

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-454; 50-455  
Licenses No: NPF-37; NPF-66

Reports No: 50-454/97006(DRS); 50-455/97006(DRS)

Licensee: Commonwealth Edison Company (ComEd)

Facility: Byron Generating Station, Units 1 & 2

Location: 4450 North German Church Road  
Byron, IL 61010

Dates: April 15-17, 1997

Inspectors: James Foster, Sr. Emergency Preparedness Analyst  
Robert Jickling, Emergency Preparedness Analyst  
Nicholas Hilton, Resident Inspector  
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Division of Reactor Safety

## EXECUTIVE SUMMARY

Byron Generating Station, Units 1 & 2  
NRC Inspection Reports 50-454/97006; 50-455/97006

This inspection included evaluation of performance during the plant's biennial exercise of the Emergency Plan and review of previous emergency preparedness open items by the plant resident staff and headquarters and regional emergency preparedness inspectors.

### Plant Support

Overall performance during the 1997 Emergency Preparedness exercise was good. Emergency offsite notifications and offsite protective action recommendations were correct and timely. Transfers of command and control of event response were orderly and timely. Two Exercise Weaknesses were identified relative to classification and utilization of the Acting Station Director's procedure and associated checklist.

- Generally, performance in the Control Room Simulator was very good as evidenced by strong operator communications. "Repeat back" communications and "peer checking" of controls to be manipulated were evident. Operator statements and actions indicated a detailed understanding of plant conditions. The Unit Supervisor displayed effective command and control of the operators. However, some specific weaknesses were observed as noted below. (Section P4.1.b.1)

The Shift Engineer reviewed the plant emergency action levels several times but focused on an explosion in the diesel generator crankcase and classified the event as an Unusual Event. The loss of all but one power supply to the Unit 1 Essential Safety Feature buses warranted the classification of an Alert. This was an Exercise Weakness. (Section P4.1.b.1)

Once the Alert was declared, the Shift Supervisor did not utilize the Acting Station Director procedure nor associated checklist. This was an Exercise Weakness. One of the checklist items, initiation of the Emergency Response Data System, was overlooked by the control room staff but was caught by Technical Support Center (TSC) personnel. (Section P4.1.b.1)

- Overall performance in the TSC was excellent. Personnel were professional, and teamwork and communications were very good. (Section P4.1.b.2)
- The overall performances of Operational Support Center (OSC) management and staff were very good. Teams were quickly assembled and dispatched from the OSC. Teams were very well controlled and team exposure was monitored constantly. Team size was reduced when high radiation fields were encountered. Communications between teams and OSC personnel were good. (Section P4.1.b.3)
- Overall performance in the Emergency Operations Facility (EOF) was good. The EOF staff in the Dixon EOF adequately performed all required activities in a correct and timely manner. (Section P4.1.b.4)

## Report Details

### IV. Plant Support

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

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

The inspectors reviewed the 1997 exercise objectives and scenario and determined that they were acceptable. The scenario provided an appropriate framework to support demonstration of the licensee's capabilities to implement its emergency plan. The scenario included a large radiological release and numerous equipment failures. Exercise realism was enhanced by use of a mock NRC Site Team.

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

##### **P4.1 1997 Evaluated Biennial Emergency Preparedness Exercise**

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

On April 16, 1997, the licensee conducted a biennial exercise involving partial State participation and full county participation. The exercise was conducted to test major portions of the onsite and offsite emergency response capabilities. The licensee activated its emergency response organization and emergency response facilities.

The inspectors evaluated licensee performance in the following emergency response facilities:

- Control Room Simulator (CRS)
- Technical Support Center (TSC)
- Operational Support Center (OSC)
- Dixon Emergency Operations Facility (EOF)

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

###### **b. Emergency Response Facility Observations and Findings**

###### **b.1 Control Room Simulator (CRS)**

In the CRS an excellent pre-exercise briefing was provided to the players, including initial conditions and paperwork which would have been completed by the preceding shift. "Repeat back" communications and "peer checking" of controls to be manipulated were evident. Periodic briefings kept operations personnel aware of current conditions and desired goals. Briefing initiations and conclusions were crisp

and formal. Operator statements and actions indicated a detailed understanding of plant conditions. Strong command and control of the operators was displayed by the Unit Supervisor.

Exercise controllers properly delayed providing the first of the exercise's events (explosion in the crankcase of the 1B Diesel Generator) until testing of the diesels was begun. Control room operators immediately suspected trouble when the individual doing the testing ceased radio communication with the control room. Operators dispatched assistance to the individual injured in the explosion and learned that the explosion had not caused a fire. Shortly thereafter, operators observed that breaker 1414 had lost control power, and there had been a loss of all but one power supply to the Unit 1 Essential Safety Feature buses.

Effective communication was noted. An operator brought various concerns to the attention of the Unit Supervisor, including the risks associated with ramping down power while electric supplies were degraded, and the possibility that one of the steam generators was faulted. When the OSC was activated, operators already performing tasks in the plant were advised by radio that they were under the control of the OSC.

The Shift Engineer reviewed the plant Emergency Action Levels (EALs) several times but apparently focused on the diesel generator crankcase explosion and thus classified the event as an Unusual Event. Operators were aware of the degraded condition of the plant power supplies and had begun to analyze the extent of the degradation. A pro-active precautionary staffing of Technical Support Center (TSC) positions was requested to assist in evaluating the overall condition of the plant.

The loss of all but one power supply to the Unit 1 Essential Safety Feature buses warranted the classification of an Alert per EAL MA1, "Power to ESF buses reduced to a single power source for  $\geq 15$  minutes". When this classification was not made within a reasonable period of time (15 minutes), a controller prompted the participants to make the classification to preserve the scenario time line. The failure to properly classify the accident scenario at the highest appropriate classification level was an Exercise Weakness that will be tracked as Inspection Followup Item 50-454/97006-01; 50-455/97006-01.

Once the Alert was declared, the Shift Engineer failed to utilize the Acting Station Director checklist included as an attachment to Emergency Plan Implementing Procedure (EPIP) BZP 310-5, "Acting Station Director or Station Director", Rev. 23, and associated checklist, BZP 310-5T1, "Acting Station Director Checklist", Rev. 2. The Acting Station Director Checklist indicated that it is to be used as a guide by the Acting Station Director to assist in the completion of emergency responsibilities and duties.

One of the BZP 310-5T1 checklist items (Step 5), initiation of the Emergency Response Data System (ERDS) as soon as possible but no later than one hour following an Alert classification or higher, was overlooked by the control room staff but was caught during checklist verification in the TSC.

The failure to utilize the Acting Station Director procedure and associated checklist was an Exercise Weakness that will be tracked as Inspection Followup Item 50-454/97006-C2; 50-455/97006-02.

An additional communicator and clerical support were called to the CRS to assist with notifications and other communications. Event notification message forms and verbal messages to State and simulated NRC officials were completed in a detailed and timely manner.

Communications between responders in the CRS and TSC were good. Transfer of command and control of event response activities from the Acting Station Director to the TSC's Station Director was orderly. The Shift Engineer properly advised the Station Director that EAL review indicated that the latter should declare a Site Area Emergency.

b.2 Technical Support Center (TSC)

Overall, performance in the TSC was excellent. Personnel were professional, and teamwork and communications were very good. The TSC staff rapidly activated their equipment and established their communications links with the CRS and OSC. Status boards were well-utilized and continuously updated.

No public address announcements were made regarding the Unusual Event declaration. Public address announcements of plant conditions with appropriate instructions could prevent unnecessary phone calls to the control room during an actual emergency.

Transfers of command and control to and from the TSC were well-coordinated and implemented. The Station Director ensured the staff was aware of the current status of communications and forthcoming notifications.

The Operations and Technical Directors were pro-active in tracking plant conditions and comparing emergency action levels for possible event paths leading to potential event classification upgrades. Tasks and priorities were effectively identified for OSC repair teams by the Maintenance, Operations, Technical, and Radiation Protection Directors and quickly communicated to the OSC. The Tasks and Priorities status board effectively tracked the OSC repair teams' priorities and status.

Individuals assigned to participate as the "mock NRC" site team arrived at the TSC, were appropriately briefed by an individual appointed as the NRC team liaison, and were provided with binders containing plant information and telephone numbers.

The Environs and Radiation Protection Directors maintained appropriate awareness of the plant and offsite radiological conditions. Dose assessment calculations conservatively projected offsite doses during the radiological release. The Radiation Protection Director provided excellent technical insight when a significant difference between TSC and EOF dose projections was identified. The dose assessor quickly identified the cause of the differences and reported the reason to the director. Offsite survey teams were effectively positioned to locate and monitor the

radiological release. Communications with the offsite teams were clear and efficient.

Protective Action Recommendations (PARs) to the State were efficiently made according to the procedures. PARs and protective actions issued by the State of Illinois were effectively communicated and displayed on a status board.

An excellent discussion was conducted among the TSC directors for sending a response team into high radiation areas to look for the radiological release path out of containment. The directors demonstrated awareness of radiological and safety concerns.

Habitability monitoring of the TSC was conducted periodically when increasing radiation levels in the plant were identified. A radiation protection technician (RPT) was observed on two occasions, dragging the frisker's probe on the carpet, a poor demonstration of health physics techniques.

Communications in the TSC were excellent. Personnel provided very good teamwork by correcting and following up on communications. The Station Director provided frequent, comprehensive briefings. A cordless microphone was circulated among the directors, facilitating comments and questions during facility briefings.

The Corporate Emergency Operations Facility (CEOF) staff was unable to maintain radio communications with the offsite survey teams. The TSC retained control and communications with the offsite field teams after command and control was transferred to the CEOF.

### b.3 Operational Support Center (OSC) and Inplant Teams

The overall performance of OSC management and staff was very good. Teams were quickly assembled and dispatched from the OSC. Team radiological exposure was monitored constantly by the escorting RPT. Appropriately qualified, experienced personnel were utilized for the teams.

The OSC was fully staffed and operational in a timely manner following the Alert declaration. Status boards were effectively used to track personnel in each technical discipline who were available for assignment to an inplant team as well as the teams themselves. Provisions for reviewing radiation work permits, issuing dosimetry and establishing dose limits were efficient and effective. Simulated exposures received by inplant team members were effectively tracked.

The priority assigned to each inplant team's mission by the TSC's decision makers was clearly understood by OSC management and communicated to OSC personnel. Inplant team briefings were clear, concise, and included current information on relevant, simulated radiological conditions. Team leaders were designated and RPTs were assigned to inplant teams when appropriate. Inplant teams were issued hand-held radios and were advised to transmit progress reports to OSC management.

Inplant teams were dispatched within about 10 minutes of TSC management's requests. All teams were adequately debriefed and were asked to report any unexpected conditions that they encountered. Briefings and debriefings were documented per procedures. OSC management remained well aware of inplant teams' progress and results.

The OSC Manager and OSC Supervisor provided very good periodic briefings to available staff on changing plant conditions, results reported by inplant teams, major event response decisions and simulated onsite radiological conditions. Communications with the CRS and TSC were well-maintained with the exception that OSC management was not informed of the General Emergency declaration for approximately 45 minutes.

After the simulated release began, abnormally high simulated radiation levels were reported in various inplant areas. The existence of these abnormal conditions was not adequately incorporated into plans for staffing two relatively large, multi-disciplinary inplant teams to assess and restore one or both trains of the containment spray system. Members of these multi-disciplinary teams were advised to remain near their RPT escort, although each team member was carrying an alarming dosimeter, and remaining near the RPT would result in team members having less freedom to attempt assessment and corrective actions.

Teams were pre-determined and included a mix of all disciplines. This created logistic difficulties that could have been avoided. The concept of As-Low-As-Reasonably-Achievable (ALARA) was not achieved because superfluous individuals were allowed to enter the simulated high radiation area. Specifically, a containment spray breaker inspection required only operations and electrical maintenance personnel. However, a team that included instrument and mechanical maintenance personnel was dispatched. The RPT sent all but one operator and one electrician back to OSC.

OSC management demonstrated good concern for limiting the simulated radiological exposures received by personnel within the OSC. OSC management coordinated with TSC managers and prudently decided to relocate the OSC (simulated) to its pre-planned alternate location (the Shift Manager's office). The OSC Director noted that ventilation in the Shift Manager's office would probably be tripped off due to high radiation levels. Therefore, habitability by a large number of people could be a problem.

b.4 Dixon Emergency Operations Facility (EOF)

Overall performance in the EOF was good. Staff in the Dixon EOF performed required activities in a correct and timely manner. Command and control in the EOF was very good throughout the exercise. Status boards were generally well-maintained. The noise level was kept low, and security personnel effectively controlled access to the EOF and the adjacent Joint Public Information Center.

The EOF staff promptly assumed their required functions as they entered the EOF. It took 39 minutes to achieve minimum staffing and for the Manager of Emergency

Operations (MEO) to take over command and control from the CEOF. Transfer of command and control was effective and smooth.

Communications and information flow within the EOF and between other facilities and the State of Illinois were good. Notifications to offsite authorities were timely. The licensee utilized a "mock NRC" cell to support simulated communications with the NRC. The MEO communicated with TSC and CEOF managers frequently and periodically discussed events with the mock NRC site team and Illinois Department of Nuclear Safety (IDNS) representatives.

The Technical Support Manager briefed the EOF staff approximately every 30 minutes. The EOF staff conducted knowledgeable technical discussions.

EOF personnel maintained good communications with the offsite survey teams. The location and findings were kept current. However, the offsite survey team's data was not displayed prominently.

Protective Action Recommendations (PARs) were well-coordinated with State decision makers. The status board showing the licensee's PARs and the State's actions was slow to be posted with information on the State's actions.

The licensee was proactive in dose assessment and dose projection, including back-calculating and verifying plant release rates from actual field measurements.

b.5 Recovery Discussions

Recovery discussions observed in the TSC and EOF were adequate. The lead controller provided the EOF and TSC staffs with scenario data and sets of questions to initiate the recovery phase of the exercise. This approach (answering questions rather than following the recovery procedure) to the recovery discussions caused confusion and recovery efforts were terminated early.

b.6 Scenario and Exercise Control

The inspectors made observations during the exercise to assess the challenge and realism of the scenario and to evaluate the control of the exercise.

The inspectors determined that the scenario was appropriate to test emergency capabilities and demonstrate onsite exercise objectives. Control of the exercise was good. No controller prompting or other problems were identified.

b.7 Licensee Self-Critique

The inspectors observed and evaluated the licensee's post-exercise facility critiques immediately following the exercise. Participants and controllers participated in the discussions and completed formal critique forms. Site Quality Verification personnel also observed and evaluated the exercise for audit purposes.

Participants and controllers were self-critical, and numerous issues, both positive and negative, were discussed. Participating personnel had an opportunity to speak.

Controllers requested written comments from the participants to augment the controllers' documents.

Prior to the exit meeting, the licensee exercise evaluation organization provided a summary of its overall assessment of the exercise, which mirrored the NRC evaluation team's conclusions. The licensee's overall self-assessment was very good.

c. Overall Conclusions

The exercise was a good demonstration of the licensee's capabilities to implement its emergency plans and procedures. Event classifications, with the exception of the initial Unusual Event, were correct and timely. Offsite notifications and offsite protective action recommendations were correct and timely. Inplant activities were well-thought-out and well-coordinated. Transfers of command and control were appropriately coordinated.

The licensee's overall self-assessment was very good.

P8 **Miscellaneous EP Issues**

(Closed) Inspection Followup Item (454/455/95011-06): Tracking of inplant teams in the OSC. During this exercise, inplant teams were coordinated and tracked very well, and there was no lack of understanding of the status of the various inplant teams. This item is closed.

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 April 17, 1997. 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

J. Bauer, Health Physics Supervisor  
E. Bendis, Operations  
D. Brindle, Regulatory Assurance Supervisor  
T. Burns, Scenario Development Supervisor  
E. Campbell, Maintenance Manager  
R. Colglazier, NRC Coordinator  
D. Drawbaugh, Emergency Preparedness Coordinator  
P. Elkmann, Corporate EP, Lead Onsite Controller  
T. Gierich, Operations Management  
P. Johnson, Engineering Superintendent  
W. Kouba, LRWC Superintendent  
H. Lange, Services  
R. Linboom, Site Quality Verification Senior Inspector  
W. McNeill, ALARA/Operations Radiation Protection  
S. Merrell, Emergency Preparedness Trainer  
M. Rasmussen, Operations Engineer  
T. Schmidt, Training  
M. Snow, Work Control Superintendent  
D. Stobaugh, Operations & Onsite Programs  
M. Vonk, Corporate Emergency Preparedness Director  
D. Wozniak, Engineering Manager

### Illinois Department of Nuclear Safety

C. Thompson, Resident Engineer

### NRC

N. Hilton, 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 AND CLOSED

### Opened

- 50-454;455/97006-01 IFI Exercise Weakness, failure to classify to the highest applicable EAL
- 50-454;455/97006-02 IFI Exercise Weakness, failure to utilize the Acting Station Director procedure and checklist

### Closed

- 50-454;455/95011-06 IFI Team tracking in the OSC

## LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CEOF	Corporate Emergency Operations Facility
CFR	Code of Federal Regulations
CRS	Control Room Simulator
ComEd	Commonwealth Edison Company
DRS	Division of Reactor Safety
EAL	Emergency Action Level
ENS	Emergency Notification System
EOF	Emergency Operations Facility
EPIP	Emergency Plan Implementing Procedure
ERDS	Emergency Response Data System
ERO	Emergency Response Organization
IFI	Inspection Followup Item
MEO	Manager of Emergency Operations
NPF	Nuclear Power Facility
NRC	Nuclear Regulatory Commission
OSC	Operational Support Center
PAR	Protective Action Recommendation
PDR	NRC Public Document Room
RPT	Radiation Protection Technician
TS	Technical Specification
TSC	Technical Support Center