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

Gentlemen:

Transmitted herewith is Operations Report No. 42 for the NBSR. The report covers the period January 1, 1989 to December 31, 1989.

Very truly yours,

J. Michael Rowe
Chief, Reactor Radiation Division

Attachment

cc: Director, Division of Reactor Licensing
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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY REACTOR (NBSR)

Docket #50-184

Facility License No. TR-5

Operations Report

--#42--

January 1, 1989 - December 31, 1989

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, 1989 to December 31, 1989.

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

March 30, 1990

J. Michael Rowe
Chief, Reactor Radiation Division

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7.8(3)(a) Summary of Plant Operations

During the calendar year 1989, the reactor was critical for 2163 hours and the energy generated was 43148 MWH.

The reactor was shutdown in June 1989 for installation of the first three of seven guide tubes into the new cold neutron facility, the first of its kind in the U.S. Completion of this phase of the project and reactor startup is expected to be early 1990. The extended shutdown period was used to perform maintenance and to incorporate improvements. Significant highlights are listed below:

1. Cold Neutron Facility

   Construction of the new guide hall adjacent to the confinement building was completed. Seven penetrations for guide tubes were also completed. Three guide tubes will be installed by early 1990, the remaining four to be installed at a later date with the penetrations sealed until then. It is expected that the new cold neutron facility will be in use in about one year.

2. Shim-Arm Maintenance

   A test stand was built to test drives of the shim arms following maintenance or for checks. The stand provides for rapid and superior testing over that in-place which is cumbersome and time consuming. The stand was used to check the performance of No. 2 shim which has not been consistently returning to the same position in the shock absorber. Testing will continue prior to returning the shim to service. The shim will be observed for a period of time during operation.

3. Cooling Tower

   A major refurbishing of the cooling tower was completed including replacement of one gear box and alignment, and replacement of most carbon steel bolts with stainless steel bolts.

4. Confinement Building.

   The experimental and upper floors of the confinement building were repainted with sealant type paint. The building roof was replaced. Most of the asbestos used as insulation was removed and replaced with non-asbestos insulation.

5. Thermal Shield Cooling System

   Another application of sealant to leaky tubes in the thermal shield system was made. The method which was developed by the National Nuclear Corporation of England requires repeated applications. The program of resealing will continue.

The thermal shield heat exchanger was replaced. A system for controlling temperature variations when the reactor shuts down was incorporated and hopefully will reduce the number of leaks due to temperature changes.

6. Main Heat Excbanger
   The extended shutdown was used to attempt to locate a very small leak (on the order of 0.0001 gpm) in one of the main heat exchangers. Extensive search and testing was made and five suspect tubes were plugged. The heat exchanger will be tested at startup in 1990. However, because of the very small size of the leak, it has been virtually impossible to find.
7. Other Items.
   Backups to the N-16 monitor and the stack monitor were designed and installed.

7.8(3)(b) Unscheduled Shutdowns

I. There was one (1) scram due to a commercial power dip. The reactor returned to power immediately.

2. The reactor scramed one time during startup while switching the scram logic selector from 13% to 125%. The startup was begun again and the reactor was brought to power.

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

1. Replaced wear rings and seals of #2 storage pool pump
2. Removed asbestos insulation from ventilation ducting and piping within the confinement building by outside contractor
3. Replaced motor bearings of #3 sec main pump
4. Regenerated IX of demineralized water treatment system
5. Dis-assembled and cleaned #2 shim arm drive mechanism and lubricated shock assembly
6. Removed, cleaned, adjusted and re-installed RWV-13

7. Re-wired EF-23 so that it will now start in conjunction with EF-3 after a loss of power
8. Wired tritium blower so that it will automatically start after a loss of power
9. Replaced liquid waste detector with spare
10. Replaced rotary contact bars of #1 & #2 cooling tower bypass valve limitorques
11. Completed replacing all thermal shield ring header valves with Conbraco brass valves
12. Modified secondary cooling auxiliary system. Two new aux pumps and new secondary shutdown pump installed
13. Refurbished fuel transfer arm index pins
14. Replaced carbon steel bolts of cooling tower structure with stainless steel
15. Replaced #2 cooling tower fan gearbox with new spare after minor bevel gear damage was detected in the old unit
16. Replaced shaft seals on ACV-12 air cylinder
17. Plugged leaking tubes of HE-1A main heat exchanger
18. Repaired stem leak on SCV-46 discharge valve of #4 secondary main pump
19. Plugged leaking tube of experimental demin heat exchanger
20. Installed 20" secondary valve in supply line to HE-1A & HE-1B main heat exchangers where a spoolpiece previously existed
21. Contractors drilled 7 holes in north wall of confinement building in preperation for neutron guide tube installation
22. Commenced repair of #2 main D_2O pump
23. Replaced belts of CO_2 bulk tank compressor
24. Technical representatives checked vibration on all three cooling tower fans to check for balance
25. BT-2 shutter latch mechanism removed, machined, re-installed and satisfactorily tested. Upper and lower limit switches also replaced and adjusted
26. Replaced upper bearing of the J-5 fuel transfer arm
27. Completed installation of new N-16, $_pH$, & test coupon system in secondary cooling system
28. Installed sump pump in new heat-exchanger vault
29. Installed new inlet valve (SCV-230) to HE-2 --- it will now function as a temperature controller
30. Installed new inlet valve (SCV-250) to HE-6 --- it will now function as a temperature

controller

31. Installed new valves in secondary cooling system to replace old ones --- (SCV-203, SCV-240, and SCV-256)
32. Replaced pump bearings and shaft seals on #2 sec main pump
33. Installed air volume tank on supply line to cooling tower basin make-up valve
34. Completed installation of overhead crane in fuel storage pool area
35. Performed regularily scheduled technical specifications and plant preventative maintenance items
36. The following instrument calibration surveillance tests were performed:

BTUR Reactor Thermal Power Channel
LIA-3 D_2O Storage Tank Level
NC-7 Nuclear Power Range Channel
RM-3-4 Irradiated Air Monitor
FIA-15 Thermal Shield Coolant Flow
RM-1 thru 10 Area Radiation Monitors
NC-4 Nuclear Intermediate Range Channel
RM-4-1 Stack Air Monitor
FRC-3 Reactor Outer Plenum Flow
FRC-4 Reactor Inner Plenum Flow
RM-4-4 Criticality Monitor
LRC-1 Reactor Level Recorder
PC-27 Process Room Fan Controller
PS-150 Emergency Standby Controller
RM-3-5 Normal Air Monitor
PC-3 Normal Exhaust Monitor
PC-150 Emergency Fan Controller
PS-151 Vacuum Breaker Controller
NC-3 Nuclear Intermediate Range Channel
NC-6 Nuclear Power Range Channel
TIA-40A Reactor Delta Temperature Indicator
TIA-40B Reactor Delta Temperature Indicator
NC-9 Nuclear Interlock Trip Test
NC-1 Nuclear Source Range Channel
NC-2 Nuclear Source Range Channel

LIA-40 Reactor Level Indicator

FIA-40 Reactor Outlet Flow Indicator

TRA-2 Reactor Outlet Temperature Recorder

RM-3-2 Fission Products Monitor

37. Repaired power supply on annunciator AN1 panel
38. Repaired annunciator card on D_2O leak 71-75
39. Repaired annunciator card on TRC-3 Rx Inlet Temperature
40. Cleaned switch on Irradiated Air Monitor
41. Adjusted position span on DWV-25 valve controller
42. Aligned chain on helium gas holder level tank & checked calibration
43. Repaired input unit 07-31
44. Replaced GM tube in Liquid Waste Monitor & complete calibration
45. Replaced 24VDC regulator on FR-1 Reactor Outlet Flow Channel
46. Calibrated PS-151 vacuum switch for ACV-12
47. Replaced DSR-FSR relay in MCCA3 relay panel
48. Repaired recorder on CO_2 gas holder
49. Repaired Log N amplifier on NC-3
50. Repaired Tritium Monitor amplifier to recorder
51. Repaired Area Monitor power supply
52. Repaired input cable connector to NC-3
53. Recalibrate TR-1 Temperature recorder
54. Repaired Area Monitor power supply
55. Calibrate Temp. channels TIA-6 & TI-7
56. Repaired Area Monitor #3 on West wallof C-100

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.

Relevant Engineering Changes are summarized below:

ECN-297A The Secondary Cooling System was modified to enhance the performance of the secondary auxilary and secondary shutdown cooling systems. This was accomplished by replacing the two (2) 15-HP secondary auxiliary cooling pumps and the 3-HP pump with 25-HP pumps. The change increased the capacity of the systems and improved their versatility. It is concluded that there is no un reviewed safety question.

ECN-340 Installed a supplementary stack monitor (RM4-2), with greater dynamic range, for indication in the Control Room and the Emergency Station. This monitor is in addition to the existing stack monitor (RM4-1) and will benefit Operations by provid-ing additional indication in the Control Room, the Emergency Station as well as the Monitor Room. There is no connection to the Reactor Safety System circuitry and the Scram Safety System has not been affected by the change in any way. It is therefore concluded that there is no unreviewed safety question.

ECN-352 Installed a controller on the tritium blower to enable it to automatically come back on when electrical power is restored after a loss of electrical power. This enhances performance and has no effect of any kind on the safety system. There is no unreviewed safety question.

ECN-354 The controller for EF-23 (which takes a suction from the hoods in the Rabbit Labs) was modified to allow automatic start/stop operation in conjunction with Normal Air exhaust (EF-23) operation. There is no degradation in the safety of the system caused by this change because the Major Scram shutdowns remain unchanged as does the fan lockout device. It is therefore concluded that there is no unreviewed safety question.

ECN-359 Replaced the tube type controller for the Regulating Rod with a microprocessor based controller. This is purely the replacement of one component with a superior and more reliable unit. All functions including trips and alarms remain exactly the same. This controller is not in a Reactor Safety System channel, but controls the reactor power level at ± 0.5% of a desired setpoint. The controller has been tested over several months and found to be accurate and reliable. The nuclear safety functions remain unchanged. Therefore, it is concluded that 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 461 curies of tritium and 328 curies of Argon-41. There were 2.9 curies of tritium and 3.9 millicuries 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.