

August 22, 2017

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Re: Docket No. 70-925; License No. SNM-928
Technical Memorandum – Determination of Enrichment Levels in Influent

Dear Sirs:

Enclosed please find copies of a technical memorandum (tech memo) prepared by Enercon Services, Inc. (Enercon). Environmental Properties Management LLC (EPM) retained Enercon to determine the projected enrichment of uranium in groundwater influent streams associated with treatment systems to be installed at the Cimarron site. It is important to develop a conservative estimate of the U-235 enrichment of uranium for groundwater influent because influent streams will consist of groundwater recovered from numerous locations containing variable uranium concentration and enrichment. The enrichment of those influent streams must be estimated to both demonstrate that critical conditions are not realistically achievable, and to enable preliminary calculation of the U-235 mass that will accumulate in the groundwater treatment systems.

Enrichment is defined as the ratio of Uranium-235 (U-235) mass to total Uranium mass, assumed as the sum of U-235 and Uranium-238 (U-238). This definition is expressed in the following equation:

$$\text{Percent (\%) Enrichment} = 100 \times (\text{U-235 } \mu\text{g/L}) \div ([\text{U-235 } \mu\text{g/L}] + [\text{U-238 } \mu\text{g/L}])$$

It should be noted that the weight of the Uranium-234 (U-234) isotope is not included in enrichment calculations for site groundwater because at natural or low enrichment values, the mass of U-234 is considered negligible (i.e., less than 0.05% of the total uranium mass).

The groundwater remediation strategy established for the Cimarron site generally involves the extraction of groundwater from multiple areas and treatment of this groundwater via three

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independent systems (i.e., treatment trains). The influent groundwater stream associated with each of these treatment trains will have different contaminant characteristics, as described below.

1. Treatment Train 1 – The influent characteristics associated with this Treatment Train will be dominated by groundwater recovered from the Western Alluvial Area (WAA) and the Western Upland 1206 Drainageway (WU-1206) Transition Zone area, where the concentration of uranium exceeds the derived concentration goal level (DCGL) of 180 picocuries per liter (pCi/L). The concentration of uranium in groundwater does not exceed 500 pCi/L, except in WU-1206 Transition Zone wells; the enrichment of uranium averages approximately 3% U-235 (by weight).
2. Treatment Train 2 – Influent characteristics associated with this Treatment Train will be dominated by groundwater recovered from extraction wells installed in the WAA “BLUFF” area, where the concentration of uranium in groundwater is significantly less than the DCGL, and the enrichment is low, averaging less than 1.5% U-235 (by weight). Groundwater in this area will be extracted to reduce concentrations of nitrate and fluoride in the alluvium, and to capture groundwater displaced by the injection of treated water in upland areas to the south. Groundwater with nitrate and fluoride concentrations exceeding remediation criteria is present in the upland areas to the south, and in the vicinity of the WAA “BLUFF” extraction wells.
3. Treatment Train 3 – This treatment train will receive groundwater recovered from Burial Area #1 (BA1), where the concentration of uranium in groundwater is significantly higher than elsewhere on the site, exceeding 4,000 pCi/L in some areas. The enrichment of groundwater in BA1 is low, averaging less than 1.5% U-235 (by weight).

The preliminary enrichment values presented above and in the enclosed tech memo will be used until **actual** enrichment values can be calculated from the results of isotopic analyses conducted on samples of resin obtained from each treatment train during groundwater treatment.

To minimize the potential for under estimating the mass of U-235 in ion exchange resin, the enrichment values presented in the tech memo represent the 95% upper confidence level, based on both historic isotopic mass concentration and reported analytical uncertainty. In addition, the enrichment value for each well location was “weighted” by the total uranium concentration, so that U-235 enrichment values for wells exhibiting higher uranium concentrations were weighted more heavily than enrichment values for wells with lower concentrations.

Changes in the remediation strategy since the submittal of the December 31, 2015 *Facility Decommissioning Plan* have resulted in changes to the treatment processes established for each

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groundwater influent stream. It is likely, though not yet definite, that the influent groundwater streams associated with Treatment Trains 1 and 2 will be combined prior to treatment for both uranium and nitrate. Doing so would reduce the maximum U-235 enrichment in groundwater received by any treatment component, and eliminate some of the remediation system infrastructure (e.g., one foundation and one influent tank instead of two). Due to the potential for Treatment Trains 1 and 2 to be combined, the tech memo includes a calculated U-235 enrichment value for this combined stream, as well as the individual streams described above.

If you have questions or comments regarding this tech memo, please contact me at jlux@envpm.com or at 405-642-5152.

Sincerely,



Jeff Lux, P.E.
Project Manager

Enclosure
cc: NRC Document Control Desk (electronic copy only)