



State of Utah

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MEMORANDUM

DRC-2018-007250

TO: File

THROUGH: Phil Goble, Manager

PRG 7/17/2018

FROM: Tom Rushing, P.G.

JR 7-17-18

DATE: July 17, 2018

SUBJECT: Review of the Energy Fuels Resources (USA) Inc. (EFR), White Mesa Uranium Mill, Blanding, Utah June 25, 2018 Source Assessment Report for Fluoride in Monitoring Well MW-14, Ground Water Discharge Permit UGW370004

Summary

A Source Assessment Report (SAR) for Fluoride in Monitoring Well MW-14 at the EFR White Mesa Uranium Mill (Mill), dated June 25, 2018 was received by the Division of Waste Management and Radiation Control (DWMRC) on June 27, 2018. The SAR was submitted for Director review and approval of a proposed revised Ground Water Compliance Limit (GWCL). The SAR was submitted in accordance with a previously submitted EFR Plan and Time Schedule dated March 2, 2018. Monitoring well MW-14 is located on the southern berm of the Mill Tailings Cell 4A and is hydraulically downgradient from eastern portions of Cell 4A and from the Mill processing areas.

The SAR is broken up into four primary sections, 1. The approach for analysis of potential sources of the contamination, 2. Results of the analysis, 3. Statistical evaluation and calculation of a revised GWCL, and, 4. Conclusions and recommendations. Generally, the SAR uses evidence from the 2007 University of Utah groundwater study and indicator parameter analysis to substantiate that the out of compliance status was not caused by Mill activities. The SAR further discusses a change in laboratory and fluoride laboratory method in 2012 which likely caused high fluoride results due to sample matrix interferences. A discussion of the EFR communication with the laboratory is included in the SAR.

The DWMRC time series plots below depict the decreasing or essentially flat concentration trends in monitoring well MW-14 for fluoride and primary indicator parameters Cl, SO4 and U using all available historical data (including potential outliers). A plot is also included for pH which shows an essentially flat trend.

Figure 1 – Fluoride Data Plot of Historical Data at MW-14 – Decreasing Trend

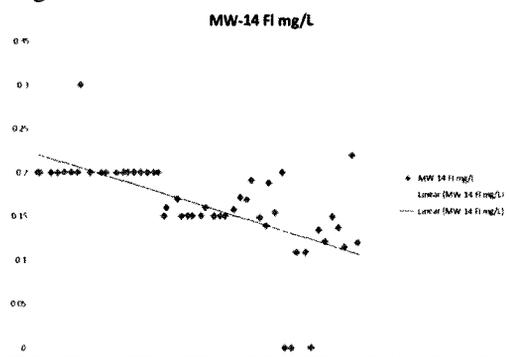


Figure 2- Chloride Data Plot of Historical Data at MW-14 – No Trend

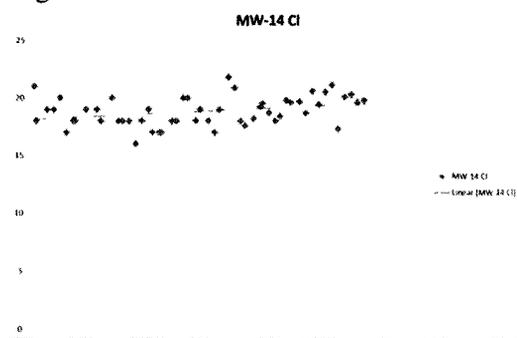


Figure – Sulfate Data Plot of Historical Data at MW-14 – No Trend

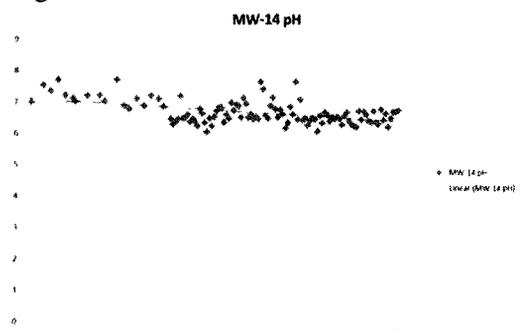


Figure – U Data Plot of Historical Data at MW-14 – Decreasing Trend

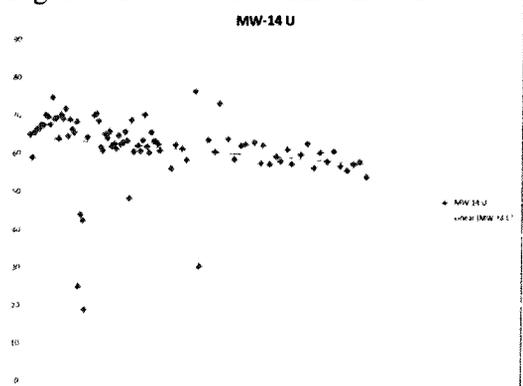
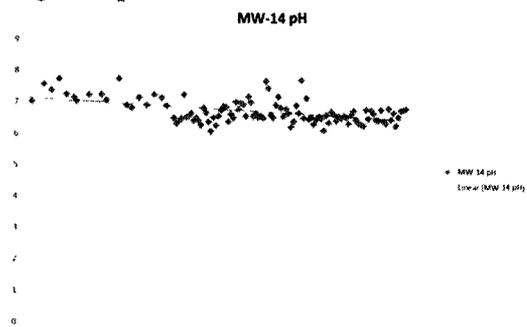


Figure – pH Data Plot of Historical Data at MW-14 – No Trend



EFR is proposing that the use of a higher GWCL for fluoride be allowed for consideration under the Utah Administrative Code (UAC) R-317-6. EFR states that the use of a fraction approach is in conformance with the Director approved statistical flow chart for GWCL's in this case. However, per DWMRC review of the data, including; 1. Visual examination of data time series plots; 2. Test for normality based on a DWMRC culled data set, 3. Review of data trends showing all flat or decreasing trends, and, 4. Recalculation of mean and standard deviation; the use of mean + 2 standard deviations is the appropriate method to calculate the GWCL and is in conformance with the statistical flow chart. Furthermore, since the data is showing a decreasing trend for fluoride in MW-14, there is no implicated source for decreasing concentrations and, since the cause of the consecutive exceedances appears to be due to an outlier in the data related to laboratory interferences it is not expected that higher concentrations will persist at the well. Therefore, there is no justification to consider maximum GWCL concentrations potentially allowed by UAC R317-6.

EFR notes in the SAR that a change in laboratory and analytical method for fluoride occurred in 2012 and that the new method identified that extreme outliers noted in the data were most likely the result of an "analytical interference issue" and began diluting fluoride samples to remove matrix interference. The December 2017 sample for fluoride in MW-14 is likely due to matrix interference during laboratory analysis.

According to DWMRC visual review of the data it appears that a data point of inflection occurred earlier in the data than the 2012 change in laboratory and method. An evident point of inflection can be seen starting with the February 2, 2010 sample. According to the EPA Unified Statistical Guidance it is appropriate to use the more recent data from this point of inflection and eliminate earlier data from the data set. This resulted in a DWMRC culled data set of 38 laboratory results of more recent data. Based on the DWMRC calculations there was one outlier in the culled data set (verified using Rosners Test) which as discussed above, was the apparent reason that monitoring well MW-14 went into out of compliance status. DWMRC also removed three non-detected concentrations from the data set. This resulted in a total data set of 34 laboratory results. Elimination of the outlier resulted in a normal distribution of data for the DWMRC culled data set. Based on evaluation of this data set the mean + 2 standard deviations calculation was 0.21 mg/L.

Conclusions:

Based on DWMRC review of the background statistics, fluoride is showing a decreasing trend. Data is normally distributed based on the DWMRC post 2/2/2010 data set (point of inflection) and removal of a verified outlier. Per the currently approved statistical flow chart, the GWCL should be set according to

mean + 2 standard deviations. The EFR calculation of mean + 2 standard deviations based on the entire data set was 0.22 mg/L and is included in Appendix B-1 of the SAR. Although the EFR data set set did not show normal or lognormal distribution, the EFR result is within the range of DWMRC calculations and therefore, the EFR result appears to be protective and reflective of the fluoride data.

Based on review a letter will be sent to EFR of initial approval of the modified fluoride GWCL (0.22 mg/L) as summarized on the table below. The letter will include notification that the modifications are subject to public notice and public participation requirements, and that the modifications will not be effective until formal issuance of a modified Permit.

Well Number	Parameter	Current GWCL	Modified GWCL	Method of Analysis
MW-14	Fluoride	0.2 mg/L	0.22 mg/L	Mean + 2 Standard Deviations

References

¹ Energy Fuels Resources (USA) Inc., June 25, 2018, *Transmittal of Source Assessment Report for Fluoride in MW-14 White Mesa Mill Groundwater Discharge Permit UGW370004*

² Energy Fuels Resources (USA) Inc., August 15, 2017, *White Mesa Uranium Mill Ground Water Monitoring Quality Assurance Plan (QAP), Revision 7.3*

³ Intera, 2007, *Groundwater Data Preparation and Statistical Process Flow for Calculating Groundwater Protection Standards, White Mesa Mill Site, San Juan County, Utah*

⁴ Utah Department of Environmental Quality, January 19, 2018, *Utah Division of Radiation Control, Ground Water Discharge Permit, Permit No. UGW370004, Energy Fuels Resources (USA) Inc.*

⁵ U.S. Environmental Protection Agency, March 2009, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance.*

DWMRC Statistical Calculations – Fluoride in Monitoring MW-14

