

DEC 12 1989

DOCKET NO: 70-1257
LICENSEE: Advanced Nuclear Fuels Corporation (ANF)
Richland, WA
SUBJECT: SAFETY EVALUATION REPORT, LICENSE AMENDMENT APPLICATION DATED
NOVEMBER 20, 1989, RE STORAGE OF URANIUM OXIDE PELLETS IN
TRAILERS OR FREIGHT CONTAINERS

Background

ANF is currently authorized to store containers of enriched uranium at the facilities described in the license. In the subject application, ANF requests authorization to store uranium oxide fuel pellets enriched up to 5.0 w/o U-235 in additional facilities. A safety demonstration and nuclear criticality safety analysis were submitted in support of the application.

Discussion

Storage of Fuel Pellets (Proposed)

ANF stores uranium oxide fuel pellets enriched up to 5.0 w/o U-235 in the Packaged Radioactive Materials Storage Building. The licensed material is stored in closed containers which are externally free of significant contamination.

In the subject application, ANF proposes to increase their storage capacity for these fuel pellets. ANF states that additional facilities are needed to temporarily accommodate the storage of pellets pending shipment. The facilities will consist of weather-tight trailers or freight containers located near the south end of the Uranium Oxide Building within the restricted area. The licensee states that the facilities will be monitored by the existing criticality alarm system.

The fuel pellets will be contained in pellet boxes (suitcases) and stored on pallets in a planar array on the floor of the trailers or freight containers. The suitcases will be sealed and free of external contamination. The storage facilities will be controlled with a Radiation Work Permit and subject to the licensee's radiological safety procedures, as well as nuclear criticality safety analyses and specification requirements. ANF adds that the proposed activity will not result in any liquid or gaseous effluents.

Nuclear Criticality Safety

Fuel pellets will be loaded end-to-end on corrugated plastic trays which are 7.75 inches wide and 24.88 inches long. These trays will be stacked to a maximum height of 4.87 inches and placed in the center of the steel base of a suitcase. The steel base is 9.37 inches wide, 26.5 inches long, and 0.12 inches thick. Once loaded, a 0.06-inch thick steel lid will be placed over the pellet stack and secured to the base plate. These suitcases may then be placed in a planar

array for storage. ANF reports that, under normal conditions, the k-effective of an infinite array of suitcases is about 0.79, assuming a maximum pellet enrichment of 5.0 w/o U-235, a hydrogen to uranium atom ratio of 2.26 inside the suitcase, and reflection on the top by 30 cm of water and on the bottom by 30 cm of concrete.

In addition, ANF has analyzed two credible abnormal conditions, optimum moderation and double stacking. Under optimum moderation conditions, the resulting k-effective was reported as 0.956 ± 0.004 . For an infinite array of suitcases stacked two high, the k-effective was reported as 0.972 ± 0.005 . Since this exceeds the k-effective criteria of 0.97 for abnormal conditions as established in the license, ANF has committed to a single planar storage array for the proposed activity.

The staff independently determined the k-effective values for the normal, optimum moderation, and double stacked conditions to be 0.766 ± 0.004 , 0.927 ± 0.003 , and 0.951 ± 0.004 , respectively.

The licensee's calculations were performed using the Hansen-Roach 16-group cross-section set along with KENO-Va, a Monte Carlo code. The staff's calculations were performed using the 27-group cross-section set which is found in SCALE, along with KENO-Va.

Conclusion/Recommendation

Based on the discussion, the staff concludes that the licensee's commitments in addition to the existing radiation and nuclear criticality safety programs are adequate for the proposed activity. Furthermore, the staff concludes that the proposed activity will not adversely affect public health and safety or the environment. Therefore, the staff recommends that the application be approved.

The Region V Principal Inspector has no objection to this proposed 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:

W. Scott Pennington
 Uranium Fuel Section
 Fuel Cycle Safety Branch
 Division of Industrial and
 Medical Nuclear Safety, NMSS

Approved by:

Original Signed By:

George H. Bidinger, Section Leader

| | | | |
|-----------------------|---------------------|-------------|-----------------|
| OFC:IMUF: <i>MB</i> | IMUF: | IMUF: | IMUF: <i>GH</i> |
| NAME:WSPennington:mh: | VLTha <i>type</i> : | DAMcCaughy: | GHBidinger: |
| DATE:12// /89: | 12/11 /89: | 12/11 /89: | 12/11 /89: |