UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

CERTIFED MAIL 7010 1060 0002 0242 5163
RETURN RECEIPT REQUESTED

November 8, 2012

Michael McPhie
President and Chief Executive Officer
Curis Resources (Arizona) Inc.
1575 W. Hunt Highway
Florence, AZ 85132

RE: Request for Information (RFI)
Class III Underground Injection Control (UIC) Well Permit Application
Curis Resources (Arizona) Inc.

Dear Mr. McPhie:

The United States Environmental Protection Agency, Region IX (EPA) is conducting a technical review of Curis Resources (Arizona), Inc. (Curis Arizona) March 2011 Underground Injection Control (UIC) permit application as modified by Dan Johnson's letter on June 1, 2012, for the Production Test Facility (PTF). EPA has reviewed your September 10, 2012, response to the Request for Information dated July 20, 2012. In order to continue our evaluation of your application, we are requesting additional information and clarifications as detailed in the enclosure.

Please address all items noted in the enclosure by submitting supplemental information in hard copy and in electronic format. With a complete response to this request, we will be able to continue our technical review of your proposed PTF. Please provide your supplemental information within 45 days of the date of this letter.

Please submit the information requested in this letter to:

Attn: Nancy Rumrill
U.S. EPA Region 9, (WTR-9)
75 Hawthorne Street
San Francisco, CA 94105

If you have any questions regarding this letter, please contact me at 415-972-3971 or call Nancy Rumrill of my staff at 415-972-3293.

Sincerely,

David Albright
Manager, Ground Water Office

Enclosure

cc w/enc: Richard Mendolia, ADEQ (via e-mail)
Dan Johnson, VP, General Manager, Curis Arizona (via e-mail)

Request for Information
Curis Arizona's UIC Permit Application
November 8, 2012

ATTACHMENT A, AREA OF REVIEW

1. A.2.1, Hydraulic Control

The description of the proposed Area of Review (AOR) as 500 feet horizontally beyond the PTF well field area is inconsistent with the distance shown on Figure Temp APP RTC (E) 18-1 in Attachment 3 of the May 23 response to Arizona Department of Environmental Quality (ADEQ) comments of May 2, 2012. The 500-foot circumscribing area around the PTF ("buffer area of PTF well field") shown on that map is 500 feet from the outer recovery wells in the PTF, not from the perimeter of the PTF well field area as drawn on that map. If the AOR boundary were drawn 500 feet from the PTF well field area perimeter, additional wells and coreholes would be located within the AOR and would require corrective action considerations.

Please clarify the description of the PTF well field area and modify Figure 18-1 to be consistent with that description if the proposed AOR boundary is 500 feet from the perimeter of the well field area as labeled in Figure 18-1, as opposed to 500 feet from the outer recovery wells. Please provide the basis for your response considering the UIC regulations at 40 CFR Part 146.6(a)(ii), which describe the AOR for an area permit as the lateral distance from the perimeter of the *project area.* Also, the March 2011 UIC permit application describes the AOR boundary as 500 feet from the perimeter of the 212-acre ISCR area rather than 500 feet from any specific well in the well field.

2. A.3, MODFLOW /MT3D Groundwater Model and Simulation Results

The Curis Arizona response to Comment 2 of our July 2012 letter, regarding the modeling results for assessment of hydraulic control, does not address the question of the extent of vertical movement of the lixiviant within the Sidewinder and other fault zones with lack of hydraulic control for 48 hours and up to 30 days. Figures 2-1 to 2-8 depict fluid movement horizontally in the fault zone in a north-south view across the PTF, but none of the figures show the fault zones in an east-west cross sectional view that could illustrate the extent of vertical fluid movement within the fault zones. The extent of vertical flow within the 10 layers is shown in the figures, but not within the Sidewinder fault zone and other intersecting faults. It is possible that lixiviant could migrate up dip within the more permeable fault zones for a lateral distance exceeding the 500-foot AOR and upward into the LBFU where the faults intersect the contact between the LBFU and Bedrock Oxide Zone.

Please provide a discussion and illustrations of the extent of vertical migration of lixiviant within the fault zones under the conditions presented in the responses to Comment 2. Cross-sectional views in an east-west orientation, similar to the cross section in Figure 9-2, should be provided for that purpose.

ATTACHMENT C, CORRECTIVE ACTION PLAN & WELL DATA

3. Well and Corehole Construction Data

Table 3-1 is a listing of the well and corehole construction data for each of the wells and coreholes within the AOR. Appendix A contains the available well and corehole construction and cementing records for wells and coreholes within the AOR. EPA will require additional steps to address the following issues although no additional information is needed at this time.

Annular Cementing records are not available for 28 of the total 38 coreholes:

- Twelve of those without annular cementing records were also reportedly plugged and abandoned with Type V cement from bottom to surface.
    - Casing was pulled in eight of the abandoned coreholes prior to plugging operations, and then cement plugs were added to fill the entire diameter and length of those coreholes.
    - For the remaining four abandoned coreholes where the casing was not pulled and the annular cementing records are not available, the coreholes may need to be re-plugged if the borehole/casing annulus was not filled with cement. Based on the drilling and plugging records, the casing was set well above the top of the Bedrock Oxide Zone in each of the coreholes. Remedial cementing may be necessary to ensure isolation in the annulus of the UBFU from the LBFU.

Annular cementing records are not available for 16 of the unplugged coreholes, and casing records are not available for 11 of the unplugged coreholes. EPA will require additional steps to determine corehole conditions to properly P&A these coreholes.

Casings in four of the six wells listed in Table 3-1 were apparently sealed with bentonite grout, and cementing records are missing for the other two wells. Because bentonite grout can be inadequate for long-term zone isolation purposes, remedial cementing will be necessary during P&A operations to place cement in the borehole/casing annulus at the Bedrock Oxide Zone/LBFU interface to ensure isolation of the injection zone from the LBFU and USDWs above the injection zone.

4. Plugging and Abandonment Plans for Corrective Action Purposes

EPA is not requesting information for this item at this time. EPA Form 7520-14, Plugging and Abandonment (P&A) Plans for the coreholes and wells within the AOR as depicted in Figure 18-1 and listed in Table 3-1 are included in Appendix G. Prior to final approval granted for P&A plans, EPA will require a final review and supplemental detailed procedures. If the 500-foot radius AOR is measured from the perimeter of the PTF well field area, as labeled in Figure 18-1, additional coreholes and wells within the larger AOR will require corrective action considerations.

ATTACHMENT K, INJECTION PROCEDURES

5. Operations Plan

The Operations Plan has been updated as requested to remove reference to Phase 2 operations and account for the modifications to the proposed PTF operations and its relocation. The revised plan is provided in Appendix B of the September 10, 2012 response document. Please provide a revision to the Plan with the following changes for purposes of clarity and omission of figures comparable to Figures 1 and 2 in the original Operations Plan presented in Appendix D of the Area Permit issued to BHP Copper in 1997.

For clarification in Section 2.2.2.2, Hydraulic Control, please add a sentence to clarify that the paired wells along the perimeter of the IRZ include an outer observation well and an inner recovery well. Please revise Figures 1 and 2 as necessary to represent the PTF operation and configuration, and add them to the amended Operations Plan.

ATTACHMENT L AND M, WELL CONSTRUCTION PROCEDURES AND DETAILS

6. Cementing Procedures and Centralizer Placement

Curis Arizona revised Section 9A.3.2.5 and Drawing 9A.1of the APP application in response to EPA's comments. In the response, a clarification is needed regarding the discussion of tremie pipe procedures.

The last sentence in the last paragraph in Response 6 on page 10 "...the tremie pipe will be removed from the well and ...." is inconsistent with the context of the paragraph, which discusses procedures for cementing the steel casing/borehole annulus. A tremie pipe will not be used to pump cement for that purpose. Please clarify the discussion. Also, please note that a demonstration of a "suitable Type V substitute" cement as described on page 10 will be subject to EPA approval.

ATTACHMENT N, CHANGES IN INJECTION FLUID

7. Changes in Pressure of Injection Zone

The Sidewinder Fault illustrated in Figure 9-2 is shown without an overlap between layers 8 and 9. That results in a discontinuity in the fault between those layers that would inhibit fluid flow in the fault zone. The geologic cross sections provided in the supplemental response to comments (Attachment 13 of the May 23, 2012 response to ADEQ comments) depict the Sidewinder Fault and two additional faults as continuous in the view looking north at the PTF well field.

If there is no discontinuity, please modify the model to represent the unbroken configuration of the Sidewinder Fault Zone, or provide an explanation for the representation and how it was considered in the model.

The Rattlesnake and Thrasher Faults are shown to intersect the wells in the PTF well field above the Sidewinder Fault in the upper layers of the proposed injection interval in the Oxide Bedrock

Zone. We are not aware that those faults and their effects on the PTF operations have been included in the predictive simulations for hydraulic control and post-closure discharge impact area.

Please provide a discussion of the possible effects of these fault zones on hydraulic control and potential migration of lixiviant beyond the PTF project area and/or into the LBFU and UBFU.

8. Native Fluid Displacement

The response is generally acceptable except that the discussion of vertical migration of lixiviant is somewhat inconsistent with the illustrations in Figures 9-1 and 9-2. The discussion on page 15 states that injected fluid is simulated to migrate upward approximately 40 feet into the exclusion zone and approximately 54 feet into the lower basin fill unit (LBFU), but no migration into the LBFU is shown in Figure 9-2.

Please explain why no migration is shown to occur into LBFU in the westward view in Figure 9-1 but does occur in the northward view of the PTF.

In addition, the PTF well field is described as an area approximately 200 feet by 200 feet in size, but appears to be significantly larger (approximately 420 by 470 feet) on the figures that show the PTF well field area, notably Figures 12-, 18-1, 8-1, and others.

If the well field dimensions are defined as the distance between the outer recovery wells, which apparently is approximately 200 by 200 feet, please clarify this definition of the well field area. All references to a 200 by 200-foot well field area should also be corrected in the application. This comment also applies to the discussion of the 500-foot AOR in Comment 1 above, and its effect on the size of the AOR and the wells and coreholes that may require corrective action.

ATTACHMENT O, PLANS FOR WELL FAILURES (CONTINGENCY PLANS)

9. Demonstrating Mechanical Integrity

Regarding demonstration of Part II mechanical integrity, the volume of cement used to completely fill the annulus does not by itself demonstrate Part II mechanical integrity, as implied in the response to this comment in paragraph 1 on page 19. It also depends on the results of the cement bond log (CBL) and/or a temperature and/or RTS if the CBL is inconclusive, as stated in subsequent paragraphs on page 20.

Please amend paragraph 1 to remove or revise the last sentence to clarify that calculated cement volumes do not satisfy Part II requirements without a CBL and/or other logs that demonstrate mechanical integrity in the annulus of Class III wells. Paragraph 2 should be edited to state "*If the cement bond and variable density log responses show adequate bonding over an acceptable interval, the Part II mechanical integrity test will have been demonstrated.*"

The percent bond index by itself is not necessarily indicative of adequate bonding of the cement to the casing and the borehole, and its application in PVC and FRP casing is questionable. The

CBL evaluation and final determination of mechanical integrity will be subject to EPA review and approval.

ATTACHMENT P, MONITORING PROGRAM

10. Annular Conductivity Devices

Please clarify in Section P.5.3, Annular Conductivity, that wells equipped with polyvinyl-chloride (PVC) and FRP **outer** casing will not be used as injection and/or recovery wells or for maintaining hydraulic control. We understand that only observation wells and Westbay wells will be equipped with ACDs in the PVC and FRP outer casing string and that ACDs will not be installed in wells equipped with steel casing.

11. Demonstration of Hydraulic Control

Please provide a proposed plan for an additional monitoring well in the lower 200 feet of the LBFU to the east of the PTF and above the area where Sidewinder fault and other faults meet the Oxide-LBFU contact. The recommended location is approximately 300 feet east of the outer recovery wells on the eastern perimeter of the PTF well field. That would be at a point where the LBFU is approximately 300 feet thick, according to the EW cross section 746167 in Attachment 13 of the May 23, 2012 response to ADEQ comments on the temporary APP application. The upper 100 feet of the LBFU in that area is above the 200-foot aquifer exemption interval in the LBFU; thus, it is required to be protected as a USDW.

12. Additional Monitoring in the Oxide Zone

Please provide a proposed plan for additional monitoring wells: one each at the most northern, western, southern, and eastern extent of the 2 mg/L contour in Figure 14A-37, labeled "Extent of Sulfate Migration within the Oxide (All Layers) 5 Years after Closure". All of these wells should be screened in the Oxide injection zone. The northern well would be screened in the Sidewinder Fault Zone where it intersects the Oxide Zone to monitor preferential flow down gradient in the fault zone. Please confirm that coincides with the northernmost extent of the predicted sulfate migration since the Sidewinder Fault Zone is apparently aligned in that position and direction at the Oxide depth in the PTF project area. The southern well would also be placed and screened where the Sidewinder Fault Zone intersects the Oxide Zone. The distance of each well from the well field will vary from approximately 50 feet to 300 feet depending on the position of the 2 mg/L contour relative to the well field. These well locations will serve to assess the accuracy of the predictive simulations for sulfate migration five years after closure and monitor for loss of hydraulic control during PTF leaching operations.