# U.S. NUCLEAR REGULATORY COMMISSION

## REGION III

Report No. 50-456/87017(DRSS)

Docket No. 50-456

Licensee: Commonwealth Edison Company

Post Office Box 767 Chicago, IL 60690

Facility Name: Braidwood Nuclear Power Station, Unit 1

Inspection At: Braidwood, Illinois and Regional Office

Inspection Conducted: March 5, 1987, (Onsite)

May 4-6, 1987, (In-Office)

Type of Inspection: Announced Special Safeguards Inspection

Inspector: J. R. Kniceley
hysical Security Inspector

Approved By: R. Creed, Chief

# Inspection Summary

Inspection on March 5, 1987 and May 4-6, 1987 (Report No. 50-456/87017(DRSS)) Areas Inspected: Included a review of deviation and investigation reports involving equipment malfunctions for which the cause was not known and potential equipment tampering was possible.

Results: The licensee was found to be in compliance with NRC requirements within the areas examined. The conclusion reached is that the cause of some of the events were directly attributable to personnel or procedural error while the cause of other events could not be determined. There was no evidence developed which showed that any of the events were deliberately intended to cause damage to safety systems.

# DETAILS

# Key Persons Contacted

The inspector met with the licensee's technical and management personnel listed below on March 5, 1987.

E. E. Fitzpatrick, Station Manager

C. W. Schroeder, Services Superintendent

F. D. Willaford, Station Security Administrator

R. Benn, Assistant Security Administrator

T. Simkin, Regulatory Assurance

W. Kropp, Senior Resident Inspector

T. Taylor, Resident Inspector

J. R. Creed, Chief, Safeguards Section, (via telephone)

# 2. Entrance and Exit Interviews (IP 30703)

- a. At the beginning of the inspection, Mr. C. W. Schroeder, Services Superintendent, was informed of the purpose of this inspection was to determine if deliberate equipment tampering was the cause of equipment malfunctions or misalignments.
- b. The inspector met with the licensee representatives denoted in Section 1 at the conclusion of the onsite portion of the inspection on March 5, 1987.
  - (1) The inspector stated and the licensee understood and concurred that an in-office regional review of the licensee's completed investigation report would be completed.
  - (2) The licensee discussed the steps to be taken to investigate and resolve the unexplained equipment malfunctions and deviations. The inspector and Region agreed with the licensee's approach to resolve our concerns and the Resident Inspectors agreed to review and monitor the licensee's progress.
  - (3) On April 29, 1987, the Region received a copy of the licensee's investigation report closing the items of concern. It should be noted that the licensee finished their investigation of these events on March 19, 1987 and the report wasn't received by the Region until April 29, 1987.

# 3. Independent Inspection - Event Follow-up Review (IP 92706)

During a routine review of licensee Deviation Reports (DVR) the Senior Resident Inspector for Construction (SRI) identified four instances of valves being mispositioned for which no cause was known. The SRI informed licensee's management on February 27, 1987, of his discovery and requested them to look into the causes of these valve mispositionings in light of potential tampering. On March 3, 1987 a second request for review was made to the licensee and the Region based Safeguards Section

was notified. The known events were discussed with the Corporate Security Director at that time. Follow-up calls were made to the site Security Administrator on March 4 and 5, 1987. The licensee indicated that an investigative team was being created to review these events.

A Physical Security Inspector was dispatched to the site on March 5, 1987 to review the licensee's team composition and their investigation methodology as well as the progress and findings on that date.

The licensee's investigative team consisted of Senior Station Management, Security, Regulatory Assurance, Operations, and Tech Staff Personnel. The investigative team personnel were chosen based on the experience and talents of personnel in relation to the events being reviewed. Additional events were identified during the investigation by the team and a total of fourteen events were eventually reviewed in detail. The licensee created a final report covering each event which includes a description of the investigation effort, including information from interviews, photographs and supporting information such as procedures, out-of-service records, operating logs, etc.

The details of these events and the licensee's review are enclosed in the "Summary of Events of Concern" which were provided to Region III on April 29, 1987.

In general, the licensee concluded that the events reviewed did not represent a security threat. Four events were attributable to personnel or procedural error while the cause of the other ten events could not be determined.

During the course of the licensee's investigation which ran from March 5-19, 1987 almost daily contact onsite between the resident inspectors and the licensee's team showed that their approach was sound and their conclusions correct. Repeated frequent updates on the progress and conclusions of the investigation were also provided to the Safeguards Section Chief by phone. The direct monitoring showed that the licensees conclusions and actions were adequate.

The licensee concluded that due to a high level of construction activity in areas of the plant, there is an ongoing potential that valves and breakers can be accidentally bumped or knocked into an undesired position, without the knowledge of the responsible individual. In the events where the cause is not known there is no basis to believe that tampering occurred but rather the inadvertent misalignment due to work activities in the area is most probable.

As a result of the events the licensee has taken the following actions to deter future potential incidences. Actions, by the licensee through awareness sessions should make craft workers more aware of this potential and if necessary immediately report those cases where a valve or breaker has been moved. Long term corrective actions include a three phase B-man training program; a precritical, three verification valve lineup check and development of an Independent Methodology Verification Review Program.

The attachment (Summary of Events of Concern) contains a description and summary of the 14 events. Other supporting documents are maintained in the licensee's Final Documentation Package which includes detailed information of each event and description of the investigation effort which supports their conclusions.

On April 29, 1987, the Region received a copy of the licensee's investigation report closing the items of concern. The Resident Inspectors and Regional Security Inspector reviewed the report and concluded that the licensee did an adequate job in investigating the events. Although, no evidence was developed to show that the events were deliberately caused, it is possible that some of the events were deliberate and caused by person(s) unknown.

It is our conclusion that of 14 events reviewed 10 of them may have been intentional tampering. The actions taken by Braidwood station personnel will reduce the potential for vandalism and equipment tampering. It is apparent that as long as there is a high level of construction activity at the plant with routine construction layoffs when work is completed, there is a potential for vandalism or tampering. As events occur the licensee needs to review and resolve these matters in an expeditious manner. Actions should be taken at first hint of potential problems.

Attachment: Summary of Concerns

ATTACHMENT &

Summary of Events of Concern

12150.

EVENT 1: DVR,20-1-87-024, dated 1/14/87; lA Diesel Generator Lube Oil Strainer Outlet Valves in incorrect position following a mechanical line up.

The lA Diesel was successfully run for a Monthly Operability Surveillance on 12/3/86 and determined to be operable. On 1/5/87 the lA Diesel was taken OOS for maintenance. A review of documentation on Diesel lube oil temperatures has determined that the valves in question had to be in their normal and correct position (open) between the dates of 12/3/86 and 1/5/87 at the time the diesel was taken Out of Service (OOS) for maintenance. Pre-lube oil pump and heater were part of the OOS. The Oil Strainer Outlet Valves, although not part of the OOS, could have been closed to facilitate maintenance on the pre-lube oil pump or in draining the oil sump since the oil was drained and replaced. There will be additional investigation in an effort to determine the particulars concerning the closure of the valves during the maintenance outage.

The Lube Oil Strainer Outlet valves were found to be closed during normal return to service testing following maintenance on the diesel generator. Refer to appropriate tab for detailed information on investigation.

# Status as of 3/11/87:

The Lube Oil Strainer valves were closed during the maintenance outage to facilitate removal of oil from the oil sump. The handle from one valve was also removed at the time of valve closure. The evidence gathered at this point suggests that the cause of the valve misalignment was personnel/procedural error. There is nothing to suggest tampering as a factor in the valve misalignment.

#### Conclusion:

Equipment tampering was not a factor in this event. The inadvertent misalignment is attributed to personnel and/or procedural errors. The special investigation into this event is closed.



EVENT 2: DVR,20-1-87-025, dated 1/19/87. Seismic Monitor inoperable (includes DVR 20-1-87-033).

At 1530 on January 19, 1987, and at 0650 on January 23, 1987, the Technical Staff Engineer responsible for the system found the Seismic Monitor panel de-energized locally due to the power switch being in the off position. The panel is located in the Unit 1 Aux electric room in which all electrical cabinets were in the process of being painted. During the same time frame IM, construction electricians, and fireproofers were also working in the area. The switches are exposed, in a narrow aisle, and could be bumped accidentally. The event had no effect on the health and safety of the plant or public. There are three passive recording accelerometers mounted in the field to record a seismic event. There is no basis for concluding intent or lack of intent for turning these switches off. The monitors in question, however, do not interact with plant operations.

# Conclusion:

The switches were mispositioned by person(s) unknown. There is no evidence to suggest anything other than the inadvertant misalignment of switches regarding the Seismic Monitor. The special investigation into this event is <u>closed</u>.



EVENT 3: DVP 20-1-87-049, dated 2/17/87; Component Cooling Pump
1B Level Trip Valve Out.

There are two lever operated ball valves in water lines to the level transmitter which take only a 1/4 turn for full cycle operation. One (1) of the valves was found fully closed and one (1) valve was only partially closed. Painters were working in the area on 2/17/87 and there were also other craft workers in the area doing general clean-up/clean-out in preparation for Chairman Zech's visit on 2/19/87. The redundant level transmitter remained unisolated and functional.

There is no evidence to indicate that the valves were closed intentionally. The fact that one (1) valve was only partially closed supports the position that the action was not intentional. Either painters or other workers in the area could have closed the valves accidentally; without knowledge of impact; or without intent to disrupt system operation. The location of those particular valves may preclude anyone "tampering" with valves. It would seem much more logical to "tamper" with those valves with more accessibility.

# Status as of 3/11/87:

Investigation is continuing in an effort to determine when the valves were closed. At this time there is no basis for concluding intent, or lack of intent, for closing these valve. Activity in the area prior to discovery does suggest the possibility of accidental misalignment.

### Conclusion:

There is no evidence to suggest equipment tampering as a factor in this event. A probable cause of inadvertent misalignment can be attributed to the work activity in the area and/or to the trouble shooting effort on the CC system trying to locate a water leak. The special investigation into this event is closed.



EVENT 4: DVR 20-1-87-054, dated 2/20/87; No Essential Service (SX) Water Pumps available to Unit 1 due to discharge valve being found closed.

At 0005, 2/20/87, while performing required surveillance to assure Unit 2 Essential Service Water Pump availability to Unit 1, it was discovered that 2A Essential Service Water Pump Discharge valve 2SX143A was closed. The surveillance had been successfully completed approximately 24 hours before.

As of this writing it is not known when the valve was closed or by whom. Operating personnel who had access to the valves during the time of concern will be interviewed on Wednesday, March 11, 1987.

There is a human factors consideration when one looks at both the lA and the 2A Essential Services (SX) Water Pump Discharge valves which could be a factor in one not properly identifying the position of the valves. When viewing, the Unit lA SX pump discharge valve open indication is at approximately 2 o'clock on the valve position indicator, and when shut the indication is at approximately 5 o'clock. On the Unit 2A SX pump discharge valve the indication for shut is at approximately 2 o'clock and the indication for open is at approximately 5 o'clock.

# Status as of 3/11/87:

The investigation is continuing.

# Conclusion:

It has been determined that the 2A Essential Service Water Pump discharge Valve, 2SX143A, was closed by person(s) unknown between approximately 0925, February 19, 1987, and 0005, February 20, 1987. The 2A SX pump had been run on February 19, 1987. The operator at the pump when the pump was secured on February 19, 1987 does not specificallly recall closing the 2SX143A value, however, closing of the valve would not have been unusual. The operator does recall having closed the discharge valve for the SX pump(s) upon shut down of the pump when requested to do so by the NSO. The special investigation into this event is closed.

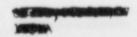
EVENT 5: DVR 20-1-87-070, dated 3/2/87; Isolation of CC Surge Tafk, Isolation Valve 1 CC 128.

On Monday, March 2, 1987, NRC Inspectors found the lCCl28 isolation valve on the CC Surge Tank partially closed. Corrective action was to perform a partial CC mechanical lineup which specified all valves associated with level indication and protective functions.

The valve is located near an aisle area. The valve is a 1/4 turn, full actuation ball valve. A more probable cause for the valve to be out of position is that on Thursday, February 26, 1987, Construction Contractors installed a funnel assembly for chemical addition near the 1CCl28 valve and it is probable that the handle was moved out of the full open position, accidentally or intentionally, to facilitate the installation of the funnel assembly. The construction workers who installed the funnel assembly will be questioned on Monday 3/9/87.

#### Conclusion:

The CC Surge Tank Isolation Valve, 1CC128, was misaligned by person unknown. It is probable that the valve was accidentally, or intentionally, mispositioned by construction workers to facilitate installation of the funnel assembly. The special investigation into this event is closed.



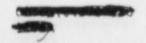
EVENT 6: DVR 20-1-86-090, dated 12/12/86; Cavitation of 1A Residual Heat Removal Pump Due to Isolation of Instrument Air (includes DVR20-1-86-090A).

On December 12, 1986 at 1540, and on December 15, 1986, at 1645 the Unit 1 Nuclear Station Operator noticed fluctuating motor amps and flow oscillation for the 1A RHR pump. The event resulted from isolation of instrument air supply to 1RH606 and 1RH618 flow control valves. Following the event on December 15, 1986 a tie wrap was placed on the instrument air valve handle to hold the valve in position and prevent it from being bumped or knocked into the closed position since there was significant construction work in the area including scaffolding around and above the instrument rack on which the instrument air valve is located. Additionally, a security officer was posted 24 hour/day to keep the valve under surveillance. The Security post was maintained until December 21, 1986 when a CC TV camera with a time lapse recorder was installed to keep the instrument air valve under surveillance. The tie wrap was removed at that time. Instructions were given to the Operating Shift to notify the Security Administration if there was any movement of the Instrument Air Valve. There was no movement of the valve during the time the camera surveillance equipment was in place. The camera was removed January 11, 1987.

The Instrument Air Valve is located on top of the instrument racks with the control lever pointing upward when open. A work order has been written to reposition the valve so the control lever will point downward when open.

## Conclusion

There is no evidence to suggest equipment tampering as a factor in this event. A probable cause of inadvertent misalignment can be attributed to work activity in the area. The special investigation into this event is <u>closed</u>.



# EVENT 7: DVR 20-1-87-072, dated 3/5/87 1CV1128 De-energized.

On March 5, 1987 at 2159, during MODE 3 operation of Unit 1 1CV112B was found de-energized by the loss of light indication for valve position by the NSO on duty. The valve was noted to be open and energized approximately 15 minutes prior to being found de-energized. A "B" operator was immediately dispatched. He found the valve open and the breaker in the "off" position. The elapsed time from discovery to complete restoration was approximately 5 minutes.

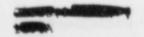
The "B" operator reported that there was no work or personnel in the area.

On March 6, the breaker was inspected and no physical abnormalities were found.

The location of the breaker is near an area where material is often stored prior to being moved through a Security door. Material being improperly handled could have knocked the breaker into the off position.

#### Conclusion:

Breaker lCV112B was de-energized by person(s) unknown. There is no evidence to support a belief that the event was equipment tampering. It is probable that the breaker was inadvertently opened as the result of improper handling of materials. The special investigation into this event is <u>closed</u>.



EVENT 8: DVR 20-1-87-073, dated 3/6/87; Instrument Air to 1SX143/168.

On March 7, 1987, the 1B Auxiliary Feedwater Pump tripped on low lube oil pressure during testing. An immediate investigation was initiated and preliminary results indicated that the trip was due to an abnormally high pressure drop across the engine lube oil filters. This pressure drop is attributed to excessive cooling of the lube oil. The excessive cooling is the result of the instrument air supply to valves 1SX173 and 1SX178 being isolated. These valves supply cooling water to several support components of the Diesel Driven Auxiliary Feedwater Pump, and fail in the open position on loss of air supply. By design, these valves are normally closed and open upon engine start.

There will be additional investigation into the Construction Work activity during the week of March 9, 1987.

## Conclusion:

The instrument air valve to 1SX173/168 valve was closed by person(s) unknown. The Tech Staff Engineer recalls construction scaffolding in the area of the valve on February 18, 1987, however, the date the scaffold was removed could not be determined. The valve could have been inadvertently misaligned during removal of the scaffold. The special investigation into this event is closed.

EVENT 9: Failure of Release Tank Flow Control Valve, OAOV-WX302, to operate.

The release tank flow control valve, 0AOV-WX302 failed to open during an attempt to begin a liquid release at  $\approx 1915$  on 3/10/87.

Investigation revealed that the instrument air isolation valve to 0WX302 was closed (tightly closed). The air valve was opened and a normal liquid release followed. A normal release through this flow path (0WX302) was completed at 0502 on 3/10/87. This was the most recent operation of 0WX302; thus, the air isolation valve had to be mispositioned (closed) between 0502 and 1915 on 3/10/87. The valve 0WX302 fails closed on a loss of instrument air.

There were no out-of-services or maintenance on the system, or on any associated system which could contribute to the valve closure. Construction work was being performed in the area and any individual with protected area access would have access to the valve in question. There is no evidence to support any specific cause (reason) for the valve closure. The system is not safety related.

# . Conclusion

The valve was closed by person unknown. There is no evidence to support a motive, however, the result had minimal impact on the Station and the event could not impact on the health and safety of the public. The special investigation into this event is closed.

Event 10: Manual Discharge Valve (OWX871) for Pump (OWX52)
Found Open

This valve, 0WX871, is the manual discharge valve for pump 0WX52P. An out-of-service card, 87-0-912 was on the valve that had been hung on 2/23/87. No temp lifts were in force at the time. The out-of-service was lifted, the valve closed, and the out-of-service rehung. The pumps and associated tank (regen waste drain tank, 0WX25T) are being worked on to repair damage from tank overpressurization. There were no personnel in the area at the time of discovery.

The OWX871 valve is located in a valve aisle on the Unit 2 side of the auxiliary building. Anyone with vital area access would have access to the valve. The valve is located such that accidental movement of the valve is not likely. There is major work and painting in an adjacent room where gas decay tanks are located.

## Conclusion

The OWX871 was either opened by person(s) unknown or the valve was in the wrong position (closed) when the OOS was hung 2/23/87. The special investigation into this event is closed.

Event 11: DVR 20-1-87-088, dated 3/11/87; 1B Diesel Generator Engine Lube Oil Pressure Mechanical Trip Isolation Valve (HV 14C) Found Closed.

At 0246, 3/11/87, 1B Diesel Generator was 23 hours into a 100 hour run when it was shut down for maintenance. At 1055, the 1B Diesel was started however, there was a trip  $\gtrsim$  20 seconds after the start. At 1130, the 1B Diesel was again started and tripped after  $\approx$  20 seconds. A third start was attempted at 1315 and again a trip after  $\approx$  20 second. The only alarm up on each trip event was "incomplete sequence". There was troubleshooting between each start attempt. At 2300 it was noticed that the HV-14C was throttled almost closed. An adjacent valve HV-26K was also closed. Following discovery of the HV-14C valve, a complete lineup check was made to assure all valves were in their proper position. The 1B diesel was successfully started at 2400, 3/11/87.

It is probable that this event was the result of personnel error. The trip isolation valve (HV 14C) is located next to two (2) valves (HV 26K & HV 26J) which are normally throttled to reduce fluctuations seen by a filter high differential pressure switch. The isolation valve (HV 14C) is located immediately above the differential pressure switch and could easily be mistaken as one of the isolation valves (HV 26K & HV 26J) valves associated with the differential pressure switch.

Consideration has been given to the fact that since the valve was not completely closed, it is possible that the diesel could have operated normally during the 23 hour run, or part of the run, preceeding the outage. The position of the valve, however, could have prevented proper operation of the system during diesel start.

## Conclusion

This event is not equipment tampering. The event is being attributed to personnel error in which an individual closed (throttled) the HV14C valve by mistake thinking he was throttling the root valve for the dP switch which is located next to HV14C valve. The special investigation into this event is closed.

Event 12: DVR 20-1-87-089, dated 3/12/87; 1A Aux FW Pump Lube Oil Cooler Outlet Valve Found Unlocked and Open

During the monthly surveillance at 0255, 3/12/87, of Essential Service Water System, the outlet valve, SX2102, for 1A Aux FW Pump Lube Oil Cooler was found unlocked and closed. The valve should have been locked open. The valve was repositioned to the open position and locked in place at 0350, 3/12/87.

The Aux FW Pump was last run at 0958 to 1049 on 3/7/87. There have been no out-of-services on the system since 3/7/87.

Investigation has determined that the SX2102 valve had been throttled (closed) "way down" for the pump run on 3/7/87 because of low temperature of the SX water serving the lube oil cooler. The valve was left in the unlocked throttled position following the pump run on 3/7/87.

#### Conclusion

This event is not equipment tampering. The event is being attributed to procedural deficiency with regard to valve position after equipment shutdown. The special investigation into this event is closed.

Event 13: DVR 20-1-87-091, dated 3/12/87; lA DG Fuel Oil Filter DP Instrument Low Side Root Stop Instrument Shut Off Valve HV26K Found Closed.

On March 12, 1987 at approximately 0905 Valve HV26K, fuel oil filter DP Root Valve was found closed. An Ml Valve Lineup on the IA DG had been conducted earlier in the day and was completed with independent verification at approximately 0600, 3/12/87.

Investigation determined that the valve, HV26K, had been observed in the closed position (throttled - no threads showing) at approximately 0100, 3/12/87.

### Conclusion

This event is not equipment tampering. Based upon the evidence, it appears that the event resulted from personnel or procedural error in conducting the MI Valve Lineup. The special investigation into this event is <u>closed</u>.

EVENT 14: 1B Steam Generator Blowdown Upstream Isolation Valve, 1SD004C, Closed.

A review of chemistry data showed chemistry samples were obtained from the 1B Steam Generator on March 12, 1987 at 0915 but were not available on March 13, 1987 at 0900. A subsequent walk down of the system was conducted by operating personnel at which time the 1SD004C, S/G Blowdown Sample Upstream Isolation Valve was discovered closed. Since there are two blowdown paths there can be no certainty that the 1SD004C valve was the only reason for the inability to obtain a sample on March 13, 1987. A valve lineup on the system was conducted on February 6, 1987 which verified 1SD04C valve to be in the open position.

### Conclusion

Either an error was made in the valve Position Verification or the valve was closed by person unknown. There is no evidence to support a motive in either case and the event had minimum impact on the Station. The special investigation into this event is closed.