



## Department of Energy

Washington, DC 20585

May 1, 2014

Ms. Yolande J.C. Norman, Project Manager  
U.S. Nuclear Regulatory Commission  
Division of Waste Management and  
Environmental Protection  
Mail Stop T8 F5  
Washington, DC 20555-0001

Subject: Comments Regarding United Nuclear Corporation's (UNC's) Response to U.S. Nuclear Regulatory Commission's (NRC's) January 10, 2014, Request for Additional Information on the *License Amendment Request for Revised Groundwater Protection Standards Based on Updated Background Concentrations, Source Materials License SUA-1475, Groundwater Corrective Action Program, United Nuclear Corporation Church Rock Mill and Tailings Site, New Mexico April 17, 2012*

Dear Ms. Norman:

The U.S. Department of Energy, Office of Legacy Management (DOE-LM) has reviewed UNC's responses dated January 10, 2014, and has identified three issues of concern. DOE-LM requests these issues be addressed before DOE-LM takes over management of the site under the Uranium Mill Tailings Radiation Control Act (UMTRCA).

1. **MOLYBDENUM:** DOE-LM is not aware of instances where naturally occurring molybdenum is present in groundwater at concentrations observed in Zone 3 wells. Hem (1985)<sup>1</sup> reports concentrations as high as 10 mg/L in waters associated with molybdenum mining and deposits. Given that the wells cited in UNC's response are only partially screened across the supposed source units of the molybdenum (30% at most), groundwater from the source units are diluted with un-impacted Zone 3 groundwater. This would require natural concentrations of molybdenum in the source units several times higher (or more depending on the productivity of those units compared to Zone 3) than concentrations reported for the existing Zone 3 wells. Natural concentrations this high seem unlikely.

A main argument against molybdenum being seepage-related is the purported lack of other seepage-related constituents in areas of high molybdenum. However, according to UNC's statistics for Zone 3 background (CERCLA Sitewide Supplemental Feasibility Study Table 18), mean and/or maximum concentrations of a number of constituents, often associated with uranium mill tailings, exceed primary or secondary drinking water standards in impacted groundwater. These include arsenic, cadmium, manganese, nitrate, sulfate, radium-226 & 228, gross alpha, and iron. While these could be naturally occurring, as suggested by UNC, their presence does not support UNC's argument that other seepage-related constituents are absent.

---

<sup>1</sup> Hem, John D., 1985. Study and Interpretation of the Chemical Characteristics of Natural Water, United States Geological Survey Water-Supply Paper 2254



**DOE Comment:** Has NRC accepted these levels of constituents as background? Should NRC agree to these levels as background; DOE-LM can and will manage the UMTRCA site using the accepted background levels and variability.

**2. ESTABLISHING BACKGROUND CRITERIA:** UNC has provided a detailed explanation of how the non-parametric UPL 95 is calculated. That explanation is consistent with the description in the Environmental Protection Agency Unified Guidance Chapter 15, Section 15.3 Estimation by Kaplan-Meier. We are concerned about the number of future observations ( $k$ ) that is used to determine the t-statistic  $[t_{\{(1-0.05/k), n-1\}}]$ . It is proposed to use a  $k$  value equal to the total number of future observations. The example in Table 2 used a  $k = 216$  which is based on 4 POC wells sampled quarterly for 6 years plus annually for 30 years,  $k = \{4*[(4*6)+(1*30)]\} = 216$ . In this scenario, data would be collected for 36 years and after that a decision would be made if action were necessary.

**DOE Comment:** This would imply that transfer of the site to DOE-LM would not happen until the remediation decision is made *plus* the implementation time for the remedial decision. Does NRC have some other timeline in mind that is justified by this approach?

**3. CALIBRATION AND SENSITIVITY ANALYSIS:** The description of the sensitivity analysis and the calibration of the model is vague on what was done or the magnitude of effort spent. Since the modeling is the basis for the decisions going forward it should be clear with sufficient detail.

- a. It is not clear whether calibration was performed before the sensitivity analysis, the sensitivity analysis was done before calibration, or they were performed concurrently. These processes are not independent and should be done concurrently. This is easily accomplished using software such as PEST (Parameter ESTimation) a model independent parameter estimation program developed by John Doherty of Watermark Computing (Doherty 2004). It appears that a trial-and-error approach was used for calibration rather than advanced automated methods such as using PEST.
- b. The sensitivity analysis that was performed encompassed 14 hydraulic parameters in 8 material zones in the 6 layers of the flow model. For most parameters the sensitivity was tested by multiplying and dividing the base parameter by factors of 2.5 and 5.0. Many parameters are sensitive over a small numerical or percent range. The above factors could result in extreme values for some parameters. For example, the base parameter for alluvium vertical hydraulic conductivity ( $K_v$ ) is 2.375 ft/day which would result in a range of 0.475 to 11.875 ft/day. It is highly unlikely that  $K_v$  would vary over three orders of magnitude. Sensitivity analysis should be performed over a smaller range such that the range does not include unreasonable values, nor mask other effects.

**DOE Comment:** Has the NRC determined that the calibration method, and sensitivity analysis is sufficient to provide a valid basis for its decision making?

Ms. Yolande J.C. Norman

-3-

May 1, 2014

Please call me at (970) 248-6034 or Deb Steckley, Site Manager of the Church Rock, New Mexico, Disposal Site at (970) 248-6042 if you have any questions. Please address any correspondence to:

U.S. Department of Energy  
Office of Legacy Management  
2597 Legacy Way  
Grand Junction, CO 81503

Sincerely,

A handwritten signature in black ink, appearing to read 'Art Kleinrath', with a long horizontal flourish extending to the right.

Art Kleinrath  
Program Manager

cc:

J. Brooks, EPA Region 6

L. Chang, NRC

E. Dixon, NMED

S. Jacobs, EPA Region 9

F. White, NN EPA

A. Gil, DOE (e)

D. Steckley, DOE (e)

File: CHR 0505.20 (A) (rc grand junction)

Sites\Church Rock\4-23-14 Church Rock Comments re UNC Comments to NRC (Norman)