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Mr. Keith I. McConnell, Deputy Director  
Decommissioning and Uranium Recovery Licensing Directorate  
Division of Waste Management and Environmental Protection  
Office of Federal and State Materials and Environmental Management Programs  
U.S. Nuclear Regulatory Commission  
11545 Rockville Pike  
# 2 White Flint, Mail Stop T7 E-18  
Rockville, MD 20852-2738

Subject: License Amendment Request for Condition 30.A and 30.C  
Source Materials License SUA-1475  
Groundwater Corrective Action Program

Dear Mr. McConnell:

United Nuclear Corporation (UNC) requests an amendment to Source Materials License SUA-1475, Condition 30 to bring the license into conformance with recent advances that have been made with respect to the corrective action programs in the Zone 3 and Southwest Alluvial targeted areas.

Continued monitoring of existing and new wells during the temporary shutdown of the Southwest Alluvial corrective action pumping, as called for in Amendment no. 32 (NRC; March 8, 2001), are reported in the 2004, 2005 and 2006 Annual Review Reports prepared by N.A. Water Systems. The data provide the weight-of-evidence to support a permanent shutdown of the pumping wells and a discontinuance of the corrective action program in the Southwest Alluvium. The monitoring program for the Southwest Alluvium would be maintained for an unspecified period into the future to demonstrate continued compliance.

Revisions are proposed to the Zone 3 corrective action program to incorporate the progress that has been made towards the development of remedy enhancements that were placed into the license with Amendment no. 31 (NRC; December 29, 2000). The license should be updated to reflect the progress and current operations of the corrective action system in Zone 3.

Finally, a proposed change from quarterly to semi-annual monitoring is being requested based upon the empirical stability in groundwater quality monitoring results and groundwater levels that have been reported over the past several years.

As of September 1997 United Nuclear Corporation became a wholly-owned, indirect subsidiary of General Electric Company. GE Corporate Environmental Programs has been retained through a separate administrative services agreement to assist UNC both technically and administratively with environmental issues at the Church Rock site.

### **Existing Conditions**

30. The licensee shall maintain a compliance monitoring program consistent with the following:

A. Sample wells GW-1-3; EPA Wells 2, 4, 5, 7, 13, 14, 23, 25 and 28, and wells 420, 504-B, 509-D, 515-A, 517, 604, 613, 614, 624, 627, 732, 708, 711, 717, 719, 801, 802, 803, 808 and TWQ-142, on a quarterly frequency for chloride, ammonia, nitrate, sulfate, manganese, calcium, magnesium, sodium, bicarbonate, potassium, field-pH, TDS and water level, arsenic, beryllium, cadmium, chloroform, lead, lead-210, nickel, combined radium-226 and radium-228, selenium, thorium-230, uranium, gross alpha and vanadium. Wells EPA 8, 9, TWQ-143, 402, 412, 424, 446, 501A, 502A, 504A, 505A, 701, 702, 706, 707, 710, 712, 713, 7143, 805, and 807, shall be monitored for water level on a quarterly basis.

Notwithstanding the above, the licensee is only required to sample EPA wells after receipt of written authorization by the land owner to enter that area for the purpose of sampling groundwater from those specified wells. The licensee shall make every reasonable effort to obtain such authorization. If authorization is not obtained, the licensee shall inform the NRC, promptly.

B. Comply with the following groundwater protection standards at point of compliance Wells GW-1, GW-2, GW-3, 632, EPA-23, EPA-28, and 509-D in the Southwest Alluvium; 614, 604, EPA-4, EPA-5, and EPA-7 in Zone 1; and 517, 613, 708, and 711 in Zone 3:

Arsenic = 0.05 mg/l, beryllium = 0.05 mg/l, cadmium = 0.01 mg/l, gross alpha = 15.0 pCi/l, lead = 0.05 mg/l, lead-210 = 1.0 pCi/l, nickel = 0.05 mg/l, radium-226 and 228 = 5.0 pCi/l in Zone 3, 5.2 pCi/L in the Southwest Alluvium, and 9.4 pCi/L in Zone 1; selenium = 0.01 mg/l, thorium-230 = 5.0 pCi/l, total trihalomethanes = 0.08 mg/L, uranium = 0.3 mg/l and vanadium = 01 mg/l.

Should the groundwater protection standard for radium-226 and -228 in the Southwest Alluvium or Zone 1 be exceeded in any compliance well, then a verification sample from the well shall be collected and analyzed within 30 days. If the verification sample also exceeds the groundwater protection standard, the well shall be out of compliance. If the sample is below the groundwater protection standard, the well shall be in compliance and shall revert back to normal monitoring.

C. Implement a corrective action program in Zone 1 in accordance with the June 14, 1990, and July 1, 1991, amendment requests, with the addition of EPA-7 as a seepage collection well to achieve the groundwater standards in License Condition 30.B.

Implement a corrective action program in Zone 3 to achieve the groundwater standards in License Condition 30.B. Groundwater pumping in Zone 3 will cease temporarily to determine groundwater concentration trends for future remedial action for a period of 12 to 18 months, as determined by the NRC. A Post-Pumping Evaluation Report must be submitted to the NRC by December 1, 2001. This report must use tables, graphs, and iso-contour maps to illustrate groundwater quality trends. If necessary, as determined by the NRC, a Post-

Pumping Evaluation Report must be submitted to the NRC by June 1, 2002. If NRC standards are still exceeded on June 1, 2002, the licensee must submit either a modified active corrective action plan, an application for alternate concentration limits (ACLs) or an alternative to the specific requirements of 10 CFR Part 40, Appendix A in accordance with 84.c of the Atomic Energy Act (AEA) by August 1, 2002.

Implement a corrective action program in the Southwest Alluvium in accordance with "Amendment 2, Reclamation Plan, License No. SUA-1475" submitted by letter dated March 29, 1989, to achieve the groundwater standards in License Condition 30.B. Groundwater pumping in the alluvium will cease temporarily to determine groundwater concentration trends for future remedial action for a period of 12 to 18 months, as determined by the NRC. A Post-Pumping Evaluation Report must be submitted to the NRC by December 1, 2001. This report must use tables, graphs, and iso-contour maps to illustrate groundwater quality trends. If necessary, as determined by the NRC, a Post-Pumping Evaluation Report must be submitted to the NRC by June 1, 2002. If NRC standards are still exceeded on June 1, 2002, the licensee must submit either a modified active corrective action plan, an application for alternate concentration limits (ACLs) or an alternative to the specific requirements of 10 CFR Part 40, Appendix A in accordance with 84.c of the Atomic Energy Act (AEA) by August 1, 2002.

No corrective action program component, meeting the abandonment criteria stated in the March 29, 1989, submittal, shall be decommissioned without obtaining prior NRC approval.

Additional wells must be installed in Zone 3 and the Southwest Alluvium to determine the extent of groundwater contamination. Once these wells have been installed, they will be sampled in accordance with the groundwater monitoring program in License Condition 30A.

The licensee shall on a semiannual frequency, submit a ground-water monitoring report as well as submit a correction action program review, by January 30 of the following calendar year, that describes the progress towards attaining ground-water protection standards.

[Applicable Amendments: 2, 4, 5, 7, 11, 19, 21, 32]

### **Justification**

#### **Monitoring Well Installation and Sampling Revisions**

UNC proposes to delete the two sentences in Condition 30.C. that require the installation and sampling of additional wells in Zone 3 and the Southwest Alluvium because the work has been completed. Well NBL-1 was constructed in Zone 3 in 2001 and SBL-1 was completed in the Southwest Alluvium in 2004. Both wells serve the intended purpose to define the limits of seepage-impacted water migration. Condition 30.A. will be amended to include the new wells in the quarterly sampling program.

#### **Southwest Alluvium Revisions**

The corrective action program contained in the current license should be formally discontinued because the groundwater quality at all Point-of-Compliance (POC) wells have remained at or within

the standards set in the license for at least the past 8 quarters. All but one POC well have been within the groundwater protection standards for much longer; well 632 exceeded the radium standard for two consecutive quarters in 2004 although those were the only exceedances in several years of monitoring. The proposed amendment text therefore strikes reference to implementing a corrective action program in the Southwest Alluvium, and continues the monitoring and compliance requirements put forth in Conditions 30. A & B.

### **Zone 3 Revisions**

UNC's proposed amendment reflects the progress and current operations of the corrective action system in Zone 3 that were made in the course of performing the actions contemplated in license Amendment no. 31. Post-pumping evaluations have been reported in the annual review reports. An enhanced remedy involving hydraulic fracturing had also been proposed (MWH, October 27, 2004). Pilot testing and design work were completed (MACTEC, December 23, 2003), and the recommendations were implemented. MACTEC (June 2006) reported the results, which supported the continued operation of the new recovery wells and the installation of another well, but did not support using hydraulic fracturing techniques to improve hydraulic conductivity and well performance. Those recommendations have been fully implemented.

In addition, another pilot study was performed to evaluate the application of in-situ alkalinity stabilization to attain groundwater protection standards for Zone 3 (BBL, 2006). Those results were reported by Arcadis-BBL ( June 2007). They are significant because a mechanism that explains the universal decline in recovery well performance in Zone 3 was identified.

The net effect of these studies and tests is that a new set of pumping wells is currently in operation, and the location of the wells is such that they will not cause the same problems that led NRC and EPA to agree with the shut-down of the remedial action system in the first place. However, as with Zone 3 recovery wells in the past, the new wells are expected to exhibit steadily declining performance. While the currently operating system is helping to contain seepage-impacted water, it is no closer to meeting the groundwater protection standards and is not expected to attain them. Therefore, it is recommended that Condition 30. C be amended to extend the date to develop either a modified corrective action plan, applications for alternate concentration limits (ACLs), or an alternative to the specific requirements of 10 CFR Part 40, Appendix A in accordance with 84.c of the Atomic Energy Act (AEA).

### **Site-wide Revisions**

Groundwater quality and water levels display remarkably consistent trends as reported in the Annual Reports of the past several years (N.A. Water Systems, December 2004; N.A. Water Systems, December 2005; N.A. Water Systems, January 2007). UNC therefore recommends that the sampling frequency be changed from quarterly to semi-annual. This recommendation will result in savings to the compliance monitoring program without causing any hindrance to data quality or use.

Finally, UNC recognized that license amendment no. 37 inadvertently forgot to replace the analysis of "chloroform" with "total trihalomethanes" in Condition 30.A when it replaced the groundwater protection standard for chloroform with one for trihalomethanes. This proposed amendment request corrects this oversight.

**Proposed Amendment Text (changes shown in bold and strike-out)**

30. The licensee shall maintain a compliance monitoring program consistent with the following:

A. Sample wells GW-1-3; EPA Wells 2, 4, 5, 7, 13, 14, 23, 25 and 28, and wells 420, 504-B, 509-D, 515-A, 517, 604, 613, 614, 624, 627, 732, 708, 711, 717, 719, 801, 802, 803, 808, TWQ-142, **NBL-1 and SBL-1** on a **semi-annual** frequency for chloride, ammonia, nitrate, sulfate, manganese, calcium, magnesium, sodium, bicarbonate, potassium, field-pH, TDS and water level, arsenic, beryllium, cadmium, **total trihalomethanes**, lead, lead-210, nickel, combined radium-226 and radium-228, selenium, thorium-230, uranium, gross alpha and vanadium. Wells EPA 8, 9, TWQ-143, 402, 412, 424, 446, 501A, 502A, 504A, 505A, 701, 702, 706, 707, 710, 712, 713, 7143, 805, and 807, shall be monitored for water level on a **semi-annual** basis.

Notwithstanding the above, the licensee is only required to sample EPA wells after receipt of written authorization by the land owner to enter that area for the purpose of sampling groundwater from those specified wells. The licensee shall make every reasonable effort to obtain such authorization. If authorization is not obtained, the licensee shall inform the NRC, promptly.

B. Comply with the following groundwater protection standards at point of compliance Wells GW-1, GW-2, GW-3, 632, EPA-23, EPA-28, and 509-D in the Southwest Alluvium; 614, 604, EPA-4, EPA-5, and EPA-7 in Zone 1; and 517, 613, 708, and 711 in Zone 3:

Arsenic = 0.05 mg/l, beryllium = 0.05 mg/l, cadmium = 0.01 mg/l, gross alpha = 15.0 pCi/l, lead = 0.05 mg/l, lead-210 = 1.0 pCi/l, nickel = 0.05 mg/l, radium-226 and 228 = 5.0 pCi/l in Zone 3, 5.2 pCi/L in the Southwest Alluvium, and 9.4 pCi/L in Zone 1; selenium = 0.01 mg/l, thorium-230 = 5.0 pCi/l, total trihalomethanes = 0.08 mg/L, uranium = 0.3 mg/l and vanadium = 01 mg/l.

Should the groundwater protection standard for radium-226 and -228 in the Southwest Alluvium or Zone 1 be exceeded in any compliance well, then a verification sample from the well shall be collected and analyzed within 30 days. If the verification sample also exceeds the groundwater protection standard, the well shall be out of compliance. If the sample is below the groundwater protection standard, the well shall be in compliance and shall revert back to normal monitoring.

C. Implement a corrective action program in Zone 1 in accordance with the June 14, 1990, and July 1, 1991, amendment requests, with the addition of EPA-7 as a seepage collection well to achieve the groundwater standards in License Condition 30.B.

Implement a corrective action program in Zone 3 to achieve the groundwater standards in License Condition 30.B. **Groundwater pumping in Zone 3 will cease temporarily to determine groundwater concentration trends for future remedial action for a period of 12 to 18 months, as determined by the NRC. A Post Pumping Evaluation Report must be submitted to the NRC by December 1, 2001. This report must use tables, graphs, and iso-contour maps to illustrate groundwater quality trends. If necessary, as determined by the NRC, a Post Pumping Evaluation Report must be submitted to the NRC by June 1, 2002.** If NRC standards are still exceeded on June 1, 2010, the licensee must submit either a modified active corrective action plan, an application for alternate concentration limits (ACLs) or an alternative to the specific requirements of 10 CFR Part 40, Appendix A in accordance with 84.c of the Atomic Energy Act (AEA) by August 1, 2010.

~~Implement a corrective action program in the Southwest Alluvium in accordance with "Amendment 2, Reclamation Plan, License No. SUA-1475" submitted by letter dated March 29, 1989, to achieve the groundwater standards in License Condition 30.B. Groundwater pumping in the alluvium will cease temporarily to determine groundwater concentration trends for future remedial action for a period of 12 to 18 months, as determined by the NRC. A Post-Pumping Evaluation Report must be submitted to the NRC by December 1, 2001. This report must use tables, graphs, and iso-contour maps to illustrate groundwater quality trends. If necessary, as determined by the NRC, a Post-Pumping Evaluation Report must be submitted to the NRC by June 1, 2002. If NRC standards are still exceeded on June 1, 2002, the licensee must submit either a modified active corrective action plan, an application for alternate concentration limits (ACLs) or an alternative to the specific requirements of 10 CFR Part 40, Appendix A in accordance with 84.c of the Atomic Energy Act (AEA) by August 1, 2002.~~

No corrective action program component, meeting the abandonment criteria stated in the March 29, 1989, submittal, shall be decommissioned without obtaining prior NRC approval.

~~Additional wells must be installed in Zone 3 and the Southwest Alluvium to determine the extent of groundwater contamination. Once these wells have been installed, they will be sampled in accordance with the groundwater monitoring program in License Condition 30A.~~

The licensee shall on a semiannual frequency, submit a ground-water monitoring report as well as submit a correction action program review, by December 31 of each year, that describes the progress towards attaining ground-water protection standards.

[Applicable Amendments: 2, 4, 5, 7, 11, 19, 21, 32]

Please contact me if you have any questions.

Sincerely,



Roy S. Blickwedel  
Remedial Project Manager  
Corporate Environmental Programs

cc Larry Bush  
Paul Michalak  
Mark Purcell