Department of Energy
Washington, DC 20585
April 30, 2020

Mr. Ryan Schierman, Uranium Recovery Program Manager
Land Quality Division
Wyoming Department of Environmental Quality
200 West 17th Street, Suite 10
Cheyenne, WY 82002

Subject: U.S. Department of Energy, Office of Legacy Management Proposal for Class IV (Industrial) Classification of Groundwater at the Gas Hill Uranium District, Wyoming

Dear Mr. Schierman:

As a follow-up to past discussions, between U.S. Department of Energy (DOE) Office of Legacy Management (LM) and Wyoming Department of Environmental Quality (WDEQ), LM is formally requesting WDEQ to consider LM's proposal that groundwater in the Gas Hills Uranium District (the District) be re-classified from livestock use Class III to industrial use Class IV. A reclassification such as this has occurred in the past at the Bear Creek UMTRCA Title II site. The District includes Gas Hills North UMTRCA Title II Disposal Site (a.k.a. Lucky Mc Disposal Site), Gas Hills East UMTRCA Title II Disposal Site, and Gas Hills West UMTRCA Title II Disposal Site (a.k.a. ANC Gas Hills West). LM takes this position because uranium mining and milling activities in the District have impacted the groundwater beneath and adjacent to these sites. In addition, the Wind River Formation is both the uranium host and the principle aquifer in the District, and as such does not naturally produce water which meets Class III livestock standards. These positions are described in detail below.

Historical Discharges from Uranium Facilities in the District

Uranium mining in the District began in the late 1950s and continued for nearly 30 years. Pathfinder Mines Corporation, Umetco (formerly Union Carbide Corporation), the Tennessee Valley Authority, and smaller mining companies extracted uranium ore by open pit mining near the site. Beginning in 1958, water from uranium mine pit dewatering operations was discharged to nearby Fraser Draw, which is located directly east of the Gas Hills North disposal site and flows to the north-northwest. From 1974 through 1981, these discharges were conducted under a National Pollutant Discharge Elimination System (NPDES) permit issued by the State of Wyoming. The NPDES permit authorized discharges of water with concentrations of uranium not to exceed a daily average of 2 milligrams per liter (mg/L) and a daily maximum of 4 mg/L (see enclosed NPDES permit). Permitted discharges from this period indicated an average uranium concentration of 0.91 mg/L. Discharges from these mine dewatering operations may have impacted groundwater quality in Fraser Draw downgradient of the Gas Hills North site.

During early uranium milling and disposal operations (1958-1960) there were routine discharges of tailings impoundment fluid to Reid Draw, the drainage in which the tailings impoundments for Gas Hills North site were constructed. In 1963, out of concern for the integrity of the Gas Hills North tailings impoundment dam during a period of heavy precipitation, there was an

intentional release of an estimated 23 million gallons of tailings impoundment fluid down Reid Draw. These discharges may have impacted groundwater quality in Reid Draw downgradient of the impoundments.

Following an evaluation of the radiological contamination identified in Reid Draw, the licensee proposed the "no action" alternative. The Nuclear Regulatory Commission (NRC) environmental assessment concluded with a Finding of No Significant Impact (FONSI) regarding the "no action" proposal on the cleanup of Reid Draw. NRC's decision to not remediate Reid Draw was posted in the *Federal Register* on March 17, 1999 (see enclosed Federal Register notice).

There is little to no risk of exposure to the contamination downgradient of the Gas Hills North site in Reid Draw, as supported by NRC's FONSI (see enclosed Federal Register notice). The water quality in a livestock surface water impoundment in Reid Draw located approximately 2 miles downgradient of the tailings impoundment was "well within NRC's effluent water concentration limits for radionuclides, as specified in 10 CFR Part 20, Appendix B, Table 2." No other current water use in Reid Draw occurs within 5 miles of the Gas Hills North tailings impoundment.

After the intentional release in Reid Draw, the downgradient-most tailings impoundment dam of the Gas Hills North site was expanded and keyed into the Cody Shale, which NRC's *Federal Register* notice indicates is competent and impermeable bedrock. According to the *Federal Register* notice, there was "no evidence of ground-water impacts from seepage through the reconstructed dam, based upon monitoring data from piezometers, and the monitoring of water quality in the immediately down-gradient point of compliance well R-2 located in Reid Draw." Therefore, tailings fluid seepage is not expected to occur in Reid Draw downgradient of the reconstructed tailings impoundment dam, which is supported by NRC's approval to decommission point of compliance well R-2 and discontinue groundwater monitoring in Reid Draw downgradient of the Gas Hills North site.

Geology and Hydrogeology of the District

The District is situated on the southeastern edge of the Wind River Basin in central Wyoming, approximately 15–20 miles north of the central Granite Mountains. Geologic structures along the margins of the Wind River Basin include the Wind River, Washakie, Owl Creek, and southern Bighorn ranges, and the Casper Arch at its eastern edge. The request for groundwater classification falls within the following areas as defined in the 2019 Wyoming State Geological Society Report on Uranium Geology and Resources of the Gas Hills District: portions of Townships 31, 32 and 33 North, Ranges 89, 90 and 91 West, Fremont and Natrona Counties, Wyoming. Refer to area outlined on attached map (WSGS 2019).

The groundwater of the District is of limited use. The water-bearing units of the Wind River Formation are the primary source of groundwater in the District. The Wind River Formation has an upper member comprised of coarse-grained sandstones and conglomerates that is conformably overly a lower member comprised primarily of siltstone and mudstone. The water-bearing

units of the formation are locally and regionally discontinuous beneath the District, isolated by incised valleys, localized faulting, and erosional surfaces. The request for groundwater classification is for the Wind River Aquifer, the water-bearing units of the Wind River Formation, and the overlying alluvial deposits within the District to a depth of 300 feet. The low permeability of the lower member of Wind River Formation restricts the downward flow of impacted water from the upper Wind River Formation and overlying alluvium.

Impacts on District Groundwater

Historical monitoring data suggest groundwater within the Wind River Formation has been impacted by uranium mining, milling, and reclamation activities. According to the 2016 Abandoned Mine Lands (AML) Project 16M Post-Reclamation Water Quality Monitoring Report, prior to AML reclamation in the area, the mining industry directly backfilled some groundwater fed mine pits and left inadequately reclaimed spoils and pre-law mine processing facilities. Where no backfilling took place, there remained abandoned mine pit reservoirs characterized by acidic water as well as high levels of metals and radionuclides. The water quality across the monitoring network has regular and frequent exceedances of Class III livestock standards, particularly with radionuclides. According to the AML report, deterioration in groundwater quality due to the backfill of mine pits, as predicted by AML column leach studies and geochemical modeling efforts, has occurred.

It is likely some of the impact on groundwater quality in the Wind River Formation is due to naturally occurring contamination since it was mined for uranium. In February 1999, following extensive groundwater corrective action, Umetco prepared an alternate concentration limit (ACL) application based on the premise the chemical constituents that are derived from the mill process are the same as those related to uranium deposition, mining, and reclamation. Umetco provided data showing that differentiation between milling impacts, mining impacts, or dissolution of naturally occurring uranium deposits cannot be made.

The extent of groundwater impacts within the Wind River Formation and overlying alluvium is described in ANC Uranium Mill Tailings Site 2015 Hydrogeologic Report. Monitoring well MW-29 was installed upgradient of the Gas Hills West and Gas Hills North disposal sites as well as multiple AML reclamation pits on the West Gas Hills portion of the District (see enclosed potentiometric surface figure). The purpose of the well installation was to obtain “background” concentrations of analytes and parameters in the alluvial deposits, as well as to compare with WDEQ Class III groundwater standards for livestock. The Wind River Formation upgradient well, MW-29, does not appear to have been impacted by previous mining activities based on low sulfate, chloride and uranium concentrations. Results from a 2015 sampling event show many of the analytical parameters fall within a Class III groundwater classification (e.g., chloride=1 mg/mL, sulfate=463 mg/L, uranium=0.006 mg/L). However, radionuclides including gross alpha and radium exceed the Class III livestock standard (see enclosed tabulated analytical results). Based on this information DOE requests WDEQ consider classification of the groundwater in the Gas Hills Uranium District be re-classified from livestock use Class III to industrial use Class IV.

Please contact me at (970) 248-6550 or Bernadette.Tsosie@lm.doe.gov, if you have any questions. Please address any correspondence to:

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Sincerely,

Bernadette Tsosie
Digitally signed by Bernadette Tsosie
Date: 2020.04.30 15:22:29 -06'00'

Bernadette Tsosie
Gas Hills District Site Manager

Enclosures

cc w/enclosures:
T. Lancaster, NRC (Docket No. 40-2259)
D. Orlando, NRC (Docket No. 40-4492)
J. Saxton, NRC (Docket No. 40-0299)
M. Kautsky, DOE-LM (e)
P. Kerl, DOE-LM (e)
J. Carman, Navarro (e)
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