UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 12 2012

THE ADMINISTRATOR

Deborah L. Swackhamer, Ph.D.
Chairwoman
Science Advisory Board
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Dear Dr. Swackhamer:

I offer my sincerest appreciation to the U.S. Environmental Protection Agency's Science Advisory Board and its augmented Radiation Advisory Committee for your thoughts and recommendations on the EPA's draft technical report, *Considerations Related to Post-Closure Monitoring of Uranium In-Situ Leach/In-Situ Recovery (ISL/ISR) Sites*. I am particularly grateful for your detailed responses to our four charge questions.

As you know, the EPA is in the early stages of considering revisions to our standards for uranium facilities at 40 CFR Part 192. The committee's expert advice and thoughtful, constructive comments will be carefully considered as the EPA completes the technical information analyses and review that will inform any potential rule revisions.

The EPA has already taken action on several of the Science Advisory Board's recommendations. The U.S. Nuclear Regulatory Commission has provided ISL/ISR monitoring data, and we have solicited additional data sets directly from industry and the National Mining Association. We will share your recommendations with the NRC, which is charged with implementing the EPA's health- and environmental-protection standards at 40 CFR 192. We will continue to work cooperatively by involving them in discussions and keeping them aware of our regulatory activities and time frames.

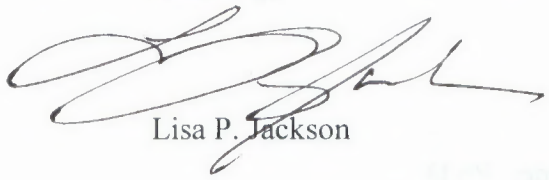
Your advisory report emphasizes the role that geochemical modeling can play in furthering our understanding of the underlying chemical processes that may control concentration limits and reaction mechanisms responsible for the mobilization of uranium and other metals in the ISL/ISR process. We are currently looking at ways in which geochemical modeling can help inform both establishing and implementing new ISL/ISR standards. The report also recommends that the EPA make more extensive use of data collected during ISL/ISR operations. We will continue to expand our use of such data, to the extent that we are able to acquire it, as we examine the technical issues involved in setting the ISL/ISR standards.

Based on your recommendations, the EPA also plans to examine the analytes necessary to conform to existing standards and those necessary for geochemical modeling. For additional information about the

EPA's plans for addressing the Science Advisory Board's recommendations, please see the enclosed table, Agency Response to SAB Recommendations.

Again, thank you very much for all the energy and hard work you devoted to this scientific advisory.

Sincerely,



Lisa P. Jackson

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 12 2012

THE ADMINISTRATOR

Bernd Kahn, Ph.D.
Chairman
Augmented Radiation Advisory Committee
Science Advisory Board
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Dear Dr. Kahn:

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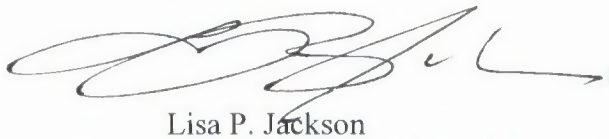

Lisa P. Jackson

Enclosure

Enclosure:
Agency Response to SAB Recommendations

Agency Charge	SAB Recommendation	Section #	EPA Response
Charge Number 1			
Designing and Implementing a Monitoring Network	Develop a long-term (e.g., 3-5 year) program of data analysis and model development for defining the geology and hydrology of the site as a basis for setting evidence-based standards	3.2	EPA is considering development of a list of analytes for monitoring and will work with NRC to explore options for an accessible database of these data for future efforts involving geochemical modeling.
Designing and Implementing a Monitoring Network	In the near-term, articulate a set of guiding principles and assumptions for standards setting	3.3	EPA discusses guiding principles in various sections of the draft technical report dealing with the phases of the ISL/ISR process and the technical issues involved in monitoring their safe completion. Should EPA decide to propose rule revisions, the preamble to the proposed rule will present a more extensive treatment of principles and assumptions.
Designing and Implementing a Monitoring Network	Identify indicators, both chemical and radioactive, for establishing conditions pre- and post-operationally	3.4, 4.3	EPA will review possible analytes and the purpose for monitoring each relative to the various stages of the ISL/ISR process, from pre-mining baseline determinations to post-restoration stability monitoring.
Designing and Implementing a Monitoring Network	Specify criteria by which to distinguish between primary and secondary indicators on basis of risk, return to pre-operational or other predetermined conditions, and information concerning other constituents	3.4	In addition to considering development of a list of analytes for monitoring, EPA is examining the field experience in monitoring some of these constituents and the rationale for making them higher or lower priority constituents for monitoring.
Designing and Implementing a Monitoring Network	Discuss in detail the many factors that affect interactions and transformations during and after operation	3.5	EPA is reviewing the various chemical interactions that take place during the mobilization of uranium (the mining phase) and the restoration process after mining. EPA is also considering factors (e.g., mass balance issues associated with lixiviant fluids and microbial activity) affecting constituent interactions and environmental transformations.
Designing and	Obtain and analyze geological and	3.5, 5.5	EPA is examining the importance of detailed geological, geochemical

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Implementing a Monitoring Network	mineralogical data to support decisions based on groundwater monitoring		and hydrologic characterization of the aquifer prior to mining.
Designing and Implementing a Monitoring Network	Before adequate modeling has been developed, specify a sufficiently dense spatial and temporal monitoring system to assure collecting sufficient data for pre- and post- mining comparison	3.6	EPA is reviewing statistical techniques that can be applied to an ISL/ISR well field in order to develop the temporal groundwater chemical composition data necessary to make confident decisions about baseline and the development of post-restoration steady-state conditions in the monitoring network.
Designing and Implementing a Monitoring Network	Consider applying available groundwater models relevant to ISL/ISR uranium mines	3.7, 7.5	The Agency encourages the use of sophisticated groundwater flow models in achieving environmental protection.
Designing and Implementing a Monitoring Network	Support research for providing both empirical values and model coefficients for understanding the approach to stability after ISL/ISR uranium mining	3.7	While the Agency encourages research that expands understanding of complex systems, we leave it to the discretion of the implementing regulatory authorities as to whether they would explicitly support such research.
Designing and Implementing a Monitoring Network	Develop individual modules if needed to reduce the complexity of groundwater models	3.7	We will consider the recommended approach and will consult with the implementing authorities (NRC and Agreement States) as appropriate.
Designing and Implementing a Monitoring Network	Devote at least as much effort to defining baseline groundwater conditions as to post-operational trend monitoring	3.8, 5.6	EPA agrees that determining baseline conditions directly relates to restoration and post-restoration stability, and therefore must be emphasized and approached rigorously.
Designing and Implementing a Monitoring Network	Prepare a glossary of uniform definitions for use by pertinent regulatory agencies and mine operators	3.11	The Agency agrees with SAB's recommendation and will consider how best to clearly articulate definitions.
Charge Number 2			
Establishing Baseline Conditions	Define monitoring objectives of baseline characterization within the framework of the Data Quality Objective (DQO) approach	4.2, 7.3	The Agency will review the use of these objectives in developing an ISL/ISR monitoring plan by the operators for supporting the licensing process to be executed by the implementing regulatory authorities.

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Establishing Baseline Conditions	Identify groundwater constituents and parameters pertinent for monitoring, not limited to those with regulatory limits but also including non-hazardous constituents that can affect the behavior of, or serve as surrogates for, constituents of interest	4.3	EPA is considering development of a list of analytes for monitoring. Justification and uses of these data will be examined as part of this review.
Establishing Baseline Conditions	Consider challenging and fluctuating ambient circumstances in baseline characterization	4.5, 3.4	EPA agrees that site-specific conditions may make establishing baseline conditions particularly challenging; operators should be aware of complicating circumstances at their sites.
Establishing Baseline Conditions	Build in flexibility to modify the design and implementation of monitoring programs as new information becomes available	4.6	EPA acknowledges the issue of flexibility and will factor it in to our analyses.
Establishing Baseline Conditions	Apply consistent sample collection techniques, record keeping, and data compilation	4.7	EPA is considering this issue.
Charge Number 3			
Post-Mining and Restoration Monitoring	Carefully qualify the meaning of "return to pre-operational groundwater quality"	5.2, 3.11	This term refers to the attempt to restore the well-field groundwater chemistry to conditions as they were prior to the onset of leaching operations.
Post-Mining and Restoration Monitoring	Develop a set of guiding principles for crafting standards	5.2, 3.3	As stated above, should EPA decide to propose rule revisions, the preamble to the proposed rule will present a more extensive treatment of principles and assumptions.
Post-Mining and Restoration Monitoring	Combine the extensive existing data sets with knowledge of constituent interactions in the rock/water system to model post-mining approach to stability	5.3, 3.2	EPA would encourage applying this type of site-specific modeling during the licensing process. EPA agrees that data on the effectiveness of restoration, and the factors influencing it, would be useful.
Post-Mining and Restoration Monitoring	Match sampling frequency and duration to information needs for model confirmation	5.5	EPA will examine various statistical techniques to identify the number of samples and duration of sampling necessary to meet information needs.

Post-Mining and Restoration Monitoring	Collect sufficient pre-operational groundwater monitoring data to support reliable post-operational decision making	5.6, 3.8	EPA agrees that determining baseline conditions directly relates to restoration and post-restoration stability, and therefore must be emphasized and approached rigorously.
Post-Mining and Restoration Monitoring	Discuss implications of data presented in tables in the Attachments to the draft technical report	5.7	EPA is factoring data from field situations into our technical analyses.
Post-Mining and Restoration Monitoring	Apply a risk-weighting system in determining acceptability of groundwater quality at ISL/ISR uranium mines	5.7, 3.4	The current version of 40 CFR Part 192 identifies certain constituents considered to be of significance to human health. We will further examine the issue of a risk-weighting system.
Charge Number 4			
Statistical Techniques	Present a survey of methods to determine sufficient well number and density	6.1, 3.6	EPA is considering the potential use of statistical techniques for determining the number of wells to sample in a well field to support decisions on pre- and post-operational conditions.
Statistical Techniques	Select statistical evaluation approach in terms of strengths and weaknesses to suit questions to be answered	6.2	EPA is examining the strengths and weaknesses (e.g., data demands) of the statistical techniques described in the draft technical report relative to their intended purposes for defining baseline conditions and post-restoration steady-state conditions in the well field.
Beyond the Charge			
Additional Advice Beyond the Charge	Monitoring other ISL/ISR impacts	7.1	Should EPA decide to propose rule revisions, supporting documentation will likely discuss potential releases (i.e., spills and leaks) that may occur during ISL/ISR operations. Support documents are also likely to discuss failures that may occur after shutdown.
Additional Advice Beyond the Charge	Considering plans for groundwater use that may be impacted by ISL/ISR uranium mining	7.2	Should EPA decide to propose rule revisions, EPA will likely address this issue in the preamble to the proposed rule.
Additional Advice Beyond the Charge	Elaborating on recommendations for applying the DQO framework to establishing technical approaches to standard setting	7.3	EPA intended the draft technical document to be a source of information on various technical issues and approaches that would support standards development. Should EPA decide to propose rule revisions, SAB's advice will likely be discussed in the preamble to the proposed rule or in supporting technical documents, as applicable.

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Additional Advice Beyond the Charge	Adding other considerations for integrating EPA requirements with existing EPA regulatory programs	7.4	EPA is comparing and contrasting the statistical techniques discussed in the draft technical report with statistical techniques and their applications as described in other EPA references. EPA is considering how the RCRA ground water protection framework applies to the ISL/ISR situation.
Additional Advice Beyond the Charge	Tapping available resources for the recommended modeling	7.5	EPA is reviewing material, including that from published sources, concerning geochemical modeling and its potential application to the ISL/ISR processes.
Additional Advice Beyond the Charge	Encouraging the working relation of EPA staff with NRC or state agency staff	7.6	Working with the NRC technical staff to understand the current state of practice for ISL/ISR operations has been very beneficial in framing the issues, and we anticipate continuing this relationship.