DRESDEN STATION

REACTOR RECIRCULATION PUMP RESTART EVENT
LLRT FAILURE EVENT
PROCEDURAL ADHERENCE

ENFORCEMENT CONFERENCE
MARCH 9, 1995

NRC REGION III

AGENDA

Introduction	Tom Joyce
Procedural Adherence Issue Discussion	Joe Eenigenburg
Corrective Actions	Jerry Tietz
Conclusions	Tom Joyce

Attachment 1 - Reactor Recirculation Pump Restart Event

Attachment 2 - LLRT Surveillance Event

PROCEDURAL ADHERENCE ISSUE DISCUSSION

- Historically, procedural adherence has been a challenge for Dresden Station

  - "Production Mentality," keep the units operating
  - Acceptance of poor procedure quality
  - Slow, inefficient process for procedure changes
  - Acceptance of low standards of human performance

- Current Evaluation of Issue

  - Recent actions to address procedure adherence

    - Maintenance Departments stopped work and created interim standards
    - RAD worker performance and procedure adherence expectations
    - Operating Department Standards
    - Specific actions focused to individual actions or departments

  - Site Quality Verification Analysis

    - 60% of problems were due to a belief that procedure adherence meant meeting the "intent" of the procedure or actions taken based on previous success

- Procedure Project Team - Contributing Factors

  - Perceived schedule pressures
  - Contradictory administrative guidance
  - Some weak procedures
  - Cumbersome procedure change process
  - Materiel condition weaknesses
  - Failure to challenge poor procedure compliance decisions by supervision

■ Root Causes

- Failure to set/reinforce high standards

  - Inadequate communication of expectations to workers and failure to reinforce these expectations

- Focus on program/process and not the workforce

  - Approach has been to fix the process (i.e., Procedure Upgrade Program)
  - We did not engage the workforce as part of the solution
  - We attempted to proceduralize standards instead of instilling those standards in our workforce

- Immediate Actions

  - February 8, 1995 - All Station Meetings on the issue of procedure adherence
  - Developed and implemented procedure DAP 09-15, Interim Procedure and Revision Processing
  - Operating Crews provided guidance on having and following the necessary procedures for all activities
  - Guidance provided to shift managers on determining when a procedure is necessary
  - SQV Audit of Chemistry Procedures

- Short Term Results

  - Increase in Temporary Procedure changes
    - 1994 - 133
    - 1/95 - 7
    - 2/95 - 65
    - 3/5/95 - 6

  - 111 Procedure Inquiries from Operating Department during February
  - Two interim procedures completed under new DAP 09-15
  - Chemistry Procedures revised and implemented
  - RWCU restart delay
  - Unit 2 Diesel Generator Tech Spec decision

- Focus Areas have become a demonstrated management approach for Dresden Station since the August 1994 shutdown of both units. The Focus Areas have been and are being used to raise our standards. As such, we have added Procedure Adherence as a Focus Area.

CORRECTIVE ACTIONS

- Procedure Adherence Focus Area
  - Procedure Adherence Project Team established
  - Corrective actions developed by Team focus on changing habits of personnel as it relates to procedural adherence

- Set Higher Standards
  - DAP 09-13 "Procedure Use"; Clear Definition of Adherence; Stricter Requirements
    - Clearly set the expectation that users STOP when procedures are not adequate/appropriate for the task
    - Removed Supervisors authority to proceed if procedure cannot be performed as written
    - Removed option for Supervisor to deviate from written sequence of steps
    - Defined criteria for tasks that may acceptably performed without a procedure

- Communicate the New Standard
  - Beginning at March 10 Monthly Leadership Meeting

- Recognize Accountability is an element to our success

- Remove Barriers for Success Path

  - On-Shift Resources Provided for Immediate Action
  - Procedure Seminar Training
  - Provide Adequate Time for Procedure Review prior to performing work activity
  - Backlog Reduction
  - Streamline Procedure Change Process

- Monitor Progress

  - Develop Performance Indicators

    - Trend procedure change turnaround time
    - Trend number of significant events with procedure adherence as a cause
    - Trend number of Temporary Procedure Changes outstanding
    - Trend number of Permanent Procedure Changes
    - Site Quality Verification Overview by Field Monitoring
    - Line Management Oversight of Activities to provide reinforcement

- Assess Results

  - Management review of monthly trends
  - Ongoing assessment through focus area

- Conservative Decision-Making

  - Training Seminars For Licensed Operators and Senior Management
  - Importance in day-to-day activities

- Change Process Improvements

  - Technical Specification Change Process to be Formalized

    - Reviewing Byron, Braidwood, LaSalle Processes
    - Will ensure training on the New Tech Specs are performed before they go into effect
    - Will ensure procedures are properly revised and trained on to meet the Tech Specs
    - Recognize the major TSUP will challenge the system; a detailed implementation plan is being formalized

  - Overhaul Training on Procedure Changes

    - Past Methods were Informal
    - More rigorous screening to identify which procedures require training
    - Strengthen the Operator continuous training program in regards to procedure changes

CONCLUSIONS

- We have a clear understanding that procedure adherence standards at Dresden are unacceptably low

- Our approach to correcting this problem must be site wide vs. event by event

- We must focus on the People vs. the Process
  - Leadership must set demanding expectations
  - Confront and reinforce our expectations when standards are not met
  - Continually assess our performance

ATTACHMENT 1

REACTOR RECIRCULATION PUMP RESTART

CHRONOLOGY

1/10/95 At approximately 0800 hours Unit 2 was in steady state operation at 665 MWe. The Instrument Maintenance Department (IMD) was expected to begin work on the 2A Reactor Recirculation Motor-Generator Set (MG set) fluid coupler oil temperature controller. At 0829 hours the Nuclear Station Operator (NSO) received a trip of the 2B Recirculation MG Set on High Oil Temperature (greater than 160 degrees). Actions were promptly taken to control the transient and the reactor was placed in a stable condition by 0900 hours. The trip of the 2B Recirculation MG Set and recirculation pump was caused by IMD personnel working on the 2B fluid coupler oil temperature controller instead of the 2A controller.

At 0930 hours, the operations team was preparing to restart the 2B (idle) recirculation pump. Preparation consisted of a Heightened Level of Awareness (HLA) briefing per Dresden Administrative Procedure (DAP) 07-37 containing review of the applicable procedures, review of the Technical Specifications, and assignment of NSOs to watch Feedwater Heater parameters, reactor vessel water level, reactor power, and recirculation system parameters. During restart preparations, the Unit NSO recognized that the requirements of DOP 0202-01, Reactor Recirculation System Operation, which states that the temperature difference between the reactor bottom head metal temperature and the reactor steam space temperature must be less than 145 degrees F prior to recirculation pump restart, could not be met. The reason for this limit is to minimize the thermal stresses on the penetrations of the bottom head, particularly the Control Rod Drive (CRD) stub tubes. The indicated temperature difference at the time was approximately 158 degrees F. Further investigation revealed that the temperature difference prior to the trip of the 2B recirculation pump was 150 degrees F. The bottom head metal thermocouple reading taken on Unit 3 prior to the scram the night before was reading approximately 20 degrees higher than the thermocouple for Unit 2. This information indicates a potential problem with the accuracy of the indication and with the appropriateness of it's use as a criteria for pump restart. Actions were taken by the team to minimize the thermal stress across the CRD stub tube welds. These actions included minimizing CRD flow and maximizing the flow of the operating recirculation pump.

During review of the Technical Specifications prior to the HLA brief, the Shift Manager recognized that the procedure and the Technical Specification specify

different temperature indications to be used to evaluate the 145 degree F differential temperature requirement. Technical Specification 3.6.H.5, which was amended by Amendment 127 effective July 19, 1994, specifies comparison between reactor drain line coolant temperature and reactor steam space coolant temperature as opposed to DOP 0202-01 (which was revised and issued on November 11, 1994 to in an attempt to meet the amended Technical Specification), which compares bottom head metal temperature and reactor steam space coolant temperature. The drain line coolant temperature indication at the time was reading about 126 degrees F, or approximately equal to drywell ambient temperature. In order for this indication to be an accurate indication of the temperature of the coolant in the bottom of the reactor vessel, there must be flow in the line. The Shift Manager knew that this line was clogged and that the thermocouple was not a reliable indication of the coolant temperature in the bottom of the vessel.

Faced with the decision to start the pump in the midst of this procedural uncertainty or shut down the Unit, the team decided to use alternate temperature indication to meet the requirements of DOP 0202-01 and Technical Specification 3.6.H.5. The alternate indication used was active recirculation loop discharge temperature with an 8 degree offset for conservatism (8 degrees being the difference between reactor vessel bottom head metal temperature before and after the pump trip). The use of this alternate indication, when combined with the actions taken earlier to minimize thermal stress across the CRD stub tube welds, was considered by the team to be a conservative approach to meeting the 145 degree differential temperature requirement of both DOP 0202-01 and the Technical Specification. The team also believed they were following the administrative procedures for procedure adherence, which in some cases allow the procedure to be performed differently than written, although these administrative procedures were not referenced during the event.

An Independent Safety Engineering Group (ISEG) staff member was present in the control room observing the team's recirculation pump start preparation activities. Prior to the recirculation pump start the ISEG engineer questioned the Unit Supervisor as to how the differential temperature requirements of DOP 0202-01 were being met. When the alternate temperature indications were mentioned, the ISEG engineer recommended delaying recirculation pump start until an engineering evaluation could be performed. Shift Management considered his recommendation and also considered submitting a temporary procedure change to use alternate indication. It was believed that a temporary procedure change would alter the intent of the existing procedure, which is not allowed for temporary procedure changes. The Unit Supervisor explained to the ISEG engineer the logic the team was using to justify recirculation pump

start. After this rationale was explained to the ISEG engineer, he did not pursue this line of questioning.

The 2B recirculation pump was restarted at 1051 hrs on 01/10/95.

The participating ISEG engineer brought the event to the attention of the SQV Director on the afternoon of 1/10/95.

OTHER SIGNIFICANT ITEM IDENTIFIED DURING INVESTIGATION

After the initial pump trip, seal purge flow was not isolated. A discrepancy exists between DOP 0202-04/05, Securing the Reactor Recirculation System, and DOA 0202-01, Recirculation Pump Trip, requirements for isolation of seal purge flow.

CAUSES

Root Causes

1. Knowledge Deficiency

A knowledge deficiency in that the licensed operators who participated in this event believed that the requirements of the technical specification were being met. The preliminary G.E. analysis concluded that the 145 degree F temperature difference was not exceeded. However, the operators had no way of definitively measuring the temperature of the bottom head drain line coolant prior to starting the recirculation pump.

2. Procedural Inadequacy

Low station standards in procedural/technical specifications quality, adherence and change implementation. The acceptance of these standards has resulted in procedures that cannot be followed as written, vague procedural guidance which allows non-compliance with procedures under certain conditions, and at least one procedure that does not satisfy technical specifications requirements. Training on procedural changes consists primarily of a required reading program of questionable effectiveness.

3. Judgement Error

Non-conservative decision making by the operations team to restart the 2B pump. The crew recognized that the Technical Specification, applicable procedures, and plant configuration were not in agreement, but used poor judgement in continuing with the restart of the 2B recirculation pump using alternate methods and without pursuing additional guidance.

Contributing Causes

1. Material Condition Deficiency

The reactor vessel drain line is clogged, and has been for many years.

2. Inadequate Engineering Support

The engineering evaluation conducted to justify the use of the reactor bottom head metal temperature to meet the requirements of G.E. SIL 251 (the document discussing idle recirculation pump start issues) when the drain line became unavailable was inadequate.

SAFETY SIGNIFICANCE

The safety significance of the reactor recirculation pump restart event is minimal due to the absence of the conditions necessary to create thermal stratification in the reactor bottom head region prior to the restart of the pump.

IMMEDIATE CORRECTIVE ACTIONS

1. The Shift Operations Supervisor informed operating team members via the Operations Orders that the units will be shut down if a recirculation pump trip occurs until there is consistent documentation to support restart of an idle recirculation pump. (This action has been completed)

2. The Unit 2 Operations Manager discussed the event with the Operations Management Team involved and coached them on conservative decision making. The team now understands that the decision to restart the 2B recirculation pump under these circumstances was a non-conservative decision. (This action has been completed)

3. Each Shift Manager and Unit Supervisor has signed a statement that they understand that literal compliance with Technical Specifications is required except under emergency situations defined by 10CFR50.54(x). (This action has been completed)

4. All-station meetings have been conducted by the station managers concerning the importance of procedural adherence. Discussion included recent instances of procedural non-compliance and the importance of the involvement of each employee in improving station performance in this area. (This action has been completed)

LONG TERM CORRECTIVE ACTIONS

5. A team is being assembled to review the technical specifications and procedures involving technical specifications with the intent of determining other inconsistencies similar to those existing in this event. In addition, the team will review training conducted on recent technical specification amendments to determine what additional operator training is necessary.

6. An engineering evaluation is underway to determine how to comply with Technical Specification 3.6.H.5 and G.E. SIL 251 with the drain line clogged, or if compliance is possible in this degraded condition. The findings of this evaluation will be utilized to reconcile the difference between the technical specification and the procedure.

7. Senior station management will reinforce to the Shift Managers that their primary roles are the overview of plant operations, ensuring compliance with safety requirements and operational standards and reinforcing the importance of conservative decision making. The Shift Managers will be trained on these roles by senior station management and their effectiveness in meeting these expectations will be continuously evaluated.

8. Station management is committed to enforce a high standard of procedural quality, procedural knowledge, and procedural adherence. A special team is meeting to discuss how best to implement this commitment. Additionally, the team will evaluate how to better process and train on procedures and procedure changes.

9. The Operations Department Core Team will continue to evaluate and improve operational standards, with emphasis on the importance of conservative decision making.

10. The Technical Specification amendment review and implementation process will be revised to include an operation readiness review and formal training prior to technical specification implementation to ensure that the proposed amendment is operationally feasible.

11. Conservative Decision Making Seminars will be conducted offsite for all Licensed Operators commencing May 3, 1995 to be completed by June 9, 1995. The seminars will discuss the definition of conservative decision making and the importance of the issue in light of selected operational experience reports, especially SOER 94-01.

12. Conservative Decision Making Seminars will be conducted by the ComEd BWR VP for all Station Senior Management to be completed by June 9, 1995. The seminars have a format similar to item 11 above.

13. Simulator Training will be conducted for all Licensed Operators emphasizing Single Loop Operations and utilizing SOER 94-01 recommendations for conservative decision making. Simulator training to be completed by April 28, 1995.

14. Regulatory Training emphasizing technical specifications, reportability, 10CFR50.54(x) and other pertinent regulatory issues will be provided to all Licensed Operators during an upcoming training cycle. Training to be completed by June 9, 1995.

15. As a follow on action to Immediate Corrective Action #1, an Operations Standing Order is in place that prohibits restarting an idle recirculation pump while operating. (This item is completed)

ATTACHMENT 2

IMPROPERLY PERFORMED LLRT SURVEILLANCE

CHRONOLOGY

1/06/95 On January 6, 1995, the Technical Specification required quarterly operability surveillance of the Torus to Reactor Building Vacuum Breakers 3-1601-31A and 3-1601-31B had been scheduled and was subsequently assigned to a B Operator during the shift briefing. The B Operator believed he was familiar with the surveillance because he had performed Dresden Operating Surveillance (DOS) 1600-13, Suppression Chamber to Reactor Building Vacuum Breaker Full Stroke Exercise Test For 2(3)-1601-31A and B, previously and did not request/require any additional assistance. However, the B Operator had only performed the surveillance to a previous procedure revision (6) and not the current revision (8). The B Operator received the Special Rotating Tool from the Operations Scheduler and a copy of DOS 1600-13 (rev 8) from the Unit 3 Field Supervisor and was instructed to perform the surveillance. DOS 1600-13 was completed, documentation filled out, reviewed and signed off with no apparent discrepancies.

2/03/95 On February 3, 1995, the IST Engineer was reviewing the surveillance documentation and recognized that there had been no Site Engineering involvement when DOS 1600-13 was performed on January 6, 1995. The IST Engineer had been performing the Unit 3 vacuum breaker quarterly operability surveillance since October of 1992. At 1300 on February 3, 1995, the Unit 3 Shift Manager was notified that the possibility existed that the surveillance had been performed by the old method which would require an LLRT (Local Leak Rate Test) to be done to verify containment integrity. The Unit 3 Shift Manager then contacted the B Operator, who had performed the surveillance, and was informed that the old method had in fact been used when performing the surveillance.

The Unit 3 Shift Manager then entered Technical Specification 3.0.A at 1500 due to the uncertainty of Primary Containment integrity. Technical Specification 3.7.A.2.b then initiated an immediate LLRT of the vacuum breaker boundaries.

At approximately 1820, on February 3, 1995, with Unit 3 operating at 99% power, the performance of Dresden Technical Surveillance (DTS) 1600-01, Local Leak Rate Testing Of Primary Containment Isolation Valves, identified the Torus to Reactor Building Vacuum Breaker [BF] Check Valve 3-1601-31B to be leaking an undetermined amount. This value when added to the existing maximum pathway leakage rate resulted in the maximum pathway leakage rate limit for Type B and C primary containment leakage, 488.452 scfh ($0.6L_a$), being exceeded.

The Unit Supervisor was notified of the event. While gathering information for the ENS phone notification, an LLRT identified the Torus to Reactor Building Vacuum Breaker Check Valve 3-1601-31A to be leaking an undetermined amount. An ENS phone notification was made at 2007 Eastern Standard Time on February 3, 1995, to report a degraded condition.

It was determined that Primary Containment was not established and in accordance with Technical Specifications 3.7.A.2 and 3.0.A an orderly Unit 3 nuclear plant shutdown commenced at 1905. An ENS phone notification was made at 2010 Eastern Standard Time on February 3, 1995, to report a Technical Specification required nuclear plant shutdown.

CAUSES

Root Cause

1. Inadequate Procedure.

The procedure for conducting the surveillance, DOS 1600-13, was inadequate in that the labeling listed in the procedure did not match the labeling in the plant. Additionally, the procedure was vague in that it referred to the broom handle as a "special extension tool," that could be confused with the "special rotating tool" of the old revision of the procedure.

Contributing Cause

1. Knowledge Deficiency

The operator conducting the surveillance had not been trained on the new procedure.

SAFETY SIGNIFICANCE

The safety significance of this event is mitigated by the integrity of Secondary Containment [NG] and the function of the Standby Gas Treatment System (SGTS) [BH]. The SGTS is used to maintain a slight negative pressure in the Reactor Building during accident conditions. Filters are provided in the system to remove radioactive particulates, and charcoal adsorbers are provided to remove radioactive halogens which may be present in concentrations significant to environmental dose criteria.

Upon a loss of Instrument Air, the inboard air-operated vacuum breaker butterfly valves 3-1601-20A and 3-1601-20B fail open. This is so that a 0.5 pound pressure differential across the check valve vacuum breaker will cause the valve to open. In an accident situation, there is only the outboard check valve vacuum breaker that would maintain Primary Containment, assuming no leakage restrictions from the hinge pin flanges and using maximum clearance between the hinge pin and the housing and the maximum clearances between the total maximum leakage cross section to Secondary Containment was calculated to be 0.252 square inches.

Calculations were performed to determine the effects of a 1/2 inch opening (0.196 square inches) in Primary Containment discharging to Secondary Containment for LER/Docket Number 90-003/0500237, Potential for Exceeding Leakage Design Basis During Containment Air Sampling Process Due to Management Deficiency. The 1/2 inch opening in Primary Containment. When added to the Technical Specification 3.7.A.2.a.(3) allowed leakage, resulted in a total leakage of 6.33 weight % per day. The results were that the 10 CFR 100, 10 CFR 50 Appendix A and NUREG-0800 regulatory release limits were not violated with the 1/2 inch opening in Primary Containment.

Another study had been performed to calculate the as-found leakage rate past the air-operated valve 2-1601-20A flange for LER/Docket Number 90-018/0500237, Leakage Path Discovered During Primary Containment ILRT Due to Management Deficiency. The as-found leak rate at 48 psig was conservatively calculated at 31 weight % per day. This study concluded that 10 CFR 100 and GDC 19 limits would not have been exceeded.

The leakage from the vacuum breaker check valve hinge pin flanges is blanketed between the leakage described in the two studies. Since the leakage in these two studies demonstrated no limits to be violated, the leakage from the hinge pin flanges would not have violated 10 CFR 100 limits.

IMMEDIATE CORRECTIVE ACTIONS

1. The Torus to Reactor Building Vacuum Breaker 3-1601-31A hinge pin flange bolting was torqued to 148 ft-lbs under Work Request D29548. A "snoop" check of the flange showed no leakage and an as-left LLRT yielded a leakage rate of 5.97 scfh.

2. The Torus to Reactor Building Vacuum Breaker 3-1601-31B hinge pin flange bolting was torqued to 148 ft-lbs under Work Request D29549. A "snoop" check of the flange showed no leakage and an as-left LLRT yielded a leakage rate of 2.03 scfh.

3. The Control Room was notified of the reestablishing of Primary Containment and the reactor shutdown was halted at 2000.

4. Dresden Operating Surveillance (DOS) 1600-13, Suppression Chamber To Reactor Building Vacuum Breaker Full Stroke Exercise Test For 2(3)-1601-31A and B, was then performed to demonstrate operability of the tilting disk check valve vacuum breakers.

LONG TERM CORRECTIVE ACTIONS

5. DOS 1600-13 will be revised to improve procedure clarity (249-180-95-00301) and training concerning these procedural changes will be given to Operations Department personnel during continuous training (249-180-95-00302).

6. Field labeling will be modified to be consistent with the procedure enhancements (249-180-95-00303).

7. All Operating Department IST Surveillances are being revised to ensure the procedure steps are clear and appropriate. The procedures will be revised as necessary to ensure any special equipment or support is clearly delineated. (249-180-95-00304).

8. The process for determining which Operations Department procedure revisions are included as continuous training topics will be evaluated and strengthened where appropriate (249-180-95-00305).

9. This incident will be tailgated prior to the next performance of DOS 1600-13. (249-180-95-00306).