

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report Nos: 50-254/98014(DRS); 50-265/98014(DRS)

Licensee: Commonwealth Edison Company

Facility: Quad Cities Nuclear Power Station  
Units 1 and 2

Location: 22710 206th Avenue North  
Cordova, IL 61242

Dates: August 25 - 28, 1998

Inspectors: R. Jickling, Emergency Preparedness Analyst  
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## EXECUTIVE SUMMARY

Quad Cities Nuclear Power Station, Units 1 & 2  
NRC Inspection Reports 50-254/98014; 50-265/98014

This inspection consisted of evaluation of the licensee's performance during the plant's biennial exercise of the Emergency Plan. It was conducted by regional emergency preparedness inspectors and a resident inspector. No violations of NRC requirements were identified.

### Plant Support

- Overall performance during the 1998 Emergency Preparedness exercise was effective and demonstrated that emergency plan implementation activities met regulatory requirements. (Section P4.1.c).
- Overall performance in the Control Room Simulator was good. Emergency event classification was accurate and notifications were promptly made. (Section P4.1.c)
- The Technical Support Center staff's performance was effective. Plant event analysis, event classification, notifications, briefings, and communications with other facilities were competently performed by the staff. (Section P4.1.c)
- Coordination activities and maintaining control and status of inplant response teams were effectively demonstrated by the Operational Support Center's staff. Facility staff and team members were professional and maintained focus on emergency response throughout the exercise. (Section P4.1.c)
- Overall performance of the Emergency Operations Facility responders was effective. Communications with onsite emergency response facilities and offsite agencies were frequent and the protective measures team properly monitored plant conditions. (Section P4.1.c)
- Good teamwork was demonstrated in the Joint Public Information Center and press releases were accurate and non-speculative. (Section P4.1.c)
- Self-critiques following termination of the exercise were thorough, self-critical, and controllers effectively solicited verbal and written inputs from exercise participants. (Section P4.1.c)

## Report Details

### IV. Plant Support

#### **P3 Emergency Preparedness Procedures and Documentation**

##### **P3.1 Review of Exercise Objectives and Scenario (82302)**

The inspectors reviewed the 1998 exercise objectives and scenario and determined that they acceptably exercised major elements of the licensee's onsite emergency plan. The scenario provided a challenging framework to support demonstration of the licensee's capabilities to implement its emergency plan as indicated in Section P4.1.b.6. The scenario included a radiological release, emergency events in both units 1 and 2, and several equipment failures.

#### **P4 Staff Knowledge and Performance in Emergency Preparedness**

##### **P4.1 1998 Evaluated Biennial Emergency Preparedness Exercise**

###### **a. Inspection Scope (82301)**

On August 26, 1998, the licensee conducted a biennial exercise involving full participation by the states of Illinois and Iowa, including the counties of Clinton, Rock Island, Scott, and Whiteside. This exercise was conducted to test major portions of the licensee's onsite and offsite emergency response capabilities. Onsite and offsite emergency response organizations and emergency response facilities were activated.

The inspectors evaluated performance in the following emergency response facilities:

- Control Room Simulator (CRS)
- Technical Support Center (TSC)
- Operations Support Center (OSC)
- Emergency Operations Facility (EOF)
- Joint Public Information Center (JPIC)

The inspectors assessed the licensee's recognition of abnormal plant conditions, classification of emergency conditions, notification of offsite agencies, development of protective action recommendations, command-and-control, the transfer of emergency responsibilities between facilities, communications, and the overall implementation of the emergency plan. In addition, the inspectors attended the post-exercise critiques in each of the above facilities to evaluate the licensee's initial self-assessment of exercise performance.

b. Emergency Response Facility Observations and Findings

b.1 Control Room Simulator (CRS)

Overall performance in the control room simulator was good. The shift manager accurately classified the emergency events, promptly notified state and local agencies and the NRC, and appropriately initiated the stations' emergency response. The operations' crew correctly used procedures in responding to the events. Communications were generally complete and accurate with the onsite emergency response facilities.

The operating crew responded correctly throughout the event. Approximately 17 minutes after the initial report of flooding in the 2A residual heat removal pump room, the shift manager, acting as the Acting Station Director, determined the appropriate emergency action level (EAL) and declared an Alert. Within the required 15 minutes, control room personnel notified state and local agencies, and the NRC was properly notified within one hour. The Technical Support Center (TSC) and the Operations Support Center (OSC) were rapidly manned; and the transfer of command and control from the control room to the TSC was smoothly executed within one hour of the Alert declaration. Operators responded appropriately to the changing plant conditions, followed procedures, and correctly used emergency operating procedures throughout the exercise.

Communications between the CRS, TSC, and the OSC were generally complete and accurate. Three way communication among the crew was not used at times and was self-identified by the crew during the critique after the exercise. During the critique, a licensee evaluator noted that although the Shift Manager knew that the Station Director in the TSC had declared a Site Area Emergency, this fact was not announced to the crew. On two occasions, the inspectors observed the control room communicator provide confusing information from the TSC to the Unit Supervisor. In both cases, the Unit Supervisor clarified the information.

b.2 Technical Support Center (TSC)

Overall performance in the TSC was effective. Analysis of plant events, event classification, notifications, briefings, communication with other facilities, and event mitigation efforts were all competently demonstrated in the TSC.

The TSC was rapidly and efficiently activated following the declaration of the Alert. The facility achieved minimum staffing within twelve minutes and assumed command and control from the CRS within forty-six minutes of the Alert declaration. A formal public address announcement was made when the Station Director (SD) assumed his responsibilities. The Emergency Response Data (ERDS) system was verified operational during the facility activation sequence. The TSC Technical Director found that ERDS had not been initiated for one of the two units and promptly initiated the second data link for the remaining unit, well within the required 60 minute requirement.

The SD contacted the CRS soon after arriving in the facility, and received a brief overview of events. The SD properly felt that the initial information was inadequate for a turnover from the CRS, and re-contacted the CRS several minutes later to obtain a more complete briefing before taking command and control of emergency response.

Subsequent briefings were effective. Briefings defined plant status and provided guidance to the TSC staff on current priorities. Continuing, periodic briefings, performed by passing a remote microphone among key responders, were informative and concise, keeping TSC personnel informed of current emergency status, priorities, and concerns. Several times during the exercise, TSC personnel made brief announcements about late-breaking events, developing situations, or condition changes. TSC Director "briefing guides" provided the sequence and general items to be addressed during status briefings.

Status boards were detailed and well maintained throughout the exercise. The "OSC Teams" status board clearly displayed inplant response team tasks, task priority, and comments. Containment radiation levels and release rates were trended, providing valuable information.

The EALs were reviewed during facility activation to verify the current event classification was correct. Possible events which could lead to higher classifications were pro-actively noted and discussed among the staff.

Priorities for activities for both units were appropriately established by the TSC staff and properly adjusted as scenario conditions changed. Priorities for inplant teams were rapidly determined and communicated to the OSC. Use of the "urgent" priority for a number of inplant teams was appropriate, according to scenario conditions.

TSC personnel demonstrated a detailed knowledge of plant systems and station procedures. An example included recognition that if Unit 1 tripped, it would experience a loss of offsite power. It was also recognized before the radiological release was initiated, that any release would be unfiltered due to the loss of the Standby Gas Treatment System, and would contain large amounts of radio-iodine.

Dose projections were performed by TSC personnel prior to and subsequent to the release. Communications and direction of environmental monitoring field teams were competently maintained in the TSC until transferred to the EOF. The TSC appropriately retained control of the single onsite environs team throughout the exercise. A cellular phone was utilized for communication with field teams when they entered radio "dead zones."

Communication with the Illinois Department of Nuclear Safety (IDNS) Resident Engineer in the TSC was excellent. Several times during the exercise, the IDNS Resident Engineer was asked to obtain information from the IDNS Gaseous Effluent Monitoring System (GEMS) radiation monitoring system so that the data could be compared with station readings. Discussions with the IDNS Resident Engineer indicated that he was satisfied with the information exchange in the TSC.

The State Nuclear Accident Reporting System (NARS) Communicator initially experienced difficulties obtaining details of the protective actions initiated by the State of Iowa for display on the facility status board. This problem was solved by direct contact with State of Iowa personnel. After command and control was transferred to the Corporate Emergency Operations Facility (CEOF) and EOF, the TSC Communicator did not need to maintain this information.

TSC staff properly determined when plant conditions met the criteria for declaration of a Site Area Emergency. The classification was accurate, and timely. TSC staff actively reviewed and discussed the criteria in the EAL logic diagram and fission product barrier matrix numerous times during the exercise.

The SD conservatively ordered a plant evacuation following indications of elevated radiation levels in the drywell. Simulated accountability of 692 site personnel was conducted and completed within approximately twenty-five minutes, with eleven individuals initially unaccounted for. The list of unaccounted individuals was rapidly reduced to five, who were then accounted for. Security personnel performed well, and innovatively reviewed the possibility that some onsite events could represent sabotage, and that the last five persons to be accounted for could have been involved.

Effective event mitigation activities were observed in the TSC. Engineering staff reviewed piping and instrumentation drawings and performed analysis of system failures or determining ways to isolate faulted systems.

### b.3 Operational Support Center (OSC)

Effective OSC staff performance was observed by the inspectors, for coordinating activities in the plant and maintaining control and status of inplant response teams. The facility staff and team members were professional and maintained their focus on emergency response throughout the exercise.

Good communications were observed between the group leaders and the OSC Supervisor and OSC Director. Group leaders and the supervisor and director maintained overall awareness of emergency and plant conditions by hearing TSC briefings that were piped in over a speaker system. The TSC briefings provided concise emergency information on a periodic basis and were augmented with additional announcements of significant changes to emergency conditions. Occasionally, the volume and frequency of these briefings was high enough to affect facility communications and add additional time to team briefings.

The OSC Communicator provided excellent response on the three-way phone with the TSC and control room. The communicator effectively documenting team requests from the TSC, identified and announced significant changes to emergency conditions from the control room, and answered requests for information from OSC group leaders, the supervisor, and director.

Plant announcements were clearly audible in the personnel staging area/lunchroom. However, the inspectors observed that announcements, including the emergency announcements and directions, were not heard in the OSC.

The inspectors accompanied the OSC response team that responded to the Reactor Core Isolation Cooling (RCIC) throttle valve and subsequently the High Pressure Coolant Injection (HPCI) leak. The operator efficiently investigated the equipment and the rooms to determine their condition. Communications from the OSC team back to the facility were concise and informative. The radiation protection technician performed comprehensive dose rate surveys en route to the RCIC and HPCI rooms and subsequent contamination and airborne surveys upon arrival. The teams were appropriately briefed on their duties, expected radiological conditions for the areas, and the lowest dose route to take.

b.4 Emergency Operations Facility (EOF)

The overall performance of the EOF responders was effective. Security personnel reported to the EOF after the Alert declaration and performed an efficient sweep of the area to ensure that no unauthorized persons were present. The Safeguards Specialist contacted the TSC's Security Director once the EOF was determined to be ready for use. The specialist and Security Director maintained communications until the EOF was staffed by technical responders. The specialist posted a detailed chronology of the licensee's onsite response to the emergency conditions as a useful briefing aid for incoming technical personnel.

The EOF's technical responders were pre-staged in a local motel and were released in a staggered manner following the Site Area Emergency declaration. Incoming staff efficiently established contacts with TSC and Corporate CEOF counterparts and prepared to perform their functions while the Manager of Emergency Operations (MEO) obtained an extensive and accurate initial briefing on event chronology, response priorities, and other current onsite and offsite concerns from the CEOF's Corporate MEO (CMEO). Transfer of command and control of the licensee's event response from the CMEO to the MEO were orderly and timely once the MEO was assured that EOF staff were briefed and were ready to assume their responsibilities.

The MEO maintained frequent communications with CEOF and TSC counterparts, as well as with Illinois and Iowa decision makers. The States' decision makers were located in their response facilities in Springfield, Illinois and Des Moines, Iowa, respectively. Liaisons from each State were free to interact with the licensee's EOF staff, including observing the MEO's conference calls with the licensee and State decision makers. Subjects that were thoroughly and accurately covered in these conference calls included: accident mitigation priorities and their status; noteworthy changes to plant conditions; onsite and offsite Protective Action Recommendations (PARs); potential changes to current PARs; and protective actions chosen for implementation by the States' decision makers.

The EOF decision makers were well aware of potentially relevant EALs should plant conditions worsen. The MEO correctly declared the General Emergency following the increase in plant radiation levels. After obtaining rapid concurrences from TSC and CEOF counterparts on this major decision, the MEO promptly informed State decision makers of this emergency reclassification and the associated PAR that was efficiently developed by his protective measures staff.

The EOF's Protective Measures Director (PMD) effectively led his functional team in monitoring and assessing abnormal inplant radiation levels, the release, and meteorological conditions. Onsite radiation level and release rate values that warranted PAR revisions were posted to better focus the protective measures staff's attention on these "trigger points". Offsite PARs were properly formulated, based on procedural guidance. Changes in radiation release rates were closely monitored. The licensee's offsite radiological monitoring teams were well positioned to detect, characterize, and track the release. Communications between the teams and EOF staff directing their activities were good. Results obtained by the licensee's offsite survey teams were communicated to the States by a dedicated communicator, who also obtained information on the States' radiological measurements. Due to a computer malfunction, the PMD requested and obtained dose projection calculation support from CEOF staff.

The magnitude of increased radiation levels in the CR, TSC, and OSC following the opening of the containment's vent valves led to rapid assessment of whether personnel in one or more of the onsite facilities should be relocated. TSC, CEOF, and EOF decision makers and the PMD quickly and correctly concluded that the significantly increased radiation levels would last about ten minutes and that relocations of onsite emergency workers were not warranted based on procedural criteria.

Assessments to determine whether onsite emergency workers or the licensee's offsite environmental monitoring teams should take potassium iodide (KI) were relatively slow. An initial dose projection indicated that onsite radio-iodine doses could exceed 25 rem. However, the short duration of the unfiltered release and the CRS and TSC staffs remaining in facilities equipped with emergency ventilation systems made a 25 rem exposure improbable. A more accurate dose projection was performed, which led to a more plausible decision that only persons in the OSC and inplant teams would be authorized to take KI.

The TSC kept the EOF's reactor safety team effectively focused on monitoring circumstances which could warrant a change in offsite PARs. They frequently compared the licensee's PAR flowchart to degraded plant conditions and possible release pathways.

#### b.5 Joint Public Information Center (JPIC)

The licensee issued five press releases, two before and three after activation of the near site JPIC. Four press releases focused on the current emergency classification, while the fifth addressed the activation of the near site JPIC. The press releases contained accurate and non-speculative information.



The inspectors observed one press briefing late in the exercise. Licensee and both State spokespersons demonstrated good teamwork in presenting current information to the audience and responded appropriately to reporter questions.

b.6 Scenario and Exercise Control

The inspectors assessed the challenge of the scenario and evaluated the licensee's control of the exercise. The scenario was challenging, as indicated in Section P3.1 of this report, and exercised the majority of the licensee's emergency response capabilities. The scenario was appropriate to test basic emergency capabilities and to demonstrate the licensee's exercise objectives.

On two occasions inspectors observed controller errors. Incorrect radiation data was provided to an operator in the control room which caused the standby gas treatment area to exceed the maximum safe radiation level, in addition to high radiation in the HPCI room. This data did not significantly affect the emergency response and although incorrect, both the control room and OSC response personnel appropriately responded to the data.

Also, prior to the failure of the safety relief valve tailpipe, the event which would pressurize containment and require venting, drywell pressure was increasing slowly. The controller told the crew to disregard the increase, as it was a function of the simulator. Later, when drywell pressure was increasing due to the event, operators were confused as to whether or not to take action because of the previous comment from the controller. The delay affected plant parameters and required artificial manipulation of drywell pressure by the simulator operator. This problem caused delays in containment venting and perturbed the event time line such that other facilities used radiation data that indicated the release had occurred when the containment venting had not yet been initiated.

b.7 Licensee Self-Critiques

The inspectors attended the licensee's self-critiques in the CRS, TSC, OSC, and EOF which occurred immediately after the exercise. Exercise controllers solicited verbal and written inputs from the participants in addition to providing the participants with the controllers' initial assessments of personnel performance. The inspectors concluded that these initial self-critiques were thorough and in close agreement with the majority of inspectors' observations.

c. Overall Conclusions

The exercise was a competent demonstration of the licensee's capabilities to implement its emergency plans and procedures.

- Overall performance during the 1998 Emergency Preparedness exercise was effective and demonstrated that emergency plan implementation activities met regulatory requirements. (Section P4.1.b)

- Overall performance in the Control Room Simulator was good. Emergency event classification was accurate and notifications were promptly made. (Section P4.1.b.1)
- The Technical Support Center staff's performance was effective. Plant event analysis, event classification, notifications, briefings, and communications with other facilities were competently performed by the staff. (Section P4.1.b.2)
- Coordination activities and maintaining control and status of inplant response teams was effectively demonstrated by the Operational Support Center's staff. Facility staff and team members were professional and maintained focus on emergency response throughout the exercise. (Section P4.1.b.3)
- Overall performance of the Emergency Operations Facility responders was effective. Communications with onsite emergency response facilities and offsite agencies were frequent and the protective measures team properly monitored plant conditions. (Section P4.1.b.4)
- Good teamwork was demonstrated in the Joint Public Information Center and press releases were accurate and non-speculative. (Section P4.1.b.5)
- Self-critiques following termination of the exercise were critical and included inputs from controllers and exercise participants. (Section P4.1.b.7)

## **P8 Miscellaneous EP Issues**

- P8.1 (Open) Inspection Follow up Item No. 50-254/96008-17; 50-265/96008-17: Was identified for untimely minimum staffing of the Corporate EOF (CEOF) for the declared Alert for the May 10, 1996 tornado event. The issue was for clarification of emergency facility minimum staffing time requirements from the time the emergency was declared and demonstration of the capability to meet these requirements. Corrective actions taken included revising the GSEP manual to reflect changes to the Bulk Power Operations (BPO) standing order to notify the Nuclear Duty Officer (NDO) after activating the CEOF call out and changes to the NDO's procedure to confirm that the BPO Dispatcher had activated the CEOF. Also, the new Community Alert Network System (CANS) for ERO call out had been put in place. Additionally, the licensee agreed to clarify their commitment to minimally staff the CEOF within 60 minutes of classifying an Alert or higher classification during their next GSEP revision. This item will remain open pending appropriate demonstration of timely CEOF staffing.

## **V. Management Meetings**

### **X.1 Exit Meeting Summary**

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on August 28, 1998. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

## PARTIAL LIST OF PERSONS CONTACTED

### Licensee

G. Boerschig, Department Engineering Manager  
T. Burns, Corporate Emergency Preparedness  
J. Dimmette Jr., Site Vice President  
M. Field, Emergency Preparedness Coordinator  
K. Giadrusich, Nuclear Oversight Manager  
T. Kirkham, Radiation Protection Technical Manager  
L. Pearce, Station Manager  
C. Peterson, Regulatory Assurance Manager  
M. Schimmer, Work Control Manager  
B. Svaleson, Operating Manager  
J. Stortz, Shift Operations Supervisor (Acting)  
F. Tsakeres, Training Manager  
M. Vonk, Corporate Emergency Preparedness Manager

### NRC

K. Walton, Resident Inspector  
L. Collins, Resident Inspector

### Illinois Department of Nuclear Safety

B. Ganser, Resident Inspector

## INSPECTION PROCEDURES USED

IP 82301 Evaluation of Exercises for Power Reactors  
IP 82302 Review of Exercise Objectives and Scenarios for Power Reactors

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Discussed

50-254;265/96008-17 IFI Clarification of emergency facility minimum staffing time requirements from the time the emergency was declared and demonstration of the capability to meet these requirements.

## LIST OF ACRONYMS USED

ALARA	As Low As Is Reasonably Achievable
CEOF	Corporate Emergency Operations Facility
CFR	Code of Federal Regulations
CMEC	Corporate Manager of Emergency Operations
CRS	Control Room Simulator
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
EAL	Emergency Action Level
EOF	Emergency Operations Facility
EPZ	Emergency Planning Zone
ERDS	Emergency Response Data System
ERF	Emergency Response Facilities
EP	Emergency Preparedness
ERO	Emergency Response Organization
GEMS	Gaseous Effluent Monitoring System
HPCI	High Pressure Coolant Injection
IDNS	Illinois Department of Nuclear Safety
IFI	Inspection Follow up Item
IDNS	Illinois Department of Nuclear Safety
IP	Inspection Procedure
JPIC	Joint Public Information Center
KI	Potassium Iodide
MEO	Manager of Emergency Operations
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OSC	Operations Support Center
PAR	Protective Action Recommendation
PDR	NRC Public Document Room
PMD	Protective Measures Director
RCIC	Reactor Core Isolation Cooling
RP	Radiation Protection
RPT	Radiation Protection Technician
SAE	Site Area Emergency
SD	Station Director
TSC	Technical Support Center