## NRC – DEQ – EPM Telecon Notes January 13, 2015 (*Red text indicates who will take the next action*)

Attendees Ken Kalman Varughese Kurian Gerald Schlapper

David Cates Pam Dizikes Paul Davis Mike Broderick Jeff Lux Mike Logan

## Administrative Issues

**Disposition of Properties** 

On 1/12/2015, DOJ approved the sale of both properties. EPM finalized the Purchase and Sale Agreements and Quitclaim Deeds and submitted them to Kansas City for the Trustee President signatures. EPM notified the realtor and the property owners that the sales were approved, and that they can schedule closing and complete the transaction upon receipt of the EPM-signed Purchase and Sale Agreement and Quitclaim Deed. EPM will notify NRC, DEQ, and DOJ when the sales are complete. *EPM* 

EPM will meet with Tom Stewart (Stewart Industries) regarding gates and fencing. Stewart Industries (SII) will need access to their property once the property is transferred, and EPM needs to be able to restrict access from the remainder of the property. Fencing and gates will need to be moved/installed. A plan for fencing modification will be submitted to NRC and DEQ after meeting with Mr. Stewart. *EPM* 

There are approximately 20 monitor wells located on the 24-acre property. EPM will discuss the timing of well abandonment with Mr. Stewart. After data from the comprehensive sampling event is reviewed, EPM will submit a proposal to abandon select wells from among those on the 24-acre property. **EPM** 

<u>2015 Budget</u> – EPM submitted a revised draft of the proposed 2015 budget on 1/13/2015. The budget modified the cost for Burns & McDonnell and Enercon support for the decommissioning plan (some Enercon Support costs were transferred from Task 4 to Task 2), and replaced "Geochem/Treatment Support" with "Treatment Vendor". EPM awaits comments and/or approval from DEQ and NRC. *NRC and DEQ* 

#### Upcoming Meetings

Meeting to discuss status and accomplishments – A meeting will be held 3/11/2015, from 8:30 to 11:30, at NRC headquarters. If needed, additional time may be available in the afternoon. The meeting will be publicly noticed. *NRC* 

Meeting to discuss remediation approach – Based on data received during the investigations performed in November and December, EPM, Burns & McDonnell, and Kurion should be prepared to present a conceptual groundwater remediation and water treatment design at the site or in Oklahoma City by the end of April. NRC and DEQ will notify EPM of what dates they are available between March 30 and April 10, and EPM will schedule the meeting. **EPM** 

## NRC – DEQ – EPM Telecon Notes January 13, 2015 (*Red text indicates who will take the next action*)

<u>Property Lease</u> – EPM generated a draft lease agreement to provide for maintenance of the land east of Highway 74 (excluding the 24-acre property). The per-acre cost (\$20) was derived from an Oklahoma Cooperative Extension Service report (Oklahoma Cropland Rental Rates: 2012-13) prepared by Oklahoma State University. The draft lease agreement is being reviewed by EPM legal counsel. A revised draft will be submitted to NRC and DEQ following their review. To address concerns regarding potential dose, EPM will submit a RESRAD evaluation of the potential dose from growing grass over contaminated groundwater, feeding cattle, and ingesting meat or milk from the cattle. *EPM* 

<u>Fourth Quarter 2014 Public Information Update</u> – A draft public information update for the fourth quarter of 2014 will be submitted to NRC and DEQ for comment. Following revision based on agency comments, the public information update will be sent to interested parties and uploaded to the Sharepoint site and <u>www.certoklahoma.com</u>. *EPM* 

#### **Groundwater Design Issues**

Treatment System Design Vendor Selection

EPM solicited proposals for treatability testing and water treatment system design from four companies:

- EnergySolutions
- Kurion, Inc.
- AVANTech, Inc.
- EnviroKlean Product Development, Inc. (EPDI)

EPDI was evaluating, in conjunction with the University of Texas at Austin, the use of zeolites as a uranium removal medium. After conducting several treatability tests, EPDI elected not to submit a proposal.

AVANTech, who had partnered with Kurion to provide water treatment services on the Fukushima emergency response, independently contacted Kurion and they decided they could demonstrate more comprehensive capabilities and provide a better product (design) as a team. Consequently, they submitted one proposal.

Following a scoping meeting conducted in Oklahoma City, EnergySolutions submitted a proposal.

EnergySolutions' proposal was far more vague than Kurion's. Kurion submitted far more detail in describing the needed work and demonstrated a much more explicit understanding of the project requirements. Not-to-exceed costs were very close to each other; EnergySolutions' cost was \$369,808, and Kurion's cost was \$398,800.

Consequently, EPM selected Kurion and sent them a draft Master Services Agreement (MSA). Due to schedule requirements (work must begin immediately to submit a groundwater remediation design by the end of 2015), a kickoff meeting was conducted January 12. EPM sent the proposal to NRC and DEQ for review to identify any "deal

## NRC – DEQ – EPM Telecon Notes January 13, 2015 (*Red text indicates who will take the next action*)

breaker" that may have been missed. Unless NRC or DEQ object, EPM anticipates executing the MSA within a week. *EPM* 

<u>Comprehensive Groundwater Sampling</u> – In addition to the annual environmental monitoring, EPM plans to collect groundwater samples from 200+ additional wells. Samples will be analyzed for nitrate, fluoride, and uranium concentration (and activity in select wells). Funding for this effort was included in the proposed 2015 budget. This will provide full delineation of all COCs in groundwater for all impacted areas, enabling EPM to update the maps and present a remedial design based on current conditions. EPM will submit a list of wells and analytes to NRC and DEQ for review and comment. **EPM** 

<u>2014 Design Investigation</u> – Field work was completed before the end of 2014. Data should be received later this week. Updated maps showing the extent of uranium impact in BA1 and nitrate impact in the WAA will be submitted to NRC and DEQ for review after data review. EPM will submit a report on the investigation in March. *EPM* 

<u>Treatability Tests</u> – Kurion's schedule provides for the completion of treatability testing by the end of March. Should initial testing (pH adjustment followed by anion resin for removal of uranium) prove effective, a report on the treatability tests may be submitted by the end of March. A treatability test report on all tests is more likely by the end of April. *EPM* 

<u>Finneran Research</u> – EPM submitted e-mails to NRC and DEQ regarding funding research, which would be overseen by Dr. Kevin Finneran, as an addition to an existing DOE-funded project. Testing could be performed more economically as an addition to this research project than as a stand-alone project. The purpose of the test would be to more definitively determine if biological immobilization of uranium after achieving DCGL by pump-and-treat could result in re-mobilization above the DCGL as the aquifer re-oxidizes. EPM needs to know if NRC and DEQ approve the funding of this research. EPM will submit an agenda for a discussion of the research project (*EPM*) and NRC and DEQ will schedule a teleconference. *NRC and DEQ* 

### License Issues

<u>U-235 Concentration Limit Paper</u> – On 12/16/2014, EPM submitted a paper by Enercon Services, evaluating the use of a U-235 concentration limit based on saturation of the anion resin. A criticality safety analysis was included to demonstrate that criticality is not an issue. The paper was submitted for NRC evaluation; if NRC identifies no issues of concern related to the evaluation, EPM will submit a license amendment request to replace the U-235 possession limit with a U-235 concentration limit as part of the decommissioning plan submittal. This review is critical to the development of a groundwater remediation plan, as even a 6,000 gram U-235 possession limit would require complete revision of the groundwater remediation approach, as well as water treatment technologies. NRC will expedite the review process as much as possible. *NRC* 

# NRC – DEQ – EPM Telecon Notes February 10, 2015 (*Red text indicates who will take the next action*)

# <u>Attendees</u> Ken Kalman Varughese Kurian Lifeng Guo Gerald Schlapper

David Cates Pam Dizikes Tad Dow Paul Davis Mike Broderick Jeff Lux Mike Logan Bill Halliburton John Hesemann

# Administrative Issues

Distribution of Funds from Anadarko Litigation

An initial distribution totaling \$49,180,842.01 was received in January, allocated as follows:

- Administrative Account \$2,380,149.50
- Federal Account \$40,114,879.29
- State Account \$6,685,813.22

A 2<sup>nd</sup> distribution totaling \$21,098,810.30 will be received in February, allocated as follows:

- Administrative Account \$1,021,095.25
- Federal Account \$17,209,470.50
- State Account \$2,868,245.08

The total of these distributions is \$70,279,652.31

## **Disposition of Properties**

The sale of the 24-acre property was conducted January 28th. The net proceeds from the sale were \$3,139.20. The allocation is as follows:

- Administrative Account \$313.92
- Federal Account \$313.92
- State Account \$2,511.36

EPM met with Tom Stewart (Stewart Industries) regarding gates and fencing. Stewart Industries (SII) will need access to their property once the property is transferred, and EPM needs to be able to restrict access from the remainder of the property. Fencing and gates will be installed. Stewart Industries will construct a portion of the fence and gates, and EPM will solicit bids for the construction of the remaining fence and gates. **EPM** 

<u>2015 Budget</u> – EPM submitted a revised draft of the proposed 2015 budget on 1/13/2015. EPM will change the "Agency Fees – State" to a total of \$31,000 to provide for the invoice recently received. DEQ and NRC will comment on the draft proposed budget. *NRC and DEQ* 

### Upcoming Meetings

Meeting to discuss status and accomplishments – A meeting will be held 3/11/2015, from 8:30 to 11:30, at NRC headquarters. If needed, additional time may be available in the afternoon. The meeting will be publicly noticed. EPM will send the Powerpoint file to NRC and DEQ prior to the meeting. *EPM* 

## NRC – DEQ – EPM Telecon Notes February 10, 2015 (*Red text indicates who will take the next action*)

Meeting to discuss remediation approach – EPM, Burns & McDonnell, and Kurion will present a conceptual groundwater remediation plan and water treatment design. The current estimated time for the meeting is within the first two weeks of June. The date should be finalized by late March. *EPM* 

<u>Fourth Quarter 2014 Public Information Update</u> – A draft public information update covering the  $4^{th}$  quarter 2014 was submitted to NRC and DEQ for comment. Following revision based on agency comments, the public information update will be sent to interested parties and uploaded to the Sharepoint site and <u>www.certoklahoma.com</u>. **EPM** 

### **Groundwater Design Issues**

# Treatment System Design

EPM will contract with Kurion to perform treatability tests and prepare a water treatment system design. The contract may be executed late this week or early next week. Kurion has prepared activity plans for both uranium and nitrate treatability tests. EPM will review and approve them, and anticipates collection of groundwater to ship to Kurion (uranium treatability tests) and AvanTech (nitrate treatability tests). *EPM* 

<u>Comprehensive Groundwater Sampling</u> – In addition to the annual environmental monitoring, EPM plans to collect groundwater samples from 200+ additional wells. Samples will be analyzed for nitrate, fluoride, and uranium concentration (and activity in select wells). Funding for this effort was included in the proposed 2015 budget. This will provide full delineation of all COCs in groundwater for all impacted areas, enabling EPM to update the maps and present a remedial design based on current conditions. EPM will submit a list of wells and analytes to NRC and DEQ for review and comment.

EPM will coordinate the schedule for this groundwater sampling event with Enercon Services, and will provide the dates for the sampling to NRC and DEQ. An inspection may be scheduled for the time during which groundwater samples are being collected. *EPM* 

<u>2014 Design Investigation</u> – Field work was completed before the end of 2014. Data has been received. DRAFT drawings showing the extent of uranium impact in BA1 and uranium and nitrate impact in the WAA were discussed. The extension of the delineation to the MCL has resulted significant increases in the areas of concern for uranium in both BA1 and the WAA, and for nitrate in the WAA. EPM will submit a report on the investigation in March. *EPM* 

<u>Treatability Tests</u> – Kurion's schedule requires ten weeks of treatability testing. If the contract can be executed and samples sent the week of February  $16^{th}$ , treatability testing could be concluded by the end of April. A report on the treatability tests may be submitted by the end of May. **EPM** 

<u>Finneran Research</u> – EPM submitted e-mails to NRC and DEQ regarding funding research, which would be overseen by Dr. Kevin Finneran, as an addition to an existing DOE-funded project. EPM will submit a formal proposal providing more definition on the need for, conduct of, and information gained from, the research. NRC noted that, since the research is intended to

# NRC – DEQ – EPM Telecon Notes February 10, 2015 (*Red text indicates who will take the next action*)

determine whether in-situ biological immobilization could be used to reduce uranium concentrations from below the DCGL to below the MCL, the funding for the research would come from the State account. Upon receipt of the proposal, NRC and DEQ will accept or reject the idea of funding the research. **EPM** 

#### **License Issues**

<u>U-235 Concentration Limit Paper</u> – The Enercon paper, evaluating the use of a U-235 concentration limit based on saturation of the anion resin, was submitted to NRC in October, and again (formally) in December. A criticality safety analysis was included to demonstrate that criticality is not an issue. The paper was submitted for NRC evaluation; if NRC identifies no issues of concern related to the evaluation, EPM will submit a license amendment request to replace the U-235 possession limit with a U-235 concentration limit as part of the decommissioning plan submittal. This review is critical to the development of a groundwater remediation plan, as even a 6,000 gram U-235 possession limit would require complete revision of the groundwater remediation approach, as well as water treatment technologies. NRC will expedite the review process as much as possible. *NRC* 

June 10, 2015 Conceptual Design Presentation Meeting Notes

- 2. The locations of uranium treatment trains within the uranium treatment/resin processing building
- 3. The piping and vessel arrangement for each uranium treatment train
- 4. The layout of equipment in each biodenitrification unit
- 5. The spent resin processing equipment

Isometric drawings of the BA1 treatment system layout depicted:

- 1. The relative locations of the influent tanks, the uranium treatment facilities, the effluent tank, and the injection skid housing equipment for injection of treated water
- 2. The piping and vessel arrangement for each uranium treatment train

### Licensing Issues

Three options for a possession limit for U-235 were presented, along with how the stipulation of each would impact the site's Material Control & Accountability (MCA) program.

- 1. A concentration limit equal to the adsorption capacity of the resin based on ideal (theoretical maximum adsorption) conditions. This maximum concentration would only be attainable in the resin vessels.
- 2. A concentration limit with secondary safety controls installed in the interior of the resinvessels to monitor the loading of the resin.
- 3. A mass limit, to be applied to each ion exchange column, rather than to the Site in its entirety.

No material control or accountability would be required for licensed material in the groundwater. This would extend to the influent tanks feeding groundwater to the treatment system. The MCA program would be implemented beginning at the first resin vessel, once uranium begins to be accumulated within a piece of process equipment. The control of and accounting for Special Nuclear Material (SNM) would continue through resin processing, packaging, and storage. Once loaded onto the truck for shipment to a licensed disposal facility, the SNM would exit the site inventory.

Operational nuclear criticality monitoring will be based on the nuclear criticality safety assessment submitted in support of a license amendment request to amend the U-235 possession limit. It is understood that the nuclear criticality safety assessment will address both expected and upset conditions, and will evaluate the maximum credible upset event.

#### Post-Remediation Activities

Post-remediation monitoring was discussed. At this time, EPM plans to propose to perform eight quarters of post-remediation monitoring to demonstrate compliance with the DCGL. EPM also plans to propose to perform four quarters of post-remediation monitoring to demonstrate compliance with the MCL.

Uranium treatment trains may be decommissioned and demobilized individually once the influent to the treatment train contains concentrations of uranium below the MCL, and biodenitrification trains once the influent to the treatment train contains concentrations of nitrate below the MCL. Once the influent concentration is below the MCL, the water can be discharged without treatment in accordance with the OPDES permit.

# NRC – DEQ – EPM Telecon Notes July 21, 2015 (*Red text indicates who will take the next action*)

#### Attendees

Ken Kalman Varughese Kurian Lifeng Guo Paul Davis David Cates Torrie Wale Jeff Lux Bill Halliburton

## Administrative Issues

## 2015 Budget

Road and Spillway Repair – In an e-mail dated May 29, EPM requested agency approval to perform repairs to the spillway on the west pond and a road leading to the alluvium. NRC requested additional information. EPM submitted a letter July 3, with additional information and attaching the contractor's bid sheet. NRC will request an NRC engineer's review of the proposal. EPM is awaiting approval to perform these repairs and pay the cost of repairs out of Task 6, Unanticipated Work. *NRC and DEQ* 

Groundwater Sampling for Plutonium Analysis – During the June 10 meeting conducted in Oklahoma City, NRC requested information regarding the sampling of groundwater for plutonium. In a June 24 e-mail, EPM provided an overview of historical plutonium analysis, and outlining a scope of work, should the agencies desire further investigation of plutonium in groundwater. NRC and DEQ both agreed to perform the work via e-mail, and EPM sent a formal proposal via letter on July 3. Because both agencies have already agreed to this sampling and analysis via e-mail, EPM is preparing an activity plan to cover this work. The cost for this sampling event will be paid out of Task 6, Unanticipated Work, and charged to the Federal Account. NRC will send a letter approving this work. EPM will include the cost of additional groundwater sampling for plutonium in the 2016 budget. *EPM* 

Collection of Soil and Groundwater Samples for ISBI Research – EPM, Burns & McDonnell, and Clemson University have agreed to conduct in-situ biological immobilization research using soil and groundwater samples from five locations. The collection and shipping of these samples will cost approximately \$5,000. EPM will submit a formal request for agency approval to pay for this work out of Task 6, Unanticipated Work, charging it to the State Account. *NRC and DEQ* 

# Final Distribution from Litigation Trust

The fourth and final distribution of funds from the litigation trust (\$1,265,928.65) was received. The distribution was as follows:

- Administrative Account \$61,265.72
- Federal Account \$1,032,568.23
- State Account \$172,094.70

EPM will submit a chart showing the distributions to NRC and DEQ. **EPM** 

## Notes from June 10 Meeting

EPM submitted draft notes from the June 10 meeting on June 26. Comments have not been received from NRC or DEQ. Notes will be finalized based on agency comments. *NRC and DEQ* 

## NRC – DEQ – EPM Telecon Notes July 21, 2015 (*Red text indicates who will take the next action*)

## **Groundwater Design Issues**

## Treatability Tests

EPM submitted a draft treatability test report to the agencies on April 29, reporting the results of the treatability tests prior to the June 10 meeting. Two treatability tests are being conducted. AVANTech has completed treatability tests for biodenitrification. Kurion will complete treatability tests for uranium removal and send the final samples for laboratory analysis this week. Upon receipt of analytical results, Kurion will finalize the treatability test report. *EPM* 

#### Groundwater Remediation Design

Since the June 10 meeting, EPM, Burns & McDonnell, Kurion, AVANTech, and Enercon have revised the conceptual design for groundwater extraction and treatment, and injection and discharge of treated water. Two uranium treatment systems have been removed from the conceptual design, and design is progressing. Submittal of the decommissioning plan and license amendment request is still scheduled for the end of the year. *EPM* 

#### 2015 Comprehensive Groundwater Sampling

A spreadsheet containing all the data from the 2015 groundwater assessment sampling was submitted to NRC and DEQ via e-mail on June 29<sup>th</sup>. *No further action required* 

#### 2014 Design Investigation Report

Burns & McDonnell submitted the 2014 Design Investigation Report to NRC and DEQ on May 8<sup>th</sup>. No comments have been received to date. *NRC and DEQ* 

#### Finneran Research on Rebound Following In-Situ Biological Immobilization

EPM contracted with Clemson University to initiate the research project. Collection of soil and groundwater samples will be performed in August. Clemson University is initiating the staffing and setup of equipment for this project. **EPM** 

## Soil and Groundwater Sampling and Analysis for Plutionium

EPM is preparing one activity plan to cover both the collection of samples for ISBI research and the collection and analysis of groundwater samples for plutonium to minimize the cost to both projects. Sampling should occur in August. **EPM** 

## License Issues

## Annual Environmental Monitoring

A spreadsheet containing the annual environmental data was submitted to NRC and DEQ in a letter dated June 29<sup>th</sup>. NRC noted that there was no explanation of highlighted or bold font entries. EPM will re-submit the annual environmental monitoring data. *EPM* 

# NRC – DEQ – EPM Telecon Notes August 18, 2015 (*Red text indicates who will take the next action*)

#### Attendees

Ken Kalman Lifeng Guo Gerald Schlapper Paul Davis Torrie Wale Jeff Lux Bill Halliburton

## Administrative Issues

Notes from July 21 Meeting

EPM submitted draft notes from the July 21 meeting on July 21. Final notes will be sent within the week. **EPM** 

## **ISBI Sample Collection**

DEQ asked if a letter requesting DEQ approval to fund the collection of soil and groundwater samples for ISBI research had been sent. EPM will check it out and send a letter if it had not been sent. **EPM** 

## **Groundwater Design Issues**

## Treatability Tests

Treatability tests are complete and Kurion has received the final data. The final treatability test report has been updated to include final data, and is undergoing Kurion internal review. The report will then be submitted to EPM for review. After EPM review, the report will be submitted to NRC and DEQ. **EPM** 

### Groundwater Remediation Design

The 60% design of the groundwater remediation infrastructure is essentially complete. EPM, Burns & McDonnell, Kurion, and Enercon will begin preparation of the decommissioning plan in September. Submittal of the decommissioning plan and license amendment request is still scheduled for the end of the year. **EPM** 

# 2014 Design Investigation Report

Burns & McDonnell submitted the 2014 Design Investigation Report to NRC and DEQ on May 8<sup>th</sup>. No comments have been received to date. EPM requested NRC and DEQ to either notify them that they have no comments, or to provide comments so the report can be revised and resubmitted if necessary. *NRC and DEQ* 

# Clemson University In-Situ Biological Immobilization (ISBI) Research

Collection of soil and groundwater samples will be performed the last week in August. Clemson University has initiated the staffing and setup of equipment for this project. **EPM** 

# Soil and Groundwater Sampling and Analysis for Plutonium

Collection of groundwater samples from two wells is scheduled for the last week in August. **EPM** 

# License Issues

There are no current license issues to be addressed.

## NRC – DEQ – EPM Monthly Status Update October 12, 2015 (*Red text indicates who will take the next action*)

# Administrative Issues

Notes from August 18 Meeting

Final notes were sent 10/12/15. No teleconference was conducted in September.

#### Pipeline Right of Way Grant

TOMPC, a subsidiary of Tall Oaks Midstream, is running an oil & gas transmission line through the southwest quarter of Section 12, which the Trust does not own. However, the pipeline route is planned to extend via subsurface boring, through the far southwest corner of the northeast quarter of Section 12, which the Trust does own. TOMPC contacted EPM to obtain a grant of easement to bore underneath the corner of the Trust property.

The first draft of the grant of easement identified Tronox as the property owner, and granted unrestricted access to TOMPC and TOMPC's contractor. Several rounds of comments and revision to the easement grant were needed to generate a grant that EPM believes satisfies the needs of the Trustee in maintaining compliance with the NRC license.

EPM sent the easement grant and a request to approve the easement to NRC and DEQ on October 9. An ad-hoc call to discuss the easement grant can be arranged if desired. *NRC and DEQ* 

#### 2016 Budget

EPM is developing a proposed budget for 2016. The scope of work for 2016 cannot be determined with confidence. The number and type of RAIs is unknown. It is uncertain whether the contractors EPM has retained for groundwater remediation, water treatment, and radiation protection, and quality assurance will need to modify the design, or if they will be able to finalize the design, prepare requests for proposals (RFPs) for construction, and operating manuals and procedures for system operation. Consequently, EPM is preparing a budget proposal that provides for some re-design as well as finalization of the design and the development of RFPs, procedures, and manuals.

The proposed budget is scheduled to be submitted to NRC and DEQ during the week of October 19<sup>th</sup>. *EPM* 

#### Monthly Status Updates

Field investigations, treatability tests, and other field activities are complete. EPM, Burns & McDonnell, Kurion, and Enercon Services continue to work on the preparation of a decommissioning plan containing the groundwater remediation design. The plan addresses the remediation of groundwater for uranium to obtain license termination. It will also provide for the remediation of all COCs to obtain unrestricted release from DEQ.

Next year will involve responding to agency requests for additional information (RAIs), as well as quarterly groundwater sampling events. EPM proposes to modify the reporting process beginning October 2015. EPM proposes to submit monthly written status reports and schedule

## NRC – DEQ – EPM Monthly Status Update October 12, 2015 (*Red text indicates who will take the next action*)

ad-hoc teleconferences to discuss responses to RAIs in lieu of conducting monthly teleconferences. NRC and DEQ approval of this proposal is herein requested. *NRC and DEQ* 

### **Groundwater Design Issues**

## Treatability Tests

The final treatability test report has been drafted and reviewed by EPM and Burns & McDonnell. Upon revision, the report will be submitted to NRC and DEQ. **EPM** 

### Groundwater Remediation Design

The 60% design of the groundwater remediation infrastructure is complete. EPM, Burns & McDonnell, Kurion, and Enercon are preparing the decommissioning plan. Submittal of the decommissioning plan and license amendment request is still scheduled for the end of the year. **EPM** 

<u>Clemson University In-Situ Biological Immobilization (ISBI) Research</u> Soil and groundwater samples were sent to Clemson the last week in August. Clemson University has initiated the test. **EPM** 

## Soil and Groundwater Sampling and Analysis for Plutonium

Laboratory results for groundwater samples collected from Monitoring Wells 1331 and 1377 were received and will be submitted to NRC and DEQ the week of October 12<sup>th</sup>. Results were non-detect for both wells, with detection limits of approximately 0.5 pCi/L for both Pu-238 and Pu-239/240. *EPM* 

### **License Issues**

There are no current license issues to be addressed.

## NRC-DEQ Technical Meeting Notes December 9, 2015

A teleconference was conducted December 9 to inform NRC and DEQ of changes that were made to the groundwater remediation approach since the June 2015 conceptual design meeting. Attendees were:

Ken Kalman Varughese Kurian Lifeng Guo Gerald Schlapper Paul Davis David Cates Torrie Wale Bill Halliburton John Hesemann Jeff Lux

#### Background

In July, quality review of estimated time required to remediate groundwater in different remediation areas identified a calculation error. Upon correction of this error, essentially all durations increased significantly.

In August, treatability tests conducted by Kurion and AvanTech were completed. By the end of September, it was determined that four significant findings had significant impact on groundwater remediation (3 negative, one positive):

- 1. Adsorption capacity of resin declines significantly as influent concentration declines. This means that far more resin will be needed per kilogram of uranium than in the 2013 treatability tests.
- 2. Bioreactors require that we heat water approximately 20 degrees F; this introduces a significant cost element to the operation of the nitrate treatment system.
- 3. Biomass in the nitrate treatment system that is not preceded by uranium removal will contain sufficient uranium to require disposal as LLRW.
- 4. The single positive we'll never get close to 1,200 grams of U-235 in a resin vessel, or in all four treatment trains combined.

In October, initial cost estimates indicated that, primarily due to the extended time needed to achieve the uranium MCL and nitrate remediation goal, we can't remain under license until completion of all groundwater remediation. The extremely long durations are associated with achieving the MCL, not the DCGL. Efforts to optimize the process, such as increasing the amount of injection trench in UP1 and UP2 to provide more "flushing", did not yield sufficient savings.

In November, we started evaluating alternative remediation strategies in an effort to achieve license termination with available funding (with the addition of a 25% contingency). Alternatives considered included:

- 1. Continue groundwater remediation in all other western areas while performing post-remediation monitoring in the WAA "U > DCGL" area.
- 2. Shut down groundwater remediation in all western areas while performing post-remediation, then resume in all western areas after post-remediation monitoring is complete in WAA "U> DCGL"; continuing until the BA1 area is < DCGL.
- 3. Shut down groundwater remediation in all western areas once uranium in the WAA "U > DCGL" area is < DCGL.

In December, it was determined that implementing the third alternative, and terminating the license after achieving the DCGL, yields a cost estimate of less than \$60 million 2015 dollars (without 25% contingency - \$75,000,000 with the contingency). We are required to include a 25% contingency in our decommissioning cost estimate. It is believed that, because the capital cost associated with construction

is approximately \$30,000,000 (half of the cost of decommissioning), a 25% contingency is likely more than is needed.

#### Current Strategy

The current plan is as follows:

- 1. Install the entire infrastructure needed to address groundwater contamination in all impacted areas.
- 2. Operate all groundwater remediation and treatment systems until in-process monitoring indicates that all wells in the WAA "U > DCGL" area yield uranium concentrations less than 180 pCi/L.
- 3. Shut down all western area groundwater remediation and treatment. Continue operating the groundwater remediation and treatment systems in BA1. Drain all western area treatment systems. Continue operating resin process systems (for resin coming from BA1). Begin post-remediation monitoring in the WAA "U > DCGL" area.
- 4. Upon completion of post-remediation monitoring in the WAA "U > DCGL" area, demobilize all western area treatment systems. Retain vessels of un-spent resin for use in the BA1 uranium treatment train.
- 5. Operate only the BA1 groundwater remediation and treatment systems until in-process monitoring indicates that all wells in BA1 yield uranium concentrations less than 180 pCi/L.
- 6. Shut down BA1 groundwater remediation and treatment. Drain BA1 treatment systems. Begin post-remediation monitoring in the WAA "U > DCGL" area.
- 7. Upon completion of post-remediation monitoring in BA1, demobilize BA1 treatment system and resin processing system. Dispose of remaining vessels of un-spent resin.
- 8. Perform a final status survey on the western area building and prepare a residual dose estimate to demonstrate compliance with decommissioning criteria.
- 9. Apply for license termination.
- 10. Evaluate remaining groundwater conditions and evaluate potential remediation alternatives based on remaining available funding. Alternatives include:
  - a. In-situ biological immobilization. This would only be considered a viable alternative if the Clemson research demonstrates conclusively that uranium concentrations will not rebound to > DCGL.
  - b. Monitored natural attenuation (MNA). In-process groundwater monitoring data collected during the ten to twelve years required to achieve the DCGL will provide a substantial amount of information to project rates of concentration decline.
  - c. Pump and inject/discharge without treatment. Continuing to pump from the remediation areas that still exceed the uranium MCL in one area and the nitrate ACL in another may yield a total influent concentration that could be discharged without treatment, accelerating the rate at which concentrations decline compared with MNA.
  - d. Institutional control. If remaining funding is not sufficient to complete remediation under any of the other alternatives, DEQ may elect to impose restrictions on the use of groundwater at the site so the Trust can dispose of the property and transfer remaining funds to the State.

### Issues Identified During the Teleconference

There were several issues identified during the teleconference:

- 1. Determination that uranium concentration is less than the DCGL. Uranium concentrations may rebound after terminating groundwater extraction. Discussion included:
  - a. Lack of a "source" in the shallow subsurface reduces the amount of uranium available to that which was sorbed onto soil located in the unsaturated during groundwater extraction.

Since this represents a tiny fraction of the saturated zone from which groundwater is extracted, little rebound should be expected from sorbed uranium.

- b. If groundwater elevations are low "regionally" (as you would experience in the summer), you would expect more rebound due to groundwater elevations rising during the post-remediation monitoring period. Data obtained during in-process monitoring will help determine the relationship between groundwater elevation and COC concentrations. If a regionally low water table appears to be an issue, plans for shutdown would have to take this potential for rebound into consideration.
- 2. Duration of post-remediation monitoring. The requirement for eight consecutive quarters of postremediation monitoring was based on the use of MNA to remediate groundwater. Groundwater extraction and treatment has more potential for rebound than MNA would present. Comparison with uranium recovery licensees indicates that NRC will require twelve quarters of postremediation monitoring rather than eight quarters. The decommissioning plan will be changed to reflect that.
- 3. Demonstration that criteria have been met. License condition reads, "… until the licensee demonstrates that the total uranium concentrations in all wells have been below the groundwater release criteria for eight consecutive quarterly samples (the past 2 years)."
  - a. This has been interpreted as "every result in every well must be below the release criteria every time. NRC introduced the concept of a statistical evaluation of the data to demonstrate that decommissioning criteria have been met.
  - b. Combining data for multiple wells, using averaging methods such as are common for soil, has not been applied to groundwater. However, statistical evaluation of data for each location may demonstrate that the criteria have been met.
  - c. Statistical evaluation of data may be necessary. At 180 pCi/L total uranium, the statistical uncertainty of each analysis can be significant. EPM will propose to statistically evaluate the data for each post-remediation monitoring location to demonstrate that there is a 95% confidence level that the uranium concentration in groundwater at that location is less than 180 pCi/L. This will be incorporated into a license amendment request for License Condition 27(b).
- 4. Re-starting if we don't meet the DCGL. DEQ asked if, after draining the remediation systems, post-remediation monitoring indicates that removal of more uranium is necessary, could treatment be resumed. The plan is to drain the systems rather than demobilize them so they could be returned to service if post-remediation monitoring indicates that more treatment is needed.