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United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Licensee Event Report (LER) 454-2003-001-00, "Control Room Ventilation System Alignment Results In Inoperable Radiation Monitors Without Taking Required Actions Per The Technical Specifications"

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Enclosed is an LER involving the January 27, 2003, discovery of an operational configuration concern of the Unit Common Control Room Ventilation System Filtration System Actuation Instrumentation radiation monitors. This condition is reportable to the NRC in accordance with 10 CFR50.73 (a) (2) (i) (B).

Should you have any questions concerning this matter, please contact Mr. William Grundmann, Regulatory Assurance Manager, at (815) 234-5441, extension 2800.

Respectfully,

Richard Lopriore
Site Vice President
Byron Nuclear Generating Station

Attachment LER 454-2003-001-00

cc: Regional Administrator, Region III, NRC
NRC Senior Resident Inspector– Byron Station

IE22

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this information collection request 50 0 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NOEB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503 If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Byron, Unit 1	STN 05000454	1 of 5

4. TITLE
Control Room Ventilation System Alignment Results In Inoperable Radiation Monitors Without Taking Required Actions Per The Technical Specifications.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEA	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	27	2003	2003	-001-	00	03	28	2003	Byron, Unit 2	STN 05000455
									FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE	1
10. POWER LEVEL	100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

☐ 20 2201(b)	☐ 20 2203(a)(3)(i)	☐ 50 73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20 2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20 2203(a)(1)	☐ 20 2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 73.73(a)(2)(viii)(B)
☐ 20 2203(a)(2)(i)	☐ 50 36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 73.73(a)(2)(ix)(A)
☐ 20 2203(a)(2)(ii)	☐ 50 36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20 2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50 46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20 2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20 2203(a)(2)(vi)	☒ 50 73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A
☐	☐	☐	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
William Grundmann, Regulatory Assurance Manager	(815) 406-2800

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO epix	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
X	Yes (If yes, complete EXPECTED SUBMISSION DATE).		NO		05	27	2003

16. ABSTRACT (Limit to 1400 spaces, i e , approximately 15 single-spaced typewritten lines)

On January 27, 2003 it was determined that the Unit Common Control Room Ventilation System (VC) Filtration System Actuation Instrumentation (FSAI) radiation monitors were not operable when VC was aligned to the Turbine Building makeup air intake. The radiation monitors are located in the outside air makeup intake. On a high radiation signal, VC is realigned to the Emergency Makeup Mode. Some VC operating and surveillance procedures allow operation of the VC System with alignment to the Turbine Building makeup air intake resulting in an inoperable FSAI system since the system is incapable of performing its design function in this configuration (i.e., there would be no air flow past the radiation monitors.) The applicable Technical Specification Limiting Condition for Operation has historically not been entered for this condition. This issue has existed since initial licensing of the facility. In addition, during the investigation, a design flaw was discovered in that the automatic shutdown of a ventilation system that may contribute to unfiltered air in-leakage to the control room was improperly removed from the engineered safety feature safety injection action signal. The root causes for the event were inadequate evaluation of the original operating and surveillance procedures and subsequent revisions and inadequate evaluation of a design change. The condition is considered to have minimal safety consequences. An engineering evaluation is in progress to assess whether this condition may have prevented the fulfillment of the VC safety function. A supplement to this report will be issued at the conclusion of this evaluation. This event is being reported pursuant to 10CFR50.73(a)(2)(i)(B).

A. Plant Operating Conditions Before The Event:

Unit: 1 Event Date: 1/27/2003 Event Time: 0500

MODE: 1 Reactor Power: 100 percent

Reactor Coolant System (RCS)[AB] Normal Operating Temperature and Pressure

B. Description of Event:

There were no systems or components inoperable at the beginning of this event that contributed to the severity of the event.

On January 27, 2003, Byron Station personnel were notified by Braidwood Station personnel of an operational configuration concern with the Control Room Ventilation System (VC)[VI] Makeup Filter unit when it was being placed into operation for the monthly operability surveillance. A Condition Report (CR) was written to enter the concern into the Corrective Action Process (CAP) for resolution. During the CR investigation, it was determined that the operability of the outside air radiation monitors could not be verified when VC is aligned to the Turbine Building makeup air intake and that the Filtration System Actuation Instrumentation (FSAI) should be declared inoperable and the applicable Technical Specification Limiting Condition for Operations (LCO) Action Condition entered.

During normal operation of the VC System, one of two trains of VC is in operation. Normal VC makeup is taken from outside air. Two radiation channels are located on the outside air intakes of each VC train. On a high radiation signal from one of the radiation channels, an actuation signal is generated to shift the VC System to the Emergency Makeup Mode and to shut down the Miscellaneous/Shift Office Ventilation (VV)[XX] system. Ducting for the VV system is routed through the Control Room ventilation boundary. In lieu of performing leakage testing on the VV system, an interlock was added to the design of the Emergency Makeup Mode switchover on a high radiation signal to also shutdown the VV system. The Emergency Makeup Mode consists of starting the makeup fan, which draws air through the Makeup Filter Unit from the Turbine Building makeup air intake, isolating the normal outside air intake, and placing the Recirculation Charcoal Adsorber in operation. In response to an Engineered Safety Feature Safety Injection (ESF-SI)[JE] actuation signal, the VC system will reconfigure to the Emergency Makeup Mode as described above, except that the VV system is not shutdown.

Monthly, each VC train is manually aligned to place the Makeup Filter Unit in operation for a 10-hour surveillance required per Technical Specifications. For the surveillance, the VC system is operated with the Makeup Filter Unit on line for 10 hours without the Recirculation Charcoal Adsorber operating and then for 15 minutes with the Recirculation Charcoal Adsorber operating. In addition to the surveillance requirement, the VC System can be manually aligned to the Turbine Building makeup air intake to support other various station activities. The VC System is manually aligned to the Turbine Building makeup air intake in accordance with approved procedures. When manually aligning the VC System, the Makeup Filter Unit is placed in operation, but the Recirculation Charcoal Adsorber is typically not placed in operation. The VV system is not shut down

when the VC System is manually aligned to the Turbine Building intake. A review of operator logs identified numerous instances over the last 3 years where the VC System was aligned in this manner.

During the review of the VC System alignment, a design issue was also identified with the ESF-SI actuation signal for isolating the Control Room environment. Duct leakage testing of the VV system was not performed and this system was required to be shut down because no in-leakage was assumed from this system in the original Control Room habitability calculation. The VV control logic was modified during construction to shut down this system on a high radiation signal from the VC outside air radiation monitors or from an ESF-SI actuation signal. A subsequent change was made to remove the shutdown of the VV system on an ESF-SI signal to eliminate nuisance trips of the systems from spurious ESF-SI actuation signals. However, since the radiation monitors were made inoperable as the result of realignment of the VC System to the Emergency Makeup Mode following an ESF-SI actuation signal, then a shut down of the VV system would not be initiated if high outside air radiation occurs after the ESF-SI actuation. The Emergency Operating Procedures do not provide direction to the operator to shut down the VV system unless the radiation monitors are above the alarm setpoint. Since the radiation monitors may not be sampling outside air, they may not be in alarm and the operators would not initiate manual action to shut down the system following an ESF-SI actuation. Failure to shut down the VV system could result in unfiltered leakage to the Control Room envelope. Excessive unfiltered in-leakage could result in higher dose to control room personnel than previously analyzed.

In summary, 2 conditions were identified at Byron:

1. Surveillance and operating procedures were used to align the VC system to the Turbine Building makeup air intake. In this configuration the outside air radiation monitors were inoperable since there was no air flow past them. However, these procedures did not address the inoperability of the outside air radiation monitors (VC Filtration System Actuation Instrumentation channel) nor did they specify entering the applicable LCO Action Condition.
2. The ESF-SI actuation logic associated with Control Room Ventilation isolation would realign the VC Filtration system to Emergency Makeup Mode, but did not initiate shutdown of the VV system. Therefore, the ESF-SI actuation logic would not provide for full Control Room Ventilation isolation following an ESF-SI signal as analyzed in the Control Room habitability calculation.

When Operating and Surveillance procedures were developed for the VC System beginning in 1984, the possible inoperability of the VC Filtration System Actuation Instrumentation while aligned to the Turbine Building makeup air intake was not recognized. When the design change was issued to revise the control logic for the VV system to eliminate shutting down the systems on an ESF-SI actuation signal, the modification documentation did not provide justification for why the elimination of the ESF shutdown of the VV system was acceptable.

This condition is reportable to the NRC in accordance with 10CFR 50.73 (a)(2)(i)(b), as a condition prohibited by Technical Specifications.

C. Cause of Event

Two root causes were identified for the event.

1. Inadequate evaluation of the original procedures and subsequent revisions. Individuals performing the evaluation of the original procedures failed to either adequately identify or correctly evaluate the impact the VC System alignment had on the radiation monitors.

2. Inadequate evaluation of the design change to remove the ESF-SI actuation signal to shut down the VV System. Individuals performing the evaluation of the design changes failed to either adequately identify or correctly evaluate the impact the VC System alignment had on the radiation monitors.

D. Safety Consequences:

The consequences of this event are minimal. All of the issues are associated with alignment of the VC System to the Makeup Filter Unit. In this configuration all makeup air to the Control Room is processed through the Makeup Filter Unit, which includes a charcoal filtration bank. Upon initiation of an ESF-SI actuation, which would precede most accidents that would release significant activity to the outside air, the VC Filtration system would align to the Emergency Makeup Mode if makeup air had been from the Turbine Building makeup air intake. However, since the radiation monitors are not sampling outside air, they may not be in alarm and the operators may not initiate manual action to shut down the VV system following an ESF-SI actuation. Failure to shut down the VV system could result in an increase in unfiltered leakage to the Control Room envelope. However, the Control Room habitability analysis includes substantial margin for unfiltered in-leakage (100 cfm is conservatively assumed in the analysis). Based on the existing VL and VW duct leakage information, the margin used in the habitability calculation is sufficient to accommodate any potential increase in the leakage into the VC return duct resulting from the failure to shut down VV.

For the accidents that do not assume an ESF-SI actuation, the Recirculation Charcoal Adsorber would not have been aligned for operations. If there were a buildup of radiation in the Control Room, the Control Room area radiation monitors would alarm and alert the operators to take actions and place the Recirculation Charcoal Adsorber on line. An engineering evaluation is in progress to assess whether this condition may have prevented the fulfillment of the VC safety function to prevent dose to the control room personnel from exceeding General Design Criteria 19. A supplement to this report will be issued at the conclusion of this evaluation.

E. Corrective Actions:

Appropriate procedure revisions were made to specify entry into the Technical Specification Action Condition for LCO 3.3.7 when the VC system is aligned to the Turbine building intake and to also shut down the VV system when in this condition.

The appropriate emergency procedure will be revised to include steps to shut down the VV system when verifying VC alignment after ESF-SI signal.

A design change will be evaluated to address the need for automatic shutdown of the VV system.

This issue will be evaluated for possible inclusion into the Operator training program.

The current evaluation processes used for design changes and procedure development and revisions are significantly more rigorous than the processes that were in place when the issues occurred.

Procedures and Training & Reference Material (T&RMs) have been developed to provide better guidance to improve the depth, quality and documentation associated with the development and review of design changes. Improved requirements for documentation associated with design changes facilitate the reviewer in performing a more comprehensive review. Nuclear Engineering Standards have been developed to provide a standardized approach to design activities.

Similarly, improvements in the process for the development or revision of procedures have been made. For example, a standardized procedure for the development and control of procedures has been implemented. The procedure provides steps for determining the technical and regulatory reviews required for the procedure change activity. Further the standardized writers guide strengthens the ties to the 10CFR 50.59 evaluation process.

The 10CFR 50.59 resource manual provides individuals with a comprehensive tool for conducting evaluations of design changes or procedures. The expectations in the standards of performance and qualification have also increased in order to improve the quality of the evaluations and reviews.

F. **Previous Occurrences:**

There were no previous occurrences identified.

G. **Component Failure Data:**

Manufacturer	Nomenclature	Model	Mfg. Part Number
N/A	N/A	N/A	N/A