UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NO. 50-142

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

NOTICE OF PROPOSED ISSUANCE OF FACILITY LICENSE

Please take notice that, unless within fifteen days after the filing of this notice with the Office of the Federal Register a request for a formal hearing is filed with the United States Atomic Energy Commission by the applicant or an intervener as provided by the Commission's Rules of Practice (Title 10, Chapter 1, Part 2), the Commission proposes to issue to The Regents of The University of California a facility license substantially as set forth below authorizing the possession and operation on the University of California campus at Los Angeles of an Argonaut-type nuclear reactor which may be operated at power levels up to 10 watts (thermal). Prior to issuance of the license the reactor will be inspected by representatives of the Commission to determine whether it has been constructed in accordance with the provisions of Construction Permit No. CPRR-43, as amended. Petitions for leave to intervene shall be filed by mailing a copy to the Office of the Secretary, Atomic Energy Commission, Washington 25, D. C., or by delivery of a copy in person to the Office of the Secretary, Germantown, Maryland, or the AEC's Public Document Room, 1717 H Street, N. W., Washington, D. C.

For further details see (1) the application submitted by the University of California and amendments thereto, and (2) a hazards analysis prepared by the Hazards Evaluation Branch, Division of Licensing and Regulation, on file at the AEC's Public Document Room. A copy of item (2) above may be obtained at the AEC's Public Document Room or upon request addressed to the Atomic

Energy Commission, Washington 25, D. C., Attention: Director, Division of Licensing and Regulation.

FOR THE ATOMIC ENERGY COMMISSION

Eber R. Price
Acting Director
Division of Licensing and Regulation

Dated at Germantown, Maryland
this day of , 1960.

SEP 9 1960

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

DOCKET NO. 50-142

PROPOSED LICENSE

1. This license applies to the Argonaut-type nuclear reactor (hereinafter referred to as "the reactor") designed for 10 kilowatt (thermal) operation which is owned by The Regents of The University of California and located on the University of California campus in Los Angeles, California, and described in the application dated June 24, 1959, and amendments thereto dated January 4, 1960, and June 23, 1960, (hereinafter collectively referred to as "the application").

2. Pursuant to the Atomic Energy Act of 1954, as amended, (hereinafter referred to as "the Act") and having considered the record in this matter, the Atomic Energy Commission (hereinafter referred to as "the Commission") finds that:

   A. The reactor has been constructed in conformity with Construction Permit No. CPRR-42 issued to The Regents of The University of California and will operate in conformity with the application and in conformity with the Act and with the rules and regulations of the Commission;

   B. There is reasonable assurance that the reactor can be operated at the designated location without endangering the health and safety of the public;

   C. University of California is technically and financially qualified to operate the reactor, to assume financial responsibility for payment of Commission charges for special nuclear material and to undertake and carry out the proposed use of such material for a reasonable period of time, and to engage in the proposed activities in accordance with the Commission's regulations;

D. The possession and operation of the reactor and the receipt, possession and use of the special nuclear material in the manner proposed in the application will not be inimical to the common defense and security or to the health and safety of the public; and

E. University of California is a nonprofit educational institution and will use the reactor for the conduct of educational activities. University of California is therefore exempt from the financial protection requirement of subsection 170a of the Act.

3. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses The Regents of The University of California:

A. Pursuant to Section 104c of the Act and Title 10, CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities", to possess and operate the reactor as a utilization facility at the designated location in Los Angeles, California, in accordance with the procedures and limitations described in the application and this license;

B. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 70, "Special Nuclear Material", to receive, possess and use up to 4.000 kilograms of contained uranium 235 and 32 grams of plutonium in a Pu-Be source for use in connection with operation of the reactor; and

C. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 30, "Licensing of Byproduct Material", to possess but not to separate such byproduct materials as may be produced by operation of the reactor.

4. This license shall be deemed to contain and be subject to the conditions specified in Section 50.54 of Part 50 and Section 70.32 of Part 70, Title 10, Chapter 1, CFR, and to be subject to all applicable provisions of the Act, and to the rules and regulations and orders of the Commission, now or hereafter in effect, and to the additional conditions specified below:

A. Operating Restrictions

1. University of California shall not operate the reactor at power levels in excess of 10 watts (thermal) without prior written authorization from the Commission.

2. University of California shall not conduct any experiments other than those outlined in Section III - "Reactor Checkout and Operation" of the final hazards report, without prior written authorization from the Commission.

3. University of California shall not make any changes in the facility design, performance characteristics, and operating procedures specified in the application without prior written authorization from the Commission.

B. Records

In addition to those otherwise required under this license and applicable regulations, University of California shall keep the following records:

1. Reactor operating records, including power levels.

2. Records of in-pile irradiations.

3. Records showing radioactivity released or discharged into the air or water beyond the effective control of University of California as measured at the point of such release or discharge.

4. Records of emergency reactor scrams, including reasons for emergency shutdowns.

C. University of California shall immediately report to the Commission in writing any indication or occurrence of a possible unsafe condition relating to the operation of the reactor.

5. Pursuant to Section 50.60 of the regulations in Title 10, CFR, Chapter 1, Part 50, the Commission has allocated to University of California for use

in connection with operation of the reactor, 3.350 kilograms of uranium 235 contained in uranium at the isotopic ratios specified in the application, and 32 grams of encapsulated plutonium. This allocation supersedes that previously granted in Special Nuclear Material License No. SNM-392 issued August 5, 1960. Estimated schedules of special nuclear material transfers to University of California and returns to the Commission are contained in Appendix "A" which is attached hereto. Transfers from the Commission to University of California in accordance with column (2) of Appendix "A" will be conditioned upon return to the Commission of special nuclear material substantially in accordance with column (3) of Appendix "A".

6. This license is effective as of the date of issuance and shall expire at midnight March 30, 1970.

FOR THE ATOMIC ENERGY COMMISSION

Attachment:
Appendix "A"

Date of Issuance:

APPENDIX "A"

TO

UNIVERSITY OF CALIFORNIA

FACILITY LICENSE NO. R-

Estimated Schedule of Transfers of Special Nuclear Material from the Commission to the University and to the Commission from the University:

(1)	(2)	(3)		(4)	(5)
Date of Transfer (Fiscal Year)	Transfers from AEC to the University Kgs. U-235	Returns by the University to AEC Kgs. U-235 Recoverable Cold Scrap	Spent Hot Fuel	Net Yearly Distribution Including Cumulative Losses Kgs. U-235	Cumulative Distribution Including Cumulative Losses Kgs. U-235
1960	4.000	0.660	-	3.340	3.340
1961	-	-	-	-	3.340
1962	-	-	-	-	3.340
1963	-	-	-	-	3.340
1964	-	-	-	-	3.340
1965	0.010	-	0.005	0.005	3.345
1966	-	-	-	-	3.345
1967	-	-	-	-	3.345
1968	-	-	-	-	3.345
1969	-	-	-	-	3.345
1970	0.010	-	0.005	0.005	3.350
1971	____	____	3.340*	(3.340)	.010**
	4.020	0.660	3.350	0.010**	

* Inventory to be returned

** Burnup losses

HAZARDS ANALYSIS

BY THE

HAZARDS EVALUATION BRANCH

DIVISION OF LICENSING AND REGULATION

IN THE MATTER OF

UCLA TRAINING REACTOR

General Description

The proposed reactor is located on the Campus of the University of California at Los Angeles, in the Beverly Hills area, approximately 15 miles from the center of Los Angeles, California. It will be housed in a special building of reinforced concrete construction which will be attached to a future engineering building. This building is located near the center of the campus, which has facilities for more than 10,000 students.

The reactor is a light water-moderated and - cooled Argonaut-type designed to operate at 10 Kw, utilizing a graphite reflector and highly enriched uranium fuel contained in aluminum-clad MTR-type plates. These plates will be arranged in groups of 12, with 4 such groups placed in each of the 6 vertical aluminum fuel boxes or channels. These will be arranged in 2 rows of 3 each, with a foot of graphite between the rows, and additional graphite reflector will surround them. The graphite will be penetrated by various beam ports and test holes to facilitate the irradiation of foils and experiments. The reactor will be controlled by 4 semaphore type control rods which will operate in enclosures between the fuel boxes. Three rods worth about 1.5% delta k/k each will be used for shim control, and the fourth, worth about 0.6% delta k/k, will be used for regulating the reactor at a steady power level. The reactor will be cooled by water circulating upward through the fuel boxes and out an overflow pipe at a rate of 10 gpm. In an emergency, a dump valve will drain the fuel boxes quickly, and the control blades will be released to fall by gravity into the reactor to shut down the reactor. The reactor will be shielded by large blocks of concrete, some of which will be removable for experimental access. The reactor room will have an independent ventilation system circulating 5000 cfm of air with filters on both the inlet and outlet, as well as radiation monitors and alarms on the outlet.

The excess reactivity of this reactor will be limited to 0.6% delta k/k above cold, clean critical, which will not result in a damaging transient even if it were all inserted at one time as a step input. Normally, reactivity insertion will be limited to 0.02% delta k per second by the gear ratio on the control rod drive motors, only one of which may actuate at a time. The mechanical drive connections involve magnetic clutches which will automatically disengage and allow the blades to drop into the reactor on receipt of a scram signal. Duplicate channels of neutron sensitive instrumentation will be provided for all levels of operations. The reactor will be protected by a number of scram and alarm interlocks including neutron level, period, and radiation level.

.eactor also has an automatic controller which may be connected only to regulating rod to maintain constant power levels. It is protected by a .iation monitor which switches the control back to manual whenever there is . deviation of more than 10% between the demanded power level and the actual level.

Loading procedures for the reactor have been established, and the application includes a chart showing the configuration of the fuel at each step in the loading. The procedures follow accepted practices, and appear to be satisfactory. The qualifications of the personnel operating the reactor are adequate to ensure that they will be able to carry out the procedures in a safe manner.

Hazards Analysis

A reactor of essentially this same design has been constructed and is being operated at the University of Florida. Hazards analyses pertaining to the Florida reactor can also be generally applied to the UCLA facility, since the reactors are almost identical. These analyses demonstrated that there appeared to be no credible way to release fission products from the reactor, and that it therefore presented no unacceptable hazard to the health and safety of the public. The conclusion, which was supported by theoretical calculations, was also based partially on the experimental information obtained in the relatively similar SPERT reactor, which has demonstrated an ability to withstand large additions of reactivity without damage. Although it is conceivable that extreme mishandling of the reactor or experiments could result in some hazard to the operators, such hazard can be minimized by proper design and operating procedures, and the possibility of hazard to the general public would be extremely low.

Operating Limitations

There are certain deficiencies in the application as discussed below which require the incorporation of several special operating limitations in the license to assure the proper degree of safety in the operation of the facility until these deficiencies are corrected.

a. Handling of Gaseous Effluents

The proposed method for handling radioactive gaseous effluent, particularly argon-41, is not considered to be described in adequate detail to support a conclusion that full power operation at 10 kilowatts (thermal) can be carried out without undue public hazard. Preliminary calculations by the applicant, assuming the reactor is at full power operation about 20% of the time and that no decay occurs within the reactor, predict an argon concentration of about 8×10^{-8} uc pe. cm^3 at the discharge point to the atmosphere. This predicted concentration is somewhat above the limit specified by AEC Regulation 10 CFR Part 20 for unrestricted areas. There are no calculations presented for predicting argon concentrations in the reactor room itself. In addition, the actual procedures described for safely releasing the activity from the reactor where it will accumulate to the atmosphere are incomplete.

For these reasons, we recommend operation of the reactor be limited for the present time to a maximum power level of 10 watts (thermal), a power level

sufficiently low to insure that the argon activity will not constitute a serious hazards problem. Before full power operation is authorized, a more complete analysis as to the quantity of gas expected, methods of controlling release, points of release, and concentrations at all points of release must be submitted by the applicant and reviewed by the Commission.

b. Experimental Program

There are essentially no procedures described in the application for conducting experiments, and proposed experiments other than those in the initial testing program are not specifically described. Before authorization for conducting experiments other that those described in Section III - "Reactor Checkout and Operation" of the final hazards report can be granted, general procedures and limitations for the conduct of the experimental program must be formulated and approved.

c. Changes in Design and Operating Procedures

At a number of points in the Hazards Report, the possibility of making changes in the reactor design and operating procedures is mentioned. We do not believe that any changes which affect facility design, performance characteristics, or operating procedures should be made without review and approval by the AEC.

In view of the foregoing, the following license provisions are considered appropriate:

1. University of California shall not operate the reactor at power levels in excess of 10 watts (thermal) without prior written authorization from the Commission.

2. University of California shall conduct only such experiments as those outlined in Section III - "Reactor Checkout and Operation" of the final hazards report.

3. University of California shall not make any changes in the facility design, performance characteristics, and operating procedures specified in the application without prior written authorization from the Commission.

Conclusions

We conclude that there is a reasonable assurance that the reactor described in the application can be constructed and operated as proposed in the application, with the additional operating limitations specified above, without an undue risk to the health and safety of the public.

Chief, Hazards Evaluation Branch
Division of Licensing and Regulation

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