TECHNICAL EVALUATION REPORT
GAS HILLS NORTH UMTRCA TITLE II DISPOSAL SITE
LONG-TERM SURVEILLANCE PLAN GROUNDWATER MONITORING PROGRAM REVIEW
FREMONT COUNTY, WYOMING

FACILITY: Gas Hill North Site

SOURCE MATERIAL LICENSE: SUA-672

TECHNICAL REVIEWER: Lifeng Guo

PROJECT MANAGER: Ted Carter

SUMMARY AND CONCLUSIONS:

By letter dated January 1, 2009, the U.S. Department of Energy (DOE) submitted the draft Long-Term Surveillance Plan (LTSP) for the Gas Hills North UMTRCA Title II disposal site in Fremont County, Wyoming for U.S. Nuclear Regulatory Commission (NRC) staff review. This review focused on the groundwater monitoring aspects of the draft LTSP. For the most part, the DOE is proposing to continue the existing groundwater monitoring program as specified in License Condition (LC) 60 of Source Materials License SUA-672, and the staff generally concurs with this proposed program.

However, the staff has several recommendations for enhancing the groundwater monitoring program described in the draft LTSP. As discussed in the Technical Evaluation below, the constituents beryllium, cadmium, arsenic, chromium, and thorium-230 should be added to the monitoring program if the proposed analytes are detected over the Alternate Concentration Limits (ACLs) and other applied water quality standards with an upward trend. The staff recommends that the DOE Annual Inspection Report include a table containing historical groundwater monitoring data, in addition to graphs of water quality over time at the Point of Compliance (POC) wells. This helps inspectors to determine future water quality changes relative to these baselines. Lastly, as part of the land use monitoring, DOE should check the records at the Wyoming State Engineer's Office at least once every 10 years to determine if there have been significant changes in water demands in the vicinity of the Gas Hills North disposal site.

BACKGROUND:

The Gas Hills North uranium mills disposal site is located in the Gas Hills region of Fremont County, Wyoming, approximately 45 miles east of Riverton. The site climate is arid to semi-arid, with annual precipitation of approximately 9 inches. The uranium mill operated from 1958 to

1988 using a conventional acid leach process, and a total of 12 million tons of ore was processed. The uranium mill facilities were decommissioned from 1993 to 1994. Alternate concentration limits for groundwater were approved in 2002. The uppermost groundwater is an unconfined, interconnected flow system composed of both the Wind River aquifer and the Fraser alluvial aquifer. The Wind River Formation consists of sand and clay-lens sequence, with mainly clay as the lower member of the formation. These two units of groundwater function as a single hydrologic system and are referred to as the "Lucky Mc Aquifer" in the site documents. Groundwater remediation through extraction wells was initiated in 1980, with addition of several more extraction wells in 1988. The groundwater corrective action was enhanced with upgradient fresh-water injection and a tailing-dewatering operation in 1989. The groundwater corrective action program was terminated in 2002 upon approval of the ACL application by the NRC.

Groundwater monitoring under the current license is as follows:

60. Based on the application for Alternate Concentration Limits for ground water, dated December 21, 2000, as revised January 11, 2002 and November 4, 2002, and the license amendment request dated April 17, 2008, the licensee shall implement a compliance monitoring program containing the following:

    A. Sample wells T1-12 (POC), AL-1, AL-6 (POE), AL-7, and T1-6 (background) on a quarterly frequency for chloride, nitrate+nitrite total dissolved solids (TDS), sulfate, pH, conductivity, water level, arsenic, beryllium, cadmium, chromium, nickel, combined radium-226 and -228, thorium-230, selenium, and uranium.

    B. Comply with the following ground water protection standards at POC well T1-12 with background being recognized in well T1-6:

        arsenic = 0.05 mg/L, beryllium = 0.07 mg/L, cadmium = 0.02 mg/l, chromium = 0.05 mg/l, nickel = 0.85 mg/L, combined radium-226 and 228 = 7.5 pCi/L, selenium = 1.10 mg/L, thorium-230 = 13.2 pCi/L and uranium = 1.70 mg/L.

        Submit a semiannual ground water monitoring report, on or before January 30, and July 30 of each year. This report must include ground water contour maps; iso-concentration maps for selenium, uranium, combined radium-226 and 228, sulfate, chloride, and TDS; and time versus concentration graphs for selenium, uranium, combined radium-226 and 228, sulfate, chloride, and TDS.

    C. Deleted by Amendment No. 63.

    If a groundwater protection standard (as stated in Condition 60.B) at the point of compliance is exceeded, the licensee shall notify the NRC within 30 days and shall increase the sampling frequency to monthly, until it is determined by the NRC staff that a true exceedance has occurred.

If it is determined that a true exceedance has occurred, the licensee shall comply with the requirements per 10 CFR Part 40, Appendix A, criterion 5D. If the NRC staff determines that it is not a true exceedance, the licensee will revert back to quarterly monitoring as indicated in License Condition 60.A,

[Applicable Amendments: 4, 5, 15, 17, 19, 22, 28, 35, 38, 41, 42, 44, 63, 72]

TECHNICAL COMMENTS:

1) **Section 3.7.1 - Groundwater Monitoring**. DOE has removed arsenic, beryllium, cadmium, chromium and thorium-230 from its annual groundwater monitoring program (see Table 3-4). Elevated concentrations of these omitted analytes were found in the tailings pore water. Indication of these elements in the groundwater may be indicative of leaching from the tailings.

   Recommendation:

   It is recommended that these constituents be added to the program if other proposed analytes are detected above the ACLs and other applied water quality standards, and reflected in Table 3-4 of the LTSP.

2) **Section 3.7.1 - Ground Water Monitoring**. The text states that the current ACLs are not the maximum acceptable POC concentrations based on risk and that theses values, if exceeded, do not signal an immediate or possibly even a future threat at the POC points. The NRC may not necessarily agree with the above statement without further review of underlying assumptions involved.

   Recommendation:

   It is recommended that DOE consider revising the text to reflect the uncertainty with the risk estimation, and to acknowledge that any values above the current ACLs and other standards applied at the POC wells need to be independently evaluated prior to making judgment related to public health and safety.

3) **Section 3.7.2 - Land Use Monitoring.**

   Recommendation:

   It is recommended that DOE check at least once every 10 years the records at the Wyoming State Engineer's Office to determine if there have been significant changes in water demands in the vicinity of the Gas Hills North disposal site.

4) **Appendix B - Initial Site Inspection Checklist**.

Recommendation:

It is recommended that DOE include a data table(s) containing water level measurements and ground water quality information with their Annual Inspection Report to assure that changing groundwater and contaminant plume conditions be observed and compared.

5) **Section 3.6.3 – Criteria for Routine Site Maintenance and Emergency Measures.** DOE presents general corrective actions for certain example scenarios.

Recommendations:

DOE should add to this section a commitment that upon occurrence of any condition of concern, “DOE will assess the situation and establish what is the specific degradation level or condition that will require corrective action."

6) **LTSP Cover Letter**. DOE mentioned in the cover letter that final NRC concurrence to the LTSP is not expected until missing information is inserted into Appendix A of the document.

Recommendation:

Insert the following information into Appendix A of the document: the warrantee deed, the Public Land Order Notice of Permanent Withdrawal as posted in the Federal Register, the BLM right-of-way permit for site access, and the legal description.

REFERENCES:

U.S. Department of Energy (DOE), 2009. Letter from Scott Surovchak, DOE, to Myron Fliegel, NRC, issuing DOE’s January 2009 Long-Term Surveillance Plan for the Gas Hills North UMTRCA Title II Disposal Site, January 22, 2009.

U.S. Nuclear Regulatory Commission (NRC), Material License Number SUA-67, Amendment No. 72, Pathfinders Mines Corporation, Lucky Mc Uranium Mill.