

September 12, 2013

Mr. Michael P. Thomas  
Vice President Regulatory Affairs  
Uranerz Energy Corporation  
P.O. Box 50850  
1701 East E Street  
Casper WY 82605-0850

SUBJECT: URANERZ ENERGY CORPORATION, NICHOLS RANCH PROJECT, SOURCE MATERIALS LICENSE SUA-1597, APPROVAL OF PRODUCTION AREA #1 WELLFIELD PACKAGE (CLOSES TAC NO. J00670)

Dear Mr. Thomas:

The U.S. Nuclear Regulatory Commission (NRC) received the Nichols Ranch Unit PA#1 [Production Area #1] Wellfield Package (wellfield package) for the Uranerz Energy Corporation (Uranerz) Nichols Ranch Project in a cover letter dated May 8, 2012. Uranerz submitted its proposed excursion upper control limits and restoration target values as page changes to the wellfield package to the NRC for review in a cover letter dated February 12, 2013, and additional page changes in a letter dated April 29, 2013. The NRC staff requested additional information from Uranerz in a letter dated May 17, 2013. Uranerz submitted responses to NRC's request for additional information in a letter dated June 19, 2013.

The NRC staff has reviewed and evaluated PA#1 wellfield package. The staff finds that the PA#1 wellfield package is acceptable. The submission of the PA#1 wellfield package to NRC for review and approval is required by NRC license SUA-1597, License Condition 10.8. The evaluation of the PA#1 wellfield package is found in the enclosed Technical Evaluation Report.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

M. Thomas

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If you have any questions concerning the above, please contact me at [Ron.Linton@nrc.gov](mailto:Ron.Linton@nrc.gov) or (301) 415-7777.

Sincerely,

**/RA/**

Ron C. Linton, Project Manager, Hydrogeologist  
Uranium Recovery Licensing Branch  
Division of Waste Management  
and Environmental Protection  
Office of Federal and State Materials  
and Environmental Management Programs

Docket No.: 040-09067

License No.: SUA-1597

Enclosure: Technical Evaluation Report

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(CLOSES TAC J00670)

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## TECHNICAL EVALUATION REPORT

### Nichols Ranch Unit Production Area #1 Wellfield Package Hydrologic Test Uranerz Energy Corporation, Nichols Ranch Unit ISR Facility

**DATE:** September 12, 2013

**DOCKET NO.:** 040-09067

**LICENSEE:** Uranerz Energy Corporation

**SITE:** Uranerz Nichols Ranch Unit, Wyoming

**PROJECT MANAGER:** Ron C. Linton

**TECHNICAL REVIEWER:** Elise A. Striz

#### SUMMARY AND CONCLUSIONS

The U.S. Nuclear Regulatory Commission (NRC) received a partial submission of the Nichols Ranch Unit [Production Area] PA#1 Wellfield Package (wellfield package) for the Uranerz Energy Corporation (Uranerz) Nichols Ranch Project in a cover letter dated May 8, 2012. Uranerz submitted its proposed excursion upper control limits and restoration target values as page changes to the wellfield package to the NRC for review in a cover letter dated February 12, 2013. The February 12, 2013, page changes completed the package and NRC staff formally began its review at that time. The wellfield package is publicly available in the NRC's Agencywide Documents Access and Management System (ADAMS) in package ML121640319 and ML13064A026, respectively. During its review, Uranerz submitted additional page changes dated April 29, 2013, in response to comments from the Wyoming Department of Environmental Quality (WDEQ) (ML13134A011). NRC staff incorporated those changes into its review. By letter dated May 17, 2013, NRC provided to Uranerz a request for additional information (RAI) for PA#1 Wellfield Package (ML13123A386). Uranerz submitted to the NRC a report documenting its response to the Nichols Ranch Unit PA#1 Wellfield Hydrologic Test NRC RAI, including figures and a CD containing original water quality reports, by letter dated June 19, 2013 (ML13189A097).

The NRC staff has reviewed the complete PA#1 wellfield package and RAI responses and provides an independent review and analysis in this Technical Evaluation Report (TER). Based on the conclusions of this analysis, NRC staff approves the Nichols Ranch Unit PA#1 wellfield package.

Enclosure

## INTRODUCTION

Uranerz Nichols Ranch ISR project is licensed under NRC License SUA-1597 (ML111751649). License condition 10.8 requires NRC review and approval of wellfield packages for the first production areas at Nichols Ranch and Hank Units. The specific language in LC 10.8 states:

*License Condition 10.8 Production Area Pump Test Document: The licensee will provide the Production Area Pump Test (PAPT) document for the first production areas at the Nichols Ranch and Hank Units for NRC review and approval prior to lixiviant injection into the production area. The licensee will provide PAPT documents for each additional production area for NRC review. The PAPT document will provide all background ground water data, restoration target values, upper control limits at each monitoring well, as well as the information outlined in Section 5.7.8.4 of the license application.*

## TECHNICAL EVALUATION

The wellfield package was reviewed using the review procedures and acceptance criteria listed in NUREG-1569, Standard Review Plan for In Situ Leach Uranium Extraction License Applications (Standard Review Plan) Section 5.7.8.2 (1), (2), (3) and (4), and Section 5.7.8.3 (1), (2), (3) and (4), respectively. These procedures assess if the licensee has: (1) adequately sampled for and established the baseline water quality and restoration target values (RTVs) for the ore zone production area; (2) adequately sampled for and established excursion monitoring well upper control limits (UCLs); (3) established acceptable excursion monitoring well locations; and (4) verified horizontal continuity between the production zone and perimeter wells and vertical isolation between the production zone and vertical excursion monitor wells. In addition, the licensee is expected, in this wellfield package, to show compliance with all related LCs.

NRC staff has determined that the information submitted in the Nichols Ranch PA#1 wellfield package meets the LC 10.8 requirement. The submission provides background ground water quality data, restoration target values, upper control limits at each monitoring well, as well as the information outlined in Section 5.7.8.4 of the license application:

1. A description of the location, extent, etc., of the production area
2. Map(s) showing the proposed production area (production patterns) and location of all monitoring wells
3. Geologic cross section maps
4. Isopach maps of the ore zone, underlying, and overlying confining units
5. Discussion on pump test methods including well completion reports
6. Discussion of the results and conclusions of the pumping tests
7. Data showing monitor well ring and ore zone are in communication

Standard Review Plan Section 5.7.8.2 review procedure (1) and Section 5.7.8.3 acceptance criteria (1) address the establishment of baseline ground water quality for the production area. In addition, NRC License SUA-1597 contains a specific LC 11.3 that addresses background water quality. License condition 11.3 states:

*License Condition 11.3 Establishment of Background Water Quality. Prior to injection of lixiviant for each production area, the licensee shall establish background ground water quality data for the ore zone, and overlying and underlying aquifers. The background water quality will be used to define the background ground water protection standards required to be met in 10 CFR Part 40, Appendix A, Criterion 5B(5) for the ore zone aquifer and surrounding aquifers. Water quality sampling shall provide representative background ground water quality data and restoration criteria as described in Section 5.7.8.5 of the approved license application. The data for each production area shall consist, at a minimum, of the following sampling and analyses:*

*A. Ore Zone. Samples shall be collected from ore zone monitoring production (MP) wells at a minimum density of one MP well per 4 acres of production area. These samples shall be analyzed for the parameters listed in Table D6-6a of the licensee's approved application. Samples shall also be collected from all ore zone perimeter monitoring wells.*

*B. Overlying and Underlying Aquifers. Samples shall be collected from all monitoring wells in the first overlying and first underlying aquifer at a minimum density of one well per 4 acres of production area. The samples shall be analyzed for those parameters listed in Table D6-6a of the approved license application.*

*C. Surficial Aquifer. One surficial well shall be located and sampled in each production area. The samples shall be analyzed for those parameters listed in Table D6-6a of the approved license application.*

*D. Sampling and Analysis. Four samples shall be collected from each well to establish background levels. Consecutive sampling events shall be at least 14 days apart. The third and fourth sample events can be analyzed for a reduced list of parameters. The parameters that can be deleted from the third and fourth sampling events are those that are below the minimum analytical detection limits during the first and second sampling events.*

*E. Ground water RTVs for the ore zone aquifer shall be established on a parameter-by-parameter basis using either a production area or well-specific basis for all constituents.*

The licensee provided the baseline ground water quality for overlying, perimeter, underlying and the production ore zone aquifers in the wellfield package in Tables 12.1, 12.2, 12.3, and 12.4, respectively, as required by LC 11.3 Subparts A, B, and D. For each aquifer, four samples were taken at least 14 days apart and analyzed for the parameters listed in Table D-D6a of the approved license application. The data was provided in both electronic form and hard copy form. The baseline water quality of the surficial aquifer in PA#1, as required by LC11.3 Subpart C, has not been supplied at this time. However, this data is not required in the wellfield package and may be supplied at a later date. The licensee established the wellfield ore zone aquifer background ground water quality using approved statistical approaches on a production area basis. As required in LC 11.3 Subpart E, the RTVs for the ore zone production aquifer,

also provided in Table 12.4, were established on a parameter-by parameter basis as the baseline mean plus two standard deviations.

The licensee conducted mechanical integrity tests (MITs) on all wells which were installed. The licensee only used wells which passed an MIT to sample for the baseline water quality. The licensee provided well completion data for all of the wells in Table 3.1 in electronic and hard copy form. The licensee also provided all of the original lab data sheets for the baseline water quality sampling in electronic form to verify the data and demonstrate it was provided by a certified laboratory. No discrepancies were detected among the figures, tables or sampling data sheets in the wellfield package. For these reasons, NRC staff finds the measurement of wellfield baseline water quality and the proposed RTVs to be acceptable.

Standard Review Plan Section 5.7.8.2 review procedure (2) and Section 5.7.8.3 acceptance criteria (2) address the establishment of UCLs for a production area. In addition, NRC License SUA-1597 contains a specific LC 11.4 that addresses UCLs for excursion monitoring wells:

*License Condition 11.4 Establishment of Upper Control Limits (UCLs). Prior to injection of lixiviant into a production area, the licensee shall establish UCLs in designated overlying and underlying aquifer and perimeter monitoring wells. The UCLs for the indicator parameters: chloride, conductivity, and total alkalinity shall be established by analyzing background monitoring data collected to satisfy LC 11.3. The concentrations of these UCLs shall be established for each production area by calculating the background mean concentration and adding five standard deviations. The UCL for chloride can be set at the background mean concentration and adding either five standard deviations or 15 mg/L, whichever is higher.*

The licensee measured the UCL indicator parameters in the overlying perimeter ring and underlying excursion monitoring wells in the wellfield package and provided the sample results in Tables 12.1, 12.2, and 12.3, respectively, as required by LC 11.4. For each set of excursion monitoring wells, six samples were taken at least 14 days apart and analyzed for the UCL indicator parameters of chloride, conductivity, and total alkalinity. The data was provided in both electronic form and hard copy form. The licensee established the UCLs using approved statistical approaches. The final UCLs, also listed in Tables 12.1, 12.2, and 12.3 for overlying perimeter ring and underlying excursion monitoring wells, respectively, were set as the mean plus five standard deviations.

The licensee conducted MIT tests on all excursion monitoring wells. The licensee only used wells which passed MIT to sample for the excursion indicators. The licensee provided well completion data for all of the wells in Table 3.1 in electronic and hard copy form. The licensee also provided all of the original lab data sheets for the baseline water quality sampling in electronic form to verify the data and demonstrate it was provided by a certified laboratory. No discrepancies were detected among the figures, tables or sampling data sheets in the wellfield package. For these reasons, NRC staff finds the measurement of excursion monitoring well UCL indicators and the UCLs provided to be acceptable.

Standard Review Plan Section 5.7.8.2 review procedures (3) and Section 5.7.8.3 acceptance criteria (3) address the establishment of acceptable excursion monitoring well locations. In

Section 2.0 of the wellfield package report, the licensee evaluated and confirmed the geological characterization of PA#1 by providing detailed cross sections and isopachs derived from the well boring logs which were generated during the wellfield installation in PA#1. The licensee determined that the underlying 1 sand was thin and did not have sufficient recharge to be considered an aquifer in the lower southern portion of PA#1. In addition, the next aquifer was determined to be 110 feet below the production ore zone A sand in this area. In Section 3.0, the licensee described the placement and installation of the excursion monitoring wells in the overlying and underlying aquifers and on the perimeter ring. In the sections of PA#1 where the underlying 1 sand aquifer was determined to be too thin and unproductive and the next aquifer was at a distance of greater than 50 feet, the licensee was not required to install underlying monitoring wells by the WDEQ. NRC concurs with the WDEQ position that the 1 sand is not an aquifer in this location and the next aquifer is greater than 50 feet below the production zone. Therefore, no underlying monitoring wells were installed in this portion of the wellfield. While the NRC LC 11.3 doesn't reference the exemption for underlying monitoring wells where the first aquifer is greater than 50 feet below the production zone, this methodology is permitted by the WDEQ and the NRC has accepted this practice for other NRC licenses in the Powder River Basin. The licensee presented the well completion information in Table 3.1 in the application. NRC staff reviewed the number, location, and screened interval of the excursion monitoring wells in the overlying and underlying aquifers, and on the perimeter ring. NRC staff finds the information meets the commitments in the approved license application and is therefore acceptable.

In Section 3, the licensee also stated it did not discover any existing wells that required abandonment within PA#1. The licensee stated if any such wells were located in the future they would be abandoned according to WDEQ rules.

Standard Review Plan Section 5.7.8.2 review procedures (4) and Section 5.7.8.3 acceptance criteria (4) address the need for the licensee to verify horizontal continuity between the production zone and perimeter wells and vertical isolation between the production zone and vertical excursion monitor wells. In Section 4.0, the licensee presented the design, analysis, and results of two separate pumping tests it conducted to establish the hydrogeological characteristics and isolation of the A sand ore zone production aquifer in PA#1. The first pumping test was performed at well MRN-23 in the southern portion of PA#1. The second test was conducted at well MRN-29 in the northern portion of PA#1. The two pumping tests confirmed a hydrologic connection between the A sand ore zone wells and the perimeter ring excursion monitoring wells. The test also confirmed that there was no response in the overlying B sand and underlying 1 sand aquifer monitoring wells to pumping in the A sand. This lack of response supported the finding that the overlying and underlying aquitards have sufficient thickness and integrity to provide adequate confinement of the A sand ore zone production aquifer. In addition, the licensee confirmed the hydrologic characteristics of transmissivity (35-50 ft<sup>2</sup>/day) and storativity (1.2 to 1.4 e-04) of the production zone A sand aquifer. NRC staff finds these values to be in agreement with the values provided in the license application. NRC staff finds the design, time period, analysis, and results of the two pumping tests to be acceptable.