May 25, 2017

Mr. Ken Kalman
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Re: Docket No. 70-925; License No. SNM-928
Response to February 9, 2017 Request for Additional Information

Dear Mr. Kalman:
Environmental Properties Management LLC (EPM) received requests for additional information (RAIs) related to the December 31, 2015 *Facility Decommissioning Plan* in a letter dated February 9, 2017. EPM submitted preliminary responses to RAIs on March 21, 2017. A teleconference was conducted the afternoon of March 27, 2017, to obtain the clarification and feedback needed to finalize responses to RAIs.

RAIs generally fell into two categories: RAIs for the completion of the Safety Evaluation Report (SER) and RAIs for the completion of an Environmental Assessment (EA). The following RAIs and responses are identified sequentially based on those categories. For example, "SER-1" is the first RAI associated with the SER, and "EA-1" is the first RAI associated with the EA.

SER-1 – Characterization of Dissolved Uranium

Description of the Deficiency

Although the extent and magnitude of uranium in the groundwater for the Western Area and Burial Area #1 is provided in Fig, 3-3 and Fig. 3-4 of the proposed decommissioning plan (DP), respectively, there is no description in Section 3.5.3 of the characteristics of the dissolved uranium in the aquifers within the different sub-areas.

Basis of the Request

Information on radiological status of groundwater is required under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70.38 (g)4(i) and Section 16.4.6 of NUREG-1757, Vol. 1, Rev. 2, including summaries of the contaminated aquifers, maximum and average radionuclide activities or concentrations, along with their background levels at the site.

Formulation of RAI

Include a summary description of the magnitude and extent of uranium in each aquifer of the various sub-areas in the DP. Discuss, in more depth, the spatial distribution and isotopic variation of dissolved uranium in the sub-areas, influence of the geologic settings, and implications for remediation.

Response

Figures 3-1 through 3-4 of the December 15, 2015 Facility Decommissioning Plan presented the extent of nitrate, fluoride, and uranium exceeding NRC and DEQ criteria. These figures will be

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replaced by more detailed isopleth maps, assigning contaminant concentrations generated through statistical analysis of groundwater monitoring results from groundwater sampling events performed from 2011 through the second quarter of 2017. Sec. 3.5.3, "Current Extent of COCs in Groundwater", of Facility Decommissioning Plan – Rev 1 (the DP) will be expanded to include for each remediation area:

- *The magnitude and spatial distribution of uranium in each aquifer;*
- *Variability of isotopic ratios (enrichment);*
- *Implications of the characteristics of the uranium on groundwater remediation.*

Figures will be added to present iso-enrichment contours for U-235 enrichment in the Western Alluvial Area, based on analysis of groundwater samples collected during the 2nd quarter of 2017, and analyzed by method EPA 200.8. The impact of the geologic characteristics of the aquifer material on remediation performance will be discussed for each area in response to RAIs SER-2, SER-4, and SER-5. Representative maximum and average uranium mass and activity concentrations will be provided for each area, along with corresponding background levels.

SER-2 – Basis of Design

Description of the Deficiency

The DP proposes the use of the pump and treat method to remediate the uranium impacted groundwater at the Cimarron site. The remedial design criteria or objectives are not included in the DP, and there is no discussion about how the proposed design described in the DP meets these criteria or objectives.

Basis of the Request

Given that the remedial goal is to restore the uranium impacted aquifer, the pump & treat design includes nine (9) groundwater extraction wells for, Burial Area #1 (BA#1), with a combined nominal extraction rate of 100 gallons per minute (gpm); and twenty-four (24) groundwater extraction wells for the Western Alluvial Area (WAA) at a total pumping rate of 458 gpm from these extraction wells for treatment. The remedial design also includes groundwater injection and extraction trenches to enhance the groundwater remediation in the upland and transitional areas. Pursuant to 10 CFR 70.38(g)(4)(ii), the remedial objectives and criteria need to be discussed in the DP. Lack of these design criteria would make it difficult to objectively evaluate the proposed pump and treat remedial design presented in the DP.

Formulation of RAI

Provide the remedial design criteria, and discuss how the selected design meets these selected criteria and is optimized to effectively remove uranium impacted groundwater in the alluvial and

bedrock aquifers respectively in the WAA and BA #1. List the input parameters for the groundwater flow model, and attach selected groundwater capture zone maps.

Response

EPM retained Burns & McDonnell Engineering Company (Burns & McDonnell) to prepare a groundwater remediation design. Burns & McDonnell has documented the design criteria and the design considerations required to achieve the groundwater remediation goals in a "Basis of Design" (BOD) document. The BOD includes:

- *Initial representative maximum uranium groundwater concentration (mass and activity basis) and distribution, as depicted in isopleth maps (see response to SER RAI #1).*
- *Final maximum uranium groundwater concentration (mass and activity basis)*
- *Hydraulic capture analysis – as determined through groundwater flow modeling based on the following input parameters:*
  - *Hydraulic conductivity*
  - *Hydraulic gradient*
  - *Saturated thickness*
  - *Plume geometry and extent*
  - *Remediation extraction well and extraction trench flow rates*
  - *Remediation injection well and extraction trench flow rates*
  - *Remediation extraction well and extraction trench locations (coordinates)*
  - *Remediation injection well and extraction trench locations (coordinates)*

Section 8.1.1 of the DP, "Groundwater Remediation Areas" will be re-named "Basis of Groundwater Remediation Design". Section 8.1.1 will summarize the basis of design, which will include the designation of remediation areas. Additionally, the BOD will be included in the DP as Appendix I.

<u>SER-3 – Stagnation Areas</u>

Description of the Deficiency

The particle tracking/pathlines and flowlines are identical in a homogenous media under a steady state and two-dimensional condition. With this assumption, the particle track/pathlines shown in Fig. 8-5 for the BA#1 and Fig. 8-4 for the WAA can be approximated as flowlines. The flowlines showed in Fig. 8-5 appear to indicate a stagnation area within the central portion of the BA#1 uranium-impacted groundwater plume (north of GE-BA#1-03, east of GE-BA#1-04 and south of GE-BA#1-05). There appears a second stagnation area in the WAA between extraction well GE-

WAA-02, GE-WAA-01 and GE-WAA-04, and the eastern boundary of WAA-U.>DCGL Remediation Area.

Basis of the Request

10 CFR 70.38(g)(4)(ii) requires a description of planned decommissioning activities. Based on the proposed groundwater extraction design, there appears to be a stagnation area within the BA#1 and WAA uranium-impacted groundwater field. The staff is concerned that contaminated groundwater exceeding the Derived Concentration Guide line (DCGL) in these stagnation areas may not be extracted.

Formulation of RAI

Provide a verification that these stagnation areas are indeed created by the proposed pump and injection system, and discuss potential remedies in the design or during extraction operation, to ensure the uranium-impacted groundwater in these stagnation areas will be extracted and treated.

Response

The particle tracking models that were presented in Figures 8-4 and 8-5 of the 2015 Decommissioning Plan show the flow paths of particles spaced at intervals around the areas from which capture of groundwater is required. Particle flow paths represent flow lines, and the spacing of particles around the edges of remediation target areas results in what appear to be areas of stagnation. If particles had been much more tightly spaced, flow lines would cross some of these apparent areas of stagnation.

Particle tracking model outputs will be refined to show a higher density of particles (flow lines). More substantially, Section 8.7.1, "Groundwater Extraction Monitoring", of the DP will include a remediation optimization program that addresses zones of stagnation by varying pumping rates among extraction wells. Additional figures will demonstrate capture and elimination of stagnation zones due to alternating pumping rates between extraction wells.

<u>SER-4 – Duration of Remediation</u>

Description of the Deficiency

As part of a pump and treat system design consideration, estimates of clean-up time for the contaminated aquifers are provided in Figure 9.1. The assumptions involved with aquifer cleanup time estimates are not included in the DP. These assumptions may include such parameters as uranium distribution coefficient (Kd), dissolved uranium distribution and transport in aquifers within different sub-areas, and groundwater flow. For example, the distribution coefficients, Kd are often assumed to be reversible and linear. The difference and uncertainty in aquifer clean-up

times for various sub-areas may have major impacts on the pump and treat design, operation and post-remedial groundwater monitoring.

Basis of the Request

The assumptions used for estimating the groundwater clean-up time, and their validity and associated uncertainties are not discussed in the DP, as required in 10 CFR 70.38(g)(4)(ii).

Formulation of RAI

Provide a list of assumptions used for the aquifer cleanup time estimates. Explain how each of these assumptions is valid and reasonable given that the geological materials in the impacted aquifers at the site vary considerably, ranging from mudstone, sandstone, to unconsolidated alluvial sediments. Provide an assessment and discussion of the impacts of uncertainties of the input parameters and assumptions on the clean-up time estimates for aquifers in various sub-areas.

Response

Remediation timeframe estimates were calculated for each area based on the following parameters:

- *Retardation – calculated using estimated bulk aquifer density, porosity, and Kd values;*
- *Pore volume – calculated using estimated plume area, saturated thickness, and porosity values;*
- *Initial aqueous-phase contaminant concentration – based on the maximum concentration at any location within a remediation area from 2011 through 2016;*
- *Number of pore volumes required to reduce maximum contaminant concentration to remediation target concentration;*
- *Time to recover number of pore volumes required to reduce maximum contaminant concentration to remediation target concentration at planned extraction rates.*

The Basis of Design memorandum will be summarized in Section 8.1.1 of the DP and included as Appendix I. This document describes how conservative values for the following input parameters were developed:

- *Area of each "Remediation Sub-Area"*
- *Saturated thickness of the aquifer in each "Remediation Sub-Area"*
- *Distribution coefficient (Kd) for alluvial sand, transition zone material, and sandstone*
- *Initial or maximum contaminant concentration*

The method for estimating remediation duration will be generally described in Sections 9.3, "Western Area Remediation" and 9.4, "Burial Area #1 Remediation". A series of webinars will be conducted to present the process of using the above listed inputs in determining remediation timeframe estimates. Webinars will address:

- *Maximum influent concentration calculations*
- *Use of flow and particle tracking models to project extraction and injection rates*
- *Use of assumptions and inputs to calculate rate of remediation*

A full description of the assumptions, input parameters, and calculation methods to develop remediation timeframe estimates for each remediation area will be provided in Appendix K.

SER-5 – Vertical Distribution of Contamination in Aquifer

Description of the Deficiency

The magnitude and extent of dissolved uranium in the groundwater at the site has been historically monitored and assessed through fully penetrating monitoring wells, but vertical distributions of dissolved uranium across the aquifer thickness have not been investigated. Under the currently proposed decommissioning plan, fully penetrating wells will be installed in the aquifer to extract uranium-impacted groundwater. If dissolved uranium is stratified in aquifers, a fully penetrating well will pump groundwater across the entire thickness of an aquifer, which may result in extracting and treating potentially uncontaminated groundwater.

Basis of the Request

The vertical distribution of dissolved uranium in the aquifer within various sub-areas is not discussed in the DP as required under 10 CFR 70.38(g)(4)(i). Stratified dissolved uranium in an aquifer may have implications on groundwater extraction well design and remediation.

Formulation of RAI

Provide an assessment of the likelihood that dissolved uranium varies vertically in different aquifers or portions of an aquifer at the site. Conduct a cost and benefit analysis of a pump and treat system with a combination of partially and fully penetrating wells, if the dissolved uranium is believed to be stratified at the site.

Response

A field investigation was conducted in December 2016 to assess the vertical distribution of uranium in alluvial deposits, primarily along the centerlines of the WAA "U > DCGL" plume (extending nearly to the Cimarron River) and the BA1 plume. In this investigation, the Geoprobe® Hydraulic Profiling Tool™ (HPT™) was advanced at several locations in each area

to collect discrete groundwater samples at various depths, along with continuous hydraulic conductivity profile data. Detailed results of this investigation were presented in a report recently submitted to NRC and DEQ. The report will only be presented independently of the response to this RAI, and will not be included as an appendix to the DP.

The investigation identified stratification of uranium in both areas, and suggests that the higher concentrations of uranium are found in higher permeability zones in the aquifer. This stratification affects the efficiency with which uranium mass can be removed from extraction wells. Vertical profiling of uranium and hydraulic permeability (using the HPT™) will be conducted at the location of each extraction well prior to well construction. Extraction well screens will be located in the zones of highest uranium concentration, thereby maximizing the mass of contaminant removed, and minimizing both 1) the recovery and treatment of uncontaminated groundwater and 2) the time required to achieve remediation goals.

A summary description of the work performed, how the findings impact plans for extraction well installation, and a description of the assessment that will be performed prior to the installation of extraction wells will be provided in Section 8.2.1, "Groundwater Extraction Wells".

SER-6 – Injection and Recovery Trench Design

Description of the Deficiency

There is no detailed discussion of the factors considered in the trench design. The technical basis for the proposed injection rates are not provided in the DP.

Basis of the Request

The remedial targets of injection trenches are the Sandstone A and Sandstone B that are impacted by uranium at the site. Groundwater injection trenches with injection wells are proposed for sub-areas of the Western Upland Area (WUA). These include WU-BA3, WU-BA2, UP1 and UP2 within the sandstone A and BA#1 (the southern end and the eastern edge of "U>DCGL" within Sandstone B). The lengths and depths of the proposed trenches are also indicated in the DP, along with respective injection rates. It is noted that the lengths of some trenches in the UP1 area are relatively shorter given its impacted size. The amount of water that can be injected into the formation may depend on trench geometry, hydraulic head, and permeability among other factors. The permeability of the subsurface formation and hydraulic heads in the trenches may be the most important factors in controlling the injection rates.

Formulation of RAI

Provide a discussion in Section. 8.4.1 of the DP regarding the considerations taken into account in the injection trench design, including trench size and injection rates. Discuss the uncertainties

associated with input parameters and their impact on the trench design and overall remedial objectives for the sub-areas of concern.

Response

A pilot test will be conducted in 2017 to generate data needed to finalize injection and extraction trench design and performance estimates. The pilot test includes the installation of additional monitor wells in the Uranium Pond #1 (UP1) Area and Burial Area #1 (BA1). Pilot-scale injection trenches, consisting of portions of the full-scale trenches planned for the UP1 and Uranium Pond #2 (UP2) remediation areas, will be constructed. Injection trench GWI-BA1-01 and extraction trench GETR-BA1-01 will be constructed in BA1. The ability of the injection trenches to deliver the design injection rate will be tested by injecting potable water under a constant head. A dye tracer test will involve monitoring for the presence of injected dye in nearby outcrops and monitor wells. The ability of the extraction trench to produce the design extraction rate will be tested by conducting a "pump test" (contaminated water will be contained in frac tanks pending future treatment). The pilot test will provide the following information:

- *Approximate fracture/joint lineament orientation, spacing, and location*
- *Vertical thickness of the targeted sandstone unit;*
- *Static groundwater elevation;*
- *Achievable hydraulic head, with respect to topographic constraints;*
- *Potential discharge from seeps*
- *Formation permeability;*
- *Achievable flow rates;*
- *Achievable trenching depth;*
- *Cost and constructability considerations.*

The performance of the injection and extraction trenches in BA1 ***do*** *impact the time in which the license termination criterion for uranium can be met. The performance of injection trenches in all other areas* ***does*** *impact the degree to which the concentrations of uranium, nitrate, and fluoride are reduced by the time the license is terminated, but* ***do not*** *impact the ability of the groundwater remediation program to achieve license termination criteria. This is due to the fact that uranium concentrations are already less than the license termination criterion in those areas.*

The results of the pilot test will be used to refine and/or revise the design of the injection and extraction trenches if the findings do not support projected extraction and injection rates. A report describing the installation and testing of the pilot test trenches, including a description of

how information obtained through the pilot test impacts the design of the groundwater remediation infrastructure, will be submitted independently of the response to this RAI. The report will not be included as an appendix to the DP.

SER-7 – Scaling and Fouling in Injection Trenches

Description of the Deficiency

The process for assessing potential mineral scaling and fouling in the injection system is not provided in the DP.

Basis of the Request

10 CFR 70.38(g)(4)(ii) requires the licensee to provide a description of planned decommissioning activities. It's indicated in Section 8.4.3 that injecting water will be pretreated, as necessary, to prevent mineral scaling and fouling of the injection system piping, injection wells/trenches, and subsurface formation. A procedure or plan should be described in the DP regarding assessment of mineral scaling and fouling potential in the injecting system. This plan should include initial assessment of the injecting water, and criteria for initiating investigation during operation of mineral scaling and fouling in the system. When an issue of this nature arises during remedial operation, the stated plan or procedure should provide a clear path to resolve the problem.

Formulation of RAI

Describe the process, including measurements and procedures used to determine whether injection water needs pretreatment to prevent mineral scaling or fouling. In addition, discuss conditions that will prompt an evaluation of possible fouling in the injection system piping, injection wells, and subsurface formations.

Response

As noted, Section 8.4.3, "Water Injection Systems," states that water coming from the uranium treatment systems (and the nitrate treatment systems in the western areas) will receive additional treatment as needed to prevent mineral scaling and fouling of the injection system piping, injection wells/trenches, and subsurface formation.

Based on scaling and corrosion indices calculated from site groundwater parameters, the potential for scale formation in untreated groundwater is mild to moderate. The current design involves reducing the pH of influent groundwater to approximately 6.8 standard units to minimize the potential for scale formation without impacting the resin's ability to adsorb uranyl carbonate.

Changes in scaling and precipitate formation potential could result from other pH/Eh changes and chemical reactions which take place within treatment processes. Scaling and precipitate formation potential for treated effluent utilized for injection is expected be relatively low; an accurate assessment of this potential is not possible until treatment system startup.

Effluent from nitrate treatment systems is filtered to remove biomass. Nevertheless, treated effluent utilized for injection may contain minute quantities of residual anaerobic bacteria and carbon substrate associated with the biodenitrification treatment process. The potential for biofouling is expected to be relatively low, but secondary extraction of biomass and/or "sterilization" of treated water may be needed to prevent biofouling.

Parameters detailed above will be closely monitored during the early stages of remediation to facilitate early detection and mitigation of scaling or fouling issues. Early detection and mitigation is key to prevent impacts requiring costly repair or replacement of equipment.

Section 8.4.3 will be revised in D-Plan Rev – 1 to include a description of the procedures and protocols that will be followed during remediation startup, commissioning, and operation of groundwater treatment and injection systems. These will include:

- *Sampling and testing water as needed to ensure that injectate meets criteria that minimize the potential for scaling;*
- *Monitoring injection pressures and flow rates to identify unanticipated scaling, fouling, or obstruction within the injection system infrastructure;*
- *Monitoring head and flow rates in injection wells and trenches to assess fouling of well screens, granular trench backfill, and/or the receiving formation;*
- *Assessment of other criteria that would trigger inspection and/or maintenance of injection system infrastructure, including rehabilitation of injection trenches.*

SER-8 –In-Process Groundwater Monitoring

Description of the Deficiency

It's stated in Section 8.4.4 of the DP that water delivery to injection wells and trenches will only be permitted if the extraction systems responsible for capture of the injected water are operating and maintaining sufficient capture. Table 8-2 provides a list of wells used for in-process monitoring of water levels in the remediation sub-areas with a specified schedule (e.g., daily during the first week of operation, weekly during the second through fourth week, and monthly thereafter). It's also indicated that depth to groundwater measurements will be conducted in selected monitoring wells to evaluate the influence of water injection on hydraulic gradient (Sec. 8.7.2), and but these selected monitoring wells and measurement schedule are not specified. It's

not clear how the assessment of injected/contaminated groundwater capture will be effectively accomplished.

Basis of the Request

There are no specific discussions on conducting groundwater level monitoring and capture zone analysis in the DP to ensure sufficient capture of injected water under 10 CFR 70.38(g)(4)(ii).

Formulation of RAI

Discuss the process and procedure to demonstrate sufficient capture of the injected water, including the monitoring well locations and schedules of field groundwater level measurements, and capture zone analysis and remedial measures to take if sufficient captures are not achieved.

Response

Monitor wells located near injection components are specified in Table 8-2 and on Figure 8-8. Water level measurements will be recorded in these wells, in accordance with the same in-process data collection schedule, to evaluate the influence of injection on hydraulic gradients.

The particle tracking model output presented in Figures 8-3 and 8-4 indicate that all injected groundwater will be captured by extraction components located in the alluvial material. One of the objectives of the in-process groundwater monitoring program is to provide the information needed to validate the conclusions reached via groundwater flow modeling and particle tracking modeling. The in-process groundwater monitoring program will also provide information needed to empirically evaluate/demonstrate that groundwater discharging from upland areas is captured by extraction wells.

Section 8.7.1, "Groundwater Extraction Monitoring", of the DP will be revised to provide more information on the in-process groundwater monitoring program. This will include the basis for selecting monitor wells for in-process depth to groundwater measurements, as well as the intended use for these measurements (i.e., capture analysis, optimization, etc.). The designated monitoring network will provide the quantity and spatial distribution of data required to sufficiently validate the capture of flow from upland areas by alluvial wells. Additional monitor wells will be needed to provide sufficient information; at a minimum, additional monitor wells will be installed between and/or upgradient or downgradient from extraction wells. The locations of existing and proposed monitor wells will be depicted in Figure 8-8, and all the in-process monitoring wells will be listed in Table 8-2.

SER-9 – In-Process Groundwater Monitoring Schedule

Comment

Modify Table 8-2 to include groundwater level measurement and groundwater sampling schedules.

Response:

Table 8-2 in the DP already specifies groundwater level measurement and groundwater sampling and analysis requirements for each in-process monitoring well. The table will be revised to incorporate the measurement and sampling frequencies (i.e., schedule) presented in Section 8.7, "In-Process Groundwater Monitoring". Any additional monitoring locations identified in the preparation of the response to SER-8 will also be incorporated into the DP.

SER-10 – Discharge Monitoring

Comment

In Section 12.2, include the sampling frequency, compositing, and analytical methods for monitoring the effluent discharging to the Cimarron River, as contained in the Oklahoma Pollutant Discharge Elimination System (OPDES) permit.

Response:

DEQ sent a draft OPDES permit to EPM for review prior to issuance for public review. The permit will not require or authorize compositing; each individual sample collected will be analyzed separately. Section 12.2, "Effluent Monitoring", will be revised to include the following information;

- *Locations from which samples are collected;*
- *Frequency of sample collection;*
- *Analyses to be performed;*
- *Analytical methods;*
- *Permit limits;*
- *Reporting frequency.*

SER-11 – Post-Remediation Groundwater Monitoring

Description of the Deficiency

The uranium-impacted groundwater under remediation at the Cimarron site occurs in different aquifers, varying from alluvial deposit to fractured sedimentary rock across sub-areas. The groundwater flow and uranium transport mechanism also differs between these sub-areas, through granular pore space in the alluvial vs. predominant fractures in the bedrock, diffusive transfer of uranium from less permeable layer (e.g., siltstone) and permeable layers (e.g.,

sandstone) and potentially greater spatial variability of dissolved uranium in the bedrock, for instance. Discuss how these differences in groundwater flow and uranium transport are considered in the proposed post-remediation groundwater monitoring network design.

Basis of the Request

Post-remediation groundwater monitoring for BA#1, WAAs, and WUAs will consist of at least 12 consecutive quarters of sampling and analysis to statistically demonstrate compliance with NRC criteria for license termination. The proposed groundwater monitoring wells are listed in Table 8-3 and Figure 8-10. However, the selection criteria for the post-remediation monitoring wells are not included in the DP as required in 10 CFR Part 70.38(g)(4)(ii).

Formulation of RAI

In Section 8.8 of the DP, provide the technical basis and discussion for the proposed post-remediation groundwater monitoring network for the various sub-areas at the site.

Response

Post-remediation monitor wells are generally located along the centerline of the uranium plume. In the Western Alluvial Area, post-remediation monitor wells are screened in high-concentration areas in both Transition Zone and alluvial material. In BA1, post-remediation monitor wells are screened in high-concentration areas in Sandstone B, Transition Zone, and alluvial material. These wells will be the last to demonstrate achievement of remediation concentration goals and will therefore be best suited for monitoring of contaminant concentration rebound during the post-remediation period.

Section 8.8, "Post-Remediation Groundwater Monitoring", of the DP will be revised by adding a discussion of the technical basis for post-remediation monitor well selection. Subsections will be added within Sections 8.8.1, 8.8.2, and 8.8.3 of the DP describing the rationale and technical basis for selecting the proposed post-remediation monitor wells for each remediation area.

<u>SER-12 – In-Process Treatment System Monitoring</u>

Description of the Deficiency

NRC staff is concerned that this weekly sampling schedule may not provide up-to-date data to adequately estimate the amounts of Uranium-235 and Uranium-238 adsorbed onto the resin and evaluate performance of the IX treatment system. During initial stage of groundwater extraction, the Uranium-235 and Uranium-238 concentrations in the influent may exhibit greater fluctuation as a result of variation in the amounts of groundwater from different extraction wells when pumping rates are being adjusted to achieve a desired or designed overall extraction rate. This may also occur when drawdowns are optimized to achieve a desired groundwater capture. A less

frequent monitoring of the IX treatment system is appropriate when Uranium-235 and Uranium-238 concentrations in the influent are shown to be close to a steady state.

Basis of the Request

The proposed in-process monitoring for the ion-exchange (IX) treatment system includes collecting an in-coming contaminated water (influent) from the sampling port located between the pre-filter and the lead resin vessel, and the treated water (effluent) at the end of the polishing vessel. It indicates that the in-process monitoring of the IX treatment system will be initially conducted on a weekly basis. However, subsequent in-process monitoring of the IX treatment system is not provided or discussed in the DP as required in 10 CFR Part 70.38(g)(4)(ii).

Formulation of RAI

In Section 8.6.1, propose a complete in-process monitoring schedule, and discuss the basis upon which the in-process IX treatment system monitoring is based, and conditions that will initiate an evaluation of the proposed in-process monitoring schedule.

Response

According to Section 8.6.1, "In-Process Monitoring":

- *Influent samples will be collected prior to entering the lead vessel,*
- *In-process samples will be collected from sampling ports located:*
    - *Between the lag and polishing vessel and*
    - *Between the lead and lag vessel*
- *Effluent samples will be collected upon exit from the polishing vessel.*

Figure 8-6 shows that the projected time to reach vessel change-out is a minimum of 90 days, increasing slowly as influent concentration decreases. Weekly sampling for this minimum 90-day time span provides a minimum of 10 data points (accounting for laboratory turnaround time) before resin is loaded. Once the operational data history is established, the sampling frequency may be reduced. Once sampling frequency is reduced, significant changes in influent concentrations (considered highly unlikely) and extended downtime are the anticipated conditions that would require a return to weekly sampling.

Section 8.6.1 states that samples will be analyzed for uranium concentration; analysis will be for U-235 and U-238 mass concentration. At the levels of enrichment found at the Cimarron site the mass of the U-234 isotope is negligible – less than 0.1% of the total mass of uranium. Consequently, the total mass of uranium, the mass of U-235, and the U-235 enrichment will be known for the water in each vessel for which uranium in the effluent is detectable.

A new Section 8.2.5, "Influent Concentration Variability" will address the potential variability in influent concentrations which may occur during startup of groundwater recovery.

Section 8.6.1 will be revised to describe the shutdown and re-start of the uranium treatment systems in Trains 1 and 2 so that groundwater can be recirculated through the bioreactors to establish a viable biomass. It will also describe in-process monitoring of the biodenitrification system to determine when a viable biomass has been established. Finally, it will include a description of the recirculation of water through the ion exchange systems before continuous treatment for uranium can be re-started.

Concerns related to nuclear material control and accountability will be addressed in Section 11.8, "Nuclear Criticality Safety", of the DP.

<u>SER-13 – Radiation Protection Plan</u>

Description of the Deficiency

The submitted DP references the Radiation Protection Plan (RPP) approved by License Amendment 15 and stated that several changes were made to the RPP to prepare for the extraction and treatment of uranium-impacted groundwater but the updated and revised RPP was not submitted for approval.

Basis of the Request

The DP does not provide enough information on the new decommissioning activities required for the technical review and evaluation criteria of NUREG-1757, Vol. 2. The RPP referenced in Section 11 of the proposed DP is for the old DP that relied on the use of monitored natural attenuation whereas the proposed DP relies on the pump and treat method. The updated RPP was not included in the DP or Appendixes for NRC staff to review.

Formulation of RAI

Please submit an updated Radiation Protection Plan (RPP), as an addendum to the DP, for the new pump and treat method which describes in detail the appropriate radiation protection procedures for the proposed pump and treat method.

Response

The RPP will be updated as the 60% design is revised, in accordance with responses to other RAIs, and as the DP is prepared. The RPP will specifically include a commitment to scan all subsurface soil brought to the surface to evaluate it for elevated activity. The revised RPP will be referenced in Section 11, "Radiation Protection Program", and included as Appendix L.

SER-14 – Demonstration that Criticality Is Not Credible

Description of the Deficiency

Appendix C, "Exemption of Packaged Fissile Exempt Material from U-235 Possession Limit," states that the current technical basis of the waste acceptance criteria (WAC) for disposal of special nuclear material (SNM) is NUREG/CR-6505, "The Potential for Criticality Following Disposal of Uranium at Low-Level Waste Facilities." Appendix C further discusses that the radionuclide concentration transportation requirements are less than the current WAC; therefore, the fissile exempt concentration for transportation is the most conservative and limiting value. The provided discussion provides details regarding the limited risk of inadvertent criticality; however, it does not provide details as to whether inadvertent criticality is credible.

Basis of Request

10 CFR 70.17 states, in part, that the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in [10 CFR Part 70] as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

10 CFR 70.61(a) states, in part, that each applicant or licensee shall evaluate, in the integrated safety analysis, its compliance with the performance requirements in paragraphs (b), (c), and (d) of [10 CFR 70.61].

10 CFR 70.61(b) states, in part, that the risk of each *credible* high-consequence event must be limited. Engineered controls, administrative controls, or both, shall be applied to the extent needed to reduce the likelihood of occurrence of the event so that, upon implementation of such controls, the event is highly unlikely.

10 CFR 70.61(d) states, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety.

NUREG 1520, "Standard Review Plan for Fuel Cycle Facilities License Applications," states, in part, that any one of the following three independent acceptable sets of qualities could define an event as not credible: (1) An external event has a frequency of occurrence that can conservatively be estimated as less than once in a million years. (2) A process deviation consists of a sequence of many unlikely events or errors for which there is no reason or motive. In determining that there is no reason for such errors, a wide range of possible motives, short of intent to cause harm, must be considered. Complete ignorance of safe procedures is possible for untrained personnel, which should be considered a credible possibility. Obviously, no sequence

of events should be categorized as not credible if it has actually occurred in any fuel cycle facility. (3) A convincing argument exists that, given physical laws, process deviations are not possible, or are extremely unlikely. The validity of the argument must not depend on any feature of the design or materials controlled by the facility's system of items relied on for safety (IROFS) or management measures. Such a demonstration of "not credible" must be convincing despite the absence of designated IROFS.

Formulation of RAI

In order to achieve reasonable assurance that the criteria described in 10 CFR 70.17 for specific exemptions is met, and that the criteria described in 10 CFR Part 70 paragraphs (a), (b), and (d) do not directly apply, please provide details as to why inadvertent criticality is not credible using any one of the three independent acceptable sets of qualities discussed in NUREG 1520 for defining an event as not credible. In this discussion, please provide details regarding any potential interaction between fissile-exempt material and any other fissile material on site. Additionally in this discussion, please provide details regarding the chemical and physical form of the material and its containers and their respective configurations.

Response

Groundwater contaminated above release criteria will be extracted from subsurface aquifers, piped to treatment facilities, and treated to remove the contaminants by ion-exchange and/or bio-remediation processes as needed. Effluent water from treatment processes will be either reinjected into the ground or discharged to surface water in accordance with an OPDES permit. Resulting contaminated waste (spent resin) will be processed, packaged and disposed in accordance with applicable requirements. The resin matrix will consist of a hydrocarbon based resin (DOWEX 1); it becomes loaded with low-enriched uranium during the groundwater treatment process. Prior to packaging the resin matrix, non-resin material will be mixed with the resin as needed to absorb free liquid to satisfy transportation and waste disposal requirements. Since the waste will contain enriched uranium, consideration has been given to the design and conduct of the processing operations to ensure that an inadvertent nuclear criticality incident is not credible.

Waste processing operations and storage of packaged waste were evaluated in three separate areas, operating on two different criticality safety limits. There are two treatment systems and a separate packaged waste storage area. The two processing locations, although separated by over ½ mile, will be treated as a combined safe mass unit with a limit of 1,200 grams U-235 and a maximum enrichment of 5% U-235. The packaged waste storage area will be operated on a "safe concentration limit" basis, in which the packaged waste stored in this location (awaiting

shipment for disposal) will not exceed the fissile exempt concentration limit of 1 gram of U-235 per 2,000 grams of non-fissile material.

A series of calculations were performed based on the assumption that the administrative controls to maintain the safe mass limit for the processing operations and the concentration limit for packaged waste are not effective. The calculations, assuming a uranium enrichment of 7.33% and utilizing an Upper Safety Limit of [k_{eff} plus 3 sigma] <0.9, demonstrate that the maximum allowable safe fissile concentration is 8 g U-235/kg Resin. The attached summary provides additional information regarding the analysis conducted. SER-14 Attachment 1: Criticality and Uranium Loading Calculations describes the basis for these input values, presents the calculations performs, and explains why the maximum allowable safe fissile concentration cannot be attained.

This evaluation concludes that it not conceivable that any combinations of upset conditions could occur that would result in a [K_{eff} plus 3 sigma] exceeding 0.9. Therefore, an inadvertent criticality incident is not credible.

Section 11.8.2, "Groundwater Treatment by Ion Exchange" will be revised to include the information provided above, and SER-14 Attachment 1 will be included as Appendix M.

SER-15 – Assurance of Subcriticality Post-Disposal

Description of the Deficiency

The current basis of the WAC for disposal of SNM is NUREG/CR6505, "The Potential for Criticality Following Disposal of Uranium at Low-Level Waste Facilities." Assurance of subcriticality is based on specified assumptions, whose application and impact to the technical basis is not described in sufficient detail.

Basis of Request

Appendix C, "Exemption of Packaged Fissile Exempt Material from U-235 Possession Limit," states that the current technical basis of the waste acceptance criteria (WAC) for disposal of SNM is NUREG/CR-6505, "The Potential for Criticality Following Disposal of Uranium at Low-Level Waste Facilities." NUREG/CR6505 states that the assurance of subcritical conditions are based on three specified assumptions: 1) the SNM is uniformly distributed throughout the soil, 2) the soil matrix is SiO_2, and 3) the SNM-contaminated soil matrix has a spherical geometry and an optimum water content for nuclear criticality.

Formulation of RAI

Please provide technical details regarding assumption 1. The SNM is uniformly distributed throughout the soil and assumption 2. The soil matrix is SiO_2, as they relate to the processes performed.

Response

The resin processing operation involves blending resin with non-resin material. Blending will result in uniform distribution of SNM throughout the packaged waste matrix in compliance with the transportation requirements. The blended waste will be containerized for shipment and will be certified to meet all of the requirements of the Waste Acceptance Criteria (WAC) for the disposal site. The blended waste will comply with the following specific WAC requirements:

1) *The SNM will be uniformly distributed throughout the matrix of the resin, a hydrocarbon material. This material is considered soil-like but is not a SiO_2 matrix.*
2) *The waste form will be in containers which will be disposed at the licensed disposal site in accordance with license requirements for containerized waste for the disposal site.*

Discussions have been held with the proposed waste disposal site to confirm that the packaged waste does conform to the WAC. SER-15 Attachment 1: Waste Criticality Evaluation provides the analysis used to demonstrate that a critical condition related to the transportation or disposal of the spent resin mixture is not credible.

Section 11.8.3, "Packaged Materials" and Section 13.1.1, "Spent Anion Resin" will both be revised in the DP to include the information provided above, and SER-15 Attachment 1 will be included in "Exemption of Packaged Fissile Exempt Material from U-235 Possession Limit", which will be Appendix F (formerly Appendix C).

EA-1 – Land Use

Description of Deficiency

With regard to land use, the ER does not clearly indicate how much of the site has been released and what the current and future uses are of released and unreleased land, as listed in item 1c below. Sections 2.1 and 5.6.10 of the DP provide general information about the site acreage, but it is not clear whether this is a comprehensive accounting of former and current site acreage and land uses.

Basis of Request

Per NUREG–1748, Sections 6.3.1 and 6.4.1, and to fully address the potential impacts associated with current and future land uses, and to assess cumulative effects, the NRC needs a description of past, current and future land uses.

Formulation of RAI

Please verify or provide the following information, which can be presented as text, as a table, and/or as a figure:

- Amount of land originally under license
- Amount of land previously released: 117-acre parcel and 24-acre parcel?
- Current use of released land, if other than the two parcels (117-acre parcel and 24-acre parcel) listed in previous bullet
- Amount of unreleased land remaining
- Amount of land to undergo groundwater reclamation
- Amount of land that will not be released, if any
- Future use of released land, if known

Response

Section 5.6.1, "Land Use" will be revised to address the items listed in the RAI. This discussion will address the status of areas already released from the license as well as those areas that would be released from the license or brought back under license in accordance with Section 6.3, "License Condition 9 – Definition of the Licensed Site".

<u>EA-2 – Workforce</u>

Description of Deficiency

The number and types of workers that would be employed to conduct the groundwater reclamation is not indicated in the DP.

Basis of Request

Per NUREG-1748, Sections 6.3.2, 6.4.2, 6.3.10, and 6.4.10, and to assess the potential socioeconomic and traffic impacts the proposed groundwater treatment activities could have on the Logan County vicinity, the NRC needs information regarding the number and types of workers and where they would come from.

Formulation of RAI

Please provide the following information:

- Number of construction workers and where they would be commuting from

- Percent skilled/unskilled
- Number of operational workers and where they would be commuting from
- Percent skilled/unskilled
- Income that could flow into Logan County (e.g., tax payments, spending on goods and services, etc.)

Response

For construction, the number of workers on site at any time, and the division between skilled and unskilled workers, will be estimated based on the proposed scope of work and the schedule presented in Section 9.0, "Schedule". The locations or areas from which workers will be commuting during construction will be dependent on the company that is selected to perform the work. It can be assumed that unskilled workers will come from the Oklahoma City area, but skilled workers may come from outside the state.

For operation of the groundwater remediation system, the number of workers and the division between skilled and unskilled workers will be estimated based on:

- *The proposed in-process monitoring programs for groundwater remediation and water treatment operations and maintenance;*
- *The requirements of the RPP and procedures;*
- *The anticipated frequency of resin vessel change out, resin processing, and waste packaging and shipping; and*
- *The anticipated frequency of maintenance and/or replacement of infrastructure components (pumps, chemicals, etc.)*

This information, as well as the estimated income that could flow into Logan County, will be provided in Section 5.6.10, "Socioeconomic Impact".

<u>EA-3 – Impact on Air Resources</u>

Description of Deficiency

The types of equipment to be used during reclamation activities and the potential effect on air resources is not presented.

Basis of Request

Per NUREG-1748, Sections 6.3.6 and 6.4.6, the ER should assess the potential impact of the proposed action on air quality. This involves an accounting of the types of mobile and fixed equipment and other activities that could cause air emissions. If there could be air emissions

other than emissions from the denitrification process, the types of equipment to be used need to be identified.

Formulation of RAI

Please provide the following information:

- Types of equipment that would be used during construction
- Types of equipment that would be used during operation
- Spec sheets for each piece of equipment, if available

Response

Specification sheets for construction equipment will not be generated, but standard construction equipment will be utilized as described below. Specifications for equipment utilized during operations are not developed at the 60% design phase. However, the types of equipment that will be utilized during operations which have the potential to produce air emissions follow:

- *Construction of remediation infrastructure: Standard earthmoving machinery and hauling equipment will be used for excavation and trenching, material handling, and clearing, grading, and utility construction. A drilling rig will be used for well installation. A crane, boom lift, or other lifting equipment may be used for equipment and structure placement. Pipe welding equipment will be used to weld piping.*
- *Construction of treatment systems: Standard earthmoving equipment will be used for site grading and preparation. Concrete trucks and/or mixers and finishing equipment will be used to construct concrete foundations and installation of security fencing. A crane or other lifting equipment will be used to erect the WAA treatment facility, to place tanks, and to place the BA1 uranium treatment system.*
- *Operation: Over-the-road trucks will transport chemicals, drums of biomass and LLRW, and other supplies. Over-the-road trucks delivering bulk liquid chemicals will use equipment to fill treatment tanks (e.g., TK-705 containing acid for pH adjustment). A forklift will be used to move spent resin vessels, drums of spent resin, fresh resin drums, and bulk bags of inert material used for mixing with spent resin). A pickup truck (or similar vehicle) will be used to tow resin vessels between the BA1 treatment area and the WAA treatment facility, as well as for daily operation and maintenance.*

Section 5.6.6 will be revised to included information on the type of equipment that will be used during construction and operations which has the potential to create air emissions, as well as the

type and quantity of emission that equipment would create. In addition, the fact that no air permitting is needed will be specifically stated, and a discussion of potential greenhouse gas emissions will be included in Section 5.6.6.

EA-4 – Impact to Surface Water

Description of Deficiency

The ER does not present sufficient detail about the trenching that would be employed during the construction and operation of the project. In addition, information about the location of the stockpiled soils is necessary for both trenches and new building excavations. In addition, the NRC staff expects that the information currently in the DP will change based on the revised remediation plan.

Basis of Request

Per NUREG-1748, Sections 6.3.4 and 6.4.4, and to assess the potential impacts on surface water, the NRC staff needs information about the trenching activities, including the location of stockpiled soils from the trenches and any building excavations. Protection of the stockpiled is required to minimize erosion and sedimentation.

Formulation of RAI

Please provide the following information:

- Surface area (trenches and process buildings) to be disturbed
- Number and size (length, width and depth) of trenches to be excavated (with locations)
- Estimated number and size of soil stockpiles (with locations)
- Method used to control erosion of soil stockpiles
- Disposition of stockpiles, if other than leaving in place

Response

Similar information was recently compiled in planning pilot injection/extraction trench design, permitting, and construction activities. A Storm Water Pollution Prevention Plan (SWP3)has been prepared. A Notice of Intent (NOI) to comply with ODEQ General Permit OKR10 (for the discharge of stormwater associated with construction activities, in accordance with the National Pollutant Discharge Elimination System (NPDES) was submitted to DEQ.

The DP will include several revisions to address this RAI. Section 8.2.2, "Groundwater Extraction Trenches", will be revised to provide information on the stockpiling, control, and disposition of material excavated during construction of extraction trenches. Section 8.4.1, "Water Injection Trenches", will be revised to provide information on the stockpiling, control, and disposition of material excavated during construction of treated water injection trenches.

Section 8.3.1, "Water Treatment Facilities", will be inserted into Section 8.3 to provide information on the stockpiling, control, and disposition of material excavated during construction of the WAA Treatment Facility and foundations for tanks, biodenitrification systems, and the secure storage area. Section 5.6.4, "Water Resources" will be revised to provide information on the protection of surface water from the discharge of treated water as well as from migration due to stormwater. Section 5.6.4 will refer to the greater detail presented in Section 8 discussed above.

Note: the proposed response to RAI EA-04 stated that Sections 9.2.1 and 9.2.2, both of which address the schedule of construction, would be revised. Sections 8.2.2, 8.3.1, and 8.4.2 will be revised rather than Sections 9.2.1 and 9.2.2 because Sections 8.2.2, 8.3.1, and 8.4.2 address the method of construction.

In addition, a new subsection will be added to Section 5.6, "Affected Environment". Section 5.6.13 "Permitting" will be added to identify permits that will be required and the primary provisions of each permit, as well as permits for which it was determined no permit is required.

EA-5 – Ecology of the Site

Description of Deficiency

The ER does not provide information about the ecology of the site.

Basis of Request

Per NUREG-1748, Sections 6.3.5 and 6.4.5, the ER should assess the potential impacts of a proposed action on terrestrial and aquatic ecological resources (flora and fauna). Part of this assessment involves conducting a review under Section 7 of the Endangered Species Act of federal threatened, endangered, and state species of concern inhabiting the site or its vicinity, as well as identification of sensitive habitats. The DP includes information about species listed under Section 7 of the ESA, but does not include a general description of the site ecology.

Formulation of RAI

Please provide information, including an assessment of the potential impacts, on the terrestrial and aquatic ecology of the Cimarron site.

Response

As stated in Section 5.6.5 of the DP, an Oklahoma Ecological Services Field Office (OKESFO) online project review was performed in August 2015 and a letter was submitted to the USFWS stating concurrence with the online assessment concluding that the proposed Project will have no effect or is not likely to adversely affect species protected under the Endangered Species Act.

No issues were raised by the USFWS regarding the Bald & Golden Eagle Protection Act and the Migratory Bird Treaty Act. Concurrence from USFWS was received by email receipt and was provided in Appendix A of the DP. The 60-day review period expired on October 30, 2015 without further response from the USFWS.

Section 5.6.5, "Ecological Resources", will be revised by adding a general description of the site ecology, boundaries of disturbance activities associated with the proposed project, and a description of the disturbance activities. Because the concurrence letter submitted to USFWS specified an estimated project completion date of July 2018, submittal of a new concurrence letter with an updated completion date will be required.

This information will be provided in Appendix B.

EA-6 – Noise Levels

Description of Deficiency

The ER does not provide information about noise levels and related potential impacts from the proposed activities, such as the ambient noise level anticipated at the site (day and night), a description of the nearest sensitive receptor, and types of equipment to be used (w/spec sheets).

Basis of Request

Per NUREG-1748, Sections 6.3.7 and 6.4.7, the ER should include information about potential impacts from noise. Without knowing the ambient noise conditions of the site, where the nearest sensitive receptors are, and the types of equipment to be used, the staff cannot assess the potential impacts.

Formulation of RAI

Please provide the following information:

- Daytime and nighttime readings of ambient sound at the site need to be identified
- The location and nature of the nearest sensitive receptor needs to be identified
- The make and model of each piece of noise-producing equipment needs to be identified, and how much noise it produces (usually determined at 50 ft, per spec sheet)

Response

Ambient sound at the site will be measured and the location and nature of the nearest sensitive receptor will be identified prior to submittal of the DP. Section 5.6.7 will be revised to provide that information, as well as estimated noise levels from equipment used during construction and operation. The types of equipment will be the same as will be described in Section 5.6.6, "Air Quality", as described in the response to RAI EA-3.

EA-7 – Historic or Cultural Resources

Description of Deficiency

The ER does not provide sufficient information about historic or cultural resources on the site, including any possible impacts on such resources.

Basis of Request

Per NUREG-1748, Sections 6.3.8 and 6.4.8, the ER should indicate whether any artifacts of historic or cultural significance were ever found on the site, or if a Class III archeological survey was ever performed for the site. If applicable, the ER should describe interactions with tribes or the State Historic Preservation Officer.

Formulation of RAI

Provide reports of previous archaeological surveys, if such surveys were conducted specifically for the Cimarron site. If applicable, provide information about any communications with historic preservation officials or tribes.

Response

Artifacts of historic or cultural significance have not been found on the site. No archeological survey has been performed for the site; Appendix D will contain a description of the efforts to identify previous archaeological research or historic cultural resources.

Outside of communications with the Oklahoma Archaeological Survey, there have been no communications with historic preservation officials.

Although over 50% of the State of Oklahoma includes Tribal Jurisdictions, none are within 25 miles of the Site, and no Native American tribes have been contacted.

It is understood that no further response to this RAI is needed and that because no archeological surveys have been performed, further revision of the DP will be needed.

EA-8 – Visual and Scenic Resources

Description of Deficiency

It is not clear whether any new structures are proposed.

Basis of Request

Per NUREG-1748, Sections 6.3.9 and 6.4.9, the ER should contain information about the proposed appearance of the site (including new structures) and potential impacts on visual and scenic resources.

Formulation of RAI

Please provide the following information:

- Physical description of existing structure(s) on site (location on site, structure height, color)
- Physical description of proposed structures on site (location on site, structure height, color)
- The presence of physical landforms that may buffer a visual impact

Response

To address aesthetic impacts, an interactive GIS model will be used to identify potential impacted view sheds within the project area. The model will incorporate the 60% design drawings, structure elevations and publicly available data (e.g. 10-meter Digital Elevation Models, recent aerials, land use land cover, and transportation networks) into an ESRI ArcGIS system, where the surrounding topography will be compared to the tallest structure of the proposed project facility. An assessment of any proposed ground disturbance will also be assessed and the geographic extent of its visibility calculated.

After areas of potential visual impacts are identified, geospatial datasets representing scenic, culturally significant and aesthetic resources (e.g., recreational areas and nature preserves, residential areas, cultural resource areas, wild and scenic rivers) will be incorporated to identify the sensitive receptors within the view shed. The potential visual impact to these sensitive receptors will then be then evaluated and assessed for level of significance. A figure illustrating the view shed and visual and scenic resources in the project vicinity will also be provided.

Section 5.6.9, "Visual/Scenic Resources", will be revised to summarize this information. The full study will be presented in Appendix E to the DP.

<u>EA-9 – Transportation Impact</u>

Description of Deficiency

The ER does not provide specific information about transportation activities associated with the proposed action.

Basis of Request

Per NUREG-1748, Sections 6.3.2 and 6.4.2, and to assess potential transportation impacts, the ER should provide information about the proposed type, number and frequency of vehicles to be used at the site.

Formulation of RAI

Please provide the following information:

- Number of workers using POVs

  - Direction of their origin
  - During construction
  - During operation
  - During reclamation
- Site hours (construction and operation)
- Type, size and number of construction vehicles
- Frequency of incoming construction vehicles and their direction
- Type, size and number of operation vehicles
- Frequency of incoming operational vehicles, including waste vehicles, and their direction
- Direction from which construction and operational supplies originate
- Will access to the site be improved (e.g., widened, paved, signage, etc.)?

Response

Section 5.6.2, "Transportation" of the DP will be revised to provide this information. Much of this information will be estimated, based on construction schedule, operational staffing, etc. Public road improvements (e.g., widening, paving, signage, etc.) will not be required for the purpose of facilitating site access.

EA-10 – Hazardous Chemicals

Description of the Deficiency

The use and storage of hazardous chemicals and the storage, transportation and disposal of wastes are not fully described in the DP.

Basis of Request

Per NUREG-1748, Sections 6.2.1.2, 6.3.12, and 6.4.12, the ER should provide information about the proposed use and management of chemicals and wastes.

Formulation of the RAI

Please provide a list of all proposed chemical storage (e.g., 5,000 gallon acid tank) and all expected wastes (for example: anion resins, biomass, solvents, construction & demolition debris), indicating whether the wastes are LLRW or non-LLRW, hazardous or non-hazardous. For each chemical or waste, list expected quantity, storage method, transportation mode and frequency, and destination/disposal site. Information can be presented as text or in a table.

Response

The following sections of the DP will include descriptions of the chemicals used in and waste generated by the following operations and/or processes:

- *Section 8.3.1, "Uranium Treatment Systems";*
- *Section 8.3.2, "Biodenitrification Systems";*
- *Section 8.4.3, "Water Injection Systems";*
- *Section 8.6.3, "Spent Resin Processing";*
- *Section 8.6.5, "Biomass Processing".*

The description shall include:

- *Expected quantity;*
- *Storage method;*
- *Transportation mode;*
- *Frequency of use/replacement;*
- *For waste, the regulatory classification (LLRW or non-LLRW, hazardous or non-hazardous).*

Section 13.1, "Solid Radwaste" will address the storage of LLRW after processing and prior to loading into trucks for transportation to a licensed disposal facility.

Finally, a summary of this information will be added to Section 5.6.12, "Waste Management". The summary will reference the above listed Sections.

EA-11 – Discharges to Ground and Surface Water

Description of the Deficiency

The ER does not contain descriptive information about the proposed wastewater treatment discharges to groundwater and river outfalls.

Basis of Request

Per NUREG-1748, Sections 6.3.4 and 6.4.4, the ER should describe potential impacts from proposed treatment discharges to groundwater and surface water. The staff recognizes that some of the technical details are presented in the DP; however, descriptive summary information in the ER that can be used in the EA would be helpful.

Formulation of RAI

Specifically, the following information should be provided in the ER:

- Regarding discharge to the Cimarron River:
    - Volume of discharge from each outfall
    - Location of outfalls (bank or directly into river)
    - Water quality of discharges

- Regarding discharge to GW:
  - Volume of discharges
  - Location of discharges
  - Quality of discharges
- Will any treated GW be discharged to onsite reservoirs?
- What is the general split of surface water and GW?

Response

Figure 8-3 of the DP provides flow rates and contaminant concentrations for both treated water discharged to the Cimarron River and treated water injected into subsurface water-bearing units. Drawings BMCD-GWREMED-C003 and BMCD-GWREMED-C005 show the locations of discharges to the Cimarron River for the western remediation areas and BA1, respectively. Drawings BMCD-GWREMED-C004 and BMCD-GWREMED-C005 show the locations of all treated water injection components. EPM believes the DP provided the requested information.

Although minor adjustment of pH will be required for groundwater treatment, treated water discharged to the Cimarron River and treated water injected into groundwater will contain the same water quality as the existing groundwater that is discharging to the Cimarron River from alluvial deposits already. Plans do not include discharge of treated water to onsite reservoirs.

This information will be summarized in Section 5.6.4 of the DP.

<u>EA-12 – Corps of Engineers Determination</u>

Description of Deficiency

In Appendix A, on Nationwide Permits (NWP), Section D, of the Army Corps of Engineers (ACOE) regarding the two treated water outfalls.

Basis of Request

Per NUREG-1748, Sections 6.3.4 and 6.4.4, the ER needs to address the potential impacts on water resources. The ACOE letter states "…the District Engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects…"

Formulation of RAI

Please provide District Engineer's determination.

Response

The ACOE issued NWP 12 for the Project. It is EPM's understanding that the ACOE's issuance of the NWP 12 permit constitutes a District Engineer's determination that the authorized activity will not result in more than minimal individual or cumulative adverse environmental effects. The permit expired March 18, 2017 and a new permit or permit extension will be requested.

Appendix A, Ecological Resources Documentation" will include this information. This appendix will be included as Appendix B. This information will be included in Sections 5.6.4 and will also be addressed in Section 5.6.13, "Permitting".

<u>EA-13 – Seismicity</u>

Description of Deficiency

With all the seismic activity that has taken place, recently, in Central Oklahoma, little information is presented with regard to the effects to the Cimarron site.

Basis of Request

Per NUREG-1748, Sections 6.3.3 and 6.4.3, the ER should address seismic characteristics and related potential impacts. Within the last several months, two very large earthquakes have occurred in Central Oklahoma, both within 50 miles of the Cimarron site, and one of which is the largest ever recorded in the State's history.

Formulation of RAI

Please respond to the following questions:

- What is the effect of large earthquakes on linear features, such as pipelines?
- Have there been any reports of damage, including pipeline ruptures, in the Cimarron area, as a result of these recent large earthquakes?
- If so, what plans does EPM have to mitigate such occurrences?

Response

Section 2.5.3, "Seismology" will include the following information:

- *Below Grade Pipeline: Due to the inherent ability of buried piping systems to resist lateral movements and absorb deflection, and the flexible nature of the proposed piping materials (HDPE and PVC), seismic activity is not expected to generate unacceptable stresses or moments within the buried piping network or at connection points above the ground surface. The buried piping network will be evaluated for locations potentially susceptible to damage resulting from seismic activity and a stress analysis will be conducted for connection points and other locations considered most at-risk. If the*

results of this analysis indicate an unacceptable risk, mitigation measures such as flexible connection fittings, stress loops, etc. will be incorporated into the design.

- *Above Grade Pipes: Piping systems not properly designed for site seismic conditions have the potential for loss of the pressure containment boundary through differential movement of the pipe. Piping system will be designed with supports and expansion features to allow movement that results from seismic events. Design aspects include use of supports that restrict movement such that piping assemblies move as a unit versus movement in multiple directions. Expansion features include the use of hoses at locations such as the connection to the tank and entrance to the facility. The hose allows for differential movement of the pipe relative to what it is connected to.*
- *A geotechnical investigation was conducted in the area within which the Western Area Treatment facility will be constructed. The geotechnical report included specifications to address seismicity. The design of the treatment facility building, the nitrate treatment system foundations, and influent and effluent tank foundations will accommodate those specifications. The geotechnical report will be included as Appendix A to the DP. A summary of the findings of the geotechnical report will be included in Section 5.6.3 of the DP.*
- *Increased seismic activity: Increased seismic activity in Oklahoma was observed beginning in 2011. Building damage was reported approximately 30 miles from the site as a result of the magnitude 5.8 earthquake near Cushing, Oklahoma in September 2016. Table 2-2 will be revised to update the list of earthquake with a magnitude exceeding 3.0, and a summary of pipeline-related leaks and reported damage will be added to Section 2.5.3, "Seismology". This information will be summarized in Section 5.6.3, "Geology and Soils".*

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If you have questions or desire clarification on any of these responses, please contact me at 405-642-5152 or jlux@envpm.com.

Sincerely,

Jeff Lux, P.E.
Project Manager

cc: J. Paul Davis, Oklahoma Department of Environmental Quality (2 copies)
Robert Evans, US Nuclear Regulatory Commission, Region IV
NRC Document Control Desk (electronic copy only)