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

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DOCKET NO.: 70-157

LICENSEE: The University of Texas (UT)
Austin, Texas

SUBJECT: REVIEW OF LICENSE RENEWAL APPLICATION FOR SNM-180

1. Background

The materials license for the University of Texas, SNM-180, was first issued in 1958 to authorize possession and use of one gram of contained U-235 in fission counter tubes and 32 grams of plutonium in two plutonium-beryllium sources. The license was amended in 1960 to add to the authorized possession, and use the U-235 in a subcritical assembly containing 470 grams U-235 as 20% enriched $UO_2$ impregnated in high density polyethylene. The license was renewed in 1963, 1966, 1969, and 1974. The current license bore an expiration date of September 30, 1979; however, since that date the license has remained in effect in accordance with the timely renewal provisions of Subsection 70.33(b) of 10 CFR 70. The University had made timely application for license renewal, transmitted by letter dated August 27, 1979. Additional information was provided on October 10, 1980, following the request in the NRC letter of September 23, 1980. After a visit to UT by NRC staff on December 3, 1980, and discussion of the renewal application, a completely revised, consolidated renewal application was transmitted by the UT letter dated January 30, 1981.

The material authorized under the license now includes three neutron sources and the large and small parts of the subcritical assembly. These materials are generally stored and used in the same laboratory area (Nuclear Engineering Teaching Laboratory) where the University's reactor is located. The reactor is operated under a reactor license independent of the SNM license for the three neutron sources and the subcritical assembly. Since these activities are under the direction and control of one organization, the safety of the activities under the SNM license is enhanced by the more stringent controls needed to ensure the safety of the reactor operation.

2. Scope of Review

The safety review of UT's renewal application included review of the renewal application of August 27, 1979, the supplementary information of October 10, 1980, and the revised, consolidated renewal application of January 30, 1981. The review also included the compliance history as recorded in the reports of the Office of Inspection and Enforcement, and, as noted in the Background, a visit to UT on December 3, 1980.

The purpose of the visit to UT by FCUP staff was to familiarize the staff with the radiation safety aspects of UT's operations with radioactive material and to discuss the renewal application with the Supervisor of the Nuclear Engineering Teaching Laboratory, Dr. T. L. Bauer. Based on this discussion and review of UT's renewal application and radiation protection program, additional information was requested from the licensee. Dr. Bauer agreed to incorporate the additional information in a revised application. The revised application was sent January 30, 1981.

3. Discussion of Review

UT's revised renewal application demonstrates that there is an adequate technical staff with the qualifications to administer an effective radiological safety program. The following sections contain a description of UT's relevant organization and radiological safety program, along with additional conditions developed by FCUP staff.

3.1 Management Organization

The President of the University of Texas has established a Radiation Safety Committee (RSC) whose purpose is to define policies and practices regarding the safe use of radioisotopes and sources of radiation on the University campus. The Radiation Safety Officer is delegated authority by the RSC for establishing and auditing the radiation safety program.

The members of the Radiation Safety Committee are three faculty and/or staff members from the Science or Engineering Departments.

There is also a Reactor Committee responsible to the Dean of the College of Engineering, with at least three members knowledgeable in nuclear safety. The Reactor Committee reviews, evaluates and approves standards associated with the operation of the laboratory, including all nuclear operations. The Radiation Safety Officer is an ex officio member of the Reactor Committee.

The laboratory operation is under the direct control of the Laboratory Director or a licensed Senior Operator designated by the Laboratory Director.

3.2 Technical Qualifications

The resumes for the individuals in safety positions provided with the application show that their qualifications of experience more than meet the requirements for the positions as defined in the renewal application. The present Radiation Safety Officer's lack

of a formal degree is compensated by his extensive experience. The qualifications given below are the defined minimum qualifications for the positions listed.

Radiation Safety Officer: Bachelor's degree in engineering, physics or related field. Three years work experience in radiation safety and/or radiological health plus a thorough working knowledge of Texas Regulations for Control of Radiation and the regulations of the NRC.

Laboratory Supervisor: Bachelor's degree in engineering or science with three years experience in a related field. Qualifications for a USNRC Senior Operator's license.

(Qualifications are also provided for Nuclear Technical Specialists and a Radiochemist on the laboratory staff but these are less specifically defined than the foregoing.)

3.3 Radiation Safety

The Radiation Safety Officer reports to the University Safety Engineer although he receives guidance from the Radiation Safety Committee. The responsibilities of the Radiation Safety Officer include the following:

a. Controlling personnel exposure to radiation.

b. Conducting periodic surveys and leak testing sealed sources.

c. Calibrating radiation detection devices.

d. Disposing of radioactive wastes.

e. Maintaining records of exposures.

f. Training staff.

g. Aiding in the preparation of procedures.

3.3.1 Control of Personnel Exposure

Personnel monitoring devices are required of all persons working in the laboratory with radiation sources. Personnel external exposure is controlled and evaluated on the basis of the data from personnel dosimeters. The film badges are read every two weeks. The licensee omitted that information from the renewal application and hence it is recommended that a license condition be imposed to require reading and evaluation of the badges at least monthly.

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3.3.2 Control of Surface Contamination

The eight, ten-inch diameter disks comprising the subcritical assembly core are enclosed in a polyethylene envelope and swipe tests over the years since 1960 have shown no measurable leakage of activity. Thus, the core is handled by hand when changing reflectors. Axial and radial holes in the subcritical assembly may be filled with 35 smaller fuel disks of about one-inch diameter. The smaller disks are also enclosed in polyethylene, but gloves are used in handling the smaller disks to protect against possible contamination. Radiation signs and rope may be used to define radiation areas during assembly operation.

The reactor room is continuously monitored by area radiation monitors with preset alarms (5 mr/hr) and a continuous air monitor with filter for particulate monitoring that also provides audible alarm indication.

The licensee has committed to the standard, six-month frequency leak tests of the sealed plutonium-beryllium neutron sources.

3.3.3 Calibration of Instruments

The consolidated license renewal application did not commit the licensee to a specific frequency for calibrating the radiation detection instruments. A license condition is therefore being added to require calibration at maximum six month intervals.

3.3.4 Airborne Activity

Because of the nature of the radioactive material being handled under this license, airborne activity should not be of concern.

3.3.5 Radioactive Waste Disposal

Sources of radioactive waste from operation of the subcritical assembly are slightly contaminated gloves from the small, polyethylene impregnated fuel pellets and activation products exposed in the assembly. Provisions exist for disposal of low level radioactive waste materials such as gloves and rags, by the Radiation Safety Office. In general, foils or materials irradiated in the assembly are short half-life and thus reusable.

3.3.6 Training Program

Since the assembly is used to teach basic concepts to undergraduate and graduate students, a portion of each student's education before performing experiments with radioactive materials will include radiation hazards, dose measurements and laboratory procedures. Experiments are performed with the supervision of laboratory staff.

3.3.7 As Low As Reasonably Achievable (ALARA)

In general the radiation doses incurred in the use of the neutron sources and subcritical assembly are in the minimal or near minimal category. The ALARA goal is supported by the procedures of the concerned UT organizations. Both occasional and periodic review of radiation doses of staff, students and visitors is carried out by Laboratory Staff and by the Radiation Safety Officer.

3.4 Laboratory Operation

The responsibilities of the Laboratory Supervisor include direction of the daily activities of the laboratory, which involve use of the reactor licensed by NRR as well as the subcritical assembly which is covered by Material License No. SNM-180. The responsibilities of the Laboratory Supervisor also include maintenance of equipment records, review of experiments and procedures, and supervision of the use of radioactive materials and sources.

3.5 Nuclear Criticality Safety

Experiments have been conducted with the assembly and neutron sources which showed a multiplication factor of less than 7.5 for all reflector and fuel load conditions. The fuel is thus insufficient to achieve accidental criticality and the licensee should continue to be exempted from the requirements of Section 70.24 of 10 CFR Part 70. (This exemption had been granted in the licenses issued before 1974 but was omitted when the license was renewed in 1974 because the U-235 possession limit was less than the quantity at which 70.24 became applicable. That interpretation does not apply under Section 70.24 as it now exists.)

3.6 Compliance History

A review of the record of inspections of UT by the Office of Inspection and Enforcement during the past ten years shows that five safety inspections were made. The only non-compliance items (found in 1974) involved failure to file material status reports

at the required frequency and failure to post a notice of the availability of copies of the relevant NRC regulations and license documents. These shortcomings were promptly corrected by the licensee. There were no adverse health effects associated with these shortcomings.

3.7 Emergency Planning

As noted in para. 3.5, there is insufficient special nuclear material under this license for accidental criticality to occur and hence the license has been exempted from the requirements of 70.24 of Part 70. The licensee has recognized a possible contamination hazard from exposure of the assembly to fire and instituted procedures to protect the assembly from such exposure. Also, the licensee has arrangements for handling emergencies in the Laboratory.

4.0 Conclusion and Recommendation

Upon completion of the radiation safety review of the licensee's application and compliance history, the Staff has concluded that UT has the necessary organization and technical staff to administer an effective radiological safety program. Conformance by UT to their proposed conditions, as well as those developed by FCUP, should ensure a safe operation and the quick detection of unfavorable trends or effects by UT or IE with prompt corrective action. Based on this review, it is concluded that issuance of the renewal application is not a major Federal action significantly affecting the quality of the human environment and thus, pursuant to 10 CFR 51.5(d)(4), no environmental impact statement, negative declaration, or environmental appraisal need be prepared.

Based on the facts summarized in the foregoing paragraphs, it is recommended that the license be renewed for a 5-year term in accordance with the revised, consolidated application and subject to the following conditions:

11. The licensee shall calibrate the radiation detection instruments at intervals not to exceed six months.

12. The licensee is exempted from the requirements of Section 70.24 of 10 CFR 70, insofar as this Section applies to the material covered by this license.

13. The licensee shall read and evaluate the personnel film badges at intervals not to exceed one month.

R. L. Stevenson

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