

APR 5 1988

IMUF:DAM

DOCKET NO: 70-1068

LICENSEE: University of Florida (UF)

SUBJECT: SAFETY EVALUATION REPORT, LICENSE AMENDMENT APPLICATION DATED  
FEBRUARY 2, 1988, AS SUPPLEMENTED FEBRUARY 26, 1988, RE  
NONDESTRUCTIVE EXAMINATION OF SPERT FUEL RODS AND CHANGE IN  
STORAGE LOCATION

I. Background

On February 2, 1988, UF submitted an amendment application requesting authorization for the movement of SPERT fuel rods for nondestructive testing purposes and for a change in the storage location of the fuel. The license currently authorizes the storage only of 190 kilograms of U-235 contained in SPERT fuel rods in Room 3 of the Nuclear Research Field Building.

II. Discussion

A. Nondestructive Testing

In response to 10 CFR 50.64, UF intends to convert the Training Reactor Core from high-enriched to low-enriched fuel. UF has received a grant from the Department of Energy that will allow the qualification of some of the SPERT fuel for this conversion. This qualification will involve X-ray analysis of SPERT fuel rods to assure the integrity of the welds.

B. Proposed Storage

The SPERT fuel is currently stored in Room 3 of the Nuclear Research Field Building. The licensee is requesting authorization to relocate the storage of the fuel to an adjacent location (Room 5) in the Nuclear Research Field Building. Room 5 originally housed the SPERT pulsing experiments. The licensee has stated that the new storage configuration will be identical to the one currently used.

C. Radiation Safety

1. Nondestructive Testing

In the supplement, UF states that the SPERT fuel rods will be under direct surveillance when not secured in the currently authorized storage location. Contamination and personnel monitoring programs will also be implemented for the movement and examination of the SPERT fuel rods. A Radiation Work Permit (RWP) will be utilized to outline radiation protection requirements and document personnel exposures. However, the licensee has not addressed the review and approval process for the RWP.

8804110314 880405  
PDR ADOCK 07001068  
C PDR

APR 5 1988

Therefore, staff recommends the following condition to ensure that RWPs are reviewed and approved by administrative and safety personnel:

Prior to implementation, all Radiation Work Permits shall have been reviewed and approved by the University of Florida Safety Review Subcommittee for the UFSA Facility and by the Director of Nuclear Facilities.

Staff believes that the licensee's radiation safety controls along with the above condition should be adequate for the safe handling of the rods during the proposed testing.

2. Release of SPERT Assembly Equipment and Room 3

In the application, the licensee states that instrumentation and equipment, previously utilized for the operation of the SPERT assembly in Room 5, will be monitored and released for unrestricted use. The supplement adds that upon completion of the SPERT fuel transfer to Room 5, the current storage location (Room 3) will be surveyed and returned to unrestricted use. However, the licensee has not committed to contamination release limits for the equipment in Room 5 or for Room 3. Therefore, staff recommends the following condition to provide the licensee with acceptable guidance for the release of potentially contaminated items and areas to unrestricted use:

Upon termination of use or prior to release of equipment for unrestricted use, the facility location(s) and equipment shall be decontaminated in accordance with the "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," August 1987.

D. Criticality Safety

1. General

Each SPERT fuel rod consists of  $4.81 \pm 0.15$  w/o U-235 uranium dioxide pellets contained in Stainless Steel tubing. The fuel pellets are right circular cylinders with a nominal diameter of 0.42 inches. The active fuel length of the rod is 36 inches.

APR 5 1988

## 2. Room 5 Storage Facility

The overall storage arrangement will consist of three arrays 14 feet long and 40 inches apart edge to edge. Each array is a vertical slab of steel-framed storage containers that accommodate rows of seven fuel rods. The vertical length of a storage container is 28 inches. The staff calculated this array assuming a maximum enrichment of 5.0 w/o U-235 and utilizing the Hansen-Roach 16 group cross-section set which is found in the SCALE program, along with KENO V.a., a Monte Carlo code. Staff has determined the  $k_{eff}$  for the storage array to be about 0.84. No credit was taken for the absorption qualities of the stainless steel clad or the steel containers, and the  $k_{eff}$  is independent of the degree of water moderation within and between the arrays or the degree of concrete reflection surrounding the array.

## 3. Handling of Fuel

To ensure that the SPERT rods will remain safely subcritical when moved to and from the nondestructive testing area, the licensee has committed to having no more than 20 rods removed from the storage room at any one time. The 20 rods correspond to no more than 787 grams of U-235. The staff has independently confirmed that this mass is below 45 percent of the critical mass for 0.4-inch and 0.6-inch diameter rods with  $UO_2$  - water lattices as specified in DP-1014.

To ensure that the SPERT fuel will remain safely subcritical when moved to the new storage location, the licensee has committed to handling no more than one storage container at any one time. Based on the calculations above for the 3.8 inch slabs, subcriticality is assured.

## 4. Criticality Monitors

The licensee has committed to maintaining a criticality monitoring system in accordance with Condition 10 of the license.

## E. Environmental Protection

This licensing action is in accordance with 10 CFR 51.22(c)(14)(v), and therefore, neither an Environmental Assessment nor an Environmental Impact Statement is warranted for this action.

APR 5 1988

III. Finding/Recommendation

Staff finds that the proposed changes to the license will have no adverse effect on the health and safety of UF personnel and the public or on the environment. Based on this finding and the discussion above, it is recommended that the license be amended in accordance with the application as supplemented and subject to the conditions developed by the staff.

The NRC Region II Inspector has no objection to this Licensing Action.

Original Signed By:

David A. McCaughey  
 Uranium Fuel Section  
 Fuel Cycle Safety Branch  
 Division of Industrial and  
 Medical Nuclear Safety, NMSS

Original Signed By:

Approved by:

Jerry J. Swift, Section Leader

OFC :	IMUF:	IMUF:	IMUF:	IMUF:
NAME:	DAMcCaughey:mh:	VLPharpe:	WSPennington	JJSwift:
DATE:	3/23/88:	3/24/88:	3/23/88:	3/24/88:

OFFICIAL RECORD COPY

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT  
PRIOR TO RELEASE FOR UNRESTRICTED USE  
OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE,  
OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission  
Division of Industrial and  
Medical Nuclear Safety  
Washington, DC 20555

August 1987

8708060434 4pp

The instructions in this guide, in conjunction with Table 1, specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.
2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.
3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.
4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:
  - a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.
  - b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be file<sup>1</sup> with the Division of Industrial and Medical Nuclear Safety, U. S. Nuclear Regulatory Commission, Washington, DC 20555, and also the Administrator of the NRC Regional Office having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

- a. Identify the premises.
- b. Show that reasonable effort has been made to eliminate residual contamination.
- c. Describe the scope of the survey and general procedures followed.
- d. State the findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.



TABLE 1  
ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES <sup>a</sup>	AVERAGE <sup>b c f</sup>	MAXIMUM <sup>b d f</sup>	REMOVABLE <sup>b e f</sup>
U-nat, U-235, U-238, and associated decay products	5,000 dpm $\alpha$ /100 cm <sup>2</sup>	15,000 dpm $\alpha$ /100 cm <sup>2</sup>	1,000 dpm $\alpha$ /100 cm <sup>2</sup>
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm <sup>2</sup>	300 dpm/100 cm <sup>2</sup>	20 dpm/100 cm <sup>2</sup>
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm <sup>2</sup>	3000 dpm/100 cm <sup>2</sup>	200 dpm/100 cm <sup>2</sup>
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm $\beta\gamma$ /100 cm <sup>2</sup>	15,000 dpm $\beta\gamma$ /100 cm <sup>2</sup>	1000 dpm $\beta\gamma$ /100 cm <sup>2</sup>

<sup>a</sup>Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

<sup>b</sup>As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

<sup>c</sup>Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

<sup>d</sup>The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

<sup>e</sup>The amount of removable radioactive material per 100 cm<sup>2</sup> of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

<sup>f</sup>The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.