

February 23, 2011

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921 South 8th Avenue, Stop 8130
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SUBJECT: IDAHO STATE UNIVERSITY AGN 201M RESEARCH REACTOR – RE:
ISSUANCE OF AMENDMENT NO. 7 TO AMENDED FACILITY
OPERATING LICENSE NO. R-110 (TAC NO. MD9611)

Dear Dr. Crowell:

The Commission has issued enclosed Amendment No. 7 to Amended Facility Operating License No. R-110 for the Idaho State University (ISU or the licensee) AGN 201M research reactor. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 4, 2008, as supplemented September 17, 2009 (Agencywide Documents Access and Management System Accession Nos. ML082550400 and ML092720824).

Title 10 of the *Code of Federal Regulations* Part 50.36 requires that the licensee have TSs that meet the requirements of that section. Section 50.36(c)(2) (ii) contains the requirement for a Limiting Condition for Operation (LCO) if one or more of the criterion listed are met. The amendment reflects the requested change to a set-point for one of the LCOs, listed in Table 3.1, Reactor Control and Safety Systems Set-Point Specifications, of the TSs. The requested change represents a change in the units of the set-point to accommodate a change in the instrument's measured value. This amendment does not change the functional effectiveness of the LCO and therefore it is acceptable. The amendment also corrects typographical errors in Table 3.1 of the TSs.

A copy of the related Safety Evaluation supporting Amendment No. 7 is enclosed.

Sincerely,

/LTran for RA/

Alexander Adams Jr., Senior Project Manager
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No.: 50-284

Enclosures: 1. Amendment No. 7
2. Safety Evaluation
cc w/encls.: See next page

Idaho State University

Docket No. 50-284

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Test, Research and Training
Reactor Newsletter
202 Nuclear Sciences Center
University of Florida
Gainesville, FL 32611

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ADAMS Accession Nos. Pkg: ML090750019, AMD: ML090750030, TS: ML090750038

*concurrent by e-mail

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|--------|-----------|----------|-----------|-----------|------------|-----------|
| OFFICE | PRLB/PM | PRLB/PM | PRLB:LA | OGC | PRLB:BC | PRLB:PM* |
| NAME | DHardesty | AAdams | GLappert | AJones | JQuichocho | AAdams |
| DATE | 7/12/2010 | 9/6/2010 | 7/14/2010 | 7/23/2010 | 2/23/2011 | 2/23/2011 |

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IDAHO STATE UNIVERSITY

DOCKET NO. 50-284

AMENDMENT TO AMENDED FACILITY OPERATING LICENSE

Amendment No. 7
License No. R-110

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for an amendment to Amended Facility Operating License No. R-110, filed by the Idaho State University (the licensee) dated September 4, 2008, as supplemented on September 17, 2009, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission set forth in Chapter I of Title 10 of the *Code of Federal Regulations* (10 CFR);
 - 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 that (i) the activities authorized by this amendment can be conducted without endangering the health and safety of the public and (ii) such activities will be conducted in compliance with the regulations of the Commission;
 - 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. This amendment is issued in accordance with the regulations of the Commission as stated in 10 CFR Part 51, and all applicable requirements have been satisfied; and
 - F. Prior notice of this amendment was not required by 10 CFR 2.105 and publication of a notice for this amendment is not required by 10 CFR 2.106.

2. Accordingly, the license is amended by changes to Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2.C.2. of Amended Facility Operating License No. R-110 is hereby amended to read as follows:

2. 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 issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Jessie Quichocho, Chief
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Enclosure:
Changes to Facility
Operating License and
Technical Specifications

Date of Issuance: February 23, 2011

ENCLOSURE TO LICENSE AMENDMENT NO. 7

AMENDED FACILITY OPERATING LICENSE NO. R-110

DOCKET NO. 50-284

Replace the following pages of the Amended Facility Operating License No. R-110 and Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Operating License

Remove

Insert

Page 2

Page 2

Technical Specifications

Remove

Insert

Page 11 of 31

Page 11 of 31

2. Facility Operating License No. R-110 is hereby amended in its entirety to read as follows:

A. This license applies to the AGN-201M research reactor (herein "the reactor"), owned by the Idaho State University and located on its campus in Pocatello, Idaho, and is described in the application for license dated November 21, 1995, and supplements dated January 31, 2003 and July 10, 2003, (renewal herein referred to as "the application"), and authorized for operation of License No. R-110.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Idaho State University:

1. Pursuant to Section 104c of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess, use and operate the reactor as a utilization facility in accordance with the procedures and limitations described in the application and in this licensee;
2. Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess and use up to 995 grams of contained uranium-235, enriched to 20% in uranium dioxide (UO₂) embedded in radiation stabilized polyethylene, in connection with the operation of the reactor; and
3. Pursuant to the Act and 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," to possess, but not to separate, such byproduct material as may be produced by the operation of the reactor.

C. This license shall be deemed to contain and be subject to the conditions specified in Parts 20, 30, 40, 50, 51, 55, 70, and 73 of 10 CFR Chapter I, to all applicable provisions of the Act, and to the rules, regulations and orders of the Commission now, or hereafter in effect, and to the additional conditions specified below:

1. Maximum Power Level

The licensee is authorized to operate the reactor at steady-state power levels up to a maximum of 5 watts (thermal).

2. Technical Specification

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.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 7 TO

AMENDED FACILITY OPERATING LICENSE NO. R-110

IDAHO STATE UNIVERSITY AGN-201M REACTOR

DOCKET NO. 50-284

1.0 INTRODUCTION

By letter dated September 4, 2008 (Agencywide Document Access and Management System (ADAMS) Accession No. ML0802550400), to the U.S. Nuclear Regulatory Commission (NRC), as supplemented on September 17, 2009 (ADAMS Accession No. ML092720824), Idaho State University, (ISU or the licensee) submitted a request for amendment to the Technical Specifications (TSs), Appendix A, to Amended Facility Operating License No. R-110 for the AGN-201M Reactor. The request, when issued, will be Amendment No. 7 to the license.

1.1 BACKGROUND

The licensee has constructed a new control console to replace obsolete technology in their original console. However, the licensee wants to retain the flexibility to operate the reactor with either console. As a result of a Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59 review of the new ISU AGN-201M Reactor control console, the licensee determined that a revision of the TSs is necessary before the new control console can be implemented. The licensee is requesting that the specified set-point for the startup count rate channel low power as measured and displayed by the new Nuclear Safety Channel No.1 be added to the TSs. The revised TSs will allow the licensee to operate the reactor with the original or the new control console.

The current specification for Nuclear Safety Channel No. 1 is given in row one of TS Table 3.1 as follows:

| | | |
|---|---------------|------------------------------------|
| Nuclear Safety Channel No. 1 (Startup Count Rate Channel) Low Power | 5% Full Scale | Scram at levels < 5% Full Scale |
|---|---------------|------------------------------------|

The proposed specification is:

| | | |
|---|---|---|
| Nuclear Safety Channel No. 1 (Startup Count Rate Channel) Low Power | Unit A) 5% of Full Scale OR Unit B) 0.5 counts/second | Scram at levels Below the set points |
|---|---|---|

By a note to Table 3.1 of the TSs, the licensee has designated Unit A as the original AGN console and Unit B as the new ISU all solid state electronic control console. Either Unit A or Unit B will be in service any time the reactor is operating.

2.0 EVALUATION

The requested amendment reflects adding a set-point for a new control console to the TSs for the Limiting Condition for Operation (LCO), listed in Table 3.1, Reactor Control and Safety Systems Set-Point Specifications. Specifically, the request adds a set-point to the Nuclear Safety Channel No. 1, (Startup Count Rate Channel) Low Power scram, that prevents control rod withdrawal if the indicated neutron flux signal is less than "0.5 counts/sec" for the new control console. This new set point for the ISU all solid state electronic control console is functionally equivalent to the present set-point of "5% of full scale" for the original AGN console.

The purpose of the Startup Count Rate Channel Low Power scram is to prevent the occurrence of either of these two events:

1. startup of the reactor with inoperable instrumentation, or
2. startup of the reactor without an inserted neutron source or sufficient intrinsic neutron source.

It is possible that a startup attempted without instrumentation or observable neutron induced signal or power level could result in the reactor exceeding the licensed power level or a Limiting Safety System Setting. In the case of the ISU AGN-201M Reactor, the design parameters (negative temperature coefficient, low excess reactivity, and a fuse-link which shuts down the reactor at approximately 20 watts) protect the health and safety of the public by preventing or mitigating the consequences of such a scenario. Even so, it is necessary that the TSs for the ISU AGN-201M Reactor contain this LCO as required by 10 CFR 50.36(c)(2)(ii)(C). In this case the implementation of the LCO is a low level power scram on the Nuclear Safety Channel No.1, (Startup Count Rate Channel) Low Power, as specified in Table 3.1, Reactor Control and Safety Systems Set-Point Specifications, of the TS.

The licensee states that the most conspicuous feature of the new circuit is that it has been designed with a continuous range to eliminate the need for manual range switching. Eliminating manual switching is expected to greatly simplify reactor operation and significantly decrease the number of inadvertent scrams that the facility will experience due to switching errors made by inexperienced operators and student trainees. The licensee also states that reducing the number of inadvertent scrams will help reduce the mechanical stresses on the control rods by reducing the number of scram cycles and will help to minimize the possibility of another control rod cladding failure as has been experienced in the past.

Because the new Startup Count Rate Channel system has a continuous range that extends to 250,000 counts/second, the licensee states that the current TS requirement of scrambling the reactor at 5% of the full-scale reading (corresponding to approximately

12,500 counts/second in the new system) is too high and does not meet the intent to prevent a startup without instrumentation or an observable neutron induced signal. The licensee proposes that the specification for the ISU all solid state electronic control console be revised to provide an equivalent numerical set point to the 5% of full scale set point on the existing Nuclear Safety Channel No.1 rate meter when set to lowest range.

The licensee's original "startup" channel instrumentation for Startup Count Rate Channel Low Power scram used "5% of full scale" as the set-point because the instrument uses a manually switched multi-range analog system. In order to implement the required Startup Count Rate Channel Low Power scram on the lowest range the scram had to be implemented on all ranges. This requires that the set point be implemented as a percent of the indication as opposed to a fixed value. The new ISU all solid state electronic control console replaces the present instrument with one that indicates the neutron level in counts/second over a continuous range. When the new digital instrument installation is complete it is necessary to calibrate the set-point at "0.5 counts/second." This change ensures that rod withdrawal is prevented below the required source level when implementing the new console. The revised TS will continue to ensure that a startup can not be attempted without instrumentation that is responsive and indicating neutron signal levels high enough to allow reliable observation of the rate and level of reactor power.

A similar change was made for another facility (the Pennsylvania State University research reactor, Docket No. 50-05, Amendment No. 32). The NRC staff finds that the proposed TS is technically acceptable and continues to meet the regulatory requirement of 10 CFR 50.36. The change to the set-point in Table 3.1 of the TSs for the new ISU all solid state electronic control console preserves the original intent of the LCO to prevent reactor startup unless the neutron detector channels can be verified operable and responding while accommodating the wider range indicating scale of the new instrument.

The licensee has requested correction of the following typographical errors that appear in Table 3.1. First, the title of the table does not contain the table number. The corrected title is "Table 3.1 Reactor Control and Safety Systems Set-Point Specifications." Second, the third row in Table 3.1 is corrected to specify the "Low Power" set-point for Channel 2 rather than the incorrect "High Power" set-point for Channel 2. Third, also in the third row, the engineering units for the set-point are changed from amps to amperes. The original third row of Table 3.1 was as follows:

| | | |
|---|----------------------------|--|
| Nuclear Safety Channel No. 2 (Log Power Channel) High Power | 3.0×10^{-13} amps | Scram at source levels < 3.0×10^{-13} amps |
|---|----------------------------|--|

The corrected third row of Table 3.1 is as follows:

| | | |
|--|-------------------------------|---|
| Nuclear Safety Channel No. 2 (Log Power Channel) Low Power | 3.0×10^{-13} amperes | Scram at source levels < 3.0×10^{-13} amperes |
|--|-------------------------------|---|

The licensee also requested that the set-point for the Area Radiation Monitor, specified in the last row of Table 3.1, be corrected to read “≤ 10 mR/hr” rather than “= 10 mR/hr.” The NRC staff found that the current TSs in the ISU authority file and in ADAMS Accession No. ML060610619 correctly specifies the set-point as “≤ 10 mR/hr” and no change is required.

These typographical corrections do not change the original intent of the TS and are therefore acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

The part of this amendment related to the control console TS setpoint involves “...changes in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20.” The NRC staff has determined that this amendment involves no significant hazards consideration, no significant increase in the amounts, and no significant change in the types, of any effluents that may be released off site, and no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this part of the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

The part of this amendment correcting typographical errors is a license amendment which “changes the format of the license or permit or otherwise makes editorial, corrective or other minor revisions, including the updating of NRC approved references.” Accordingly, this part of the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10)(v).

Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

5.0 CONCLUSION

The NRC staff has concluded on the basis of the considerations previously discussed that: (1) the amendment does not involve a significant hazards consideration because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, create the possibility of a new kind of accident or a different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities; 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 the health and safety of the public.

Principal Contributors: D. Hardesty, Project Manager
A. Adams, Jr., Senior Project Manager

Date: February 23, 2011