

May 4, 2005

Mr. David R. Vasbinder, Director  
Buffalo Materials Research Center  
State University of New York at Buffalo  
220 Winspear Avenue  
Buffalo, NY 14215-1034

SUBJECT: ISSUANCE OF AMENDMENT NO. 26 TO FACILITY OPERATING LICENSE  
NO. R-77 — UNIVERSITY OF NEW YORK AT BUFFALO [BUFFALO  
MATERIALS RESEARCH CENTER (BMRC) RESEARCH REACTOR]  
(TAC NO. MC3050)

Dear Mr. Vasbinder:

The Commission has issued the enclosed Amendment No. 26 (enclosure 1) to Facility Operating License No. R-77 for the University of New York at Buffalo (BMRC Research Reactor). The amendment is in response to BMRC's requests dated April 27, 2004, November 16, 2004, January 4, 2005, and March 21, 2005. The amendment consists of several changes to the Technical Specification (TS) including deletion of the facility 50 meter high stack exhaust system and its associated instrumentation, modification of fuel storage requirements, minor modification of required surveillance, minor administrative changes, and typographical error corrections. Each change is evaluated in the safety evaluation and the replacement pages to Appendix A of your license are provided in enclosure 1.

A copy of the related safety evaluation supporting Amendment No. 26 is also enclosed (enclosure 2).

Should you have any questions on this amendment, I would be pleased to hear from you. My telephone number is 301-415-1631.

Sincerely,

**/RA/**

Daniel E. Hughes, Project Manager  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-57

Enclosures: 1. Amendment No. 26  
2. Safety Evaluation

cc w/enclosures: Please see next page

BUFFALO MATERIALS RESEARCH CENTER

Docket No. 50-57

cc:

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STATE UNIVERSITY OF NEW YORK AT BUFFALO

(BUFFALO MATERIALS RESEARCH CENTER)

DOCKET NO. 50-57

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 26  
Licensee No. R-77

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application as filed by the State University of New York at Buffalo (the licensee), dated April 27, 2004 and supplemented November 16, 2004, January 4, 2005, and March 21, 2005, is in compliance with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the regulations of the Commission as stated in 10 CFR Chapter I;
  - B. The facility will be maintained in conformity with the applications, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public and (ii) that such activities will be conducted in compliance with the rules and 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 10 CFR Part 51 of the regulations of the Commission 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 notice for this amendment is not required by 10 CFR 2.106.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2. C. 2. of License No. R-77 is hereby amended to read as follows:

2. C. 2. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 26, are hereby incorporated in the license. The licensee shall maintain the facility in accordance with the Technical Specifications as amended.

3. This license amendment is effective on the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA Marvin Mendonca Acting for/**

Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Enclosure: Appendix A Technical Specifications Replacement Pages

Date of Issuance: May 4, 2005

ENCLOSURE TO LICENSE AMENDMENT NO. 26

FACILITY LICENSE NO. R-77

DOCKET NO. 50-57

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Remove Page Number	Insert Page Number
1	1
2	2
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
16	16
17	17
18	18
19	19
20	20
22	22
26	26

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 26 TO

FACILITY OPERATING LICENSE NO. R-95

STATE UNIVERSITY OF NEW YORK AT BUFFALO

(BUFFALO MATERIALS RESEARCH CENTER)

DOCKET NO. 50-193

1.0 INTRODUCTION

By letters dated April 27, 2004, November 16, 2004, January 4, 2005, and March 21, 2005, the State University of New York at Buffalo [Buffalo Materials Research Center] (the licensee or BMRC) requested several changes to the Technical Specifications (TS) including deletion of the facility 50 meter high stack exhaust system and its associated instrumentation, modification of fuel storage requirements, minor modification of required surveillance, and minor administrative changes. Each change is evaluated in this Safety Evaluation (SE).

2.0 BACKGROUND

The BMRC reactor has been shut down since June 1994. "Possession-Only" TSs were issued June 19, 1997. The university has experienced a lengthy waiting period to return the reactor fuel to the DOE. Shipment of the fuel is now expected to occur within the year.

3.0 EVALUATION

3.1 Facility Ventilation and Radiation Monitoring Systems

As originally constructed, air was exhausted from the reactor containment building by two fan systems. A 50-meter high "stack exhaust" system was used to exhaust air from fume hoods and irradiation facilities. A second exhaust system, referred to as the "building air" system, exhausts the general breathing air in the reactor building and certain low-level fume hoods. A six-inch diameter emergency exhaust duct was tied into the stack system, in the event of a significant reactor accident, to provide containment pressure control and controlled (slow) venting of potential airborne contaminants. Current TS only require operation of the stack exhaust during fuel handling operations.

The reactor has been shut down since June, 1994 and the license was amended for "possession-only" on June 19, 1997. The licensee has re-evaluated the potential airborne releases from fuel cladding failure events, considering the nominal ten-year fuel decay period, and has determined that a stack exhaust system may be removed while maintaining the building air system and still provide adequate protection of the public and plant workers.

The current TS allow for the storage of irradiated fuel within the reactor tank, hot cell, or similar “alternate storage” facilities. It is specifically required that any alternative storage facilities be vented to the stack exhaust (as is the Hot Cell). The licensee has analyzed the potential consequences of cladding failure within the containment building, again considering the nominal ten-year fuel decay period, and has concluded that it is no longer necessary to vent the fuel storage facilities to the stack.

### 3.2 Proposed Modifications in the Ventilation and Radiation Monitoring System

The licensee states that the stack exhaust system will be eliminated. The remaining stack exhaust fan will be permanently removed from service. The duct will be sealed shut outboard of the pratt damper, and the pratt damper will be closed. All fans that provide air to this duct will be electrically disabled or disconnected from the ducts exiting containment.

In addition the six-inch emergency bypass duct will be removed from service. The duct will be sealed shut immediately outboard of the pressure relief valve.

The supply air systems will not be modified. It is anticipated that only the AC1 supply system will be routinely operated. This system will provide adequate makeup air, and the additional capacity of the fume hood supply system will not typically be needed.

The particulate and gaseous radiation monitoring instruments for the stack exhaust will be removed from service. The remaining effluent monitors will remain in service. The automatic triggering system requirement is deleted, but a specification is added to required that a qualified individual be present to manually trigger the dampers within 60 seconds of any accident during fuel handling operations.

### 3.3 Technical Specification (TS) Changes required to Implement Modifications.

The licensee proposes that in TS 4.0, the stack and six-inch exhaust systems and the requirements that fuel storage facilities be vented to the stack be deleted. The changed TS 4.0 is as follows:

#### 4.0 Engineered Safety Systems

Applicability These specifications apply to the facility containment vessel and ventilation systems.

Objectives The objective of these specifications is to control potential releases of airborne radioactivity from the facility.

Specifications Irradiated reactor fuel shall not be handled in the reactor tank, Hot Cell, or in alternative facilities pursuant to Section 10.3 unless:

- 1) The truck door is closed and sealed, and at least one of the doors for each airlock is closed and sealed. All other penetrations such as piping and electrical shall also be sealed.
- 2) The Building Air exhaust fan located within the Control Deck fan room is operating.

- 3) The air pressure within the reactor containment is negative relative to the outside air pressure.
- 4) The dampers (Pratt dampers) within the containment ventilation ducts are either closed or capable of closing in 5 seconds or less after receipt of a manual damper closure signal and a qualified individual is present who shall be capable of initiating a manual damper scram within 60 seconds.

#### Bases

- 1) Specification 4.0. 1) ensures that containment penetrations other than the ventilation ducts are closed, preventing the unmonitored and uncontrolled release of airborne radioactivity.
- 2) Specification 4.0. 2) ensures that fan is operating to maintain the containment at negative pressure.
- 3) Specification 4.0. 3) ensures that all containment leakage is inward.
- 4) Specification 4.0. 4) ensures operability of the containment isolation systems in the event of fuel cladding compromise.

The licensee proposes that TSs 3.2 and 3.3 be changed to the following in order to implement their proposed modification to the facility radiation monitoring system that in part is necessitated by the change in the air exhaust and ventilation systems.

#### 3.2 Radiation Effluent Monitor Requirements

Applicability These specifications apply to the permanently mounted radiation monitor in the building air exhaust system, which is equipped with remote read-out in the reactor control room.

Objective The objective of these specifications is to set a minimum level of performance for the effluent radiation monitoring system.

#### Specifications

- 1) Effluents from the containment building, exhausted through the building air exhaust system (containment roof), will be continuously monitored for gaseous radioactivity by the Building Gas Monitor whenever the exhaust fan is operating and:
  - i. Irradiated reactor fuel is being handled within the facility  
or
  - ii. Activities are being conducted within the containment building that may potentially create airborne gaseous activity in excess of 10% of the release concentration limit established by 10 CFR 20 when averaged over a 24 hour period.

- 2) Effluents from the containment building, exhausted through the building air exhaust system (containment roof), will be continuously monitored for particulate radioactivity by the Building Particulate Monitor whenever the exhaust fan is operating and:
  - i. Irradiated reactor fuel is being handled within the facility  
or
  - ii. Activities are being conducted within the containment building that may potentially create airborne particulate activity in excess of 10% of the release concentration limit established by 10 CFR 20 when averaged over a 24 hour period.
- 3) If operation of the monitors is required, the output of the monitors shall be recorded on a strip chart, a data logger, videographic recorder, or equivalent, or logged at intervals of not more than every 15 minutes.
- 4) The setpoints for the Building Gas Monitor and the Building Particulate Monitor shall be specified in writing by the Operating Committee.

#### Bases

- 1) Operation of the Building Gas and Building Particulate Monitors ensures that any substantive releases of gaseous or particulate radioactivity will be detected.
- 2) Specification 3.2. 4) will ensure that the alarm set point is clearly stated, cannot be changed without management review, and can be maintained at the lowest possible level commensurate with facility conditions and operational requirements.

#### 3.3 Radiation Area Monitor Requirements

#### Specifications

- 1) Reactor Fuel shall not be handled in the reactor tank, unless the Reactor Bridge Monitor is operating. For purposes of this specification any fuel handling in the Hot Cell which includes insertion of fuel into the pass-through tube shall be considered "in the reactor tank."
- 2) The Set Point for the Reactor Bridge Monitor shall be specified in writing by the Operating Committee and may not exceed 75 mR/hr.
- 3) In the event of failure of the Reactor Bridge Monitor a portable unit shall be substituted and shall be frequently monitored, and a qualified individual shall be identified who shall be capable of initiating a manual damper scram within sixty (60) seconds.

#### Bases

- 1) The Reactor Bridge Monitor will provide redundant warning to the reactor operators in the event of low pool water level, and will warn operators of unusually high radiation levels should they occur during fuel handling operations.

- 2) Specification 3.3. 2) will ensure that the alarm set point is clearly stated, cannot be changed without management review, and can be maintained at the lowest possible level commensurate with facility conditions and operational requirements.
- 3) Specification 3.3. 3) will ensure that radiation levels will be adequately monitored if the Reactor Bridge Monitor is not operational.

The licensee is proposing to change TS 6.0 to the following. This change is required to remove portions that are rendered meaningless when the proposed facility modifications are implemented.

#### 6.0 Airborne Effluents

Applicability These specifications apply to the levels of radioactivity discharged to the environment through the building air exhaust system.

Objective The objective of these specifications is to ensure that persons outside of the facility are not exposed to concentrations of airborne radioactivity in excess of the limits established by 10 CFR 20.

#### Specification

##### 6.1 Building Air Effluent Radiation Limit

- 1) The concentration of radioactivity in the Building Air Exhaust, at the point of release (containment roof), shall not exceed the effluent limit established in 10 CFR 20, when averaged over the calendar year.

#### Basis

Specification 6.1 ensures that the concentration of radioactivity in the air which exits through the containment roof is below the NRC limit.

The licensee proposes two additional changes to TS 8.2. 1) and 8.2. 2) to increase the precision of the nomenclature for the installed instrumentation. That change is from "Effluent Radiation Monitors" to "Building Gas and Particulate Monitors." In addition, an applicability section was added to specify more precisely when the surveillance is applicable. Changes to the wording to TS Section 8.3. 1) are being proposed in order to reflect the removal of the stack and the change of the damper trip to manual.

The licensee is proposing to change TS 8.2 and TS 8.3 to the following:

#### 8.2 Radiation Monitoring Systems

- 1) The Reactor Bridge Monitor and the Building Gas and Particulate Monitors shall be tested for operability monthly, at intervals not to exceed 6 weeks.

- 2) The Reactor Bridge Monitor and the Building Gas and Particulate Monitors shall be calibrated quarterly, at intervals not to exceed four months. For the purpose of meeting this requirement, the monitors shall be calibrated by determination of their response to appropriate reference sources.
- 3) Any radiation monitors associated with Fuel Storage Facilities utilized pursuant to Section 10.3 shall be calibrated before fuel is installed in the facility, and shall be Operability checked as appropriate.

#### Applicability

The Reactor Bridge and Building Gas and Particulate Monitor operability tests shall not be required if the monitor(s) are not in service, however the tests must be conducted if and when the monitors are placed back in service.

The Building Gas and Particulate Monitor calibration tests are not required if the monitor has been continuously taken out of service more than 30 days before the calibration is due, however the calibration must be conducted if and when the monitor is placed back in service.

Calibration of the Reactor Bridge Monitor is not required if it has been taken out of service, however the calibration must be performed if and when the monitor is placed back in service.

#### 8.3 Engineered Safety Feature (Containment) Tests

The following items shall be tested quarterly at intervals not to exceed four months:

- 1) The Building Air ventilation isolation damper closes in less than 5 seconds in response to manual trip.
- 2) The Control Systems maintain negative pressure in the building under normal conditions.

In TS 9.3 Ventilation Systems the licensee has proposed changes that are necessitated by the removal of the "stack exhaust" system. The last two paragraphs of the existing TS are removed and three paragraphs are added. This specification is a plant design feature. It is specifying what exists at the facility after the change in the ventilation systems. The proposed section is as follows:

#### 9.3 Ventilation Systems

Under normal conditions, the containment building is ventilated by a single pass system. Conditioned air is supplied to the containment through a 30 inch diameter duct. A second 30 inch supply system can also be employed; however, it is not necessary under most conditions.

Air from the general (occupied) areas of the containment, and certain low activity fume hoods, is exhausted through a 36-inch duct which penetrates the containment roof

(commonly referred to as the "Building Air" system). The Building Air exhaust system is HEPA filtered and includes a vortex control damper on the suction side which is used to control the negative pressure in the containment building.

When the reactor was in operation, air from the remaining fume hoods and reactor irradiation facilities was exhausted thru a "Stack Exhaust" system that exited containment thru the sub-basement and exhausted through a 167 foot high stack. This system has now been abandoned and all fans that fed air into this exhaust system have been disabled and/or disconnected from the duct. In addition a six (6) inch diameter "emergency bypass" exhaust duct equipped with HEPA and activated charcoal filters, is removed from service.

The two 30 inch supply ducts, and the 36 inch exhaust duct are equipped with "Pratt" hydraulic isolation dampers which can be manually triggered if high airborne radioactivity is detected. The damper in the former stack exhaust system is maintained in the closed position, and the duct has been blanked off. The 6 inch emergency exhaust duct has been capped outboard of the pressure relief valve, and the activated charcoal filter is no longer required.

When the isolation dampers are closed the building air exhaust and fans that feed into it shut down, as do the two 30 inch supply fans. This will place the containment in an approximately neutral pressure condition. As a consequence there will be minimal escape of contaminated air from the facility.

All of the proposed changes that are listed above are needed to implement the licensee's elimination of the stack exhaust system and the requirement that the system be operated during fuel handling operations. The licensee has, considering the nominal ten-year fuel decay period, re-evaluated the potential airborne releases from fuel cladding failure events and determined that the stack exhaust system may be removed while maintaining the building air exhaust system and still provide adequate protection of the public and plant workers. The analysis was done using conservative assumptions and the licensee found that releases from hypothetical fuel handling events would result in a dose to the facility staff and the public that is below the 10 CFR 20 limits and is significantly lower than the exposures to the public resulting from the design basis accident for the operating reactor.

The system that the licensee is proposing to be modified functions to mitigate a design basis accident. The associated TSs were limiting conditions of operation (LCO) to comply with 10 CFR 50.36 (c)(2)(ii)(C). The NRC staff has reviewed the analyses provided by the licensee and the assumptions taken. The reactor has been shut down for a nominal 10 years. The analyzed design basis accident for a shutdown reactor is only credible during fuel handling which will only occur when the licensee prepares the fuel for shipment to the DOE. The fission products in the fuel have been decaying for the period of shutdown thereby reducing the inventory considerably. Considering these factors the risk of a release is lower. With the modification and the above changes to the TS there remains reasonable assurance that the health and safety of the public and the environment is protected. With the change of the design basis accident to one with reduced consequences it is acceptable to modify the mitigative system to one that has reduced mitigative capability. The TS, as proposed will still function as a LCO for the modified system and comply with 10 CFR 50.36 (c)(2)(ii)(C). The staff find the modification and the above proposed changes to TS acceptable.

## Additional proposed changes

Minor modifications of other sections of the TS are requested as further outlined below.

### TS 5.0 Reactor Tank Water Conditions

Three typographical or grammatical corrections are proposed by the licensee, none of which change the functionality of the specification. The staff thus find the changes acceptable.

### TS 7.0 Liquid Effluents

Four typographical corrections are proposed by the licensee, none of which change the functionality of the specification. The staff thus find the changes acceptable.

### TS 8.0 Surveillance Requirements

In this Section of the TS the licensee is proposing several additional changes beyond the several changes that were addressed previously.

#### TS 8.1. 1) Plant Instrumentation Systems

The condition statement: "...whenever irradiated fuel is stored within the tank." is to be added to the end of the existing specification. This change is in anticipation of the fuel being removed from the tank prior to decommissioning. With this change the surveillance will no longer be required when the fuel is removed. Since the reactor is permanently shut down and decommissioning is pending the fuel shipment to DOE within the next year, the staff find this change acceptable.

#### TS 8.4 Other Instrumentation System Surveillance

The licensee also is proposing a change to a reference number. This change clarifies the specification and is therefore acceptable.

#### TS 8.5 Reactor Fuel Shielding Water Monitoring

The licensee is proposing to increase the specified surveillance intervals for system water gross beta activity and gamma spectroscopy measurements. The surveillance interval for gross beta activity is proposed for quarterly, not to exceed 100 days and to biannually, not to exceed seven months for the gamma spectroscopy measurement. The licensee justifies the change by providing data that shows the stability of the measurements over time intervals much longer than the surveillance intervals proposed. This is evidence that the proposed intervals will ensure changes are identified in a timely manner, and therefore the NRC staff find the change acceptable.

Another proposed change in this section is to add a reference to the basis. This is necessitated by the change discussed above. It is a clarifying change to the specification. The NRC staff find the change acceptable.

TS 10.3.4 Transfer of Fuel between Fuel Storage Facilities and TS 10.3.5 Fuel handling within the reactor tank

The licensee is proposing to delete references to TS 3.4 in the above two TS since a change previously accepted in this amendment has removed that section from the TSs. The NRC staff find the deletions acceptable.

TS 11.1 Organizational Structure, TS 11.2 Minimum Staffing Requirements, and TS 11.5.1. 3) Reactor Decommissioning Safety Committee

The licensee is proposing to change the name of the "Director of Occupational and Environmental Safety" to "Director of Environment, Health and Safety" in one place in TS 11.1, two places of TS 11.2, once in 11.5.1. 3) and is reflected in several blocks of TS Figure 1, BMRC Organizational Structure. The licensee states that the proposed changes reflect a name change for the campus safety department. In addition the licensee proposes changes in the responsibilities of the Director of Environment, Health and Safety as stated in TS 11.1. 2) and the BMRC Director as stated in TS 11.1. 3). The licensee states that these latter two changes are to establish the best allocation of resources and expertise to effectively manage the facility and ensure safety. The NRC staff find these administrative changes acceptable.

#### 3.4 Corrections to miscellaneous topographical errors

Typographical errors in a previous amendment resulted in the deletion of TS 10.3.4. 2) and TS 10.3.4. 3), and TS 12.0. 2) and TS 12.0. 3) under specified actions. These deletions were restored. The first entry (1.0 Definitions) to the table of contents was deleted in error with a previous amendment. Page numbers for sections 14.0 and 14.1 were wrong because of a topographical error in a previous amendment. The correct entries were restored. In TS 3.1, TS 3.2, TS 3.2, TS 3.3, TS 4.0, and TS 5.0 there were typographical errors made in previous amendments by not using the right hand parenthesis ")" when internally referencing a specification. The parenthesis was restored in each case (e.g. "5.0. 1" and "5.0. 2" in the basis of TS 5.0 replaced with "5.0. 1)" and "5.0. 2)").

The table of contents was updated with the correct page numbers after repagination due to the changes made with this amendment.

#### 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 or changes in inspection and surveillance requirements. The staff has determined that this amendment involves 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.

## 5.0 CONCLUSION

The staff has concluded on the basis of the considerations previously discussed that (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, or create the possibility of a new or different kind of accident from any accident previously evaluated, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities; and (3) such activities will be conducted in compliance with the Commission's regulations, and the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

Principal Contributor: Daniel E. Hughes

Date: May 4, 2005