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March 25, 1999

U.S. Nuclear Regulatory Commission Document Control Desk Washington, DC 20555

Subject: Docket #50-184

Gentlemen:

Transmitted herewith is Operations Report No.51 for the NBSR. The report covers the period January 1, 1998 to December 31, 1998.

Sincerely,

Treetcamp for

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

Enclosure

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY REACTOR (NBSR)

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Docket #50--184

Facility License No. TR-5

Operations Report

-- #51 --

January 1, 1998 - December 31, 1998

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, 1998 to December 31, 1998.

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

March 25, 1999

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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, 1998 through December 31, 1998 the reactor was critical for 5578 hours with energy output of 111,076 MWH. Towards the latter part of the year, a very small leak, on the order of 0.01 liter per hour was discovered in the vicinity of the thermal column. It was decided to shut down the reactor and search for the leak. After an exhaustive search and testing, the source of the leak was not found and the leak had not returned. The situation will continue to be monitored.

7.3(3)(b) Unscheduled Shutdowns

- 1. There were (4) scrams due to commercial power interruptions. A return to 20 MW occurred twice within the hour, once after a one day delay because of Xenon buildup, and once after a two day delay because of Xenon buildup.
- 2. There were (3) shutdowns due to commercial power interruptions. A return to 20 MW occurred in each instance within the hour.
- There was (1) scram during startup when routinely switching the scram setpoint from 13% to 125%, cause unknown. After verifying normal conditions, restart to 20 MW occurred within the hour.
- 4. There was (1) shutdown due to loss of the confinement building main exhaust fan. A return to 20 MW occurred after verifying proper ventilation performance and with a one day delay because of Xenon buildup.
- 5. There was (1) shutdown due to loss of the cold source compressor. The compressor was restored and restart occurred after the scheduled refueling because of Xenon buildup.

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. Regenerated IX column of demin water station 41 times
- 2. Installed dilution tank at demin water station to allow neutralization of IX column regeneration effluent
- 3. Replaced proximity detectors on refueling system conveyor twice
- 4. Replaced 11 cells of station battery

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- 5. Replaced starting batteries on both emergency diesel generators
- 6. Replaced spent fuel storage pool IX resin (twice)
- 7. Disassembled, cleaned and reassembled spent fuel storage pool IX column flow distribution tree
- 8. Replaced spent fuel storage pool pre filters (three times) and after filters twice
- 9. Replaced pre and after filters of thermal shield system
- 10. Replaced after filters of experimental demin system
- 11. Replaced pre and after filters of primary purification system
- 12. Replaced RT-1 flow switch and adjusted low flow set point
- 13. Disassembled #2 Shim arm drive, replaced both thrust bearings, cleaned and lubricated lead screw and ball nut assembly. Reassembled and tested satisfactorily
- 14. Replaced electro magnet with new unit on clutch of #2 Shim arm drive, adjusted clutch current to 120 ma, cleaned and relubricated lead screw and ball nut assembly
- 15. Replaced spark plug of #3 shim arm leak collection container
- 16. Replaced fill, channels and angues in all three cooling tower cells
- 17. Cleaned cooling tower basin of sediment
- 18. Repaired cracks in cooling tower basin by pumping grout into needed areas
- 19 Reworked cooling tower suction pit curb with new grout material
- 20. Replaced gaskets of all three cooling tower gearbox inspection covers
- 21. Replaced least ite on all three cooling tower motor vibration cutout switches
- 22. Replaced blown fuse for #3 cooling tower fan start circuit
- 23. Process Instrument test panel updated and moved to more convenient location (ECN - 441)
- 24. Installed supplemental air valve at BT-1, BT-4, BT-7, & BT-9 control boxes to allow pressurized nitrogen to be used to raise shutter
- 25. Installed and satisfactorily tested absolute filters for hood #2 & #3 in C-001
- Satisfactorily tested absolute filters for hood #1 in C-001 (filters were installed Dec 24, 1997)
- 27. Installed motor operator to allow opening and closing of C-100 truck door other than manually
- 28. Replaced packing of secondary system #123 & #456 strainers
- 29. Repiped emergency cooling tank level transmitter lines
- 30. Replaced # 6 secondary main pump motor bearings after remachining both bearing

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housing surfaces

- 31. Repaired actuator for SCV-560 (thermal shield heat exchanger secondary bypass valve)
- 32. Replaced resin in #2 thermal shield IX column
- 33. Replaced motor of EF-2 (dilution exhaust fan)
- 34. Investigated D2O leak at thermal column door area
- 35. Replaced positioner for DWV-22 (primary purification system bypass)
- 36 Repaired weld on pick up tool of refueling chute drop cut plug
- 37. Replaced air hoses for ACV-7
- 38. Replaced #2 cooling tower cell bypass valve with new Limitorque valve
- 39 Replaced gaskets ch both sides of DWV-318 (thermal column tank leak detector trap)
- 40. Replaced valve diaphragm for DWV-316 (thermal column tank drain)
- 41. Replaced valve diaphragm for old level connection of thermal column tank- (no valve number)
- 42. Replaced 3-way air valve for B-2 auto closure door
- 43. Replaced all conductivity cells in process room
- 44. Replaced air dryer on B-2 with higher capacity unit
- 45. Replaced RT-1 rabbit timer module
- 46. Rebuilt #1 & #2 secondary aux booster pumps with new mechanical shaft seals
- 47. Continued treating leaking the mal shield tubes as necessary
- 48. Commenced replacing thermal shield lower ring header valves
- 49. Performed regularly scheduled Tech specs and plant PM's
- 50. The following instrument calibration surveillance tests were performed:

Channel Title

- BTUR-1 Reactor Thermal Power Recorder
- BTUR-1 Reactor Thermal Power Recorder
- CRA1-2A Primary D2O IX Inlet Conductivity Recorder
- CRA1-2B Primary D2O IX Outlet Conductivity Recorder
- CIA-4 Storage Pool Water Conductivity Channel
- CIA-5 Storage Pool IX Outlet Conductivity Channel
- CIA-6 Thermal Shield Water Conductivity Channel
- CIA-7 Thermal Shield IX Outlet Conductivity Channel
- FRC-3 Outer Plenum Flow Recorder

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FRC-4	Inner Plenum Flow Recorder
FIA-8A	Cold Source D2O Flow Channel A
FIA-8B	Cold Source D2O Flow Channel B
FIA-15	Thermal Shield Coolant Flow Indicator
FIA-40	Reactor Outlet Flow Indicator Alarm
LRC-1	Reactor Vessel Level Recorder
LIA-4	Thermal Column Tank Level Indicator Alarm
LCA-19	Storage Pool Pump Pit Level Control
LIA-40	Reactor Vessel Level Indicator
NC-3	Intermediate Channel NC-3
NC-4	Intermediate Channel NC-4
NC-5	Nuclear Power Channel NC-7
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-3	Normal Exhaust System Pressure Controller
PIA-3	Recombiner Outlet Pressure Indicator
PC-27	Process room Pressure Controller
PIC-102	Thermal Column Pressure Controller
SPC-150	Emergency Fan Controller
SPS-150	Emergency Standby Fan Controller
SPS-151	Vacuum Breaker 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

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- TIA-40B Reactor Outlet-Inlet Temperature Differential Indicator & Alarm Channel B 51. The following instrument service requests (ISR) were completed:
- ISR # ACTION
- 1442 Replaced Recorders for Liquid Waste Tanks at Emergency Station.
- 1454 Adjusted Reg Rod Controller.
- 1455 Repaired RM4-1 Channel.
- 1456 Repaired Storage Pool Level Control.
- 1457 Repaired NGIV-7 Closed Pushbutton.
- 1458 Reset FR-20 and FR-21 Flow Cl.annels.
- 1459 Repaired Storage Pool Level Control.
- 1460 Repaired NGIV-4 Closed Pushbutton.
- 1462 Replaced Detector In RM1-15 For C-001.
- 1463 Repaired NGIV-7 Closed Pushbutton.
- 1464 Replaced RT-1 Rabbit Tip Flow Switch.
- 1465 Adjusted NC-5 Console Indication.
- 1466 Repaired NC-3 Period Drawer.
- 1467 Recalibrated RM1-2, C-100 North.
- 1468 Repaired Storage Pool Level Control.
- 1469 Replaced Process Instrument Test Panel to Address Switches Not Locking In Position.
- 1470 Repaired FIA-8A Flow Transmitter.
- 1471 Recalibrated Reactor Inlet Temperature Controller.
- 1472 Repaired Storage Pool IX Conductivity Channel.
- 1473 Returned Cold Source D2O Outlet Temperature To Normal.
- 1474 Repaired Purification IX Conductivity Recorder.
- 1475 Recalibrated LIA-2 Channel.
- 1476 Verified Proper Operation Of Rundown Circuit.
- 1477 Calibrated Erratic RM4-2 Channel.
- 1478 Replaced LIA-2 Level Detector.
- 1479 Repaired NC-5 Servo Deviation Meter.
- 1480 Repaired Purification IX Conductivity Recorder.
- 1481 Investigated Problem With FCA-7 Flow Controller.
- 1482 Repaired FRC-4 Flow Recorder.

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- 1483 Repaired SCV-560 Controller.
- 1485 Replaced K-104X Relay For Reactor ON Lights.
- 1486 Recalibrated RM1-7, Storage Pool.
- 1487 Repaired Pulser Pacer In Nuclear Instrumentation.
- 1488 Calibrated Erratic RM4-2 Channel.
- 1489 Repaired Tritium Monitoring System.
- 1490 Recalibrated FRC-4 Flow Channel.
- 1491 Repaired FIA-8A Flow Transmitter.
- 1492 Repaired Wiring In HE-1A & -1B Flow Channels.
- 1493 Replaced Failed TR-2 Reactor Outlet Temperature Recorder.
- 1494 Investigated Problem With NC-3 & -4 Console Meter Indication.
- 1495 Recalibrated Tritium Monitoring System.
- 1496 Repaired Shim Arm No. 4 Indication.
- 1497 Repaired D2O Flow to Rabbit Tip.
- 1499 Repaired Storage Pool Contuctivity Channel.
- 1500 Repaired 42 VDC Power Supply.
- 1502 Repaired Purification IX Inlet Conductivity Channel.
- 1503 Repaired Purification IX Conductivity Recorder.
- 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 356B Two N-16 secondary cooling radiation detectors and associated equipment were moved several feet, and radiation shielding installed to compensate for increased background radiation levels due to installation/operation of neutron guide NG-1. There is no change in detector functionality. There are no unreviewed safety guestions.
- ECN 440 Modify the annunciator system alarm reset pushbutton to also reset any scram

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function together with the scram reset pushbutton, when both buttons are depressed simultaneously. This improves the reliability of the scram reset without introducing any unreviewed safety questions.

- ECN 441 Move the Instrument Test Panel to the front of the Control Room console, add the capacity to the panel to test new rundown functions, and modify the logic of the rod drop test circuit. This change improves the panel and adds flexibility during testing. There are no unreviewed safety questions.
- ECN 443 Installation of new voltage regulators for process loop instrumentation. This change updates and ceritralizes equipment, and improves cabinet space utilization. There are no unreviewed safety questions.
- ECN 444 Replacement of temperature and conductivity transmitters for light and heavy water systems with up-to-date transmitters as part of the on-going instrumentation upgrades. All functions remain the same. There are no unreviewed safety questions.
- ECN 447 Replacement of outdated recombiner outlet pressure transmitter with up-to-date transmitter as part of the on-going instrumentation upgrades. There are no unreviewed safety questions.
- ECN 450 Add remote indication in the Control Room of Thermal Shield System pH to improve system performance. There are no unreviewed safety questions.

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

The gaseous waste released was 332 curies of tritium, \$12 curies of Argon-41, 0.042 curies of CI-38, and 0.033 curies of Br-82. There were 1.19 curies of tritium and 122 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.

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

1. None to visitors.

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2. Dosimetry results for this reporting period indicated that no facility personnel received significant exposures.

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