40-8907

U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION 6
1445 Ross Avenue, Suite 1200, 6SF-LP
Dallas, TX 75202-2733

TRANSMITTAL

To:

Robin Brown
New Mexico Environment Department
Groundwater Quality Bureau
P.O. Box 26110
1190 St. Francis Drive
Santa Fe, NM 87502-6110

R. W. von Till
U.S. Nuclear Regulatory Commission
MS: T-8a33
Two White Flint North
11545 Rockville Pike
North Bethesda, MD 20852 - 2738

Diane Malone
Navajo Nation EPA
P.O. Box 2946
Window Rock, AZ 86515

Leonard Robbins
Navajo Regional Counsel
U.S. Bureau of Indian Affairs
P.O.Box 1060
Gallup, NM 87305

Roy S. Blickwedel
General Electric Company
640 Freedom Business Center
King of Prussia, PA 19406

From:

Mark Purcell
Remedial Project Manager
Louisiana/Oklahoma Project Management Section
Superfund Division
Tel. 214-665-6707
Fax. 214-665-6660

Date: March 22, 2004

Re: United Nuclear Corporation Superfund Site
Gallup, NM

Comment: I am transmitting copies of the recent EPA correspondence to UNC on the hydraulic fracturing proposal for Zone 3 and the supplemental feasibility study. I am also transmitting copies of some older EPA correspondence that you may not have received previously. I apologize if you did not receive them before.

NM7580

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

40-8907

Via Certified Mail
Return Receipt Requested

March 19, 2004

Mr. Larry Bush, President
United Nuclear Corporation
UNC Holdings 2
State Highway 566
21 miles northeast of Gallup
Gallup, NM 87305-3077

Subjects: Hydraulic Fracturing for Zone 3 and Supplemental Feasibility Study
United Nuclear Corporation Church Rock Superfund Site
Administrative Order (Docket No. CERCLA 6-11-89)

Dear Mr. Bush:

As a follow-up to the U.S. Environmental Protection Agency's (EPA's) March 10, 2004 letter to you on the above-referenced subject, I have enclosed additional comments which the EPA received from Mr. Patrick Antonio of the Navajo Nation Environmental Protection Agency (NNEPA). As you know, the enclosed comments were sent to you and your consultant, Mr. Blickwedel of General Electric, by electronic mail on March 15, 2004. Please address the enclosed comments in accordance with the requirements specified in EPA's March 10, 2004 letter.

If you have any questions, please contact me by telephone at 214-665-6707 or via e-mail at purcell.mark@epa.gov.

Sincerely,

Mark D. Purcell
Remedial Project Manager
Superfund Division

Enclosure

cc: R. Blickwedel, GE
R. Brown, NMED
R.W. VonTill, NRC
D. Malone, Navajo EPA

THE NAVAJO NATION

Navajo Nation Environmental Protection Agency
P.O. Box 339 Window Rock, Arizona 86515 (928) 871-7692

JOE SHIRLEY, JR.
PRESIDENT

FRANK DAYISH, JR.
VICE PRESIDENT

March 11, 2004

Mark Purcell
Superfund Division (6SF-LP)
U.S. Environmental Protection Agency - Region VI
1445 Ross Avenue
Dallas, TX 75202-2733

RE: Proposed Hydraulic Fracturing at the United Nuclear Church Rock Facility

Dear Mark:

From review of the December 23, 2003 "Final Report Hydraulic Fracturing Pilot Test Results and Preliminary Full Scale Design United Nuclear Church Rock Facility" prepared for UNC and from discussion at the February 26, 2004 "Technical Meeting on the Ground Water Remedy", I have derived the following comments.

(1) There are numerous borings that exist throughout the area of the Zone 3 plume. From the data associated with these borings, is UNC able to sufficiently characterize the subsurface structural geology in terms of identifying fractures, voids, and other potential conduits? These numerous borings within the area of the Zone 3 plume are potential points for short-circuiting.

(2) What are the in-situ stresses expected in Zone 3 and in the surrounding layers? Hydraulic fracturing will propagate perpendicular to the minimum principal stress in a formation. What is the fluid efficiency expected for the proposed hydraulic fracturing?

(3) During hydraulic fracturing of Zone 3, if the propagated fracture vertically migrates to the surface the hydraulic fracturing will cease and the fracture will be allowed to close in on itself. UNC has proposed seven recovery wells (RW-11 to RW-17). If there is any excursion encountered during hydraulic fracturing, how will this impact the placement of the recovery wells. How much displacement will be needed to relocate a hydraulic fracturing/recovery well locale?

(4) The fracture conductivity is the sum of the propped fracture width and the permeability of the propping agent. This conductivity will reduce with time due to increasing stress on the fracture, stress corrosion affecting proppant strength, proppant crushing, and proppant embedment into the formation. Will the proposed recovery wells be affected by this type of reduction of fracture conductivity? What is the expected life of these proposed recovery wells?

(5) UNC proposes to use sand as a propping agent in the hydraulic fracturing. If results of the fracturing are not favorable will UNC opt to use another propping agent?

(6) Fracture diagnostics for the proposed hydraulic fracturing will involve the use of surface tilt meters in a 32-unit array (for each well?). During Stage 2 of the pilot hydraulic fracturing operations, where the induced fracture moved up vertically 50 feet, the tilt meter array used did not detect a vertical component at the time. Will use of surface tilt meters be sufficient to detect any and all undesired vertical prolongations? Downhole tilt meters at depths near the zone to be fractured are useful for determining fracture height.

(7) The Zone 3 plume is migrating in a north-northeast direction. Increases in alkalinity in the ground water are the precursors to increases in acidic pH and metals. The northern-most monitoring well (NBL-01), prior to reaching the Navajo Nation boundary, is reportedly showing an increase in alkalinity. The proposed hydraulic fracturing is intended to stop the plume from advancing further northward. Is there a need to install another monitoring well further north of NBL-01 in Section 36 to assess whether the plume has stopped advancing? What are the conditions of the existing monitoring wells located near the Navajo Nation boundary?

(8) How will U.S. EPA measure success of the hydraulic fracturing? At what point (i.e., decrease in well pumping rates) will U.S. EPA decide that the hydraulic fracturing is not successful?

The following comments were supplied by staff from Navajo EPA's Underground Injection Control Program:

(1) Naturally occurring fractures at the facility site could act as conduits to the surface upon fracture stimulation.

(2) Since the zone in question (Gallup Sandstone Formation) crops out at the site, there is no overlying confining rock layer to contain the frac.

(3) Typically, the fracture gradient of a zone is estimated at 0.2 psi/ft of depth. At the very shallow depth of 200', the calculated fracture point of the rock is only 40 psi; the fracture pressures in *MACTEC*'s report (225-2982 psi.) far exceed this maximum pressure value.

(4) The recommended open-hole frac may be more difficult to control than a cased-hole frac, i.e., the frac may not go horizontally as designed.

(5) Typically, "frac jobs" have "sled runner" configurations, i.e., the induced fractures begin horizontally, but eventually turn vertically at their terminus. At the very shallow depths at this site, this means that the fractures could break to surface.

Thank you for the opportunity to provide these comments. If you have any questions, please contact me at (928) 871-7185.

Sincerely,

Patrick Antonio, Program Manager
Water Quality/NNPDES Program
Navajo Nation Environmental Protection Agency

XC: Diane Malone, Program Manager, NNEPA Superfund Program
File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

40-8907

Via Facsimile and Certified Mail
Return Receipt Requested

March 10, 2004

Mr. Larry Bush, President
United Nuclear Corporation
UNC Holdings 2
State Highway 566
21 miles northeast of Gallup
Gallup, NM 87305-3077

Subjects: Hydraulic Fracturing for Zone 3 and Supplemental Feasibility Study
United Nuclear Corporation Church Rock Superfund Site
Administrative Order (Docket No. CERCLA 6-11-89)

Dear Mr. Bush:

The United States Environmental Protection Agency (EPA) has completed its review of the United Nuclear Corporation's (UNC's) document entitled "Final Report Hydraulic Fracturing Pilot Test Results and Preliminary Full Scale Design, United Nuclear Church Rock Facility (Report), dated December 23, 2003. Based on its review, and the discussions between the EPA, UNC and other regulatory agencies at the February 26, 2004 meeting, the EPA has several concerns regarding the Report which must be adequately addressed before it will be approved. The EPA's comments are enclosed.

Please submit a revised Report which adequately addresses all of the enclosed comments within 30 days of receipt of this letter.

As also discussed during the February 26, 2004 meeting, the EPA believes it appropriate to conduct a Supplemental Feasibility Study (SFS) concurrent with the ongoing evaluation and potential full-scale implementation of hydraulic fracturing for Zone 3. The EPA recommended the SFS in its September 2003 Five-Year Review for evaluating other remedial alternatives and support of future EPA decision making on the ground-water remedial action at the UNC Church Rock Superfund site (Site). In the event that the hydraulic fracturing testing or implementation for Zone 3 is unsuccessful or it is disapproved by the EPA, an evaluation of other remedial alternatives will be necessary for any future EPA decision making.

Therefore, the EPA directs UNC to initiate the SFS by developing and screening remedial alternatives that will achieve the remedial objectives and Site performance standards set forth in the EPA's 1988 Record of Decision for Zone 3. UNC shall submit a Technical Memorandum on Remedial Technologies, Alternatives, and Screening to the EPA within 60 days of receipt of this letter. UNC shall follow EPA's current guidance on conducting feasibility studies (*see* EPA/540/G-89/004 - Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA).

Although the initial development and screening will be for Zone 3, please be aware that the EPA may direct UNC to include the Southwest Alluvium as part of the SFS. The remedial system for the Southwest Alluvium is currently shut down while UNC conducts a Natural Attenuation (NA) test. Based on our discussions at the February 26, 2004 meeting, the EPA agreed to allow UNC to continue the NA test for an additional year and submit a new report on the NA test results. If the results of the NA test do not support monitored natural attenuation as an alternative to the existing remedy, then UNC may be required to restart the remedial system for the Southwest Alluvium or perform an evaluation of other remedial alternatives to support any remedy change by the EPA.

If you have any questions, please contact me by telephone at 214-665-6707 or via e-mail at purcell.mark@epa.gov.

Sincerely,

Mark D. Purcell
Remedial Project Manager
Superfund Division

Enclosure

cc: R. Blickwedel, GE
R. Brown, NMED
R.W. VonTill, NRC
D. Malone, Navajo EPA

March 10, 2004

EPA COMMENTS

on the

United Nuclear Corporation's
Report on Hydraulic Fracturing Pilot Test Results
and Preliminary Full Scale Design
Church Rock Site, Gallup, NM

Dated December 23, 2003

General Comments:

1. The United States Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) are concerned that fractures induced by the hydraulic fracturing of Zone 3 may propagate in unwanted directions, causing the spread of contamination or naturally occurring petroleum deposits (oil) in the area. For example, fractures that propagate downward through the shale and lignite of Zone 2 and into the underlying Zone 1, causing the downward migration of contamination from Zone 3 into Zone 1.

   In light of such concerns, please modify the Report on Hydraulic Fracturing Pilot Test Results and Preliminary Full Scale Design (Report) to include a contingency plan for stopping the hydraulic fracturing operation in the event that induced fractures propagate into the underlying Zone 1 or an oil-bearing zone. Also specify in the contingency plan how the induced fractures shall be sealed in the event that they penetrate into such Zones. Further, describe how the operator will know if, and when, the propagating fractures penetrate into Zone 1 or an oil-bearing zone. Finally, specify as a contingency that additional monitoring wells will be constructed into Zone 1 to monitor water chemistry in the area of the propagating fractures should they propagate downward into Zone 1. Specify that the number and location of Zone 1 monitoring wells shall be determined based on the results of the hydraulic fracturing operation and subsequent approval by the EPA. Also specify that the frequency and duration of the Zone 1 ground-water monitoring, if performed, shall be determined by the EPA.

2. Please include with the revised Report supporting documentation such as case studies to substantiate UNC's/MACTEC's claim about the rock mechanics and anticipated fracture direction for Zone 3 which was discussed at the February 26, 2004 meeting with EPA and other regulatory agencies (*i.e.*, hydraulic fracturing will most likely cause induced fractures to propagate upward within Zone 3, rather than downward thru the underlying shale and coal layers of Zone 2 and into Zone 1).

Specific Comments:

1. *Section 4.2 – Recovery Well Installation, page 4-4, Item 3):*

   Provide details of the chemical composition of Super CBL® or Microbond® in an appendix and include an evaluation of such material to ensure that they will not introduce harmful substances into the ground water. These materials are proposed to be used as bonding agents in the cement used to fill the well annular space.

2. *Section 4.2 - Recovery Well Installation, page 4-5, Item 5):*

   The paragraph states that pea gravel and sand will placed at the bottom of the well to reduce the chance of the induced fractures propagating down the well and into the coal. Please provide documentation that supports such design.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

6D-8907

Via Facsimile and Certified Mail
Return Receipt Requested

February 13, 2004

Mr. Larry Bush, President
United Nuclear Corporation
UNC Holdings 2
State Highway 566
21 miles northeast of Gallup
Gallup, NM 87305-3077

Subject: EPA Comments on the Technical Impracticability Evaluation and Southwest Alluvium Natural Attenuation Test
United Nuclear Corporation Church Rock Superfund Site

Dear Mr. Bush:

The United States Environmental Protection Agency (EPA) has completed its review of the United Nuclear Corporation's (UNC's) submittal entitled "Final Report and Technical Impracticability Evaluation, Southwest Alluvium Natural Attenuation Test, Church Rock Site" (Report), dated November 2002. Based on its review, the EPA has several concerns regarding the Report which must be adequately addressed before the Report will be approved. Enclosed are the EPA's comments.

Please be prepared to discuss the enclosed comments at the upcoming technical meeting in Santa Fe, NM, on February 26, 2004.

If you have any questions, please contact me by telephone at 214-665-6707 or via e-mail at purcell.mark@epa.gov.

Sincerely,

Mark D. Purcell
Remedial Project Manager
Superfund Division

Enclosure

Mr. Larry Bush
EPA Comments on TI Evaluation and Southwest Alluvium NA Test Report
United Nuclear Corporation Church Rock Site
February 13, 2004

cc: R. Blickwedel, GE
R. Brown, NMED
R.W. VonTill, NRC
D. Malone, Navajo EPA

Mr. Larry Bush
EPA Comments on TI Evaluation and Southwest Alluvium NA Test Report
United Nuclear Corporation Church Rock Site
February 13, 2004

bcc: J. Turner, 6RC-SF
D. Williams, 6SF-LT

February 13, 2004

EPA COMMENTS

On the

United Nuclear Corporation's
Final Report and Technical Impracticability Evaluation
Southwest Alluvium Natural Attenuation Test
Church Rock Site, November 2002

General Comments

1. The conclusions regarding natural attenuation are not necessarily supported by the results of the trend analyses provided in the United Nuclear Corporation's (UNC's) document entitled "Final Report and Technical Impracticability Evaluation, Southwest Alluvium Natural Attenuation Test, Church Rock Site" (Report). Although trend analysis is a valid tool for assessing temporal changes in water quality, the predictive value is diminished when hydrologic systems are in a state of flux such as caused by cessation of pumping. Stabilization of water levels does not necessarily imply that the system has reached pre-pumping conditions. Additional time may be needed for chemical equilibrium to be reached, especially where pumping resulted in unsaturated conditions that upon cessation of pumping revert to saturated conditions. Similarly, changes in hydraulic gradient can alter the direction and rate of flow as well as residence times. Changes in storage also occur as water levels rise in the vicinity of the wells that were used for pumping. These changes will likely affect water quality. Additional monitoring data is needed in order to use trend analysis results to predict or evaluate natural attenuation.

   Basically, fluctuations observed during the period over which conditions are stabilizing in response to the pumps being shut down should not be included in the trend analysis if the goal is to predict results of natural attenuation. The graphs of constituent concentrations versus time for many of the wells suggest that geochemical conditions were changing during the period used for post-pumping trend analysis. Estimates of ground-water flow rates provided on page 3-3 also indicate several years may be required for ground water to flow through the site.

2. A spatial analysis should be done as part of the natural attenuation evaluation (e.g., to determine if wells in the vicinity of the pumping wells were affected differently from those farther away; and to identify which wells that would not be

expected to show effects of pumping cessation (or reestablishment of plume migration) given the anticipated flow rates and time frame of the test).

3. Geochemical mechanisms supporting observed and predicted changes in water quality over time and distance should also be included in the assessment. For example, uranium concentrations show increases following cessation of pumping (e.g., figures A-8, A-12, and A-14). Increasing concentrations of ligands such as carbonate and sulfate can increase the dissolved phase uranium concentrations (see reference such as Solutions, Minerals, and Equilibria by Garrels and Christ, 1965). For example, data shown in the Appendix A graphs suggest a positive correlation between sulfate concentrations and uranium concentrations. Likewise, trends should be viewed in conjunction with hydrologic conditions such as precipitation events to ensure that observed patterns, especially when evaluating short-term data sets, are not primarily responses to factors such as increased recharge.

4. Based on the data presented in the Report, the effectiveness of active remediation and natural attenuation cannot be compared. To do so, data must be obtained for a several month (or longer) period following stabilization of the hydrologic system or geochemical models should be employed that have some predictive capability. Increases in the concentrations of uranium and other constituents need to be addressed. Data provided in the UNC's subsequent submittal entitled "*The Results of Statistical Testing for Uranium*," suggest that uranium concentrations decreased as the system stabilized.

5. Low flow rates and rock-water interactions could require several years of more of monitoring to observe effects of the natural system on contaminant levels. One recommendation is that a predictive model of flow and transport of contaminants be constructed to demonstrate natural system influences on uranium, manganese, and other contaminants. A model such as PHREEQC by D.L. Parkhurst (USGS, public domain availability) or other reaction-coupled transport model could meet this objective as well as shedding light on all the natural attenuation processes active in this system (e.g., redox, ion-pairing, rock-water interactions, as well as advection/dispersion/dilution.

6. Statistical analyses should include a determination whether there are no significant differences between the trends (i.e., relative steepness, not just up or down) within a certain confidence interval.

7. The Technical Impracticability (TI) area proposed by UNC for sulfate and total dissolved solids (TDS) on Figure 3-2 only shows the on-property area. UNC needs to discuss its rationale for excluding off-property areas from the TI proposal.

Specific Comments:

1. *Section 2-2, end of first paragraph on page 2-2:*

   The Report states "The stable to declining water levels in these wells indicate that the system has fully recovered." As previously mentioned in the General Comments section, above, stabilization of water levels does not necessarily imply that the system has stabilized with respect to geochemistry.

2. *Section 2-3, page 2-3, regarding discussion of metals:*

   a. What geochemical processes are controlling manganese concentrations? Has the pH or eH changed in response to cessation of pumping? Proposing a mechanism for the observed decreases in manganese concentrations would support the viability of natural attenuation as an alternative to treatment. In the discussion of chloride concentrations exceeding standards, mention is made of Well 623. Data for this well are not included in table 2.2 and the location is not shown on the Report's maps.

   b. Well 509 D should not be used as an example for indicating that manganese levels are decreasing since manganese is higher in this well and has exceeded the cleanup standard over the last year.

3. *Section 2.4 - Statistical Evaluation, page 2-4, third paragraph:*

   a. UNC states "...most of these trends indicate an improvement in water quality..." Based on the graphs of constituent concentrations over time (Appendix A), the claim that trend analysis indicates an improvement in water quality isn't readily apparent. For example, sulfate concentrations in well EPA 25 show no statistically significant trend for the post-pumping period but the overall concentration appears to have increased when compared to data obtained during pumping. Trends observed when the hydrologic system is responding to the cessation of pumping do not necessarily have predictive value.

   b. UNC also states "... concentrations of most of the constituents remain within the range of concentrations that is observed in the baseline data." A comparison of before and after concentrations might be a better way to describe improvement but comparing the post-pumping data to the full range of data collected during pumping isn't necessarily a valid way to claim improvement. It would be better to compare the post-pumping data

with more recent pumping data, rather than the range over the full period, to account for temporal changes in concentration associated with mitigation efforts as described on page 3-10.

4. *Section 2.4 - Statistical Evaluation, page 2-5, second paragraph:*

The statement "...the data from the final quarter demonstrate three main features in the trends:" is unclear. Does this mean that the subsequent interpretation of trends in constituent concentrations was only based on the most recent three months of data?

5. *Section 2.4 - Statistical Evaluation, page 2-5, Item 1. - Increase in Upward Trends for Bicarbonate, Chloride, and TDS:*

Interpretations provided in this section are confusing. Does this section refer to an increase in the overall number of statistically significant upward trends for these constituents or to the difference in concentration before and after pumping, or to the last quarter of data? For example, Figure A.5 suggests an increase in bicarbonate concentrations after pumping but the trends both before and after the pumps where shut down are not increasing. Patterns for well 802 (Figure A.6) does support the change from declining concentrations in bicarbonate and TDS concentrations to increasing concentrations associated with the end of pumping. However, the nonlinear relation between chloride concentration and time makes it difficult to interpret trend analysis results and, looking at the data for the final quarter, suggests a declining trend in concentration.

6. *Section 2.4 - Statistical Evaluation, page 2-6, Item 3. - No change for the trends for Manganese, Chloroform, or Uranium:*

a. UNC states "The patterns of trends for manganese, chloroform, and uranium in the test data are similar to those in the baseline data and have remained unchanged throughout the test period." The Appendix A graphs of manganese concentrations for Wells 801and 803 show decreasing trends following cessation of pumping in contrast to increasing trends. Although the direction of the trend did not change after pumping stopped, the rate of increase in uranium concentrations in wells 802, 803, GW1, GW2, and GW3 is greater than during the period of pumping. The greatest uranium concentrations were measured after pumping stopped in several wells. This does not appear to support the statement that natural attenuation rather than pumping controls concentrations.

b. UNC also states "The lack of change in trends for these constituents confirms that natural attenuation mechanisms...are controlling

concentrations". On the previous page (p. 2-5), it is stated "the reversal in the chloride trend may indicate that the seepage front that was moving in response to shutting off the pumps has begun to stabilize". This statement implies that the system had not stabilized during much of the post-pumping analysis upon which trend analysis was based. In order to use trend analysis to predict concentrations resulting from natural attenuation processes, the data used in the analysis should be from a period during which the system had stabilized.

7. *Section 3.3.2, page 3-4, last sentence of first paragraph:*

What is the mechanism for attenuation of radionuclides?

8. *Section 3.3.2, page 3-4 last paragraph:*

The Report states "the seepage is migrating at a rate of 77 feet per year." Specify if this rate is estimated for the period of pumping or after the pumps where shut down? Changes in hydraulic gradient due to pumping might affect flow rates.

9. *Page 3-8, table showing median concentrations for seepage impacted and unimpacted water.*

a. Please clarify which wells are included in these groups and how many samples were used to determine the median value.

b. This table depicts the median concentration for sulfate in both seepage-impacted water and unimpacted water is 2,480 mg/L. However, levels of sulfate shown in Figure 3-2 appear to indicate that the median concentration for unimpacted water should be lower and concentration for impacted water should be higher. Please verify and revise the figure accordingly.

10. *Page 3-12:*

a. In the second paragraph, UNC states "The test demonstrates that the tailings seepage is naturally attenuated by the alluvium and that active remediation is no more effective than the natural system in controlling migration of constituents of concern." As stated in the General Comments, above, the EPA believes that such a conclusion has not been adequately demonstrated by UNC.

b. In the third paragraph, UNC states "...Overall, sulfate concentrations actually exhibited a decreasing trend during the NA test." However, several of the wells downgradient from the spoil area actually show increases in sulfate concentration (*see* Appendix A graphs for GW-1,

GW-3, 632, 802 and others). Even some of the wells that showed decreasing trends for sulfate after pumping was terminated, appeared to have higher sulfate concentrations after pumping ceased than during the period immediately prior to stopping the pumps. Because the wells downgradient of the pumping wells are the ones most likely to be affected by pumping, the changes in contaminant concentrations at those wells should be most likely to indicate the changes anticipated from natural attenuation. Thus, it would be more representative to assess overall changes in the downgradient wells.

c. In the third paragraph, UNC also states "The other regulated constituents exhibited no change in trend." Uranium concentrations appear to have increased in the magnitude of trends and in concentration after pumping was stopped in several downgradient wells.

11. *Section 3.4.3 – Restoration Timeframe Analysis, page 3-15, first paragraph:*

In the last sentence, UNC states "Essentially the restoration is already complete, and any further reductions in sulfate concentrations will be determined by the chemical equilibrium within the saturated Southwest Alluvium." The EPA believes such a conclusion is premature since it is not adequately supported by the results of the trend analyses provided by UNC in this Report.

12. *Figure 3-13 - Attenuation of sulfate by natural processes:*

Are there any processes other than dilution/dispersion and gypsum precipitation that have contributed to the decrease in sulfate concentrations?

13. *Section 4.0 - Summary and Conclusions, page 4-1, paragraph 1:*

The first sentence states "The results of the natural attenuation test demonstrate that turning off the extraction wells does not have and adverse effect on water quality." This statement is not well supported by the Appendix A graphs, especially for the wells downgradient from the pumping wells. In addition, chemical equilibrium may not have been reached during the post-pumping data collection period.

14. *Appendix B – Table B.7:*

The Baseline Trend reported for Mn, U, and chloroform is different from the baseline trend reported in December 2001 and February 2002. Please explain the reasons for the differences.

15. *Results of Statistical Testing Well 803 Uranium Concentration*

The results of statistical testing were provided to the EPA during its performance of the Five-Year Review and included data collected after the Report was prepared and submitted. The uranium concentrations presented for Well 803 indicate that uranium concentrations are declining after an initial post-pumping increase. The large variability in constituent concentrations following the pumping period is associated with stabilization of hydrologic and geochemical conditions. However, this variability contributes to a large standard error, which makes it difficult to ascertain statistically significant trends. This is also illustrated by the large variance exhibited in the impacted wells, which makes determination of statistically significant differences unlikely. The EPA believes that data collected prior to stabilization needs to be excluded from the statistical comparisons.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

40-8907

Via Overnight Mail

August 15, 2003

Mr. Larry Bush, President
United Nuclear Corporation
UNC Holdings 2
State Highway 566
21 miles northeast of Gallup
Gallup, NM 87305-3077

Re: Draft EPA Five-Year Review Report
United Nuclear Corporation Church Rock Superfund Site
McKinley County, NM

Dear Mr. Bush:

The United States Environmental Protection Agency (EPA) is providing the United Nuclear Corporation (UNC) with a copy of the draft EPA Five-Year Review report (Report) for the UNC Church Rock Superfund Site (Site) for information and review (*see* enclosure). The Report (text only) has been modified from the original draft prepared for the EPA by UNC and others (hereinafter the "UNC Draft Report"). The figure, tables, and several other appendices contained in the UNC Draft Report were not revised and, therefore, they are not included with the copy provided to you. Included with the Report are the interview records prepared by the EPA (Appendix F). A summary of the major revisions are discussed below. The EPA requests that any written comments you may have on the Report be provided in a separate document and be received by the EPA no later than September 2, 2003. The EPA plans to complete the Five-Year Review and sign the final Report by no later than September 24, 2003.

The major changes the EPA made to the UNC Draft Report are as follows:

- Shallow ground water: The EPA made findings with respect to the nature of the shallow ground water at the Site in the 1988 Record of Decision (ROD) and it is discussed in some detail in the ROD (*see also* Appendix H, Responsiveness Summary). The UNC Draft Report directly contradicted the ROD on this issue and, therefore, it was modified accordingly.

- Ground water extraction: The UNC's recommended action to decommission the ground-water extraction well system for the Southwest Alluvium was modified. The EPA is concerned with the increase in uranium levels in some monitoring wells since the system was shut off and does not believe that natural attenuation is as effective as pumping in controlling the migration of uranium. Therefore, the Report recommends that the Southwest Alluvium pumping operations be re-started to reestablish an hydraulic barrier to tailing seepage migration. The Report also recommends that further characterization and monitoring of the Southwest Alluvium contaminant plume be conducted (*e.g.*, delineation of down-gradient extent of plume)

- Supplemental feasibility study: The implementation of a supplemental feasibility study is recommended to identify further remedial alternative in support of any future CERCLA response action decision making (*i.e.*, ROD Amendment or Explanation of Significant Differences).

- Potential remedy changes: UNC's recommendation for a remedy change to natural attenuation and a technical impracticability (TI) waiver on ARARs for the Southwest Alluvium and Zone 1 of the Upper Gallup Sandstone have been deleted since such proposed changes would involve fundamental remedial changes that must be made in a formal modification to the ROD in accordance with the National Contingency Plan (NCP), 40 C.F.R. 300.435(c)(2). The Report now states that the EPA's analysis of natural attenuation and potential TI waiver for those units needs to be completed and appropriate decisions made as to their acceptability within the proper framework for such decision making.

- Institutional controls: UNC's recommendation for institutional controls to restrict the use of ground water for areas of the Southwest Alluvium and Zone 1 is included in the Report. However, such controls cannot be implemented without a formal modification to the ROD in accordance with the NCP. UNC's draft Tribal Resolution and Bureau of Indian Affairs (BIA) environmental right-of-way proposal (Appendix G of UNC Draft Report) have been deleted, as preliminary and unnecessary surplusage. Any such final agreements connected with site access and/or contaminant exposure must be approved by EPA. Note that by definition, all areas containing hazardous substances emanating from the facility are considered part of the site, as well as those "areas in very close proximity to the contamination necessary for the implementation of the response action." See definitions of "facility" and "on-site" at 40 C.F.R. 300.5.

- Long-term care transition: The UNC proposal for clarifying a transition to the Department of Energy long-term stewardship or exiting the CERCLA remedial action was deleted as inappropriate for this report. Although clarification may be necessary or desirable at some point, the EPA has not determined that the CERCLA response action has met the remedial action objectives and requirements set forth in the 1988 ROD (or any future EPA decision document for the Site). Thus, the EPA does not believe it appropriate to include such recommended action in this Report.

The EPA has provided copies of the Report to the U.S. Nuclear Regulatory Commission (NRC), the New Mexico Environment Department (NMED), the Navajo Nation Environmental Protection Administration (Navajo EPA), and the Bureau of Indian Affairs (BIA) under separate cover for review and comment. A copy of the Report is also being provided to your parent company, the General Electric Company (GE). The Report provided to UNC and to GE contains some additional minor modifications that are not contained in those provided to the Agencies listed above. If you have any questions, please contact me by telephone at 214-665-6707 or via e-mail at purcell.mark@epa.gov.

Sincerely,

Mark D. Purcell
Remedial Project Manager
Superfund Division

Enclosure

cc: R. Blickwedel, GE (w/ enclosure)
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Mr. Larry Bush
EPA's Draft Five-Year Review Report
United Nuclear Corporation Church Rock Site
August 15, 2003

bcc: J. Turner, 6RC-SF
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