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 Docket No. 40-8786
 SUA-1400, Amendment No. 5

MEMORANDUM FOR: Docket File 40-8786

FROM: Kristin B. Westbrook, Project Manager
 Operating Facility Section I
 Uranium Recovery Licensing Branch
 Division of Waste Management

SUBJECT: AMENDMENT NO. 5 TO SOURCE MATERIAL LICENSE SUA-1400

License Condition No. 17 of Source Material License SUA-1400 requires Uranium Resources Inc. (URI) to submit a groundwater quality restoration plan for the North Platte R&D ISL Project. URI submitted the required plans, dated February 18, 1982 and May 10, 1982. URI's May 10, 1982 submittal asked that we remove the technical documentation accompanying the amendment request of February 18, 1982 and substitute the May 10, 1982 submittal in its entirety. We have complied with this request.

Original License Condition No. 17 called for a restoration plan to be submitted at least ninety (90) days prior to termination of mining activities. The following elements are required to be included in the restoration plan: the restoration method; restoration criteria; a list of water quality indicators for which the restoration stream and representative injection and recovery well water samples are to be analyzed; monitor well sampling during groundwater restoration; and a post restoration monitoring plan.

URI has proposed the use of reverse osmosis equipment to purify the groundwater before pumping the water back into the formation. A bleed system to the evaporation pond will continue to be used in order to maintain a hydraulic sink in the wellfield area so that mining solutions will not migrate outwards. The bleed stream will be sent to the evaporation pond. Liquid and residues from the evaporation pond will be disposed of at an NRC licensed disposal area as indicated in License Condition No. 41. Previously, reverse osmosis has been successful at other uranium solution mining projects.

License Condition No. 17 requires URI to submit a list of water quality indicators for which the restoration stream and representative injection

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or recovery well samples are to be analyzed. URI has proposed and NRC accepts weekly sampling of well P-1 for conductivity, chloride, and uranium. Well P-1 is acceptable because URI has only one recovery well (P-1) and this is the sole source of the restoration stream. Weekly sampling is acceptable because it is consistent with our Position Paper WM-8102, entitled "Groundwater Monitoring at Uranium In Situ Mines" which recommends a minimum frequency of biweekly. Conductivity is acceptable because it is a summation of the amount of all dissolved constituents present in the groundwater. Chloride is negatively charged and is not adsorbed by clays which makes it highly mobile. Chloride levels approaching baseline would indicate that all the affected water has been cycled through the restoration process. Uranium is positively charged and often attenuates because of adsorption by clays. It is one of the most difficult indicators to stabilize and once uranium reaches baseline usually the other indicators will be near baseline levels. NRC is also requiring water level readings to be taken during sampling of this well (and all other wells) as a check on fluid balance in the wellfield.

URI's proposal for monitor well sampling is to analyze all existing monitor wells monthly for conductivity, chloride, and sodium until restoration is achieved. Conductivity and chloride are acceptable for the same reasons as outlined in the above paragraph. Sodium will serve as a representative of the positively charged ions present. Another significant positively charged ion of concern is uranium. However, analysis for sodium is less expensive. URI's proposed use of only these three indicators is a change from operational requirements which has also included four other indicators (uranium, vanadium, alkalinity and calcium). The frequency of operational monitoring was also monthly except for conductivity and chloride which were biweekly. Since no more lixiviant is being injected and URI is required to restore the groundwater to preoperational baseline quality, it is no longer considered necessary to monitor as extensively as it was during operations. However, due to continuing problems with alkalinity and calcium excursions, NRC is requiring that these be retained as excursion indicators.

URI's proposed restoration criteria is to sample well P-1 for the long list of forty (40) groundwater quality indicators (Table 5.1.01 of the EIA) and if the value for each indicator is equal to or below the pre-operational mean of the five spot wells, restoration would be considered complete. Restoration criteria must be applied to all wells in the five spot pattern on a groundwater quality indicator by indicator basis and any monitor well ever declared an excursion. URI did not

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include the four injection wells or monitor wells ever declared on excursion in their restoration criteria proposal. The NRC staff cannot agree to consider restoration complete without some verification from the injection and monitor wells. This is consistent with our Position Paper WM-8102, entitled, "Groundwater Monitoring at Uranium In Situ Mines". Therefore, we are requiring a full suite analysis of the indicators in Table 5.1.01 of the EIA for the production well, all four injection wells, and all wells that have ever been declared on excursion during restoration and/or operation.

In addition, all monitor wells not ever on excursion will be analyzed for the following: conductivity, chloride, sodium, calcium, alkalinity, gross alpha, gross beta, nitrate, nitrite, lead-210, flouride, and radium-226. This list contains conductivity, chloride, and sodium for the same reasons stated in the preceding paragraphs. Calcium and alkalinity are included because operational data shows that these indicators have been elevated during the in situ process. The remaining indicators are included because URI did not provide complete operational data prior to termination of lixiviant addition as required by License Condition No. 13 specifying analyses for the full suite of indicators listed in Table 5.1.01 of the EIA. A long list of indicators was taken May 29, 1982. A review of this submittal found that not all of the Table 5.1.01 indicators were sampled. Because we cannot determine whether or not these unanalyzed indicators have been affected during the in situ process, URI must include them in the post-operational monitoring.

URI's six months post restoration monitoring proposal calls for Well P-1 to be monitored monthly for the full suite of indicators listed in Table 5.1.01 of the EIA. Post-restoration monitoring for a full suite analyses from a long list of indicators on a monthly basis is consistent with our Position Paper No. WM-8102, entitled, "Groundwater Monitoring at Uranium In Situ Solution Mines". The NRC staff has accepted URI's proposal with the exception that we consider six months to twelve months as the expected stabilization period and consider 6 months as a minimum time requirement. Therefore, URI will be required to monitor for post-restoration stability for at least 6 months and the post-restoration stability verification sampling will depend on the sample results from well P-1 after a minimum of six (6) months. For the final post-restoration verification, all production-injection and monitoring wells will be sampled for all indicators in Table 5.1.01 of the EIA and the information will be submitted to NRC for our review and a determination of the adequacy of restoration.

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In accordance with the above, we recommend that License Condition No. 17 be amended to read as follows:

- 17. Restoration shall be accomplished through reverse osmosis or any method that doesn't involve the addition of chemicals to the injection stream except for H₂S₂ or SO₂ as indicated in the licensee's original application report of March, 1981. The licensee shall notify the USNRC, Uranium Recovery Licensing Branch within thirty (30) days of any subsequent changes in the restoration methods specified in the licensee's May 10, 1982 submittal.

Restoration of the production aquifer and any other groundwaters that may be affected by mining operations shall be initiated within sixty (60) days after solution mining operations have been terminated.

The objective of restoration shall be to return the groundwater quality, on a groundwater quality indicator by indicator basis, to baseline conditions for each well.

Water level readings shall be taken, recorded, and submitted during all groundwater quality analysis specified in the subsequent paragraphs.

During restoration, a sample shall be taken weekly from Well P-1 and analyzed for conductivity, chloride and uranium until restoration is verified.

The 10 wells (6 perimeter ore zone monitor wells and 3 shallow and 1 deep monitor well) shown on Figure C-5-2 of the licensee's March 31, 1981 Technical Report shall be used for groundwater quality monitoring during restoration. These wells shall be sampled monthly for conductivity, chloride, sodium, calcium and alkalinity until restoration is verified.

When URI's sampling results for Well P-1 show that restoration is achieved, a verification sample (including 5 injection-production wells and also any monitor well(s) ever having been declared on excursion during operation or restoration) shall be analyzed for the full suite of water quality indicators listed in Table 5.1.01 of the EIA.

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In addition, all 10 monitor wells shall be analyzed for the following: conductivity, chloride, sodium, calcium, alkalinity, gross alpha, gross beta, nitrate, nitrite, lead-210, flouride, and radium-226. The results of the verification samples shall be sent to NRC for evaluation within thirty (30) days. Restoration shall be considered complete only upon written notification by the USNRC, Uranium Recovery Licensing Branch.

Post restoration monitoring shall continue for a minimum of six (6) months after NRC determines that restoration is complete. Well P-1 shall be analyzed monthly for the full suite of water quality indicators listed in Table 5.1.01 of the EIA. When sampling results from P-1 indicate stability is achieved, a verification sample (including 5 injection and production wells and 10 monitor wells) shall be analyzed for the full suite of water quality indicators listed in Table 5.1.01 of the EIA. The results of the final post restoration verification samples shall be sent to NRC for evaluation within thirty (30) days. Post restoration monitoring shall be discontinued only upon written notification by the USNRC, Uranium Recovery Licensing Branch.

Originally, License Condition No. 13 required the same operational and restoration monitoring for the monitor wells. The restoration monitoring program proposed by URI and modified by the staff, is adequate for the reasons detailed above. Therefore, the specific restoration monitoring now outlined in License Condition No. 17 causes the reference to restoration monitoring in License Condition No. 13 to become obsolete and we are deleting the reference to restoration monitoring in License Condition No. 13.

In accordance with the above, we recommend that License Condition No. 13 be amended to read as follows:

- 13. The 10 wells (6 perimeter ore zone monitor wells and 3 shallow and 1 deep monitor well) shown on Figure C-5-2 of the licensee's March 31, 1981 Technical Report shall be used for groundwater quality monitoring during solution mining operations prior to initiation of restoration. These wells shall be sampled for chloride and conductivity every two (2) weeks and once every month for alkalinity, calcium, vanadium, sodium, and uranium. Prior to termination of lixiviant addition or at six (6)

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months after operations begin whichever comes first, a set of samples from all of the monitor wells shall be analyzed for the full suite of water quality indicators listed in Table 5.1.01 of the EIA.

Originally, License Condition No. 20 monitoring requirements applied only to operations. This was an inadvertant error in wording made by NRC and we are recommending that the License Condition No. 20 requirements continue during restoration until restoration verification. We recommend that License Condition No. 20 be amended to read as follows:

20. Net flow rates for the well field shall be recorded whenever monitor well water levels are measured; barometric pressure at the site or vicinity and its effect on water levels shall also be recorded. Hydrologic monitoring shall continue as described in this condition during groundwater quality restoration until restoration verification.

Flow rates on each injection and production well and injection pressures shall be checked at least once per day. This check, noting any significant variations, shall be recorded on a daily log.

An evaluation of the net flow balance along with water level data in graphical and tabular form shall be submitted in a separate section of each quarterly report, as discussed in License Condition No. 23 below, until restoration has been verified.

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Approved by:

John J. Linehan
John J. Linehan, Section Leader
Operating Facility Section I

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