



March 31, 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
Notes from March 27 Meeting to Discuss NRC Requests 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 prepared preliminary responses to RAIs to provide an overview of the information which we believe will satisfy NRC's requirement for information in a letter dated March 21, 2017. A teleconference was conducted the afternoon of March 27, 2017, to obtain clarification and feedback from NRC on the appropriateness of the preliminary responses.

Attendees included:

NRC	EPM/Contractors	DEQ
Ken Kalman	Jeff Lux (EPM)	Paul Davis
Christine Pineda	John Hesemann (BMcD)	Mike Broderick
Lifeng Guo	Gerry Williams (Enercon)	Jordan Caldwell
Varughese Kurian	Chuck Beatty (Enercon)	
Rob Evans (Reg IV)	Ja-Kael Luey (Kurion)	
Don Stearns (Reg IV)		
Gerald Schapper (Reg IV)		

The following lists EPM's proposed method for responding to each RAI, and the discussion and feedback received from NRC during the teleconference conducted on March 27th. RAIs 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 RAIs were assigned a number 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

Proposed Response:

Figures 3-1 through 3-4 of the December 15, 2015 Facility Decommissioning Plan (DP) presented the extent of nitrate, fluoride, and uranium exceeding NRC and DEQ criteria. These figures will be replaced by more detailed isopleth maps, assigning contaminant concentrations generated through statistical analysis of groundwater monitoring results for samples analyzed from 2011 through Q2 2017. Sec. 3.5.3, "Current Extent of COCs in Groundwater", of the

NMSSDI

revised decommissioning plan (D-Plan – Rev 1) 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.

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 concentration and activity concentration values will be provided for each area, along with corresponding background levels.

Discussion/Feedback:

Instead of maps showing only the area within which COCs exceed the NRC or DEQ criteria, plume maps in D-Plan – Rev 1 will include isopleth maps that present a more detailed representation of COC concentration distributions in each remediation area. In addition, figures will be added to present iso-enrichment contours for U-235 enrichment values of 1%, 2%, 3%, and 4%, based on the analysis of groundwater sampled and analyzed for U-235 and U-238 by method EPA 200.8 during the second quarter of 2017.

The agencies indicated that the proposed response, as described during the discussion, will provide NRC the needed information.

SER-2 – Basis of Design

Proposed Response:

EPM retained Burns & McDonnell Engineering Company (Burns & McDonnell) to prepare a groundwater remediation design, and Kurion Inc. (Kurion) to design water treatment systems and facilities. NRC’s “Basis for the Request” indicates that this RAI pertains only to the 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. EPM will respond to this RAI by providing the BOD as an appendix to Facility Decommissioning Plan – Rev 1 (DP Rev 1). 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)

Discussion/Feedback:

The design criteria listed above was documented in a Basis of Design (BOD) memorandum generated by Burns & McDonnell for internal use. Some of this information (e.g., flow rates) was provided in the DP. The BOD memorandum will be provided as an appendix to D-Plan – Rev 1.

The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-3 – Stagnation Areas

Proposed Response:

The particle tracking models presented in Figures 8-4 and 8-5 of the DP 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.

The particle tracking model output will be refined to show a higher density of particles (flow lines). More substantially, Section 8.7.1, “Groundwater Extraction Monitoring”, of DP Rev 1 will include a remediation optimization program that addresses zones of stagnation by varying pumping rates among extraction wells.

Discussion/Feedback:

Particle tracking models will provide more particles around the extent of groundwater requiring remediation to show that areas of potential stagnation are much smaller those depicted in the DP. The “remediation optimization program” referenced above will include periodic operational modifications consisting of increased pumping rates for one set of extraction wells, combined with reduced pumping rates for another set of wells, as required to address stagnation zones confirmed during the early stages of pump and treat operations. The wells selected for pumping rate increases/decreases will be periodically reversed and these alternate operational periods will be of sufficient duration to achieve groundwater flux through, and contaminant removal from the identified stagnation zones. Particle tracking models will provide flow paths for each scenario, which will show that impacted groundwater between extraction wells will eventually be extracted for treatment.

NRC requested that groundwater flow vectors be presented on figures to depict groundwater flow fields under pumping conditions. Illustrating the velocity of groundwater flow in these potential stagnation areas may help demonstrate that the optimization program provides sufficient time in each alternating sequence of flow rate adjustments for groundwater between wells to report to extraction wells. Otherwise, the groundwater between extraction wells may just “slosh” back and forth within the stagnation area without ever reporting to an extraction well. EPM committed to the installation of additional monitoring wells in potential stagnation areas to compare actual with modeled groundwater extraction effectiveness.

DEQ also requested that the flow model be utilized to determine how long it would take for groundwater between extraction wells to report to extraction wells, to provide for the same type of evaluation that flow vectors provide for. Burns & McDonnell will work with the groundwater flow model personnel to develop a flow modeling method that provides the requested information.

The agencies indicated that the proposed response, with the addition of some type of modeling to demonstrate the effectiveness of the optimization program, will provide the needed information.

SER-4 – Duration of Remediation

Proposed 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 required to recover number of pore volumes required to reduce maximum contaminant concentration to remediation target concentration – based on groundwater extraction rate.

The method for estimating remediation duration will be generally described in Sections 9.3, “Western Area Remediation” and 9.4, “Burial Area #1 Remediation” of DP Rev 1. The assumptions, input parameters, and calculation data sheets used to develop remediation timeframe estimates for each remediation area will be included as an appendix to DP Rev 1.

Discussion/Feedback:

The agencies requested that a description of the relative level of certainty associated with each remediation duration estimate input parameter be provided. DP Rev 1 will be amended to



include the requested information level of certainty associated with remediation duration estimate input parameters.

The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-5 – Vertical Distribution of Contamination in Aquifer

Proposed 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 will be presented in a report currently in production. The report will be presented independently of the response to this RAI.

The investigation indicated stratification of uranium within both areas, and suggests that the higher concentrations of uranium are present in the higher permeability zones in the aquifer. This stratification may impact the efficiency with which uranium mass is 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. Plans for this assessment prior to the installation of extraction wells will be provided in Section 8.2.1, “Groundwater Extraction Wells” of D-Plan – Rev 1.

Discussion/Feedback:

A report on the vertical distribution of uranium in alluvial material will be provided to the NRC and DEQ prior to the submittal of D-Plan – Rev 1. NRC requested that, although D-Plan – Rev 1 will not include that report, that D-Plan – Rev 1 reference that report and provide a summary of the results and how those findings influenced the process of investigating each area prior to the installation of extraction wells.

The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-6 – Injection and Recovery Trench Design

Proposed 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 a frac tank(s) 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 results of the pilot testing program will be used to refine and/or revise the design of the injection and extraction trenches as appropriate. Note that the performance of the injection and extraction trenches in BA1 impact the achievement of license termination criteria. Performance of the injection trenches in all other areas impacts the degree to which the concentrations of uranium, nitrate, and fluoride are reduced by the time the license is terminated, but should not impact the ability of the groundwater remediation program to achieve license termination criteria.

Assuming the proposed 2017 budget is approved by NRC and DEQ before the end of March, detailed results of this pilot test will be presented in a report to be submitted early in the third quarter of 2017. The report will be presented independently of the response to this RAI.

Discussion/Feedback:

NRC and DEQ requested a schedule for the upcoming pilot test trench construction effort; a draft schedule was submitted to NRC and DEQ during the teleconference. As with the report on the vertical distribution of uranium, the report documenting the results of the pilot trench testing will be a standalone document and will not be included in the response to RAIs or D-Plan – Rev 1. However, the results of the report will be summarized in D-Plan – Rev 1, and Section 8 will

include a description of the design modifications resulting from the pilot test. The remediation simulations developed using the groundwater flow model will be updated based on the results of the pilot test.

The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-7 – Scaling and Fouling in Injection Trenches

Proposed 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. 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.

Discussion/Feedback:

Discussions focused on two potential issues: mineral scaling and fouling associated with biological activity and precipitates. Based on scaling and corrosion indices calculated from site groundwater parameters, the potential for scale formation in untreated groundwater is mild to moderate. Changes in the scaling and precipitate formation potential could result from pH/Eh changes and chemical reactions resulting from the treatment processes. In general, the scaling and precipitate formation potential associated with treated effluent utilized for injection is expected to be relatively low; however, an accurate assessment of this potential will not be possible until after treatment system startup.

Although the treated effluent utilized for injection may contain residual populations of anaerobic bacteria and carbon substrate associated with the denitrification treatment process, the potential for biofouling is also expected to be relatively low. Extraction of biomass and “sterilization” of treated water may be required to prevent biofouling. This is being evaluated, and will be addressed in Section 8.4.3 of D-Plan – Rev 1.



In-process monitoring 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 sufficient impacts potentially requiring costly repairs or replacement of equipment.

The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-8 –In-Process Groundwater Monitoring

Proposed Response:

Monitor wells located in the vicinity of water injection components are specified in Table 8-2 and on Figure -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 water injection on hydraulic gradient.

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. If the installation of additional monitor wells is needed to provide sufficient information, 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.

Discussion/Feedback:

As discussed in the “Discussion/Feedback” associated with SER-3, it was determined that additional monitor wells or piezometers, located between and/or upgradient or downgradient of extraction or monitor wells, will be added to the in-process groundwater monitoring network. Section 8.7.1 will provide the rationale for adding monitor wells, and Table 8-2 will be revised to incorporate the additional wells.



The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-9 – In-Process Groundwater Monitoring Schedule

Proposed 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”, of the DP. Any additional monitoring locations identified in the preparation of the response to SER-8 will also be incorporated into D-Plan – Rev 1.

Discussion/Feedback:

NRC clarified that the timetable for in-process monitoring should be added to the table. This will be done.

The agencies indicated that the proposed response, as described during the discussion, will provide the needed information.

SER-10 – Discharge Monitoring

Proposed Response:

DEQ has 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.

Discussion/Feedback:

The agencies indicated that the proposed response will provide the needed information.

SER-11 – Post-Remediation Groundwater Monitoring

Proposed Response:

Post-remediation monitor wells selected 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.

Discussion/Feedback:

The agencies indicated that the proposed response will provide the needed information.

SER-12 – In-Process Treatment System Monitoring

Proposed Response:

According to Section 8.6.1, “In-Process Monitoring”, of the DP:

- 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 90 days provides a minimum of 10 data points (accounting for laboratory turnaround time). Once the operational data history is established, the sample frequency may be reduced. Unexpected significant changes in the inlet conditions 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. It does not state that 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 will be negligible, being substantially less than 0.1% of the total mass of uranium. Consequently, the total mass of uranium, the mass of U-235, and the mass enrichment of U-235 will be known for the water in each vessel from which sufficient uranium is present to detect in its influent.

Section 8.6.1 will be revised to address the potential variability in influent concentrations which may occur during startup of groundwater recovery. Finally, in-process sampling for treatment trains that include nitrate treatment will accommodate the shutdown and re-start needed so that groundwater can be recirculated through the bioreactors to establish a viable biomass before continuous treatment for uranium can begin. All these changes will be reflected in Section 8.6.1 of D-Plan – Rev 1.

Additionally, concerns related to nuclear material control and accountability will be addressed in Section 11.8, “Nuclear Criticality Safety”, of D-Plan – Rev 1.

Discussion/Feedback:

The agencies indicated that the proposed response will provide the needed information.

SER-13 – Radiation Protection Plan

Proposed Response:

The RPP will be updated as the 60% design is revised, responses to other RAIs, and D-Plan – Rev 1 is prepared. The revised RPP will be referenced in Section 11, “Radiation Protection Program”, and submitted as an addendum to D-Plan – Rev 1.

Discussion/Feedback:

NRC requested that the RPP specifically include a commitment to scan all subsurface soil that is brought to the surface to evaluate that material for elevated activity.

The agencies indicated that the proposed response, including the requested information, will provide the needed information.

SER-14 – Demonstration that Criticality Is Not Credible

Proposed Response:

It will be demonstrated that inadvertent criticality is not credible for the proposed groundwater decommissioning of the Cimarron site. Details regarding the chemical and physical form of the material and its containers and their respective configurations will be presented. The approach will be as follows:

- A statistical evaluation of available groundwater data will be presented to estimate bounding parameters for uranium influent concentration (mean plus 2σ) and U-235 enrichment for each treatment train.
- The bounding concentration for uranium adsorption on resin will be calculated for each treatment train, using equations from studies completed by the treatment system designer. This bounding condition exceeds the maximum concentration for waste which complies with fissile exempt criteria.

- Criticality analysis will be presented to demonstrate that k_{eff} is less than 0.9 for the bounding conditions described above.
- The above analyses will demonstrate that, given physical laws, process deviations are not possible, or are extremely unlikely, to create a critical condition.

This demonstration will be briefly described in Section 11.8.2, "Groundwater Treatment by Ion Exchange" of D-Plan – Rev 1. The full evaluation will be presented as an attachment to D-Plan – Rev 1.

Discussion/Feedback:

The agencies indicated that the proposed response will provide the needed information.

SER-15 – Assurance of Subcriticality Post-Disposal

Proposed Response:

It will be demonstrated that the SNM will uniformly distributed throughout the waste package. The spent resin will be processed as described in Section 8.6.3. Spent resin will be dewatered and blended at Cimarron before shipping to the disposal facility. This process will ensure that the waste meets the requirements for disposal (SNM be uniformly distributed with no free water content). By meeting this criteria, the spent resin will to meet both the transportation regulations and disposal site WAC. Details regarding the process and additional technical basis will be added to Appendix C and submitted with the revised DP.

Because the waste form is spent resin instead of soil, the discussion and evaluation in Appendix C will be further revised to discuss the similarities and differences between a resin matrix and a soil matrix. Regardless of differences, Cimarron will demonstrate that the waste meets the criteria established in the approved WAC and criticality is not credible.

Discussion/Feedback:

The agencies indicated that the proposed response will provide the needed information.

EA-1 – Land Use

Proposed Response:

Section 5.6.1, "Land Use", of D-Plan – Rev 1 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" of D-Plan – Rev 1.

Discussion/Feedback:

Some of this information had been provided in a previous section of the DP. NRC requested that this information be included in Section 5, "Environmental Information". Alternatively, if all the

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requested information is already addressed elsewhere in the DP, Section 5 should summarize the information and refer to the section of D-Plan – Rev 1 that contains the full information.

The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-2 – Workforce

Proposed 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”, of D-Plan – Rev 1. 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 changeout, 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 16, “Cost Estimate” of D-Plan - Rev 1.

Discussion/Feedback:

NRC explained that none of the information listed above is addressed in Section 5, which leaves the reviewer looking through the DP for this information. Section 5 should include more description of the socioeconomic impact and traffic impact. Some of this information may already be in Section 16, but the number of skilled and unskilled workers employed during construction and operations and information relative to those workers needs to be included in Section 5.

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The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-3 – Impact on Air Resources

Proposed 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 emissions to the air 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 diesel 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 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 of D-Plan – Rev 1 will be revised to include 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.

Discussion/Feedback

EPM explained that the scale of construction and operations is very small, and the impact on air resources will be negligible, primarily due to a small number of vehicles and operating

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equipment during construction, and a small fraction of that during operations. It was pointed out that the groundwater treatment and remediation processes themselves will not result in any emissions that may require permitting.

NRC pointed out that this kind of information, with estimates of the kinds and numbers of vehicles/equipment, should be incorporated into Section 5. If no air permitting will be required to address emissions from operations, this should also be specifically stated. A discussion of potential greenhouse gas emissions is also needed.

The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-4 – Impact to Surface Water

Proposed Response:

Similar information was recently compiled in planning pilot injection/extraction trench design, permitting, and construction activities. A Storm Water Pollution Prevention Plan (SWP3) and 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)).

D-Plan – Rev 1 will include several revisions to address this RAI. Section 9.2.1, “Groundwater Remediation Facilities”, will be revised to provide information on the stockpiling, control, and disposition of material excavated during construction of injection and extraction trenches. Section 9.2.2, “Water Treatment Facilities”, will be revised to provide information on the stockpiling, control, and disposition of material excavated during construction of the WAA Treatment Facility and foundations for tanks, biodegradation systems, and the secure storage area.

In addition, a new subsection will be added to Section 5.6, “Affected Environment”. Sections 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 an evaluation was performed and for which it was determined that no permit will be required.

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Discussion/Feedback:

All excavated soils that are not returned to the trench on the same day will be transported outside of the 100-year floodplain. Best Management Practices (BMPs) will be installed around all stockpiles to minimize erosion and sedimentation.

The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-5 – Ecology of the Site

Proposed 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. The 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 may be required.

Discussion/Feedback:

Any new correspondence with ecological agencies, will be incorporated into D-Plan – Rev 1. The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-6 – Noise Levels

Proposed 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 D-Plan – Rev 1. Section 5.6.7 will be revised to provide that information, as well as the approximate noise levels for equipment utilized during

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construction and operating activities. 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.

Discussion/Feedback:

The agencies indicated that the proposed response will provide the needed information.

EA-7 – Historic or Cultural Resources

Proposed Response:

Artifacts of historic or cultural significance have not been found on the site. No archeological survey has been performed for the site; Appendix B to the DP contains 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 believed that no further response to this RAI is needed.

Discussion/Feedback:

NRC described their interactions with the State Historic Preservation Office and contacts with four Native American tribal officials. One tribe has expressed an interest in consultation. Unless involvement by EPM is requested by NRC, at this point, follow-up on that consultation request will be in NRC's purview. Section 5 of D-Plan – Rev 1 will include a clarification that no archaeological survey has been performed on the site.

The agencies indicated that the proposed response, if included in Section 5, will provide the needed information.

EA-8 – Visual and Scenic Resources

Proposed Response:

To address aesthetic impacts, an interactive GIS model will be used to identify potential impacted view sheds within the project area. The model incorporates the 60% design drawings, structure elevations and publicly available data (e.g. 10-meter Digital Elevation Models, recent aeriels, land use land cover, and transportation networks) into an ESRI ArcGIS system, where

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the surrounding topography is compared to the tallest structure of the project facility. An assessment of any proposed ground disturbance will also be assessed and the geographic extent of its visibility calculated. After the 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 an attachment to D-Plan – Rev 1.

Discussion/Feedback:

The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-9 – Transportation Impact

Proposed Response:

Section 5.6.2, “Transportation” of D-Plan – Rev 1 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.

Discussion/Feedback:

Due to uncertainties regarding how the construction will be scheduled, reasonable ranges for the numbers of vehicles and personnel can be estimated based upon the schedule developed for site decommissioning. More accurate estimates will not be available until schedules are developed during the contracting process. NRC agreed that general ranges of the number and types of vehicles and personnel at the site will be sufficient.

The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

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EA-10 – Hazardous Chemicals

Proposed Response:

The following sections of D-Plan – Rev 1 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).

In addition, 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.

Discussion/Feedback:

The proposed response is sufficient, but a summary of these issues also needs to be included in Section 5, so the Environmental Report is complete. The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-11 – Discharges to Ground and Surface Water

Proposed Response:

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

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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 already. Clarification is needed if the flow rates, concentrations, and discharge and injection locations provided in the above-listed figure and drawings are insufficient. Plans do not include discharge of treated water to onsite reservoirs.

Discussion/Feedback:

The information contained in Section 8, as revised in accordance with the response to RAI SER-10, is sufficient. However, Section 5 needs to include a summary of that information and reference Figure 8-3 so the Environmental Report is complete. The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-12 – Corps of Engineers Determination

Proposed Response:

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

Discussion/Feedback:

The Corps of Engineers permit does constitute the District Engineer's determination that the authorized activity will not result in more than minimal individual or cumulative adverse environmental effects. However, this information is not provided in Section 5. Section 5 needs to include a summary of that information and reference the Appendix containing the permit so the Environmental Report is complete. The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

EA-13 – Seismicity

Proposed Response:

Section 2.5.3, "Seismology" of D-Plan – Rev 1 will include the following information:

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- **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 an attachment to D-Plan – Rev 1.
- **Increased seismic activity:** Increased seismic activity in Oklahoma was observed beginning in 2011. A review of pipeline leaks and releases (including units connected to pipelines, such as natural gas compressor stations) revealed 222 incidents nationwide, with 9 of those occurring in Oklahoma. Six of these were attributed to pipeline corrosion, maintenance workers hitting a pipeline, or poor construction. The cause of the other three was not determined, but none were attributed to earthquake activity. None occurred within a month after an earthquake with a magnitude exceeding 4.0. 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.



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Discussion/Feedback:

The geotechnical investigation report discussed in the third bullet above should be submitted to NRC and DEQ separately from the response to RAIs. The report need not be included in D-Plan – Rev 1, but the findings should be presented, and the impact of those findings on the design should be included in Section 5. The discussion include in all four bullets should be added to Section 5. The description of damage and recent earthquakes provided in the fourth bullet is sufficient to respond to that portion of the RAI.

The agencies indicated that the proposed response, with the inclusion of information discussed above into Section 5, will provide the needed information.

If you have questions or comments on these notes from the March 27 teleconference, please contact me at 405-642-5152 or jlux@envpm.com.

Sincerely,

A handwritten signature in cursive script that reads "Jeff Lux".

Jeff Lux, P.E.
Project Manager

Enclosure

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)