January 7, 2003

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

SUBJECT: EROSION PROTECTION DESIGN CONCERNS IDENTIFIED AT RECENT SITE VISIT (TAC NO. L52459)

Dear Mr. Blickwedel:

The purpose of this letter is to detail U.S. Nuclear Regulatory Commission (NRC) requirements for the stabilization of uranium mill tailings sites, and to summarize NRC staff concerns with the erosion protection at the United Nuclear Corporation (UNC) Church Rock uranium mill tailings impoundment. At a June 13, 2002, site visit, staff identified several areas of concern in relation to erosion protection. During a September 16, 2002, teleconference, we discussed these concerns. At that time, you requested that NRC provide a letter identifying the areas of concern and discussing the regulatory requirements for the erosion protection. This letter provides you with a detailed discussion of our concerns and requirements.

The Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) was enacted to ensure that uranium mill tailings would be stabilized, disposed of, and controlled in a safe and environmentally sound manner. It also added Section 83c to the Atomic Energy Act of 1954 (AEA) which requires the Commission to determine compliance with regulatory requirements at the time of license termination. NRC regulations in 10 CFR Part 40 implement UMTRCA and Appendix A to that part provides the technical requirements.

Appendix A, Criterion 6 (1), requires that uranium mill tailings waste disposal be “in accordance with a design which provides reasonable assurance of control of radiological hazards to be effective for 1000 years, to the extent reasonably achievable, but in any case for at least 200 years....” In addition to ensuring stabilization of the tailings, NRC regulations specify that no ongoing maintenance of the disposal site should be required. Specifically, Appendix A, Criterion 1 states that, “Tailings should be disposed of in a manner that no active maintenance is required to preserve conditions of the site.” Lastly, Appendix A, Criterion 11E., states: “Material and land transferred to the United States or a State in accordance with this Criterion must be transferred without cost to the United States or a State other than administrative and legal costs incurred in carrying out such transfer.” Therefore, the erosion protection of a site must be designed and constructed such that both the material and design will not degrade within the design life. Any movement of rock or deposition of sediment within the constructed design prior to license termination clearly indicates degradation and the construction or design should be closely reviewed for compliance with Appendix A.

NRC staff visited the Church Rock site on June 13, 2002, in response to concerns raised by the Department of Energy (DOE) in a letter to NRC dated June 7, 2001. DOE will be the long-term custodian of the site. During this visit, staff noted several areas where erosion control features were damaged and did not meet the requirements of 10 CFR 40, Appendix A. It appeared that the design had degraded in several areas around the site and, in other areas, the erosional features appeared to require maintenance which is contrary to the requirements of Appendix A. Also attending that visit was Carl Jacobson, a DOE representative. Mr. Jacobson also noted his concern with the condition of the erosion protection during this visit. A letter to you dated July 24, 2002, summarized the site visit and the NRC staff's five main areas of concern.

In the September 16, 2002, teleconference with you and NRC staff, we discussed the areas in which the design and construction appear to be deficient and possible methods of resolution. In general, where damage has been identified, the options are: 1) repair the damage or construction deficiencies, 2) re-design, and 3) justify the adequacy of the existing design in light of the damage. For your convenience, a summary of these issues follows.

I. Sediment in Branch Swales (on-pile collection channels)

The area of concern noted is the sedimentation in the branch swales or the on-pile collection channels. These are shallow channels which direct flow off the pile. However, large amounts of sediment have accumulated in these channels which reduces the capacity of the channel to carry flow. If the channels should become filled with sediment, flow off the top of the tailings impoundment would not be controlled. The erosive forces of the concentrated flow could damage the tailings impoundment. The sediment may be a result of deposits from run-off of storm events or from windblown material off the top of the pile. In any case, the staff considers this to be a degradation of the design.

Possible methods of resolution include:

1) Redesign sediment-handling ability of channels. This approach has been used at other sites to include the use of sediment traps, channel enlargement, and re-routing of channels.
2) Show by analysis that the sediment accumulating in the branch channels is not a problem. This can be accomplished by using a worst case scenario, which would determine if the sediment is a factor and whether additional sediment analysis is warranted.
3) Provide funding for long-term maintenance of the channels. The cost may be determined by estimating the volume of sediment deposited in the channels on an annual basis and determining the cost of removal.

II. Sediment in North Upstream Diversion Channel and Poor Condition of the Road

Sediment has accumulated in the diversion channels upstream of the roadway/berm and future sedimentation is expected. A complete blockage of the channels could occur with additional sediment. Flood flows could overtop the berm and flow onto the top of the tailings pile causing tailings to be eroded. Collector channels and the top slope are not designed for such large flows. It is unclear whether the road was included in the design and this should be further investigated and evaluated. Assuming it is included in the design, flows could be ponded behind the berms, causing saturation and failure of the berm. The berm itself is in poor

condition and is marginally stable in the long-term. This potential for additional degradation increases risk to the public and the environment.

Possible methods of resolution include:

1) Analyze stability of slopes of the berm and make necessary repairs.
2) Remove existing sediment and provide funding for long-term maintenance of the channels. The cost may be determined with the same method as stated above.
3) Redesign sediment-handling ability of channels. This can be accomplished using many different methods, possibly including sediment traps, channel enlargement, and channel re-routing.
4) Show by analysis that the sediment accumulating in the channel is not a problem. This can be accomplished by using a worst case scenario which would determine if the sediment is a factor and whether additional sediment analyses are warranted.

III. Damage to "Jetty"

A recent flood in the Pipeline Arroyo caused some movement of the rock jetty which is perpendicular to the flow of the arroyo. The jetty was constructed to prevent the main drainage west of the cell from migrating into the tailings impoundment. The rock movement indicates a degradation of the design. In addition, the arroyo channel on the downstream side of the jetty is headcutting toward the jetty.

Possible methods of resolution include:

1) Redesign the jetty and increase rock size. NUREG-1623, "Design of Erosion Protection for Long-term Stabilization," provides methods to calculate a more accurate probable maximum flood.
2) Show by analysis that the rock has been accurately sized.
3) Provide funding for long-term maintenance of the arroyo channel and the rock jetty. The cost may be determined by estimating the amount of rock movement on an annual basis and determining the cost of repair.

IV. Erosion at Southwest End of Embankment

A gully formed during recent storms on the southwest side of the tailings embankment. This is a problem because further degradation could occur causing a release of the tailings.

One method of resolution for this issue is the repair of the damage to the impoundment. We understand that UNC has agreed to repair the gully.

V. Differential Settlement on Top of the Tailings Impoundment

The top of the impoundment has settled at different rates causing the topography of the top of the impoundment to be pitted. This is a problem because an uneven surface creates turbulence in run-off which may be erosive.

One method of resolution for this issue is to fill and re-grade settled areas. We understand that UNC has agreed to fill and re-grade settled areas.

We have suggested several possible alternatives for your consideration regarding erosion control protection issues at Church Rock. However, we would consider additional proposals to resolve this issue. We have also attempted to clarify our concerns and explain the requirements under which this site is regulated and will ultimately be transferred.

In accordance with 10 CFR 2.790 of NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any question regarding this matter, please feel free to contact NRC Project Manager, William von Till at 301-415-6251 or at rwv@nrc.gov or Ms. Jill Caverly at 301-415-6699 or at jsc1@nrc.gov.

Sincerely,

/RA/

Daniel M. Gillen, Chief
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

cc: Art Kleinrath, DOE-Grand Junction
Mark Purcell, U.S. EPA, Region 6
Marcy Leavitt, New Mexico Environmental Department
Diana Malone, Navajo EPA

January 7, 2003

We have suggested several possible alternatives for your consideration regarding erosion control protection issues at Church Rock. However, we would consider additional proposals to resolve this issue. We have also attempted to clarify our concerns and explain the requirements under which this site is regulated and will ultimately be transferred.

In accordance with 10 CFR 2.790 of NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any question regarding this matter, please feel free to contact NRC Project Manager, William von Till at 301-415-6251 or at rwv@nrc.gov or Ms. Jill Caverly at 301-415-6699 or at jsc1@nrc.gov.

Sincerely,

/RA/

Daniel M. Gillen, Chief
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

cc: Art Kleinrath, DOE-Grand Junction
Mark Purcell, U.S. EPA, Region 6
Marcy Leavitt, New Mexico Environmental Department
Diana Malone, Navajo EPA

TAC NO L52459 (CLOSED)

DISTRIBUTION: Accession No.: ML030080471
ACNW CNWRA CCAIN/RIV FCFBr/f

G:\FCLB\Uranium Recovery Section\church rock rock.wpd

OFC	FCFB	FCFB	FCFB	OGC	FCFB	FCFB
NAME	JCaverly*	Wvontill*	BGarrett*	STreby	GJanosko	DGillen
DATE	12/ /02	12/10/02	12/10/02	1/03/03	1/03/03	1/07/03

***see previous concurrence **OFFICIAL RECORD COPY**