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

Docket No. 50-407

September 30, 1975

The University of Utah
ATTN: Mr. Joseph E. Bernolfo, Jr.
Vice Chairman
2000 Merrill Engineering Building
Salt Lake City, Utah 84112

Gentlemen:

The Commission has issued the enclosed Facility Operating License No. R-126. The license authorizes you to operate the TRIGA Mark I nuclear reactor at power levels up to 100 kW (thermal) on your campus at Salt Lake City in accordance with your application dated October 1971 and supplements thereto.

Copies of the related Supplement 1 to the Safety Evaluation, Negative Declaration with supporting Environmental Impact Appraisal, and the Federal Register Notice are also enclosed.

Two copies of Amendment No. 8 to Indemnity Agreement No. E-31 are enclosed. Please sign and return one copy to this office.

Sincerely,

Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Reactor Licensing

Enclosures:
1. License No. R-126
2. Safety Evaluation (Supplement 1)
3. Federal Register Notice
4. Negative Declaration with supporting Environmental Impact Appraisal
5. Amendment No. 8 to Indemnity Agreement No. E-31 (2 cys)

cc w/enclosures:
See next page

cc w/enclosures 1 through 4:
Mayor Conrad Harrison
114 City & County Building
Salt Lake City, Utah 84111

cc w/enclosures 1 through 4
and incoming:
Mr. Burton L. Carlson
State Planning Coordinator
State Capitol Building - Room 118
Salt Lake City, Utah 94114

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WASHINGTON, D. C. 20555

SUPPLEMENT NO. 1 TO THE SAFETY EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THE UNIVERSITY OF UTAH

TRIGA MARK I NUCLEAR REACTOR

DOCKET NO. 50-407

Introduction:

By application dated October 1971 (received March 24, 1972) and supplements thereto dated August 4, and October 10, 1972, The University of Utah requested authorization to construct and operate a TRIGA Mark I nuclear reactor on its campus at Salt Lake City, Utah. A notice for the issuance of a construction permit and subsequently a facility license was made on March 12, 1973. The construction permit was issued on April 24, 1973. The purpose of this supplement is to update the safety evaluation prior to issuance of the facility operating license. The PSAR was updated by letters of February 22, 1974 and January 2, 1975, to reflect minor changes since the Construction Permit was issued. By letter of July 28, 1975, the applicant requested a change to his proposed Technical Specification regarding the surveillance of fuel elements.

Discussion

The University of Utah reactor is a TRIGA Mark I reactor and is described in detail in the Safety Evaluation dated March 2, 1973. The reactor was obtained from the University of Arizona where the reactor was operated successfully since December 1958. The reactor will be operated at a maximum of 100 KW (thermal) in a non-pulsed mode at this time.

Evaluation

The University of Utah reactor has been constructed substantially the same as described in the PSAR and Safety Evaluation. Any minor changes during construction, however, have been documented with appropriate changes to the PSAR by letters dated February 22, 1974, and January 2, 1975.

The USNRC Office of Inspections and Enforcement has periodically inspected the construction of the reactor to determine if the construction was performed pursuant to the Construction Permit. A final inspection substantiates that the construction is essentially the same as described in the PSAR. (Reference: Memo, Davis to Boyd dated September 12, 1975).

The proposed Technical Specifications noticed prior to issuance of the Construction Permit have been changed in the following manner:

1. Section 4.1, Fuel, has been changed as requested by University of Utah letter dated July 28, 1975, to substitute visual inspection of the fuel elements every two years in lieu of visual inspection and measurement of uninstrumented fuel elements every twelve months.

   The measurements of fuel required of pulsing TRIGA reactors is associated with the more severe service experienced by the fuel in the pulsing mode. This is the reason that the measurements are required after the accumulation of a certain integrated reactivity worth of pulses, such as 3500 dollars. For a non-pulsing reactor, which this is, these measurements at any fixed frequency are not appropriate. We agree with the licensee that the probability of fuel damage during the measurement of the fuel with the possibility of dropping an element is greater than the probability of this type degradation (i.e., elongation or bending) in a non-pulsing reactor. Therefore, the requirement for visual inspection every two years is sufficient to detect any physical degradation of fuel. This is based on the accumulated experience of operation with this type fuel at many facilities, some with more severe operating conditions than will be the case at Utah. By not requiring unnecessary handling of the fuel, the probability of fuel damage is reduced. No safety margin is reduced and the consequences of accidents previously analyzed are unaffected.

2. Section 6.1, has been replaced and now shows a line of communication between the Reactor Safety Committee and the Reactor Supervisor. The changes reflect the current organization for the Nuclear Reactor Facility.

3. A new Technical Specification has been added to restrict the release of Argon-41 from the Facility Stack.

4. The definition of and reference to abnormal occurrences has been removed from the Technical Specifications in accordance with the reporting requirements of Regulatory Guide 1.16, Rev. 4.

5. Throughout, the Technical Specifications have been changed to reflect the NRC organization instead of the old AEC organization.

The applicant, by letter dated July 16, 1974, submitted amendments to the University of Utah physical security plan which conform to the requirements of 10 CFR 50.34(c) and 10 CFR 73.40. The plan is therefore acceptable.

Conclusion

We conclude that construction of the University of Utah reactor has been substantially completed in conformity with Construction Permit No. CPRR-119 and the application, as amended, the provisions of the Act and the rules and regulations of the Commission.

We have concluded, based on the reasons discussed above, that (i) the activities authorized by this license can be conducted without endangering the health and safety of the public, and (ii) such activities will be conducted in compliance with the Commission's regulations and the issuance of this license will not be inimical to the common defense and security or to the health and safety of the public.

Date: September 30, 1975

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

ENVIRONMENTAL IMPACT APPRAISAL
BY THE DIVISION OF REACTOR LICENSING
FOR THE
UNIVERSITY OF UTAH
RESEARCH REACTOR
DOCKET NO. 50-407

The enclosed document discusses the environmental aspects of the operation of the University of Utah research reactor at power levels up to 100 kilowatts thermal. It is issued in support of the Commission's negative declaration with respect to the need for a separate Environmental Impact Statement for the University of Utah research reactor.

ENVIRONMENTAL CONSIDERATIONS REGARDING THE LICENSING OF THE UNIVERSITY OF UTAH RESEARCH REACTOR, FACILITY OPERATING LICENSE NO. R-126

Introduction

This discussion deals with those features and operating characteristics of the University of Utah research reactor (UURR) which affect the local environment. UURR, a modified TRIGA Mark I reactor, is to be regularly used in areas of education and research including nuclear and neutron physics, reactor physics and engineering, activation analysis, radiochemistry, molecular dynamics, solid state physics, radiation effects, and production of radioisotopes. Operation of such a facility will generally not exceed a 5 day week, 8 hour day or about 2000 hours per year. The UURR will operate at a maximum power level of 100 kWt and is to be located in the Nuclear Engineering Laboratory of the existing Merrill Engineering Building on the campus of the university at Salt Lake City, Utah.

Facility

There are no pipelines or transmission lines entering or leaving the site above grade. All utility services (water, gas, electricity, telephone and sewage) are below grade and are comparable to those required for typical campus laboratories. Heat dissipation will be accomplished by radiation and conduction into the surrounding reactor pool, which serves as a heat sink. A five ton rated evaporative cooling tower may also be utilized as a heat sink. This cooling tower is comparable to cooling towers associated with the air conditioning system of large office buildings. The city supply provides water for the pool makeup and for other reactor needs. Radioactive gaseous effluents are limited to Argon 41. Liquid radioactive wastes will be collected and disposed of either by dilution and release into the sanitary sewage system or transferred to a licensed facility for storage and/or disposal, after appropriate treatment, by burial. Solid, low-level radioactive waste will be packaged in accordance with USNRC and DOT regulations and shipped offsite for storage at NRC approved sites. Chemical and sanitary waste systems are similar to those existing at other university laboratories and buildings.

Environmental Effects of Facility Operation

Release of thermal effluents from a reactor of 100 kWt will not have a significant effect on the environment. This small amount of waste heat is rejected to the atmosphere by convection and radiation from the reactor pool or through a small cooling tower. Extensive drift and/or fog will not occur at this low power level. Release of routine gaseous effluent will be limited to Argon-41, which is generated by neutron

activation of air. Yearly doses to unrestricted areas will be at or below established limits in 10 CFR 20. Routine releases of radioactive liquid effluents will be carefully monitored and controlled in a manner that will ensure compliance with current standards. Solid radioactive wastes will be shipped to an authorized disposal site in approved containers. These wastes should not amount to more than a few shipping containers a year.

Based on experience with other research reactors, specifically TRIGA reactors operating in the 1 to 2 MWt range, the annual release of gaseous and liquid effluents to unrestricted areas from the UURR should be less than 30 curies and 0.01 curies respectively.

No release of potentially harmful chemical substances will occur during normal operation. Small amounts of chemicals and/or high dissolved solid content water may be released from the facility through the sanitary sewer during periodic blowdown of the cooling tower or from laboratory experiments.

Other potential effects of the facility, such as esthetics, noise and societal or impact on local flora and fauna are expected to be too small to measure.

Environmental Effects of Accidents

Accidents ranging from the failure of experiments up to the largest core damage and fission product release considered possible result in doses of onlya small fraction of 10 CFR Part 100 guidelines and are considered negligible with respect to the environment.

Unavoidable Effects of Facility Operation

The unavoidable effects of operation involve the materials used in construction that cannot be recovered and the fissionable material used in the reactor. No adverse impact on the environment is expected from either of these unavoidable effects.

Alternatives to Operation of the Facility

To accomplish the objectives associated with research reactors, there are no suitable alternatives. Some of these objectives are training of students in the operation of reactors, production of radioisotopes, and use of neutron and gamma ray beams to conduct experiments.

Long-Term Effects of Facility Operation

The long-term effects of research facilities are considered to be beneficial as a result of the contribution to scientific knowledge and training. Because of the relatively low amount of capital resources involved and the small impact of the environment very little irreversible and irretrievable commitment is associated with such facilities.

Costs and Benefits of Facility and Alternatives

The costs are on the order of less than 100,000 dollars with very little environmental impact. The benefits include, but are not limited to, some combination of the following: conduct of activation analyses, conduct of neutron radiography, training of operating personnel and education of students. Some of these activities could be conducted using particle accelerators or radioactive sources which would be more costly and less efficient. There is no reasonable alternative to a nuclear research reactor for conducting this spectrum of activities.

Conclusion

The NRC staff concludes that there will be no significant environmental impact associated with the licensing of the UURR to be operated at 100 kWt and that no environmental impact statement is required to be written for the issuance of the operating license for this facility.