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

Gentlemen:

Transmitted herewith is Operations Report No.52 for the NBSR. The report covers the period January 1, 1999 to December 31, 1999.

Sincerely,

J. Michael Rowe
Director, NIST. Center for Neutron Research

Enclosure

cc: Project Scientist
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NIST
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**NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY REACTOR
(NBSR)**

Docket #50-184

Facility License No. TR-5

Operations Report

-- #52 --

January 1, 1999 – December 31, 1999

This report contains a summary of activities connected with the operations of the NBSR. It is submitted in fulfillment of section 7.8(3) of the NBSR Technical Specifications and covers the period from January 1, 1999 to December 31, 1999.

Section numbers in the report (such as 7.8(3)(a)) correspond to those used in the Technical Specifications.

March 24, 2000

A handwritten signature in black ink, appearing to read "J. Michael Rowe", is written over a horizontal line.

J. Michael Rowe
Director, NIST Center for Neutron Research

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7.8(3)(a) Summary of Plant Operations

During the period January 1, 1999 through December 31, 1999 the reactor was critical for 6466 hours with energy output of 128,638 MWH. Overall, reactor operation for the year was routine and uneventful. Two more shipments of spent fuel were made.

7.8(3)(b) Unscheduled Shutdowns

1. There were (4) scrams due to commercial power interruptions. A return to 20 MW occurred once within an hour and three times after a one day delay because of xenon buildup.
2. There was a shutdown due to commercial power interruptions caused by an ice storm. Returned to power the next day after xenon decay.
3. There was a Low Flow scram caused by #1 D₂O pump tripping off. After verifying normal conditions, restart to 20 MW occurred within an hour.
4. There was a shutdown due to #3 Shim clutch current dropout. A capacitor was replaced in the output card. Returned to 20 MW the next day after xenon decay

7.8(3)(c) Tabulation of Major Items of Plant Maintenance

Note: Several of these items are covered by an Engineering Change Notice (ECN).

1. Continued thermal shield tube sealing as necessary
2. Repaired thermal shield floor header leak under BT-9
3. Replaced thermal shield floor header trench drain piping with clear tubing allowing visual indication of leakage
4. Replaced helium sweep system condensate receiver pump with new unit
5. Replaced packing in #123 secondary strainer
6. Modified circuitry for SCV-50 so it will automatically open when any of the six secondary main pumps are restarted
7. Replaced fourteen cells of the station battery
8. Replaced TSV-87 supply valve with new one
9. Replaced spark plug of #2 Shim arm collection container
10. Installed flange with isolation valve on refueling drop out chute below FTV-2 to allow

- rinsing of chute and/or fuel element with clean D₂O
11. Replaced air solenoid valves on neutron guide isolation valves
 12. Replaced both open and close push button switches for NG-1
 13. Adjusted vibration cutout switch for #3 cooling tower fan motor
 14. Installed and put into operation new refrigerator compressor for cold source to serve as a backup for existing unit
 15. Replaced motor on SF-11 with new unit
 16. Developed system to allow cooling of secondary side of HE-2 using potable water when secondary system is drained for maintenance and /or repairs
 17. Pumped out and cleaned cooling tower basin, removing all sludge
 18. Changed pre and after filters of primary purification system
 19. Changed pre (three times) and after filters (once) of spent fuel storage pool system
 20. Relocated lobby plant annunciator panel to B-2 (New lobby annunciator panel to be installed in the near future)
 21. Replaced discharge pressure gages of both thermal shield pumps
 22. Modified C-100 truck door motor circuitry so motor will not energize unless truck door seal is deflated (part of ECN-452)
 23. Changed resin in #1 thermal shield IX column
 24. Replaced fan motor of EF-23
 25. Replaced motors of #2 & #4 main D₂O pumps
 26. Back flushed rabbit tips RT-1 & RT-2 using helium and then clean D₂O
 27. Performed load center surveys of A-1, A-5, A-7, B-4, B- 6 & B-8 switchboards
 28. Tech rep performed repairs of CO₂ bulk tank compressor
 29. Instrument section replaced capacitor in #3 shim arm clutch card due to shim arm slipping during operation
 30. Replaced air operator of SCV-4 (secondary system automatic makeup valve)
 31. Cut 48 spent fuel elements in preparation for shipment
 32. Shipped 84 spent fuel elements off site
 33. The following instrument calibration surveillance tests were performed:

Channel	Title
BT-4FACS	BT-4 FACS Spectrometer Radiation Monitors
BTUR-1	Reactor Thermal Power Recorder
FR-1	Reactor Outlet Flow Recorder

FRC-3	Outer Plenum Flow Recorder
FRC-4	Inner Plenum Flow Recorder
FIA-8A	Cold Source D ₂ O Flow Channel A
FIA-8B	Cold Source D ₂ O Flow Channel B
FIA-13	Storage Pool Cooling Flow Indicator
FIA-15	Thermal Shield Coolant Flow Indicator
FIA-18	D ₂ O Injection Flow Indicator
FIA-40	Reactor Outlet Flow Indicator Alarm
LCA-19	Storage Pool Pump Pit Level Control
LIA-3	Storage Pool Level Indicator
LIA-40	Reactor Vessel Level Indicator
LRC-1	Reactor Vessel Level Recorder
NC-1	Source Range Channel NC-1
NC-2	Source Range Channel NC-2
NC-3	Intermediate Channel NC-3
NC-4	Intermediate Channel NC-4
NC-5	Nuclear Power Channel NC-5
NC-6	Nuclear Power Channel NC-6
NC-7	Nuclear Power Channel NC-7
NC-8	Nuclear Power Channel NC-8
NC-9	Nuclear Safety System
PC-27	Process room Pressure Controller
PC-3	Normal Exhaust System Pressure Controller
RM 1-1	Area Monitor - First Floor North Wall
RM 1-2	Area Monitor - First Floor East Wall
RM 1-3	Area Monitor - First Floor South Wall
RM 1-4	Area Monitor - First Floor West Wall
RM 1-5	Area Monitor - Second Floor Ceiling
RM 1-6	Area Monitor - Second Floor West Wall
RM 1-7	Area Monitor - Fuel Storage Pool Area
RM 1-8	Area Monitor - Process Room East Wall
RM 1-9	Area Monitor - Process Room West Wall
RM 1-10	Area Monitor - Control Room

RM 3-1	Secondary Cooling N-16 Radiation Monitor
RM 3-2	Helium Sweep Gas Radiation Monitor
RM 3-3	Secondary Cooling N-16 Radiation Monitor
RM 3-4	Irradiated Air High Activity Radiation Monitor
RM 3-5	Building Exhaust High Activity Radiation Monitor
RM 4-1	Stack Gas High Activity Radiation Monitor
RM 4-2	Emergency Ventilation Stack Radiation Monitor
RM 4-4	MAA Gamma Radiation Monitor
SPC-150	Emergency Fan Controller
SPS-150	Emergency Standby Fan Controller
SPS-151	Vacuum Breaker Controller
TR-1	Reactor Delta-T Recorder
TRA-2	Reactor Outlet Temperature Recorder
TIA-12	Cooling Tower Basin Temperature
TIA-40A	Reactor Delta-T Indicator & Alarm - Channel A
TIA-40B	Reactor Delta-T Indicator & Alarm - Channel B

34. The following instrument service requests (ISR) were completed:

ISR #	ACTION
1504	Calibrated Storage Pool Cooling Flow Channel
1505	Replaced Emergency Ventilation Flow Transmitter
1506	Repaired CO ₂ Gas Holder Level Indication
1507A	Calibrated RM4-2 After Erratic Readings
1507B	Replaced Conductivity Recorder
1508	Calibrated RM4-2 After Erratic Readings
1509	Repaired and Calibrated FT-8B
1510	Repaired Auto/Manual Transfer Switch Indicating Light
1511	Modified RM4-2 Outdoor Cover to Prevent Water Intrusion
1512	Repaired Auto/Manual Transfer Switch Indicating Light
1513	Replaced Relay Boards in Tritium Recorder
1514	Calibrated CO ₂ Gas Holder Level Channel
1515	Repaired Contacts on Stack Monitor Electronics
1516	Calibrated Emergency Tank Level Transmitter
1517	Repaired Radiation Recorder, RR-1

- 1518 Adjusted Microswitch on Helium Blowoff Valve
- 1519 Verified Readings of Fission Product Monitor, RM3-2
- 1520 Repaired Loose Connection on RM4-1
- 1521 Performed System Check on Secondary Flow Channel
- 1522 Troubleshoot Storage Pool Area Radiation Monitor
- 1523 Repaired NC-5 Range Selector Switch
- 1524 Replaced Ultrasonic Coupling Compound on all Ultrasonic Flow Channels
- 1527 Replaced 07-55 Card in NC-9
- 1528 Repaired and Calibrated Radiation Recorder
- 1531 Replaced Flashed Card for AN-1
- 1532 Replaced Electronics for FT-8A and FT-8B
- 1533 Replaced Relay in CO₂ Gas Holder Make-up Circuit
- 1534 Calibrated Cooling Tower Temperature Loop
- 1535 Replaced Batteries on Criticality Monitor .

7.8(3)(d) Tabulation of Major Changes in the Facility and Procedures, and the Test and Experiments, Carried Out Without Prior Approval by the NRC pursuant to 10 CFR 50.59.

There were no significant changes to procedures or test and experiments during this period.

The following facility changes were completed this year, all of which are considered minor;

ECN 448 Installation of a new neutron beam shutter assembly and associated shielding for BT-5 at the face of the reactor was completed because of changes to the experimental apparatus at BT-5. There are no unreviewed safety issues.

ECN 452 Installation of a motor operator for the C100 truck door reduces the number of personnel needed to operate this large door, permitting the staff to concentrate on more important tasks. There are no changes to design functions and no unreviewed safety issues.

ECN 453 Replacement of the Neutron Guide Isolation Valves' solenoid valves occurred

because the replacement valves are simpler and more rugged, increasing equipment reliability. There are no changes to design functions and no unreviewed safety issues.

ECN 454 Replacement of the emergency exhaust duct flow indicator was done to upgrade the existing equipment, thereby improving reliability and lessening the difficulty in obtaining spare parts in the future. There are no changes to design functions and no unreviewed safety issues.

ECN 455 Replacement of facility evacuation sirens and associated equipment was done to reduce the current draw of the sirens by 50%. This change allows for more sirens to be installed in the future as needed. There are no changes to design functions and no unreviewed safety issues.

7.8(3)(e) Summary of Radioactive Material Released and Results of Environmental Surveys Performed.

The gaseous waste released was 539 curies of tritium, 1189 curies of Argon-41, 0.045 curies of Cl-38, and 0.00158 curies of Br-82. There were 1.06 curies of tritium and 94 microcuries of other beta-gamma emitters released into the sanitary sewer. Environmental samples of the streams, vegetation, and/or soil, and air showed no significant changes.

7.8(3)(f) Summary of Significant Exposures Received by Facility Personnel and Visitors.

1. None to visitors.
2. Dosimetry results for this reporting period indicated that no facility personnel received significant exposures.