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

SAFETY EVALUATION BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 17 TO FACILITY OPERATING LICENSE NO. R-37

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

MIT RESEARCH REACTOR

DOCKET NO. 50-20

Introduction

By letter dated March 13, 1980, Massachusetts Institute of Technology (MIT) requested an amendment to Facility Operating License No. R-37 which would authorize the receipt and possession of byproduct materials that have been previously activated in reactors other than the MIT Research Reactor, for use in the hot cells that were recently installed in the containment building.

Description

MIT has constructed hot cells for the chemical and physical examination of (among other uses) irradiated material. The current license for byproduct material is contained within Facility Operating License No. R-37 and amendments. The current license permits byproduct utilization to that which " . . may be produced by operation of the reactor".

MIT wishes to broaden the existing Facility Operating License to also include the receipt, examination and testing of non-fissionable byproduct materials activated in offsite reactor facilities. Utilization of this source of by-product material would be limited to the MIT hot cells.

Byproduct materials that are so utilized will be limited to atomic numbers 3 through 83 and to solid form only. Additional qualifications are:

1. Total inventory of materials from other sources would not exceed 1,000,000 curies.

2. Inventory for any one sample or specimen would be limited to 10,000 curies. (Definition of "sample" or "specimen": that amount that is contained in any single canister or container that will be subsequently utilized in the hot cells)

3. Each sample or specimen would be limited to a radiation flux of 1000 rads/hr., at one meter from an unshielded source.

Safety Evaluation

1. Storage of Inventory

Storage for the byproduct material inventory is in the form of various existing storage facilities located within the containment complex. These include the fuel storage pool for watertight, corrosion resistant containers, fuel storage holes no longer being used, shielded casks and additional miscellaneous storage facilities for low level samples.

Transfer of the radioactive materials can be accomplished with existing equipment.

2. Hot Cell Safety Systems

To ensure hot cell integrity and safety of out-of-cell personnel, special ventilation, instrumentation and fire prevention systems have been included.

3. Ventilation

The cells are kept at a negative pressure (magnitude greater than 0.1" W.C.) with a flow of about 100 CFM per cell to the containment building ventilation system. Both inlet and outlet air passes through 2" roughing filters. The outlet air is then ducted to a fire-resistant 6" HEPA filter, a blower, and finally into the building exhaust upstream from the radiation monitors, holdup plenum and filters.

The hot cell blower is electrically interlocked with the building exhaust to shut off when the main ventilation is off (the same as other auxiliary blowers). When the containment cell blowers or dampers are shut down the hot cell ventilation system is automatically shut off. Visual alarms located in the hot cell area alert the operator that all activities in the hot cell are to be terminated. In addition, operation of the hot cell ventilation system is subject to the periodic inspection and approval of the Industrial Hygiene Group of the MIT Environmental Medical Service.

4. Instrumentation

Instrumentation is provided for measuring radiation levels and for monitoring operation of the ventilation system. A detector capable of gamma measurements up to 1000 r/hr is installed to check the dose rates for samples introduced into a hot cell. Reactor area monitors provide backup readings. One of the reactor floor monitors (SAR paragraph 12.3.2.4.1), which alarms in the control room and at the detector site, will indicate the general radiation level external to the hot cell. The Reactor Radiation Protection office also conducts periodic surveys.

Ventilation is monitored by means of a manometer on each cell, and procedures specify the minimum differential pressure required for cell use. A local alarm notifies the hot cell operator if the differential pressure is too low.

5. Fire Prevention

The potential for fire is minimized by limiting the amount of flammable materials, such as paper, which are used in reducing contamination. Decontamination of the hot cell interiors is done with non-flammable detergents, except that small counts of solvents such as acetone may be needed to clean the manipulators. Rags and similar materials are stored in metal containers with self-closing lids.

In event a fire should occur, however, the cell exhaust system will automatically shutdown, the rate of rise fire detector and alarm (set at 125°F) will alert the staff, and a Halon fire extinguishing system will automatically operate if the temperature rises to 135°F. As a back up to the Halon fire extinguishing system, CO_2 bottles which are located within the hot cells can be manually operated.

6. Environmental Considerations

We have determined that this amendment will not result in any significant environmental impact and that it does not constitute a major Commission action significantly affecting the quality of the human environment. We have also determined that this action is not one of those covered by 10 CFR 51.5(a) or (b). Having made these determinations, we have further concluded that, pursuant to 10 CFR 51.5(d)(4), an environmental impact statement or environmental impact appraisal and negative declaration need not be prepared in connection with issuance of this amendment.

Conclusion

With the limitations included on the characteristics and quantities of activation products permitted in the hot cells, the safety features provided in the hot cells, the interlocking of the containment and hot cell ventilation systems, the visual and audible alarms and the operational procedures, the utilization of byproduct materials in the hot cells can be conducted with reasonable assurance (1) of the safety of personnel and the contiguous population and (2) that the conduct of the operations will be performed within the requirements of License No. R-37.

We have concluded, based on the consideratins discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered, and does not involve significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: November 21, 1980