U. S. ATOMIC ENERGY COMMISSION
REGION III
DIVISION OF COMPLIANCE

Report of Inspection

CO Report No. 263/70-15

Licensee:	Northern States Power Company Monticello Nuclear Generating Plant Construction Permit No. CPPR-31 Category B	
Dates of Inspection:	August 31 - September 9, 1970	
Dates of Previous Inspection:	August 17-22, 1970	
Inspected By: H.D. Thornburg for C. D. Feierabend	Responsible Reactor Inspector	9-25-70
H.D. Thornburg for E. L. Jordan	Reactor Inspector	9-25-70
Reviewed By: H.D. Thornburg H. D. Thornburg	Sr. Reactor Inspector	9-28-70
Proprietary Information:	None	

SUMMARY

This inspection was performed to verify completion of facility construction and testing in accordance with the Atomic Safety and Licensing Board order for issuance of the low power license. Facility License DPR-22 was issued on September 8, 1970 allowing the licensee to load fuel and conduct low power testing up to 5 Mwt. All prerequisites were completed and core loading was begun at approximately 9:20 p.m. The inspector observed initial fuel loading operations.

One circuit of the standby gas treatment system was found to be inoperable on September 8, 1970, due to a failure in the control circuitry caused by an electrical short circuit in an air heater. This was reported to DRL as an abnormal occurrance. (Section II.M.)

DETAILS

I. Scope of Inspection

An announced inspection of the Monticello Nuclear Generating Station was conducted on August 31 - September 9, 1970. The inspection was to determine completion of the facility in conjunction with the pending low power license. Mr. Jordan participated in the inspection on

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September 1-4, and participated in preparation of this inspection report. Mr. H. D. Thornburg, Senior Reactor Inspector, accompanied the inspectors, participating in a visual inspection of the facility on September 2.

The following personnel were contacted during the course of these inspections:

Northern States Power Company (NSP)

L. Wachter - Vice President, Power Production
J. Sullivan - Principal Quality Assurance Representative
C. Larson - Plant Superintendent (Operations)
M. Clarity - Assistant Plant Superintendent (Operations)
E. Eliason - Radiation Protection Engineer
G. Jocobson - Plant Results Engineer
D. Antony - Test Engineer

General Electric Company (GE)

G. Goettge - Site Manager
Dr. R. Hobson - Lead Test and Design Engineer
J. Klucar - Test Engineer
J. Miller - Operations Manager
G. Mattey - Operations Superintendent
J. Staley - Test Engineer
J. Sheehan - Test Engineer

Bechtel Corporation (Bechtel)

W. Balodis - Chief Startup Engineer

II. Results of Inspection

A. Visual Inspection

Thornburg, Feierabend and Jordan performed a visual inspection of the reactor facility on September 2. Except for work in the turbine building area, no construction work was observed. Most of the areas had received final cleaning in preparation for plant operation. Access control had been established for the reactor building, controlled by NSP personnel. The refueling floor was observed to be ready for fuel loading operations. The fuel was stored in the fuel storage pool (dry) protected with polyethylene.

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Final cleaning of the primary containment vessel interior, cable spreading room and control room was observed on September 8, prior to verifying plant completion.

B. Liquid and Solid Radwaste Systems

1. Status of Completion

The inspector made field examinations of the radwaste equipment and found that construction of the radwaste facility was completed. All components of the facility had been turned over the NSP from construction.

2. Preoperational Testing

The inspector reviewed and discussed the preoperational testing with Messrs. Sheehan and Jocobson, and found it to be satisfactorily completed. The most limiting performance aspect of the radwaste facility observed during preoperational testing was the relatively short runs obtained with the waste collector floor drain filters. The applicant has taken corrective action consisting of adding flocculent aid to the waste sludge tank to increase particle size. The applicant also installed temporary cuno pre-filters preceeding the floor drain filters. The inspector verified that the P&ID drawings reflected the changes. The applicant stated that the cartridge filter would probably be removed after the processing of construction dirt is completed.

3. Calibration of Monitors

Satisfactory completion of preoperational testing was reviewed during a previous inspection.[1/] The applicant has subsequently verified the detector efficiencies, via a known concentration cesium-317 solution which was placed in each detection volume. Linearity and range of each detector was satisfactorily demonstrated and the desired discriminator setting was established from the pulse height versus energy curve which was generated for each detector.

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The inspector witnessed a demonstration of the canal monitor operation. This was performed by installation of a cobalt 60 planchet source at the detector. The count rate indication in the control room was found to agree with the preoperational test values for the same sources.

The liquid effluent monitor was found to have an efficiency of 2.5×10^{-6} Ci/ml/cps compared with the efficiency of 1×10^{-6} Ci/ml/cps which was furnished by the detector vendor. The applicant has adopted the more conservative measured value. The detector with its shielding in place was found to have a response of 8×10^{2} cps per mr/hr of added background. Mr. Eliason stated that the background in the area would be closely monitored for any effect on monitor performance. Additional shielding will be installed if required.

C. Instrumentation

1. Reactor Protection System (RPS) Instrument Response Time

RPS instrument response time measurements have been discussed in previous inspection reports.[2/] The inspector vierified that RPS instrument response time measurements have been satisfactorily completed for all neutron monitoring instrumentation.

2. RPS Relay Modification

Malfunctions of several electrical relays, and subsequent investigations, modifications and testing have been discussed in previous inspection reports.[3/] The inspector verified that NSP had made an audit of all relays to assure that all of the GE Type HFA relays in the facility were identified, modified and tested. The inspector observed a sample of

2/ CO Report No. 263/69-12 70-5 and 70-13

3/ CO Report No. 263/70-10, 263/70-13 and 263/70-14

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modification completion and reviewed records indicating that all of the modification and testing was complete.

3. Scram Reset Time Delay

A modification to include a time delay in the scram reset circuit, as discussed in a previous inspection report[4/] has been completed. The inspector observed a demonstration that the scram could not be reset for 10 seconds after initiation by a manual scram in the control room.

4. Strong Motion Seismograph

The inspector verified that the strong motion seismograph, a Model MTS-100 Teledyne Geotech instrument as described in the FSAR, was installed. The instrument is equipped to signal a seismic disturbance and start a four track tape recorder which records data from three sensors. The sensors have a range $\pm$ 1g. The trigger sensitivity is dependent on incoming disturbance amplitude and period. The trigger was stated in manufacturers literature to operate from a signal $\geq$ 0.015 g if the half sine wave duration is $\geq$ 0.175 sec. For an amplitude $\geq$ 0.06 g a half sine wave duration of $\geq$ 0.065 sec is required. The recorder automatically starts when triggered and will run for twenty seconds after the trigger signal is lost. The licensee was found to have a satisfactory abnormal procedure which would be initiated in the event of a seismic disturbance.

Preoperational testing of the instrument was completed on September 6, 1970, in accordance with manufacturer's instructions. One item of maintenance was identified.

5. Instrument Excess Flow Check Valves

The inspector reviewed the results of instrument sensing line excess flow check valve tests and discussed the results with Messrs. Jacobson and Kaut. A previous inspection report[5/] identified some apparent deficiencies. All of the check valves that had been identified as deficient during

4/ CO Report No. 263/70-1

5/ CO Report No. 263/70-8

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the original test have been removed, repaired and retested and reinstalled in the system. All of the valves have now been successfully tested. These valves will be tested periodically in accordance with technical specification requirements.

6. Containment Pressure Transmitter

An apparent mismatch between the containment pressure transmitter and receiver was identified in a previous inspection report.[6/] The inspector reviewed the instrument data sheet and verified that the recorder will receive a compatible signal from the transmitter. There appears to be no problem with the system.

7. Calibration of Radiation Monitors

The inspector reviewed the calibration records for the following radiation monitor systems and found them to be satisfactory.

System	Preoperational Test Number
Stack gas monitor	C4A
Off gas monitor	C4B
Area radiation monitor	C6
Radwaste monitor	C8A
Discharge canal monitor	C8A
Main steam line monitor	C8B
Reactor Building vent monitor	C8C

The licensee was found to have conservatively verified the sensitivity of each detector and set the alarm point of each effluent monitor at least one decade below the technical specification value. Mr. Eliason stated that the low setting would be maintained during the low power (open vessel) testing.

D. Control Rod Drives (CRD)

1. Retesting of the CRD mechanisms, following the recent disassembly, cleaning and reassembly, has been completed. This testing was accomplished in three phases and was essentially a repeat of the preoperational test.

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Results of Inspection (continued)

a. Phase 1, Operability and Over Travel Checks

This verified that the hydraulic control valve (HCV) was valved properly for initial drive insertion, verified that the blade guide was correctly installed, checked overtravel indication and visual observation that the control blade operated smoothly during initial drive insertion. This testing has been completed and documented for each CRD.

b. Phase 2, Insert and Withdraw Timing

This phase verified that each CRD mechanism was vented, that the position indication and the rod drift alarm were working correctly, and that the drive could be notch operated. Additionally, each CRD mechanism was cycled five times and the final insertion and withdrawal times were recorded.

The insertion and withdrawal times for each CRD mechanism were verified to satisfy the technical specification of 48 $\pm$ 9 seconds. This testing has been completed and documented for each CRD mechanism.

c. Phase 3, Scram Testing

Scram tests were performed for each CRD mechanism. Documentation included data concerning accumulator pressures, in addition to scram time measurements.

The inspector reviewed the test results and compared them with the original preoperational test. The test data correlated well. All times were within technical specification limits. Final adjustment of insert and withdrawal times will be performed after fuel loading.

The CRD mechanism retesting verified that the system is operating as designed following the cleaning, inspection and retesting.

2. Control Rod Drive (CRD) Housing Supports

Review of the licensee's surveillance inspection records showed that inspection of the CRD housing supports had been

Results of Inspection (continued)

completed subsequent to replacement of the CRD system. The inspector verified that the supports were satisfactorily installed and that verification is a check list item for startup.

E. Emergency Plan

1. Preparations

a. Assembly Point

The inspector found that a house trailer had been installed as the shelter for assembly point No. 1 (approximately 1,000 feet south of the reactor building). The circulating water discharge structure was found to be complete and ready to serve as an alternate assembly point (750 northeast of the reactor building).

b. Emergency Equipment

The inspectors inventoried emergency equipment stored in assembly point No. 1 with Messrs. Larson and Eliason and found it to be satisfactory. Communications equipment, telephone and radio were found to be operative and satisfied the requirements of the emergency plan.

c. Personnel Training

The inspector verified that radiation safety and emergency plan training was complete for all operating shifts.

2. Testing

Testing of the emergency plan was satisfactorily completed during the first week of September. This included verification of all communications channels and simulation of an activity release to the review, including timing of sampling and offsite notifications.

On September 3 an evacuation test was observed by the CO inspectors. The test was realistic, with plant and supporting personnel performing their assigned functions in accordance with the plan.

The plant was evacuated quickly and in an orderly fashion. A personnel check system accounted for all except two persons

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within a few minutes. A second check verified that one of the men was on vacation and that the other had signed out and left the site before the test began. Search of the plant by assigned shift personnel during the test showed that all personnel had exited the facility promptly.

All telephone and radio contacts were completed. One of the portable radios at the sheriff's office did not acknowledge receipt of the message by return transmission, however receipt of the message was confirmed by telephone. The transmitter was subsequently replaced and tested satisfactorily. Notification was received at CO:III by telephone and telegraph in accordance with the plan.

F. Startup Test Program

Startup test procedures (STP) were reviewed and discussed in a previous inspection report.[7] The inspectors reviewed final revisions of the test procedures and discussed them with Mr. Clarity and Dr. Hobson.

1. Intermediate Range Monitoring (IRM) System

The inspector reviewed the startup test procedure prescribing calibration of IRM System instrumentation. He verified that a caution note had been added to alert personnel concerning possible difficulties in performing overlap calibration because of flux gradients due to the existing control rod pattern.

2. Preparations for Fuel Loading

The inspector examined the final revision of the fuel loading procedure and found that, together with the administrative agreement described in a previous inspection report,[8] these procedures for initial fuel loading appear satisfactory.

G. Preoperational Testing

All of the preoperational tests required for fuel loading and low power operation have been completed. The licensee has reviewed all exceptions to the tests and determined that there are no exceptions

7/ CO Report No. 263/70-8

8/ CO Report No. 263/70-14

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remaining that require resolution prior to fuel loading. The inspector reviewed the test results and the resolution of exceptions. It was found that there were no exceptions remaining required for fuel loading.

1. Core Spray System, PTP A-11

   Several exceptions which required resolution prior to fuel loading have now been completed. These included the following items:

   a. The core spray pump discharge relief valves had not been set. This was completed September 3, 1970.

   b. Comparison between indicated flow and vendor curve flow through test line needed to be rechecked. The inspector verified that the comparison showed that the measured flows confirmed the pump curves.

   c. Reactor vessel level trip points required recalibration. This has been completed.

   d. Verification was obtained on August 14, 1970 that all amendments to the test procedure had been made.

   The air operators for the testable feature of the testable check valves are being upgraded. Since the air operators were once installed this work is considered to be maintenance. The check valves are installed and their satisfactory operation has been demonstrated. The air operator provides for remote testing of the check valve and has no affect on the valves normal operation.

2. Standby Gas Treatment (SGT) System, PTPB-19-8

   Initial preoperational tests of the SGT system identified several deficiencies in the system.

   a. The air flow rates did not meet design requirements.

   b. Air heater controls did not function in automatic.

   c. There were gasket leaks at the filters.

d. One strip heater was defective, (loose terminals) requiring replacement.

e. Flow switch and temperature alarm settings did not appear appropriate.

The test was completed to verify system logic and controls. Except for automatic operation of the heaters, the logic and control tests were satisfactory.

To correct the deficiencies identified during the pre-operational tests, Bechtel initiated a system upgrading program. A factory representative was called to the site to correct the heater controller problem. New gaskets were obtained and installed and a replacement heater was ordered. System flow was increased by replacing the 10 HP offgas stack fan drive motors with 20 HP motors. This increased both the stack and the SGT System flows. The available flows were found to be 4300 cfm vs. the design value of 4000 cfm. The new gaskets were received and the filters subsequently passed the DOP tests. The heater controllers were corrected, and all systems tested satisfactorily, prior to final completion of the test, with one exception. This was the defective heater elements requiring replacement. Alarm settings were adjusted to adequately monitor system operation. The heater element was subsequently replaced. Later, during final surveillance testing before fuel loading, control problems developed in this system. They are described in paragraph II.M. below.

3. Reactor Feedwater (FW) System, PTP B-8

The FW system preoperational test was completed with several exceptions, primarily due to a maintenance problem involving the pump coupling on one of the feedwater pumps. A portion of the feedwater preoperational test will be repeated after repairs are complete and prior to power operation. FW system is not needed during fuel loading and low power operation. One feedwater loop has performed well.

H. Surveillance Testing

A surveillance testing program has been initiated to assure timely performance of all surveillance testing. This will include all

Results of Inspection (continued)

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Results of Inspection (continued)

periodic tests and checks needed for safe operation of the plant, in addition to all the surveillance items required by the Tech. Specs. A detailed scheduling system has been prepared that should assure timely completion of the tests. The operating staff began performing the tests in accordance with the schedule in July, so most of the periodic tests are already phased into the schedule. The inspector reviewed the record of tests completed to assure that all surveillance testing required for fuel loading and low power testing was complete.

I. Operating Procedures

All of the operating procedures required for fuel loading and low power testing have been reviewed and accepted by the Operations Committee. The committee recommendations have been approved by licensee management. Review of portions of the operation manual showed that previous CO comments have been incorporated into the manual. The inspector reviewed the copy of the operation manual provided in the control room, and determined that it contained the latest revisions.

J. Maintenance Procedures

The inspector reviewed the status of maintenance procedures. A systematic method has been initiated to assure that maintenance manuals and procedures are available for all system components. The maintenance manual will provide special procedures in all areas where the vendor manuals do not provide adequate details. Upgrading of maintenance procedures is a continuing process. The licensee has provided for periodic reviews to assure that procedures are current, and for review of all procedures, (including changes to procedures) by the Operations Committee.

K. Plant Security

The inspector discussed plant security with Messrs. Larson and Geottge in conjunction with any projected increases in security measures. The inspector was informed that increased security measures were already in force. On August 25, two additional patrolmen were added to the night security force. In addition, the gate security check now requires all personnel to sign in and sign out as they enter and leave the site.

The permanent plant security fence is under construction. Considerable progress was noted since the last inspection. The plant security fence will be completed prior to power operation.

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L. Operating License

Tuesday morning, September 8 the inspector completed his inspection efforts in conjunction with finding of plant completion. Mr. Wachter, Vice President, Power Production, confirmed that NSP management had received recommendations from the Safety Audit Committee concerning plant readiness, and approved the plant for fuel loading.

DRL informed the licensee by telephone and telegraph, on Tuesday afternoon, that operating license DPR-22 had been issued for the facility.

M. Abnormal Occurrance, Standby Gas Treatment (SGT) System

At about 1430, Tuesday, September 8, 1970, one circuit of the SGT system was found to be inoperable due to a failure in the control circuitry of an air heater, caused by a short circuit in the heater. License DPR-22 had not been received at the time of the occurrance, however, the licensee reported the occurrance in accordance with the tech specs. Details of the occurrance are described in the licensee's report to DRL which was forwarded on September 18, 1970.

CO was subsequently informed (by telephone and telegraph in accordance with technical specifications) of two more occurrances concerning the SGT system on September 10 and 11, 1970. The licensee suspended fuel loading operations on September 11, 1970. GE and/or Bechtel were requested to resolve and repair all recent problems on the system, perform sufficient testing to verify that the problems have been resolved, establish that the system can be started and stopped several times consecutively and that continued satisfactory operation of the system can be expected, and perform a design review of the system.

CO:III was informed by telephone on September 12, 1970 that repairs to the systems had been completed, that both trains had been successfully tested through three operating cycles and had been determined to be serviceable. It was also learned that fuel loading would be resumed. The system is currently under design review by GE and Bechtel, to assure that future system operations will be reliable. The additional failures were also reported to DRL on September 18, 1970.

N. Initial Fuel Loading

The inspector observed final preparations for fuel loading, establishment of communications and control of the fuel handling operations, observed instrument response in the control room for the first elements inserted and observed fuel handling operations during loading of several

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additional fuel elements into the reactor. All of the operations were conducted in a professional manner in accordance with the detailed written procedures. The fuel loading schedule provides for a daily 12 hour shift, 7 p.m. to 7 a.m. A total of 24 fuel elements were loaded during the first shift. The core is expected to be fully loaded in about 2½ weeks.

O. Exit Interview

The inspector conducted an informal exit interview with Mr. Larson at the conclusion of the inspection to discuss the results of the inspection.

The inspector stated that he was satisfied that NSP had taken action to assure continuity in QC control and record keeping, but that this area will require additional attention during plant operation. Mr. Larson stated that he has recognized that QA responsibilities apply also to operating licenses and that NSP will continue to maintain QA functions and records.

The inspector stated that CO:III is interrested in criticality testing and wishes to be notified sufficiently prior to initial criticality so that an inspector may be present. Mr. Larson agreed to keep CO:III informed.

The inspector discussed the reporting of abnormal occurrances. Mr. Larson stated that the failure of the air heater control of the SGT system (Section II.M.) would be reported as an abnormal occurrance.