U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/86011(DRSS); 50-265/86010(DRSS)

Docket Nos. 50-254; 50-265 Licenses No. DPR-29; DPR-30

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Quad Cities Nuclear Generating Station, Units 1 and 2

Inspection At: Quad Cities Station, Cordova, IL

Inspection Conducted: August 25-27, 1986

Inspector: T. Ploski, Team Leader — Date: 9/20/86

for N. Williamsen — Date: 9/20/86

Approved By: W. Snell, Chief, Emergency Preparedness Section — Date: 9/20/86

Inspection Summary

Inspection on August 25-27, 1986 (Report No. 50-254/86011(DRSS); 50-265/86010(DRSS))

Areas Inspected: Routine, announced inspection of the Quad Cities Station Emergency Preparedness Exercise involving observations by six NRC representatives of key functions and locations during the exercise.

Results: No items of noncompliance or deviations were identified. However, exercise weaknesses which require a written response and corrective actions are identified in this report and in the appendix to the report's transmittal letter.

DETAILS

1. Persons Contacted

NRC Observers and Areas Observed

T. Ploski, Control Room, Technical Support Center (TSC), Emergency Operations Facility (EOF), Joint Public Information Center (JPIC)
A. Madison, Control Room, TSC
A. Morrongiello, Inplant Team, Radiological Environmental Monitoring Team
G. Arthur, TSC
T. Lonergran, Inplant Teams, Operational Support Center (OSC)
N. Williamsen, EOF

Commonwealth Edison Company

*G. Spedl, Services Superintendent
*G. Tietz, Operations Superintendent
*T. Tamlyn, Production Superintendent
*C. Smith, Quality Control Supervisor
*C. Norton, Quality Assurance Staff
*M. Kooi, Regulatory Assurance Staff
*J. Kopacz, Technical Staff Supervisor
*D. Jessen, GSEP Coordinator
*C. Brown, GSEP Coordinator
*W. Graham, Training Instructor
*S. Flood, Control Room and TSC Controller
*M. Rodts, Control Room Controller
*F. Krowzack, EOF Controller
*B. Schnell, EOF Controller
T. Greene, TSC Controller
M. Whitemore, OSC Controller
M. Delavetta, OSC Controller
A. Nykiel, OSC Controller
T. Ziakis, EOF Controller
D. Kenealy, Environmental Monitoring Team Controller
T. Blackmon, JPIC Controller

*Indicates those licensee personnel who attended the August 27, 1986 exit interview.

2. Licensee Actions on Previously Identified Items

(Closed) Item No. 254/85015-02 and 265/85017-02: During the 1985 exercise, some inplant emergency workers were not adequately instructed on proper radiological protection methods while performing emergency maintenance tasks. As indicated in Paragraph 5.c of this report, an inspector witnessed briefings given to various inplant teams and accompanied several teams. The briefings were adequate, including those aspects related to radiological protection. This item is closed.

(Closed) Item No. 254/85015-03 and 265/85017-03: During the 1985 exercise, poor methods were used to transport post-accident samples to the counting room. Specifically, at one point a simulated highly radiated sample was removed from its shielding and was hand-carried to the counting room. As indicated in Paragraph 5.c of this report, an inspector observed post-accident sampling activities during the 1986 exercise. While the licensee had improved the equipment used to transport the samples, some difficulties were exhibited with this equipment and several poor Health Physics practices were observed during sample collection and handling in the counting room. Therefore, a 1986 exercise weaknesses has been identified regarding these post-accident sampling problems that differed from those observed during the previous exercise. The 1985 item is closed.

(Closed) Item No. 254/85015-04 and 265/85017-04: During the 1985 exercise, initial offsite protective action recommendations associated with the Site Area and General Emergency declarations were inadequate. Errors were made either when formulating, reviewing, documenting, or in communicating these recommendations. As indicated in Paragraphs 5.b and 5.d of this report, all offsite protective action recommendations were formulated in accordance with procedural guidance. No errors in formulating, documenting, or communicating these recommendations were observed. This item is closed.

(Closed) Item No. 254/85015-05 and 265/85017-05: During the 1985 exercise, information disseminated by the licensee's JPIC staff was inaccurate and inadequate. As indicated in Paragraph 5.e of this report, an inspector observed two media briefings and reviewed the five press releases issued by the licensee. These verbal and hardcopy information transmittals were adequately detailed and accurate, based on the news information staff's current knowledge of scenario events. This item is closed.

3. General

An off-hours exercise of the licensee's Generating Station Emergency Plan (GSEP) and Quad Cities Annex to the GSEP was conducted at the Quad Cities Station on August 26, 1986. The exercise tested the licensee's and offsite support organizations' capabilities to respond to a hypothetical accident scenario resulting in a major release. The attachments describe the exercise scope, objective, and scenario. The exercise was integrated with a test of the Clinton County (Iowa), Scott County (Iowa), Rock Island County (Illinois), and Whiteside County (Illinois) emergency plans. This was a full-participation exercise for these four counties and the State of Iowa, and a partial-participation exercise for the State of Illinois.

4. General Observations

a. Procedures

The exercise was conducted in accordance with 10 CFR Part 50, Appendix E requirements using the GSEP, Quad Cities Annex, and the Emergency Plan Implementing Procedures (EPIPs) employed by Station and the Emergency Operations Facility (EOF).

b. Observers

Licensee observers monitored and critiqued this exercise along with six NRC observers and a number of observers representing Regions V and VII of the Federal Emergency Management Agency (FEMA). FEMA observations of the responses by the State and local governments will be provided in separate reports.

c. Critique

The licensee held critiques following the exercise on August 26, 1986. The NRC critique was held on August 27, 1986. In addition, a public critique was held on the evening of August 27, 1986, to present the preliminary findings regarding the onsite and offsite activities by the NRC and FEMA exercise observers, respectively.

d. Conclusions

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

5. Specific Observations

a. Control Room

There were several examples of improper controller actions which were due to a combination of the following factors: a shortage of Control Room controllers; the late arrivals of several Control Room exercise participants; late changes to the scenario (see Paragraph 5.g); and controller over-enthusiasm or inexperience. Although both reactors were adversly affected by initial scenario events, only two controllers were available to issue messages and to monitor each unit's operator plus the Shift Engineer (SE), Shift Forman (SF), Shift Control Room Engineer (SCRE), and various key TSC staff who later arrived in the Control Room for their initial briefings. Several Control Room participants did not arrive until a few minutes prior to the exercise, which left them with insufficient time to review and comprehend scenario messages related to the ground rules and initial conditions of each reactor. As a result, the lead controller made several prompting statements regarding items to definitely record in the players' logs as he hastily went over the ground rules and responded to players' questions. The other controller was later observed to be showing scenario information to a non-participant and did not stop a brief discussion between a player and another non-participant. The lead controller occasionally asked a participant to demonstrate the ability to locate relevant instrumentation on the Conrol Room panels. On several occasions,

the lead controller would then virtually lead the player to the appropriate panel so that he could quickly return to his other controller duties. The aforementioned examples of improper Control Room controller actions together constitute an Exercise Weakness (50-254/86011-01 and 50-265/86010-01).

In general, Control Room personnel exhibited good teamwork during the exercise. For the first few hours of the scenario, they were particularly challenged since both units were being adversely affected to different extents by changing reactor water chemistry. Personnel did a good job in monitoring both units' gradually increasing water conductivity rates and the resulting coolant leak rates. Plant Technical Specifications, Abnormal Operating Procedures, and Emergency Plan Implementing Procedures (EPIPs) were effectively utilized. However, when Unit 2 automatically shutdown, its operator seemed overly engrossed in procedure review rather than in promptly responding to this event. The SE, SCRE, and Units 1 and 2 operators all maintained very detailed records of scenario events and their actions. Appropriate actions were initiated to determine if contaminated resins had been used in both units' operational condensate demineralizers. Proper concern was exhibited for shutting down both units without a SCRAM, if possible, in order to avoid further stress to the deteriorating seals on the recirculation loops' pumps.

The original SE adequately transferred his normal and emergency responsibilities to his replacement early in the exercise. The replacement SE correctly declared an Unusual Event at about 8:10 a.m. due to the exceedance of a Technical Specification limit on reactor water conductivity. The SCRE completed initial offsite notifications to the NRC and the States of Iowa and Illinois within fifteen minutes of event declaration; however, the NRC Operations Center was notified before the States, which is inconsistent with the criteria in 10 CFR 50.72(a)(3). The incoming Station Director (SD) was adequately briefed on scenario events by the SE (acting-SD) and then relieved him of his emergency responsibilities. The SD and several persons, who later became his principle aids in the TSC, then remained in the Control Room until after the SD had declared an Alert. The SCRE again completed all initial offsite notifications within fifteen minutes in the same order as was done for the Unusual Event. After his aides had gradually left as part of the TSC activation, the SD remained in the Control Room and adequately gave a briefing on various plant conditions and emergency response activities to a caller from the Illinois Department of Nuclear Safety (IDNS).

In addition to the Exercise Weakness, the following items should be considered for improvement:

- Appropriate State agencies should be initially notified of emergency classifications prior to or simultaneously with the NRC Headquarters Duty Officer.

- The licensee should consider having a knowledgeable person other than the SCRE assist in the notification of the NRC Duty Officer so that the SCRE can also devote sufficient attention to his Shift Technical Advisor responsibilities.

b. Technical Support Center (TSC)

While the SD had earlier announced to Control Room personnel that he had assumed command of emergency response activities, he did not make a similar announcement to his TSC staff until about ten minutes after his arrival in that facility. This relatively minor omission was only the first of a number of internal communications problems in the TSC, some of which are of sufficient importance to be categorized as an exercise weakness.

While TSC staff quickly recognized that the loss of secondary containment had created a release path, they were not aggressive in trying to learn the cause of this failure. No one had apparently been assigned to address this problem to its resolution. While some TSC staff were well aware that some systems' pump seals were deteriorating and that this, together with the loss of secondary containment, constituted a release to the environment, the staff was not aggressive in having a radiation survey team promptly sent immediately downwind of plant structures to verify that a ground-level release had begun. Instead, onsite survey activities focused on surveys of debris which had supposedly fallen from the reactor building. Also, as stated in Paragraph 5.f of this report, TSC staff had dispatched both field survey teams further downwind and across the Mississippi River into Iowa. The teams later confirmed the release. As the teams' travel times back to the plant were on the order of 30 minutes, someone apparently decided not to recall one team in order to perform a survey downwind within the owner-controlled area. Exercise controllers in the EOF eventually issued a contingency message stating that the release had begun, as they had concluded that TSC staff were too slow in recognizing this event. Finally, although the SD had the simulated assembly and accountability of onsite personnel initiated prior to the Site Area Emergency declaration due to rapidly deteriorating plant conditions, their simulated evacuation was not ordered about 90 minutes after the completion of onsite accountability, which was about one hour after the Site Area Emergency declaration. While the SD and various aides correctly expressed concern for the radiological safetry of evacuees and wanted assembly areas and potential evaucation routes surveyed, over one hour passed before their concerns had been satisfied and the simulated evacuation was initiated along a safe route. The internal breakdowns of communications in the TSC, which resulted in late awareness of a release, late awareness of the cause of the loss of secondary containment, and the late evacuation of non-essential onsite personnel is an Exercise Weakness (50-254/86011-02 and 50-265/86010-02).

While exercise participants recognized the above and other important tasks which warranted high priority attention, it was sometimes unclear to the inspectors just which TSC personnel had been assigned lead responsibility for investigating and resolving any given

problem. There was no concise listing of major problems and assignments of responsibility on a status board. While the SD occasionally briefed TSC personnel on changing conditions, he rarely polled his staff to ensure that appropriate personnel were at work on specific problems, what their progress was on assigned tasks, or were there additional tasks or suggestions to be pursued. Some persons could also have made more effort to listen to the SD's briefings.

The SD correctly classified the Site Area Emergency. Initial offsite notifications were completed in a timely manner. The associated offsite protective action recommendation was appropriate; however, the SD hurriedly told the wrong director to formulate the recommendation. This individual promptly located the procedural guidance and correctly sought and received the advice of the Environs Director. TSC staff did a good job in identifying and actually locating the equipment likely to be needed to accomplish temporary repairs to the secondary containment. Logkeeping by individual directors varied from very detailed to marginally acceptable.

In addition to the exercise weakness, the following items should be considered for improvement:

- The licensee should develop additional administrative measures for tracking problems and the assignment of responsibility for resolving such problems confronting TSC staff.

- The licensee should develop additional procedural guidance regarding task prioritization for onsite radiation survey tasks outside of plant structures.

- Appropriate TSC directors should be retrained regarding procedural responsibilities of formulating, communicating, and documenting initial and followup information related to emergency declarations.

c. Operational Support Center (OSC) and Inplant Teams

The OSC was promptly activated and staffed with an adequate number of personnel. The OSC Director effectively utilized several persons to assist him in issuing emergency equipment, briefing and debriefing inplant teams, tracking emergency workers' simulated exposures, logkeeping, and maintaining a status board. Adequate supplies of survey instruments, personal dosimetry, and protective clothing were readily available. Team briefings and debriefing were accomplished with the aid of checklists. Survey instruments had current calibration stickers. Protective covers were employed to help prevent contamination of these instruments when in use. Communications with deployed teams were adequate. The OSC Director occasionally gave verbal briefings on plant status to technicians awaiting assignments. However, while the director and his staff had information on some simulated inplant radiation levels, these data were not posted on readily available plant drawings or a status board. Also, while the director and his aides kept adequately

informed on the assignments and whereabouts of the inplant teams, such information was usually not communicated to the Control Room. While a status board was used to record major scenario events, its information was crowded and difficult to read from the rear of the OSC.

Onsite chemistry technicians obtained and analyzed a sample of unused demineralizer resin early in the exercise. A team was later dispatched to collect and transport coolant and containment air samples under simulated post-accident conditions. The licensee has improved the equipment used to transport sample containers to the onsite counting laboratory. However, one sample became stuck in the long tube used to hold the containers. While the sample was eventually safely removed, some unnecessary personnel exposures would have resulted if the sample had had high radiation levels.

Several other problems were noted during the collection and temporary storage of the post-accident samples. While the technician removing the samples at the collection point wore adequate dosimetry, he did not wear gloves. However, Procedure QCP 920-2 stated that personnel should avoid contact with sample containers. In addition, several items intended to minimize personnel radiation exposure and contamination in the counting room were not initially available in that location until an NRC inspector voiced his concern regarding their absence. For example, no temporary shielding supplies were initially available, although Procedure QCP 920-3 addressed the need for such equipment. Instead, the samples were placed on the floor in the corner of the counting room. The same procedure also addressed the need to properly post the area, label the samples, and log receipt of the sample for accountability. These procedural steps were not adequately demonstrated. The failures to follow procedural guidance regarding the handling of samples at the collection point and to properly shield, label, and log receipt of the samples at an appropriately posted counting facility is an Exercise Weakness (50-254/86011-03 and 50-265/86010-03).

In addition to the Exercise Weakness, the following items should be considered for improvement:

- Relevant inplant radiation level data should be displayed on available OSC status boards or plant drawings.

- The OSC Director should ensure that the Control Room is kept adequately informed of the locations and assignments of inplant teams.

- Information posted on OSC status boards should be better organized and legible from all viewing areas in the OSC.

- The licensee should modify the equipment utilized to transport samples to the counting room to reduce the potential for sample containers becoming lodged in this equipment.

d. Emergency Operations Facility (EOF)

A conservative decision was made shortly before 10:00 a.m. to activate the EOF in view of the increasing problems affecting both reactors. However, although the Recovery Manager (RM) and about 12 of his staff had arrived at the facility by 10:30 a.m. and quickly had begun organizing themselves and establishing communications with the TSC, it was apparent from statements made by several personnel that their goal was to have the EOF fully operational within about one hour after their arrivals, rather than within about an hour after the decision was made to activate the facility. The RM did not, in fact, assume overall command and control of emergency response activities until 11:30 a.m. The excessive amount of time taken by exercise participants to have the EOF fully operational with the RM in overall command and control is an Exercise Weakness (50-254/86011-04 and 50-265/86010-04).

The RM correctly declared the General Emergency just before noon. The associated offsite protective action recommendation was properly formulated, and initial offsite notifications were adequately completed within the required time limits. The Advisory Support Director, with some assistance from the environs staff, adequately prepared, transmitted, and documented at least three hourly followup messages to the State agencies. Based on feedback from several State agency representatives stationed in the EOF, their organizations were kept adequately informed of scenario events by the licensee's EOF staff. The RM gave a number of verbal status briefings to EOF personnel. Status boards were effectively utilized and were kept current. Logkeeping by various individuals was satisfactory. EOF security and clerical support were adequate.

Following a scenario time jump, the RM met with all his key staff to discuss short and long term Recovery Mode activities. It was recognized that a number of plant systems had to be promptly inspected for evidence of leaks and that any repairs would have to be completed before initiating more permanent repairs to the secondary containment structure. The need for additional offsite surveys was also recognized.

With the exception of the aforementioned Exercise Weakness, this portion of the licensee's program is acceptable.

e. Joint Public Information Center (JPIC)

The JPIC was located at the licensee's garage facilities just north of the EOF building. The facility's ventilation provisions were inadequate, and consisted primarily of opening the vehicle entrance door following media briefings and leaving another door open at all times. About 12 telephones were available for the media. Sufficient space was available for three portable television cameras which were set up by media representatives or the licensee. A sufficient number of chairs were also available.

An inspector observed two media briefings and evaluated the five hardcopy press releases issued by the licensee during the exercise. The licensee's three spokespersons (corporate, technical, and health physics) did an adequate job in coordinating their presentations with those of the spokespersons from Illinois and Iowa. The licensee's spokespersons responded properly to questions posed by the media and a controller, based on the spokespersons' current understandings of scenario events. A chart, map, and a reactor building cutaway drawing were effectively utilized during one briefing. The press releases were adequate in number and contained appropriate information, as was understood at the times of their formulation.

Based on the above findings, this portion of the licensee's program is acceptable.

f. Radiological Environmental Monitoring Teams

An inspector accompanied one of the two teams dispatched from the Station during the exercise. Both teams were dispatched into Iowa prior to the loss of the secondary containment. Both teams used dedicated "GSEP vans," one of which was normally based at the Quad Cities Station and the other at the Mazon EOF. The teams checked their equipment prior to leaving the Station. The team which was accompanied by the inspector adequately demonstrated the capabilities of collecting, temporarily storing, and labeling air, soil, and vegetation samples. The team kept an adequately detailed log of its actions. Good contamination control practices were demonstrated when handling samples and equipment. When one of the van's generators malfunctioned, the team utilized a spare portable generator to power the air sampler. The malfunctioning generator was repaired by the licensee within 48 hours after the exercise.

The van's radio equipment operated properly. However, several communications problems were noted during the period when EOF staff directed the teams' movements. At one point, a team was ordered to leave its location for ALARA considerations. However, the team was not told in which direction to move. The team did not question the instruction and chose to travel South. As a result, both teams were on the same side of the plume, rather than on opposite sides as was intended. On another occasion, a team was instructed to proceed along what EOF staff interpreted from their maps to be a winding roadway that ran roughly East/West. EOF staff later learned that the roadway was actually the Wapsipinicon River.

Based on the above findings, this portion of the licensee's program is acceptable; however, the following items should be considered for improvement:

- Offsite survey teams and persons directing their movements should ensure that all instructions are completely understood.

- Maps utilized by the teams and persons directing their movements should have local roadways and other topographic features clearly labeled.

g. Exercise Scenario and Licensee Critiques

Sometime between the August 25th controllers' meeting and the August 26th exercise, changes were made to the scenario such that different plant conditions warranted the Unusual Event declaration. The NRC was not informed of these changes before the exercise, either verbally or by changes to the exercise manuals. All key controllers of offsite support agencies were apparently not adequately informed of the changes, as evidenced by the fact that an Illinois exercise participant called the Control Room to state that he had received a contingency message which indicated that an Unusual Event should have been declared for an excessive leakrate. This call confused some Control Room players who realized that the scenario's revised leakrate data did not warrant an Unusual Event declaration. The confusion was finally resolved when the Station Director (SD) later declared an Alert as was anticipated in the exercise manuals. Regardless of whether or not the last minute changes in scenario data were justified, they were poorly coordinated with at least some offsite exercise controllers and the NRC evaluators. This is an Exercise Weakness (50-254/86011-05 and 50-265/86010-05).

The inspectors attended verbal critiques which immediately followed the exercise and involved the licensee's exercise participants and controllers in the TSC, OSC, EOF, and JPIC. Player comments were solicited. Controllers also presented their major positive and negative comments, and indicated that the licensee's internal evaluation of the exercise would be completely documented within several months. As is customary for this licensee, there was no presentation made to the NRC just before the exit interview which summarized the licensee's preliminary findings of all its exercise controllers and observers.

In addition to the Exercise Weakness, the following item should be considered for improvements:

- Just before the exit interview, the licensee should make a verbal presentation to the NRC which summarizes the preliminary major findings of its exercise evaluators.

6. Exit Interview

On August 27, 1986, the inspectors met with those licensee representatives listed in Paragraph 1 to present the preliminary findings of this inspection. The licensee agreed to consider the items discussed and indicated that none of the information was proprietary in nature.

Attachments:
1. Scope of Participation
2. Exercise Objectives
3. Scenario Narrative Summary and Timeline

Quad Cities Exercise
August 26, 1986

SCOPE OF PARTICIPATION

The August 26, 1986, Quad Cities Exercise is a nighttime event to test the capability of the basic elements within the CECo GSEP. The exercise will include mobilization of CECo personnel and resources adequate to verify their capability to respond to a simulated emergency.

Commonwealth Edison will participate in the Quad Cities exercise by activating the on-site emergency response organization and the near-site EOF as appropriate, subject to limitations that may become necessary to provide for safe efficient operation of the Quad Cities and other CECo nuclear generating stations. The Corporate Command Center at the general office in Chicago will not be activated for this exercise.

Activation of the TSC and other on-site participants will be conducted on a real time basis during the nighttime hours. The shift on duty will receive the initial scenario information and respond accordingly.

The Nuclear Duty Person and the balance of the Recovery Group will be prepositioned close to the Quad Cities to permit use of Recovery Group personnel from distant locations.

Commonwealth Edison will demonstrate the capability to make contact with contractors whose assistance would be required by the simulated accident situation, but will not actually incur the expense of using contractor services to simulate emergency response except as prearranged specifically for the exercise.

Commonwealth Edison will arrange to provide actual transportation and communication support in accordance with existing agreements to the extent specifically prearranged for the exercise.

Quad Cities Exercise
August 26, 1986

OBJECTIVES

Primary Objective:

Demonstrate the capability to implement the Commonwealth Edison Generating Stations Emergency Plan in cooperation with the Illinois Plan for Radiological Accidents and the Iowa Emergency Plan to protect the public in the event of a major accident at the Quad Cities Station. Demonstrate this capability during the hours to qualify as a nighttime exercise in accordance with NRC guidance.

Supporting Objectives:

1) Incident Assessment and Classification

   a. Demonstrate the capability to assess the accident conditions, to determine which Emergency Action Level (EAL) has been reached, and to classify the accident level correctly in accordance with GSEP. (CR, TSC, EOF)

2) Notification and Communication

   a. Demonstrate the capability to notify the principal offsite organizations within 15 minutes of declaring an accident classification. (CR, TSC, EOF)

   b. Demonstrate the capability to notify the NRC within one hour of the initial incident. (CR)

   c. Demonstrate the capability to contact organizations that would normally assist in an emergency, but are not participating in this exercise (e.g. INPO, Murray & Trettel, General Electric, etc.) (CR, TSC, EOF)

   d. Demonstrate the ability to provide accurate and timely information to the Joint Public Information Center for use in developing press releases. (TSC, EOF)

   e. Demonstrate the ability to notify state agencies with hourly plant status followup information. (TSC, EOF)

3) Radiological Assessment

   a. Demonstrate the capability to calculate offsite dose projections. (TSC, EOF)

   b. Demonstrate the capability of environmental field teams to conduct field radiation surveys and collect air, liquid, vegetation and soil samples when needed. (ENV)

c. Demonstrate the capability to conduct in-plant radiation protection activities. (OSC, HP)

d. Demonstrate the capability to collect and simulate analysis of air or liquid samples onsite via HRSS. (OSC, HP, CHEM)

e. Demonstrate the ability to perform calculations with radiological survey information, trend this information, and make appropriate recommendations concerning protective actions. (TSC, EOF, HP)

4) Emergency Facilities

a. Demonstrate the capability to activate the emergency organization and staff the nuclear station emergency response facilities in accordance with procedures during a nighttime period. (CR, TSC, EOF, OSC, JPIC)

b. Demonstrate through discussion and staff planning, the ability to perform a shift change. (CR, TSC, and EOF)

5) Emergency Direction and Control

a. Demonstrate the ability of the directors to manage the emergency organizations in the implementation of the GSEP. (CR, TSC, EOF, OSC)

b. Demonstrate the capability of coordinating the direction of emergency response among CECo, Illinois and Iowa offsite command centers by using liaison personnel and communicators. (EOF)

c. Demonstrate the security force's ability to limit and control access to affected areas of the station. (SEC)

6) Public Information

a. Demonstrate the ability to provide accurate and timely press releases from the Joint Public Information Center. (JPIC)

7) Recovery and Re-entry

a. Demonstrate the capability of the emergency response personnel to identify requirements, programs, and policies governing damage assessments and implementing procedures for recovery and re-entry. (TSC, EOF)

Quad Cities Exercise
August 26, 1986

NARRATIVE SUMMARY

INITIAL SITUATION (0545-0830)

Unit One is operating normally at full power (824 MWe, 2509 MWth) and has been at high power since starting up from a weekend maintenance outage in May. The 1/2 diesel is out of service, three (3) days into a seven (7) day LCO before unit shutdown will be required. Mechanical Maintenance reports that the 1/2 diesel should be returned to service in two (2) to three (3) days.

Unit Two is operating normally at high power (770 MWe, 2360 MWth) and is controlling load automatically in EGC. The unit has been on line all summer without outage. The unit is in an LCO for the 1/2 diesel out of service. Unit Two RCIC is out of service for trip throttle valve repairs. Unit Two has been operating with a significant condenser tube leak for the last two weeks. Due to load demand, the unit has been kept on line requiring one or two condensate filter demineralizers to be backwashed, precoated and returned to service per shift. A Unit Two shutdown to repair the leaking condenser tubes is scheduled to commence on the upcoming weekend.

For the last week there has been an Off Gas System leak in the turbine building. Personnel exiting through the trackway portals are found to have contaminated clothing after being in the Turbine Building for any extended period of time.

A large amount of condensate filter demineralizer resin was recently delivered to the station. One order of resin is contaminated with a powered chemical cleaning agent known as Baxite 86. The contaminated resin will be used to precoat three demineralizers (1C, 2A, and 2E) and will cause chemical contamination of the reactor feedwater when the demineralizers are placed in service. The Baxite 86 will cause degradation of elastomer seals, and a crud release in the reactor, which eventually leads to a release from the station.

At 0555 (t+10) 2A condensate filter demineralizer, coated with Baxite, is placed in service. Unit Two chemistry parameters begin to diverge from normal due to chemical intrusion.

At 0600 (t+15) crud release begins in the Unit Two drywell. Main steam line radiation levels begin to trend upward.

At 0645 (t+60) 1C condensate filter demineralizer, coated with Baxite, is placed in service. Unit One chemical intrusion begins.

At 0650 (t+65) reactor recirculation pump seals and reactor water clean up pump mechanical seals begin to degrade as a result of the chemical intrusion.

At 0730 (t+105) HI seal leakage alarm is received due to failure of the Unit Two reactor recirculation pump seal. Leakage is at 2 gpm and rapidly increasing. Chemistry technician draws his daily Unit Two chemistry sample.

At 0810 (t+145) Unit Two offgas and main steam line radiation monitors begin to trend upward due to fission release from failed fuel.

UNUSUAL EVENT (0830-0920)
EAL #14

At 0830 (t+165) loss of primary coolant greater than 25 gpm is calculated for the Unit Two drywell drain sump. Drywell pressure and temperature continue to increase. Unit Two begins power reduction to prepare for shutdown.

At 0900 (t+195) Unit One drywell equipment sump leakage exceeds 25 gpm. Unit One begins power reduction to prepare for shutdown.

ALERT (0920-1040)
EAL #16

At 0920 (t+215) a dramatic increase in Unit Two crud concentration causes drywell radiation levels to reach 200 R/hr. Airborne, main steam line, and offgas radiation levels continue to increase due to fuel element failure.

At 0945 (t+240) Unit One drywell radiation level reaches 200 R/hr.

At 1000 (t+255) Unit Two isolates on high main steam line radiation levels as fuel element failure accelerates. HPCI is started to control reactor pressure. Steam leakage occurs around the HPCI turbine seals which significantly increases reactor building airborne levels. Reactor building ventilation system trips on high radiation level. Control failure occurs allowing supply fans to continue to run and supply dampers to remain open. SBGT system starts and runs normally, but cannot control reactor building pressure increase resulting in overpressurization of the reactor building.

At 1020 (t+275) Unit One "A" filter demineralizer is inadvertently placed in service. Since the 1A filter demineralizer hold pump is out of the system and the isolation valves leak, a large quantity of reactor coolant is released to the demineralizer room as the 1A demineralizer is placed on line. This source also significantly increases reactor building airborne levels.

SITE EMERGENCY (1040-1200)
EAL #16/20

At 1040 (t+295) Unit Two drywell radiation level has reached 400 R/hr, and drywell pressure exceeds 2 lbs.

At 1045 (t+300) failure of the reactor building over and under pressure portection system allows overpressurization of the reactor building to continue until the simultaneous rupture of blow-out panel and the reactor building roof occurs. This results in a loss of secondary containment and initiates an uncontrolled, unmonitored release from the reactor building. Security reports to the control room that debris from the reactor building is "all over the place".

At 1050 (t+305) rapid shutdown of Unit One commences.

At 1100 (t+315) Unit One drywell radiation level exceeds 400 R/hr.

At 1115 (t+330) Unit One forced cooldown begins by dumping steam to the main condenser. Unit Two cooldown continues via HPCI.

GENERAL EMERGENCY (1200-1400)
EAL #16

At 1200 (t+375) Unit Two drywell average air temperature reaches 290 degrees due to continued RR pump seal leakage while drywell cooling remains isolated.

At 1220 (t+395) Unit One and Unit Two drywell radiation levels stabilize at 450 and 560 R/hr, respectively.

At 1255 (t+430) release rate begins to taper off.

At 1300 (t+435) a twenty-four hour time jump occurs. Shortly after the time jump, both Unit One and Unit Two successfully enter shutdown cooling.

At 1320-1345 (t+1895-t+1920) several RHR pump seals fail due to the ongoing chemical intrusion. A steady-state release of 1.0E+06 uCi/sec is maintained.

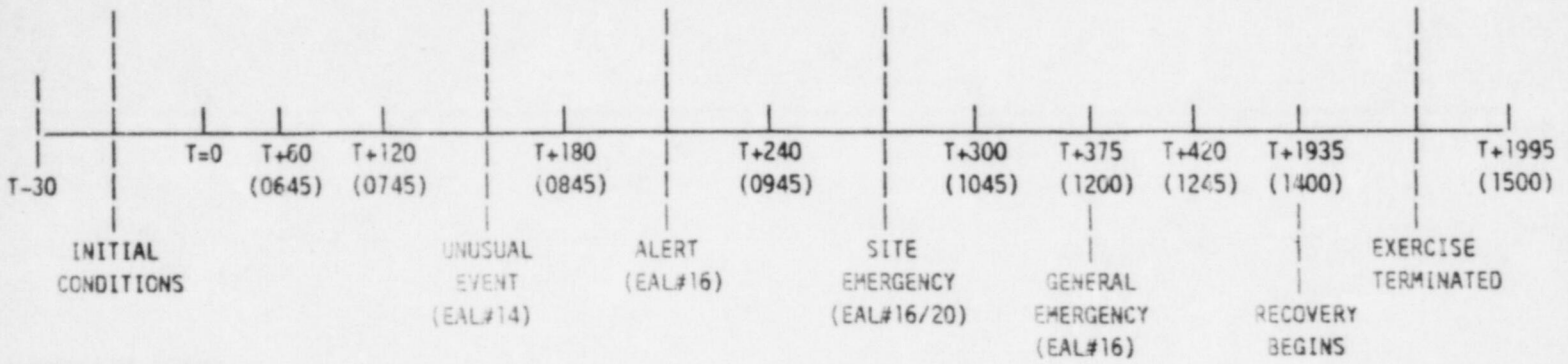
RECOVERY (1400-1430)

At 1400 (t+1935) the reactor building is temporarily repaired ending the uncontrolled release. The SBGT system is operating normally.

At 1430 (t+1965) end of scenario.

BAS/lmk/6939E/3

1986 QUAD CITIES SCENARIO TIMELINE



Summary of Events:

T+0 (0545) Initial Conditions
- Unit One and Unit Two operating normally at 824 Mwe, and 770 Mwe, respectively.

T+10 (0555) 2A condensate filter demineralizer, coated with Baxite, is placed in service resulting in a chemical intrusion. Unit 2 chemistry begins to diverge from normal.

T+15 (0600) Baxite begins attacking elastomer pump seals. A crud release begins resulting in increased drywell radiation levels.

T+60 (0645) 1C condensate filter, coated with Baxite, is placed in service. Unit 1 chemical intrusion begins.

T+145 (0810) Unit 2 offgas radiation monitor and main steam line begins to trend upward due to fission release from failed fuel.

T+165 (0830) UNUSUAL EVENT (EAL #14)
- Loss of Primary Coolant greater than 25 gpm as calculated via the U2 drywell drain sump.

T+195 (0900) Unit 1 drywell equipment sump leakage exceeds 25 gpm.

T+215 (0920) ALERT (EAL #16)
- Loss of fission product barriers (Greater than 200 R/hr in the Primary Containment.)
- Airborne radiation levels increasing due to increased leakage from Primary Containment.

T+295 (1040) SITE EMERGENCY (EAL #16)
- Loss of Fission Product Barriers (Greater than 400 R/hr in the Primary Containment.)

T+300 (1045)
- Reactor building blow-out panels rupture due to over pressurization of the building.
- An unmonitored release begins from the reactor building.

T+375 (1200) GENERAL EMERGENCY (EAL#16)

T+435 (1300) Twenty-four hour time jump occurs.

T+1935 (1400) RECOVERY
- Reactor building is temporarily repaired ending the unmonitored release from the reactor building.

T+1965 (1430) EXERCISE TERMINATED