U. S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO.(s) 50-456/95014(DRS); 50-457/95014(DRS)
EA 95-174

FACILITY

Braidwood Station
License No.(s) NPF-72; NPF-77

LICENSEE

Braidwood Station
Commonwealth Edison Company
R.R. #1, Box 84
Braceville, IL 60407

MEETING

Pre-Decisional Enforcement Conference
September 21, 1995
Region III Office
801 Warrenville Road
Lisle, IL 60532

DATES OF ORIGINAL INSPECTION

July 17 through August 21, 1995

INSPECTORS

E. Cobey, Reactor Inspector

APPROVED BY

Mark A. Ring, Chief
Lead Engineers Branch

10/10/95
Date

INSPECTION DETAILS

1. Persons Present at Conference

K. Strahm, Vice President PWR Operations, Corporate
K. Kaup, Site Vice President
T. Tulon, Station Manager
D. Cooper, Operations Manager
B. Kerr, Engineering Manager
D. Miller, Technical Services Superintendent
K. Bartes, Regulatory Assurance Supervisor
L. Weber, Shift Operations Supervisor
M. Andrews, Shift Engineer
J. Muraida, Site Engineering
S. Trubatch, Attorney
T. Gierich, Operations Manager, Byron
E. Connell, Design Engineering Superintendent, Dresden
P. Holland, Regulatory Assurance Supervisor, Dresden
J. Madden, Regulatory Assurance Supervisor, Zion
J. Van Laere, Assistant System Engineering Supervisor, Byron
D. Galanis, Design Engineering, Zion
M. Molaci, Design Lead, Dresden
S. Reece-Koenig, Nuclear Licensing, Corporate
T. Prendergast, Nuclear Licensing, Corporate
B. Renuart, Chief, Configuration Management, Corporate
N. Brennan, Corporate

U.S. Nuclear Regulatory Commission

H. Miller, Regional Administrator, RIII
A. Beach, Deputy Regional Administrator, RIII
G. Grant, Director, DRS, RIII
J. Grobe, Acting Deputy Director, DRS, RIII
G. Wright, Acting Deputy Director, DRP, RIII
M. Ring, Chief, Lead Engineers Branch
E. Cobey, Reactor Inspector, RIII
E. Duncan, Resident Inspector
M. Kunowski, Resident Inspector
B. Burgess, Director, EICS, RIII
P. Pelke, Enforcement Specialist, RIII
M. Satorius, Sr. Enforcement Specialist, NRR
R. Assa, Project Manager, NRR
Z. Falevits, Reactor Inspector, RIII
P. Lougheed, Reactor Inspector, RIII

Illinois Department of Nuclear Safety

J. Roman, Illinois Resident Inspector

2. Pre-Decisional Enforcement Conference

A Pre-Decisional Enforcement Conference was held in the NRC Region III Office on September 21, 1995. This conference was conducted as a result of the

inspection findings of an inspection conducted from July 17 through August 21, 1995, in which apparent violations of NRC regulations were identified. The inspection findings were documented in Inspection Report Nos. 50-456/457/95011(DRS), transmitted to the licensee by letter dated August 29, 1995.

The purpose of this conference was to discuss the apparent violations, root causes, contributing factors, and the licensee's corrective actions.

The licensee's presentation included acknowledgement of the apparent violations which had occurred, a discussion of the incident's safety significance, a discussion of the circumstances which caused the event, and an outline of corrective actions taken or planned.

The NRC representatives questioned the licensee to clarify the extent of the licensee's investigation and corrective actions.

A copy of the licensee's handouts for their presentation is attached to this report.

Attachment: As stated

BRAIDWOOD

BATTERY 211 VENTILATION FAN

SUMMARY OF ENFORCEMENT CONFERENCE PRESENTATION

SEPTEMBER 21, 1995

REGION III
LISLE, ILLINOIS

CONTENTS

VIOLATIONS: CAUSES AND CORRECTIVE ACTIONS

VIOLATIONS ADDRESSED

FAILURE TO PERFORM SAFETY EVALUATION

FAILURE TO PERFORM OPERABILITY ASSESSMENT

INADEQUATE ANNUNCIATOR RESPONSE PROCEDURE

FAILURE TO FOLLOW ANNUNCIATOR RESPONSE PROCEDURE

EVALUATION OF SAFETY SIGNIFICANCE

Evaluation shows that events had minimal safety significance. Events did not result in conditions necessary to change core damage frequency.

Situation Evaluated:

Impact of inoperability of battery exhaust ventilation system on the operability of the 125-Volt D. C. system, with and without alternative ventilation.

Operability Criterion:

Exhaust ventilation system designed to limit hydrogen concentration in the battery area to less than 2% by volume (one half of minimum explosive concentration).

Evaluation Methodology:

Calculation shows that with no ventilation and battery in float charge, hydrogen concentration would reach 2% in slightly more than 15 days, assuming homogeneous distribution of hydrogen.

With ventilation provided by a fan and all other conditions as described above, hydrogen is expected to concentrate at a lower rate.

For the actual room conditions, direct measurement supports the assumption that hydrogen will distribute itself homogeneously. Measurements of hydrogen concentration over a 15 day period in the battery area with no ventilation showed that there were no measurable concentrations -- "pockets"-- of hydrogen.

Actual airflows in the battery area were measured and shown to vary substantially with changes in the balance of the main ventilation system. No credit has been taken for these flows in the calculations.

Actual Situation:

Event	Duration	Battery Status
Nov. 22-Dec. 2, 1994	11 days	continuous float charge
July 19-July 22, 1995	4 days	continuous float charge

Conclusion:

Circumstances of the two events did not result in calculated hydrogen levels that could increase the probability of actual inoperability of the batteries.

Violation:	Failure to perform safety evaluation
Root Cause:	System engineer failed to apply design basis knowledge to recognize nature of change to system configuration
Contributing Causes:	Inadequate questioning attitude
	Failure to trend and aggressively solve fan tripping problem
	Inadequate supervision of poor performer
	Inadequate communication by system engineer with peers and supervisor
Corrective and other Actions:	System engineer removed from work on safety related systems. Work has been reassigned.
	Fan tripping problem will be resolved by modification to be issued by October 20, 1995.
	Technical Services Superintendent met with all system engineers to convey seriousness of this event and stress need to follow procedures and to develop 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.
	Clarified management's intent to transfer individuals who cannot be remediated.
	Seminars to enhance use of design basis knowledge through the resolution of simulated problems will be piloted for ventilation systems.
	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.
	Operating and engineering personnel were interviewed regarding the existence of material conditions that might inhibit optimum plant operation. No new conditions were identified.

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 corrections to equipment problems are discussed; and engineers are rated on their design basis knowledge.

Plant walkdowns identified 24 potential unanalyzed temporary alterations. Evaluations showed that none of them involved immediate operability or safety significant issues. These items have either been removed or been documented as approved temporary alterations.

Personnel awareness of temporary alterations has been heightened by focused communications, especially a front page article in the daily station newspaper. Follow up departmental tailgate meetings will begin in mid-October.

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

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

Violation:	Failure to perform operability assessment
Root Cause:	Operations staff lacked sufficient design basis knowledge to recognize change as temporary alteration to a necessary support system
Contributing Causes:	Inadequate application of questioning attitude due to broad acceptance of continued fan problems
	Inadequate supervisor involvement
Corrective Actions and Other Actions:	All shift engineers 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 is being developed by the operations department and will begin October 16, 1995.
	Current system specific training will be reviewed for the adequacy of design basis and PRA information. This action will be performed for the ventilation systems by December 31, 1995.
	Training is currently ongoing for first line supervisors. Included are human performance standards, material condition and supervisor accountability.
	Operating will be trained on the station's procedure for temporary alterations. Training will focus on recognizing temporary alterations and will be completed by June 1996.
	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 bring them promptly to management's attention for timely resolution.

Violations: Failure to provide adequate annunciator response procedure and failure to follow annunciator response procedure

Root Causes: Lack of ventilation system design basis knowledge

Failure to recognize potential for misinterpretation of discretion in procedure

Corrective Actions: Ventilation procedures have been clarified

- the four annunciator response procedures for battery room exhaust fan high differential pressure have been revised to clarify the required operator actions
- explicit mention of discretion has been deleted in three of five other annunciator procedures where choice of action is limited

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.

Training on Procedure BwAP 100-20, "Procedure Use and Adherence," has been ongoing through the month of September for Site personnel. The training discusses procedure usage requirements and expectations including actions required when a procedure can not be performed as written.

ATTACHMENT

RESPONSE TO NRC ITEMS SUMMARY

Concerns	Response
1) Safety Significance	Shown to be minimal.
2) Root and Significant Contributing Causes	- System Engineer failure to apply design basis knowledge - Inadequate management response to known weak system engineer - Operating Department lack of design basis knowledge - Lack of questioning attitude. - Conditioned response to repeated acceptance of deviating condition - Failure to recognize potential for misinterpretation of discretion in annunciator procedure
3) Recurring failure to understand design basis.	- System Engineer failed to apply design basis knowledge - Operations needs more training with design basis - Prior corrective actions focused on knowledge, but failed to address application and was not provided to all operators
4) Failure to recognize configuration change.	Recurring acceptance of replacement fan blunted application of questioning attitude.
5) Adequacy of annunciator response procedures.	Procedures are being reviewed for consistency with design basis.
6) Characteristics of reverse air flow.	Not credited and highly variable depending on VE System status.
7) Potential for hydrogen pocketing.	Tested under actual conditions and nothing significant found.

ATTACHMENT

RESPONSE TO SPECIFIC ITEMS IDENTIFIED IN INSPECTION REPORT

1) The safety significance of the loss of the battery exhaust ventilation system.

ComEd Response:

Evaluation shows that events had minimal safety significance. Events did not result in conditions necessary to change core damage frequency.

Situation Evaluated: Impact of inoperability of battery exhaust ventilation system on the operability of the 125-Volt D. C. system, with and without alternative ventilation.

Operability Criterion: Exhaust ventilation system designed to limit hydrogen concentration in the battery area to less than 2% by volume (one half of minimum explosive concentration).

Evaluation Methodology: Calculation shows that with no ventilation and battery in float charge, hydrogen concentration would reach 2% in slightly more than 15 days, assuming homogeneous distribution of hydrogen.

With ventilation provided by a fan and all other conditions as described above, hydrogen is expected to concentrate at a lower rate.

Direct measurement supports the assumption that hydrogen will distribute itself homogeneously. Measurements of hydrogen concentration over a 15 day period in the battery area with no ventilation showed that there were no measurable concentrations --"pockets"-- of hydrogen.

Actual airflows in the battery area were measured and shown to vary substantially with changes in the balance of the main ventilation system. No credit has been taken for these flows in the calculations.

Conclusion: Circumstances of the two events did not result in calculated hydrogen levels that could increase the probability of actual inoperability of the batteries.

2) The root cause(s) of this event:

ComEd Response:

Violation:	Failure to perform safety evaluation
Root Cause:	System engineer failed to apply design basis knowledge to recognize nature of change to system configuration
Contributing Causes:	Inadequate questioning attitude
	Failure to trend and aggressively solve fan tripping problem
	Inadequate supervision of poor performer
	Inadequate communication by system engineer with peers and supervisor
Violation:	Failure to perform operability assessment
Root Cause:	Operations staff lacked sufficient design basis knowledge to recognize change as temporary alteration to a necessary support system
Contributing Causes:	Inadequate application of questioning attitude due to broad acceptance of continued fan problems
	Inadequate supervisor involvement
Violations:	Failure to provide adequate annunciator response procedure and failure to follow annunciator response procedure
Root Cause:	Failure to recognize potential for misinterpretation of discretion in procedure

3) The recurring nature of the failure of your staff to understand the design basis of the plant and attendant support systems including the adequacy of the corrective actions associated with the Control Room Ventilation event described in Inspection Report 94015:

ComEd Response:

Corrective actions in response to the VC damper battery Enforcement Conference (Inspection Report 94015) provided training to System Engineering, Site Engineering, and some Operating Engineers. This training described the various sources of design basis information along with the kind of information available in each source. It also included a review of events where lack of design basis understanding was a root cause. The training was limited in scope and did not address the application of the design basis.

4) The failure of your staff to understand that the alteration of a safety related support system constituted a change to the configuration of the plant which could have resulted in an unreviewed safety question:

ComEd Response:

Placing a fan in the battery room as alternate ventilation had been an accepted past practice. This contributed to a lack of a questioning attitude with the fan installation.

5) The method Braidwood will use to ensure that all other annunciator response procedures are adequate and when followed will not result in the operation of the plant outside the design basis:

ComEd Response:

Five other annunciator response procedures which allow the use of "Shift Engineer's discretion" have been reviewed. Three of the procedures were revised to more clearly indicate the required operator actions. The remaining two procedures clearly indicate the required actions.

Annunciator response procedures associated with plant ventilation systems (approximately 700 procedures) have been reviewed and evaluated by engineering for clear, concise actions which ensure operation within the design basis. Revisions to approximately 500 procedures are being made and will be completed by December 31, 1995.

All other annunciator procedures are being reviewed and evaluated by engineering, during the regular two year review cycle, for clear, concise actions which ensure operation within the design basis and within approved procedures.

6) The motive force and reliability of the 60 CFM reverse air flow with the 211 battery exhaust ventilation system secured:

ComEd Response:

Potential induction of airflow by the main ventilation system:
A special test was conducted to measure airflows through each battery room during each mode of operation. The test was performed to validate the 60 CFM backflow originally measured in the 211 battery room. The test concluded the 211 battery room flow to be 77 CFM. When airflows for the other battery rooms and for other modes of operation were measured, the magnitude of these flows varied from approximately 0 CFM to 118 CFM. The differences in the airflows in this lineup are attributed to the change from outside air to recirculation modes and/or system balance. The original analysis assumed no airflow.

7) The result of testing to determine the hydrogen distribution in the battery area when the 211 battery exhaust ventilation was secured:

ComEd Response:

Potential for hydrogen pocketing:
A special test was performed to measure hydrogen concentrations in the 211 battery room. Several locations were selected and measured for a fifteen day duration. The test concluded insignificant concentrations of hydrogen were detected for the entire duration of the test.