

**From:** [Mike Griffin](#)  
**To:** [Saxton, John](#)  
**Cc:** [Ralph Knode](#); [Ben Schiffer](#)  
**Subject:** [External\_Sender] RE: Proposed license condition for 11.3 A & B  
**Date:** Wednesday, March 29, 2017 12:36:43 PM  
**Attachments:** [image001.png](#)  
[TR Page 5-89 Draft Revision 29 Mar 2017.pdf](#)  
[LC 11.3B Proposed revision 29 Mar 2017.pdf](#)

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Hi John:

Following is Strata's response to the proposed license conditions included in your email:

**License Condition 11.3(A):** We agree to the proposed License Condition as presented.

**License Condition 11.3(B):** In order to address NRC concerns regarding response time for excursion parameters at perimeter monitor wells that may be spaced more than 400 feet from the production unit area, Strata proposes to set UCL's for those well(s) on a per well basis that will ensure that a potential excursion will be detected within the same period of time as currently provided at 400 feet using the approved standard methods (i.e., 5 standard deviations or, in the case of chloride, baseline average plus 15 mg/L). In order to allow this method to ensure timely detection, Strata proposes that License Condition 11.3(B) be revised as shown in the attached version. In order to implement this commitment to set alternate UCLs for wells spaced more than 400 feet out from the production area, Strata will revise section 5.7.8.2 of the approved application as shown in the attached revision.

**License Condition 11.3(C):** At this time Strata withdraws the request to amend License Condition 11.3(C) until the issues identified in your email can be addressed and asks that NRC staff complete the amendment of 11.3(A) and (B) as discussed above.

Please let me know if you have any questions.

Mike

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**From:** Saxton, John [mailto:John.Saxton@nrc.gov]  
**Sent:** Thursday, March 09, 2017 10:19 AM  
**To:** Mike Griffin  
**Subject:** Proposed license condition for 11.3 A & B

Mike,

Below please find staff's proposed license condition for 11.3 A & B

- A) 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 four acres of wellfield production area. If a portion of a wellfield production area is isolated by distance to other production areas within a wellfield or isolated hydraulically, as determined by the pumping tests, a minimum of one well in each of the isolated areas will be required for the baseline data if the isolated area is less than four acres in area. Wells selected for the baseline data will be the same ones used to measure restoration success and stabilization.
- B) Perimeter Monitoring Wells. Samples shall be collected from all perimeter monitoring wells that will be used for the excursion monitoring program. The perimeter wells will be installed for a wellfield in accordance with information presented in Section 3.1.6 of the approved license application, as amended by the submittal dated December 21, 2015 (ML16004A032), with the following stipulations: the distance between the nearest production unit and perimeter well will be between 300 and 400 feet and the spacing between perimeter wells will be between 300 and 500 feet provided that the maximum angle from the closest unit to the two nearest wells is less than 75 degrees. In no case will the perimeter monitoring wells be installed outside of the exempted aquifer as defined by the Class III UIC permit issued by the Wyoming Department of Environmental Quality.

If Strata agrees to staff's proposed license condition, please send me a response by email. After that, we will send the EA to Wyoming for comments.

As far as License Condition 11.3C, at the present time we cannot accept it as proposed. You will need to clarify how the 50 foot thickness of the aquitard is met if the thickness of that portion overlying the DM Unit is less than 50 feet, clarify the well yields based on an established regulatory threshold, e.g., Wyoming's Guideline 4, and address the environmental impacts of sampling/reduced sampling similar to guidance in NUREG-1569 (see Acceptance Criterion 5.7.8.3(3)). You could submit a response directly in response to this email or, if you prefer, I will prepare formal RAIs and/or schedule a public meeting to discuss this topic.

John Saxton



11.3 B) Perimeter Monitoring Wells. Samples shall be collected from all perimeter monitoring wells that will be used for the excursion monitoring program. The perimeter wells will be installed for a wellfield in accordance with information presented in Section 3.1.6 of the approved license application, as amended by the submittal dated December 21, 2015 (ML16004A032), with the following stipulations: the distance between the nearest production unit and perimeter well will be between 300 and ~~400~~500 feet and the spacing between perimeter wells will be between 300 and 500 feet provided that the maximum angle from the closest unit to the two nearest wells is less than 75 degrees. In the event a perimeter well exceeds the 400-foot spacing from the nearest production unit, the UCLs for that perimeter well will be calculated in accordance with commitments in [Strata's submittal dated March 29, 2017]. In no case will the perimeter monitoring wells be installed outside of the exempted aquifer as defined by the Class III UIC permit issued by the Wyoming Department of Environmental Quality.

to the lixiviant during recovery operations. Water levels are obtained and recorded prior to each well sampling. Rising water levels are indicative of an imbalance in the wellfield, which could result in an excursion. Although water levels are not proposed as an official excursion indicator, modeling indicates that such changes may provide a much earlier indication of an excursion than a geochemical anomaly measured in a monitoring well.

WDEQ/LQD Guideline 4 (WDEQ/LQD 1994) recommends that UCLs are set by adding five standard deviations to the mean baseline concentration of the excursion indicator. The UCL will be less than the lowest concentration that typically occurs in the lixiviant while the wellfield is in operation and greater than the mean baseline concentration for its respective excursion indicator. For chloride, WDEQ/LQD states that, the UCL may be determined by adding 15 mg/L to the baseline average if the resulting value is greater than the baseline mean plus five standard deviations. For perimeter monitor wells spaced from the nearest production unit beyond the standard 400 feet (i.e, 400 +/- five percent if the wellfield average is 400 feet), the UCLs for those wells will be calculated to provide reasonable assurance that an excursion will be detected within the same timeframe or less as an excursion for a well spaced at 400 feet using an UCL established by the standard method (baseline average plus five standard deviations, or in the case of chloride, the baseline average plus 15 mg/L). The UCL calculations will consist of the well- or wellfield-mean plus a specific number of standard deviations provided that the number of standard deviations is less than five. The analysis on timing for an excursion detection may be based on the specific modeling results found acceptable by NRC staff in its evaluation (ML17068A399) or a mine-unit specific fate and transport modeling such as MODFLOW/MT3D/PHAST or other equivalent methods (e.g., analytical models) The analysis will be documented in the wellfield package.

Chloride, total alkalinity and conductivity appear to be strong indicators of dissolution during ISR operations. Therefore, these constituents as UCLs are proposed for excursion determination for the mineralized sandstones of the OZ aquifer as well as the shallow sandstones of the SM system. However, elevated natural/background chloride concentrations in the DM aquifer negate the use of chloride as downward movement of lixiviants into the DM aquifer would likely result in a decrease in chloride concentrations. In lieu of chloride, Strata

proposes that sulfate will be used along with conductivity and alkalinity as a metric for determining that a vertical excursion downward has occurred. Water quality testing indicates concentrations of sulfate in the DM aquifer are typically less than 150 mg/L while ambient sulfate levels in the OZ aquifer range between 300 mg/L to more than 900 mg/L and are anticipated to increase during ISR operations by at least 150 mg/L. In addition, Section 6.1.6 compares water quality analogs at various operating ISR facilities, and increases of sulfate commonly occur during operations, which should be beneficial to detecting a downward vertical movement at the proposed Ross ISR Project. Upper control limits for the excursion indicator parameters have not been calculated at this time due to the limited number of wells installed during the regional baseline program. Following completion of the necessary monitoring well network in order to develop the Mine Unit 1 wellfield package, sufficient data on the ore zone aquifer, DM, SM and laterally adjacent aquifers