



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING EXEMPTION FROM 10 CFR 73.50 AND 73.60

FACILITY OPERATING LICENSE NO. R-97

DOCKET NO. 50-160

Introduction

By letter dated November 2, 1977, as supplemented by letter dated August 17, 1978, the Georgia Institute of Technology (the licensee) requested an exemption to store a plutonium beryllium (PuBe) neutron source containing .08 kilograms of plutonium (.2 kg formula quantity) in its reactor building, without the additional physical security measures required by 10 CFR 73.50 and 73.60. Storage of this neutron source in the reactor building brings the total amount of non-exempt special nuclear material (SNM) stored by the licensee to 5.114 kg (formula quantity). Under 10 CFR 73.50 and 73.60, additional security measures are required when the amount of SNM possessed by a licensee at a site exceeds 5.000 kilograms (formula quantity).

Discussion

In its letter of November 2, 1977, the licensee stated that it possessed 4.888 kg of non-exempt special nuclear material in the form of reactor fuel elements and .026 kg in forms used for research and development-- a total of 4.914 kg (formula quantity). This total amount is increased to 5.114 kg (formula quantity) when a plutonium beryllium (PuBe) neutron source containing .08 kg (.2 kg formula quantity) is included.* Although the neutron source has not been stored in the reactor building since the licensee became aware of the excessive SNM condition, it is used there occasionally to calibrate survey instruments.

The licensee currently possesses non-exempt SNM in the form of reactor fuel elements which would normally be held by the manufacturer, because the manufacturer has declared bankruptcy. The reactor is operated infrequently, resulting in a very low rate of fuel burnup. The fuel burnup rate has been so low during the past year that the licensee requested in its August 17, 1978, letter that the exemption be effective until the fall of 1979. The licensee expects that the infrequent use of its reactor will continue in the future.

* Note: The formula quantity of SNM contained in the neutron source is calculated, as provided by §73.50, as follows: .08 kg (Pu-239) x 2.5 = .2 kg.

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The licensee has investigated available options for reducing the inventory of non-exempt SNM and concluded that these options would result in unnecessary hardships. The options that were considered by the licensee are as follows:

1. Lowering the inventory of non-exempt SNM below the 5,000 kg level by interchanging partially irradiated fuel in the reactor with unirradiated fuel. The licensee pointed out that such an interchange is prohibited until the present core undergoes additional burnup because of the excess reactivity limit imposed by the technical specifications.
2. Committing partially irradiated fuel elements (less than 10% burnup) existing in the reactor and those fuel elements in storage to the reprocessing facilities. The licensee concluded that this option would not be prudent nor economical in light of the current shortage of research reactor fuel.
3. Transferring unirradiated fuel elements to temporary storage at another site. The licensee pointed out that this option is not practical because a special shipping container would be required. The licensee mechanically attached a permanent top section to each fuel element thereby increasing the overall length from two to seven feet. This prevents the use of an approved standardized shipping container without destroying the mechanical connection. The excess amount of SNM will be reduced to an acceptable level before a special shipping container could be designed, approved, manufactured and arrangements completed at another site to receive and store the unirradiated fuel elements.
4. Replacing the Pu Be neutron source with americium-beryllium an exempt neutron source material. This option is technically feasible in that approximately six curies of americium-beryllium would give the equivalent neutron intensity as the existing (Pu Be) source. However the licensee rejected this option on economic grounds in that a \$3,000 to \$4,000 cost burden would result to cover the procurement of the replacement source and the disposal of the existing source.

We have reviewed these options and agree with the licensee's conclusion that they would not be practical alternatives.

Evaluation

The possession of the neutron source in the reactor building does not significantly increase the safeguard risk of the licensee's inventory of SNM, because it is in a sealed form. The sensitive material (Pu) in the neutron source is not in a form attractive for use as a clandestine fission explosive or as a chemical poison. The staff agrees that the threat to the common defense and security is sufficiently low that the existing security measures are adequate. Furthermore, the excess amount of SNM (.114 kg formula quantity) is so small that the inventory will be reduced below the 5.000 kg limit after the next refueling cycle. This is likely to occur before the security measures set forth in 10 CFR 73.50 and 73.60 could be implemented. The staff therefore concludes that additional protection is not required.

The neutron source is not the same geometrically as the fuel elements stored in the storage pit. Therefore, the neutron source cannot be placed accidentally in the fuel element racks located in the storage pit. This assures against possible accidental criticality. Storing the neutron source in the reactor building, therefore, does not involve a reduction in the level of safety of the facility regarding accidental criticality. In addition, there would be unnecessary inconvenience to the licensee involved in transferring the source to and from the reactor building whenever the neutron source is needed for calibration purposes.

In summary, the licensee requested authorization to properly store the PuBe neutron source in the reactor building without providing additional security measures. For the reasons stated above, we conclude that the licensee should be granted this authorization for a period of one year from the issuance date of this exemption.

Conclusion

We have concluded, based on the considerations discussed above, that this exemption from the provisions of 10 CFR 73.50 and 73.60 is authorized by law, will not endanger life or property or the common defense and security and is otherwise in the public interest.

Dated: November 30, 1978