mixed material and placed in a certified pre-cleaned HDPE bottle. The composite sediment sample for

each stratum will be identified according to the same scheme described for surface water samples; however, an "SD" suffix will signify the sample matrix as sediment. Sediment samples will be preserved by placing containers in an ice-chest and maintaining a cool temperature until received by the analytical laboratory.

#### *C. Quality Control*

Field duplicates and equipment blanks for surface water sampling will be collected on a frequency of one duplicate and blank per 20 surface water samples. Fictitious sample identification will be assigned to the duplicates and blanks that are similar to the actual sample identification. Field duplicates and equipment blanks are not required for sediment sampling. Sampling personnel will refer to the LM Sampling Plan for specific requirements of sample packaging, shipment to the laboratory, and sample custody management.

### **IV. Laboratory Test Analyses**

Surface water samples will be submitted to a contracted analytical laboratory for analysis of selenium by ICP-MS (inductively coupled plasma-mass spectrometry, EPA SW-846 6020). The laboratory reporting limit (0.1 µg/L) will be consistent with previous and current monitoring for selenium in OUIII water samples.

Sediment samples will be prepared in the laboratory using an acid digestion procedure (EPA SW-846 050B) to extract selenium from the matrix. Sediment samples will be analyzed for selenium by ICP-MS. This method routinely provided detection limits as low as 0.2 milligrams per kilogram selenium in samples collected to characterize the content of OUIII ground water contaminants of concern in the post-remediation soil of the former millsite.

### **V. Reporting**

Laboratory data reporting will conform to the applicable requirements and formats described in the LM Sampling Plan. S.M. Stoller personnel will manage laboratory results in the project database.

A trip report documenting all the field activities will be prepared by S.M. Stoller personnel. The report will identify personnel in attendance, number, location and identity of samples, sampling methods, general site conditions, and any variances from the Program Directive and rationale.

After the laboratory results have been received and validated, S.M. Stoller personnel will prepare a letter report summarizing the field sampling program and analytical results, for distribution to representatives of the BTAG. Laboratory results will also be summarized in the macroinvertebrate report described in Program Directive MNT-08-03 (Aquatic macroinvertebrate sampling and analysis for OUIII biomonitoring) (DOE 2008).

## VI. References

DOE (U.S. Department of Energy), 1998. *Operable Unit III Remedial Investigation, Appendix M – Ecological Risk Assessment*, GJO-97-9-TAR, U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, January.

DOE (U.S. Department of Energy), 2004. *MMTS Operable Unit III Post-Record of Decision Monitoring Plan*. DOE/LMGJ684-2004, U.S. Department of Energy, Office of Legacy Management, Grand Junction, Colorado, August.

DOE (U.S. Department of Energy), 2008. Program Directive MNT-08-03, *Aquatic macroinvertebrate sampling and analysis for OUIII biomonitoring*. U.S. Department of Energy, Office of Legacy Management, Grand Junction, Colorado.

DOE (U.S. Department of Energy), 2007. *Sampling and Analysis Plan for U.S. Department of Energy Legacy Management Sites*, revised. GJ1197-2006, U.S. Department of Energy, Office of Legacy Management, Grand Junction, Colorado.