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U.S. Nuclear Regulatory Commission  
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Subject: Docket #50-184

Gentlemen:

Transmitted herewith is Operations Report No. 62 for the NBSR. The report covers the period January 1, 2009 to December 31, 2009.

Sincerely,

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Acting Director, NIST Center for Neutron Research

Enclosure

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**NIST**

**NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY REACTOR  
(NBSR)**

Docket #50-184

Facility License No. TR-5

Operations Report

-- #62 --

January 1, 2009 - December 31, 2009

This report contains a summary of activities connected with the operations of the NBSR. During this period the facility license No. TR-5 was renewed for an additional 20 years, effective July 2, 2009. This report is submitted in fulfillment of section 7.8(3) of the previous NBSR Technical Specifications for the period from January 1, 2009 through July 1, 2009. In addition, this report fulfills the requirements of section 6.7.1 of the present Technical Specifications for the period from July 2, 2009 to December 31, 2009.

The section numbers in the report (such as 7.8(3)(a)-6.7.1(1)) correspond to the sections in the previous and present Technical Specifications, respectively.

March 26, 2010



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Robert M. Dimeo  
Acting Director, NIST Center for Neutron Research

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**7.8(3)(a)-6.7.1(1) Summary of plant operations including the energy produced by the reactor and the hours the reactor was critical**

During the period January 1, 2009 through December 31, 2009 the reactor was critical for 6014 hours with an energy output of 120,007 MWH. Major activities during this period included; shipping spent fuel elements to SRS; cutting spent fuel elements for eventual shipment; and the licensing of one senior reactor operator.

**7.8(3)(b)-6.7.1(2) Unscheduled shutdowns, including reasons therefore**

1. There was a scram due to reduced reactor primary flow when the #1 primary pump tripped (one of three). The pump could not be restarted. The idle #4 primary pump was started and the reactor was returned to 20 MW within 17 minutes of the scram. It was determined that the #1 primary pump tripped and would not restart due to a faulty soft start unit in the motor control center (MCC). The replacement of the soft start unit was made during a scheduled shutdown and the test of the pump was satisfactory.
2. The reactor was shutdown following a rundown for Cold Source Low Flow. The low cold source flow was caused by a failure of the controller for DWV-23. The controller was repaired, the cold source flow was restored, and the reactor was returned to 20 MW within the hour.
3. The reactor was manually scrammed by the operator after Shim # 4 dropped due to a low clutch current. After troubleshooting, the clutch power card was found to be defective and was replaced. The reactor was returned to 20 MW 37 hours later.
4. There was a scram due to a commercial power dip. There were multiple near simultaneous scram signals so the specific cause of the scram was not determined. The reactor was returned to 20 MW within 20 minutes.

**7.8(3)(c)-6.7.1(3) Tabulation of major preventative and corrective maintenance operations having safety significance**

Note: Some of these items may be also listed as Engineering Change Notices (ECN).

1. Replaced both casing wear rings of #1 main D<sub>2</sub>O pump
2. Replaced BT-4 and BT-9 main shutter beam stops
3. Replaced #1 secondary main pump shaft and impeller assembly
4. Replaced SCV-14

5. Installed a bypass line in thermal column system
6. Implemented the use of a new fuel element cart and washing station
7. Cut spent fuel elements for eventual shipment
8. Shipped spent fuel elements pieces to SRS
9. Replaced C-100 crane and controls
10. Replaced C-100 personnel back door
11. Replaced the main air dryer
12. Instrument calibration surveillance tests were performed for the following:
  - a. Three Wide-range Nuclear Power Channels
  - b. Reactor Vessel Flow and Level Recorders and Indicators
  - c. Two Reactor Differential Temperature Channels
  - d. Confinement Building Area Radiation Monitors
  - e. Fission Product Monitor and Secondary Cooling N<sup>16</sup> Monitors
  - f. Three Confinement Building Effluent Monitors
  - g. Emergency Ventilation System Controllers
13. Thirty two instrument service requests (ISR) were completed. The following were the most significant:

ISR #	ACTION
1857	Replaced Soft Start Unit, No. 1 D <sub>2</sub> O Pump
1859	Replaced Action Pak, FIA-40 Outlet Flow
1863	Reconfigured recorder for-Tritium Monitoring System
1864	Rebooted, Thermal Power Recorder
1865	Corrected valve lineup, LIA-3 Storage Tank Level Channel
1867	Replaced UPS, Tritium Detector
1869	Tightened loose wire, RM 3-4 Irradiated Air Major Scram
1870	Drained oil sensing line, PC-150 Smiling Jack
1871	Replaced Action Pak, AN 4-10 14" Inlet Flow Low Alarm
1874	Replaced meter, No. 4 Shim Arm Position Indicator
1882	Replaced Action Pak, TRA-40B
1883	Replaced Action Pak, AN 4-47 D <sub>2</sub> O Overflow Low Alarm
1884	Replaced controller, DWV-23
1885	Adjusted/verified mechanical clutch gap, Nos. 1, 2, and 4 Shim Arm Clutches

**7.8(3)(d)-6.7.1(4) A brief description, including a summary of the safety evaluations, of changes in the facility or in procedures and of test and experiments carried out pursuant to 10 CFR 50.59**

The following facility changes were completed this year. None required a license amendment or a change to the technical specifications. The applicability determination of each of these changes determined that further evaluation under section 10 CFR 50.59 was not needed.

ECN 532 New Fuel Element Cart and Washing Station

ECN 554 Installation of flow meter to monitor D<sub>2</sub>O cooling to Rabbit Tube #4 (RT-4)

ECN 555 Relocating air system valves on C100 North Wall to accommodate new neutron guides

ECN 560 Routing Change of Chilled Water Supply line from C-100 to Helium Compressor Building to accommodate new neutron guides

ECN 562 Replacement of Main Air Dryer and addition of inlet air filter

ECN 563 Modification to fuel element assembly; change in the type of machine screws used to attach fuel element head

**7.8(3)(e)-6.7.1(5) Summary of the nature and amount of radioactive effluents released or discharged to the environs and the sewer beyond the effective control of the licensee as measured at or prior to the point of such release or discharge**

Gaseous releases to the environs consisted of 877 curies of Tritium, 1260 curies of Argon-41, and 0.282 curies of other beta-gamma emitters. There were 4.71 curies of Tritium, and 205 microcuries of beta-gamma emitters released to the sanitary sewer.

**7.8(3)(e)-6.7.1(6) Summary of environmental surveys performed outside the facility**

Environmental samples of the streams, vegetation, and/or soil, and air showed no significant changes. Results from thermoluminescent dosimeters located at the NIST fence line consistently showed a net dose of zero from NBSR effluents.

**7.8(3)(f)-6.7.1(7) Summary of significant exposures received by facility personnel and visitors**

Dosimetry results:

1. There were no significant exposures to visitors for this reporting period.
2. There were no significant exposures to facility personnel for this reporting period.