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November 15, 1995

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

Subject: Braidwood Nuclear Power Station Units 1 and 2 Integrated Response Including Reply to a Notice of Violation from Inspection Report Number 50-456/457/95014, Reply to a Notice of Violation from Inspection Report Number 50-456/457/95010, and Actions to Resolve Auxiliary Building Ventilation Problems from Inspection Report Number 50-456/457/95010, NRC Docket Numbers 50-456; 50-457

- References: 1) G. E. Grant letter to K. Kaup dated October 17, 1995, transmitting Notice of Violation from NRC Inspection Report 50-456/457/95014
- 2) W. L. Axelson letter to K. Kaup dated September 20, 1995, transmitting Notice of Violation from NRC Inspection Report 50-456/457/95010

Enclosed is Commonwealth Edison Company's (ComEd) integrated response to items identified in the references above. This response includes: reply to four Severity Level IV violations cited in reference 1; reply to one Severity Level IV violation cited in reference 2; and a reply describing actions to resolve auxiliary building ventilation problems requested in reference 2, all requiring a written response. ComEd's response is provided in the attachments.

While the issues discussed in this response may not be safety significant individually, collectively they reinforce that a significant issue currently facing Braidwood Station is the material condition of the plant. Station management evaluated the issue and determined that a major cause of the declining material condition was that clear standards for acceptable material condition had not been identified and communicated to plant personnel. With this understanding, management developed the Plant Area Standards which are the foundation for the Material Condition Improvement Strategy.

The Improvement Strategy consists of six elements which are sponsored by senior managers who are accountable for development and implementation of specific action plans for those elements. The six elements are: Identification of Deficiencies/Reinforcement of Standards; Operator Workaround Reduction; Major Equipment Restoration; Work Execution Improvement; Facility Improvement; and Plant Cleanliness Improvement. Engineering is an integral part of the Strategy, particularly regarding problem identification, resolution of operator workarounds, and restoration of major equipment. We share the NRC's concerns regarding the inconsistency of our Engineering staff's effectiveness. Our corrective actions discussed in the attachments reflect our efforts to improve performance of Engineering and of Braidwood Station.

The elements of the Material Condition Improvement Strategy have been discussed in greater detail with members of the NRC staff. To achieve success with this Strategy, management is working to change the culture of Braidwood Station personnel. This requires time, continuous reinforcement, personal involvement, personal commitment, and the realization that this effort can never be considered complete. We will continue to keep the NRC apprised of our progress with this ongoing issue.

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The following commitments to the NRC are included in Attachment I:

System specific training will be reviewed for the adequacy of design basis and PRA information. This will be completed for ventilation systems by December 31, 1995.

Annunciator response procedures for plant ventilation systems will be revised by December 31, 1995.

Remaining annunciator procedures will be reviewed by Engineering as part of the next two year review cycle.

All station procedures that allow "Shift Engineer discretion" will be reviewed by December 31, 1995

Additional training on the station's temporary alteration procedure will be given to Operating, Maintenance, and Engineering personnel by June 30, 1996.

Seminars to enhance use of design basis knowledge through the resolution of simulated problems will be piloted for ventilation systems.

The following commitments to the NRC are included in Attachment II:

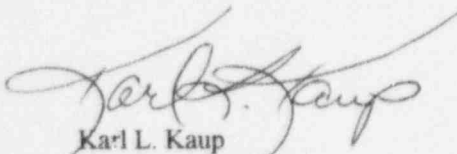
The revised surveillance for changing drain basket strainers will be approved by March 31, 1996.

A new surveillance to perform periodic verification that auxiliary building floor drains are clear and free flowing will be approved by March 31, 1996.

A new surveillance to inspect and clean all leak detection sumps will be approved by March 31, 1996.

Attachment III includes ComEd's plan for addressing auxiliary building ventilation problems.

If your staff has any questions or comments concerning this letter, please refer them to Kevin Bartes, Braidwood Regulatory Assurance Supervisor, at (815)458-2801, extension 2980.



Karl L. Kaup
Site Vice President
Braidwood Station

KLK/JML/tts
Attachments

cc: H. J. Miller, NRC Regional Administrator - RIII
R. R. Assa, Project Manager - NRR
S. P. Ray, Acting Senior Resident Inspector
K. A. Strahm, Vice President PWR Operations

ATTACHMENT I

REPLY TO A NOTICE OF VIOLATION INSPECTION REPORT 50-456/457/95014

VIOLATIONS (50-456/457/95014-01a, b, and c):

1. 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.

- a. BwAP 330-10, "Operability Assessment Process," requires, in part, that an operability assessment be performed when any system, structure, or component (SSC), which supports any SSC explicitly subject to the facility's Technical Specifications or Updated Safety Analysis Report in order to perform their specified safety function(s), involves a loss of quality or functional capability.

Contrary to the above, from November 22 through December 2, 1994, and July 19 through July 22, 1995, an operability assessment was not performed when the battery 211 exhaust ventilation system was inoperable, a system which supports the 125-Volt D.C. Bus 211 which was subject to the facility's Technical Specifications.

This is a Severity Level IV violation (Supplement I).

- b. Contrary to the above, as of August 4, 1995, the Control Room Annunciator Response Procedure, BwAR 2VX01J-1-A6, Revision 5, "Battery Room 211 Exhaust Fan 2VE03C Diff Press High," was not adequate to ensure that the design limit of hydrogen in the battery area would not be exceeded; in that, this procedure did not require hydrogen monitoring or specify a sampling frequency.

This is a Severity Level IV violation (Supplement I).

- c. The Control Room Annunciator Response Procedure, BwAR 2VX01J-1-A6, "Battery Room 211 Exhaust Fan 2VE03C Diff Press High," requires in part, that with the battery exhaust ventilation system secure and at the Shift Engineer's discretion either perform a H₂/O₂ concentration sample in the battery room and/or provide an alternate means of ventilation.

Contrary to the above, from November 22 through December 2, 1994, the 211 battery exhaust ventilation system was inoperable; and, the licensee did not monitor the 211 battery room for H₂/O₂ concentration or provide for an alternate means of ventilation.

This is a Severity Level IV violation (Supplement I).

ATTACHMENT I

REPLY TO A NOTICE OF VIOLATION INSPECTION REPORT 50-456/457/95014

REASON FOR THE VIOLATION (Example 1a):

The Operations staff lacked sufficient design basis knowledge to recognize the installation of the fan as a temporary alteration to a necessary support system.

Contributing to the violation was an inadequate application of questioning attitude due to the broad acceptance of continued fan problems, and inadequate supervisor involvement on the part of Operations.

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED (Example 1a):

All shift engineers were counseled by either the Site Vice President or the Station Manager.

All Operating crews have been counseled by Operations management on the specifics of this event.

Design basis training has been developed by the Operating and Engineering departments and is being taught to Operations personnel.

Training has been conducted by Station senior management for first line supervisors. Topics included in the training were human performance standards, material condition and supervisor accountability.

Station standards and expectations for material condition and human performance have been communicated through the distribution of the Braidwood Station Handbook for 1995.

Standards from the Material Condition Improvement Strategy have been communicated to station personnel through the station's newsletter and departmental tailgate meetings. Communications will continue to reinforce the unacceptability of recurrent equipment problems and the need to identify problems so they can be resolved.

CORRECTIVE STEPS TAKEN TO AVOID FURTHER VIOLATION (Example 1a):

Current system specific training is being reviewed for the adequacy of design basis and PRA information. This action will be performed for the ventilation systems by December 31, 1995. Feedback from this review will be evaluated to determine subsequent system reviews to be performed.

Operating is being trained on the station's procedure for temporary alterations. Training will focus on recognizing temporary alterations and will be completed by June 30, 1996.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED (Example 1a):

Full compliance was achieved when repairs to the VE fan were completed and the fan was declared operable on July 22, 1995.

ATTACHMENT I

REPLY TO A NOTICE OF VIOLATION INSPECTION REPORT 50-456/457/95014

REASON FOR THE VIOLATIONS (Examples 1b and 1c):

There is a lack of ventilation system design basis knowledge among Operations personnel. As a result, Operations did not monitor the 211 battery room for H₂/O₂ concentration or provide for an alternate means of ventilation from November 22 through December 2, 1994.

The annunciator response procedure was inadequate because writers failed to recognize the potential for misinterpretation of discretion in the procedure. The procedure did not specifically require monitoring of hydrogen concentration or specify a sampling frequency, but instead, allowed use of discretion to determine action to be taken.

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED (Examples 1b and 1c):

The four annunciator response procedures for the battery room exhaust fan high differential pressure have been revised to clarify the required operator actions. Similar clarifications have been made to other annunciator response procedures for ventilation systems.

Training on Procedure BwAP 100-20, "Procedure Use and Adherence," has been given to Site personnel. The training discussed procedure usage requirements and expectations including actions required when a procedure can not be performed as written.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATION (Examples 1b and 1c):

Seven hundred annunciator response procedures for plant ventilation systems have been reviewed and evaluated by Engineering for clear, concise actions which ensure operation within the design basis. Approximately 500 procedures will be revised by December 31, 1995.

Remaining annunciator procedures will be reviewed for the same purposes by Engineering as part of the two year review cycle.

All station procedures that allow "Shift Engineer discretion" will be reviewed to ensure operator required actions are clearly stated. This review will be completed by December 31, 1995.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED (Examples 1b and 1c):

Full compliance was achieved with approval and implementation of the revised battery room ventilation annunciator procedures on August 10, 1995.

ATTACHMENT I

**REPLY TO A NOTICE OF VIOLATION
INSPECTION REPORT 50-456/457/95014**

VIOLATION (50-456/457/95014-02):

2. 10 CFR Part 50.59, "Changes, Tests, and Experiments," requires, in part, that the licensee shall maintain records of changes in the facility and that these records must include a written safety evaluation which provides the basis for the determination that the change does not involve an unreviewed safety question.

Contrary to the above, on July 19, 1995, the licensee changed the configuration of the 211 battery room ventilation system by installing a portable fan and did not perform the required safety evaluation to demonstrate that the change would not result in an unreviewed safety question.

This is a Severity Level IV violation (Supplement I).

REASON FOR THE VIOLATION:

The System Engineer failed to apply design basis knowledge to recognize the nature of a change to system configuration.

Contributing to this violation were inadequate questioning attitude, failure to trend and aggressively solve the fan tripping problem, inadequate supervision of a poor performer, and inadequate communication by the System Engineer with his peers and supervisor.

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED:

The System Engineer involved in the event was removed from work on safety and other related systems. This work has been reassigned.

A design change to modify the VE System circuitry to resolve the fan tripping problem has been issued. Temporary alterations have been installed on both units for the VE fan circuitry to eliminate the fan trip until the permanent modifications can be installed.

The Technical Services Superintendent met with all System Engineers to convey the seriousness of this event and to stress the need to follow procedures and have a questioning attitude in the application of design basis knowledge.

Supervisory oversight of other below average System Engineers increased while efforts are made to remediate them.

Station management clarified its intent to transfer individuals who cannot be remediated to positions more suited to their abilities.

The addition of experienced engineers to System Engineering will continue. Two SRO certified individuals have been added recently.

License certification training has been completed for about one third of the System Engineers and will continue until the majority are trained.

ATTACHMENT I

**REPLY TO A NOTICE OF VIOLATION
INSPECTION REPORT 50-456/457/95014**

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED (Continued):

Operating and Engineering personnel were interviewed regarding the existence of material conditions that might inhibit optimum plant operation. All conditions identified were found to be in the process of being addressed or corrected.

System Engineers will continue to conduct walkdowns of all systems accompanied by their group leaders, other senior plant management, ComEd Nuclear Engineering Chiefs, or the Vice President of Engineering. During these walkdowns: expectations and standards are reinforced; questioning attitudes are fostered; trends, adverse conditions, and solutions to equipment problems are discussed, and engineers are rated on their system knowledge.

Plant walkdowns identified 24 potential unanalyzed alterations. Evaluations showed that for those items that met the temporary alteration criteria, none of them involved immediate operability or safety significant issues. Items meeting the criteria have either been removed or been documented as approved temporary alterations.

Personnel awareness of temporary alterations has been heightened by focused communications, including a front page article in the daily station newspaper which is being followed up by individual department tailgate meetings.

System Engineers have received a guideline for a standardized process for determining the root causes of equipment problems.

Subsequent to the event, an evaluation was performed to determine if any unreviewed safety question existed at the time the unauthorized temporary alteration was installed. It was determined that the event had minimal safety significance.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATION:

Additional training on the station's temporary alteration procedure is being given to personnel in the Operations, Maintenance, Engineering and other departments, as appropriate. The training will focus on the recognition of changes to plant design and the appropriate documentation for them. Training is expected to be completed by June 30, 1996.

Seminars to enhance use of design basis knowledge through the resolution of simulated problems are being piloted for ventilation systems.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED:

Full compliance was achieved upon removal of the unauthorized temporary fan on July 21, 1995. A subsequent evaluation determined that the event had minimal safety significance.

ATTACHMENT II

**REPLY TO A NOTICE OF VIOLATION
INSPECTION REPORT 50-456/457/95010**

VIOLATION (50-456/457/95010-01):

10 CFR Part 50, Appendix B, Criterion XVI, requires that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.

Contrary to the above:

The poor material condition of the auxiliary building floor drain system, which resulted in the system's inability to fulfill its design function, was not promptly corrected.

This is a Severity Level IV violation (Supplement I).

REASON FOR THE VIOLATION:

Braidwood had no surveillance to check the condition of the leak detection sumps or auxiliary building floor drain piping; therefore, the poor condition of the plugged drain piping was not known. As a result, water backed up from the plugged floor drain in the 1A RHR system pump room on August 1, 1995.

Additionally, inspections performed by the System Engineer in June 1995 identified debris and other deficient conditions associated with the leak detection sumps. Although these deficient conditions did not result in this event and violation, they are significant material condition issues that if not addressed, could lead to more serious events. These problems were documented as action requests. The auxiliary building floor drain system and the leak detection sumps are not safety-related, nor are they support systems for safety-related components; therefore, the action requests were assigned a normal, routine priority.

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED:

When the 1A RHR pump room drain was found plugged, the Station cleared the drain utilizing the hydrolazing process, restoring the drain's ability to function as designed.

All the leak detection sumps were cleaned of debris.

A review of the auxiliary building flood calculation was performed to determine the relative importance of the various room and area floor drains with respect to the equipment in those areas, and the assumed outflow from the room in an internal flooding event. Based on the review, a plan was developed and hydrolazing was completed for designated auxiliary building drains.

A 10 CFR Part 50.59 Safety Evaluation was performed to evaluate the nylon mesh strainer baskets installed in floor drain bowls. This safety evaluation indicated that there was no unreviewed safety question and no change to the UFSAR was needed.

ATTACHMENT II

REPLY TO A NOTICE OF VIOLATION INSPECTION REPORT 53-456/457/95010

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED (Continued):

The System Engineer took action to ensure that leak detection sump level switches are calibrated on an appropriate frequency. Those switches that did not meet the acceptable calibration frequency period have been calibrated.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATION:

The existing surveillance for changing drain basket strainers is undergoing a major revision to specifically indicate which drain strainers need to be changed and on what frequency. It will also include documentation and information on what type strainers are acceptable. This surveillance will be approved for use by March 31, 1996.

A new surveillance is being written to perform periodic verification that floor drains in the auxiliary building are clear and free flowing. Different frequencies will be set based on the results of the flooding calculation reviews and evaluation of the limited amount of historical data available from past drain cleaning. This surveillance will be approved for use by March 31, 1996.

A new surveillance is being written to periodically inspect and clean all the leak detection sumps. The inspection criteria will include identification of degradation of weir plates, accumulation of debris, and damage to gratings and level switches. This surveillance will be approved for use by March 31, 1996.

Engineering has provided further guidance for ensuring that leak detection sumps and drains remain free of uncontrolled material and are available to mitigate the consequences of an internal flooding event.

A Document Change Request was initiated to revise the floor drain detail drawings to indicate that nylon strainer baskets may be present.

Enhancements to the material condition of the leak detection sumps are being evaluated by Engineering and will be implemented as appropriate following the evaluation.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED:

Full compliance was achieved upon completion of cleaning the leak detection sumps and completion of hydrolazing the floor drains.

ATTACHMENT III

ACTIONS TO RESOLVE AUXILIARY BUILDING VENTILATION SYSTEM PROBLEMS INSPECTION REPORT 50-456/457/95010

A significant material condition issue facing Braidwood Station is concerned with the Auxiliary Building Ventilation (VA) System. Design problems and equipment failures contributed to the violation for the fire door impairment that was identified in Inspection Report 50-456/457/93022. Recently, the VA System experienced a catastrophic failure of the A exhaust fan. Following is a description of the A exhaust fan failure, the root cause, the evaluation of options, identification of immediate actions, and implementation of the plan.

Description of the Event:

The A auxiliary building exhaust fan, 0VA02CA, catastrophically failed on November 7, 1994, at approximately 10:20 A.M. System Engineering and Corporate System Materials Analysis Department inspected the failed fan on November 8. All but two of the first stage blades and all of the second stage blades were severed. The first stage blades had broken off at different distances from the root; thirteen from five to six inches and one at the root. The fan's shaft turned easily and showed no signs of bearing failure. Some blade tips found on the floor exhibited no signs of rubbing on the fan housing. Many welds were broken on the fan housing and most of the pillow block fasteners were loose from the fan running out of balance. Vibration readings taken by System Engineering three times within a month of the failure indicated no sign of a problem. An Operator was beside the fan checking oil levels within one and one half hours of the failure and observed nothing unusual.

Root Cause Analysis:

A root cause analysis of the failed fan was performed and documented on August 2, 1995. The analysis concluded that 0VA02CA failed due to cyclic fatiguing of its blades while operating in a stall or near stall condition. This conclusion is supported by the following: the operating point of the fan was in and/or near the stall region; the physical evidence from the blade fracture locations and appearances; and the expert opinion of Dr. John Murphy, retired Manager of Engineering at Joy Technologies, manufacturer of the fan.

Options Evaluated:

ComEd has reviewed various options to restore the VA exhaust fan availability and ensure the system design basis is maintained. The Engineering recommendation is to replace the existing cast aluminum blade assembly with a forged aluminum design on the A and B exhaust fans. The forged blades offer superior resistance to fatigue cracking and will improve the fan availability. In a parallel effort, Engineering will identify practical duct modifications to reduce the system resistance to improve the fan operating point on the fan curve. The basis for this recommendation comes from the benefit of re-establishing dual fan operation, restoring airflow margin and improving the material condition of the VA System.

The lead time for the forged blades is estimated at 40 weeks; therefore, procurement of the forged blades will be the critical path to restoration of the VA exhaust fans. In parallel, the duct modifications will be evaluated for implementation.

- ATTACHMENT III

**ACTIONS TO RESOLVE AUXILIARY BUILDING VENTILATION SYSTEM PROBLEMS
INSPECTION REPORT 50-456/457/95010**

VA System Plan:

The plan to return to four fan operation involves several actions to be performed for all the fans in the VA system. Currently, the plan is to repair 0VA02CB and replace 0VA02CA. The rotor assemblies of these two fans will incorporate a forged aluminum blade in lieu of the cast aluminum blades to offer superior fatigue resistance. Currently, exhaust system ductwork modifications that will improve the exhaust fan's operating point are under review for potential implementation. Planned maintenance is scheduled for the balance of the VA supply and exhaust fans. Additionally, options are being pursued to address the impaired fire door documented in violation 50-456/93022-01; 50-457/93022-01.

Due to the long lead time of the forged blades, the plan includes repair of the 0VA02CB fan with the original cast blades. Once the replacement for 0VA02CA and the rotor assembly for 0VA02CB arrive, final modifications and acceptance testing of the VA system will be performed.

On October 18, 1995, one of Byron Station's VA supply fans experienced a catastrophic failure. Braidwood Engineering representatives traveled to Byron to learn what had occurred and to share information. We believe this event is applicable to Braidwood and we will continue to interface with Byron personnel throughout the evaluation of the event. Results of this evaluation will be incorporated into the maintenance and modification of the VA system.