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

October 31, 1979

Docket No. 50-128

Dr. Robert R. Berg
Office of University Research
Texas A & M University
College Station, TX 77843

Dear Dr. Berg:

The Commission has issued the enclosed Amendment No. 7 to Facility License No. R-83 for the Texas A & M University Nuclear Science Center Reactor. The amendment consists of changes to the Technical Specifications in response to your application dated February 6, 1979, as supplemented May 15, June 13 and August 21, 1979.

This amendment increases the quantity of explosive materials allowed within the reactor building and available for irradiation in experimental facilities to a maximum of five (5) pounds (equivalent TNT).

A copy of the related Safety Evaluation is also enclosed.

Sincerely,

A handwritten signature in black ink that appears to read "Robert W. Reid".

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:

1. Amendment No. 7
2. Safety Evaluation

cc: w/enclosures
See next page

DO NOT REMOVE

Pasted
Am-7 ta
R-83

Texas A & M University

cc w/enclosure(s):
Mayor of the City of College Station
College Station, TX 77843

Dr. John D. Randall, Director
Nuclear Science Center
F. E. Box #89
Texas A & M University
College Station, TX 77843

cc w/enclosure(s) & incoming dtd: 2/6/79, 5/15/79, 6/13/79, & 8/21/79
Director, Governor's Budget
and Planning Office
Executive Office Building
411 West 13th Street
Austin, TX 78701



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

TEXAS A & M UNIVERSITY

DOCKET NO. 50-128

AMENDMENT TO FACILITY LICENSE

Amendment No. 7
License No. R-83

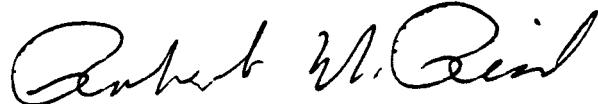
1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Texas A & M University (the licensee) dated February 6, 1979, as supplemented May 15, June 13 and August 21, 1979, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied; and
 - F. Publication of notice of this amendment is not required since it does not involve a significant hazards consideration nor amendment of a license of the type described in 10 CFR Section 2.106 (a)(2).
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility License No. R-83 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 7, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Attachment:
Changes to the
Technical Specifications

Date of Issuance:

October 31, 1979

Attachment to License Amendment No. 7

Facility License No. R-83

Docket No. 50-128

Appendix A is revised as follows:

REMOVE PAGES

15

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INSERT REVISED PAGES

15

15a (new page)

16

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3.6 LIMITATIONS ON EXPERIMENTS

Applicability

This specification applies to experiments installed in the reactor and its experimental facilities.

Objective

The objective is to prevent damage to the reactor or excessive release of radioactive materials in the event of an experiment failure.

Specifications

The reactor shall not be operated unless the following conditions governing experiments exist.

- a. Non-secured experiments shall have reactivity worths less than 1 dollar.
- b. The reactivity worth of any single experiment shall be less than 2 dollars.
- c. Explosive materials in quantities greater than five (5) pounds shall not be allowed within the reactor building. Irradiation of explosive materials shall be restricted as follows:
 - (1) Explosive materials in quantities greater than 25 milligrams shall not be irradiated in the reactor pool. Explosive materials in quantities less than 25 milligrams may be irradiated provided the pressure produced upon detonation of the explosive has been calculated and/or experimentally demonstrated to be less than the design pressure of the container.
 - (2) Explosive materials in quantities greater than 25 milligrams shall be restricted from the upper research level, demineralizer room, cooling equipment room and the interior of the pool containment structure.
 - (3) Explosive materials in quantities greater than five (5) pounds shall not be irradiated in experimental facilities.
 - (4) Cumulative exposures for explosive materials in quantities greater than 25 milligrams shall not exceed 10^{12} n/cm² for neutrons or 25 roentgen for gamma exposures.
- d. Experiment materials, except fuel materials, which could off-gas, sublime, volatilize, or produce aerosols under (1) normal operating conditions of the experiment or reactor, (2) credible accident conditions in the reactor, or (3) possible accident conditions in the experiment shall be limited in activity such that if 100% of the gaseous

activity or radioactive aerosols produced escaped to the reactor room or the atmosphere, the airborne concentration of radioactivity averaged over a year would not exceed the limit of Appendix B of 10 CFR Part 20.

- e. In calculations pursuant to d. above, the following assumptions shall be used:
 - (1) If the effluent from an experimental facility exhausts through a holdup tank which closes automatically on high radiation level, at least 10% of the gaseous activity or aerosols produced will escape.
 - (2) If the effluent from an experimental facility exhausts through a filter installation designed for greater than 99% efficiency for 0.3 micron particles, at least 10% of these vapors can escape.
 - (3) For materials whose boiling point is above 130°F and where vapors formed by boiling this material can escape only through an undisturbed column of water above the core, at least 10% of these vapors can escape.
- f. Each fueled experiment shall be controlled such that the total inventory of iodine isotopes 131 through 135 in the experiment is no greater than 1.5 curies.
- g. If a capsule fails and releases material which could damage the reactor fuel or structure by corrosion or other means, removal and physical inspection shall be performed to determine the consequences and need for corrective action. The results of the inspection and any corrective action taken shall be reviewed by the Director or his designated alternate and determined to be satisfactory before operation of the reactor is resumed.

Bases

- a. This specification is intended to provide assurance that the worth of a single unfastened experiment will be limited to a value such that the safety limit will not be exceeded if the positive worth of the experiment were to be suddenly inserted (SAR II, pg. 24).
- b. The maximum worth of a single experiment is limited so that its removal from the cold critical reactor will not result in the reactor achieving a power level high enough to exceed the core temperature safety limit. Since experiments of such worth must be fastened in place, its removal from the reactor operating at full power would result in a relatively slow power increase such that the reactor protective systems would act to prevent high power levels from being attained (SAR II, pg.21).

- c. This specification is intended to prevent damage to the reactor or reactor safety systems resulting from failure of an experiment involving explosive materials.
 - 1. This specification is intended to prevent damage to the reactor core and safety related reactor components located within the reactor pool in the event of failure of an experiment involving the irradiation of explosive materials. Limited quantities of less than 25 milligrams and proper containment of such experiments provide the required safety for in pool irradiation.
 - 2. This specification is intended to prevent damage to vital equipment by restricting the quantity and location of explosive materials within the reactor building. Explosives in quantities exceeding 25 milligrams are restricted from areas containing the reactor bridge, reactor console, pool water coolant and purification systems and reactor safety related equipment.
 - 3. The failure of an experiment involving the irradiation of up to five (5) lbs. of explosive material in an experimental facility located external to the reactor pool structure will not result in damage to the reactor or the reactor pool containment structure.
 - 4. This specification is intended to prevent any increase in the sensitivity of explosive materials due to radiation damage during exposures.
- d. This specification is intended to reduce the likelihood that airborne activities in excess of the limits of Appendix B of 10 CFR Part 20 will be released to the atmosphere outside the facility boundary of the NSC.
- e. The 1.5-curie limitation on iodine 131 through 135 assures that in the event of failure of a fueled experiment leading to total release of the iodine, the exposure dose at the exclusion area boundary will be less than that allowed by 10 CFR Part 20 for an unrestricted area.
- f. Operation of the reactor with the reactor fuel or structure damage is prohibited to avoid release of fission products.

4.0 SURVEILLANCE REQUIREMENTS

4.1 GENERAL

Applicability

This specification applies to the surveillance requirements of any system related to reactor safety.

Objective

The objective is to verify the proper operation of any system related to reactor safety.

Specifications

Any additions, modifications, or maintenance to the ventilation system, the core and its associated support structure, the pool or its penetrations, the pool coolant system, the rod drive mechanism, or the reactor safety system shall be made and tested in accordance with the specifications to which the systems were originally designed and fabricated or to specifications approved by the Reactor Safety Board. A system shall not be considered operable until after it is successfully tested.

Bases

This specification relates to changes in reactor systems which could directly affect the safety of the reactor. As long as changes or replacements to these systems continue to meet the original design specifications, then it can be assumed that they meet the presently accepted operating criteria.



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

SAFETY EVALUATION BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 7 TO
FACILITY LICENSE NO. R-83
TEXAS A & M UNIVERSITY
NUCLEAR SCIENCE CENTER REACTOR
DOCKET NO. 50-128

Introduction:

NRC Region IV Inspection and Enforcement Report No. 50-128/78-02 identified an unresolved item concerning Texas A & M University's (the licensee) interpretation of a Technical Specification for the Nuclear Science Center Reactor (NSCR) involving explosive material limitations. By letter dated October 6, 1978, Region IV requested the licensee to terminate the radiography of explosive material that exceeded the 25 milligram limits specified in Technical Specification 3.6.c. until information on the licensee's planned use of explosives within the reactor facility was submitted for review and approved by the Commission.

Discussion:

By letter dated February 6, 1979, as supplemented on May 15, June 13 and August 21, 1979, the licensee proposed an amendment to Facility License No. R-83 for the Nuclear Science Center (TRIGA) Reactor. The amendment would modify the Technical Specifications relating to the radiography of explosive material to: (1) increase the quantity of explosive materials allowed within the reactor building and available for irradiation in experimental facilities to a maximum of five (5) pounds (equivalent TNT); (2) restrict quantities of explosive material exceeding 25 milligrams from areas containing reactor safety related equipment; and (3) restrict the cumulative exposure for explosive materials.

Evaluation:

The structural adequacy of those structures, systems, equipment and components important to the safety of the reactor and the reactor support systems have been evaluated against a postulated inadvertent detonation of the largest proposed mass, five pounds, of explosive materials at any point along the proposed path through the facility, including the final radiography location. The local and gross effects of an explosion, including postulated misses, electrical shorts, and fire were evaluated. It has been concluded that the safety related structures, systems and components are either capable of withstanding the effects of the blast, or are adequately shielded by the concrete walls and floors. The licensee's Safety Analysis Report Appendix III

provides a description of the design features along the transportation route. It should be noted that the control room and all critical safety cables are located on the opposite side of the reactor pool from the neutron radiography facility.

The most serious safety concern would involve the detonation of a charge while it is being radiographed since the beam port is exposed at this time and the potential rupture of the beam port could result in the loss of pool water. The consequences of the detonation of a charge while it is being radiographed were determined by evaluating the effects of the associated peak pressure developed on the weakest part of the beam port. The limiting failure strength of the beam port was determined by examination of the weld stresses between the beam tube and end plate. The licensee presented analyses with which we concur, which indicate a wide safety margin between the limiting weld shear, circumferential, and longitudinal stresses, and the peak blast pressures.

The licensee's Standard Operating Procedures governing the use of the neutron radiography facility provide detailed guidelines for the transportation and handling of explosive materials which are designed to preclude an inadvertent detonation. In the event of a detonation, the facility is capable of sustaining the effects of the maximum postulated blast without significant damage to the core, tank, or other critical structures. In addition, because the irradiation facility is open to the environs, the beam port would not rupture and there would be no loss of pool water.

If the beam port end plate were breached or damage to piping occurred, the effects would be less severe than those previously considered due to loss of coolant in Appendix II to the Safety Analysis Report. Therefore, we conclude that no new unreviewed safety considerations are presented.

The adequacy of fire protection in the radiography facility in the event of a fire due to an explosion or any other cause was reviewed. The radiography facility interior structure is constructed in part of some small amounts of wood and paraffin which could burn, but there are no other significant combustible materials on the lower level. Furthermore, the walls, floors, and ceilings are concrete so the fire would most likely burn itself out harmlessly. If, however, a fire is postulated which reaches any part of the mechanical chase area near the cable trays containing the control system and experimental scram system cables, the reactor may be manually scrammed from the control room or by the experiment scram which is operable from the lower research level. In the interest of prudent industrial safety and fire protection procedures, the licensee has committed in a mailgram of August 21, 1979, to install smoke detector systems in the general area of the cable trays directly beneath the reactor control room and in the central exhaust system stack. The licensee expects to have these systems functional within six months of the date of the aforementioned mailgram.

In summary, there is adequate assurance that the radiography of explosive materials within the conditions specified in the proposed Technical Specifications will not threaten the integrity of the reactor, any vital equipment, or any safety related reactor components.

Therefore we conclude that there will be no significant increase in the probability or consequences of an accident and no significant decrease in the safety margin.

Environmental Consideration:

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:

We have concluded, based on the considerations 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 a 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: October 31, 1979