December 15, 2014

MEMORANDUM TO: Bill Von Till, Branch Chief
Uranium Recovery Licensing Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

FROM: David Brown, Sr. Health Physicist **/RA/**
Uranium Recovery Licensing Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

SUBJECT: SUMMARY OF DECEMBER 9, 2014, MEETING WITH URANERZ ENERGY CORPORATION

On December 9, 2014, The U.S. Nuclear Regulatory Commission (NRC) staff met with representatives of Uranerz Energy Corporation (Uranerz) to discuss its application for an amendment to its source materials license for the Nichols Ranch In Situ Recovery Project. The associated meeting notice was issued on November 13, 2014, and is available at the NRC's Agencywide Documents Access and Management System (ADAMS) Accession No. ML14317A343. A summary of the meeting is enclosed.

Docket No.: 040-09067

Enclosure: Meeting Summary

CONTACT: David Brown, NMSS/DUWP
(301) 287-9110

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OFFICE	DWUP	DWUP	DWUP	DWUP	DWUP
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DATE	12/11/14	12/12/14	12/15/14	12/15/14	12/15/14

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MEETING SUMMARY

DATE:	December 9, 2014
TIME:	9:00 a.m. – 11:00 a.m., EST
PLACE:	U.S. Nuclear Regulatory Commission Three White Flint North, North Bethesda, MD Room 1D07
PURPOSE:	To discuss the Uranerz Energy Corporation May 8, 2014, license amendment request for the Nichols Ranch In Situ Recovery Project
ATTENDEES:	See attached list

BACKGROUND:

On May 8, 2014, Uranerz Energy Corporation (Uranerz) submitted an application to amend its Source Material License for the Nichols Ranch In Situ Recovery Project to include licensed activities in a proposed Jane Dough Unit located immediately south of, and contiguous with, the Nichols Ranch Unit (Agencywide Documents Access and Management System (ADAMS) Accession Number ML14164A274). On September 11, NRC staff informed Uranerz that the application is publicly available in ADAMS and that staff had begun an acceptance review (ADAMS Accession Number ML14251A346). On November 25, 2014, staff informed Uranerz that its application was deficient due to lack of sufficient information regarding the coalescing of the A and B Sands on the eastern side of the proposed Jane Dough Unit (ADAMS Accession Number ML14317A447). The discussion at the December 9, 2014, meeting focused primarily on the issue identified by the staff in its November 25, 2014, letter.

DISCUSSION:

Mr. David Brown, NRC Sr. Health Physicist, opened the meeting with a statement on the purpose of the meeting and introductions.

Hydrogeology

Ms. Elise Striz, NRC Hydrogeologist, presented a summary of the application deficiencies identified in the staff's November 25, 2014, letter to Uranerz. The following exhibits from the May 8, 2014, application, were used to illustrate the issue:

- Exhibit JD-D5-2, "Jane Dough Unit North-South Cross Section B-B'",
- Exhibit JD-D5-11, "Jane Dough Unit West-East Cross Section K-K'", and
- Exhibit JD-D5-17, "Jane Dough Unit AB Mudstone Isopach"

Ms. Striz explained the NRC staff's concerns regarding the absence of a confining unit (aquitard) above the A sand, which is the aquifer containing the ore zone, over large portions of the proposed Jane Dough Unit. Over much of the eastern side of the proposed Jane Dough Unit, the A sand and overlying B sand are coaslesced into one aquifer with essentially uniform mineralogical and hydrological characteristics.

Ms. Striz described in detail the sections of the application that Uranerz will need to revise to provide sufficient information on licensed activities in Jane Dough. The details of deficiencies identified during the staff's acceptance review are provided in the discussion points (Attachment 1).

Ms. Striz also summarized four options for Uranerz to consider as it revises the application to address the issues identified by NRC staff:

Option 1: Treat the A sand as the production zone, even where the A and B sand have coalesced and there is no confining unit (aquitard) between the A sand and the overlying B sand aquifer.

As described in more detail in Attachment 1, the staff believes this option requires substantial revisions to the application and is least likely to result in an acceptable application.

Option 2: Define the production zone as the AB sand where the A and B sand have coalesced and there is no confining unit (aquitard) between the A sand and the overlying B sand aquifer. Select an overlying aquifer in a different sand unit above the B sand. The application must address water quality and excursion monitoring in the selected overlying aquifer.

Option 3: Similar to Option 2, define the production zone as the AB sand where the A and B sand have coalesced and there is no confining unit (aquitard) between the A sand and the overlying B sand aquifer. Select the overlying aquifer to be the F sand which is the first continuous sand that is also an aquifer above the AB sand. Evaluate the thickness and characteristics of the aquitard between the AB sand and the F sand and provide evidence which demonstrates this intervening aquitard is sufficiently thick and competent to eliminate the need for excursion monitoring the overlying F sand aquifer.

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Option 4: Revise the amendment request to include only areas where the production zone is the A sand and the A sand is separated from the B sand by a confining unit (aquitard). Submit a subsequent amendment for the areas where the A and B sand have coalesced, and there is no confining unit (aquitard) to address the issues raised.

Uranerz staff stated that they understood the problems posed by the coalesced A and B sands, and that they had already considered similar options as described by Ms. Striz to resolve this issue, except that Uranerz will not consider Option 4. Mr. Michael Thomas, Uranerz, explained that Uranerz is considering Option 1 as the most favored option at this time.

Uranerz described several factors that it believes supports Option 1, including: low vertical hydraulic conductivity between the A and B sands, even where they are coalesced; the fact that Uranerz conducts mechanical integrity testing (MIT) for all wells, including all injection, recovery, and monitoring wells, which reduces the risk that well casing failure will be a cause of vertical excursions; and the existence of shale stringers in the B sand, which may be further revealed and better characterized as Uranerz collects data for well field packages.

Ms. Striz cautioned that casing failures are only one cause of vertical excursions, and that thin confining units (aquitard) with poor integrity have also been a common cause of vertical

excursions. Ms. Striz explained that according to NRC's analysis of historical excursions, vertical excursions are generally the most difficult to correct and require the longest amounts of time to correct. Furthermore, attempts to remediate a vertical excursion in an overlying aquifer with no confining aquitard by a corrective action such as pumping in the overlying aquifer may only exacerbate an excursion from the production zone. Ms. Striz also cautioned that controlling injection rates to prevent vertical excursions will be difficult as injection creates a pressure increase locally near the well which can push fluids upward into the overlying aquifer if no confining aquitard is present. Furthermore, Ms. Striz stated that several license conditions, including a pre-operational pilot test will likely be required to demonstrate that vertical confinement can be achieved and maintained in the absence of an overlying aquitard.

Mr. Bill Von Till, NRC branch chief, asked Uranerz when they would file the aquifer exemption request for the A sand in Jane Dough. Mr. Thomas explained that the application was included as an appendix to the Wyoming Department of Environmental Quality (WDEQ) permit application, and WDEQ will forward the application to EPA after WDEQ reviews it.

Mr. Thomas stated that there is sufficient well field testing and characterization data to support revisions to the applications. Uranerz has already completed some groundwater modeling and is considering other factors, such as the density of monitoring wells required to monitor excursions under Option 1. Uranerz requested to meet with NRC staff again before submitting a revision to its application, to discuss the results of its re-analysis. NRC staff cautioned Uranerz that even if they provide the additional information and groundwater modeling requested, NRC staff may find that the B sand overlying aquifer cannot be protected and conclude that operations cannot be conducted safely in the wellfields where the AB aquitard is missing.

Radon effluent monitoring and Meteorological Monitoring Program

In the tie-down conditions in the April 15, 2014, amendment to the Uranerz source material license, which were developed and put in place just a few weeks before Uranerz submitted its license amendment request to expand operations to the Jane Dough Unit, Uranerz is required to implement a radon and radioactive particulate air effluent monitoring program in accordance with commitments, statements and representations made in letters to NRC dated February 19 (ADAMS Accession Number ML14051A113), February 28 (ADAMS Accession Number ML14063A214), March 6 (ADAMS Accession Number ML14066A051), and March 11 (ADAMS Accession Number ML14071A092). This condition currently applies only to operations at the Nichols Ranch Unit. Mr. Brown asked if Uranerz intended to revise its Jane Dough license amendment application to extend its previous commitments for a radon and radioactive particulate air effluent monitoring program to the Jane Dough license amendment application.

Mr. Thomas and Ms. Dawn Kolkman, Uranerz, stated that the commitments it made to an air effluent monitoring program will extend to Jane Dough. Ms. Kolkman stated that the revisions required to address the geology/hydrology issues described above may also be an opportunity to revise the application to clarify these commitments.

Mr. Brown also asked Uranerz about the location of the meteorological tower and whether the meteorological monitoring program continues to operate. Mr. Thomas stated the tower became operational in July 2011 and is now in its fourth year of operation. It is located on a hill about ¼ mile from the CPP.

Health Physics Designee

Mr. Ron Linton, NRC, described the current status of NRC's review of Uranerz' May 15, 2014 (ADAMS Accession Number ML14140A351) and May 19, 2014 (ADAMS Accession Number ML14148A134) requests for NRC to approve an alternative approach to a training program for plant operators and other suitable personnel (i.e., "designees") to conduct a daily walk through inspection of all work storage areas of the facility. Currently, license condition 9.7 requires Uranerz to follow the guidance in NRC Regulatory Guide 8.31, Regulatory Position C.2.3.1 that the daily inspection be performed by a radiation safety officer (RSO) or a health physics technician (HPT). The NRC staff responded to the Uranerz May 15, 2014 request by letter dated August 21, 2014 (ADAMS Accession Number ML14218A207), which identified a number of deficiencies in the May 15 submittal. On September 18, 2014, Uranerz responded by letter to these deficiencies, providing 5 pages of responses and copies of three operational and training procedures. By e-mail dated December 3, 2014, NRC staff provided additional information to Uranerz regarding acceptable health physics designee training programs at the Lost Creek Project and Crow Butte In Situ Recovery facilities (ADAMS Accession Number ML14342A531).

Mr. Thomas expressed his concern that NRC approval is taking too long. He explained that as winter approaches, further delays will expose Uranerz RSO and HPT employees to needless risk of daily travel to and from the site when roadways are most affected by winter weather. If NRC would approve the training program, these staff would travel to the site only during the normal 4 day / 10 hours-per-day work week for Uranerz professional staff. He also expressed concern that the NRC staff has billed Uranerz 20 hours of review effort for review of a 2-page program description.

NRC staff agreed to further discuss this issue with Uranerz staff to see if NRC can expedite review of this request.

PUBLIC DISCUSSION:

Ruth Thomas, Environmentalist Inc., asked for clarification about the purpose of this meeting, the nature of the technical concerns described by NRC staff, and requested more information about the project. Mr. Brown committed to call Ms. Thomas later in the day to discuss what information Ms. Thomas would like and provide that information.

ACTION ITEMS:

Uranerz will complete new analyses that support revisions to the Jane Dough amendment application and will contact NRC staff to request a meeting before the revised application is submitted.

ATTACHMENTS:

1. Specific Acceptance Issues – NRC staff talking points for December 9, 2014, meeting
2. Meeting Attendees

Specific Acceptance Issues – NRC staff talking points for December 9, 2014, meeting

Chapter 2

1. Inconsistent description of geology: Appendix JD-D5, Section JD-D5.3, "Site Geology," of the application states with respect to the Jane Dough Unit that, "The principle uranium ore bearing sand unit is the A Sand" and "The Jane Dough A Sand ore body is bounded above and below by aquitards." (p. JD-D5-8). However, the analysis on p. JD-D5-10 states, among other things, "Where the AB Shale Aquitard is not present the B Sand sits directly upon the A Sand." The extent of where the AB Shale Aquitard is not present is depicted in Exhibit JD-D5-17 and various other cross-section drawings (e.g., Exhibit JD-D5-5), which clearly indicates that the AB mudstone (i.e., the AB Shale Aquitard between the A and B sands) is non-existent throughout much of the eastern side of the Jane Dough Unit where two proposed wellfields are located.

2. The licensee did not address the coalescing of the A and B Sands in Technical Report: Sections 2.6.2.2, "Jane Dough Unit," 2.7.2.2.1, "Hydrologic Setting and Well Construction," 2.7.2.2.2, "Summary of Aquifer and Aquitard Properties," 2.7.2.2.3, "Groundwater Flow," and 2.7.2.2.4, "Groundwater Quality."

3. Groundwater quality of A and B sands show no significant difference: The licensee provided reasonably comprehensive chemical and radiochemical analysis of water samples within and outside mineralized zones (Section 2.7.2.2.4 and Section JD-D6.1 including piper diagrams, tables of water quality addendum JD-D6E and JD-D6L). This water quality data demonstrated that the groundwater quality in A and B sands is essentially the same in piper diagrams JD-D6E1-1 through 1-3.

4. Aquifer tests do not show isolation of overlying B sand aquifer from A sand aquifer where the AB aquitard is missing: Aquifer pumping tests are provided in Addendum JD-D6C (multi well). The aquifer test in JA-1 using JB-3 as observation well shows 10 ft of drawdown. This demonstrates a clear hydrologic connection between A and B sand. In the analysis, JB-3 was used as observation well to determine transmissivity in the B sand from JA-1 A sand aquifer test. A similar analysis was done in the JA-7 and JA- 8 aquifer tests with a B sand well, JB-9, used as observation well to determine B sand transmissivity.

Chapter 3

1. The licensee did not address the effects of ISL operations on connected aquifers or present or future surrounding groundwater users: In Sections 3.4.8.1, 3.4.8.2, and Addendum 3D, the licensee provided numerical groundwater flow modeling of A sand only during proposed operations. Modeling of the A sand alone does not show how the B sand is impacted by its hydrologic connection to the A sand and how that will impact surrounding groundwater users. The modeling also does not show impact of A sand production on groundwater flow patterns and aquifer levels in B sand. The application did not include sufficient information on the groundwater flow model development, parameter assignment, calibration and execution to be evaluated by NRC staff. The licensee also did not provide the groundwater flow model electronic files to enable NRC staff to evaluate the model.

2. The licensee did not demonstrate the ability to control the movement of production fluids from the production zone to surrounding aquifers: Sections 3.4.8.1, 3.4.8.2, and Addendum 3D provided groundwater flow numerical modeling of A sand only. The licensee did not model interaction with B sand which is in contact with A sand over entire eastern side of license area where the AB aquitard is missing. The groundwater flow analysis does not demonstrate the licensee is able to control production fluids from entering the B sand during operations in proposed wellfields where the AB aquitard is missing. The licensee did not demonstrate how the hydrologic connection between the A and B sand will impact the bleed required to maintain an inward gradient. The licensee also did not provide the groundwater flow model electronic files to enable NRC staff to evaluate the model.

Chapter 5

1. The licensee did not establish satisfactory criteria for determining monitoring well locations and screen intervals where the AB aquitard is missing to detect horizontal and vertical excursions: In Sections 5.7.8.2 and Addendum 3D, the application does not address any increased monitoring for B overlying sand in the absence of a confining layer between the A sand production zone and the overlying B sand.

2. The licensee did not establish satisfactory aquifer testing: In Section 5.7.8.3, the application does not describe how aquifer tests will be used to demonstrate how the B sand is isolated from the A sand production zone where the AB aquitard is missing over more than half of the license area.

3. The licensee did not define operational approaches for the monitoring program: In Section 5.7.8.10, the application does not address how B sand monitoring will be revised and conducted to account for lack of confining layer between A and B sands in half of license area.

Chapter 6

1. The licensee did not provide accurate estimates volume of and quality of extraction solutions that need to be cleaned up during groundwater restoration. In Section 6.1, the application does not address A production sand connection to overlying B sand and how this will impact volumes for restoration in more than half of the license area where the AB aquitard is missing.

2. The licensee did not provide acceptable estimates of well field pore volume and the associated horizontal and vertical flare. In Section 3 and Addendum 3D, the application does not address lack of confining layer between A production sand and B overlying sand and its impact on horizontal and vertical flare from the hydrologic connection between the A and B sand aquifers.

Chapter 7

The licensee did not address the coalescing of the A and B sands in its summary of environmental effects in Section 7.2.3, “Groundwater Impacts”

Environmental Report

The licensee did not address the coalescing of the A and B sands in its summary of environmental effects in Section 4.4.1.3, “Groundwater Impacts”

Missing AB Aquitard Summary

If the licensee chooses to proceed with the application in which the A sand is the production zone and selects the B sand as the overlying aquifer in proposed wellfields where the AB aquitard is missing, the application will require significant revisions and additions. The application should be revised to address how wellfields will be operated and restored to protect the overlying B sand aquifer where no AB Shale aquitard is present. The location, density and sampling frequency for the B sand monitoring wells to detect and correct excursions must be addressed. In addition, groundwater flow and transport modeling of both the A and B sands during operation, restoration and excursion detection and correction is necessary to demonstrate how groundwater in the B sand aquifer will be protected during ISR operations in the proposed wellfields where the AB shale aquitard is absent.

The revised application should include at a minimum the following revisions and additions to be found acceptable for further review:

1. Correct the geological characterization.

2. Correct the hydrogeological characterization.

3. Describe and model the effects of in situ recovery production and restoration on present and future surrounding water users in both A and B sands where the AB aquitard is missing.

4. Describe and demonstrate through modeling how operations and restoration will be conducted to control fluids from moving from the production A sand aquifer to B sand overlying aquifer where AB aquitard is missing.

5. Demonstrate through modeling how much bleed is needed to maintain an inward gradient as the AB combined aquifer is thicker than A sand aquifer alone.

6. Describe and demonstrate through modeling what techniques will be used to correct and remediate excursions in the B sand where AB aquitard is missing.

7. Describe and demonstrate through modeling how monitoring well locations, screen placement and screen lengths for horizontal and vertical excursions will be chosen where AB aquitard is missing. Specifically, the application should address how excursions will be detected where the AB aquitard is missing, including any modification to the density of monitoring wells and sampling frequency to protect the overlying B sand aquifer and surrounding perimeter aquifer.

8. Conduct aquifer testing to demonstrate the isolation of the overlying B sand aquifer from the A sand production aquifer where the AB aquitard is missing.

9. Provide estimates of well field pore volume and the associated horizontal and vertical flare where AB aquitard is missing as the hydrologic connection of the B sand to the A sand will impact both flare estimates.

MEETING ATTENDEES

Date: December 9, 2014

Topic: Meeting between Uranerz Energy Corporation and U.S. Nuclear Regulatory Commission on Nichols Ranch License Amendment to Expand Operations to the Jane Dough Unit

Name	Affiliation
Dave Brown	NRC
Elise Striz	NRC
Jose Valdes	NRC
Bill Von Till	NRC
Jill Caverly	NRC
Ashley Waldron	NRC
Ron Linton	NRC
Lydia Chang	NRC
Marla Morales	SWRI-CNWRA
Chandrika Manepally	SWRI-CNWRA
Bruce Larson	Uranerz
Mike Thomas	Uranerz
Dawn Kolkman	Uranerz
Tom Michals	Uranerz consultant
George Hoffman	Uranerz consultant
Ruth Thomas	Environmentalists, Inc.
Ben Schiffer	WWC Engineering