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To: U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Possession-Only License Amendment Application
Worcester Polytechnic Institute Reactor
Nuclear Regulatory Commission License No. R-61
August 10, 2007

This application is for a possession-only license (POL) amendment, to permanently remove from its NRC license (R-61) authorization to operate the Worcester Polytechnic Institute (WPI) research reactor. By letter to the NRC, dated June 30, 2007, WPI certified that the operation of the WPI reactor had permanently ceased, and that the reactor had been permanently de-fueled. The amendment for POL status is intended to remove certain license and technical specifications applicable only to operation of the reactor. The POL is intended as an interim status, WPI will make an application for authorization to decommission the reactor facility as soon as possible, and within two years after cessation of reactor operations (June 30, 2007).

The following provides an explanation of the need for the POL, the activities to be performed during the POL time frame, the schedule during which the POL will be in effect, and an explanation of factors which could affect that schedule. Following this information, the specific proposed changes to the Facility License (R-61) (Amendment-7), Technical Specifications, and Requalification Program (Appendix-F) will be presented, addressing surveillance requirements, operator re-qualification plans, and management and organizational structure required to possess and maintain the facility in a safe configuration. Health and safety issues concerning the proposed changes will then be addressed, to assure that the facility staff and public will be protected during the POL period.

Need for Possession Only License

WPI has decided to no longer have a nuclear engineering program. As such, WPI intends to divest itself of its nuclear reactor facility by decommissioning the facility and terminating the reactor license. This decision does not affect WPI's use of radioactive materials under its

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agreement state license. By letter, dated June 30, 2007, WPI notified the NRC that as of that date, operation of the reactor had permanently ceased, and that the nuclear fuel had been removed from the reactor core and placed into its approved storage locations. Therefore, WPI seeks to amend its reactor license to remove authorization to operate the reactor and provide for safe possession of the nuclear fuel and associated radioactivity, until it is superseded by an amendment authorizing initiation of decommissioning activities.

Expected Activities During POL Period

During the period covered by the POL, the primary physical activities to be conducted at the WPI reactor facility will be associated with the surveillance activities as defined by the amended technical specifications. This will typically include visual inspections of the facility and radiological measurements. Some maintenance activities may also be performed, as is required to keep the building structure and associated support systems (demineralizer, etc) in proper working order. During the POL period, it is also expected that the used nuclear fuel will be transferred to DOE or another reactor licensee. During the POL period, WPI will also be making preparations for the decommissioning of the facility. Therefore, it is expected that WPI and its decommissioning contractor will be performing activities needed to plan and prepare for the decommissioning. These activities include tours, inspections and characterization of the facility's structures, systems and components. These activities may include analytical measurements and sampling of structural materials and residues associated with the facility, for the purpose of defining the nature and extent of radiation, radioactive contamination or hazardous materials.

During the POL period, the reactor facility will not be used for any purposes not directly associated with licensed activities. There will no alteration or dismantling of the reactor facility that could affect the ability to monitor and contain radioactivity, or which provides a protective function.

POL Duration and Schedule

WPI ceased operation of its reactor as of June 30, 2007, and intends to decommission and terminate its R-61 license. The following is the intended timeline of activities pursuant to that objective:

- June 30, 2007: ceased reactor operation, removed nuclear fuel from reactor core.
- July, 2007: initiated negotiations with DOE and UMass Lowell (another reactor licensee) for removal and transfer of the nuclear fuel as soon as conditions permit.
- August 10, 2007: submit application to NRC for Possession-Only license.
- January 1, 2008: begin preparing Decommissioning Plan and supporting documentation.
- June 30, 2008: submit Decommissioning Plan to NRC for approval; begin preparations for physical decommissioning.
- June 30, 2009: begin physical decommissioning activities.

Known Factors That Could Change Schedule

It is WPI's intent to proceed with the decommissioning of the reactor facility as quickly as possible, as described above. This schedule is dependent upon NRC approval of WPI's Decommissioning Plan, and removal and transfer of the used nuclear fuel. The fuel will either be transferred to DOE or to another reactor licensee (such as UMass Lowell) for reuse. As such, any delays in obtaining approvals, or resulting from third party intervention, or delays in obtaining necessary equipment (e.g., shipping casks) could affect WPI's ability to meet the proposed schedule.

General Proposed Revisions

In general, the following are proposed:
1. Revisions to the license: proposed revisions include removing authority to operate the reactor.

2. Revisions to the Technical Specifications (Tech Specs) incorporated in the license: proposed revisions include those that by virtue of the reactor no longer being operated can be eliminated without a negative effect on health and safety. These revisions are being specifically proposed because the requirement for their performance is not implicitly negated by removal of the authorization to operate the reactor (i.e., the changes being proposed solely pertain to or require the operation of the reactor). The revisions being proposed (detailed below) pertain to surveillance requirements (i.e., elimination of foil activations for determination of reactor power, verification of reactor shut down margins, reactivity worth measurements and, measurement of control blade drop and magnet release times). Additionally, Tech Spec requirements for inspection and maintenance of the control blades are proposed to be eliminated. Changes to the operating staff and their roles and responsibilities are also proposed, along with updated personnel titles. Changes are also requested for the personnel required to move fuel into a storage cask.

3. Revisions to the SRO Requalification Program: proposed revisions include elimination of training activities associated with operating the reactor.

Specific Proposed Revisions

The following details the specific revisions requested by this license amendment application:

1. Proposed Revised License Conditions:

Item 1: Replace License Amendment-7, Condition No. 2.B. (1) with:

> 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.

[Justification: Here we propose removing the phrase "use and operate", in agreement with our certification letter of June 30th, 2007, stating we agree not to operate the reactor. From a safety point of view, since the facility will at best license only one more SRO (Roger Steele) as we head towards decommissioning, WPI feels it is safest simply to not operate the reactor]

Item 2: Replace License Amendment-7, Condition No. 2.B. (2) with:

Pursuant to the Act and 10CFR, Chapter 1, Part 70, "Special Nuclear Material," to possess but not use up to 4004 grams of contained U-235 and 16 grams of plutonium as Pu-Be source, and...

[Justification: Here we propose removing the words "receive", "use", and "in connection with operation of the reactor" in agreement with our certification letter of June 30th, 2007, stating we agree not to operate the reactor, as we head towards decommissioning.]

Item 3: Replace License Amendment-7, Condition No. 2.C. (1) with:

Maximum Power Level

The licensee may not operate the reactor.

[Justification: Here we propose removing the previous text that allowed WPI to operate the reactor at a maximum of 10 kilowatts (thermal), in agreement with our certification letter of June 30th, 2007, stating we agree not to operate the reactor, as we head towards decommissioning.]

2. Proposed Revised Technical Specifications (Appendix A to License R-61):

Item 1: Section 1.0 DEFINITIONS

Replace definition of Readily Available on Call, with:

Readily available on call shall mean the SRO, RSO, ARSO, or Chair of the Radiation, Health, and Safeguards Committee (RHSC) on duty that is a reasonable driving time (approximately 30 minutes) from the reactor building, that can be contacted in the event of an emergency.

[Justification: the previous text refers to an SRO on duty being within a reasonable driving time (1/2 hour). This is fine for a facility with multiple SRO's providing a depth of coverage in the event of an emergency, but in our case with only one SRO, the addition of the RSO, ARSO, or RHSC Chair adds a depth of coverage if the

SRO is unavailable. Since the reactor will not be operated, SRO status is not required to help in the event of an emergency. The change to approximately 30 minutes for the person on duty from the previous 30 minutes, adds some flexibility in view of the diminished operations.]

Item 2: Replace Section 2.0 SAFETY LIMITS AND OPERATING RESTRICTIONS, in its entirety, with:

2.0 SAFETY LIMITS AND OPERATING RESTRICTIONS

2.1 Safety Limits

Radiation Alarms: Upon indication of radiation levels in excess of 50 mrems/hr (20 mrems/hr for fuel storage) area radiation monitors shall actuate audible evacuation alarms in the reactor room and in the second and third floor areas above the reactor pool. [no change]

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 mrems/hr. [no change]

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, when fuel is present in the pool.

Water Purity: Corrective action shall be taken promptly if the following limits for the pool water are not met, when fuel is in the pool:

(1) pH less than 8.0 and greater than 6.0
(2) resistivity greater than 5×10^{-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.

[Justification: the inclusion of the phrase "when fuel is present in the pool" for the water level, purity, and temperature sections, reflects the fact that these measurements make no sense if the fuel has been removed from the facility. As we progress towards decommissioning, the only remaining fuel movement will be from the storage area of the pool into the cask for removal from the facility. From a safety perspective, if the fuel is no longer in the pool (or the facility) there is no longer a need to monitor the pool water as closely as before.]

Item 3: Replace Section 3.1 Frequency of Surveillance, in its entirety, with:

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. [No change]

Semiannually: At least semiannually, the pool water pH shall be measured and conductivity and pH devices shall be calibrated, as long as fuel is present in the pool.

[Justification: As listed above for item-2. Performing the semiannual measurements of pool water pH and conductivity only makes sense if the fuel is still stored in the pool, not after the fuel has been removed from the facility.]

Item 4: Section 5.1 Facility Administrator:

First sentence: replace "operation of the reactor facility" with "maintaining the facility in a safe configuration"

Second sentence: replace the word "Dean of Faculty" with "Provost"

Last sentence: replace word "operation" with "storage"

[Justification: if we no longer operate the reactor, the Facility Administrator should no longer have resonsiblities related to operating the reactor. For the second change: the Dean of Faculty position no longer exists at WPI. For the third change, changing "operation" to "storage" clarifies the role of the Facility Administrator given its new shut down status.]

Item 5: Section 5.2 RHSC:

In the last sentence, replace "Vice President" with "Provost".

[Justification: WPI currently has multiple Vice Presidents, but only one Provost who appoints the members of the RHSC.]

Item 6: Section 5.8 Annual Operating Reports, (1) Operations Summary:

Item (f): replace "Health Physicist" with "RSO or SRO"

[Justification: WPI currently has an RSO instead of a "Health Physicist". And adding the SRO position makes sense regarding the annual reporting of staff changes since that has always been a key position in the facility.]

Item 7: Section 5.9 Fuel Storage:

Replace first sentence of third paragraph with: "When fuel is removed from the pool into a cask for permanent removal from the facility, the process shall be overseen by the most senior SRO and the RSO".

[Justification: WPI's final fuel movement will be from its storage position in the pool into a DOE cask for removal from the facility. Since this movement will also be overseen by the DOE, having the previously approved 3 WPI individuals oversee the process (including an RO to help the SRO) should not be required, especially given the elevated status of previous fuel movements into and out of the core during reactor operations. The status of WPI's current student RO's remains unclear relative to fuel removal since most of them will likely graduate and leave WPI prior to the fuel removal.]

3. Proposed Revisions to the Operator Re-qualification Plan (Appendix F to License R-61):

Item 1: First sentence of introductory paragraph:

Delete the following words: "...specific requirements for frequency of reactor operation by each licensee..."

[Justification: Since the reactor will no longer be operated, any re-qualifying SRO can not operate the reactor as part of the testing. With respect to safety, although the SRO testing will no longer include operating the reactor, which deminishes the required training, since the reactor will no longer be in operations such training is not pertinent to safety].

Item 2: Evaluation and Corrective Action Procedure 1:

Replace 2nd sentence with: "The examination will be prepared and graded under the direction of the RSO, or by personnel qualified by education or experience in the areas of radiation and nuclear safety, and the examination, results and qualifications of the preparers and graders will be available for review by a representative of the RHSC".

[Justification: The previous text specified that the Facility Director would prepare and grade the biennial written re-qualification exams, however given the reactor's

new shut down status, WPI's new Facility Director is predominately administrative, so we propose the RSO or other individuals qualified in safety prepare future exams.]

Item 3: Evaluation and Corrective Action Procedure 2:

1st sentence: delete "and coping with abnormal operating conditions".

[Justification: previous annual operating exams included a section on "abnormal operating conditions". Given the reactor's new shut down status, we propose this operating exam predominately stress emergency procedures. With respect to safety, since the reactor will not be in operation, training SRO's to respond to abnormal operating conditions makes no sense].

Item 4: Evaluation and Corrective Action Procedure 5:

Replace the last sentence of evaluation and corrective action procedure number 5 with: "In particular the lectures will emphasize a review of the WPI Technical Specifications, a review of facility problems, a review of the facility and personnel monitoring procedures, and a review of the administrative and record keeping requirements for the facility".

[Justification: previous lectures included sections on operating problems, unintentional scrams, reactor modifications of the previous year, and a review of preoperational checkout procedures. Given the reactor's new shut down status, training individuals in these areas makes no sense. With respect to safety, since the reactor will not be operated, training SRO's for operations procedures makes no sense, when instead they should focus on monitoring the fuel and on safety].

Item 5: Delete evaluation and corrective action procedures numbers 7, 8 and 9.

[Justification: The new Facility Director is predominently administrative, so will not be preparing lectures and exams, nor do we need to address his SRO status. Since the reactor will no longer operate, requalifying individuals can not participate in at least 10 reactor startups, nor can they operate the reactor for four hours every quarter, etc. With respect to safety, the re-qualifying individuals should focus on fuel monitoring and safety issues.]

Assurance of Health and Safety

Certain aspects of the existing Safety Analysis, associated with operating the reactor, are no longer pertinent for POL status. That is, many of the postulated accident scenarios and the

associated impacts to Health &Safety cannot occur with the reactor shutdown and defueled. When authorization to operate the reactor is rescinded, these accident scenarios and their calculated impacts will become obsolete. These obsolete scenarios include:

1. "Accidents of Mechanical Type" from section 7.2 of the Safety Analysis Report, which include the following accident scenarios:

    a. 7.2.1 Power Failure
    b. 7.2.2 Fuel Element Failure
    c. 7.2.3 Binding of Control Blades

2. "Accidents of Operating Type" from section 7.3 of the Safety Analysis Report, which includes the following accident scenarios:

    a. 7.3.1 Startup Accident

3. "Accidents of Experimental Type" from section 7.4 of the Safety Analysis Report, which includes the following accident scenarios:

    a. 7.4.1 Flooding Beam Port
    b. 7.4.2 Maximum Credible Accidents
    c. 7.4.3 Dropping Fuel Element on Full Core
    d. 7.4.4 Collapse of In-Core Experiment

The remaining accident scenarios described in the Safety Analysis Report are associated with the radionuclide inventory contained in structures, systems and components and the used nuclear fuel in storage. These accident scenarios remain valid for bounding the maximum credible consequences that could be encountered during POL status. It should be pointed out that the consequences that were calculated in the Safety Analysis will decrease significantly over time as short lived radionuclides decay away and are not replenished through operation of the reactor. These remaining accident scenarios are:

1. "Accidents of Mechanical Type" from section 7.2 of the Safety Analysis Report, which include the following accident scenarios:

    a. 7.2.4 Loss of Coolant"

2. "Accidents of Operating Type" from section 7.3 of the Safety Analysis Report, which includes the following accident scenarios:

    a. 7.3.2 "Refueling Accident"
    b. 7.3.3 "Mishandling of Demineralizer Resin"

Based upon rescinding of authorization to operate the reactor, the amendment for a POL will not result in a degradation of health and safety of the public or WPI workers. WPI does not believe

that the existing Safety Analysis needs to be modified, or the bases reanalyzed, to support this application since there are no credible scenarios in the current safe-storage configuration in which consequences of an incident or accident would exceed those already analyzed for an operating reactor.

We certify under penalty of perjury that the foregoing is true and correct to the best of our knowledge. Executed on June 26, 2007.

Sincerely,

David S. Adams
WPI RSO

Michael J. Curley
Reactor Director
University Compliance Officer
Finance and Operations

Reviewed and approved by an officer of WPI, as indicated by the signature below:

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