



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 27, 2000

Mr. Donald R. Metzler
U.S. Department of Energy
Grand Junction Office
2597 B 3/4 Road
Grand Junction, CO 81503

SUBJECT: ACCEPTANCE OF THE FINAL SITE OBSERVATIONAL WORK PLAN FOR THE URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT SITE AT MONUMENT VALLEY, ARIZONA

Dear Mr. Metzler:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the U.S. Department of Energy's (DOE's) Final Site Observational Work Plan (SOWP), submitted by cover letter dated May 14, 1999, for the Uranium Mill Tailings Remedial Action (UMTRA) Project site at Monument Valley, Arizona. DOE previously submitted a SOWP by letter dated May 2, 1996, for which NRC provided comments by letter dated February 21, 1997. Additional comments were provided on aquifer testing via telephone to DOE on November 30, 1999, and DOE also submitted recent aquifer testing results by letter dated December 1, 1999.

The NRC staff's review focused on the proposed groundwater remediation strategy for compliance with 40 CFR Part 192 and the technical information presented in support of this strategy. DOE has proposed a combination of active and passive remediation strategies to remediate groundwater quality at the Monument Valley site. At this time, the proposed alternative would involve groundwater pumping with distillation and phytoremediation for the alluvial aquifer. Aquifer restoration standards (required by 40 CFR 192) have been established for nitrate and uranium, and an aquifer restoration goal (not required by 40 CFR Part 192, but requested by the Navajo Nation) has been established for sulfate.

Based on its review, the NRC staff has determined that the final SOWP has adequately evaluated the site to the point that DOE can draft the Groundwater Corrective Action Plan (GWCAP). However, as discussed in the enclosed Technical Evaluation Report (TER), the NRC staff has identified several comments that should be addressed in the GWCAP.

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D. Metzler

If you have any questions concerning the subject, please contact the NRC Project Manager for the Mexican Hat and Monument Valley sites, Melanie Wong, at (301) 415-6262 or e-mail at mcw@nrc.gov.

Sincerely,

Original Signed By

Thomas H. Essig, Chief
Uranium Recovery and
Low-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. WM-70
Enclosure: Technical Evaluation Report

cc: M.Roanhorse, Navajo Nation

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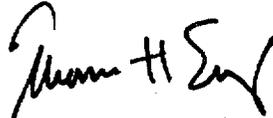
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D. Metzler

If you have any questions concerning the subject, please contact the NRC Project Manager for the Mexican Hat and Monument Valley sites, Melanie Wong, at (301) 415-6262 or e-mail at mcw@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas H. Essig". The signature is fluid and cursive, with the first name being the most prominent.

Thomas H. Essig, Chief
Uranium Recovery and
Low-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. WM-70
Enclosure: Technical Evaluation Report

cc: M.Roanhorse, Navajo Nation

**TECHNICAL EVALUATION REPORT
MONUMENT VALLEY FINAL SITE OBSERVATIONAL WORK PLAN**

DATE: December 16, 1999

FACILITY: Monument Valley, Arizona

TECHNICAL REVIEWER: William von Till

PROJECT MANAGER: Melanie Wong

SUMMARY AND CONCLUSIONS:

The U.S. Department of Energy (DOE) submitted a Final Site Observational Work Plan (SOWP) for the Monument Valley, Arizona, Uranium Mill Tailings Remedial Action (UMTRA) Project Site by cover letter dated May 14, 1999. DOE had previously submitted a SOWP by letter dated May 2, 1996, that the U.S. Nuclear Regulatory Commission (NRC) provided comments by letter dated February 21, 1997. The NRC provided some comments on aquifer testing via phone call to DOE on November 30, 1999, and DOE submitted additional recent aquifer testing data by letter dated December 1, 1999. With the more recent aquifer testing, DOE has satisfied initial NRC concerns. DOE was able to successfully sustain a flow rate of 45 gallons per minute by improving drilling methods and using stainless steel wire-wrap screen with a 30/70 sand pack.

The SOWP has adequately evaluated the site to the point that DOE can draft the Groundwater Corrective Action Plan (GWCAP). However, several concerns have been noted in this evaluation that should be addressed in the GWCAP.

BACKGROUND:

Regulatory Framework:

The UMTRA Project regulatory framework provides several ways to comply with the ground-water protection standards as outlined in DOE's Programmatic Environmental Impact Statement (DOE, 1996):

- 1) No remediation
- 2) Natural flushing
- 3) Active ground-water remediation

The regulations as outlined in 40 CFR Part 192.20 require that DOE consult with affected Indian Tribes. In the case of Monument Valley, DOE has consulted with the Navajo Nation and discussions are on-going.

Enclosure

Site Description:

The DOE Monument Valley UMTRA Project site is located on the Navajo Indian Reservation in northeastern Arizona, approximately 15 miles (24 kilometers [km]) south of Mexican Hat, Utah. The site is arid, receiving approximately 6.4 inches (16.25 centimeters [cm]) of annual precipitation.

The Vanadium Corporation of America operated the site starting in 1943. Milling started in 1955 and continued until 1968 when the mill was closed. The mill buildings and milling equipment were removed after 1968 and beginning in 1992, the tailings piles, windblown tailings, contaminated radioactive materials, concrete foundations, and debris were removed and placed in the Mexican Hat UMTRA Project disposal cell, which was completed in January 1994.

Previous documents relating to the site include an engineering assessment (DOE, 1981), an Environmental Assessment (DOE, 1989), a Remedial Action Plan (DOE, 1993), a water sampling and analysis plan (DOE, 1994), a Base Line Risk Assessment (DOE, 1996), and a draft SOWP (DOE, 1996).

The three main aquifers beneath the site are the alluvial, Shinarump, and De Chelly. The alluvial aquifer is unconfined, which is underlain by the unconfined and leaky confined Shinarump. The main confining unit is the Upper Moenkopi, which overlies the leaky confined Hoskinnini and De Chelly. The Hoskinnini and De Chelly appear to be hydraulically connected. In the region of the site, a paleo-valley exists where the Shinarump and Upper Moenkopi Formation have been eroded away, providing a direct hydrological connection between the alluvial and De Chelly aquifers.

Ground-water flow in the alluvial aquifer is to the north. The depth to ground water is generally from 8-50 feet (2.4-15.4 meters [m]) below ground surface. The aquifer consists of windblown fine-to-medium-grained sand deposits that vary in thickness from 0 to 120 feet (0-36.96 m).

The Shinarump aquifer consists of lenticular deposits of sandstone and conglomerate with occasional thin mudstone layers with thickness ranging from 0 to 90 feet (0 to 27.72 m). Ground water generally occurs under semi-confined conditions and flow to the north-northeast. Depth to ground-water ranges from 7 to 50 feet (2.16 to 15.4 m) below ground surface.

The De Chelly aquifer consists of fine-grained sandstone that is approximately 500 feet (154 m) thick. Ground water is generally semi-confined and may be unconfined in areas where the formation is in contact with the ground surface. The aquifer is under artesian conditions under portions of the site and at a maximum depth of 165 feet (50.82 m) at other areas of the site.

Most of the contamination is in the alluvial aquifer with some contamination in the De Chelly aquifer. Ground-water contamination in excess of Maximum Concentration Limits (MCLs) is not present in the Shinarump aquifer.

TECHNICAL EVALUATION:

DOE has proposed, based on the Programmatic Environmental Impact Statement for Uranium Mill Tailings Remedial Action Groundwater Project (PEIS)(DOE, 1996), different strategies for the three main ground-water aquifers based on the presence of constituents in each. For the alluvial aquifer, DOE has proposed active remediation for nitrate and sulfate and natural flushing for uranium. DOE proposes no remediation for the Shinarump aquifer since no chemicals of concern (COCs) were identified. For the De Chelly aquifer, DOE has proposed natural flushing to reduce uranium to below the standard (MCL).

Based on the final SOWP review, several technical issues were noted that will need further focus in the GWCAP:

- 1) It is unclear how DOE will use active remediation within the alluvial aquifer. DOE proposes to use a combination of ground-water pumping and phytoremediation but has not established where specifically these two technologies will be used to remediate hazardous ground-water constituents to standards. The NRC agrees that optimization modeling is needed to properly design the recovery/injection well configuration and that this can be completed in the final GCAP.
- 2) The use of phytoremediation to remediate ground water in the alluvial aquifer is questionable and must be adequately assessed, including 1) whether phytoremediation will sufficiently reach into the saturated zone to be effective in reducing hazardous ground-water constituents to standards, and 2) since DOE has chosen to remediate sulfate, how efficient phytoremediation will be at removing sulfate. If this technology is implemented, other contingencies to comply with the standards should be addressed in case it is unsuccessful. In addition, the risk to humans and animals from potential ingestion of the plants used in the phytoremediation should be assessed.
- 3) NRC agrees with DOE that using re-injection of treated water is a superior alternative compared to pump/treat/discharge due to more efficient and expeditious flushing and the conservation of ground-water resources. The NRC would consider evaluating other treatment alternatives if DOE wishes to re-evaluate this aspect of active remediation, however, aquifer depletion would have to be adequately addressed.

REFERENCES:

U.S. Department of Energy (DOE), 1996, Baseline Risk Assessment of Ground Water Contamination at the Monument Valley Uranium Mill Tailings Site, Cane Valley, Arizona, DOE/AL/62350-43 Rev. 2.

DOE, 1996, Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project, DOE/EIS-0198, October, 1996.

DOE, 1996, Site Observational Work Plan for the Monument Valley, Arizona, Uranium Mill Tailings Remediation Action (UMTRA) Project Site at Monument Valley, Arizona. DOE/AL62350-201, Rev. 0.

DOE, 1994, UMTRA Project Water Sampling and Analysis Plan Monument Valley, Arizona, DOE/AL62350-123, prepared by Jacobs Engineering Group, Inc. for DOE.

DOE, 1989, Environmental Assessment of Remedial Action at the Monument Valley, Arizona, Uranium Mill Tailings Remediation Action (UMTRA) Project Site at Monument Valley, Arizona, final, UMTRA-DOE/AL-0368.

DOE, 1981, Engineering Assessment of Inactive Uranium Mill Tailings, Monument Valley Site, Monument Valley, Arizona.

U.S. Regulatory Commission (NRC), 1997, Letter from J.J. Holonich of the NRC to R. Plieness of the DOE submitting comments on DOE's March 1996 SOWP, February 21, 1997.