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Document Control Desk  
U.S. Nuclear Regulatory Commission  
11555 Rockville Pike  
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**SUBJECT:** Response to Questions Dated September 21, 2005 Concerning  
Decommissioning Plan for the Ward Center for Nuclear Studies at Cornell University,  
TRIGA Reactor, Docket No 50-157, License R-80 and the ZPR, Docket No. 50-97,  
License R-89

To Whom it May Concern:

Attached to this letter are Cornell's responses to your questions posed by e-mail, dated September 21, 2005, related to the Decommissioning Plan (DP) for the Ward Center for Nuclear Studies at Cornell University, Revision 1, July 2003 (DP) for Facility Operating Licenses No. R-80 and R-89 for the Cornell University Reactors, as originally submitted to your office in August 2003.

Please review these responses and advise us of any additional information or clarification that you require. Modified pages reflecting these responses have also been attached.

By my signature below, I hereby affirm that I am authorized to represent Cornell University in these matters and that the statements made in these responses are true and accurate to the best of my knowledge and belief.

Sincerely,

A handwritten signature in cursive script that reads "Charles R. Fay".

Charles R. Fay  
Vice Provost for Research Administration  
TRIGA D&D Project Director

cc: D. Hughes

Enclosures: Questions and Responses (1 page)  
Modified Pages

A 020

**Attachment A:**  
***Responses to Questions Sent by E-mail, September 21, 2005, regarding,  
Cornell University Research Reactors, Docket No. 0-157/97***

**Question No. 1:**

In the Decommissioning Plan for the Ward Center for Nuclear Studies at Cornell University, TRIGA Reactor, Appendix B, Environmental Report, you provide two different dose estimates for the complete project. On Page 26 it is stated that the collective dose equivalent estimate to workers for the entire decommissioning project is about 18 person-rem. However, on Page 33 it is stated that the total dose estimated for decommissioning workers is 4 person-rem for the entire project evolution. Please discuss this apparent inconsistency.

**Response to Question No. 1:**

*The total dose estimate for decommissioning workers discussed on page 33 of the Environmental Report should have been 18 person-rem. This collective dose estimate is consistent with that discussed on page 26 of the Environmental Report and with the collective dose estimate discussed in Section 3.1.4 of the Decommissioning Plan.*

*To prepare the collective dose estimate for the decommissioning, 2 different references were used. The first reference, NUREG/CR-1756 supported an estimate of 18 person-rem. The second reference, Decommissioning Techniques for Research Reactors, Vienna, International Atomic Energy Agency, 1994, supported an estimate of 4 person-rem. In preparing the Decommissioning Plan a decision was made to use the more conservative dose estimate.*

*Unfortunately when the Environmental Report was issued the reference to the collective dose of 4 person-rem on page 33 of the Environmental Report was missed. In addition, Reference 5-9 on page 35 of the Environmental Report should have been updated to reflect the use of NUREG/CR-1756.*

**Question No. 2:**

In the same document on Page 29 it is stated that there will be approximately 4,620 cubic feet of low level radioactive waste generated during the Ward Center decommissioning. However, on page 33 the statement is made that the proposed action could generate approximately 12,000 cubic feet of low level radioactive waste. Please discuss this apparent inconsistency.

**Response to Question No. 2:**

*The estimated volume of radioactive waste discussed to on Page 33 of the Environmental Report should have been 4,700 cubic waste. This estimated volume is consistent with the estimated volumes discussed on page 29 of the Environmental Report, Section 3.2.2 of the Decommissioning Plan, and Section 4.2 of the Decommissioning Cost Estimate.*

#### 4.8 Cumulative Effects

No significant cumulative effects are expected from the proposed action, as discussed below:

Human Health - The total dose estimated for decommissioning workers is 18 person-rem for the entire project evolution. This estimate will be achieved by utilizing ALARA practices including planning of work activities, utilization of engineered safeguards, and minimization of exposure times. The decommissioning will be conducted under a Radiation Work Permit system using written procedures to ensure proper planning, training, and evaluation of potential risks. The 18 person-rem total dose estimate was taken from NUREG/CR-1756 (Ref. 5-9). The estimate in NUREG/CR-1756 was developed for a reference TRIGA research reactor very similar to the Cornell TRIGA reactor.

The doses to members of the general public, as a result of decommissioning activities described in the Ward Center Decommissioning Plan, are expected to be negligible. The dominant internal exposure pathway for members of the public is inhalation. The dose to the public is estimated to be negligible as access to the area surrounding the facility is restricted and decontamination activities with potential for airborne activity will be conducted utilizing engineered safeguards such as HEPA-equipped enclosures. In addition, temporary barriers with a HEPA filter system will be utilized during activities that have the potential to generate airborne radioactivity. Potential airborne radioactivity should be negligible resulting in a negligible potential internal dose to the general public.

The estimate of negligible dose to members of the public can also be obtained from the estimate given for the reference research reactor in the *Final Generic Environmental Impact Statement on Decommissioning Nuclear Facilities* (NUREG-0586) (Ref. 5-5). In Section 7.3.1 of NUREG-0586, the dose to the public as a result of decommissioning operations at the reference research reactor - including truck transportation of radioactive waste - is "estimated to be negligible (less than 0.1 person-rem)." This estimate of less than 0.1 person-rem includes both internal (from inhalation and ingestion) and external exposure doses.

Waste Generation - The proposed action could generate approximately 4,700 cubic feet of low-level radioactive waste. The waste requiring disposal would be shipped to either the Barnwell, South Carolina, or the Envirocare of Utah disposal site. Both waste sites have sufficient capacity to receive the waste. The waste to be processed prior to disposal would be shipped to a licensed waste processor.

Cultural Resources - No cultural resources would be impacted by the proposed action.

Population and Land Use - Only temporary employment for a few contractors would be provided by the proposed action. No increase in population would occur. Land use would not change.

**5.0 REFERENCES**

- 5-1 National Council on Radiation Protection and Measurements (NCRP). Ionizing Radiation Exposure of the Population of the United States. Report No. 93. 1987.
- 5-2 U.S. EPA. "Risk Assessment Guidance for Superfund, Volume 1 Human Health Evaluation Manual (Part A)." Office of Emergency and Remedial Response, U.S. EPA, Washington D.C. 1989.
- 5-3 U.S. EPA. "Risk Assessment Methodology Draft Environmental Impact Statement for Proposed NESHAPS for Radionuclides." Vol. 1. U.S. Environmental Protection Agency, Office of Radiation Programs. Washington D.C.
- 5-4 *Nuclides and Isotopes, Chart of Nuclides; 14<sup>th</sup> Edition*, Nuclear Energy Operations, General Electric Company, San Jose, CA; 1989.
- 5-5 US NRC, NUREG-0586, *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, August 1988.
- 5-6 NUREG-1507, *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*
- 5-7 US NRC, NUREG-1727, *NMSS Decommissioning Standard Review Plan*, September 2000
- 5-8 US NRC, NUREG-1757 Vol. 1, *Consolidated NMSS Decommissioning Guidance Decommissioning Process for Materials Licenses*, September 2002.
- 5-9 NUREG/CR-1756, *Technology, Safety and Costs of Decommissioning Reference Nuclear Research and Test Reactors*, March 1982.