U. S. ATOMIC ENERGY COMMISSION DIRECTORATE FOR REGULATORY OPERATIONS

REGION III

RO Inspection Report No. 050-263/73-07

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Licensee: Northern State Power Company 414 Nicollet Mall Minneapolis, Minnesota 55401

> Monticello Nuclear Generating Plant Monticello, Minnesota

License No. DPR-22 Category: C

Type of Licensee: BWR (GE) 545 Mwe

Type of Inspection: 10 CFR Part 70, Routine

Date of Inspection: July 12, 1972

Date of Previous Inspection: August 12-13, 1970 (Safeguards)

Principal Inspector: C. C. Peck CC Peck

August 10, 1973 (Bate)

Accompanying Inspector: None

Other Accompany Personnel: None

Reviewed By: J. A. Hind, Chief Materials and Plant Protection Branch

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(Date)

Attachment: Findings (Exempt from Disclosure)

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SUMMARY OF FINDINGS

Enforcement Action: None

Licensee Action on Previously Identified Enforcement Items:

No previous enforcement items.

Unusual Occurences: None

Other Significant Findings: None

Management Interview:

A closeout meeting was held July 12, 1973 by C. C. Peck with C. E. Larson, Plant Superintendent and D. E. Nevinski, Nuclear Engineer. The licensee representatives were informed that the inspection had disclosed no items of non-compliance with the requirements of 10 CFR Part 70.

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REPORT DETAILS

Persons Contacted

C. E. Larson, Plant Superintendent D. E. Nevinski, Nuclear Engineer

General Status of Facility

The Monticello Nuclear Generating Plant has a boiling water reactor designed by General Electric; the reactor has design power of 1670 MWt and 545 MWe.

License DPR-22 was issued to the facility September 8, 1970 and full power was achieved January 19, 1971. The reactor operated from startup through March 3, 1973 with no changes in the original fuel; on March 4, 1973 the reactor was shut down to replace a few leaking fuel assemblies and accomplish other maintenance, completing fuel cycle 1. During the shutdown the leakers were replaced and many fuel assemblies were relocated in the core. Cycle 2 began on May 18, 1973 and was in progress at the time of the inspection.

A previous 10 CFR Part 70 inspection was made on August 12 and August 13, 1970, prior to startup. There were no items of noncompliance at that time. This inspection covers the period from the earlier inspection to July 12, 1973.

Fuel Accountability Procedures

The licensee's accountability procedures are Section D.1 of his Operations Manual. The procedures were established prior to startup in 1970, and have been followed essentially as written since that time. One of the stated objectives of the procedures is to meet the requirements of 10 CFR Part 70. The procedures designate the Nuclear Engineer as principally responsible for preparation of fuel transfer procedures, maintenance of all fuel records, and preparation of all AEC reports (Forms AEC-741 and 742).

Features of the procedures are:

- Tag boards and inventory forms for recording the location of all fuel assemblies.
- A location history form on which are recorded all movements of each fuel assembly from receipt to shipment as spent fuel.
- Transfer log forms for recording all fuel movements during each refueling operation. The completed logs are compared with a completed checklist form after refueling. Redundent forms are thus employed which must agree to verify accuracy.
- An underwater television system. After refueling, a television camera scans the core, providing positive identification of each assembly and its location on a tape for future reference.

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 e method is described by which the current isotopic composition of each fuel assembly can be determined from the process computer.

The accountability procedures meet the requirements of Section 70.51(b)(1).

Inventory and Inventory Verification

The fuel arsembly location history forms were used to verify the accurancy of the current core fuel diagram. A hundred of the 484 assemblies in the core were checked against their location history forms. The diagram was also checked against the tag board, and finally a portion (approximately 10%) of television tape of the fuel in the core was viewed and compared with the diagram. There were no discrepancies.

There were twenty spent fuel assemblies in the spert fuel pool. A visual inspection was made to confirm the number, and their pool locations were checked against the current pool diagram. No attempt was made to identify the actual fuel by number which would have been impossible without fuel movement. However, the location history forms were used to verify the diagram. No errors were found.

The twenty fuel assemblies are the net spent fuel removed from the core during the refueling outage that took place after the shut down on March 4, 1973. At that time 25 assemblies containing leaking rods were removed. Only twenty new fuel assemblies were available for replacements; these were inserted into the core. The additional assemblies needed were made up by "reconstituting" among the 25 leakers; that is all leaking rods were removed from some of these assemblies and replaced by sound rods from others of the group. After reconstituting, there were twelve sound assemblies and thirteen rejects. Five sound assemblies were inserted into the core leaving seven sound assemblies and thirteen rejects in the pool. The seven sound assemblies will probably be used in the next refueling outage, scheduled for 1974. None of the assemblies was renumbered as a result of the reconstituting process, since the maximum number of rods replaced in any assembly was ten of the 49 total. Replacement was on a one-for-one basis so that the licensee has no remaining loose rods. The licensee has records of all the individual rod movements; these were examined, but not audited

There were no new fuel assemblies in the license's inventory.

The licensee has a single one curie (16 gram) Pu-Be source. At the time of the inspection this was stored in a source storage area within the containment area in a 55-gallon drum.

The licensee's inventory practices meet the requirements of 70.51(b)(2).

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Records

Internal records of all fuel in the licensee's possession have been maintained on the types of forms described in the section on Fuel Accountability Procedures.

The records meet the requirement of 70.51(a).

Reports

Use of Form AEC-741 transaction reports since the inspection of August 13, 1970 has been limited to the shipment and later return of one fuel rod, the receipt of the Pu-Be source, and the receipt of twenty new fuel assemblies. The reports were correctly executed and are reflected in Attachments 1 and 2 to this report.

The licensee has prepared Form AEC-742, Material Status Reports, semiannually since June 30, 1970. All were inspected. Form AEC-741 transfer information has been correctly incorporated into the status reports. The only other changes in material status have resulted from uranium depletion and plutonium production in the reactor. These quantities have been routinely included in the reports.

The licensee is in compliance with the requirements of 70.54 and 20.53.

Uranium Depletion and Plutonium Production

Thermal power generated by the reactor is printed out hourly by the process computer in the control room in megawatt hours. The total of each day is also printed. The nuclear engineer accumulates these data, verifying their accuracy by comparison with the electrical power, by the use of other data on water temperatures and B.T.U. data that are printed by the computer, and by knowledge of previous thermal power generation. No manual calculations are required. With the thermal power for whatever period of time is of interest for an input, uranium depletion and plutonium production for each assembly in the core and for the entire core may be obtained from the licensee's off-line computer. The program used is called ON DEMAND 12, and is part of the General Electric service to the licensee. Data may be obtained at any time.

This system has been used since startup to determine uranium depletion and plutonium production data for semi-annual Form AEC-742 use. At the time of the inspection, the off-line computer was not producing accurate data, because the OD 12 program was in the process of being adjusted to reflect the recent partial refueling of the reactor. The depletion and production data that have appeared on Form AEC-742 reports through December 31, 1972, appear accurate to the extent that it is possible to verify their accuracy with manual calculations. A comparison of licensee and AEC-calculated data is presented as Attachment 3 to this report.

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The licensee's production and depletion determinations satisfy the requirements of 70.51(b)(1).

Attachments: 1 thru 3

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MONTICELLO (YND)

PRIVATELY OWNED ENRICHED URANIUM

MATERIAL BALANCE STATEMENT

AS OF DECEMBER 31, 1972

Units: Grams

	Uranium	Urenium - 23
Beginning Inventory 8/14/70	93,670,423	2,108,552
Receipts		
YLJ(General Electric) to YND 19 YLJ to YND 20	3,901 3,735,222	44 85,768
Total to Account for	97,409,546	2,194,364
Removals		
YND to YLJ 2 Depletion	3,884 983,040	44 592,563
Ending Inventory 12/31/72	96,422,622	1,601,757
Total Accounted for	97,409,546	2,194,364

Possession Limit of DPR-22: 2300 kilograms uranium -235

Attachment 1

EXAMPLE AND INCOME

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MONTICELLO (YND) PRIVATELY OWNED PLUTONIUM MATERIAL BALANCE STATEMENT AS OF DECEMBER 31, 1972

Units: Grams

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	Plutonium	Plutonium - 239, - 241	
Beginning Inventory 8/14/70	~ 0~	÷ 0+	
Receipts			
ZOE (Pathfinder) to YND1 Production	16 319,697	15 274,480	
Total to Account for	319,713	274,495	
Ending Inventory 12/31/72	319,713	274,495	
Total Accounted for	319,713	274,495	

Possession Limit of DPR 22: 16 grams of plutonium as contained Pu-Be neutron sources.

Attachment 2

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MONTICELLO

URANIUM DEPLETION - PLUTONIUM PRODUCTION

REPORTED ON AEC-742 AND AEC CALCULATED

Period	Thermal Power (MWD)	Uranium (Grams)	Uranium - 235 (Grams)	Plutonium (Grams)
1/1/71 = 12/31/71 AEC-742 Calculated Difference (%)	181,626	301,600 298,067 -1.2	198,401 198,174 -0.1	109,951 112,627 +2.3
1/1/72 + 6/30/72	202,514			
AEC-742 Calculated Difference (%)		316,788 314,590 -0.7	190,747 190,438 -0.2	104,322 100,333 -4.0
7/1/72 = 12/31/72 AEC-742 Calculated Difference (%)	254,127	364,652 366,688 +0.6	203,415 205,558 +1.1	105,424 96,230 -9.6
1/1/71 - 12/31/72 (AEC-742 Calculated Difference (%)	(Total) 638,267	983,040 979,345 -0,4	592,563 594,170 +0.3	319,697 309,190 -3.3

Attachment 3

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UNITED STATES ATOMIC ENERGY COMMISSION DIVISION OF COMPLIANCE REGION III 799 ROOSEVELT ROAD GLEN ELLYN, ILLINOIS 60137

TELEPHONE (\$12) \$58-2660

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