

August 15, 2005

Dr. Weldon Jackson, Provost
Manhattan College
Manhattan College Parkway
Riverdale, NY 10471-4098

SUBJECT: NRC INSPECTION REPORT NO. 50-199/2005-201

Dear Dr. Jackson:

This refers to the Nuclear Regulatory Commission (NRC) inspection and confirmatory radiation survey conducted on April 7, 2005, at the Manhattan College Zero Power Reactor (MCZPR). The enclosed report presents the results of that inspection.

The inspection focused on the completion of decommissioning activities and performance of an independent radiation survey by the Oak Ridge Institute for Science and Education (ORISE), a NRC contractor, to confirm that residual radiation levels satisfied NRC criteria for unrestricted release of the facility. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations during the confirmatory survey. Additional information was obtained by telephone from the acting Facility Director (Dr. Berlin) on June 1, 2005.

Based on the results of this inspection, it has been determined that: 1) the decommissioning of the MCZPR, NRC License No. R-94, Docket No. 50-199, has been performed in accordance with the approved Decommissioning Plan; 2) the terminal radiation survey and associated documentation from the licensee demonstrated that residual radioactive material at the facility and site is less than the NRC-approved guideline limits; and 3) since the licensee has met their NRC-approved guideline limits, the facility and site meet the criteria for license termination set forth in 10 CFR 20.1401(b)(3). The results of our review of your request for license termination will be sent by separate letter in the near future.

No safety concern or noncompliance with NRC requirements was identified. No response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/NRC/ADAMS/index.html>.

Dr. W. Jackson

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August 15, 2005

Should you have any questions concerning this inspection, please contact Mr. Thomas Dragoun in King of Prussia, PA at 610-337-5373.

Sincerely,

/RA Alexander Adams, Jr. 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

Docket No. 50-199
License No. R-94

Enclosure: NRC Final Inspection Report No. 50-199/2005201
cc w/enclosure: See next page

Manhattan College

Docket No. 50-199

cc:

Municipal Reference and Research Center
31 Chambers Street
New York, NY 10007

Barbra Youngberg
Chief, Radiation Section
NYS Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7255

Mr. John P. Spath
NYS Energy Research and
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17 Columbia Circle
Albany, NY 12203-7399

Mr. Bob Berlin
35 Sterling Pines Road
Tuxedo, NY 10987

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

Dr. W. Jackson

-2-

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U. S. NUCLEAR REGULATORY COMMISSION

Docket No: 50-199

License No: R-94

Report No: 50-199/2005-201

Licensee: Manhattan College Corporation

Facility: Manhattan College Zero Power Reactor (MCZPR)

Location: Riverdale, New York

Date: April 7, 2005

Inspector: Thomas Dragoun

Approved by: 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

EXECUTIVE SUMMARY
Manhattan College Zero Power Reactor
Report No. 50-199/2005-201

This inspection included an onsite review of the completed remediation of the facility in accordance with the NRC approved Decommissioning Plan (DPlan). In addition, ORISE staff conducted an independent radiation survey to confirm the radiological conditions described in the Final Status Survey Report submitted by Manhattan College on February 3, 2005. The inspection found that remediation efforts were successful in reducing residual radioactivity and radiation to levels well below the NRC limits for unconditional release of the facility. The facility and site meet the criteria for license termination set forth in 10 CFR 20.1401(b)(3).

Report Details

Summary of Plant Status

The MCZPR was a 0.1 watt swimming pool reactor that was constructed in 1964 and operated under license R-94. The reactor was permanently shut down in 1995.

- All of the reactor fuel was transferred in August 2004, to another licensee by the Department of Energy.
- Other radioactive material, sources, and special nuclear material (SNM) have been removed from the facility, disposed of or transferred to other licenses.

The reactor tank was empty and all reactor system equipment was removed from the facility. The control console remained intact in anticipation that a historical display will include the console. Physical access to the area was controlled in accordance with the security program. The Final Status Survey (FSS) was performed and documented in a report submitted to the NRC. The final status survey grid markings used by the licensee were clearly visible at the facility and were used during the confirmatory survey by the Oak Ridge Institute for Science and Education (ORISE) Environmental Survey and Site Assessment team.

1. Decommissioning

a. Inspection Scope (Inspection Procedure 69013)

In a letter to the NRC dated February 3, 2005, the licensee stated that all NRC requirements for termination of reactor license R-94 have been met. To confirm this, the inspector reviewed aspects of:

- Decommissioning Plan, Manhattan College Zero Power Reactor, Revision 1, dated July 1998
- NRC letter to Dr. Weldon Jackson, Provost, "Issuance of Amendment No. 12 to Facility Operating License No. R-94 Manhattan College Zero Power Reactor" dated March 23, 1999
- Technical Specifications, Possession Only Status, dated July 1998
- Manhattan College letter to NRC, "Subject: Additional Information, Decommissioning Plan for Manhattan College Zero Power Reactor", dated July 21, 1998
- NRC Letter to Dr. Weldon Jackson, "NRC Routine Announced Inspection Report No. 50-199/1999-201", dated October 25, 1999
- NRC Letter to Dr. Richard H. Heist, Dean, School of Engineering, Manhattan College, "NRC Inspection Report No.50-199/2004-201" dated April 26, 2004
- Manhattan College Letter to NRC, "Transport of Manhattan College Fuel", dated January 5, 2004
- Manhattan College Letter to NRC, "Facility Operations Report (September 1, 1999 - August 31, 2003); MCZPR, License No. R-94"
- Manhattan College Letter to NRC, "Termination of Facility License R-94; Docket 50-199" dated February 3, 2005
- Manhattan College letters from the Acting Reactor Administrator to NRC, no subject, dated October 29, 1998; November 10, 1998; and January 6, 1999

- NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination" Draft Report for Comment, dated June 1992
- NRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" dated June 1974
- ORISE Report, "Confirmatory Survey of the Manhattan College Zero Power Reactor, Manhattan College, Riverdale, New York", dated June 8, 2005

b. Observations and Findings

On March 23, 1999, the NRC approved the DPlan dated July 21, 1998, by License Amendment No. 12 issued on March 23, 1999. On February 3, 2005, the licensee reported that decommissioning was complete and requested termination of the reactor license.

1. Removal of Materials

The inspector reviewed selected aspects of:

- transportation records
- disposal records
- NRC Forms 741 and 742
- DPlan dated July 21, 1998

The first task in the DPlan was the disposal of all radioactive material and sources, including a core load of Low Enrichment Uranium (LEU) fuel kept in storage. Shipping documents and other records submitted by the licensee show that all material was properly transferred for disposal or continued use by an authorized licensee. This task was satisfactorily completed.

2. Inspections during Decommissioning

NRC routine inspections during decommissioning determined that the following programs were conducted in accordance with the revised Technical Specifications, NRC approved DPlan, and applicable regulatory requirements: organization and staffing, review and audit functions, maintenance and surveillance, radiation safety program, effluent control and environmental monitoring, emergency preparedness, physical security, and special nuclear material control and accounting.

3. Review and Conduct of Surveys

A Final Status Survey Report (FSSR) describing the radiological status of the facility dated December 2004 was submitted with the licensee's February 3, 2005, letter. NRC review of the documentation concluded that the FSS generally followed the guidance provided in NUREG/CR-5849 for classifying areas of the site, sampling frequency, and data evaluation and reporting. However, additional information and clarification was provided by the Acting Reactor Administrator to the NRC inspector by telephone on June 1, 2005, as follows:

- calibration of radiation survey instruments was done by vendors using standard techniques and NIST traceable calibration sources with energies that approximated the radionuclides of concern
- calculation of μ_{α} (mu subscript alpha) for the three survey units for the alpha particle, beta particle, and beta plus gamma ray radiation field measurements were all less than the guideline value. This demonstrated that each of the three survey units satisfied the NRC release criteria at a 95% confidence level. (See NUREG/CR-5849 section 8.5.5)
- air attenuation during measurement of the alpha particle levels was minimized by placing the detector probe in contact with the surface being surveyed
- the observation that over half of the survey data had negative value after correction for background was expected due to the absence of contamination everywhere in the facility.

At NRC request, the Oak Ridge Institute for Science and Education conducted an independent confirmatory survey of the facility. The survey determined that the surface activity levels and exposure rates were less than the NRC criteria for release of the facility for unrestricted use given in 10 CFR 20.1401(b)(3), thereby confirming the licensee's FSS results. That criteria is stated in the Site Decommissioning Management Plan (SDMP) Action Plan of April 16, 1992 (57 FR 13389). The surface contamination of reactor facility structures shall meet Table 1 of "Termination of Operating Licenses for Nuclear Reactors," Regulatory Guide 1.86, June 1974 and an indoor exposure rate of less than 5 μ r/hr above natural background at 1 meter with an overall dose objective of 10 mr/yr.

c. Conclusions

The licensee has satisfactorily completed the decommissioning of the MCZPR, and has demonstrated that the residual radiation levels of the facility meet the radiological criteria for license termination of NRC License R-94 in accordance with 10 CFR 20.1401(b)(3).

2. Exit Meeting

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on April 7, 2005. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R.Heist, Dean, School of Engineering
R.Berlin, Acting Reactor Administrator

INSPECTION PROCEDURES USED

IP 69013 RESEARCH AND TEST REACTOR DECOMMISSIONING

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED: none

CLOSED: none

LIST OF ACRONYMS USED

DPlan	Decommissioning Plan
FSS	Final Status Survey
FSSR	Final Status Survey Report
MCZPR	Manhattan College Zero Power Reactor
NRR	Nuclear Reactor Regulation
ORISE	Oak Ridge Institute for Science and Education