STRATA ENERGY INC

June 12, 2015

U.S. Nuclear Regulatory Commission
Nuclear Material Safety and Safeguards
Division of Decommissioning, Uranium Recovery, and Waste Programs
Uranium Recovery Licensing Branch
Attention: Mr. John Saxton, Project Manager
Two White Flint North, Mail Stop 8 F5
1545 Rockville Pike
Rockville, MD 20852

Re: Strata Energy, Inc. Ross In Situ Recovery Project
Source Materials License SUA-1601, Docket No. 040-09091
License Conditions 12.11(B), 12.11(C), and 12.12
Response to Questions dated March 18, 2015

Dear Mr. Saxton:

On January 16, 2015, Strata Energy, Inc. (Strata) submitted a request to amend license conditions (LC) 12.11(B), 12.11(C) and 12.12 of SUA-1601 by providing information that would allow NRC Staff to review and verify the proposed groundwater monitoring program for the lined retention ponds at the Ross ISR Project. In a letter dated March 18, 2015, the NRC staff responded to Strata's request and provided a list of items that need to be addressed in order for the staff to verify the groundwater monitoring program. Following are responses to the staff's request in a comment/response format with the staff's comments provided in italics, followed by Strata's responses. Strata apologizes for the delay in submitting this response. As NRC is aware the U.S. Environmental Protection Agency (EPA) Region 8 has been reviewing Strata's submittal for approval of pond construction under 40 CFR § 61.07. Since that submittal contained much of the same information submitted to NRC in response to these preoperational license conditions Strata did not want to submit responses to NRC that were later affected by the parallel EPA review. By letter dated May 5, 2015, Strata received approval from EPA Region 8 to construct the ponds in accordance with the proposed program.

***(1) Need to document changes have been properly vetted***

*Several passages in the report document changes that have been implemented from those documented in the approved application. Two processes exist for changes to an approved application. The first process is approval by the U.S. Nuclear Regulatory Commission (NRC) staff through a license amendment. The second process is the licensee's approval through the Safety and Environmental Review Panel (SERP) (License Condition 9.4) that the change meets certain criteria that does not require a license*

*amendment. Because the NRC staff has not approved the changes through the amendment process, it is assumed that the changes were reviewed by Strata's SERP.*

*The specific items are:*

*(a) Bulleted items on (page 7 and 8)*

*(b) Change in parameters for the detection monitoring program (page 10)*

*Please verify that the changes were reviewed by the SERP.*

**Response:**

Strata confirms that the design improvements discussed on pages 7, 8 and 10 of the Groundwater Detection Monitoring Plan have been reviewed and approved by the SERP consistent with Section 5.2.4 of the approved license application and LC 9.4. The Strata SERP approved these changes on June 4, 2015. The SERP review and approval is contained in SERP-15-16 and is available on-site for inspection.

***(2) Baseline Monitoring***

*Strata cannot rely on the baseline data acquired during site characterization for the proposed monitoring program. Furthermore, two of the three shallow wells were screened in bedrock. The baseline data must be obtained from the compliance wells/points including any upgradient well.*

*Please verify that baseline data will be acquired at wells and/or monitoring points to be installed as part of the groundwater detection monitoring program.*

**Response:**

Strata will obtain preoperational background water quality for each of the compliance monitoring points as shown on Map 1. As described in the response to comment #3, the compliance monitoring points will include the monitor wells surrounding the impoundments and the upgradient French Drain collection sump. Strata will establish background levels using the following procedures, which have been prepared for consistency with the procedures to establish wellfield background water quality in LC 11.3 of SUA-1601. All sample results and statistical evaluations of background levels will be maintained on site and included in the applicable semiannual effluent and environmental monitoring reports required by LC 11.1(C) of SUA-1601. For clarification regarding the screened interval, wells may be completed in bedrock materials should the shallowest, water bearing zone exist in Lance Formation siltstones or sandstones. For example, the area immediately west of Pond 1 and specifically, MW-P1-C4 may be screened in bedrock material.

Sample Parameters: Background water quality samples will be analyzed for the parameters listed in Table 5.7-2 of the approved license application. The first two sample events will be analyzed for the full suite of parameters in Table 5.7-2, while the third, fourth and any subsequent sampling events may be analyzed for a reduced list of parameters that may exclude those below the minimum analytical detection limits (MDLs) during the first and second sampling events provided the MDLs meet the data quality objectives for the sampling.

Sample Frequency: Strata will collect a minimum of four samples spaced at least 14 days apart from each compliance monitoring point. The site characterization monitoring results for CPP-area piezometer SA43-18-3 provide justification for the sampling interval. Piezometer SA43-18-3 is located nearest the future impoundments and was completed in the alluvial aquifer as opposed to other CPP-area piezometers that were completed wholly or partially in the adjacent bedrock. The sampling results from SA43-18-3 in Table 2.7-43 of the approved license application show that the water quality remained consistent over three sampling events during site characterization monitoring. Map 1 of the Groundwater Detection Monitoring Program Plan shows that piezometer SA43-18-3 is in close proximity to the compliance monitor wells surrounding the impoundments. Based on the proximity of the compliance monitoring points to piezometer SA43-18-3 and the temporal consistency of the data collected from SA43-18-3, it is anticipated that there will not be significant temporal variability in background water quality at the compliance monitoring points. To verify this assumption, Strata will continue to sample the compliance monitoring points quarterly, following the initial biweekly sampling period, until either three additional samples are collected or until operation of the associated impoundment commences, whichever comes first. The quarterly sampling results will be combined with the biweekly sampling results to calculate background levels prior to impoundment operation.

Strata proposes to establish preoperational background water quality for the upgradient compliance monitoring point (French drain collection sump) and for the compliance monitor wells associated with Pond 1 prior to operation of Pond 1. If it becomes necessary to construct Pond 2, Strata will establish preoperational background water quality for the compliance monitor wells associated with Pond 2 prior to operation of Pond 2.

Calculation of Preoperational Background Water Quality: For consistency with the approved procedures to calculate preoperational background water quality for the ore zone monitor wells in each wellfield in LC 11.3(E), Strata will calculate background levels on a parameter-by-parameter basis using the mean value plus a statistically valid factor to account for variability in the data, after screening sample results for potential outliers. Alternately, Strata may calculate the background levels as an upper confidence limit, as calculated using ProUCL or similar statistical software. Background levels will be calculated on a compliance monitoring point-by-compliance monitoring point basis or for groups of compliance monitoring points if there is no statistically significant variation between compliance monitoring points.

Consistent with EPA Unified Guidance (EPA 530/R-09-007, Section 5.3), Strata may periodically update the background water quality and corresponding action levels for the compliance monitoring points using the detection monitoring results. Such updates would occur approximately every 1-2 years, after accumulating approximately 4 to 8 quarterly detection monitoring results. Prior to updating background water quality, Strata would compare recent sample results for each constituent with the sample results used previously to establish background water quality in order to determine whether there is a statistically significant increasing trend. If no statistically significant increasing trend is apparent, Strata

may pool the recent sampling results with previous sampling results and recalculate background water quality and corresponding action levels, provided that no leak is detected in the detection monitoring results.

***(3) Compliance Point***

*The plan discusses the proposed compliance points as the French Drain discharge (underlying the surface impounds) or wells. Please be clear. It would seem that during times of a high water table the French Drain would be the point of compliance and when the water table was lower than the elevation of the drain, the monitoring wells will be the point of compliance wells. The water table contour map provided in the plan was obtained prior to construction of the Containment Barrier Wall and may not be representative of the current conditions or conditions after the drain is installed under the impoundments. It is noted that the water table reported in the application was below the elevation of the drain during part of the year.*

*Please provide an estimated water table during operations and Strata's determination of the timing when the wells or the discharge would be the compliance point.*

**Response:**

To avoid ambiguity and for consistency with 10 CFR Part 40, Appendix A, Criterion 5B(1) and 40 CFR § 264.95, Strata proposes that the compliance monitoring points include the following wells/monitoring points shown on Map 1 of the Groundwater Detection Monitoring Program Plan:

- Upgradient compliance monitoring point (to be used following commencement of operation of either impoundment): French drain collection sump adjacent to the containment barrier wall (CBW)
- Pond 1 compliance monitoring points (to be used following commencement of operation of Pond 1): monitor wells MW-P1-C1 through MW-P1-C4.
- Pond 2 compliance monitoring points (to be used following commencement of operation of Pond 2): monitor wells MW-P1-C4 and MW-P2-C1 through MW-P2-C7. Note that monitor wells MW-P1-C1 through MW-P1-C3 will no longer be designated as compliance monitoring points following commencement of operation of Pond 2, since at that time these monitor wells will be internal to the two operating impoundments. This approach is consistent with 40 CFR § 264.97(b), which states that separate groundwater monitoring systems are not required if a facility contains more than one regulated unit.

Since the proposed compliance monitor wells surround each impoundment and are in close proximity to the impoundments, they will provide "prompt indication of ground-water contamination on the hydraulically downgradient edge of the disposal area" in conformance with 10 CFR Part 40, Appendix A, Criterion 5B(1).

As described in the response to comment #5, Strata will sample the effluent from the impoundment underdrains to detect whether a leak has occurred in a secondary liner. For clarification, the term "French Drain" referenced in the amendment request refers to the structure adjacent to the CBW, while the term "underdrains" refers to the system underlying the pond cells. These monitoring locations are no longer proposed to be designated as compliance monitoring points, since their purpose is to detect a leak from the secondary impoundment liners and they represent the groundwater quality within the footprint of the impoundments (and thus are not "beyond" the impoundments as specified by Criterion 5B(1)). Compliance monitoring points within the footprint of an impoundment also are not consistent with 40 CFR § 264.95, which, similar to Criterion 5B(1), specifies that compliance points should be at the "limit of the waste management area."

Map 1 in the Groundwater Detection Monitoring Program Plan also indicated that leak detection systems would be designated as compliance monitoring points. Strata wishes to clarify that these will be used to determine whether there is a leak in a primary impoundment liner and not whether there is a release to groundwater.

Regarding the staff's question on the water table during operations, Strata is required by the conditions of Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) Permit to Mine No. 802 to maintain the water table at or below elevation 4,120 feet during operation of the impoundments (i.e., at an elevation that is at least 1 foot below the bottom of the impoundments). Strata's commitment to maintain the water table 1 foot below the bottom of the impoundments also was evaluated by NRC staff on page 200 of the Ross ISR Project Safety Evaluation Report. The water table will be maintained at or below this elevation through operation of the underdrain dewatering systems beneath the impoundments along with the French drain and CBW. During operations, the water table will vary from about elevation 4,115 feet, which is the approximate minimum elevation of the underdrains, to a maximum of 4,120 feet.

Regarding the staff's question on the timing of the various compliance points, please refer to the bullet list above. Again, Strata does not propose to use the underdrains as compliance monitoring points, since they are within the footprints of the impoundments. By designating compliance monitor wells surrounding each impoundment, Strata hopes to avoid the ambiguity of alternating compliance monitoring points based on water level. The compliance monitor wells will insure that a release to groundwater outside the limits of the waste management area will be detected.

***(4) Screen Horizon***

*The plan calls for fully screened wells. Typically, a release from a near-surface impoundment would affect the water table and thus a well screened at the water table is preferred.*

*Please provide rationale for proposing wells that are screened over the entire saturated thickness.*

**Response:**

For clarification, Strata is not proposing wells that are fully screened through the surficial aquifer (SA). The monitor wells will be screened from the base of the SA to 2 feet above the maximum observed static water level. These wells are designed to obtain representative background water quality and to represent the quality of groundwater passing the points of compliance. Since the water table varies naturally in the vicinity of the impoundments and will further be affected by the operation of the dewatering systems, it would not be practical to screen a narrower interval without increasing the risk that a hazardous constituent would pass above or below the screened interval undetected. Since the saturated thickness is relatively narrow (Table 2.7-20 in the approved license application shows that the screened interval of the SA43-18-3 CPP-area piezometer was only 10 feet) and the constituents of concern are miscible, the monitor wells will be able to detect a potential release to groundwater at the points of compliance.

***(5) Detection/Compliance/Corrective action program***

*The program should be set up as a detection monitoring program, then, if a release is detected but below the regulatory threshold, a compliance monitoring program, and finally if the release results in greater than the regulatory threshold, a corrective action program. Please note that the groundwater detection monitoring program is distinct from the leak detection program. For the detection monitoring program, the plan provides a general description of the action levels.*

*Please provide more details, (e.g., 95% UCL) on the action levels determination.*

*If the action levels are exceeded and the program enters compliance monitoring, please provide any assessment which will be performed (e.g., analysis of a full suite of parameters, additional wells, liner inspection, etc.) to determine if a release occurred.*

*If correction actions are warranted, please provide a proposed schedule to implement the corrective actions.*

**Response:**

The following provides greater detail on the Groundwater Detection Monitoring Program and distinguishes it from the Compliance Monitoring Program and Corrective Action Program that will be implemented if necessary based in the results of detection monitoring.

<u>Groundwater Detection Monitoring Program</u>

The Groundwater Detection Monitoring Program will consist of evaluating nonhazardous indicator parameters at the compliance monitoring points and in the underdrain dewatering system, which is part of the leak detection system and will act as an early warning system to determine whether a release to groundwater occurs. As described below, sample results will be compared to action levels. An action level exceedance in the underdrain dewatering system will provide early warning of a potential for a release to reach the compliance monitor wells and trigger increased monitoring frequency in the

compliance monitor wells, while exceedance of the release criterion at a compliance monitor well will trigger additional action as described below.

For the underdrains, action levels will be established as 50 percent of the electrical conductivity (EC), chloride and total alkalinity of the respective pond cell. These action levels are proposed for consistency with LC 10.8(A), which specifies that a leak in the primary liner will be determined by an EC in the leak detection system of 50 percent of that in the pond. In the event that a leak is detected in the primary liner system, a sample (if available) will be collected from the underdrain from the specific pond cell of concern and analyzed for water level, EC, chloride and total alkalinity to determine if a release from the pond lining system has occurred. If any action level is exceeded in an underdrain sample, then the primary course of action will be to increase the sampling frequency in the compliance monitor wells, as described below, to determine whether a release to groundwater beyond the point of compliance has occurred. Corrective action to address the leaking pond also will be conducted as required by LC 10.8(A) in response to the leak identified in the primary pond lining system. In addition, the underdrain from the specific pond cell of concern will continue to be sampled at a minimum frequency of once every 7 days thereafter until the leak in the pond lining system has been corrected and three (3) consecutive underdrain samples are at or below the action levels.

Action levels for the compliance monitor wells will be established for the nonhazardous indicator parameters of EC, chloride and total alkalinity. They will be calculated following the procedures to establish UCLs for excursion detection in LC 11.4. The action levels will be calculated as the mean plus five (5) standard deviations of the background water quality data except for chloride, where the action level will be set at the background mean concentration plus either five (5) standard deviations or 15 mg/L, whichever is higher. Action levels will be established for each indicator parameter (EC, chloride and total alkalinity) and for each compliance monitor well, unless it can be demonstrated that there is sufficient consistency in background water quality to pool the data from two or more compliance wells prior to calculating action levels. As described in the response to comment #3, Strata may periodically update the background water quality and corresponding action levels using the detection monitoring sample results.

Groundwater detection monitoring in the compliance monitor wells will consist of collecting samples from designated compliance monitor wells monthly for the first year of operations and then quarterly thereafter, except that the sampling frequency will be increased to twice monthly if a leak in the pond lining system has been detected through underdrain sampling. Samples will be analyzed for water level, EC, chloride and total alkalinity. Water quality results will be compared to action levels. Consistent with the excursion confirmation procedures in LC 11.5, a suspected release to groundwater beyond a point of compliance will be defined as a sample exceeding two or more action levels or exceeding one action level by 20 percent. A verification sample will be collected from that monitor well within 48 hours after the results of the first analysis are received. If the verification sample confirms that the release criterion is exceeded, then additional action will occur as described below. If the verification sample does not

confirm that the release criterion is exceeded, then a third sample will be taken within 48 hours after the results of the first verification sample are received. If the third sample shows that the release criterion is exceeded, then additional action will occur as described below. If the third sample does not show that the release criterion is exceeded, the first sample shall be considered to be an error and routine groundwater detection monitoring will resume.

Upon confirmation that a release to groundwater beyond a compliance monitoring point has occurred (i.e., upon confirmation that the release criterion has been exceeded based on nonhazardous indicator parameters), Strata will perform the following actions, which are consistent with the excursion reporting and corrective action procedures in LC 11.5:

1) Notify the NRC Project Manager by telephone or email within 24 hours of confirming that the release criterion has been exceeded, and by letter within 7 days.
2) Increase the groundwater detection monitoring frequency for all compliance monitor wells to at least once every 7 days until three (3) consecutive samples are at or below the action levels.
3) Conduct an investigation to determine the probable cause of the release to groundwater.
4) Initiate corrective action as necessary to return the concentrations of the nonhazardous indicator parameters to concentrations below the action levels (e.g., transfer the contents of a leaking pond cell to another cell, increase the pumping rate from the underdrain system to enhance the inward hydraulic gradient, etc.).
5) Submit a written report to the NRC describing the release event, probable cause, corrective actions taken and the corrective action results within 60 days of confirming that the release criterion has been exceeded. If the release to groundwater beyond the compliance monitoring point has been corrected within 60 days of confirming that the release criterion has been exceeded, routine detection monitoring will resume.

If the release to groundwater beyond the compliance monitoring point has not been corrected within 60 days of the initial confirmation, Strata will perform the following actions consistent with 40 CFR § 264.98(g):

1) Immediately sample the groundwater in all compliance monitor wells associated with that impoundment and evaluate samples for the full suite of parameters in Table 5.7-2 of the approved license application. If any hazardous constituents, as defined in 10 CFR Part 40, Appendix A, Criterion 13, are detected at concentrations above the background level established for that constituent, then Strata will resample the well within 30 days for confirmation. If the results of the second sample confirm the initial results, then those constituents will form the basis for compliance monitoring. If it is determined based on confirmation sampling that no hazardous constituents are present above background levels at a compliance monitor well, Strata will continue sampling the groundwater in all compliance wells associated with that impoundment at least twice monthly and evaluate samples for the full suite of parameters in

Table 5.7-2 of the approved license application until the release to groundwater is corrected and all hazardous constituent concentrations are equal to or less than background levels.

2) If a hazardous constituent is confirmed to be present at a concentration above the background level established for that constituent, Strata will, within 90 days of confirmation, submit an application to NRC to establish a Compliance Monitoring Program. The application will provide the following information needed to satisfy 10 CFR Part 40, Appendix A, Criterion 5B(1):
    a. Identify the concentration of any hazardous constituent detected in groundwater at each compliance monitor well;
    b. Recommend concentration limits consistent with 10 CFR Part 40, Appendix A, Criterion 5B(5);
    c. Recommend a compliance monitoring frequency and duration; and
    d. Indicate any proposed changes to the groundwater monitoring system based on developed data and site information as to the flow of groundwater or contaminants.

Compliance Monitoring Program

The Compliance Monitoring Program will involve sampling one or more compliance monitor wells and comparing sample results with concentration limits established by the NRC to determine whether the lined retention ponds are operating in conformance with 10 CFR Part 40, Appendix A, Criterion 5B(1). Pursuant to Criterion 5B(1), the Commission will identify hazardous constituents, establish concentration limits, set the compliance period, and may adjust the point of compliance if needed to accord with developed data and site information as to the flow of groundwater or contaminants, when the detection monitoring indicates leakage of hazardous constituents beyond a point of compliance. As described previously, Strata will submit a Compliance Monitoring Program in the event that a hazardous constituent concentration is confirmed to be above the background level established for that constituent at a compliance monitor well.

If it is determined that a concentration limit is exceeded at a compliance monitor well, Strata will notify the NRC in writing within 7 days. Within 180 days, Strata will submit to the NRC a Corrective Action Program, pursuant to 10 CFR Part 40, Appendix A, Criterion 5D, that will provide a detailed description of corrective actions that will be used to achieve compliance with the concentration limits and a monitoring program to demonstrate the effectiveness of the corrective actions.

Corrective Action Program

If the groundwater compliance limits are exceeded, Strata will implement a Corrective Action Program as soon as is practicable, and in no event later than 18 months after the Commission finds that the standards have been exceeded, in accordance with Criterion 5D. Corrective actions may include, but will not be limited to:

1) Increasing the pumping rate from the underdrain dewatering system to draw groundwater inward toward the impoundments; or

2) Pumping groundwater from one or more compliance wells or installing additional wells to pump groundwater and return it to a lined retention pond cell or to the CPP for deep well disposal in order to remove the contaminants from groundwater.

A formal application to establish a Corrective Action Program will be submitted to NRC within 180 days of confirming a concentration limit exceedance as described previously. It will provide a detailed description of the proposed corrective actions and a monitoring program to demonstrate the effectiveness of the corrective actions.

***(6) Other***

*A 24-hour verification sampling for the leak detection program is not consistent with LC 10.8 (page 11). The High Water Level (HWL) and not Normal Water Level (NWL) is the appropriate criterion for the daily inspection (page 13).*

*What is a detailed examination of the liner system for the quarterly inspection (page 15)?*

*Verify that the reported parties reviewing the pond inspections are correctly listed.*

**Response:**
Pursuant to LC 10.8(A), Strata will conclude that a leak has occurred in the pond primary liner if the fluid height in any of the standpipes for the pond leak detection system is found to be in excess of 6 vertical inches and if a sample of the fluid in the leak detection system is in excess of 50 percent of the EC of the fluid in the respective pond cell. This commitment supersedes the statement on page 11 of the Groundwater Detection Monitoring Program Plan that 24-hour verification sampling would be used to confirm whether a leak has occurred prior to initiating corrective action.

Regarding the daily lined retention pond inspections, Strata wishes to clarify the language on page 13 of the Groundwater Detection Monitoring Program Plan. Normally the water level in each pond cell will be maintained at or below the normal water line (NWL), which includes not only freeboard for runoff and wave runup, but also freeboard to pump the contents of a damaged pond cell into the remaining cell within that pond in the event of a liner failure. Therefore, during normal pond operations, daily inspections will be used to verify that the ponds are operated at or below the NWL. In addition, at all times, the ponds will be operated below the high water line (HWL), which includes 3 feet of freeboard for direct precipitation and wave runup. Therefore, daily inspections will compare pond water levels to both the NWL and HWL, and the water level in the ponds will always be maintained below the HWL.

Regarding the detailed examinations of the pond liner systems that will be conducted quarterly, such inspections may include the following at a minimum:

- Inspect all visible liner surfaces for damage from sharp-footed wildlife;

- Inspect all visible liner penetrations, including leak detection pipes, vents, etc., for any sign of separation or leakage;
- Inspect all visible seams for any evidence of separation;
- Inspect all visible liner surfaces for evidence of bleaching, UV degradation or cracking;
- Inspect liner surfaces for evidence of entrapped air; and
- Examine integrity of toe-ins.

Regarding the review of the pond inspection reports the individuals reviewing the pond inspections are correctly listed in the January 16, 2015 submittal. The titles are based on the current Strata organization and are functionally equivalent to those used in Section 5 of the approved Technical Report.

**LC 12.11(B)**

When submitting the request to amend license conditions 12.12 and 12.11(C), Strata inadvertently neglected to state that the Groundwater Detection Monitoring Program Plan was also provided to satisfy the requirements of preoperational LC 12.11(B), which requires Strata to provide written inspection procedures for the CPP dewatering system. Following is a summary of the commitments Strata has made regarding the inspection procedures for the CPP dewatering system.

CBW/French Drain Collection Sump

- Water levels will be monitored in the two piezometers located on either side of the CBW to verify the effectiveness of the CBW and French drain collection sump. Strata will instrument the piezometers with pressure transducers with data downloaded monthly. A quarterly evaluation of trends in groundwater levels will be conducted.
- Monthly, quarterly and annual inspections will be conducted of the French drain collection sump and associated pumping and discharge systems.

Underdrain Dewatering System

- A high water alarm will be established at the maximum water level elevation, which is 1 foot below the bottom of the impoundments. The alarm will be inspected daily to verify that the water table is below the maximum water level elevation.
- The water level in the underdrain system will be measured monthly during routine sample collection as part of the Groundwater Detection Monitoring Program.
- The underdrain pumping system will be inspected daily to ensure proper operation. In addition, annual inspection and testing will be conducted of the underdrain pumping system.
- Water levels will be measured at compliance monitor wells during each sampling event.

Strata requests that NRC staff review and verify that the provided information meets the requirements contained in LC 12.12, 12.11(B) and 12.11(C). If you have any questions or require additional information, please contact me at (307) 686-4066 or mgriffin@stratawyo.com.

Sincerely,
STRATA ENERGY, INC.

Michael Griffin
Vice President of Permitting, Regulatory and Environmental Compliance