September 12, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

G. Paul Bollwerk, III, Chairman
Dr. Richard F. Cole
Dr. Craig M. White

In the Matter of:	)	
	)	
Strata Energy, Inc.	)	Docket No. 40-9091-MLA
	)	ASLBP No. 12-915-01-MLA-BD01
	)	
(Ross In Situ Recovery	)	
Uranium Project)	)	

REBUTTAL TESTIMONY OF BEN SCHIFFER

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1.0 CONTENTION 1 – ALLEGED FAILURE OF THE FSEIS TO ADEQUATELY CHARACTERIZE BASELINE (I.E., ORIGINAL OR PRE-MINING) GROUNDWATER QUALITY

1.1 The FSEIS and SER Demonstrate That the License Application Complies with NUREG-1569 Section 2 Acceptance Criteria with Respect to Baseline Groundwater Quality

Q.1. In their initial testimony at A.1.4, NRC Staff state that, "The water quality datasets that are generated following Criterion 7 and Reg. Guide 4.14 are sufficient to meet the requirements of NEPA, which requires a description of the water that could be affected by the proposed action" (Ex. NRC001 at 8, 2nd ¶, lines 15-18). Do you agree with this? If so, please explain.

A.1. I agree with this statement but would add that the specific criteria that a license applicant must follow to show that they have complied with Criterion 7 are found in NUREG-1569 Section 2. As paraphrased by NRC Staff, Criterion 7 requires that "at least one full year prior to any major site construction, the applicant or licensee must conduct a monitoring program to provide complete baseline data on a milling site and its environs" (Ex. NRC001 at 8, 2nd ¶, lines 3-6). To my knowledge, Criterion 7 does not contain any specific details about how a license applicant shows that "complete baseline data" have been provided. It is therefore necessary to look at guidance documents prepared by NRC Staff for the specific procedures that should be followed. My initial testimony at A.11-A.29 (Ex. SEI005 at 7-14) describes how the FSEIS and SER demonstrate that the license application complies with NUREG-1569 Section 2 acceptance criteria with respect to baseline groundwater quality. For instance, my initial testimony at A.21-A.23 describes how Strata analyzed all of the constituents in NUREG-1569 Table 2.7.3-1 except for two minor differences for consistency with State of Wyoming guidelines. Further, my initial testimony at A.30-A.31 (Ex. SEI005 at 14-15) describes how the application was prepared to comply with Regulatory Guide 4.14 and Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) guidelines. It is my testimony that satisfying the applicable NUREG-1569 Section 2 acceptance criteria and provisions of Regulatory Guide 4.14 is the means to demonstrate compliance with the 10 CFR Part 40, Appendix A, Criterion 7 requirement to provide "complete baseline data on a milling site and its environs" and that this was done in the approved Strata license application.

1.2 Background Water Quality for Each Wellfield Will Be Collected Prior to Operations

Q.2. In his initial testimony at A.12, Dr. Abitz states that, "Baseline and background are interchangeable terms when describing water quality in an aquifer that has not been disturbed by human actions." Do you agree with this statement based on your understanding of the terms "baseline" and "background" in the context of groundwater quality sampling at an ISR facility?

A.2. Based on my professional experience, "baseline" typically refers to the groundwater quality within the project area as it exists today, it describes the affected environment. It is not the groundwater quality that existed prior to any anthropogenic influence (i.e., pre-industrial groundwater quality). In Strata's case, it is the groundwater quality that Strata sampled during 2009-2011 as part of the site-wide groundwater quality characterization that was conducted to satisfy NUREG-1569 Section 2 acceptance criteria and WDEQ/LQD guidelines. I agree with the statement by NRC Staff in their initial testimony that "baseline" in this context refers to (Ex. NRC001 at 4, 1st ¶, lines 1-8):

> "pre-licensing, site-characterization groundwater quality information that describes the existing state of groundwater quality in the vicinity of the Ross facility. This information is required to be included in an SEIS by 10 C.F.R. Part 51, Subpart A, Appendix A, 'Affected Environment', and is used by the Staff as the basis for its evaluation in the FSEIS of the current quality of the groundwater that may be impacted by the Ross Project's operation and to qualitatively assess how ISR activities at the site might reasonably affect that groundwater quality."

NUREG-1569 uses the term "baseline" frequently in Section 2 when describing the information that should be included in a license application regarding site-wide characterization of baseline groundwater quality. Examples include (emphasis added):

- "Verify that a sufficient number of **baseline** ground-water samples are collected to provide meaningful statistics, that samples are spaced in time sufficiently to capture temporal variations, and that the chemical constituents and water quality parameters evaluated are sufficient to establish pre-operational water quality, including classes of use." (Ex. SEI007 at 60, review area 2.7.2(4))
- "Reasonably comprehensive chemical and radiochemical analyses of water samples, obtained within and at locations away from the mineralized zone(s), have been made to determine pre-operational **baseline** conditions. **Baseline** water quality should be determined for the mineralized and surrounding aquifers." (Ex. SEI007 at 62, acceptance criterion 2.7.3(4)
- "Table 2.7.3-1. Typical **Baseline** Water Quality Indicators to be Determined During Pre-operational Data Collection" (Ex. SEI007 at 63)
- "The applicant should identify the list of constituents to be sampled for **baseline** concentrations. The list of constituents in Table 2.7.3-1 is accepted by the NRC for *in situ* leach facilities." (Ex. SEI007 at 64, acceptance criterion 2.7.3(4))
- "The licensee has acceptably described the hydrology by providing (i) estimates of the local and regional hydraulic gradients, using potentiometric surface maps with acceptable contour intervals, including the mineralized aquifer and other overlying or underlying aquifers, and the likely consequences to affected populated areas; (ii) hydrologic cross-sections, based on an appropriate number of boreholes; (iii) acceptable comprehensive chemical and radiochemical analyses of

water samples from in and near the mineralized zone(s) that define the pre-operational **baseline** water quality conditions; (iv) all hydraulic parameters used to determine expected operational and restoration performance; and (v) characterization of surface water in the *in situ* leach facility and nearby areas, including presentation of such information on maps." (Ex. SEI007 at 65, 2nd ¶)

NUREG-1569 also uses the term "baseline" in Section 5, but only in the context of evaluating the procedures used to establish post-licensing, pre-operational groundwater quality in future wellfields and excursion monitor wells. Examples include (emphasis added):

- "The staff should review the technical bases and **procedures** for the following components of an effective ground-water and surface-water operational monitoring program: (1) **Well field baseline** water quality monitoring programs (ground-water and surface-water)" (Ex. SEI007 at 134, review area 5.7.8.1(1))
- "The reviewer should determine whether these objectives of the operational monitoring program have been met. To this end, the reviewer should (1) Verify that **procedures** for establishing **baseline** water quality include acceptable sample collection methods, a set of sampled parameters that is appropriate for the site and *in situ* leach extraction method, and collection of sample sets that are sufficient to represent any natural spatial and temporal variations in water quality." (Ex. SEI007 at 134, review procedure 5.7.8.2(1))
- "For each new well field, the applicant's **approach** for establishing **baseline** water quality data is sufficient to (i) define the primary restoration goal of returning each well field to its pre-operational water quality conditions and (ii) provide a standard for determining when an excursion has occurred." (Ex. SEI007 at 136, acceptance criteria 5.7.8.3(1))
- "The applicant has established acceptable **well field baseline sampling programs** including the number and timing of samples, constituents sampled, and appropriate statistical methods to remove outliers." (Ex. SEI007 at 142, last ¶)

In the context of post-licensing, pre-operational groundwater quality, my understanding is that "baseline" and "background" may be used interchangeably such that Commission approved "background" and baseline in this context mean the same thing although "background" is more commonly used. Examples include:

- "To calculate the increase in surety for vertical excursions, an initial estimate of the area contaminated is made. All estimates assume that the entire thickness of the aquifer is contaminated. As characterization of the extent of contamination proceeds, the surety may be increased or decreased, as appropriate. Once the extent of contamination is determined, the area contaminated above **background** is used to calculate the level of surety. When the vertical excursion is cleaned up, the additional surety requirements resulting from the excursion are removed." (Ex. SEI007 at 141-142)

- "Restoration Standards. Hazardous constituents in the ground water shall be restored to the numerical ground water protection standards as required by 10 CFR Part 40, Appendix A, Criterion 5B(5). In submitting any license amendment application requesting review and approval of proposed alternate concentration limits (ACLs) pursuant to Criterion 5B(6), the licensee must also show that it has first made practicable effort to restore the specified hazardous constituents to the **background** or maximum contaminant levels (whichever is greater)." (Ex. SEI015 at 7, license condition 10.6)
- "Establishment of Background Water Quality. Prior to injection of lixiviant in a wellfield, the licensee shall establish **background** water quality data for the ore zone, overlying and underlying aquifers. The **background** water quality sampling shall provide representative baseline data and establish ground water protection standards and excursion monitoring upper control limits, as described in Section 5.7.8 of the approved license application and this license condition." (Ex. SEI015 at 12, license condition 11.3)
- "Ore Zone. To establish a Commission-approved **background** concentration pursuant to Criterion 5B(5)(a) of 10 CFR Part 40 Appendix A, samples shall be collected from production and injection wells at a minimum density of one production or injection well per two acres of wellfield production area …" (Ex. SEI015 at 12, license condition 11.3(A))
- "Sampling and Analyses. Four samples shall be collected from each well to establish **background** levels…" (Ex. SEI015 at 12, license condition 11.3(D))

Q.3. Do you agree with the following statement cited in Dr. Abitz's initial testimony at A.12: "The most important quality of background is that it reflects the historical conditions unaffected by the activities it is designed to be compared to" (Ex. JTI001 at 6, lines 14-15)?

A.3. Given that for an ISR facility "background" typically refers to post-licensing, pre-operational groundwater quality, I agree it is important that it not be affected by ISR activities. That is why Strata is required to determine the background groundwater quality for each wellfield prior to operations. I do not agree that background must reflect "historical conditions" in the context of an ISR facility. For post-licensing, pre-operational groundwater quality, background will reflect the conditions that exist prior to Strata initiating ISR operations.

Q.4. Do you agree with the following statement cited by Dr. Abitz in A.13 of his initial testimony: "High quality background data is the single most important key to a successful statistical groundwater monitoring program, especially for detection monitoring" (Ex. JTI001 at 7, lines 9-10).

A.4. I agree that statistically sound background (i.e., post-licensing, pre-operational) data are vital to successful detection monitoring. However, it is important to clarify that in the context of an ISR facility, "detection monitoring" refers to excursion monitoring, and the statistically sound data that enable excursion detection may not be collected until after license issuance. (See A.13 and A.20 of the initial testimony of Hal Demuth and Errol Lawrence, which provide support for

the conclusion that an ISR applicant is not permitted to install a complete wellfield monitor well network in order to establish Commission-approved background (CAB) and upper control limits (UCLs) for each wellfield prior to license issuance, Ex. SEI026 at 8, 10, 11). Section 5.7.8.1 of the approved license application details the density of wells, number of water quality samples and statistical methods that will be used to establish the background water quality in each wellfield in accordance with NUREG-1569 and WDEQ/LQD guidance (Ex. SEI014C at 234-240). These commitments are enforced by license condition 11.3 (Ex. SEI015 at 12-13), which requires Strata to establish the background concentration in perimeter, overlying and underlying monitor wells that will be used in the excursion monitoring program.

1.3 Perimeter Wells Will Be Used to Establish Background Water Quality Upgradient from Each Wellfield

Q.5. In A.14 of his initial testimony, Dr. Abitz states that "for RCRA and CERCLA sites, baseline or background values … are established for the groundwater horizons by installing wells … *upgradient* of known or suspected contamination zones" (Ex. JTI001 at 7, lines 13-16). In contrast, NRC staff state in their initial testimony at A.1.7 that "we disagree with Drs. Abitz and Larson that the establishment of background values is only viable if those values are established with samples collected from wells hydraulically upgradient of the disturbed area" (Ex. NRC001 at 15, 1st ¶, lines 1-4). Do you agree with NRC staff's conclusion that "upgradient water quality is not necessarily representative of the background water quality in the ISR production zone" (Ex. NRC001 at 15, 1st ¶, lines 15-17)?

A.5. I am not aware of any direct applicability of RCRA and CERCLA regulations and guidance to ISR facilities, and I do not believe that a RCRA-based upgradient/downgradient monitoring approach is directly applicable to an ISR operation where each wellfield is entirely surrounded by a monitoring well network. I agree with NRC staff that an attempt to establish Commission-approved background (CAB) water quality from areas upgradient of the wellfields would not result in water quality that necessarily is representative of conditions in the production zone. That is why NUREG-1569 specifies that CAB should be established using at least one well per four acres of wellfield pattern area (injection/production wellfield area) and not one well per four acres of some area that is upgradient from the wellfield (Ex. SEI007 at 136). In this case, license condition 11.3(A) requires that CAB be established "from production and injection wells at a minimum density of one production or injection well per <u>two acres</u> of wellfield production area" (Ex. SEI015 at 12), which exceeds the minimum guidance in NUREG-1569. I would further add that background water quality will be established for all perimeter monitor wells, some of which will be upgradient from each wellfield.

Q.6. Please respond to the allegation by Dr. Abitz in A.14 of his initial testimony that "NRC Regulatory [Guide] 4.14 (JTI008 at Section 1.1.2, p. 4.14-2) notes that at least one well must be hydrologically upgradient to serve as a source for background samples. There is no such well identified in the FSEIS." (Ex. JTI001 at 7-8)

A.6. It is important to put this statement from Regulatory Guide 4.14 into context. The full quote of the text from Regulatory Guide 4.14 is as follows (Ex. JTI008 at 3, 1st ¶ under Sec. 1.1.2):

> "Samples of ground water should be collected quarterly from at least three sampling wells located hydrologically down gradient from the proposed tailings area, at least three locations near other sides of the tailings area, and one well located hydrologically up gradient from the tailings area (to serve as a background sample)."

First, the guidance applies to "tailings areas," which will not be present at the Ross ISR Project. As noted in the SER (Ex. SEI010 at 113, 2nd ¶ under Sec. 2.6.3.7):

> "Staff agrees that the applicant is not required to follow Regulatory Guide 4.14 groundwater monitoring guidance for tailings impoundments because Strata will not use tailings impoundments …"

Second, it is important to point out that this specification from Regulatory Guide 4.14 is under a subsection of Section 1.1, which is titled "Preoperational Sampling Program." It should be clear from the title that these samples should be collected prior to operations as opposed to prior to license issuance.

Third, if the guidance in Regulatory Guide 4.14 for "tailings areas" is applied to the ISR wellfields, then this statement from the guidance document would be interpreted to specify that preoperational groundwater quality samples should be collected from three wells downgradient from each wellfield, three side-gradient wells, and one upgradient well. Since a ring of perimeter monitor wells will be constructed around each wellfield, it is clear that preoperational sampling will occur in areas upgradient, downgradient, and side-gradient from each ISR wellfield.

Finally, it is important to point out that in the context of the planned wellfield areas, pre-license baseline groundwater quality was sampled at the 34-7OZ well, which is hydrologically upgradient from all planned wellfield areas (see Ex. SEI019).

1.4 Detailed Statistical Analysis Is Not Required for Site-wide Baseline Groundwater Quality Characterization

Q.7. In A.14 and A.24 of Dr. Abitz's initial testimony, he mentions that EPA guidance recommends a minimum of 8 to 10 independent samples before running statistical tests (Ex. JTI001 at 8, lines 3-5; Ex. JTI001 at 21, lines 10-11). Further, in A.26 of his initial testimony, Dr. Abitz states that "there is no mention [in the FSEIS] of the proper statistical methods for evaluating individual wells prior to grouping them and calculating an average or range for the aquifer horizon" (Ex. JTI001 at 22-23). Please comment on these statements.

A.7. Initially, I would point out that establishing statistically sound background water quality for each ISR wellfield is something that takes place after license issuance and prior to operations. As mentioned in A.4 of my rebuttal testimony, Strata's procedures for establishing background water quality for each well field are described in Section 5.7.8.1 of the approved license

application, enforced by license condition 11.3, and consistent with NUREG-1569 and WDEQ/LQD guidance. Please see also A.8 of my initial testimony, which describes where these procedures are described in the FSEIS.

With respect to the number of samples that will be used to establish background water quality for each wellfield, Strata has committed to collecting four samples from each well. I am not aware of any NRC or WDEQ/LQD regulatory guidance that specifies that more than four samples should be collected. Examples of regulatory guidance for ISR facilities that support the use of four samples to establish background water quality include (emphasis added):

- "For each new well field, the applicant's approach for establishing baseline water quality data is sufficient to (i) define the primary restoration goal of returning each well field to its pre-operational water quality conditions and (ii) provide a standard for determining when an excursion has occurred … **At least four independent sets of samples should be collected**, with adequate time between sets to represent any pre-operational temporal variations." (NUREG-1569 acceptance criterion 5.7.8.3(1), Ex. SEI007 at 136)
- "For more detailed mining unit sampling, **all monitoring wells per mining unit should be sampled four times** (minimum of 2 weeks between samplings). Wellfield wells (injection and production) should be sampled four times (minimum of 2 weeks between samplings) during mine unit baseline characterization at a recommended density of 1 well per 4 acres of mining unit." (WDEQ/LQD Guideline No. 4, Reference Document 10 – Premining Water Quality and Quantity Sampling, Ex. SEI012B at 174).

In terms of site characterization, I am unaware of any regulatory basis for performing detailed statistical analysis beyond providing the sample results from site characterization monitoring (including regional baseline monitor wells installed by Strata and private water supply wells) and listing the range of sample results for each parameter in order to generally describe the groundwater quality characteristics in each relevant aquifer. I agree with the following statements by NRC staff in A.1.8 of their initial testimony (Ex. NRC001 at 21-22):

> "The purpose and use of the data in the FSEIS is to characterize the Ross Project's water quality and to support the Staff's assessment of the project's potential impacts. The purpose of this data is not to establish a value of central tendency (such as mean or median) with a specific confidence level that could be used to determine whether the constituents meet or do not meet established regulatory limits. The limited statistical data (i.e. the mean, ranges, and number of samples) presented in the FSEIS is sufficient for the Staff to conduct the qualitative and descriptive evaluation required for the FSEIS's characterization of groundwater at the site and evaluation of the project's potential impacts."

The approved license application generally presents the site-wide groundwater quality characterization data as a range of values grouped only according to aquifer or well use. For example, Table 2.7-29 summarizes the regional groundwater quality in the cluster wells for the

SA, SM, OZ and DM monitoring zones as a range of each parameter (Ex. SEI014A at 267-268). Further, Tables 2.7-31, 2.7-34, 2.7-37 and 2.7-40 provide sample results from eight quarters of monitoring for each cluster well with no attempt to statistically summarize the data (Ex. SEI014A at 270, 273-274, 277, 280-281). In addition, Tables 2.7-45, 2.7-46 and 2.7-49 summarize the range of concentrations for each parameter and in each well for the private water supply wells (Ex. SEI014A at 286-287, 290). In the case of the private wells, the results are grouped by use (industrial, stock or domestic) rather than by aquifer. The text in Sections 2.7.5.2.2 and 2.7.5.2.3 of the approved license application similarly describes general traits in the groundwater quality across the site without presenting statistical summaries or grouping wells other than into their respective aquifers or well use. For example, Sec. 2.7.3.5.2.2 states that, "The major ion chemistry and TDS concentrations of each aquifer provide a general indication of water quality within each zone" (Ex. SEI014A at 211). No representation is made that the data provided in the license application encompass the full range of concentrations that may be observed in each aquifer within the license area, nor are the data provided to form a statistically sound basis for future excursion monitoring. They are provided instead to generally characterize the baseline groundwater quality in each of the four aquifers that may be impacted by ISR operations in accordance with applicable regulatory guidance including NUREG-1569 Section 2.

Similarly, the FSEIS does not indicate that the groundwater quality data contained in Section 3.5.3.3 and Appendix C represent a statistically sound data set that is adequate for detection monitoring or that is adequate to conclude that the groundwater quality in any aquifer exceeds a certain MCL across the license area. For example, the FSEIS states, "The maximum, average, and minimum values of the chemical constituents **measured in ground water from wells installed in each aquifer** (SA, SM, OZ, and DM) are presented in Table 3.6" (Ex. SEI009A at 183, 1st ¶, emphasis added). This is consistent with the license application, which presents the range of concentrations measured in each well and each aquifer as opposed to representing that a statistical analysis has been performed to state with a specified level of confidence that the water quality across the license area falls within a certain range. Likewise, the FSEIS states, "Table 3.8 presents the WDEQ's and the U.S. Environmental Protection Agency's (EPA's) water-quality standards for constituents that were found to exceed the standards in the Applicant's pre-licensing, site-characterization data" (Ex. SEI009A at 183). Again, this simply states that some EPA MCLs were exceeded in some samples. Or, as stated by NRC staff in their initial testimony (Ex. NRC001 at 27):

> "the information gathered and assessed by the Staff in the FSEIS was sufficient to find that some levels of uranium and radium-226 in the ore zone exceeded the EPA's MCLs for these constituents."

It has been my experience that this type of analysis is consistent with evaluating the general characteristics of the affected environment in an FSEIS. I personally am not aware of any EIS document – including the several FSEIS's recently issued by NRC staff and other EIS's for oil/gas development and coal mine expansions in Wyoming that I have reviewed – that provides

detailed statistical evaluation of the site-wide, baseline groundwater quality in all potentially affected aquifers, nor am I aware of any regulatory requirement to do so.

Q.8. You mention that you have reviewed other recent NEPA documents relating to energy development in the Powder River Basin of Wyoming to develop a comparison with the Ross ISR Project in terms of the level of detail provided for characterizing groundwater quality. How do the data collection effort for the Ross ISR Project and its NEPA evaluation in the FSEIS compare with the baseline groundwater quality characterization conducted in support of other similar NEPA actions?

A.8. In general, the amount of site-specific groundwater quality analysis in other similar NEPA actions pales in comparison to the level of characterization conducted by Strata and the NRC staff for Ross as well as other recent ISR NEPA actions. In fact, specific groundwater quality results similar to that found in Appendix C of the FSEIS (Ex. SEI009B at 3) are not included with the massive Powder River Basin (PRB) Oil and Gas (O&G) FEIS nor the three large coal expansion NEPA documents reviewed during preparation of this testimony (see citations provided with the table below). I believe this is significant because groundwater quality was specifically mentioned by the public as a concern during scoping for the three coal-mine expansion actions. In response, the BLM provided the water quality characterization for the aquifers of concern that included basic water type (i.e. major cations and anions) along with the minimum, maximum, median or average concentration of TDS for each aquifer (see Ex. SEI051 at 171-172; SEI052 at 179-188 and SEI053 at 164-175). Similarly, the BLM in the PRB O&G FSEIS, provided basic water composition, values for the minimum, maximum and average TDS along with a comparison to EPA MCLs for trace elements in the Fort Union Formation in characterizing the water quality of the aquifers of concern (see SEI050 at 7-14).

As can be seen in Table 1 below, the density of monitor wells installed for pre-license characterization for other ISR projects and for Ross, specifically, significantly exceeds the density used for similar NEPA evaluations (EISs) conducted by the BLM for O&G and coal mine expansion projects within the PRB. All of these undertakings included scoping, preparing draft documents and making these available for public comment and final determination of impacts in a final EIS. Undoubtedly one of the purposes of these EISs was to "disclose to the agency and the public the actual baseline conditions" within each project area, quoting Dr. Abitz (Ex. JTI001 at 10, line 17). With this in mind, it is clear to me that Strata and other ISR applicants have provided sufficient if not excessive groundwater quality data in support of the NEPA review and subsequent Record of Decision. This is shown in the table below, where the data density used to characterize groundwater quality in the Ross ISR Project ranges from more than 6 times to more than 1,000 times the data density used to evaluate baseline groundwater quality in O&G and coal lease EISs in the PRB.

Table 1. Comparison of Baseline Water Characterization Wells at Ross and Other Recent EIS Efforts

NEPA Document	Data Source	Purpose	Lead Federal Agency	Wells Used to Characterize Baseline Water Quality			Project Area (mi^2)	Well Density (wells/mi^2)
				No. Existing Wells inside Project Area	No. New Wells Installed	Total Wells Evaluated inside Project Area		
FEIS for PRB O&G	1	Oil and Gas	BLM	132	0	132	12,361	0.01
FEIS for the West Antelope II Coal Lease Application	2	Coal	BLM	11	0	11	6.4	1.7
FEIS for the Eagle Butte West Coal Lease Application	3	Coal	BLM	4	0	4	2.2	1.8
FEIS for the Maysdorf Coal Lease Application	4	Coal	BLM	0	0	0	3.5	0.0
Ross FSEIS	5	**Uranium**	**NRC**	**3**	**28**	**31**	**2.7**	**11.5**
Moore Ranch FSEIS	6	Uranium	NRC	7[a]	25	25	11.1	2.3
Nichols Ranch FSEIS	7	Uranium	NRC	10[b]	10	21	1.8	12.0
Lost Creek FSEIS	8	Uranium	NRC	12[a]	27	27	6.6	4.1

Notes:

[a] Not used for baseline water quality, used only for comparison.

[b] Not all wells used for baseline water quality.

Data Sources:

1 FEIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project Chapter 3, Exhibit SEI050 at 16.

2 FEIS for the West Antelope II Coal Lease Application, WYW163340, Volume 1, Exhibit SEI051 at 161-162.

3 FEIS for the Eagle Butte West Coal Lease Application, WYW155132, Exhibit SEI052 at 182.

4 FEIS for the Maysdorf Coal Lease Application, WYW154432, Exhibit SEI053 at 170.

5 Ross ISR Project Environmental Report Vol. 1, December 2010 ADAMS Accession ML110130342.

6 Moore Ranch Technical Report, Revised May 2010 ADAMS Accession ML12074A126.

7 Nichols Ranch Technical Report, Revised July 2010 ADAMS Accession ML102650539.

8 Lost Creek Technical Report, Revised April 2010, ADAMS Accession ML102420209.

Q.9. Do you agree with the statement by Dr. Abitz in A.16 of his initial testimony that, "The FSEIS provides that two separate efforts to evaluate baseline water quality data will occur, one pre-license and another post-license, with almost all the data collections and the actual setting of baselines performed *post*-license" (Ex. JTI001 at 9, lines 1-3)?

A.9. I agree that there are two phases to collecting baseline or background groundwater quality data for an ISR facility and that these two phases are described in the FSEIS for the Ross ISR Project. Please refer to A.5 through A.11 of my initial testimony, which describes how the first phase involves demonstrating the adequacy of site characterization baseline groundwater quality and the procedures for establishing Commission-approved background (CAB) water quality for each wellfield, and the second phase involves collecting CAB for each wellfield and establishing target restoration values (TRVs) and upper control limits (UCLs) (Ex. SEI005 at 4-7).

However, I strongly disagree that "almost all the data collections" for baseline groundwater quality are performed after the license is issued. My initial testimony at A.12 through A.34 describes how Strata conducted an extensive site-wide baseline groundwater quality characterization program in accordance with applicable regulations (Ex. SEI005 at 7-17). This included constructing a regional baseline monitoring well network consisting of 28 monitor wells within the license boundary and sampling these monitor wells along with 29 existing water supply wells both inside and outside of the license boundary for an extensive list of parameters. My initial testimony describes how the site-wide baseline groundwater characterization was performed in accordance with applicable regulations and guidance documents, including 10 CFR Part 40, Appendix A, Criterion 7, NUREG-1569 Section 2, Regulatory Guide 4.14, and WDEQ/LQD Guideline 4 (Ex. SEI012A and SEI012B).

I can find no specific examples where Dr. Abitz challenges the adequacy of the site-wide baseline groundwater quality characterization with respect to specific NRC or WDEQ/LQD guidance or regulations. The only possible exception is his implication in A.32 that Strata has generally failed to comply with the 10 CFR 40, Appendix A, Criterion 7 requirement to provide "complete baseline data on a milling site and its environs" (JTI001 at 35, lines 11-13). In this case, my initial testimony at A.34 presents evidence that the license application complies with Criterion 7 since NUREG-1569 is the primary NRC guidance document for ISR facilities to comply with 10 CFR Part 40, Appendix A criteria and since Strata has demonstrated conformance NUREG-1569 Section 2 acceptance criteria for site-wide baseline groundwater quality characterization. I also have found no instances where Dr. Abitz specifically has challenged the procedures described in the license application, approved license and FSEIS to establish wellfield-specific background water quality prior to operating each wellfield.

1.6 OZ Aquifer Baseline Groundwater Quality Data Are Not Biased

Q.10. Please comment on the allegation by Dr. Abitz in A.24 of his initial testimony that the baseline groundwater quality data collected from the OZ aquifer in Strata's monitoring well network were biased since the wells are "screened only through the part of the ore zone (OZ)

water horizon that is in contact with the ore zone, rather than the entire column of water in the OZ sand interval" (Ex. JTI001 at 21, lines 9-10).

A.10. I do not agree with this allegation; in fact, it is more likely that the water quality from the OZ aquifer sampled in the regional baseline monitor wells is actually diluted compared to the water quality in the mineralized zone since these wells all were screened across intervals larger than the average mineralized zone thickness. The average mineralized intercept thickness in the license area is 8.9 feet as stated in Ex. SEI014C at 24. In contrast, the screened interval in the six OZ aquifer cluster wells ranged from 30 to 110 feet and averaged 72 feet (see Ex. SEI014A at 251-252). Therefore, the screened intervals were about 3 to 12 times larger than the average mineralized zone thickness. This likely had the effect of diluting some of the constituents such as uranium and radium-226 as compared to future wells that will be used to establish CAB, which will be production and injection wells screened discretely in the mineralized zone. It is also clear in the gamma logs from the cluster wells (see Ex. SEI014A at 310-315) that only two wells (14-18OZ and 12-18OZ) intercepted uranium mineralization that met economic cut-offs. Briefly, the natural gamma measured at the clusters is depicted on the far left side of the graph for each well. Natural measurements of gamma that met economic cut-offs (as applied when the wells were installed) are indicated by black shading (see Ex. SEI014A at 313, 315). This shading indicates that the first-run of gamma exceeded the range of the graph; in these cases another run was recorded at a higher range. Since only two of the cluster well groups had economic uranium intercepts and the other four did not, there was clearly no effort to bias the measured concentrations of uranium or radium by screening the wells in the portions of the OZ aquifer that recorded the highest natural gamma (and hence had the highest concentration of uranium) as alleged by Dr. Abitz.

As importantly, due to the nature of the completions used in the OZ wells at the clusters, Strata did not propose to use the wells for compliance purposes to develop Commission-approved background (CAB). Therefore, no target restoration values (TRVs) will be calculated from water samples collected from these wells, further making the numerous comparisons to the EPA MCL for uranium irrelevant to this proceeding. On a similar note, in my experience, I cannot envision a scenario where NRC or WDEQ/LQD staff would compare pre-license, site characterization groundwater quality data with results from active restoration or stability monitoring, since such comparison would be meaningless given that the establishment of CAB would be specific to each wellfield and supported by robust statistical methods.

Q.11. Please respond to the allegation by Dr. Abitz in A.25 of his initial testimony that "NRC Guidance (NRC013 at 5-43) also recognizes this bias and the NRC states that fully screened intervals are more accurate in their representation of the water quality that a user of the water will encounter" (Ex. JTI001 at 22, lines 8-10).

A.11. I assume Dr. Abitz is referring to NUREG-1569, which is Ex. JTI007 or Ex. SEI007 and not Ex. NRC013, which is NUREG-1748. NUREG-1569 contains a page 5-43 that deals with fully screened intervals for monitor wells. While NUREG-1748 does not contain a page 5-43,

Page 5-43, which is in, NUREG-1569 (Ex. SEI007 at 140) discusses screened intervals for perimeter monitor wells and states the following:

> "Partially screened monitor wells only sample the zone of extraction within an aquifer. These wells might miss some excursions, but would suffer less from dilution effects than fully screened wells. For most situations the staff favors fully screened monitor wells. Fully screened monitor wells would assure that excursions will eventually be detected, have the advantage of more accurately representing the water quality that a ground-water user is likely to experience, and do not suffer from the uncertainty of predicting the completion intervals of injection and production wells that have not yet been drilled."

As described in A.10, the regional baseline monitor wells in the OZ aquifer were screened in intervals larger than the average mineralized thickness and therefore are anticipated to represent water quality from a larger interval than future production and injection wells screened discretely in the mineralized zone. Therefore, no bias has been introduced with respect to the baseline groundwater quality in the mineralized zone. With respect to the perimeter monitor wells, Strata has committed to following the NUREG-1569 guidance to install fully screened monitor wells. This commitment is found in Ex. SEI014C at 238 (1st ¶, lines 2-4):

> "The perimeter monitor wells will fully penetrate the lower Lance and Upper Fox Hills mineralized sandstones of the OZ interval."

1.7 Regional Cluster Wells Were Properly Located

Q.12. Please respond to the allegation by Dr. Abitz in A.24 and A.25 of his initial testimony that the regional cluster wells are "improperly located" and should have been at "random locations across the proposed mining area" (Ex. JTI001 at 21, lines 8, 12, 19).

A.12. I described the justification for the regional cluster well locations in A.30 of my initial testimony (Ex. SEI005 at 14-15). The number and location of cluster wells were based on a number of factors including WDEQ/LQD guidelines (including at least one production zone well per square mile), proximity to existing drilling data, sufficient spatial distribution for development of potentiometric data, and landowner considerations. I am not aware of any regulations or guidelines for uranium ISR projects that specify that regional cluster wells should be located at "random locations across the proposed mining areas."

1.8 There Is No Need to Conclude That the Water Quality in the OZ Aquifer Exceeds EPA MCLs

Q.13. Do you agree with the statement by Dr. Abitz in A.33 of his initial testimony that "an industry-standard, statistical sampling approach … with a stated level of decision confidence, is the only valid scientific method available to Strata if they wish to conclude that the water quality in the ore zone does not meet the EPA drinking-water MCLs for uranium and radium-226. Indeed, NRC guidance is to place one baseline well in every four acres [citing NUREG-1569 page 5-39]" (Ex. JTI001 at 36, lines 2-8)?

A.13. No. I do not agree with this statement for two reasons. First, it is based on an incorrect assumption: that a license applicant must conclude that the water quality in the ore zone exceeds EPA MCLs in order to permit/license a project. In fact, Strata's approved aquifer exemption from EPA and WDEQ makes no mention of whether the baseline groundwater quality exceeds EPA MCLs (Ex. SEI034 at 2):

> "Based on our review of the information provided, the EPA concurs with the WDEQ's conclusions concerning the aquifer exemption criteria listed below:
>
> - it does not currently serve as a source of drinking water (40 CFR §146.4(a)), and
> - it is mineral producing and can be demonstrated to contain minerals that, considering their quantity and location, are expected to be commercially producible (40 CFR §146.4(b)(1).)"

Second, Dr. Abitz incorrectly cites a criterion from NUREG-1569 Section 5, which is titled "Operations," when stating that "NRC guidance is to place one baseline well in every four acres." His citation is to page 5-39, which specifies that CAB should be established using at least one well per four acres of wellfield pattern area (refer to A.5 of this rebuttal testimony, which describes how Strata will exceed this criterion by using at least one well per two acres of wellfield pattern area). This has nothing to do with characterizing the site-wide groundwater quality prior to obtaining a license, the criteria for which are provided in NUREG-1569 Section 2.

Q.14. So it is clear that MCLs for uranium and radium-226 were not part of the aquifer reclassification and exemption criteria. Nevertheless, in the approved license application and FSEIS, Strata and NRC compared measurements of water quality from the regional baseline wells and private water supply wells against EPA MCLs, secondary limits and the WDEQ class of use standards. Can you explain why this was done?

A.14. Yes. For the approved license application these comparisons were included for two reasons. First, they were done in accordance with guidance in NUREG-1569 which states, "All water quality data submitted to NRC should … [b]e submitted in tabular form with the appropriate standards (i.e., EPA national interim primary drinking water regulations, livestock standards … [etc.] listed in the same table, for ease of comparison" (Ex. SEI007 at 71). Second, EPA MCLs, secondary standards and WDEQ class of use standards provided readily identifiable benchmarks for the public and regulators with which to compare the quality of water for a variety of uses.

Q.15. Without going into too much detail, can you discuss the results of these comparisons that might be relevant to this proceeding?

A.15. Yes. Tables in the ER compare the water quality measured in each aquifer at the regional baseline wells against the WDEQ class of use standards and EPA MCLs and secondary standards. Other tables also provide a similar comparison for the results from private water

supply wells within and surrounding the license area (see Ex. SEI016A at 334-355). Some noteworthy results in these tabulations include:

- The water quality measured in four private water supply wells (CSWELL01, DWWELL01, P144030W, and P31770W) exceeded the EPA MCL for gross alpha, one private well (P31770W) exceeded the MCL for uranium and one private well (P42868W) exceeded the MCL for arsenic (Ex. SEI016A at 355).
- The water quality measured in the regional baseline cluster wells in the host or OZ aquifer indicates that the water quality is only suitable for industrial uses based on exceedances of the WDEQ class of use standards for ammonia, TDS, sulfate, manganese, radium-226 & 228, and/or gross alpha (Class I or domestic standards); TDS, sulfate, radium-226 & 228, and/or gross alpha (Class II or irrigation standards); and radium-226 & 228 and/or gross alpha (Class III or livestock standards) (Ex. SEI016A at 342).
- The water quality measured in the regional cluster wells completed in the overlying or SM interval indicates that it is suitable for livestock (Ex. SEI016A at 339). Interestingly, despite Drs. Abitz's and Larson's claims that there are "thousands of unplugged boreholes" (e.g., JTI001 at 51, lines 15-16) and claims regarding the mobility of uranium, no measurements of uranium, radium-226 or gross alpha in the SM wells exceeded EPA MCLs (Ex. SEI016A at 340). In fact, the majority of water quality results for these parameters were slightly above or at the detection limits.
- As interesting, the water quality measured from the cluster wells completed in the DM interval indicate that WDEQ likely would classify this water as livestock or industrial use water due to high concentrations of chloride (Ex. SEI016A at 345). Again, despite being known as a conservative ion and despite allegations that there are "thousands of unplugged boreholes", the chloride concentration in the overlying OZ aquifer in no way resembles that in the DM interval. This is illustrated in Table 3.6 in the FSEIS, which shows that the chloride concentration in the DM interval ranged from 139-818 mg/L, while the chloride concentration in the OZ aquifer ranged from 3-11 mg/L (Ex. SEI009A at 184).

2.0 CONTENTION 2 - ALLEGED FAILURE OF THE FSEIS TO ANALYZE THE ENVIRONMENTAL IMPACTS THAT WILL OCCUR IF THE APPLICANT CANNOT RESTORE GROUNDWATER TO PRIMARY OR SECONDARY LIMITS

2.1 The Storymap and Brief Analysis of Restoration and Excursion Data from the Christensen Ranch Mine Are Irrelevant to the Ross ISR Project

Q.16. In A.25 through A.60 of his initial testimony, Dr. Larson describes an ArcGIS-based depiction of the Christensen Ranch portion of the Willow Creek Project, which he refers to as a "Storymap." How do you respond to this testimony by Dr. Larson?

A.16. I worked at Christensen Ranch (under COGEMA ownership) and have subsequently provided consulting services to Uranium One on projects at this facility (now part of the Willow Creek Project). As I read Dr. Larson's testimony I noted a number of items that concerned me. These are summarized as follows:

1. To my knowledge, NRC has not yet approved the restoration of Christensen Ranch Mine Units 2-6, so the entire exercise seems premature, since it has not been established that restoration is complete until issuance of regulatory approval.
2. The frequent comparison of uranium concentrations to the EPA primary drinking water standard (MCL) does not appear relevant, since affected portions of the Wasatch Formation were reclassified and exempted from protection as an underground source of drinking water (USDW) under the Safe Drinking Water Act.
3. I was unable to confirm (or even find) the total amount of groundwater affected from ISL mining at Christensen Ranch Mine Units 2-6 (JTI003 at 42, 3rd ¶) in the surety estimate Dr. Larson referenced (Ex. JTI038 at 21), but regardless of the amount, a good portion of it was treated using reverse osmosis and re-injected back into the Wasatch Formation during active restoration.
4. Dr. Larson is mistaken in A.60; when discussing Mine Unit 4 he states "… the same restoration process was followed as proposed in the Ross FSEIS." (Ex. JTI003 at 42). Strata did not propose nor did the safety and environmental analyses evaluate the use of chemical reductants, which were used by COGEMA in Mine Unit 4.
5. In A.60 (and A.15) Dr. Larson is critical of the NRC Staff in the FSEIS for evaluating impacts from an estimated 8-month active restoration schedule when it apparently took much longer at Mine Unit 4 at Christensen Ranch (JTI003 at 43, 2nd ¶). Dr. Larson states "Similar or worse, groundwater degradation at the Ross project is virtually inevitable and such impacts have not been meaningfully analyzed by the FSEIS" (Ex. JTI001 at 43, last ¶). Dr. Larson is clearly not familiar with license condition 10.6 of SUA-1601 (Ex. SEI015 at 7-8), which firmly describes what needs to be done to restore the groundwater and that the restoration must be done until standards are achieved regardless of how long it takes.
6. In regard to excursions at Christensen Ranch as discussed in A.81, Dr. Larson fails to recognize that license condition 10.7 of SUA-1601 (Ex. SEI015 at 8) requires Strata to maintain a net inward hydraulic gradient as measured at the perimeter monitor well ring starting when injection begins until stabilization (post active restoration). This means that in addition to the period of active ISR, a net inward gradient must be maintained during all phases of restoration until stabilization is reached, thereby significantly reducing the potential for impacts to the adjacent, non-exempt portions of the aquifer. Furthermore, the examples of the excursions provided in the "Storymaps" (Ex. JTI003 at A.77 and A.81) seem to indicate that the perimeter and overlying/underlying monitor well systems are working as designed at these facilities. In other words, the monitor well networks

detected the excursions, which are not themselves environmental impacts but merely warnings of potential wellfield imbalance, and the excursions were corrected.

3.0 CONTENTION 3 - ALLEGED FAILURE OF THE FSEIS TO INCLUDE ADEQUATE HYDROLOGICAL INFORMATION TO DEMONSTRATE SEI'S ABILITY TO CONTAIN FLUID MIGRATION.

3.1 Adequate Justification Is Provided to Exclude Uranium from the List of Excursion Monitoring Parameters

Q.17. In A.38 through A.40 of his initial testimony, Dr. Abitz argues that uranium should be used as an excursion parameter (Ex. JTI001 at 41-45). More specifically, he argues that because the FSEIS "is silent on the extent to which mining activities will destroy the reducing geochemical conditions in the exempted aquifer … there is no logical basis to omit uranium as an excursion indicator, as the levels of uranium in the lixiviant are generally three to four orders of magnitude greater than true baseline; and increase in chloride, alkalinity and TDS in the aquifer will be less than one or two orders of magnitude" (Ex. JT1001 at 43, lines 3-4 and 10-13). How do you respond to this allegation?

A.17. This argument is flawed for a variety of reasons. First, as stated by NRC Staff in their initial testimony at A.3.2.10, "the rate of uranium transport in the aquifer could be slowed by adsorption and precipitation; and therefore, uranium is not a leading indicator of an excursion" (Ex. NRC001 at 72-73). The amount that the uranium is slowed by adsorption and precipitation is less important than the fact that it is slowed by these processes, whereas the approved excursion indicators (chloride, alkalinity and TDS) are not. I agree with NRC Staff's conclusion in Ex. NRC001 at 72:

> "But the point is not whether uranium may increase in the groundwater from an excursion. The point is which parameter should be monitored as a leading indicator to identify the excursion most quickly."

Second, excursion monitoring does not take place within the actual mineralized zone, where most of the oxidation will occur during ISR. It takes place in perimeter monitoring areas that are 400 feet away from the production and injection wells and in overlying and underlying aquifers where no lixiviant injection will occur. Therefore, the extent to which ISR alters geochemical conditions within the wellfield has little bearing on whether uranium will reach the monitor wells outside of the wellfield area.

Third, Strata has committed to collecting background water quality data in every monitor well for a long list of parameters that includes uranium. As noted in Ex. SEI014C at 239, samples will be analyzed for all applicable WDEQ/LQD Guideline 8 parameters and all parameters in NUREG-1569 Table 2.7.3-1.

Finally, Strata's WDEQ/LQD Permit to Mine will require analysis for uranium and a number of other parameters if an excursion is not controlled within 30 days. Reference Ex. SEI012B at 27, item 5(b):

> "If the excursion is not controlled within 30 days after confirmation of the excursion, a suite of samples should be analyzed for the parameters listed in LQD R&R Chapter 11. At the time UCLs are no longer exceeded, a suite of samples should again be analyzed for those parameters."

WDEQ/LQD R&R Chapter 11 refers to Chapter 11 of the Noncoal Rules and Regulations (Ex. SEI011). Section 12(d)(i) of R&R Chapter 11 requires (Ex. SEI011 at 31, emphasis added):

> "**If an excursion is not controlled within 30 days following confirmation of the excursion, a sample must be collected from each of the affected monitoring wells and analyzed for the following parameters**: Ammonia; Antimony; Arsenic; Barium; Beryllium; Bicarbonate; Boron; Cadmium; Calcium; Carbonate; Chloride; Chromium; Conductivity; Copper; Fluoride; Gross Alpha; Gross Beta; Iron; Lead; Magnesium; Manganese; Mercury; Molybdenum; Nitrate; Nitrate + Nitrite; pH; Potassium; Selenium; Sodium; Sulfate; Radium-226 and 228; Thallium; Total Dissolved Solids; **Uranium**; Vanadium; and Zinc, unless the Administrator determines a specific parameter is not likely to occur as a result of the in situ operation."

Therefore, Strata will be required to establish the background uranium concentration for uranium in each monitor well and will be required to sample for uranium and dozens of other parameters in the event that an excursion is not corrected within 30 days.

3.2 The Lack of Mixing between the OZ and SM Aquifers Supports the Conclusion in the FSEIS That There Is Adequate Confinement to Safely Conduct ISR Operations

Q.18. In A.44 and A.45 of his initial testimony, Dr. Abitz claims that "…communication between the SM and OZ horizons is evident in the 24-hour pump test data from well 12-18OZ and the water-quality results for sodium and sulfate" (Ex. JTI001 at 49, lines 21-22). He states that this assertion is supported by water quality results from 2010 for the SM and OZ intervals along with results from water supply well 22X-19. How do you respond to this allegation?

A.18. I disagree with Dr. Abitz for several reasons. First, the figure plotting sulfate and sodium concentrations measured in the cluster wells targeting the SM and OZ intervals clearly shows two distinct groups of samples: one group of samples for the SM and one group of samples for the OZ aquifer. As observed by Dr. Abitz, the OZ aquifer tends to have higher concentrations of both sulfate and sodium with the exception of two samples from well 12-18OZ. In my opinion, two samples from one well and an interpreted "linear trace" between groups does not mean that the entire overlying confining unit has been compromised and that "…mixing of the groundwater

from these two horizons is clearly indicated…" as stated by Dr. Abitz (Ex. JTI001 at 50, lines 3-4).

Second, as noted in A.3.2.8 of NRC Staff's initial testimony (Ex. NRC001 at 67-69), Dr. Abitz is incorrect about the completion of well 22X-19 when he states that "it is also known that 22x-19 is screened through the SM and OZ zones" (Ex. JTI001 at 51, line 13). This well withdraws water from the OZ and DM intervals, not the SM interval as alleged by Dr. Abitz; therefore, the plotted water quality from 22X-19 in no way supports Dr. Abitz's mixing hypothesis. The approved license application (Ex. SEI014A at 201 and 220) discusses the completion interval for this industrial well and acknowledges that withdrawals from 22X-19 have decreased the water levels in the DM interval.

Third, his claim that communication is evident in the 24-hour pump test data at the 12-18 cluster is not supported with specific evidence in his testimony and, further, it is simply not the case. NRC Staff note this also in their initial testimony at A.3.2.7 (Ex. NRC001 at 67), although, for clarification, nearly **97 hours** (one 72.6-hour test and one 24-hour test) of pumping occurred at the 12-18 cluster with **no response** in either the overlying SM interval or underlying DM interval (see Ex. SEI014G at 148). It is important to note that all of the wells were equipped with data logging pressure transducers that are highly accurate. As importantly, 55 exploration holes were re-entered and re-abandoned with cement surrounding the 12-18 cluster, thereby demonstrating that the historical drill holes can be found, re-entered, abandoned and geologic integrity confirmed through "much longer pump test intervals" as Dr. Abitz claims are necessary (Ex. JTI001 at 51, lines 17-18). Strata's commitments for hole plugging and the reinforcement of these commitments through license conditions are found in both the license (LC 10.12 in Ex. SEI015 at 9-10) and in the approved license application (Ex. SEI014C at 40-42 and 239).

3.3 Baseline Water Quality and Adequate Groundwater Fluid Migration Information Have Been Provided to Satisfy NEPA and Demonstrate That Water Resources Will Be Protected

Q.19. In A.47 of his initial testimony, Dr. Abitz discusses the importance of groundwater as a source of drinking water to western communities, the State of Wyoming and the Nation (Ex. JTI001 at 54-55). Similarly, in A.86 through A.89 of his initial testimony, Dr. Larson discusses groundwater as a source of drinking water, potential degradation and treatment of groundwater resources for municipal supply, and potential groundwater effects from the Lance District projects (Ex. JTI003 at 66-69). What is your response to these concluding sections of their respective testimonies?

A.19. I have some reservations about this testimony from both Dr. Abitz and Dr. Larson. First, consumptive use of groundwater and cumulative impacts of the 'Lance District Projects' were litigated previously in this process and as far as I know are no longer part of the currently admitted contentions. While I appreciate their concern for our water supplies, these arguments lack technical merit. It is important to remember that since both surface and groundwater are the property of the State of Wyoming, both quality and quantity are highly regulated by the state.

Second, both experts seem to forget or neglect to acknowledge that in order to conduct uranium ISR, an aquifer must be reclassified and ultimately exempted from protection as a USDW under the Safe Drinking Water Act. As has been discussed previously, one of the key bases for this exemption is that it does not currently serve as a source of drinking water. Third, and to be a little more specific, in A.87 of his initial testimony, Dr. Larsen uses the Gillette Madison Pipeline Project as an example of the potential costs to meeting increasing water demands in the region. In my mind, the $217.6 million dollar price tag seems high, particularly given that the Lance and Fox Hills aquifers are present under Gillette and that ostensibly they could have saved a lot of money by targeting these aquifers in lieu of the Madison Formation currently being developed to the east of the city. But the City of Gillette selected the Madison Formation and associated conveyance costs over the Lance and Fox Hills aquifers, apparently based either on water quality and/or water quantity needs. In any event, NRC Staff in the FSEIS evaluated cumulative impacts to a level well beyond previous evaluations for other ISR facilities, including potential impacts to the City of Gillette's Madison Formation wellfield located in Crook County and determined them to be SMALL (Ex. SEI009A at 424-425).

4.0 REFERENCES

Energy Metals Corporation US, 2010, Moore Ranch Technical Report, Revised May 2010, NRC ADAMS Accession No. ML12074A126.

Lost Creek, Inc., 2010, Lost Creek Technical Report, Revised April 2010, NRC ADAMS Accession No. ML102420209.

Uranerz Energy Corporation, 2010, Text Revisions to the Open Issues to the Safety Evaluation Report for the Nichols Ranch ISR Project License Application, NRC ADAMS Accession No. ML102650539.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)		
	)		
Strata Energy, Inc.	)	Docket No.	40-9091-MLA
	)	ASLBP No.	12-915-01-MLA-BD01
	)		
(Ross In Situ Recovery	)		
Uranium Project)	)		

AFFIDAVIT OF BEN SCHIFFER

I declare under penalty of perjury that my statements in prefiled Exhibit Ben Schiffer Rebuttal Testimony (SEI045) are true and correct to the best of my knowledge and belief.

Benjamin J. Schiffer, P.G.

Executed in Sheridan, WY
this 12th day of September, 2014