

August 26, 2008

Mr. Michael J. Curley, Reactor Director  
Worcester Polytechnic Institute  
Office of the Vice President for Finance and Operations  
100 Institute Road  
Worcester, MA 01609-2280

SUBJECT: WORCESTER POLYTECHNIC INSTITUTE—AMENDMENT RE: POSSESSION  
ONLY OF WORCESTER POLYTECHNIC INSTITUTE REACTOR (TAC  
NO. MD6410)

Dear Mr. Curley:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 11 to Facility Operating License No. R-61 for the Worcester Polytechnic Institute (WPI). The amendment consists of changes to the facility operating license and technical specifications (TSs) in response to your application of August 13, 2007, as supplemented on November 19, 2007, and April 10 and May 5, 2008.

The amendment removes authority from the license to operate the reactor, authorizes possession only of the reactor, and amends the TSs to remove operational requirements not needed for possession-only status.

Your application for license amendment also contained requested changes to the facility reactor operator requalification plan. Your proposed changes to the reactor operator requalification plan are acceptable.

On November 25, 2002, WPI applied for renewal of Facility Operating License No. R-61, which was due to expire on December 30, 2002. Because your renewal application satisfied the requirements of Title 10, Section 2.109, "Effect of Timely Renewal Application," of the *Code of Federal Regulations* (10 CFR 2.109), we informed you by letter dated December 13, 2002, that the Agency will not deem the license to have expired until the NRC made a final determination regarding your application. Your letter of November 19, 2007 requested withdrawal of your license renewal application. In response to your request, we consider your application withdrawn. In accordance with 10 CFR 50.51(b), your license continues in effect until the Commission notifies you in writing that the license is terminated.

A copy of the safety evaluation supporting Amendment No. 11 is also enclosed.

Sincerely,

**/RA/**

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

Docket No. 50-134

Enclosures:

1. Amendment No. 11
2. Safety Evaluation

cc w/enclosures: See next page

Worcester Polytechnic Institute

Docket No. 50-134

cc:

City Manager  
City Hall  
455 Main Street, Room 309  
Worcester, MA 01608

Dr. John A. Orr  
Provost *ad interim* and Dean of Undergraduate Studies  
Office of Academic Affairs  
Worcester Polytechnic Institute  
100 Institute Road  
Worcester, MA 01609

Frank Diliado III, District Chief  
Worcester Fire Department  
Worcester, MA 02180

Department of Environmental Protection  
One Winter Street  
Boston, MA 02180

Director  
Radiation Control Program  
Department of Public Health  
90 Washington Street  
Dorchester, MA 02121

Nuclear Preparedness Manager  
Massachusetts Emergency Management Agency  
400 Worcester Road  
Framingham, MA 01702-5399

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

A copy of the safety evaluation supporting Amendment No. 11 is also enclosed.

Sincerely,

**/RA/**

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

Docket No. 50-134

Enclosures:

1. Amendment No. 11
2. Safety Evaluation

cc w/enclosures: See next page

DISTRIBUTION:

Public                      RidsNrrDpr                      RidsNrrDprPrta  
RTR r/f                      RidsNrrDprPrtb                      GHill (2)

ADAMS Accession No.: ML081500506

OFFICE	PRTA:LA	TechEditor	PRTA:PM	OGC	PRTA:BC
NAME	EBarnhill eeb	HChang hc	AAdams aa	BMizuno bm	DCollins dsc
DATE	6/23/08	6/9/08	6/24/08	6/26/08	8/26/08

WORCESTER POLYTECHNIC INSTITUTE

DOCKET NO. 50-134

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 11  
License No. R-61

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that
  - A. The application for an amendment to Facility Operating License No. R-61 filed by the Worcester Polytechnic Institute (the licensee) on August 13, 2007, as supplemented on November 19, 2007, and April 10 and May 5, 2008, conforms to the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the regulations of the Commission as stated in Chapter I of Title 10 of the *Code of Federal Regulations* (10 CFR);
  - B. The facility will be possessed 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 the following paragraphs which are hereby amended to read as follows:
  - 2.A. This license applies to the pool-type training and research reactor (hereinafter "the reactor"), that is owned by Worcester Polytechnic Institute and located on the Institute's campus at Worcester, Massachusetts, and described in the application for license renewal dated July 16, 1979, as supplemented by filings dated July 20, 1979, September 27, 1979, October 26, 1979, May 22, 1980, June 12, 1980, November 20, 1980, January 19, 1981, March 3, 1982, and October 26, 1982.
  - 2.B.(1) Pursuant to Section 104c of the Act and 10 CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities," to possess the reactor in accordance with the procedures and limitations described in the application and in this license;

2.B.(2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to possess but not use up to a maximum of 5.2 Kilograms of contained U-235 at enrichments less than 20% and 16 grams of plutonium as Pu-Be source.

2.C.(1) Maximum Power Level

The licensee may not operate the reactor.

2.C.(3) Physical Security Plan

The licensee shall maintain and fully implement all provisions of the Commission's approved physical security plan, including amendments and changes made pursuant to the authority of 10 CFR 50.54(p). The approved security plan consists of documents withheld from public disclosure pursuant to 10 CFR 2.390, entitled "Worcester Polytechnic Institute Physical Security Plan dated June 11, 1980, and submitted by letter dated June 12, 1980, as amended by Revision 1 dated November 20, 1980.

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 Facility Operating License No. R-61 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 11, are hereby incorporated in the license. The licensee shall possess the facility in accordance with the Technical Specifications.

4. Accordingly, the license is amended by removal of license condition 2.B.(4), 2.D. and 2.E.

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

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Daniel S. Collins, Chief  
Research and Test Reactors Branch A  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Enclosures:

1. Facility Operating License Changes
2. Appendix A, Technical Specifications Changes

Date of Issuance: August 26, 2008

ENCLOSURE 1 TO LICENSE AMENDMENT NO. 11

FACILITY OPERATING LICENSE NO. R-61

DOCKET NO. 50-134

Replace the following pages of Facility Operating License No. R-61 with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Remove

2  
3  
4

Insert

2  
3  
4

H. The receipt, possession and use of the byproduct and special nuclear materials as authorized by this license will be in accordance with the Commission's regulations in 10 CFR 30 and 70, including section 30.33, 70.23 and 70.31.

2. Facility Operating License No. R-61 is hereby amended in its entirety to read as follows:

A. This license applies to the pool-type training and research reactor (hereinafter "the reactor"), that is owned by Worcester Polytechnic Institute and located on the Institute's campus at Worcester, Massachusetts, and described in the application for license renewal dated July 16, 1979, as supplemented by filings dated July 20, 1979, September 27, 1979, October 26, 1979, May 22, 1980, June 12, 1980, November 20, 1980, January 19, 1981, March 3, 1982, and October 26, 1982.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Worcester Polytechnic Institute at Worcester, Massachusetts:

(1) Pursuant to Section 104c of the Act and 10 CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities," to possess the reactor in accordance with the procedures and limitations described in the application and in this license;

(2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to possess but not use up to a maximum of 5.2 Kilograms of contained U-235 at enrichments less than 20% and 16 grams of plutonium as Pu-Be source.

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

(4) deleted

C. This license shall be deemed to contain, and be subject to, the conditions specified in the following Commission regulations in 10 CFR Chapter I; Part 20, Section 30.34 of 10 CFR Part 30, and Section 70.32 of Part 70, and is subject to all applicable provisions of the Act and rules, regulations and orders of the Commission now, or hereafter in effect, and is subject to the additional conditions specified below:



(1) Maximum Power Level

The licensee may not operate the reactor. |

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 11, are hereby incorporated in the license. The licensee shall possess the facility in accordance with the Technical Specifications. |

(3) Physical Security Plan

The licensee shall maintain and fully implement all provisions of the Commission's approved physical security plan, including amendments and changes made pursuant to the authority of 10 CFR 50.54(p). The approved security plan consists of documents withheld from public disclosure pursuant to 10 CFR 2.390, entitled "Worcester Polytechnic Institute Physical Security Plan dated June 11, 1980, and submitted by letter dated June 12, 1980, as amended by Revision 1 dated November 20, 1980. |

D. deleted |

E. deleted

F. This license shall expire at midnight twenty years from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

R/A

Darrell G. Eisenhut, Director  
Division of Licensing

Enclosure:  
Appendix A Technical  
Specifications

Date of Issuance: December 30, 1982

Amendment No. 11  
August 26, 2008

ENCLOSURE 2 TO LICENSE AMENDMENT NO. 11

FACILITY OPERATING LICENSE NO. R-61

DOCKET NO. 50-134

Replace the following pages of Appendix A, "Technical Specifications for the Worcester Polytechnic Institute Reactor," with the enclosed pages. The revised pages are identified by amendment number.

Remove  
Cover Page to 16

Insert  
Cover Page to 8

APPENDIX A  
TO LICENSE NO. R-61  
TECHNICAL SPECIFICATIONS FOR THE  
WORCESTER POLYTECHNIC INSTITUTE REACTOR

DOCKET NO. 50-134

Amendment No. 11  
August 26, 2008

## TABLE OF CONTENTS

	<u>Page</u>
1.0 DEFINITIONS .....	1
2.0 SAFETY LIMITS AND OPERATING RESTRICTIONS.....	3
2.1 Safety Limits .....	3
3.0 SURVEILLANCE REQUIREMENTS .....	4
3.1 Frequency of Surveillance .....	4
3.2 Action to be Taken.....	4
3.3 Radiation Detection .....	4
4.0 SITE AND DESIGN FEATURES .....	5
4.1 Site .....	5
4.2 Restricted Area and Exclusion Area.....	5
4.3 Reactor Building and Ventilation System .....	5
4.4 Reactor Core .....	5
5. ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS .....	6
5.1 Facility Administrator .....	6
5.2 Radiation, Health, and Safeguards Committee.....	6
5.3 Radiological Safety Officer .....	6
5.4 Fire Protection .....	6
5.5 Procedures .....	6
5.6 Operating Records.....	7
5.7 Reports .....	7
5.8 Annual Operating Reports .....	8
5.9 Fuel Storage .....	8

The actual values of dimensions, measurements, and other numerical values may differ from values given in these specifications to the extent of normal construction and manufacturing tolerances, or normal accuracy of instrumentation.

## 1.0 DEFINITIONS

Cold, Clean, Critical Condition: Since xenon and samarium effects are negligible for this reactor in its normal operations, the term cold, clean, critical shall refer to the condition of the reactor core when it is at the normal ambient water temperature of 70° to 75°F and free of any experiments that could affect reactivity.

Critical Reactor Operation: Critical reactor operation shall refer to any situation when more than 12 fuel elements are loaded in the core and any control blade is withdrawn more than 6 in.

Experiment: An experiment shall mean any apparatus, device, or material installed in the core or in external experimental facilities that is not a normal part of those facilities.

Movable Experiment: A movable experiment is one that may be inserted, removed, or manipulated while the reactor is critical.

Operable: An instrument or channel is operable when the instrument or channel will be operational once it is energized.

Operational: An instrument or channel is operational when that instrument or channel is installed, energized, and in all other respects performing the monitoring and safety functions for which it was intended.

Reactor Operation: Reactor operation shall be any condition wherein either the reactor key is inserted into the console lock or the reactor is not in a shutdown condition.

Reactor Safety System: The reactor safety system is that combination of control channels and associated circuitry that forms the automatic protective system for the reactor or provides information that requires manual protective action to be initiated.

Reactor Scram: Reactor scram shall be the rapid insertion of the three control blades into the core by either of the following methods:

- (1) Relay (slow) scram: Reactor relay scram (slow scram) shall be instigated by the relay scram circuits which control current inputs for the trip amplifier. Interruption of this current shall de-energize the scram magnets.
- (2) Electronic (fast) scram: Reactor electronic scram (fast scram) shall be caused by the application of sufficient negative bias in the trip amplifier to terminate current to the scram magnets.

Readily Available on Call: Readily available on call shall mean an individual on duty within a reasonable driving time (1/2 hr) from the reactor building, that can be contacted to fulfill duties as specified in the implementing plans and procedures.

Reportable Occurrence: A reportable occurrence is any of the following conditions:

- (1) a safety system setting less conservative than the limiting setting established in the Technical Specifications;
- (2) operation in violation of a limiting condition for operation established in the Technical Specifications;
- (3) a safety system component malfunction or other component or system malfunction that during operation could, or threatens to, make the safety system incapable of performing its intended safety functions;
- (4) release of fission products from a failed fuel element;
- (5) an uncontrolled or unplanned release of radioactive material from the restricted area of the facility;
- (6) an uncontrolled or unplanned release of radioactive material that results in concentrations of radioactive materials within the restricted area in excess of the limits specified in Appendix B, Table 1 of 10 CFR Part 20;
- (7) an uncontrolled or unanticipated change in reactivity in excess of 0.5%  $\Delta k/k$ ;
- (8) conditions arising from natural or man-made events that affect or threaten to affect the safe operation of the facility; and
- (9) an observed inadequacy in the implementation of administrative or procedural controls such that the inadequacy causes or threatens to cause the existence or development of an unsafe condition in connection with the operation of the facility.

Shutdown Condition:

The reactor shall be deemed to be in the shutdown condition if no control or regulating blade is withdrawn from its fully inserted position or if there are less than 12 fuel elements loaded on the grid plate.

## 2.0 SAFETY LIMITS AND OPERATING RESTRICTIONS

### 2.1 Safety Limits

Radiation Alarms: Upon indication of radiation levels in excess of 50 mrem/hr (20 mrem/hr for fuel storage) area monitors shall actuate audible evacuation alarms in the reactor room and in the second and third floor areas above the reactor pool.

Radiation Levels: The maximum radiation levels 1 m above the pool surface and at the surface of the concrete shield, when the beam port and thermal column are closed, shall be less than 50 mrem/hr.

Water Level: The minimum depth of water above the top of the end box of the fuel elements in the reactor pool shall be 10 ft. When fuel is not in the pool, the water level shall be maintained to keep radiation levels as low as reasonably achievable (ALARA). The pool water level detector and alarm will be operational, with the alarm set-point being a water drop of less than or equal to 1 foot. The pool water level detector and alarm may be by-passed provided a licensed senior reactor operator is present in the facility.

Water Purity: Corrective action shall be taken promptly if the following limits for the pool water are not met.

- (1) pH less than 8.0 and greater than 6.0
- (2) resistivity greater than  $5 \times 10^{-5}$  ohm-cm
- (3) pool water activity less than  $10^{-5}$  uCi/ml

Water Temperature: The maximum bulk water temperature of the reactor pool shall be 110°F and the minimum shall be 40°F, when fuel is in the pool.



## 3.0 SURVEILLANCE REQUIREMENTS

### 3.1 Frequency of Surveillance

Quarterly: The area radiation monitoring systems and the pool water level switch shall be checked and ensured to be operational quarterly.

Semiannually: At least semiannually, during possession of the facility, a reactor inspection shall be performed consisting of

(1) Pool water pH shall be measured and conductivity and pH devices shall be calibrated.

### 3.2 Action to be Taken

If maintenance or recalibration is required for any of the items, it shall be performed and the instrument shall be rechecked before being placed back in service.

### 3.3 Radiation Detection

Area Monitors: Area radiation sensors capable of detecting gamma radiation in the range of 0.1 to 100 mrem/hr shall be installed near the beam port, demineralizer, thermal column door, fuel storage area, and less than 1 m above the core pool surface. Upon indication of radiation levels in excess of 50 mrem/hr (20 mrem/hr for fuel storage) these monitors shall actuate audible alarms in the reactor room and in the second and third floor areas above the reactor pool. Area monitors shall be calibrated on a semi-annual basis.

Portable area monitors capable of detecting gamma radiation in the range of 0.10 to 50 mrem/hr may temporarily replace fixed area monitors described above provided that the required alarms are operational.

Portable Monitors: During fuel handling or other operations involving or potentially involving sources of radiation, operable portable survey instruments shall be readily available to the reactor operator for measuring beta-gamma exposure rates in the range 1.0 mrem/hr to 50 rem/hr, and fast plus thermal neutron dose rates from 0.04 to 1,000 mrem/hr. One or more portable survey instruments for measuring beta-gamma exposure rates in the range 10 mrem/hr to 50 rem/hr will be kept available to the reactor staff in an external location (normally the security office) to facilitate obtaining radiation readings if a reactor radiation alarm should be activated.

## 4.0 SITE AND DESIGN FEATURES

### 4.1 Site

The reactor and associated equipment is housed in the Washburn Laboratories located between West Street and Boynton Street on the campus of Worcester Polytechnic Institute in Worcester, Massachusetts.

### 4.2 Restricted Area and Exclusion Area

The reactor room shall constitute a restricted area as defined in 10 CFR Part 20 and shall be controlled by partitions and normally locked doors. In addition, two small areas, one each on the second and third floors of Washburn Laboratories, directly above the reactor control drives, shall become restricted areas whenever the radiation levels in any of the rooms exceed those specified in 10 CFR 20.1301. The exclusion areas, as defined in 10 CFR Part 100, shall consist of the reactor room and the areas above the reactor.

### 4.3 Reactor Building and Ventilation System

The reactor shall be housed in a closed room that is designed to restrict leakage. The ventilation system shall provide at least two changes of air per hour in the reactor room whenever the reactor is operating.

### 4.4 Reactor Core

Fuel Elements: Standard fuel elements shall be flat plate type consisting of uranium-aluminum alloy clad with aluminum. The width and depth of each fuel element shall be 3 in. x 3 in. Each element shall have an active length of 24 in. There shall be a maximum of 10 g of U-235 in each fuel plate and not more than 170 g of U-235 in any fuel element. The fuel shall be enriched to less than 20% U-235. Standard fuel elements have 18 fuel plates, each plate 1.52 mm thick with a clad thickness of 0.381 mm on each side. No fuel elements may be installed in the core.

## 5.0 ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS

### 5.1 Facility Administrator

The Director of the Nuclear Reactor Facilities shall have full responsibility for maintaining the facility in a safe configuration. The Director shall report to the Provost and shall be responsible to the Radiation, Health, and Safeguards Committee for conformance to the facility license provisions and all local and NRC safety regulations. The Director also shall be responsible for proper maintenance of such records and operating practices as the Committee may deem necessary for the safe storage of the facility.

### 5.2 Radiation, Health, and Safeguards Committee

A Radiation, Health, and Safeguards Committee shall review, approve and document all proposed modifications affecting reactor safety and procedures, pursuant to 10 CFR 50.59. This committee also shall conduct, at least quarterly, reviews of operations, equipment performance, records, and procedures. The Committee shall establish written procedures regarding review methods, quorums, and subcommittees, and it shall maintain written records of its activities. The members of the Committee shall be appointed by the Provost of Worcester Polytechnic Institute (WPI) and a majority shall be WPI faculty members.

### 5.3 Radiological Safety Officer

A Radiological Safety Officer shall be appointed to serve on the Radiation, Health, and Safeguards Committee and to review and approve all proposed procedures and experiments concerning radiological safety. The Radiological Safety Officer shall advise the Director of the Nuclear Reactor Facilities of rules, regulations, and procedures relating to radiological safety and shall routinely conduct radiation surveys.

### 5.4 Fire Protection

The licensee shall provide heat or ionization-type smoke detectors, which will alarm when there is a fire in the reactor room. At least two such detectors shall be operable at all times.

### 5.5 Procedures

Detailed written procedures shall be provided for all normal operations of the reactor, supporting facilities, maintenance operations, radiation protection, experiments, and emergency plans and operations. These procedures shall be approved by the Radiation, Health, and Safeguards Committee before they are implemented.

Temporary procedures that do not change the intent of the initial approval procedures may be authorized by two members of the facility staff at least one of whom shall be a licensed senior operator. Such procedures shall be subsequently reviewed by the Radiation, Health, and Safeguards Committee.

## 5.6 Operating Records

In addition to records required elsewhere in the license application, the following records shall be generated and kept of:

- (1) maximum radioactivity released or discharged into the air or water beyond the effective control of the licensee as measured at or before the point of such release or discharge;
- (2) maintenance operations involving substitution or replacement of reactor equipment or components; and
- (3) tests and measurements performed pursuant to the Technical Specifications.

Old records pertaining to operation of the reactor, including power levels, emergency shutdowns, inadvertent scrams, experiments, and incore irradiations, shall be kept for purposes of decommissioning.

## 5.7 Reports

In addition to reports otherwise required under this license and applicable regulations--

- (1) The licensee shall inform the Commission of any incident or condition relating to the safe storage of the facility that prevented or could have prevented a safety system from performing its safety function as described in the Technical Specifications. For each such occurrence, WPI shall promptly notify, by telephone or telegraph, the Administrator of the appropriate NRC Regional Office listed in Appendix D of 10 CFR Part 20 and shall submit within 10 days a report in writing to the Director, Division of Waste Management and Environmental Protection (DWMEP), with a copy to the Regional Office.
- (2) The licensee shall report to the Director, DWMEP, in writing within 30 days, any observed occurrence of substantial variance of conditions from performance specifications contained in the Safety Analysis Report or the Technical Specifications.
- (3) The licensee shall report to the Director, DWMEP, in writing within 30 days, any occurrence of significant changes in transient or accident analysis as described in the SAR.

## 5.8 Annual Operating Reports

A report covering the previous year shall be submitted to the Administrator of the appropriate Regional Office not later than March 31 of each year. It shall include:

- (1) Operations Summary: a summary of issues having safety significance occurring during the reporting period, including:
  - (a) changes in facility design
  - (b) performance characteristics (e.g., equipment and fuel performance)
  - (c) changes in operating procedures that relate to the safety of facility operations
  - (d) any abnormal results of surveillance tests and inspections required by these Technical Specifications
  - (e) a brief summary of those changes, tests, and experiments that did not require authorization from the Commission pursuant to 10 CFR 50.59 (d)(2)
  - (f) changes in the plant staff serving in the positions of Reactor Facility Director, SRO, RSO, ARSO, or Radiation, Health, and Safety Committee members;
- (2) Maintenance: a discussion of corrective maintenance (excluding preventative maintenance) performed during the reporting period on safety related systems and components;
- (3) Changes, Tests, and Experiments: a brief description and a summary of the safety evaluation for those changes, tests, and experiments that were carried out without prior Commission approval, pursuant to the requirements of 10 CFR 50.59 (d)(2); and
- (4) Radioactive Effluents Releases: a statement of the quantities of radioactive effluents released from the plant.

## 5.9 Fuel Storage

Two fuel storage racks are located on opposite sides of the reactor pool. Each rack shall be designed to contain not more than 18 fuel elements. When the reactor contains a critical mass, all additional fuel elements not in the core shall be locked in place except as authorized by the licensed senior operator in charge.

A fuel element shall not be stored outside of the reactor pool unless it produces radiation dose levels of less than 100 mrems/hr at the storage container surface. Storage containers of fuel elements shall be locked closed when unattended.

All fuel element transfers shall be conducted by a staff of not less than three persons, which shall include a licensed senior operator in charge and a RSO. Staff members will continuously monitor the operations using appropriate radiation monitoring and core nuclear instrumentation.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 11 TO

FACILITY OPERATING LICENSE NO. R-61

WORCESTER POLYTECHNIC INSTITUTE

DOCKET NO. 50-134

1.0 INTRODUCTION

By letter dated August 13, 2007, as supplemented on November 19, 2007, and April 10 and May 5, 2008, Worcester Polytechnic Institute (WPI or the licensee) submitted a request for amendment to Facility Operating License No. R-61 for the WPI reactor and to Appendix A, "Technical Specifications for the Worcester Polytechnic Institute Reactor," to the license. The requested changes would remove authorization from the license to operate the reactor, authorize possession only of the reactor and remaining byproduct and special nuclear material, and change the technical specifications (TSs) to remove or modify operational TSs that are not needed for possession-only status. The licensee also submitted changes to the reactor operator requalification plan to reflect the permanent shutdown status of the reactor.

2.0 BACKGROUND

The WPI reactor is a 10 kilowatt (thermal power) pool-type research reactor located on the licensee's campus in Worcester, Massachusetts. It is fueled with materials testing reactor-type plate fuel elements.

By letter dated June 27, 2007, the licensee certified that it was proceeding toward decommissioning and that it would not operate the reactor after June 30, 2007. It stated that the reactor fuel has been permanently removed from the reactor core and placed into storage. It is the licensee's intent to return the fuel to the U.S. Department of Energy and to apply for authorization to decommission the reactor facility as soon as possible.

During the time between approval of this amendment request and the review of the application for approval of decommissioning, the licensee intends to conduct activities consistent with the possession-only status of the reactor facility. This will include maintenance of the facility to keep required systems in proper working order, routine inspections and radiological measurements, and activities in preparation for decommissioning, such as nondestructive radiological characterization of the facility. In response to a request for additional information from the staff of the U.S. Nuclear Regulatory Commission (NRC), the licensee confirmed that these activities will not include those that can be characterized as dismantlement or decommissioning.

Based on the permanent shutdown of the reactor and the removal of the reactor fuel from the reactor core, the licensee has requested changes to the reactor license and TSs. The licensee has also requested changes to the reactor operator requalification plan.

### 3.0 EVALUATION

The licensee has proposed a number of changes to the facility license and TSs to reflect the permanent shutdown of the reactor facility and the removal of the fuel from the reactor core to storage.

#### 3.1 Changes to License Conditions

The licensee has proposed changes to the reactor license to reflect the permanent shutdown of the reactor. License condition 2.B.(1) reads as follows:

- (1) Pursuant to Section 104c of the Act and 10, CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities," to possess, use and operate the reactor in accordance with the procedures and limitations described in the application and in this license;

The licensee has proposed changing this license condition to read as follows:

- (1) Pursuant to Section 104c of the Act and 10 CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities," to possess the reactor in accordance with the procedures and limitations described in the application and in this license;

The licensee has proposed removing the use and operation of the reactor from this license condition. Because this is consistent with the licensee's decision to permanently shut down the reactor and not operate it again, the proposed changes are acceptable to the staff.

License condition 2.B.(2) reads as follows:

- (2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess and use up to a maximum of 5.2 kilograms of contained uranium 235 at enrichments equal to or less than 20% and 16 grams of plutonium as Pu-Be source for use in connection with operation of the reactor.

The licensee has proposed changing this license condition to read as follows:

- (2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to possess but not use up to a maximum of 5.2 Kilograms of contained U-235 at enrichments less than 20% and 16 grams of plutonium as Pu-Be source.

The licensee has proposed removing the use of licensed special nuclear material from this license condition. Because this is consistent with the licensee's decision to permanently shut down the reactor and not operate it again, the proposed changes are acceptable to the staff.

The license condition refers to the enrichment of the uranium-235 as equal to or less than 20 percent. This license condition was amended in 1988 when the reactor was converted from the use of high-enriched uranium to low-enriched uranium. The purpose of the amendment to the license condition was to limit possession of uranium-235 to only low-enriched uranium. An error in the license condition wording appears to have been made. Low-enriched uranium is defined

as “less than 20 percent” enrichment, not as “equal to or less than 20 percent” as it appears in the license condition. The NRC Senior Project Manager discussed this license condition with the WPI Radiation Safety Officer (RSO) during a telephone conversation on May 21, 2008. The RSO agreed to correct the license condition. The low-enriched fuel used to convert the reactor met the definition of low-enriched uranium. Because this change corrects an error in wording it is acceptable to the staff.

License condition 2.C.(1) reads as follows:

(1) Maximum Power Level

The licensee may operate the reactor at steady state power levels up to a maximum of 10 kilowatts (thermal).

The licensee has proposed changing this license condition to read as follows:

(1) Maximum Power Level

The licensee may not operate the reactor.

The licensee has proposed removing operation of the reactor from this license condition. Because this is consistent with the licensee’s decision to permanently shut down the reactor and not operate it again, the proposed change is acceptable to the staff.

License condition 2.D. lists records that the licensee is required to keep. License condition 2.E. contains reporting requirements. These license conditions duplicate (with minor differences in wording) the requirements of TSs 5.6 and 6.7(1). Current NRC practice is to include administrative recordkeeping and reporting requirements in the TSs. The licensee has proposed to eliminate these license conditions. Because these requirements appear in the TSs in agreement with NRC practice, eliminating these license conditions is acceptable to the staff.

During a telephone conversation on May 5, 2008, the NRC staff noted and discussed with the licensee some additional clarifications and changes to the license and TSs. The licensee submitted a letter dated May 5, 2008, which summarized the outcome of the conversation. The parties agreed to correct a typographical error in license condition 2.A. and change “Polytechnic” to “Polytechnic.” Because it corrects an error, the change is acceptable to the staff. The parties also agreed that in license condition 2.C.(3), where reference is made to withholding the facility security plan from public disclosure pursuant to Title 10, Section 2.790, of the *Code of Federal Regulations* (10 CFR 2.790), the regulation would be updated to 10 CFR 2.390, “Public Inspections, Exemptions, Requests for Withholding.” An update to 10 CFR Part 2, “Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders,” changed the regulation protecting the disclosure of security plans from 10 CFR 2.790 to 10 CFR 2.390. Because it updates a reference to the regulations to reflect the current applicable regulation, the change is acceptable to the staff. License condition 2.B.(4) was added to the license on September 12, 1988, when the reactor was converted from the use of high-enriched uranium fuel to low-enriched uranium fuel. The license condition states the following:

Pursuant to the Act and 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material,” to possess, but not to use, a maximum of 4004 grams of contained uranium at greater than 20% enrichment until the existing inventory of high enriched uranium is removed from the facility.



The inventory of high-enriched uranium has been removed from the facility and returned to the Department of Energy. The staff agrees with the licensee that this license condition is no longer needed. Because the special nuclear material authorized by this license condition is no longer at the facility, the removal of license condition 2.B.(4) from the license is acceptable to the staff.

### 3.2 Changes to Technical Specifications

The licensee has proposed changes to the TSs to reflect the permanent shutdown status of the facility and the removal of the reactor fuel from the reactor core to storage. The staff has reviewed these changes against the requirements of 10 CFR 50.36, "Technical Specifications," and concludes that the amended TSs will continue to meet the requirements of 10 CFR 50.36.

The definition for "Readily Available on Call" currently in the TSs reads as follows:

Readily Available on Call: Readily available on call shall mean the licensed senior operator on duty shall ensure that he/she is within a reasonable driving time (1/2 hr) from the reactor building. The licensed senior operator shall always keep the licensed operator informed of where he/she may be contacted.

The licensee has proposed changing this definition to read as follows:

Readily Available on Call: Readily available on call shall mean an individual on duty within a reasonable driving time (1/2 hr) from the reactor building, that can be contacted to fulfill duties as specified in the implementing plans and procedures.

The original purpose of this TS was to ensure the availability of a person with a senior reactor operator (SRO) license during reactor operation as required by 10 CFR 50.54(m)(1). With the facility permanently shut down, operations requiring an on-call SRO will not occur. Fuel movement is the only future activity requiring the presence of an SRO at the facility. The licensee has proposed changing the definition of availability as noted above. This definition will apply wherever the concept of readily available on call appears in licensee documents (e.g., emergency plan) but is not defined. Because the reactor is permanently shut down and will not need an SRO on call, the proposed changes to this definition are acceptable to the staff.

The licensee has proposed changes to TS Section 2.0, "Safety Limits and Operating Restrictions." The licensee has proposed eliminating safety limits on criticality, shutdown margin, magnet release and blade drop times, maximum excess reactivity, control blade withdrawal, startup source requirement, and temperature and void coefficients. The licensee stated that these safety limits only apply to a functional reactor, and as the reactor core has been permanently defueled, they are no longer necessary. The NRC staff has reviewed these safety limits, considering the permanent shutdown condition of the reactor and the fact that the reactor fuel has been permanently removed from the core and put into storage. The staff concludes that these safety limits are no longer needed given the status of the reactor, and that the proposed removal of the safety limits from the TSs is acceptable.

Safety limits on radiation alarms, radiation levels, and water purity remain unchanged. However, the licensee has proposed changes to the safety limits for water level and water temperature.

The safety limit on water level reads as follows:

Water Level: The minimum depth of water above the top of the end box of the core fuel elements in the reactor pool shall be 10 ft.

The licensee has proposed changes to this safety limit to read as follows:

Water Level: The minimum depth of water above the top of the end box of the fuel elements in the reactor pool shall be 10 ft. When fuel is not in the pool, the water level shall be maintained to keep radiation levels as low as reasonably achievable (ALARA). The pool water level detector and alarm will be operational, with the alarm set-point being a water drop of less than or equal to 1 foot. The pool water level detector and alarm may be by-passed provided a licensed senior reactor operator is present in the facility.

The licensee has proposed that the pool water level be maintained at 10 feet above the top of the end box of the fuel elements when fuel is in the pool. After the fuel is removed, the pool level will be maintained so as to keep radiation levels from activated components remaining in the pool as low as reasonable achievable (ALARA). The requirement to have an operational pool level detector and alarm, and the ability to bypass the pool level detector and alarm if a licensed SRO is present in the facility, are similar to the pool level requirements of TS Table 4.1. These requirements were moved from TS Table 4.1 to the water-level safety limit because the licensee is proposing to eliminate TS Table 4.1. The requirement for a radiation monitor above the pool in TS 3.3, "Radiation Detection," provides indication of a loss of pool water when the pool level detector and alarm are bypassed. The second sentence in the proposed TS, added to the TS by the licensee's letter of November 19, 2007, was inadvertently dropped from the TS when the licensee later retyped the TS. During a telephone conversation with the WPI RSO on May 21, 2008, the NRC Senior Project Manager confirmed that the sentence was removed from the TS in error. The proposed changes to the TS are acceptable to the staff because water level will continue to be monitored as before when fuel is present in the pool; after fuel is removed from the pool, radiation levels from the remaining activated components will be monitored and maintained ALARA.

The safety limit on water temperature reads as follows:

Water Temperature: The maximum bulk water temperature of the reactor pool shall be 110 °F and the minimum shall be 40 °F. During critical operation of the reactor, the corresponding temperature limits shall be 100 °F and 60 °F.

The licensee has proposed changes to this safety limit to read as follows:

Water Temperature: The maximum bulk water temperature of the reactor pool shall be 110 °F and the minimum shall be 40 °F, when fuel is in the pool.

The licensee has proposed eliminating the water temperature requirements during critical operation. Because the reactor will not undergo critical operation again, this change is acceptable to the staff. The licensee also proposed that water temperature limits only apply when fuel is in the pool. Water temperature is controlled because it can impact the criticality of arrays of fuel. With no fuel in the pool, there is no safety reason to control water temperature. The normal heating of the reactor facility will keep the pool water

from freezing after fuel has been removed from the pool. Therefore, the changes to this safety limit as proposed by the licensee are acceptable.

The licensee has proposed eliminating Section 2.2, "General Operating Limitations," of the TSs. This section of the TSs contains limits on personnel requirements, system integrity, and abnormal conditions during operation. The licensee states that the operating limits only apply to a functional and operating reactor, and as the reactor core has been permanently defueled, they are no longer necessary. The NRC staff has reviewed Section 2.2 of the TSs and has determined that the TSs are related to reactor operation; therefore, the staff concludes that these limits can be removed from the TSs.

The licensee has proposed eliminating Section 2.3, "Experiments," of the TSs. This section of the TSs contains limits on the conduct of the reactor experimental program, such as reactivity worth of experiments and limits on experimental materials. The licensee states that the reactor is no longer functional, as the reactor core has been permanently defueled; accordingly, experiments using the reactor are no longer possible and the requirements are no longer necessary. The NRC staff has reviewed Section 2.3 of the TSs and has determined that the requirements are related to limits on the experimental program. Because the reactor will not operate again, the facility experimental program has ended, and the staff concludes that the Section 2.3 TS limitations on experiments are no longer needed.

The licensee has proposed changes to TS 3.1, "Frequency of Surveillance." The licensee has proposed eliminating daily surveillance requirements that are related to critical operation of the reactor. The licensee has also proposed eliminating semiannual surveillance requirements for the measurement of excess reactivity, calibration of reactor console instrumentation for reactor power, minimum shutdown margin and measurement of the reactivity worth of the regulating blades, and the annual requirement to inspect and verify operation of the control blades. The licensee states that these surveillance requirements can only be performed with a functional reactor, and as the reactor core has been permanently defueled, they are no longer necessary or possible. The NRC staff has reviewed these surveillance requirements and determined that they are related to reactor operation. The daily surveillances are related to critical operation of the reactor. Measurements of excess reactivity and shutdown margin are reactor core physics parameters that have safety significance to a reactor core. They have no safety significance for fuel that is in storage in accordance with the TSs. Calibration of the reactor console for reactor power has safety significance only if the reactor is to be operated. Measuring the worth of the regulating blade and verifying the operation of the control blades only has safety significance if there is fuel on the reactor grid plate. Because the reactor has been permanently shut down and the fuel unloaded from the core grid plate into storage, the staff concludes that the elimination of the above surveillance requirements is acceptable.

In TS 3.1, the licensee retained the semiannual surveillance requirement for the measurement of pool water pH and calibration of pH and conductivity devices. The licensee added "during possession of the facility" to make it clear that water chemistry will be maintained during possession of the facility. Because the proposed change maintains the surveillance requirements during the possession-only period, it is acceptable to the staff.

The licensee has proposed a change to TS 3.2, "Action to be Taken," which currently reads as follows:

If maintenance or recalibration is required for any of the items, it shall be performed and the instrument shall be rechecked before reactor startup proceeds.

The licensee has proposed changing this to read as follows:

If maintenance or recalibration is required for any of the items, it shall be performed and the instrument shall be rechecked before being placed back in service.

The proposed change reflects the fact that the reactor will not be started again while ensuring that equipment will continue to be checked for operation before being placed back in service after maintenance or recalibration. Because the proposed TS changes ensure that equipment will continue to be checked, they are acceptable to the staff.

The licensee has added a surveillance requirement to TS 3.3 that the area monitors shall be calibrated on a semiannual basis. Because this formalizes the requirement for radiation monitor calibration, this change is acceptable to the staff.

The licensee has made several changes to the portable monitors section of TS 3.3. The licensee proposes replacing the phrase "reactor operation" with "fuel handling or other operations involving or potentially involving sources of radiation." Because this change reflects the permanent shutdown status of the facility, it is acceptable to the staff.

The licensee has requested changes to TS 4.0, "Site and Design Features." The licensee has proposed the elimination of TSs 4.5, "Reactor Safety and Control System," 4.5.1, "Nuclear Instrumentation," 4.5.2, "Control Blades," 4.5.3, "Regulating Blade," and 4.5.4, "Blade Position Indicators," and Table 4.1, "Safety System Functions" (with the exception of the requirements for the pool water-level system that were moved to TS 2.1 as discussed above). The licensee has also proposed eliminating the second paragraph in TS 4.4, "Reactor Core," concerning the use of experimental fuel elements in the reactor core. The licensee states that these design features only apply to a functional reactor, and as the reactor core has been permanently defueled, they are no longer necessary. The NRC staff has reviewed the TSs proposed for elimination and has determined that they are related to reactor operation; therefore elimination of these TSs is acceptable to the staff.

The licensee has proposed a change to TS 4.2, "Restricted Area and Exclusion Area." The proposed change would update the reference to a radiation protection regulation (10 CFR 20.105 to 10 CFR 20.1301, "Dose Limits for Individual Members of the Public") to reflect changes in the regulations. During a telephone conversation between the NRC Senior Project Manager and the WPI RSO on May 21, 2008, the parties agreed to correct a typographical error in the TS by changing "reactors" to "reactor." Because the requested changes update the TS to be consistent with the regulations and correct an error, the changes are acceptable to the staff.

The licensee has proposed to further change TS 4.4 by replacing the statement that a maximum of 28 standard fuel elements may be installed in the core with one indicating that no fuel

elements may be installed in the core. This change reflects the permanent shutdown of the reactor and the movement of the fuel from the reactor core into storage. Because the requested change reflects the permanent shutdown and defueled status of the facility, this change is acceptable to the staff.

The licensee has proposed changes to TS 5.0, "Administrative and Procedural Requirements," and the elimination of TS 5.10, "Initial Startup of Altered Core Configuration." TS 5.10 contains requirements for making changes to the core fuel loading. The licensee states that these administrative and procedural requirements only apply to a functional reactor, and as the reactor core has been permanently defueled, they are no longer possible or necessary. The NRC staff has reviewed TS 5.10 and has determined that the TS contains requirements applicable to an operating reactor; therefore, the elimination of TS 5.10 is acceptable to the staff.

The licensee has proposed changes to TS 5.1, "Facility Administrator." Part of the change involves replacing the phrase "operation of the reactor facility" with "maintaining the facility in a safe configuration" and "operation" with "storage" to reflect the permanent shutdown and defueled status of the reactor. The staff finds these changes acceptable because they are consistent with the possession only status of the facility.

The licensee also asked to change the reporting requirement in TS 5.1 for the Facility Director from the Dean of Faculty to the Provost. The licensee states that the Dean position no longer exists at WPI and that the Provost has the same authority as the Dean. Because this change makes the TSs current with the organization of WPI and the Provost has the same authority regarding the reactor as the Dean, this change is acceptable to the staff.

The licensee has proposed changes to TS 5.2, "Radiation, Health and Safeguards Committee," to make the wording consistent with the current wording of 10 CFR 50.59, "Changes, Tests and Experiments." The licensee has proposed adding language to the TS stating that the Radiation, Health, and Safeguards Committee will document all proposed modifications affecting reactor safety and procedures pursuant to 10 CFR 50.59. Adding documentation to the duties of the Committee clarifies these duties and is acceptable to the staff. The licensee proposed removing from the TS the requirement that the Committee review and approve general and specific types of experiments under 10 CFR 50.59. Because the reactor has been permanently shut down, the licensee states that experiments will no longer be performed. Because experiments will no longer be performed, this change is acceptable to the staff. The licensee has requested changing the organizational position that appoints members of the Radiation, Health, and Safeguards Committee from the President or Vice President of WPI to the President or Provost of WPI. The licensee states that WPI has multiple Vice Presidents but only one Provost, and the Provost has the same authority over the reactor as a Vice President. This change is also consistent with having the Facility Director report to the Provost. Because the level of authority for appointing members to the Radiation, Health, and Safeguard Committee remains the same, this change is acceptable to the staff.

The licensee has proposed changes to TS 5.6, "Operating Records," which currently reads as follows:

#### 5.6 Operating Records

In addition to records required elsewhere in the license application, the following records shall be kept of:

- (1) reactor operation, including power levels and periods of operation at each power level;
- (2) maximum radioactivity released or discharged into the air or water beyond the effective control of the licensee as measured at or before the point of such release or discharge;
- (3) emergency shutdowns and inadvertent scrams, including reasons for emergency shutdowns;
- (4) maintenance operations involving substitution or replacement of reactor equipment or components;
- (5) experiments installed including description, reactivity worths, locations, exposure time, total irradiation and any unusual events involved in their performance and in their handling;
- (6) tests and measurements performed pursuant to the Technical Specifications; and
- (7) incore irradiations.

The licensee has proposed amending the TS to read as follows:

#### 5.6 Operating Records

In addition to records required elsewhere in the license application, the following records shall be generated and kept of:

- (1) maximum radioactivity released or discharged into the air or water beyond the effective control of the licensee as measured at or before the point of such release or discharge;
- (2) maintenance operations involving substitution or replacement of reactor equipment or components; and
- (3) tests and measurements performed pursuant to the Technical Specifications.

Old records pertaining to operation of the reactor, including power levels, emergency shutdowns, inadvertent scrams, experiments, and incore irradiations, shall be kept for purposes of decommissioning.

The licensee has proposed changing TS 5.6 to require the creation and retention of records appropriate to the permanent shutdown status of the reactor. The licensee will also retain records from the period of reactor operation that are important to decommissioning planning and show compliance with the regulations. Because these operating records will be retained and records related to the permanent shutdown status of the reactor will be generated and kept, the changes to TS 5.6 are acceptable to the staff.

The licensee has requested changes to TS 5.7, "Reports," which currently reads as follows:

5.7 Reports

In addition to reports otherwise required under this license and applicable regulations:

- (1) The licensee shall inform the Commission of any incident or condition relating to the operation of the reactor that prevented or could have prevented a nuclear system from performing its safety function as described in the Technical Specifications. For each such occurrence, WPI shall promptly notify, by telephone or telegraph, the Administrator or the appropriate NRC Regional Office listed in Appendix D of 10 CFR 20 and shall submit within 10 days a report in writing to the Director, Division of Reactor Projects-III/IV/V & Special Projects (DRSP), with a copy to the Regional Office.
- (2) The licensee shall report to the Director, DRSP, in writing within 30 days, any observed occurrence of substantial variance disclosed by operation of the reactor from performance specifications contained in the Safety Analysis Report or the Technical Specifications.
- (3) The licensee report to the Director, DRSP, in writing within 30 days, any occurrence of significant changes in transient or accident analysis as described in the SAR.

The licensee has proposed changing the TS to read as follows:

5.7 Reports

In addition to reports otherwise required under this license and applicable regulations:

- (1) The licensee shall inform the Commission of any incident or condition relating to the safe storage of the facility that prevented or could have prevented a safety system from performing its safety function as described in the Technical Specifications. For each such occurrence, WPI shall promptly notify, by telephone or telegraph, the Administrator of the appropriate NRC Regional Office listed in Appendix D of 10 CFR 20 and shall submit within 10 days a report in writing to the Director, Division of Waste Management and Environmental Protection (DWMEP), with a copy to the Regional Office.
- (2) The licensee shall report to the Director, DWMEP, in writing within 30 days, any observed occurrence of substantial variance of conditions from performance specifications contained in the Safety Analysis Report or the Technical Specifications.
- (3) The licensee shall report to the Director, DWMEP, in writing within 30 days, any occurrence of significant changes in transient or accident analysis as described in the SAR.

TS 5.7(1) contains the requirements for informing the Commission of events. The phrase "operation of the reactor" has been replaced with "safe storage of the facility," and "nuclear" has been replaced with "safety." During a telephone conversation between the NRC Senior Project Manager and the WPI RSO on May 21, 2008, the parties agreed to correct two typographical errors (in TS 5.7(1), "...Administrator or the..." is changed to "...Administrator of the..." and in TS 5.7(3), "shall" is added). In TS 5.7(2), the licensee has replaced the phrase "disclosure by operation of the reactor" with "of conditions." The requested changes reflect the permanent shutdown status of the facility. The licensee requested changes to the TS to update the NRC office to which it will send reports by replacing the "Division of Reactor Projects—III/IV/V & Special Projects" with the "Division of Waste Management and Environmental Protection in the Office of Federal and State Materials and Environmental Management Programs," the NRC office that will oversee decommissioning activities. Because the changes reflect the permanent shutdown status of the facility, correct an error, and update NRC office contacts to reflect decommissioning activities, the changes are acceptable to the staff.

The licensee has requested changes to TS 5.8, "Annual Operating Reports," which currently reads as follows:

5.8 Annual Operating Reports

A report covering the previous year shall be submitted to the Administrator of the appropriate Regional Office not later than March 31 of each year. It shall include:

- (1) Operations Summary: a summary of operating experience having safety significance occurring during the reporting period, including:
  - (a) changes in facility design;
  - (b) performance characteristics (e.g., equipment and fuel performance);
  - (c) changes in operating procedures that relate to the safety of facility operations;
  - (d) any abnormal results of surveillance tests and inspections required by these Technical Specifications;
  - (e) a brief summary of those changes, tests, and experiments that did not require authorization from the Commission pursuant to 10 CFR 50.59(a); and
  - (f) changes in the plant operating staff serving in the positions of Reactor Facility Director, Health Physicist, or Radiation, Health, and Safety Committee members.
- (2) Power Generation: the most current summary of thermal output of the facility available together with a summary of the total thermal power generated over the life of the reactor.
- (3) Shutdowns: a listing of unscheduled shutdowns which have occurred during the reporting period, tabulated according to cause, and a brief discussion of the actions taken to prevent recurrence.



- (4) Maintenance: a discussion of corrective maintenance (excluding preventative maintenance) performed during the reporting period on safety related systems and components.
- (5) Changes, Tests, and Experiments: a brief description and a summary of the safety evaluation for those changes, tests, and experiments that were carried out without prior Commission approval, pursuant to the requirements of 10 CFR 50.59(a).
- (6) Radioactive Effluents Releases: a statement of the quantities of radioactive effluents released from the plant.

The licensee proposed changes to the TS to read as follows:

#### 5.8 Annual Operating Reports

A report covering the previous year shall be submitted to the Administrator of the appropriate Regional Office not later than March 31 of each year. It shall include:

- (1) Operations Summary: a summary of issues having safety significance occurring during the reporting period, including:
  - (a) changes in facility design;
  - (b) performance characteristics (e.g., equipment and fuel performance);
  - (c) changes in operating procedures that relate to the safety of facility operations;
  - (d) any abnormal results of surveillance tests and inspections required by these Technical Specifications;
  - (e) a brief summary of those changes, tests, and experiments that did not require authorization from the Commission pursuant to 10 CFR 50.59(d)(2); and
  - (f) changes in the plant staff serving in the positions of Reactor Facility Director, SRO, RSO, ARSO, or Radiation, Health, and Safety Committee members.
- (2) Maintenance: a discussion of corrective maintenance (excluding preventative maintenance) performed during the reporting period on safety related systems and components.
- (3) Changes, Tests, and Experiments: a brief description and a summary of the safety evaluation for those changes, tests, and experiments that were carried out without prior Commission approval, pursuant to the requirements of 10 CFR 50.59(d)(2).
- (4) Radioactive Effluents Releases: a statement of the quantities of radioactive effluents released from the plant.

The licensee has requested changes to TS 5.8 to reflect changes that have been made to 10 CFR 50.59. Because these changes are consistent with the wording of 10 CFR 50.59, they are acceptable to the staff. The licensee has requested a change to TS 5.8(1)(f) concerning the staff positions about which changes need to be reported to the NRC. The licensee has

proposed replacing the position of "Health Physicist" with "RSO, SRO or ARSO." The health physicist position has been replaced by the RSO supported by the assistant RSO. The licensee has asked to add the SRO position since the SRO is a key position within the facility. Because the proposed changes update positions to be consistent with the licensee's current organization, these changes are acceptable to the staff. The licensee has asked to remove the annual report content about power generation and shutdowns to reflect the permanent shutdown status of the facility. Because the facility will not operate again, there will be no reason to report on power generation and shutdowns because none will occur. Therefore, this change is acceptable to the staff. In TS 5.8(1), the licensee has proposed replacing "operating experience" with "issues," and in TS 5.8(1)(f), the word "operating" has been removed from the TS to reflect the permanent shutdown status of the facility. Because these proposed changes reflect the permanent shutdown status of the facility, they are acceptable to the staff.

The licensee has requested a change to TS 5.9, "Fuel Storage." The third paragraph of the TS currently requires that all fuel element transfers to or from the reactor core shall be conducted by a staff of not less than three persons, which shall include a licensed senior operator in charge and a licensed operator. The third paragraph of the TS currently reads as follows:

All fuel element transfers to or from the reactor core shall be conducted by a staff of not less than three persons, which shall include a licensed senior operator in charge and a licensed operator. Staff members will continuously monitor the operations using appropriate radiation monitoring and core nuclear instrumentation.

The licensee has proposed changing this portion of the TS to read as follows:

All fuel element transfers shall be conducted by a staff of not less than three persons, which shall include a licensed senior operator in charge and a RSO. Staff members will continuously monitor the operations using appropriate radiation monitoring and core nuclear instrumentation.

The licensee has asked to remove reference to fuel movement from the core to reflect the fact that the fuel has been permanently removed from the core into storage. The proposed wording also makes the TS applicable to the transfer of the fuel from storage to the shipment cask at the time the fuel is removed from the facility. The licensee has also requested that an SRO and the RSO shall oversee the process. This request reflects current staffing levels at the facility. All fuel has been removed from the reactor grid plate and is currently in storage. The next fuel movement will involve transferring the fuel from the storage racks into a shipping cask for removal from the facility. The licensee states that fuel movement will be performed using detailed procedures approved under TS 5.5, "Procedures." Criticality safety will be maintained by administrative procedures that will limit the number of fuel elements that can be moved at one time. The requested staffing meets the requirements of 10 CFR 50.54(k), (l), and (m)(1) for minimum staffing and SRO staffing requirements. Because a licensed SRO and RSO will oversee fuel movement into the shipping cask under approved procedures, the requested change is acceptable to the staff.

The licensee has retyped the TSs to reflect the changes discussed above. This work included renumbering sections of the TSs and reformatting the TSs. These administrative changes reflect the other changes made to the TSs, and accordingly are acceptable to the staff.

### 3.3 Changes to Operation Regualification Plan

The licensee has proposed changes to the operator requalification plan to reflect the fact that the reactor will no longer be operated. The staff has reviewed the requested changes to the plan. Given the permanent shutdown status of the reactor, the staff finds that the proposed revisions to the plan are in accordance with the regulations contained in 10 CFR Part 55, "Operator's Licenses," with modifications as outlined in American National Standards Institute (ANSI)/American Nuclear Society (ANS) industry standard ANSI/ANS-15.4, "Selection and Training of Personnel for Research Reactors."

### 4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, "Standards for Protection against Radiation," or changes in inspection and surveillance requirements. The 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 amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). 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.

This amendment also involves changes in recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10). 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

On the basis of the considerations discussed above, the staff has concluded 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 proposed activities will not endanger the health and safety of the public; 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 Contributor: A. Adams, Jr.

Date: August 26, 2008