

NATIONAL BUREAU OF STANDARDS REACTOR

Docket #50-184

Facility License No. TR-5

Operations Report

... #40 ...

January 1, 1987 - December 31, 1987

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, 1987 to December 31, 1987.

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

March 28, 1988

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TABLE OF CONTENTS

- 7.8(3)(a) Summary of Plant Operations
- 7.8(3)(b) Unscheduled Shutdowns
- 7.8(3)(c) Tabulation of Major Items of Plant Maintenance
- 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
- 7.8(3)(e) Summary of Radioactive Material Released and Results of Environmental Surveys Performed
- 7.8(3)(f) Summary of Significant Exposures Received by Facility Personnel and Visitors

7.8(3)(a) Summary of Plant Operations

During the calendar year 1987, the reactor was critical for 3358.4 hours and the energy generated was 63,968 MWH. The following are highlights of significant operational activities during this period.

1. Spent Fuel Shipments

Nine spent fuel shipments were made to the Department of Engineering for reprocessing.

2. Shim Arm Replacement

The four shim arm cadmium blades were replaced with new ones. The old ones lasted more than seven years. During the transfer of old blades, one of the hold-down bolts were dropped into the vessel and was retrieved. The new shim arms utilize captive bolts. Following assembly of the shim arm drives, shim No. 1 drive malfunctioned. This was covered by a special report to the Region.

3. Heat Exchanger Leaks

Sixteen tubes in one of the main heat exchangers developed leaks and were plugged. This was covered by a special report to the Region.

4. Thermal Shield Cooling System

Additional coils in the thermal shield cooling system developed leaks and were isolated. A new method for sealing these leaks is being investigated.

7.8(3)(b) Unscheduled Shutdowns

There were two (2) Scrams due to commercial power dips. In both cases the reactor was kept shutdown.

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

1. Replaced "cups" of ACV 7 air operator
2. Replaced thermal shield storage tank fill valve diaphragm
3. Changed experimental demin system filters
4. Installed top mechanical stop of regulating rod
5. Isolated several loops of thermal shield ring header that were leaking or suspected to be leaking
6. Replaced all "o" rings of RT-3 rabbit receiver
7. Regenerated demineralizer (5 times)
8. Changed storage pool IX pre and after filters (4 times)
9. Installed 3" make-up line to cooling tower basin from firemain
10. Replaced all pneumatic clamping cylinders of fuel cutting saw
11. Replaced thermal shield make-up isolation valve
12. Installed #2 retention tank pump for hot waste system
13. Replaced valve operator diaphragm for TSV-2
14. Replaced shaft sleeves, outer bearing, and mechanical seal of #2 secondary pump
15. Repiped filter of storage pool vacuum
16. Replaced seals and bearings of fuel transfer cannon
17. Plugged leaking tubes of experimental demin heat exchanger
18. Plant division conducted 5-year maintenance on all switchboards and transformer
19. Replaced CO₂ purge fan drive belt

20. Replaced suction and discharge valve diaphragms of both experimental D₂O pumps
21. Plugged leaking tubes of main heat-exchanger HE-1A
22. Replaced all conductivity cells in process room with new ones
23. Replaced storage pool IX resin and cleaned distribution screens
24. Replaced all four shim arms with new ones
25. Installed new sealing rings on all four shim arm shafts
26. Replaced air operator diaphragm of TSV-1
27. Replaced left battery bank on "B" emergency diesel generator
28. Replaced fuel lines on both emergency diesel generators
29. Replaced both pre and absolute filters in EF-4 ventilation unit
30. Replaced anthra-filt and acticar filters of station demineralizer
31. Replaced IX resin of station demineralizer
32. Changed valve diaphragms of SPV 4, 8, and 60
33. Changed resin in both thermal shield IX columns
34. Replaced cell #50 and #54 of station battery with new cells
35. Installed storage pool pump priming system
36. Replaced valve diaphragms of TSV-3 & 4
37. Replaced wear rings and seals of #1 storage pool pump
38. Replaced high voltage power supply on Reactor power channel NC-6.
39. Replaced alarm unit on Experimental Demin. Water Pressure PIC-1.
40. Calibrated Reactor Outlet Flow Recorder FR-1.
41. Replaced neutron detector on NC-6.
42. Replaced console panel meter on NC-6.
43. Replaced detector on the Liquid Waste Monitor RM4-3.
44. Calibrated Storage Pool IX Flow FIA-14.
45. Replaced detector and source checked Area Monitor RM1-4.

46. Replaced Input Unit Card 07-39 on NC-6 High Flux Scram.
47. Calibrated Reactor Vessel Level Channel LIA-40.
48. Replaced detector, checked calibration and source checked RM3-1.
49. Replaced digital eter for #1 Shim position Readout.
50. Calibrated Reactor Differential Temperature channels TIA-40A & B.
51. Replaced transmitter and manifold valve on Sec. Heat Exchanger HE-1B.
52. Replaced Automatic Regulating Rod withdraw relay K50A.
53. Calibrated Recombiner internal & outlet Temp. channels TRA-10 & TIA-11.
54. Replaced drive cable on the Radiation Recorder RR-1.
55. Replaced print coil & print head on the Radiation Recorder RR-1.
56. Replaced +10 VDC Nuclear power supply for maintenance.
57. Adjusted * Power Deviation Input Unit Card 07-30 to 10*.
58. Replaced power tubes in main Radiation Area Monitor chassis.
59. Replaced three zener diodes on the annunciator panel AN4.
- 60 The following Technical Specification surveillance test were performed:

NC-8	Nuclear Power Range Channel
LIA-3	Storage Tank Level
FIA-15	Thermal Shield Cooling Water Flow Indicator
BTUR-1	Reactor Thermal Power
TIA-40A	Reactor Delta Temperature Indicator
RM1-1-10	Area Radiation Monitors
NC-7	Nuclear Power Range Channel
RM-3-4	Irradiated Air Monitor
NC-4	Nuclear Intermediate Range Channel

RM4-1	Stack Air Monitor
FRC-3	Reactor Outlet Plenum Flow
FRC-4	Reactor Inlet Plenum Flow
FCA-7	Thermal Column Flow Indicator Control
RM4-4 N	North Criticality Monitor
RM4-4 S	South Criticality Monitor
RM-3-5	Normal Air Monitor
NC-3	Nuclear Intermediate Range Channel
LRC-1	Reactor Level Recorder
NC-9	Nuclear Interlock Trip Test
PC-3	Normal Exhaust Monitor
PC-27	Process Room Fan Controller
SPC-150	Emergency Fan Controller
SPS-150	Emergency Standby Controller
SPS-151	Vacuum Breaker Controller
NC-6	Nuclear Power Range Channel
LIA-40	Reactor Level Indicator
FIA-40	Reactor Outlet Flow Indicator
RM-3-1	N-16 Monitor
NC-1	Nuclear Source Range Channel
NC-2	Nuclear Source Range Channel
RM-3-2	Fission Products Monitor
TIA-40B	Reactor Delta Temperature Indicator
TRA-2	Reactor Outlet Temperature 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

D₂O Cold Neutron Source Experiment

A D₂O cold neutron source was installed in the beam tube originally designed for it. The purpose of the source is to enhance the intensity of very low energy neutrons available for materials research using neutron methods. The source is self contained within its own shield. Extensive analysis have shown that any creditable failure including potential release of stored energy will not affect the reactor. Accordingly there are no unreviewed safety questions.

Relevant Engineering Changes are summarized below:

ECN-315 Install a Cryogenic Compressor alarm. This equipment has no effect on the operation of the reactor and therefore its failure would not involve an unreviewed safety question.

ECN-324 Modify makeup water system to the Cooling Tower. This system is a replacement for the previous system and operates on the same Cooling Tower level controller. Therefore, no unreviewed safety question exist.

ECN-328 Install Cryogenic Bismuth Tip instrument panel for cryogenic flow and temperature.

This change incorporates an instrumentation panel for the Bismuth tip. The instrumentation will monitor the cooling flows of the bismuth tip and associated equipment and include trips, alarms and leak detectors. There will be a reactor scram or low flow connected to "Experiment Scram" channel. With the exception of activating the "experiment scram", all other safety functions remain the same and are unaffected by this change. Therefore, there are no unreviewed safety questions. Associated procedures have been prepared and implemented.

ECN-330 Modify Cryogenic Shutter lift mechanism so that shutters A& and C could all be operated at the same time.

This modification involves no unreviewed safety question since the shutters and latch mechanisms remain as originally designed.

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

The gaseous waste released was 1,154 curies of tritium (includes 796 curies via the cooling tower) and 727 curies of Argon-41, while 117.7 curies of tritium and 3 millicuries of other beta-gamma emitters were 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.



UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

March 28, 1987

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

Subject: Docket #50-184

Gentlemen:

Transmitted herewith is Operations Report No. 40 for the National Bureau of Standards Reactor. The report covers the period January 1, 1987 to December 31, 1987.

Very truly yours,

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Attachment

cc: Director, Division of Reactor Licensing
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11