

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

**Docket No:** 50-263  
**License No:** DPR-22

**Report No:** 50-263/2000002(DRS)

**Licensee:** Northern States Power Company

**Facility:** Monticello Nuclear Generating Plant

**Location:** 2807 W. County Road 75  
Monticello, MN 55362

**Dates:** January 10-14, 2000

**Inspector:** Mark Mitchell, Radiation Specialist

**Approved by:** Steven K. Orth, Acting Chief, Plant Support Branch  
Division of Reactor Safety

## **EXECUTIVE SUMMARY**

### **Monticello Nuclear Generating Station NRC Inspection Report 50-263/2000002(DRS)**

This announced inspection included the as-low-as-is-reasonably-achievable (ALARA) planning and controls for the nineteenth refueling outage (RF019); internal exposure monitoring; radiological surveys and postings; radiation worker performance; and the control of high, locked high and very high radiation areas. Ongoing work such as the drywell in-service inspection, inboard main steam isolation valve (MSIV) repair, and drywell insulation removal/replacement were also observed. No previously identified NRC items were reviewed during this inspection and no violations were identified.

- RFO19 activities were well planned and utilized effective ALARA controls. Accrued dose was consistent with completed work including emergent activities. Drywell shielding and scaffolding support work was well conducted. Workers exhibited good work practices and radiation protection (RP) management and technicians' work oversight was effective (Section R.1.1).
- The inspector concluded that the licensee maintained an effective internal exposure control program. Whole Body Counting systems were appropriately used and well maintained. The licensee's actions following the discovery of alpha contaminants in the primary system components were considered appropriate (Section R.1.2).
- Radiological postings and controls were well maintained and associated surveys were well performed. During walkdowns, the inspector observed good work practices and observed no significant, radiological impediments to routine work (Section R.2.1).
- Access to High Radiation Areas (HRAs), Locked High Radiation Areas (LHRAs), and Very High Radiation Areas (VHRAs) were well controlled and associated keys were properly issued and accounted for by RP staff (Section R.2.2).

## Report Details

### IV. Plant Support

#### **R1 Status of Radiation Protection and Chemistry (RP&C) Controls**

##### **R1.1 ALARA Planning and Controls for the Nineteenth Refueling Outage (RFO19)**

###### **a. Inspection Scope (83750)**

The inspector reviewed the ALARA planning and controls for RFO19. This inspection included walkdowns of the Reactor and Turbine Buildings, observations of work activities, interviews with workers, and a review of ALARA planning documents.

###### **b. Observations and Findings**

The RFO19 dose goal was 190 rem, with 145 rem projected for the drywell activities, and as of January 14, 2000 about 50 rem was accrued with about 30 percent of the planned work completed. Significant activities and the current dose/work status through the above date were: start of the MSIV seat repair work, 0.435 rem (approximately 20 percent complete); drywell nozzle inservice inspection (ISI) work, 5.605 rem (80 percent complete); opening and closing nozzle shield doors, 1.076 rem (50 percent complete) and drywell shielding installation, 5.1 rem (100 percent complete). Each of these jobs was assigned and tracked using the radiation work permit (RWP) system, by the ALARA project manager. Further, the RP coordinators verified that coordination was conducted between RP and other work groups. These activities are discussed in more detail in Section R.4 of this report.

Emergent work from the failure of an inboard MSIV during Local Leak Rate Testing (LLRT) contributed to the use of some of the 10 rem emergent dose planned for the outage. Individual total effective dose equivalent (TEDE) totals for the outage were less than expected and the number of contamination events to date (13) was low. None of the contamination events resulted in intakes. The drywell planning by the ALARA coordinator had conservatively anticipated a 15 percent increase in drywell doses. Initial, as found, dose rates in the drywell were 15 percent lower than expected.

Based on discussions with the ALARA coordinator, workers and Radiation Protection Technicians (RPTs), the inspector concluded that work activities had been systematically planned. The ALARA coordinator indicated that job planning from a variety of disciplines received the RP presentation and a critical review. A strength in work planning and implementation, and therefore dose planning, came from the many years of outage experience of the drywell coordinator. Radiation work permits (RWPs) reviewed by the inspector made use of industry and station historical data, were consistent with the associated ALARA plan, and listed contingency planning stop points. For drywell work, the licensee made use of remote audio and visual communications, as well as extensive use of remote dosimetry. Each individual was monitored and total dose was limited by RWP activities. However, the inspector noted

that early in the outage, RPTs assigned to drywell coverage were not completely familiar with the entrance and egress to some areas of the drywell. The inspector discussed this with radiation protection management and they took immediate steps toward corrective action.

As in past outages, ALARA reviews did not support the use of respirators for radiological controls. Respirators were issued, as a precaution, for initial breach of primary system components when RP staff was not able to survey for removable contamination in the inaccessible and potentially highly contaminated areas. An example of respirator use was observed during opening of the inboard MSIV. Respirators were also issued during opening of the turbine control and stop valves. This precaution was to limit any potential for intake of radioactive material until internal and airborne contamination could be quantified.

Outage support activities such as shielding and scaffolding installation/removal was reviewed by the inspector. As of January 14, 2000, about 5.1 rem was accrued with 60 percent of the planned work completed. Overall performance was considered good. Shielding and scaffolding locations were identified based on previous refueling outage use or as indicated by the work planners. Predefined engineering evaluations were also obtained prior to installation. In RF18, about 15 percent dose savings was attained from temporary shielding; a 15 percent savings was expected for RFO19 due to effective shielding, in addition to lower than anticipated drywell dose rates.

Overall, ALARA controls and RPT coverage was considered adequate. During walkdowns, the inspector observed RP management in the field and effective control of work activities by RPTs. Air samples were appropriately collected and tracked, evaluated for alpha contamination during analyses, and identified no significant airborne hazards. Workers were observed utilizing low dose areas and using good work practices. Access to the upper drywell elevations were accessible but properly controlled by the assigned RPTs. Fuel movement had not started during the inspection period. Remote cameras and teledosimetry were also observed in use during drywell activities. A prejob briefing and planning meeting was attended by appropriate personnel, adequately discussed radiological concerns (including RWPs and ALARA plans), and considered interferences from other, ongoing work.

c. Conclusions

RFO19 activities were well planned and utilized effective ALARA controls. Accrued dose was consistent with completed work, including emergent activities. Drywell shielding and scaffolding support work was well conducted. Workers exhibited good work practices and RP management and technicians' work oversight was effective.

R1.2 Internal Exposure Control

a. Inspection Scope (83750)

The inspector reviewed the use of *in vivo* counting systems and *in vitro* bioassay methods, including whole body counting (WBC) operations, and reviewed procedures

and operational data for WBC and bioassay. The inspector also reviewed the licensee's actions following the detection of alpha contamination in the turbine stop and control valves.

b. Observations and Findings

Station procedures required that *in vivo* bioassay be performed during initial site entrance and final site exit processing and after a suspected intake. All persons authorized onsite were included in the bioassay program. The inspector reviewed routine WBC activities with the responsible staff members and noted that staff were knowledgeable of procedures and used them to perform data collection. No deviations from procedural expectations were observed during the inspection.

The licensee maintained a stand-up whole body counter. The unit was calibrated after initial installation or major equipment changes and these calibrations were then verified annually. The inspector reviewed the latest annual recalibration of the unit. The calibration was performed using a methodology consistent with industry and NRC guidance and all verifications were conducted as stated in station procedures. During the last calibration the instrument was found within specifications and did not require major adjustments or repairs. Daily constancy tests verified continued equipment availability.

*In vitro* bioassay was performed after a suspected/known uptake involving alpha or beta emitting isotopes. No contamination event met the requirement for *in vitro* or WBC during the course of the inspection. The normal exit WBC bioassays did not identify any intake of materials during the course of the inspection.

The inspector reviewed specific internal exposure control methods used by the RP staff. During opening of an inboard MSIV and the turbine control and stop valves, RP staff identified a release of entrained alpha contaminants. Given the fuel history and the lack of significant operating events, alpha contamination was expected in the steam systems. Appropriate precautions, including respiratory protection, were taken during opening the primary system components and as a result no intakes were experienced during the inspection.

c. Conclusions

The inspector concluded that the licensee maintained an effective internal exposure control program. Whole Body Counting systems were appropriately used and well maintained. The licensee's actions following the discovery of alpha contaminants in the primary system components were considered appropriate.

## **R2 Status of RP&C Facilities and Equipment**

### **R2.1 Radiological Surveys, Conditions, Practices, Labeling, and Postings**

#### **a. Inspection Scope (83750)**

The inspector conducted several walkdowns of the Radiologically Posted Area (RPA) including the reactor drywell, turbine building, and radioactive waste building. During these walkdowns, the inspector reviewed plant radiological posting and labeling, control of contamination areas, radworker performance, radiation surveys, plant housekeeping, and materiel condition.

#### **b. Observations and Findings**

The radiological surveys, postings, and labeling observed in the reactor, turbine and radioactive waste buildings effectively informed plant workers of radiological conditions and presented information in accordance with station procedure. Independent radiation surveys conducted by the inspector throughout the facilities verified that area postings and container labels were appropriate. Several plant staff were interviewed to verify that station requirements regarding surveys and postings were well understood. Plant housekeeping and material condition was controlled consistent with ongoing work. The Radioactive Waste Building was very well maintained. Incoming materials required for the outage were stored in an orderly fashion and clearly labeled. The radioactive waste products produced as part of the outage were frequently removed from the work areas of the plant and placed in designated areas of the Radioactive Waste Building prior to daily transfer to the appropriate processing and transport containers.

Contamination control practices were effective and housekeeping was considered good. Catch basins were well secured, contaminated materials were appropriately bagged and/or labeled, and contaminated area boundaries were well maintained. Workers were observed using proper work controls inside contaminated areas and appropriately surveying material prior to leaving the RPA.

The inspector reviewed current radiation survey data and noted that these surveys were comprehensive, conducted at the appropriate locations, and at the required frequencies. In particular, the inspector observed current survey data being posted at the drywell, refueling floor control points, and areas being used by workers in the field.

#### **c. Conclusions**

Radiological postings and controls were well maintained and associated surveys were well performed. During walkdowns, the inspector observed good work practices and observed no significant radiological impediments to routine work.

**R2.2 Condition of High, Locked High and Very High Radiation Areas**

**a. Inspection Scope (83750)**

The inspector observed the licensee controls over high radiation areas, locked high and very high radiation areas and the condition of several infrequently entered LHRAs in the Radwaste and Reactor Buildings. This inspection consisted of a review of procedures, a plant walkdown, and interviews with workers.

**b. Observations and Findings**

The inspector noted that all observed areas were locked and properly posted or were posted and controlled as required by the regulations and station procedure. Specifically, the inspector reviewed the traversing incore probe (TIP) storage area and the drywell for control of VHRAs. The LHRA waste storage areas in the radioactive waste building during normal operation was likewise controlled as LHRA during the outage. LHRA keys were appropriately stored, controlled and inventoried by RP staff. Each LHRA was controlled by a specific lock (i.e., no common keys) and each key was tagged with the door location and other, supplemental information.

The inspector observed workers using effective controls in HRAs/LHRAs and verified, through interviews, that workers understood them. Entry procedures were reviewed for clarity and consistency with NRC regulations and industry practice; no problems were identified.

Some areas of the plant were properly "down posted" from LHRA to Radiation Areas and Contaminated Areas, with the main steam tunnel adjacent to the drywell as an example. Workers in this area were observed properly dressed and observing good ALARA practices. The area survey maps were accurate as verified by the inspector.

**c. Conclusions**

Access to HRAs, LHRAs, and VHRAs were well controlled and associated keys were properly issued and accounted for by RP staff.

**R4 Staff Knowledge and Performance in RP&C**

**R4.1 Main Steam Isolation Valve Work (83750)**

The inspector observed the ALARA controls and planning for the inboard MSIV seat repair work. This job was not a first-time station evolution and station history was used during prejob planning. However, because the work was emergent due to failure of the local leak rate tests conducted early in the outage, the doses associated with this work were not part of preoutage planning, and were tracked in the ALARA planning as emergent dose. The licensee had allotted an outage total of 10 rem for emergent work of this nature (see Section R1.1). Work controls included using an experienced, dedicated work crew. A review of similar work accomplished during previous refueling outages was used to familiarize less experienced workers with the job. Remote

cameras and dedicated RPT coverage were used to monitor workers during the breach of the MSIV. The inspector observed effective radworker practices such as use of job segmentation, time controls, respiratory protection and RPTs in continual attendance and controlling personnel access. Additionally, air samples and high efficiency particulate air (HEPA) filtration units were used to monitor and minimize potential airborne levels.

#### **R4.2 Inservice Inspection and Drywell Shield Door Removal/Replacement (83750)**

The inspector observed the ALARA planning and controls for the drywell nozzle shield door removal/replacement work and the ISI work on nozzle welds. As recorded in RP tracking documents and as stated by workers, the work was going smoothly. Significantly lower than expected drywell dose rates and good worker performance in shielding placement, were expected to result in drywell ISI work being completed below 8.4 rem goal. Based on plant history, RPTs were present during initial opening of shield doors and ISI work. However, the shield door removal and closure activities were approximately 70 percent completed and about 20 percent over the goal. The inspector noted no significant problems while observing this work activity. The RP staff conducted thorough surveys of the areas in support of scheduled activities. Due to dose savings in other areas it was not expected that this would affect overall drywell exposure goals.

#### **R4.3 Refueling Floor Activities (83750)**

The inspector observed the ALARA controls and planning for refueling floor activities. No fuel movements were conducted during the inspection. The inspector observed activities related to reactor vessel inspection and in support of RP contamination prevention on the refuel floor. Total dose through January 14, 2000, was about 3.25 rem with 30 percent of the overall scope done. Area dose rates (0-5 mrem/hr) and contamination levels ( $\leq 1000$  disintegrations per minute /100 cm<sup>2</sup>) were low, and were posted daily on an RP status board at the entrance to the refuel floor. Area radiation monitors, continuous air monitors and portable air samplers were well located, operable and a review of monitor and sample trending data identified no radiological concerns. The inspector observed the RP staff response to a malfunction on a continuous air monitor. The staff took adequate diagnostic and corrective measures to return the unit to service and concurrently provide coverage to other activities on the refuel floor. Access to the refuel floor was well controlled and RPTs were continuously in attendance. The RPT logbook was maintained as required. Through interviews, the inspector verified that refuel floor workers were kept appraised of plant activities and that drywell personnel would be informed when fuel movement was started.

#### **R4.4 Drywell Access and RP Controls (83750)**

During the outage, drywell access was controlled by assigned RPTs. All personnel entering and leaving the drywell received and returned an assigned remote reading electronic dosimeter, received briefing on any changing conditions and received RPT assistance in RP related issues. During walkdowns, the inspector observed no significant radiological impediment to workers, but did note one potential problem with radiological access control at the drywell. The inspector observed that during certain periods, such as lunch or work break times for the RPTs, the RPT coverage was

stressed when work groups were ready to enter the drywell for assigned duties. During one of these times the inspector noted that a laborer entered the drywell without a set of outer rubber shoe covers. This was immediately noted by the laborer and brought to the attention of, and corrected with the assistance of the RPTs. The RP management took immediate action to assess the staffing levels at this station and determine if additional RP support was necessary during certain periods of the day. Some adjustments to the RP scheduling were made before the end of the inspection to assure adequate coverage at all times.

## **V. Management Meetings**

### **X1 Exit Meeting Summary**

The inspector presented these results to licensee management and staff during an exit meeting on January 14, 2000. The licensee representatives stated that none of the materials examined during the inspection were considered proprietary.

## PARTIAL LIST OF PERSONS CONTACTED

### Licensee

K. Bothun, Radiation Protection Coordinator  
T. Corrigan, Radiation Protection Specialist  
B. Day, Plant Manager  
K. Jepson, Radiation Protection Supervisor  
G. Mathiasen, Principle Health Physicist  
C. Migliore, Contract Radiation Protection Technician  
M. Olson, Radiation Protection Specialist  
W. Shinnick, ALARA Coordinator  
P. Yurczyk, Special Projects Coordinator  
J. Windschill, Radiation Protection Manager

### NRC

S. Burton, Senior Resident Inspector, Monticello

## INSPECTION PROCEDURES USED

IP 83750: "Occupational Radiation Exposure"

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

None

### Closed

None

### Discussed

None

## LIST OF ACRONYMS USED

ALARA	As-Low-As-Is-Reasonably-Achievable
CAM	Continuous Air Monitor
CR	Condition Report
HEPA	High Efficiency Particulate Air
HRA	High Radiation Area
IP	Inspection Procedure
ISI	Inservice Inspection
LHRA	Locked High Radiation Area
LLRT	Local Leak Rate Testing
MSIV	Main Steam Isolation Valve
PDR	Public Document Room
RFO	Refueling Outage
RP	Radiation Protection
RP&C	Radiation Protection & Chemistry
RPT	Radiation Protection Technician
RPA	Radiologically Posted Area
RWP	Radiation Work Permit
TEDE	Total Effective Dose Equivalent
TIP	Transverse Incore Probe
VHRA	Very High Radiation Area
WBC	Whole Body Counting

## PARTIAL LIST OF DOCUMENTS REVIEWED

### Station Procedure Nos:

MNGP 5621-2 (Revision 2), "Airborne Radioactive Material TEDE ALARA Review";  
MNGP R.14.14 (Revision 3), "Alnor/PMETS Interface Operations";  
MNGP R.14.13 (Revision 4), "Electronic Dosimeter Operations";  
MNGP R.14.07 (Revision 4), "Whole Body Counting (FASTSCAN)";  
MNGP R.05.03 (Revision 13), "Respirator Issuance";  
MNGP 02.01 (Revision 11), "Dose Rate Surveys";  
MNGP R.01.01 (Revision 31), "RWP Preparation and Issuance";  
MNGP R.01.04 (Revision 10), "Control of Personnel in High Radiation and Airborne Contamination Areas";  
MNGP R.02.02 (Revision 15), "Surface Contamination Surveys";  
MNGP R.02.03 (Revision 8), "Airborne Radioactivity Sampling";  
MNGP R.13.05 (Revision 8), "Pre-job Briefings";

### Condition Reports:

20000061 (01/06/00), "RAM Control: North door to warehouse radioactive materials area found unlocked";  
20000074 (01/06/00), "RAM Control: Contaminated toolbox found unlabeled and outside a posted area";  
20000094 (01/08/00), "Instruments: Malfunction of a RAD 51 dosimeter apparently due to radio frequency interference";  
20000109 (01/09/00), "Postings: Workers removed panel at rear of HP turbine hood without notifying RP";  
20000124 (01/10/00), "Work Control: Observed numerous workers improperly undressing from PCs at the step-off pads";  
20000130 (01/10/00), "Postings: Contaminated area not posted from one avenue of approach";

### RWP Nos (includes associated ALARA plans):

MNGP RWP Number 522 (Revision 0), "933 Drywell-Main Steam Line Area";

### Miscellaneous:

MNGP 2000 Refueling Outage Daily Handouts from 01/10/2000 to 01/14/2000