U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/92021(DRSS); 50-455/92021(DRSS)

Dockets No. 50-454; 50-455 Licenses No. NPF-37; NPF-56

Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Byron Nuclear Generating Station, Units 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: October 27-29, 1992

Inspector: J. W. Cormick-Barger for — 11/2/92
H. Simons — Date

J. W. Cormick-Barger for — 11/2/92
C. Cox — Date

J. W. Cormick-Barger for — 11/2/92
T. Ploski — Date

A. Markley — 11-2-92
Date

Accompanying Personnel: T. Reidinger
R. Pugh
J. Hickman

Approved By: J. W. McCormick-Barger — 11/2/92
J. W. McCormick-Barger, Chief — Date
Emergency Preparedness and
Non-Power Reactor Section

Inspection Summary

Inspection on October 27-29, 1992 (Report Nos. 50-454/92021(DRSS); 50-455/92021(DRSS))
Areas Inspected: Routine, announced inspection of the Byron Station's emergency preparedness exercise involving a review of the exercise scenario (IP 82302), observations by seven NRC representatives of key functions and locations during the exercise (IP 82301), and follow-up on licensee actions on previously identified items (IP 82301).
Results: No violations or deviations were identified. Overall exercise performance was excellent. Two minor performance concerns were identified regarding the maintenance of status boards in the Technical Support Center

(Section G.b) and failure of the dose assessment staff in the Emergency Operations Facility to obtain a weather forecast (Section 6.d).

DETAILS

1. NRC Observers and Areas Observed

H. Simons, Control Room Simulator (CRS), Technical Support Center (TSC), Operational Support Center (OSC)
J. Hickman, CRS
T. Reidinger, TSC
R. Pugh, TSC
C. Cox, OSC
T. Ploski, Emergency Operations Facility (EOF)
A. Markley, Field Monitoring Teams

2. Persons Contacted

G. Schwartz, Production Superintendent
M. Burgess, Technical Superintendent
D. Brindle, Regulatory Assurance Supervisor
S. Barrett, Radiation Protection Supervisor
B. McNeill, Emergency Planning (EP) Coordinator
M. Vonk, Senior Engineer, Corporate Emergency Planning
T. Hickernell, Corporate EP Engineer
E. Zittle, NRC Coordinator
T. Tulon, Assistant Superintendent-Maintenance
J. Kudalis, Services Director
W. Grundmann, Safety Quality Verification (SQV) Superintendent
W. Bielasco, SQV Inspector
T. Cierich, Assistant Superintendent-Work Planning
T. Didier, Operating Engineer
P. Sunderland, Scenario Developer
B. Larson, EP Trainer

The personnel listed above attended the NRC exit interview on October 29, 1992.

The inspectors also contacted other licensee personnel during the inspection.

3. Licensee Action on Previously Identified Items (IP 82301)

(Closed) Inspection Follow Up Item No. 454/91006-01: During the 1991 exercise, some information provided in the Joint Public Information Center (JPIC) during news briefings was untimely and unclear.

The JPIC was evaluated during the annual exercise at Braidwood Station and was documented in Inspection Reports No. 50-456/92015(DRSS) and No. 457/92015(DRSS). The licensee's corporate personnel are assigned JPIC responsibilities and would respond to all of the JPICs for the licensee's six nuclear generating stations. The information given to the news media during the Braidwood exercise was timely and informative. Based on the satisfactory performance in the JPIC during the 1992 exercise at Braidwood Station, this item is closed.

4. General

An announced, daytime exercise of the licensee's Generating Stations Emergency Plan (GSEP) was conducted at Byron Station on October 28, 1992. This was an utility only exercise. The exercise tested the licensee's emergency response organization's capabilities to respond to an accident scenario. Attachment 1 describes the scope and objectives of the exercise. Attachment 2 summarizes the exercise scenario.

5. General Observations

The licensee's response was coordinated, orderly and timely. If scenario events had been real, the actions taken by the licensee would have been sufficient to mitigate the accident and permit state and local authorities to take appropriate actions to protect the public's health and safety.

6. Specific Observations (IP 82301)

a. Control Room Simulator (CRS)

The licensee used the simulator for the first time during an annual emergency preparedness exercise which added to the realism of the exercise.

Performance of the Control Room Simulator (CRS) staff was excellent. Procedures were always obtained, referred to, and followed. The operators' actions were well coordinated with other emergency response actions and executed in a timely manner. Operators clearly indicated which procedures were in use and when transitions were made from one procedure to another.

Briefings by the Shift Engineer to the CRS staff were very well done. Information was provided completely yet succinctly. Timely announcements of key information were made to all CRS staff. The transfer of command and control of the emergency response was well done with an excellent briefing and turnover to the Station Director in the Technical Support Center.

Classifications were timely and conservative. The Alert was quickly recognized and the Unusual Event was also recognized after the CRS staff received confirmation that the station auxiliary transformer had been lost.

Although one communicator appeared to be unfamiliar with the Nuclear Accident Reporting System (NARS) and Emergency Notification System (ENS) forms, all notifications were made within the required time frames. In addition, acronyms and abbreviations were used on the NARS form which may not have been understood by the state personnel receiving the message.

No violations or deviations were identified.

b. Technical Support Center (TSC)

The Technical Support Center (TSC) was staffed and activated in a timely manner. Minimum staffing was achieved in approximately six minutes. Command and control was promptly assumed by the Station Director (SD) after the TSC staff had been briefed and he had received a formal turnover from the Shift Engineer in the CRS.

Management and control of the TSC by the SD was effective. TSC directors coordinated actions falling within their areas of responsibility, and in accordance with the correct procedures, to mitigate the emergency. The TSC staff assessed current conditions and took actions, when available, beyond procedural guidance to mitigate and decrease the severity of the accident. In one instance, the Technical Director suggested applying ice to a gear oil cooler and the diesel driven pump oil coolers to initiate inventory recovery in the primary and secondary systems.

Accident assessment and classifications were very good. The emergency action levels (EALs) were properly used to classify the emergency. Primary and secondary plant systems status were continuously reassessed to confirm and upgrade the EAL classification. TSC directors and staff effectively coordinated data exchange and activities to assimilate important information, assessed the current plant status and projected expected plant trends or system degradation. The TSC staff could have made better use of plant drawings when assessing component failure modes or system valve and pump lineups. Specifically, the plant drawings may have been useful in assessing the effects of the loss of instrument air on the condensate and feed system and on reactor coolant sampling capabilities.

The Radiation Protection Director and the Environs Director worked well together to formulate a proper protective action recommendation. Numerous dose projections were performed to assess worst case scenarios. The TSC staff was aggressive in initiating onsite and offsite monitoring to assess any potential releases to the environment.

Notifications to the offsite authorities and communications among facilities were good. The TSC staff were also kept informed of current plant conditions and ongoing activities by frequent staff briefings initiated by the SD. The SD utilized input from all TSC directors during the briefings to ensure no important information was overlooked. Although TSC staff appeared to be attentive during these briefings, several instances were observed when a TSC staff member would ask a question directly related to some information which was provided during a briefing. All the questions were quickly and efficiently answered by another staff member.

The plant status board was not maintained with accurate and current information throughout the duration of the exercise. For example, the status board recorder was noted posting plant status information which was already 25 minutes old. At times the status

boards were not updated for periods exceeding 40 minutes, during which times significant changes in plant status had occurred. The priority status board did not categorize the tasks that were listed on the board. Priorities were discussed and assigned during TSC briefings; however, the tasks were listed on the board in a random order without a designated priority. The failure to adequately maintain the plant status and priority status boards is considered an Inspection Follow Up Item (No. 454/92021-01 and No. 455/92021-01).

No violations or deviations were identified; however, one inspection follow up item was identified.

c. Operational Support Center (OSC)

The OSC activation occurred rapidly and efficiently. The OSC was operational within 15 minutes of the Alert declaration and the first team was dispatched within 20 minutes. The setup of the OSC was efficient with habitability quickly established and Security manning the entrance, establishing a controlled access.

The OSC Director demonstrated excellent command and control. He provided clear directions to the staff and maintained order throughout the facility. OSC briefings were frequent and thorough with the OSC Director providing updates on plant status and the OSC Supervisor providing updates on the radiological conditions.

Team briefings and debriefings were excellent. The teams were dispatched with clear directions, knowing what they were supposed to do, who to call back to, and what the radiological conditions were in the locations they were dispatched. Debriefings provided a good source of information to answer questions about the status of plant equipment.

The average dispatch time for the teams was 10 minutes. Some delays were noted due to teams waiting for radiation protection briefings or support. One operator assigned a high priority task to shut an Essential Service Water valve, had to wait for a radiation protection technician to return from another team assignment. Due to the delay, the team took an additional 15 minutes to get dispatched after the time the operator was prepared to perform his task. These delays may have been unnecessary since there were no radiological hazards during the exercise.

Tracking of the OSC teams was effective. On the few occasions that a team's status was unknown, the staff quickly obtained information to resolve that team's status. Over 20 teams were dispatched, with up to 12 teams in the field at one time.

Information flow to and from the OSC was excellent. Any questions about plant, equipment or team status were quickly followed up and answered.

No violations or deviations were identified.

d. Emergency Operations Facility (EOF)

A precautionary activation of some EOF staff was initiated following the Alert declaration. EOF staff began performing their initial duties in an orderly manner. Several early arriving staff did a very good job in gathering information and providing some support to TSC counterparts while EOF staffing continued.

The Manager of Emergency Operations (MEO) received good briefings from several EOF staff prior to contacting the TSC's SD. The MEO was clear and decisive when expressing his goals for assuming command and control of response efforts. The transfers of non-delegable and other lead responsibilities to the MEO and key EOF staff was very well coordinated and timely.

The MEO and his key staff conducted detailed, periodic teleconferences with TSC counterparts. These individuals then briefed all EOF staff on the results of the teleconferences as a supplement to status board information. Personnel remained well informed of corrective action priorities, the status of corrective actions and the status of onsite and offsite protective actions.

Protective measures staff closely monitored and trended current meteorological conditions to ensure that the affected downwind sectors beyond two miles from the site remained correctly identified. However, a weather forecast was not procured, either from the licensee's meteorological contractor or from TSC staff who had earlier obtained a forecast. Lacking such a forecast, EOF decision makers remained unaware of potential changes in wind conditions which could have affected the offsite PAR. The failure to obtain a weather forecast is an Inspection Follow Up Item (No. 454/92021-02 and No. 455/92021-02).

A fairly comprehensive list of onsite and offsite recovery action items was developed. Correct decisions were made not to transition to a recovery phase until each unit was in a stable, cold shutdown condition. It was recognized that Unit 2 might remain in an Unusual Event classification, pending damage assessment and restoration of offsite power to this Unit. The need to prepare for interfacing with an NRC Incident Investigation Team should also have been recognized and discussed in the initial recovery planning discussions.

No violations or deviations were identified, however, one inspection follow up item was identified.

e. Field Monitoring Teams

Both field teams were mobilized from the OSC. After logging in with OSC radiation protection and security personnel, each team proceeded to the their vehicles. Inventories and operability checks were performed in a timely and orderly manner. Both teams appeared to be very familiar with the necessary tasks.

The inspector observed only one of these teams. The methods, documentation, and use of procedures for sampling and analysis of vegetation, soil, and potential airborne radioactive materials were observed to be excellent. Contamination control practices utilized during sampling, counting, removal of protective clothing, and during re-entry of the vehicle were very good.

However, some minor equipment problems were noted. The battery powered air sampler flow gauge had an indicated readout capability of 1, 2, and 3 cubic feet per minute (cfm). This gauge did not have gradient markings for fractional flows between the whole number flow rates. As more samples were taken with the battery powered air sampler, this flow rate decreased from 0.9 to approximately 0.7 cfm. This was not noted by the field team members, and the flow rate was documented as ".9 cfm" for all air samples taken. Without additional reference markings, determination of air sample flow rates becomes somewhat subjective and deterioration in equipment performance becomes difficult to detect. Since air samples are taken over a prescribed time interval, an undetected reduction in actual sample volume could result in under-reporting of actual airborne radioactivity.

A battery powered air sampler was left to sample at a certain location. Then the team proceeded to another location to take another sample. However, the team was unable to immediately obtain an air sample at this location because a sample head for the other air sampler was missing. The licensee should consider adding additional sample heads to the environmental monitoring kits to ensure adequate field monitoring capabilities.

Overall, communications were good. The use of radios, transmission of field data, and communication of plant status information was very good. Some problems were also noted with one team's radio. The volume of this radio could not be controlled. Problems were also noted with an apparent over amplification during transmission from one of the radios. This resulted in some difficulty in hearing instructions from the TSC and EOF. The licensee planned to contact the vendor to correct these problems.

One team was requested to find a State of Illinois radiation monitor location and perform dose rate surveys due to a simulated failure of this monitor. The team drove by this monitor three times without recognizing it. The team reported their failure to find the monitoring station and reported dose rates for a location approximately one-half mile from the monitoring station. After the exercise, the team requested that the controller show them the monitoring station.

Overall, the offsite monitoring teams demonstrated very good performance in meeting exercise objectives and demonstrated the capability, knowledge and skills necessary to perform emergency response functions.

No violations or deviations were identified.

7. Exercise Objectives and Scenario Review (IP 82302)

The exercise scope and objectives and the exercise scenario were submitted to NRC within the proper timeframes. The licensee adequately answered the inspectors' questions pertaining to the scenario.

The scenario was challenging and included dual unit events, the use of real meteorological data, the loss of heat sink, extensive secondary system damage, and a loss of power to one unit.

No violations or deviations were identified.

8. Exercise Control

Exercise control was very good. There were adequate controllers to control the exercise. No instances of controllers prompting participants to initiate actions, which they might not otherwise have taken, were observed.

No violations or deviations were identified.

9. Exercise Critiques

The licensee's controllers held initial critiques in each facility with participants immediately following the exercise. These critiques were well detailed. The licensee provided a summary of its preliminary strengths and weaknesses prior to the exit interview which were in strong agreement with the inspectors' preliminary findings.

11. Exit Interview

The inspectors held an exit interview on October 29, 1992, with the licensee representatives identified in Section 2 to present and discuss the preliminary inspection findings. The licensee indicated that none of the matters discussed were proprietary in nature.

Attachments:
1. Exercise Scope and Objectives
2. Exercise Scenario Summary

ATTACHMENT 1

OBJECTIVES FOR BYRON 1992 GSEP EXERCISE

PRIMARY OBJECTIVE:

Commonwealth Edison will demonstrate the ability to implement the Generating Station Emergency Plan (GSEP) to provide for protection of the public health and safety in the event of a major accident at the Byron Nuclear Power Station. The 1992 demonstration will be conducted during the hours which qualify as a daytime Exercise in accordance with NRC Guidelines.

SUPPORTING OBJECTIVES:

An EOF designation includes all EOFs, the CEOF and BEOF if activated. Objectives marked with "*" are Key objectives. A Weakness or Not Met for a Key objective will prevent that facility from receiving a rating higher than Satisfactory. A Weakness or Not Met on two Key objectives will prevent that facility from receiving higher than a Weakness on its overall evaluation.

1) Assessment and Classification

a. Demonstrate the capability to assess conditions which warrant declaring a GSEP Classification within fifteen (15) minutes.
- (CR, TSC, EOF)

b. *Demonstrate the ability to determine the highest Emergency Action Level (EAL) applicable for assessed conditions within fifteen (15) minutes.
- (CR, TSC, EOF)

2) Notification and Communications

a. Demonstrate the ability to correctly fill out the NARS form for conditions presented in the scenario.
- (CR, TSC, EOF)

b. Demonstrate the ability to notify appropriate State and local organizations within fifteen (15) minutes of an Emergency classification or a significant change in NARS information.
- (CR, TSC, EOF)

c. Demonstrate the ability to notify the NRC immediately after the State notifications and within one (1) hour of the Emergency classification using the Event Notification Worksheet as appropriate.
- (CR, TSC, EOF)

d. Demonstrate the ability to provide information updates to the States at least hourly and within thirty (30) minutes of significant changes in conditions reported on the State Agency Update Checklist.
- (CR, TSC, EOF)

e. Demonstrate the ability to contact INPO, ANI, Murray & Trettel and Teledyne during the Exercise and the Fuel Vendor, General Electric or Westinghouse, if necessary.
- (TSC, EOF)

f. Demonstrate the ability to maintain an open-line of communication with the NRC on the ENS upon request.
- (CR, TSC, EOF)

g. Demonstrate the ability to maintain an open-line of communication with the NRC on the HPN upon request.
- (TSC, EOF)

h. Demonstrate the ability to provide information updates using the Event Notification Worksheet as appropriate to the NRC at least hourly and within thirty (30) minutes of significant changes in reportable conditions when an open-line of communication (ENS or HPN) is not maintained.
- (CR, TSC, EOF)

3) Radiological Assessment and Protective Actions

a. Demonstrate the ability to collect, document and trend plant radiological survey information and make appropriate recommendations concerning protective actions for personnel.
- (OSC, TSC, EOF)

c. *Demonstrate the ability to provide protective clothing and respiratory equipment for onsite personnel in accordance with Station policies and procedures.
- (OSC, TSC)

e. Demonstrate the ability to issue and administratively control dosimetry in the OSC in accordance with and Station policies and procedures.
- (OSC)

f. Demonstrate the ability to perform habitability surveys in the Emergency Response Facilities in accordance with Station policies and procedures.
- (OSC)

g. Demonstrate the ability to establish and maintain radiological controls in the Emergency Response Facilities in accordance with Station policies and procedures.
- (CR, TSC, EOF)

i. Demonstrate the ability to monitor, track and document radiation exposure to inplant operations and maintenance teams in accordance with Station policies and procedures.
- (TSC, OSC)

k. *Demonstrate the ability to select proper Protective Action Recommendations (PARs) within fifteen (15) minutes of determining an Offsite Dose Projection or using an Emergency Classification flowchart.
- (OSC)

n. Demonstrate the ability to determine the magnitude of a release based on plant system parameters and effluent monitors.
- (TSC, EOF)

3) Radiological Assessment and Protective Actions (cont'd)

p. Demonstrate the ability to calculate Offsite Dose Projections in accordance with emergency procedures.
- (Field Teams)

s. Demonstrate the ability to collect and count field samples in accordance with Environmental Sampling procedures.
- (Field Teams)

t. Demonstrate the ability to document field samples in accordance with Environmental Sampling procedures.
- (TSC, EOF, Field Teams)

u. Demonstrate the ability to perform dose rate measurements in the environment.
- (Field Teams)

Demonstrate the ability to assess and trend field sample results in accordance with CEPIPs.
- (TSC, EOF)

w. Demonstrate the ability to dispatch the Field Teams within forty-five (45) minutes of determination of the need for field samples.
- (TSC, OSC)

x. Demonstrate the ability to control/coordinate Field Teams activities in accordance with CEPIPs procedures.
- (TSC, EOF)

y. Demonstrate the ability to transfer control/coordination of Field Teams activities in accordance with Station procedures and CEPIPs.
- (TSC, EOF)

4) Emergency Facilities

a. *Demonstrate the ability to establish minimum staffing in the TSC and OSC within thirty (30) minutes of an Alert or higher Classification during a daytime event [within sixty (60) minutes of an Alert or higher Classification during an off hours event] in accordance with GSEP Section 4.
- (TSC, OSC)

b. *Demonstrate the ability to augment the Control Room staff within thirty (30) minutes of an Alert or higher Emergency Classification in accordance with the GSEP Section 4.
- (CR)

c. Demonstrate the ability to transfer Command and Control authority in a timely manner from the Control Room to the TSC in accordance with appropriate checklists.
- (EOF)

d. Demonstrate the ability to transfer Command and Control authority in a timely manner from the TSC to the EOF in accordance with appropriate checklists.
- (TSC, EOF)

e. Demonstrate the ability to assess minimum manning and to assess the capability to assume the non-delegable responsibilities of Command and Control in accordance with GSEP Section 4.
- (TSC, EOF)

g. Demonstrate the ability to maintain current and accurate information of Status Boards by updating at least every thirty (30) minutes.
- (TSC, OSC, EOF)

h. Demonstrate the ability to maintain information of the Electronic Status Board in accordance with procedures.
- (TSC, EOF)

i. Demonstrate the ability to exchange data and technical information between the Emergency Response Facilities in accordance with CEPIPs and Station procedures.
- (CR, TSC, OSC, EOF)

5) Emergency Direction and Control

a. Demonstrate the ability of the Directors and Managers to provide leadership in their respective areas of responsibility as specified in Generic GSEP and position-specific procedures.
- (CR, TSC, OSC, EOF)

b. *Demonstrate the ability to assemble and dispatch Inplant Teams in accordance with Station policies and procedures.
- (TSC, OSC)

c. Demonstrate the ability to prioritize resources for Inplant team activities in accordance with Station policies and procedures.
- (CR, TSC, OSC)

d. Demonstrate the ability to acquire and transport emergency equipment and supplies necessary to mitigate or control unsafe or abnormal plant conditions.
- (TSC, OSC)

e. Demonstrate the ability of the Acting Station Director, Station Director, OSC Director and MEO to provide briefings and updates concerning plant status, event classification, and activities in progress at least every sixty (60) minutes.
- (CR, TSC, OSC, EOF)

f. Demonstrate the ability to provide access for the NRC Site Team in accordance with Access Control procedures.
- (TSC, EOF)

g. Demonstrate the ability to interface with the NRC Site Team.
- (TSC)

h. Demonstrate the ability of individuals in the Emergency Response Organization to perform their assigned duties and responsibilities in accordance with position specific procedures.
- (CR, TSC, OSC, EOF, FIELD TEAMS)

i. *Demonstrate the ability to identify and designate nonessential personnel within thirty (30) minutes after completion of Site Accountability.
- (TSC, EOF)

l. Demonstrate the ability to assemble and account for On-site personnel within 30 minutes of a Site Emergency declaration.
- (CR, TSC)

6) Recovery

a. Demonstrate the ability to identify the criteria to enter a Recovery classification in accordance with GSEP procedures.
- (TSC, EOF)

b. Demonstrate the ability to generate a Recovery Plan which will return the plant to normal operations in accordance with CECo policies and procedures.
- (TSC, EOF)

c. Demonstrate the ability to determine long-term recovery staffing requirements.
- (TSC, EOF)

ATTACHMENT 2

BYRON NUCLEAR POWER STATION
1992 GSEP EXERCISE
OCTOBER 28, 1992

NARRATIVE SUMMARY

INITIAL CONDITIONS

UNIT 0

The River Screen House (RSH) power is being supplied by Unit 2 due to a 1A RSH transformer replacement. The work on the transformer has been in progress for two days and is expected to continue for the next three days. The Natural Draft Cooling Towers (NDCTs) have been scheduled for winter mode alignment changes next week due to decreasing outside temperatures. Icing on the towers has been occurring. Mechanical Maintenance is scheduled to clean the Circulating Water (CW) pump intake screens this weekend due to increasing differential levels.

UNIT 1

Unit 1 is at 99.9% power and the fuel cycle is approaching its end of life (EOL). In addition to the normal administrative out of services, The following equipment is out of service:

1B Essential Service Water (SX) Pump
1B Auxiliary Feedwater (AF) Pump
1D Condensate/Booster (CD/CB) Pump
ACB 1576 and ACB 0451 have hold cards

Currently, the 1B steam generator has a known tube leak estimated at 10 gpd. The 1B SX pump discharge strainer is being repaired. The Mechanical Maintenance department is maintaining the leakage removal system at the SX strainer which is located on the 330' elevation, B SX pump room, in the Auxiliary Building.

UNIT 2

Unit 2 is at 79.2% power and is ramping up at 2 MW/min. The number four (4) governor valve is experiencing high noise and vibrations as the unit passes through the 900 to 950 megawatt power range. There is higher than normal condenser inleakage due to the A MSR hot reheat line penetration to the Unit 2 C Low Pressure Turbine. The penetration seal has a crack which cannot be repaired at power. The only unusual equipment lineup is ACB 2576, which is closed and supplying the RSH with power. Early on the last shift a turbine supervisory alarm was received. The Shift crew entered 2BOA TG-1 and exited when no abnormal plant indications were observed. A Nuclear Work Request was written and walked through to the Instrument Maintenance Department. The field work on the nuclear work request to investigate the turbine supervisory alarm is starting at 0730 hours.

BYRON NUCLEAR POWER STATION
1992 GSEP EXERCISE
OCTOBER 28, 1992

NARRATIVE SUMMARY

ALERT (0800-0920)

Unit 2 experiences a reactor trip at 0800 due to a loss of condenser vacuum caused by the propagation of the crack on the Unit 2 C low pressure turbine reheat line penetration. The turbine fails as a result of the transient and pieces of the turbine and casing exit the turbine building via the west turbine building wall and the east turbine building wall near the roof. The pieces exiting the east wall are deflected and land on the Unit 1 NDCT causing damage to the canopy seals near the outfall screens. The turbine pieces exiting the west wall are deflected into the Unit 2 SAT feeder line towers causing both SATs to trip. The SAT trip causes a loss of offsite power on Unit 2. Subsequently, all equipment on Unit 2 operates as designed.

The RSH loses power when the Unit 2 Station Auxiliary Transformer (SAT) lines are struck by the Unit 2 turbine blading pieces. The CW flume level starts to drop due to the loss of the CW make up pumps at the RSH. This combined with the damage caused by falling ice has severely degraded two canopy seals above the outfall screen area on the Unit 1 NDCT.

When the Unit 2 SX pumps trip and restart, the 1B SX pump discharge valve seat fails due to the pressure transients. The leakage past the seat overflows the temporary birm setup to dewater and begins to fill the "B" SX pump room. The maintenance crew calls the Shift Engineer to report the flooding and the fact that they can not get the manways back on the strainer due to the flow. Simultaneously, the Radwaste Operator calls Center Desk and reports a high sump level alarms on the "B" SX pumps for both units.

EXPECTED RESPONSE

The shift crew will receive a message for the Unit 2 trip as well as a report from a fire watch that the turbine is flying apart and steam is coming out of holes on the north end of the turbine. The shift crew should dispatch operators to the turbine and the SATs. Operator reports given to the Unit 2 crew should require the Acting Station Director to classify the accident as an ALERT based on EAL 6T (Main Turbine failure causing casing penetration). The Acting Station Director may call an Unusual Event due to EAL 3D (Loss of power to the 4-KV buses from the Unit's System Auxiliary Transformer). The TSC and OSC should be activated and environs teams should be dispatched. The Unit 2 Station Air Compressor (SAC) loses power so the Unit 0 SAC may be required to be started.

The flooding of the SX pump room should require operations response. It is expected that operators will isolate 1SX143B by closing the upstream valves 1SX012B and 1SX005 from the main control board (MCB) and 1SX034 locally. Once isolated, the crew is expected to request the Mechanical Maintenance crew to reinstall manways on the strainer which will be inhibited by the manway being under water. The water level in the room reaches 48" and is above the lower part of the motor. If the crew isolates the valves, the leak will stop. The crew may decide to isolate the valves from the MCB and just isolate the room due to personnel safety, in which case isolation should be achieved by isolating further downstream. A MM crew is expected to be needed for dewatering the room and replacing the manway covers.

NARRATIVE SUMMARY

It is also expected that the Unit 1 crew will shutdown CW blowdown due to the flume level loss. It is expected that they will request the TSC to pursue restoring power to the RSH. The crew may decide to start a ramp down in power due to the loss of water inventory in the flume. If the crew does not observe the level loss the "Intake Bay Low Level" alarm should direct their attention to the problem. Attempts to use the deep well and SX make up will not supply the quantity of water needed to prevent level loss.

SITE EMERGENCY (0920-1015)

The initiating event for the Site Emergency is the final failure of the canopy seals (preformed concrete slabs that extend from the hot water basin to the tower stack) at 0920. The canopy seals have been damaged due to freezing and thawing temperatures and falling ice as well as the impact of the turbine blading from Unit 2. The existing damage, combined with the turbine blading damage, has caused two panels to fall into the tower fill at the outfall screens. The fill has clogged the NDCT outfall screens and increased clogging on the CW pump intake bay screens. The NDCT cold basin overflows (662,000 gpm) causing the flume level to fall more rapidly. The CW pump intake bay level decreases more rapidly than the flume level due to the increasing screen differential. The overflow also makes the plant entrance impassible due to water washing out the main access road. A security guard calls the SE to report the tower overflow which is a concern to the TSC due to NPDES requirements. The tower overflow stops when all the running CW pumps trip or are stopped, however, the plant entrance will continue to be blocked due to the entrance road being washed out. The WS pumps also trip.

Unit 1 will trip due to a loss of CW and WS pumps. The loss of secondary side cooling prevents prolonged operation of all secondary side pumps including station air compressors. The Shift Crew should enter applicable emergency procedures.

Corrective measures should be taken to restore station air compressors and secondary side cooling will be initiated. The 1A SX pump will trip soon after the unit trips eventually causing a loss of the 1A CV and 1A AF pumps. The TSC should expedite the work on 1B AF pump and the 1A SX pump. The Shift Crew will attempt to establish a water source to the steam generators. The steam generator tube leak increases to 10 gpm. Bus 159 feed breaker will trip due to overcurrent if the CD/CB pumps are cycled to try to get water to the steam generators.

BYRON NUCLEAR POWER STATION
1992 GSEP EXERCISE
OCTOBER 28, 1992

NARRATIVE SUMMARY

EXPECTED RESPONSE

The Shift Crew may already be aware of the increased flume level loss rate due to close monitoring after the "Intake Bay Low Level" alarm. The Shift Crew should sense the inevitable and trip the Unit or should trip the Unit when the CW pumps trip. Unit 1 will simultaneously lose WS pumps and CW pumps. The Shift Crew should stop pumps supplied by WS if not already done. The SACs running at the time of the WS pump trip will trip due to high temperature. The Unit 2 SAC then may have to be electrically aligned to Unit 1 and fire protection (FP) aligned for cooling. The 1A SX pump will trip soon after the turbine trips thus causing a loss of the ultimate heat sink. The Centrifugal Charging (CV) pump will trip in approximately six minutes and the 1A AF pump will trip in approximately one minute due to a loss of cooling.

The loss of the CW pumps will prevent steam dump operation (loss of condenser interlock, C-9). The loss of steam dumps will cause the S/G PORVs to lift. The TSC should be concerned due to the 1B S/G having a tube leak. The tube leak will have grown to 10 gpm since the unit tripped. The increased tube leak will be hard to detect since it is so small. The RM-11 will be the only means of detection through increased steam line radiation.

The Station Director should evaluate for GSEP based on the loss of heat sink upon entry into BFR H.1. The SITE EMERGENCY should be declared with EAL 3N or 4H based on the loss of all feedwater and no RH in operation. There is little that can be done by the Shift Crew due to the loss of SX which degrades ECCS equipment and the loss of WS which degrades all secondary pumps including the station air compressors. The fire protection pumps will run and the operable station air compressors can be supplied cooling. Also, a S/G can be depressurized and FP can be routed through the seized 1A AF pump to the depressurized S/G. The Shift Crew may elect to attempt gravity feed of the depressurized S/G from the CSTs. Either one of these methods will supply 25-50 gpm to a depressurized S/G. It should be noted that the Shift Crew will cause an SI, if not blocked, when they depressurize a S/G. The SI will start and run equipment without cooling. There will be a failure of the B train equipment to start on any SI due to a sequencing relay (K608) failure. The SRO will have to decide at step 4 of BFR H.1 to continue or to manually SI in an attempt to set up a feed and bleed. The SI will not improve the situation. The 1A SX pump is needed to start an adequate feed and bleed. The Unit will start to cooldown with an FP pump or CD gravity feed supply to the steam generator. The Shift Crew may utilize the Positive Displacement Charging pump to supply the RCPs with seal injection and minimal makeup to the RCS.

GENERAL EMERGENCY (1015-1230)

The condition of Unit 1 will continue for greater than 45 minutes and the Station Director should evaluate for GSEP and declare a GENERAL EMERGENCY based on EAL 3Q or 4J (Loss of all feedwater and no RH for over 45 minutes). A failure of an off site monitor which is found by a call from the State of Illinois will be addressed by the EOF.

BYRON NUCLEAR POWER STATION
1992 GSEP EXERCISE
OCTOBER 28, 1992

NARRATIVE SUMMARY

The Shift Crew will struggle to cool down the reactor without the aid of AF or SX. The field teams have complications when a van radio is found to be out of service and a hand radio is dropped. NRC arrival on site is hampered by the entrance road being washed out.

RECOVERY (1230-1400)

The event recovery will occur after the return of the 1A SX pump and/or the 1B AF pump and minimum S/G levels are established.