



State of Utah

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DIVISION OF WASTE MANAGEMENT  
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July 27, 2022

Kathy Weinel, Quality Assurance Manager  
Energy Fuels Resources (USA) Inc.  
225 Union Blvd., Suite 600  
Lakewood, CO 80228

RE: Energy Fuels Resources (USA) Inc. March 7, 2022, Source Assessment Report for Manganese and Sulfate in Monitoring Well MW-11, White Mesa Uranium Mill  
Utah Groundwater Discharge Permit No. UGW370004

Dear Ms. Weinel:

The Division of Waste Management and Radiation Control (Division) has reviewed the Energy Fuels Resources (USA) Inc. (EFRI), March 7, 2022, document titled *White Mesa Uranium Mill, State of Utah Groundwater Discharge Permit No. UGW370004, Source Assessment Report Under Part I.G.4 for Exceedances in MW-11 in the Fourth Quarter of 2021 (SAR)*. The SAR includes an evaluation of “out of compliance” (OOC) parameters (manganese and sulfate) in monitoring well MW-11. Monitoring Well MW-11 is located hydraulically downgradient from cell 2, cell 3, and the Mill processing areas.

In Section 3.5.2 of the SAR, EFRI finds that based on assessment and factors demonstrating that MW-11 has not been impacted by seepage from the tailings cell, that current changes in groundwater chemistry and uranium and selenium OOC at monitoring well MW-11 are due to groundwater background and impacts from the nitrate/chloride plume migration. The SAR includes discussion of the assessment and Section 3.5.2 lists the 8 factors supporting that EFRI conclusion.

Specifically, the SAR states:

1. *“Key indicator parameter fluoride is decreasing.*
2. *pH has been stable to increasing since 2016.*
3. *Iron (which is the constituent having the highest concentration in the TMS) has been decreasing since the first quarter of 2012.*

(Over)

4. *Statistically significant increasing trends in sulfate and manganese were present in MW-11 at the time of the Hurst and Solomon (2008) isotopic investigation report which included MW-11 in its analysis and that concluded there were no impacts to groundwater from the TMS, indicating that these trends are not the result of potential TMS seepage. Trends in both constituents are attributable to oxidation of naturally occurring pyrite at the site. In addition, manganese may be released from carbonate cement; and sulfate may be released by gypsum and anhydrite.*
5. *Although not within the plume, concurrently increasing chloride and nitrate at MW-11 since 2018 results from the increasing influence of the nitrate/chloride plume. The increasing influence of the nitrate/chloride plume, which originates approximately 1,000 feet upgradient of the TMS, results from continued downgradient migration of the plume towards MW-11. One consequence of the increasing nitrate is mobilization of naturally occurring uranium at MW-11.*
6. *Because uranium is substantially less mobile than nitrate or chloride at the near neutral pH conditions at MW-11, concurrently increasing uranium, nitrate, and chloride indicate geochemical changes in the immediate vicinity of MW-11 (caused in part by the increasing influence of the nitrate/chloride plume) rather than transport from a remote source such as the TMS.*
7. *Increasing water levels are expected to impact the MW-11 groundwater chemistry and contribute to trends in dissolved constituents.*
8. *Mass balance analysis indicates that water level increases at MW-11 are unrelated to potential TMS seepage.”*

Per Division review of the SAR and historical data for MW-11, the out-of-compliance status for manganese and sulfate in monitoring well MW-11 does not appear to be associated with contamination from a tailing wastewater source or other Mill activities. Division findings are detailed in a separate SAR review memorandum. Based on these findings it is appropriate to adjust the Permit groundwater compliance limit for manganese and sulfate in MW-11, consistent with the currently approved groundwater data statistical process flow chart for the Mill and associated guidance.

#### Statistical Analysis

Based on Division review of the SAR statistical analysis, it was noted that analysis was conducted for the complete historic data set for MW-11 and for a post-January 1, 2016 data set. The Division notes in the MW-11 pH concentration plot there is an apparent reversal in the pH trend from downward to neutral/upward at around 2016. According to SAR discussion, the pH changes are reflective of a shift in the data which warrants use of the modified data set as allowed by the U.S. Environmental Protection Agency Statistical Guidance. Per Division review of a plot of historical data for pH in MW-11, the 2016 pH trend reversal is evident.

EFRI Statistical methods used in the SAR included: 1. Descriptive statistics for the complete and modified data sets; 2. Mean and Standard Deviation Calculation; 3. Shapiro-Wilk Test for normality; and 4. Mann-Kendall Trend Analysis (non-normally distributed data sets) and Linear Trend Analysis. Proposed GWCL's were calculated based on highest historical value (HHV) for manganese and Mean X 1.25 of the post-January 1, 2016 data set for sulfate. The calculations and findings are summarized on a table in the SAR (Appendix A-1 of the SAR).

In the SAR Section 4.2, EFRI proposed that GWCL's be adjusted according to HHV for manganese and background (Mean X 1.25) for the post-January 1, 2016 data set for sulfate. The Division approved statistical flow chart for the White Mesa Mill groundwater monitoring wells clarifies that if an upward trend is apparent for a constituent, then a modified approach should be considered. The modified approach should allow for a GWCL which considers the increasing concentrations.

MW-11 Approved Modified GWCLs

In accordance with the review of the SAR Section regarding proposed modifications to the GWCL and statistical analysis of the data, the GWCLs will be modified in the White Mesa Uranium Mill Ground Water Permit for monitoring well MW-11 for manganese and sulfate as summarized on the table below:

Well Number	Parameter	Current GWCL	Modified GWCL	Method of Analysis
MW-11	Manganese	237 µg/L	376 µg/L	HHV
MW-11	Sulfate	1309 mg/L	1493.6 mg/L*	Mean X 1.25*

\*Based on Mean X 1.25 of the Sulfate background data mean of the post-January 1, 2016 data set for monitoring well MW-11

Note that the modified GWCL's will not be effective until future issuance of a modified Permit, and that the modifications will be subject to formal public notice and public participation requirements. These Permit modifications are anticipated to be made during calendar year 2022.

If you have any questions, please call Tom Rushing at (801) 536-0080.

Sincerely,



Phil Goble, Uranium Mills and Radioactive Materials Manager  
 Division of Waste Management and Radiation Control

PRG/TR/kd

- c: Grant Sunada, Health Director, San Juan Public Health Department
- Ronnie Nieves, Environmental Health Director, San Juan Public Health Department
- Russell Seeley, UDEQ District Engineer