



State of Utah

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DIVISION OF WASTE MANAGEMENT  
AND RADIATION CONTROL

Scott T. Anderson  
Director

September 14, 2016

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

RE: Energy Fuels Resources (USA) Inc. June 24, 2016, Transmittal of Source Assessment Report for Monitoring Well MW-18 and MW-24  
White Mesa Uranium Mill Groundwater Discharge Permit No. UGW370004 (Permit)

Dear Ms. Weinel:

The Division of Waste Management and Radiation Control has completed its review of the Energy Fuels Resources (USA) Inc. (EFR), June 24, 2016 document titled *Source Assessment Report for MW-18 and MW-24 White Mesa Uranium Mill* (SAR). The SAR includes an assessment of sulfate in monitoring well MW-18 and fluoride, field pH, cadmium and thallium in monitoring well MW-24.

***1. Division Findings Regarding Sulfate in MW-18***

Source Assessment

Energy Fuels provided a source assessment and calculated a revised Ground Water Compliance Limit for sulfate in monitoring well MW-18. Monitoring Well MW-18 is located hydraulically upgradient from the mill processing and disposal areas. In the SAR, EFR notes that sulfate was identified as having an increasing concentration trend since the development of the Existing Wells Background Report. Based on a review of indicator parameter (Cl, Fl, SO<sub>4</sub> and U) trends using all data, it is noted that chloride is showing a slight increasing trend; fluoride is showing a decreasing trend; uranium is showing a decreasing trend and sulfate is showing a slight increasing trend.

Based on the review of the indicator parameter data and location of the well (hydraulically upgradient), as well as other supporting arguments in the SAR, it appears that Mill activities are not influencing sulfate concentrations at monitoring well MW-18.

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Statistical Analysis

In accordance with the April 25, 2013 letter, Ground Water Compliance Limits (GWCLs) will be removed from the Permit based on the location of the well, hydraulically upgradient from Mill activities and waste storage. This was also noted by EFR in Section 3.4.1 (p. 11) of the SAR. Since all GWCLs will be removed from the Permit for MW-18, the statistical analysis and proposed modified GWCLs in the SAR were not reviewed.

**2. *Division Findings Regarding Fluoride, Field pH, Cadmium and Thallium in MW-24***

Source Assessment

The review of trends for indicator parameters (Cl, Fl, SO4 and U) at monitoring well MW-24 indicates that chloride is showing a flat (slightly decreasing) concentration trend; fluoride is showing an increasing trend; sulfate is showing a flat (slightly increasing) trend and uranium is showing a flat (slightly decreasing) concentration trend. It was noted that pH is showing a significant decreasing trend.

The SAR supports the premise that the increasing concentrations of fluoride, field pH, cadmium and thallium in monitoring well MW-24 are not caused by tailings solution based on the following: (1) a review of plots of indicator parameter concentration trends; (2) the 2007/2008 University of Utah Study which included ground water age dating of the water in tailings cell 1 and comparison with groundwater age and which included monitoring well MW-2 (near MW-24) which found that “stable isotope fingerprints do not suggest contamination of groundwater by tailings cell leakage, evidence that is corroborated by trace metal concentrations similar to historically observed concentrations;” (3) potential geochemical influences from pyrite oxidation in the perched groundwater causing site-wide decreases in pH and dissolution of metals including cadmium and thallium; and, (4) potential analytical influences caused by an EFR change of laboratories during the fourth quarter of 2012.

MW-24 Approved Modified GWCL’s

In accordance with the SAR Section regarding proposed modifications to the GWCLs and statistical analysis of the data and a telephone conference on September 13, 2016, it was agreed that the GWCLs will be modified in the White Mesa Uranium Mill Ground Water Permit for monitoring well MW-24 as summarized on the table below:

Well Number	Parameter	Current GWCL	Modified GWCL	Method of Analysis
MW-24	Fluoride	0.36 mg/L	0.47 mg/L	Mean + 2 $\alpha$
MW-24	pH	5.55-8.5 S.U.	5.03-8.5 S.U.	Mean + 2 $\alpha$

These modified GWCLs are consistent with the approved statistical process flow chart for the White Mesa Mill.

MW-24 Parameters for Additional Statistical Analysis

Based on a review of the statistical analysis for cadmium and thallium in monitoring well MW-24, it was noted that the data sets used were not normally distributed and that trend analysis showed increasing trends for both parameters. EFR proposes using the highest historical value from all data points for each parameter to modify the GWCL.

The review of the cadmium and thallium data sets shows that a large number of non-detects are included in the early time data, and that after 2009, the concentrations begin increasing. EFR attributes these increases to declining pH due to pyrite oxidation in groundwater. For comparison, it would be helpful for EFR to provide a separate analysis of the data sets as was provided in the December 9, 2015 SAR (Monitoring Well MW-31) using a divided data set based on an identified point of inflection in the data. Specifically, a data inflection is noted at approximately 2009 for cadmium and thallium in monitoring well MW-24. This comparison test is useful in that it may provide a normalized data set and a comparable and representative determination of mean + 2 $\alpha$ .

In accordance with the December 9, 2015 SAR, the Division used the divided data set test as a comparison tool against mean + 2 $\alpha$  and Highest Historical Value and determined that since all of the results were in the same range, it was appropriate to use the highest value of the three methods. Cadmium and thallium in monitoring well MW-24 would benefit from this same type of analysis. Please provide the additional analysis and an update of the SAR Table B-1 (*Geochemical Analysis Summary Table*) within 60 calendar days of receipt of this letter.

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

Sincerely,



Scott T. Anderson, Director  
Division of Waste Management and Radiation Control

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c: Rick Meyer, Environmental Health Director, San Juan County Health Department