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

OREGON STATE UNIVERSITY

DOCKET NO. 50-243

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 9
License No. R-106

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The applications for amendment to Facility Operating License No. R-106, filed by Oregon State University (the licensee), dated July 19, 1983 and October 12, 1987, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the applications, the provisions of the Act, and the 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 set forth in 10 CFR Chapter I;

   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, paragraph 2.C.(1) of Facility Operating License No. R-106 is hereby amended to read as follows:

(1) Maximum Power Level

The licensee may operate the facility at power levels not in excess of 1000 kilowatts (thermal) and, in the pulse mode, with reactivity insertions not to exceed 2.55$.

3. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2.C.(2) of License No. R-106 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 9, 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 its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

L. S. Rubenstein

Lester S. Rubenstein, Director
Standardization and Non-Power
Reactor Project Directorate
Division of Reactor Projects III, IV,
V and Special Projects
Office of Nuclear Reactor Regulation

Enclosure:
Appendix A Technical
Specifications Changes

Date of Issuance: February 11, 1988

ENCLOSURE TO LICENSE AMENDMENT NO. 9

FACILITY OPERATING LICENSE NO. R-106

DOCKET NO. 50-243

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain a vertical line indicating the area of change.

Remove Pages	Insert Pages
8	8
12	12
18	18
19	19
20	20
21	21
30	30

3. LIMITING CONDITIONS OF OPERATION

3.1 STEADY STATE OPERATION

Applicability. This specification applies to the energy generated in the reactor during steady state operation.

Objective. The objective is to assure that the fuel temperature safety limit will not be exceeded during steady state operation.

Specifications. The reactor power level shall not exceed 1.0 megawatt under any condition of operation.

Basis. Thermal and hydraulic calculations indicate that TRIGA fuel may be safely operated up to power levels of at least 2.0 megawatts with natural convection cooling.

3.2 REACTIVITY LIMITATIONS

Applicability. These specifications apply to the reactivity condition of the reactor and the reactivity worths of control rods and experiments. They apply for all modes of operation.

Objective. The objective is to assure that the reactor can be shut down at all times and to assure that the fuel temperature safety limit will not be exceeded.

Specifications. The reactor shall not be operated unless the following conditions exist:

The shutdown margin provided by control rods shall be greater than $0.57 with:

1. experimental facilities and experiments in place and the highest worth non-secured experiment in its most reactive state,

2. the most reactive control rod fully withdrawn, and

3. the reactor in the cold condition without xenon.

Bases. The value of the shutdown margin assures that the reactor can be shut down from any operating condition even if the most reactive control rod should remain in the fully withdrawn position.

TABLE I

Minimum Reactor Safety Channels

Safety Channel	Function	Effective Mode		
		S.S.	Pulse	S.W.
Fuel Element Temperature	SCRAM @ 510°C	X	X	X
Safety Power Level	SCRAM @ 110%	X		X
Percent Power Level	SCRAM @ 110%	X		X
Console Scram Button	SCRAM	X	X	X
Wide-Range Log Power Level	SCRAM @ period no less than 3 sec.	X		
Preset Timer	Transient rod SCRAM @ 15 sec or less after pulse		X	
High Voltage	SCRAM @ 25% of nominal operating voltage	X	X	X

TABLE II

Minimum Interlocks

Interlock	Function	Effective Mode		
		S.S.	Pulse	S.W.
Wide-Range Log Power Level Channel	Prevents control rod withdrawal @ less than 2 cps	X		
Transient Rod Cylinder	Prevents application of air unless fully inserted	X		
1 kw Pulse Interlock	Prevents pulsing above 1 kw		X	
Shim, Safety, and Regulating Rod Drive Circuit	Prevents simultaneous withdrawal of two rods	X		X
Shim, Safety, and Regulating Rod Drive Circuit	Prevents movement of any rod except transient rod		X	
Transient Rod Cylinder Position	Prevents pulse insertion of reactivity greater than $2.55		X	X

4. 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 Operations Committee. A system shall not be considered operable until after it is successfully tested.

Basis. 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.

4.2 SAFETY LIMIT -- FUEL ELEMENT TEMPERATURE

Applicability. This specification applies to the surveillance requirements of the fuel element temperature measuring channel.

Objective. The objective is to assure that the fuel element temperatures are properly monitored.

Specifications.

a. Whenever a reactor scram caused by high fuel element temperature occurs, an evaluation shall be conducted to determine whether the fuel element temperature safety limit was exceeded.

b. A calibration of the temperature measuring channels shall be performed semi-annually (interval not to exceed seven and one-half months).

c. A Channel Check of the fuel element temperature measuring channel shall be made prior to pulsing operation on a daily basis (must be done during the calendar day on which pulse operation is planned).

Bases. Operational experience over the past five years with the TRIGA system gives assurance that the thermocouple measurements of fuel element temperatures have been sufficiently reliable to assure accurate indication of this parameter.

4.3 LIMITING CONDITIONS FOR OPERATIONS

4.3.1 Reactivity Requirements

Applicability. These specifications apply to the surveillance requirements for reactivity control of experiments and systems.

Objective. The objective is to measure and verify the worth, performance and operability of those systems affecting the reactivity of the reactor.

Specifications.

a. The reactivity worth of each control rod and the shutdown margin shall be determined annually (interval not to exceed 15 months) and following significant core or control rod changes.

b. The reactivity worth of an experiment shall be estimated or measured, as appropriate, before reactor operation with said experiment.

c. The control rods shall be visually inspected for deterioration biennially (interval not to exceed two and one-half years).

d. The transient rod drive cylinder and associated air supply system shall be inspected, cleaned and lubricated as necessary, semi-annually (interval not to exceed seven and one-half months).

e. The reactor shall be pulsed semi-annually (interval not to exceed seven and one-half months) to compare fuel temperature measurements and peak power levels with those of previous pulses of the same reactivity value.

Bases. The reactivity worth of the control rods is measured to assure that the required shutdown margin is available and to provide an accurate means for determining the reactivity worths of experiments inserted in the core. Past experience with TRIGA reactors gives assurance that measurement of the reactivity worth on an annual basis is adequate to insure no significant changes in the shutdown margin. The visual inspection of the control rods is made to evaluate corrosion and wear characteristics caused by operation in the reactor. The reactor is pulsed at suitable intervals and a comparison made with previous similar pulses to determine if changes in fuel or core characteristics are taking place.

4.3.2 Control and Safety System

Applicability. These specifications apply to the surveillance requirements for measurements, tests, and calibrations of the control and safety systems.

Objective. The objective is to verify the performance and operability of those systems and components which are directly related to Reactor Safety.

Specifications.

a. The SCRAM time shall be measured annually (interval not to exceed 15 months) or whenever any work is done on the control rods or the control rod drive system.

b. A Channel Check of each of the reactor safety system channels for the intended mode of operation shall be performed prior to each day's operation or prior to each operation extending more than one day.

c. A Channel Calibration shall be made of the power level monitoring channels by the calorimetric method annually (interval not to exceed 15 months).

d. A Channel Test of each item in Table I and Table II other than measuring channels, shall be performed semi-annually (interval not to exceed seven and one-half months).

Bases. Measurement of the scram time on an annual basis is a check not only of the scram system electronics, but also is an indication of the capability of the control rods to perform properly. The channel tests will assure that the safety system channels are operable on a daily basis or prior to an extended run. The power level channel calibration will assure that the reactor will be operated at the proper levels. Transient control element checks and annual maintenance insure proper operation of this element.

4.3.3 Radiation Monitoring System

Applicability. This specification applies to the surveillance requirements for the area radiation monitoring equipment and the air monitoring systems.

Objective. The objective is to assure that the radiation monitoring equipment is operating properly and to verify the appropriate alarm settings.

Specification. The area radiation monitoring system and the air monitoring systems shall be calibrated annually (interval not to exceed 15 months) and their set points verified weekly (interval not to exceed ten days).

Basis. Experience has shown that weekly verification of area radiation monitoring and air monitoring system set points in conjunction with annual calibration is adequate to correct for any variation in the system due to a change of operating characteristics over a long time span.

4.3.4 Ventilation System

Applicability. This specification applies to the building confinement ventilation system.

Objective. The objective is to assure the proper operation of the ventilation system in controlling releases of radioactive material to the unrestricted area.

Specification. It shall be verified semi-annually (interval not to exceed seven and one-half months) that the ventilation system is operable.

Basis. Experience accumulated in over seven years of operation has demonstrated that tests of the ventilation system on a semi-annual basis are sufficient to assure proper operation of the system and control over releases of radioactive material. The perfect operating record of this system achieved in the past is sustained by regular mechanical maintenance performed on a monthly basis.

4.3.5 Reactor Pool Water

Applicability. This specification applies to the surveillance requirements for the reactor pool water.

Objective. The objective is to assure that the reactor pool water level and the bulk water temperature monitoring systems are operating, and to verify appropriate alarm settings.

Specification.

a. The reactor bulk water temperature monitoring system shall be calibrated annually, (interval not to exceed 15 months) and its set point verified monthly (interval not to exceed six weeks).

b. It shall be verified monthly (interval not to exceed six weeks) that the reactor pool water level monitoring system is operable.

Basis. Experience over the past seven years has shown that monthly verifications of set points and annual calibrations of temperature measuring devices are sufficient to ensure proper operation of the system.

4.3.6 Experimental Limits

Applicability. This specification applies to the surveillance requirements for experiments installed in the reactor and its experimental facilities.

Objective. The objective is to prevent the conduct of experiments which may damage the reactor or release excessive amounts of radioactive materials as a result of experiment failure.

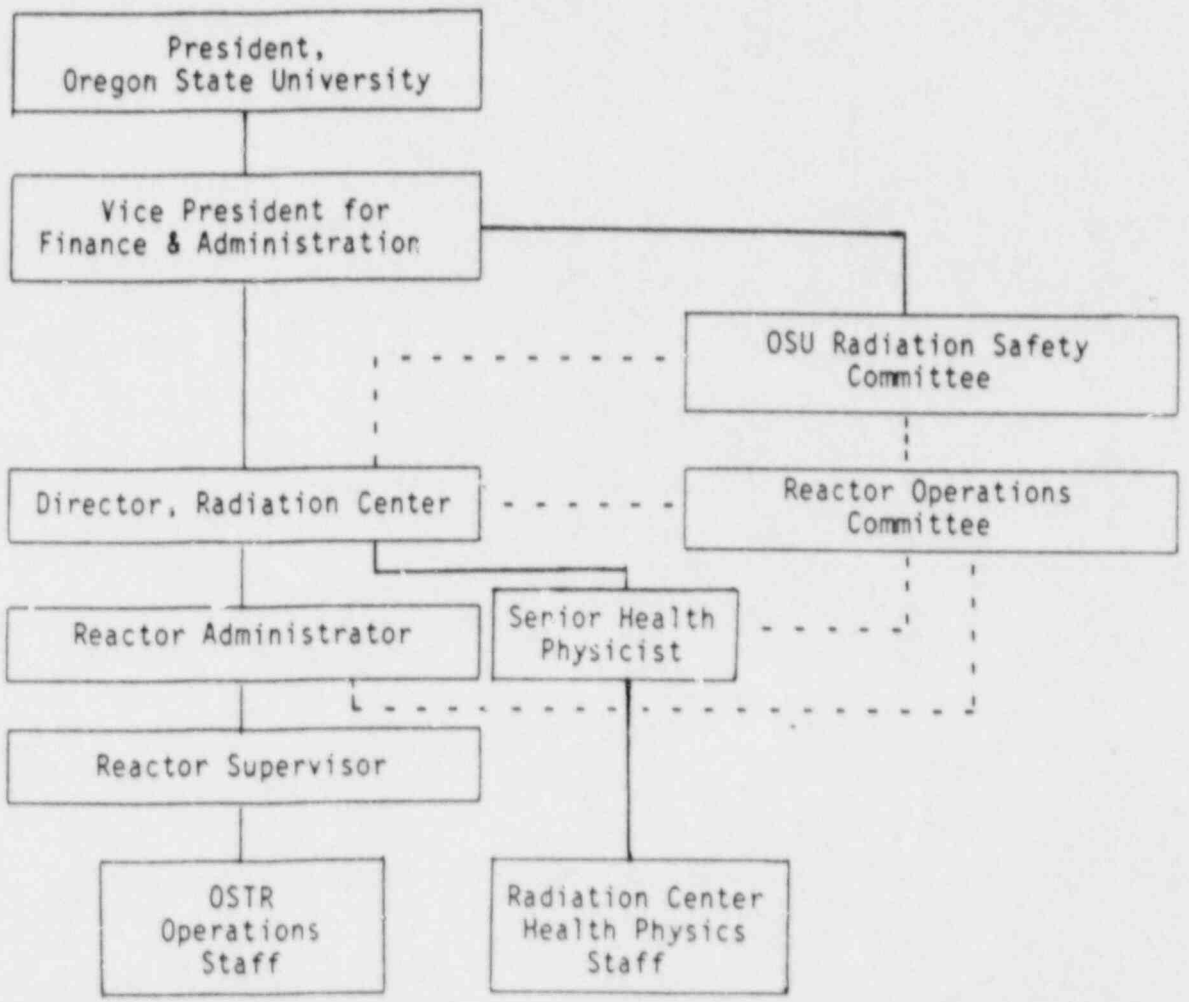
Specifications. An experiment shall not be installed in the reactor or its experimental facilities unless a hazards analysis has been performed and reviewed for compliance with Limitations on Experiments, Section 3.8, by the Reactor Operations Committee in full accord with Section 6.2.d.1 of these Technical Specifications, and the procedures which are established for this purpose.

6. ADMINISTRATIVE CONTROLS

6.1 ORGANIZATION

a. The facility shall be under the direct control of the Radiation Center Director or a licensed senior operator designated by him to be in direct control. The Radiation Center Director shall be responsible to the Vice President for Finance and Administration of Oregon State University for the safe operation and maintenance of the reactor and its associated equipment. The Radiation Center Director, or an individual appointed by the Director, shall be responsible for assuring that all operations are conducted in a safe manner and within the limits prescribed by the facility license and the requirements of the Reactor Operations Committee. The Radiation Center Director shall enforce rules for the protection of personnel against radiation.

b. The safe operation of the OSTR shall be related to the University Administration as shown in the following chart:



———— Normal administrative reporting channel

- - - - - - - Technical review (as applicable), communications and assistance