

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos: 50-352
50-353

Report Nos: 50-352/97-05; 50-353/97-05

License Nos: NPF-39
NPF-85

Licensee: PECO Energy
Correspondence Control Desk
P. O. Box 195
Wayne, PA 19087-0195

Facility: Limerick Nuclear Generating Station, Units 1 & 2

Dates: June 23 - 26, 1997

Inspectors: N. McNamara, Emergency Preparedness Specialist, Region I
J. Laughlin, Emergency Preparedness Specialist, Region I
J. Lusher, Emergency Preparedness Specialist, Region I
R. Bores, Sr. Project Manager, Region I
C. Sisco, Reactor Engineer, Region I
P. Bonnett, Resident Inspector, Limerick
D. Screnci, Sr. Public Affairs Officer, Region I

Approved by: Michael C. Modes, Chief
Emergency Preparedness and Safeguards Branch
Division of Reactor Safety

EXECUTIVE SUMMARY

Limerick Units 1 & 2 Full-Participation Emergency Preparedness Exercise Evaluation Inspection Report Nos. 50-352/97-05 and 50-353/97-05

These inspectors evaluated the licensee's performance during its biennial full-participation emergency preparedness (EP) exercise. The inspectors observed the emergency response facility (ERF) staffing, procedure implementation, effectiveness of mitigation actions, communications, command and control, emergency classification, off-site notifications, and protective action recommendation (PAR) formulation.

An exercise strength was identified in the Emergency News Center (ENC). The spokesperson conducted excellent press briefings which were consistently informative, accurate and well organized.

The ERFs were promptly staffed and activated in a timely manner. The event classifications were correct and timely. Off-site notifications were completed within 15 minutes. The first PAR, at the general emergency (GE) declaration, was made within the 15 minute requirement and was upgraded twice as plant and radiological conditions changed.

The noise level from a three-way speaker phone linking communication between the Simulator Control Room (SCR), Technical Support Center (TSC) and Operations Support Center (OSC) was observed to be a problem in all three facilities. It appeared to be a distraction and often the facility directors had to request that other facilities mute their phone so that their conversations would not interfere with communications. However, the licensee was very good at "repeat backs" which helped eliminate any serious consequences of the speaker phone noise problem.

An exercise weakness was identified in the TSC. The Emergency Director (ED) and Assistant Emergency Director's (AED) strong command and control tended to promote a "reactive" response rather than a "proactive" response from the engineering staff for performing "what if" strategies and providing alternative suggestions to the ED. This resulted in the licensee not fully demonstrating an integrated response in the TSC. Also, the duties of the Maintenance Team Coordinator (MTC) were not effectively demonstrated.

The licensee's formal critique was acceptable, however, it was very brief, lacked detail, did not cover exercise objectives, and was not very self-critical.

An improvement was noted in the OSC since the previous graded exercise.

Report Details

IV. Plant Support

P3 EP Procedures and Documentation

a. Inspection Scope (92904)

The inspector reviewed the Nuclear Emergency Plan (E-Plan) and various Emergency Response Procedure (ERP) revisions in the regional office prior to the inspection to determine if the changes reduced the effectiveness of the E-Plan.

b. Observations, Findings and Conclusions

Based on the licensee's determination that the changes do not decrease the overall effectiveness of the E-Plan, and that it continues to meet the standards of 10 CFR 50.47(b) and the requirements of Appendix E to Part 50, NRC approval of the changes is not required. Initial review of these changes found that they were in accordance with 10 CFR 50.54(q). (See Attachment 1). Implementation of these changes will be subject to inspection to confirm that they do not decrease the overall effectiveness of the E-Plan and ERPs.

P4 Staff Knowledge and Performance

a. Exercise Evaluation Scope

During this inspection, the NRC inspectors observed and evaluated the performance of the licensee's emergency response organization (ERO) during the biennial, full-participation exercise in the SCR, TSC, OSC, emergency operations facility (EOF) and the ENC. The inspectors assessed licensee recognition of abnormal plant conditions, classification of emergency conditions, notification of offsite agencies, development of PARs, command and control, communications, and the overall implementation of the E-Plan. In addition, the inspectors attended the post-exercise critique to evaluate the licensee's self-assessment of the exercise.

b. Emergency Response Facility Observations and Critique

Simulator Control Room

The Alert was declared by the shift supervisor at 4:05 p.m. Event notifications and plant announcements were accurate and timely. Emergency operating procedures were entered and correctly implemented by the SCR crew. The shift manager exhibited very good command and control while acting as the emergency director's (ED) until the TSC was activated. The inspector observed an excellent detailed turnover of the ED duties by the SCR shift manager to the TSC ED.

Excessive background noise from a three-way communication speaker phone sometimes made it difficult for the SCR communicator to effectively communicate to the SCR team.

One area of concern was identified in the SCR. Near the end of the exercise, the licensee made a decision to flood containment in order to obtain core cooling. However, at that time, the location of the breach in containment was unknown. (Two residual heat remover pumps and one core spray pump were available). By flooding containment there was the possibility of damaging those safety systems resulting in the potential loss of long term core cooling and a safety consequence to the public. The SCR shift manager questioned the ED about this decision. The inspector observed very little discussion between the shift manager and the ED regarding the consequences of this decision. Because of the safety consequences of this decision, the inspector concluded that the decision makers in the TSC did not aggressively seek additional engineering resources, to assess alternatives to achieve long term core cooling which may have precluded the need to flood containment.

Overall, the SCR staff demonstrated a very good performance during the exercise and the shift manager established effective control room emergency command and control functions.

Technical Support Center

The TSC was activated within the required time period after the Alert declaration. The staff demonstrated an appropriate use of ERPs, in particular, the Emergency Action Levels to classify the emergencies. Event classifications were correct and timely, and notifications of off-site agencies were also timely. The TSC staff kept the EOF apprised of the status of the emergency, and the proper functions were transferred to the EOF when it became activated. With the exception of the maintenance team status board, the status boards generally reflected current plant data.

The licensee utilized a three-way speaker phone at the ED's desk which maintained an open communications link between the TSC, SCR and OSC. This link was effective and useful in allowing the ED and the AED to continuously monitor the communications between the SCR and OSC. However, like in the SCR, there were also difficulties with this phone. For example, the SCR and OSC repeatedly requested that the TSC mute its phone to reduce background noise or a loss of the link had occurred. However, they were very good at "repeat backs" which helped eliminate any serious consequences of the speaker phone noise problem.

The ED and AED are strong technically knowledgeable individuals with years of plant experience. They exhibited good command and control, provided staff updates and conducted team leader briefings. The ED and AED promptly recommended to the ERM at the EOF the PAR, and to upgrade the PAR twice as plant and radiological conditions changed. Generally, the performance in the TSC was good.

However, during the course of the exercise, the inspector observed several instances in which the technical support team (TST) was not fully utilized by the ED and AED particularly during crucial decisions and for devising "what if" mitigating strategies. For example, the AED directed the SCR to start 1A/1C condensate pumps without first determining the hotwell level. No support from the TST or ED was requested prior to making this decision. Also, there were discussions regarding the decision to flood containment between the ED, AED and the EOF. The inspector did not observe discussions in the TSC regarding the consequences, contingencies or other alternatives for achieving long term core cooling. Another example is when the TST questioned the ED regarding the consequences of placing the hydrogen recombiner in service with the D12 bus dead. Overhearing the conversation on the speaker phone, the SCR responded that this evolution would be approached as in the surveillance test. The inspector concluded that the TST should have known this information and informed the ED not the SCR.

During the team leaders' briefings, the ED did not solicit advice or support from the team leaders, but rather told them what the priorities were and provided little direction for what was needed to mitigate the accident. In fact, the MTC, was not able to provide any viable information to the ED during the briefings because he was not kept informed of job requests nor involved in discussions between the ED and OSC for prioritizing maintenance repairs. Although the function of the MTC is to coordinate the maintenance job requests between the OSC and TSC, this position was bypassed through the direct link of the ED and OSC. Furthermore, the ED never questioned nor directed the MTC to become more involved and perform his designated duties. The inspector concluded that the ED was able to bypass the MTC because the necessary information was being relayed over the speaker phone. This prevented the MTC from fully demonstrating his ability to fulfill his duties.

Due to the strong technical background of the ED and AED and the open communication speaker phone, these issues did not result in any adverse consequences. However, the ED and AED's actions tended to promote a "reactive" response rather than a "proactive" response from the TSC engineering staff for performing "what if" strategies. Additionally, the inspector concluded that the inadequate demonstration of the MTC duties and the licensee not being able to consistently demonstrate the integrated response of the TST, this is considered an exercise weakness. (IFI 50-352/95-07-01; 50-353/97-07-01)

Operations Support Center

Overall, the performance in the OSC was very good which was an improvement since the previous emergency graded exercise.

The OSC was staffed in a timely manner. The OSC Director (OSCD) demonstrated excellent command and control. He frequently conferred with the shift manager and TSC ED to clarify work priorities. These priorities were effectively communicated to his group leaders so that personnel could be tasked their work assignments. The OSCD conducted regular briefings to keep his staff informed of plant conditions. He kept his staff focused on priorities and often requested that personnel reduce the noise level. He also ensured that OSC habitability was frequently confirmed.

The group leaders utilized hand-held white boards to track work priorities to completion and quickly dispatched teams to accomplish the priority jobs. Repair teams were briefed, tracked, and debriefed upon returning. OSC status boards were kept current and contained excellent team status and radiological information. The health physics group leader informed the OSCD of changing radiological conditions to ensure that radiation exposure could be maintained as low as reasonably achievable.

As discussed in previous sections, the speaker phone between the SCR, TSC and OSC was effective for three-way communications but was sometimes a distraction. The OSCD occasionally requested that the other facilities mute their phone so that their conversations would not interfere with communications.

The GE declaration was announced on the PA (Public Address) system one hour and 15 minutes after it occurred. Additionally, there was no PA announcement of the commencement of a radiological release. These oversights had no negative impact on exercise performance, but emergency responders should be aware of this information to understand the seriousness of the radiological emergency.

The OSCD kept a record of work priorities on a paper flip-chart rather than using a the designated priority status board which had the capability of copying the information for faxing to the TSC. ERP 230 requires that the OSCD periodically (every 30 minutes) fax a copy of the priority status board to the MTC in the TSC. However, because the OSCD used the paper flip-chart, nothing was being faxed to the TSC. The Site EP Manager stated that the OSCD requested to use a paper flip-chart but when they approved this request, consideration was not given that the information wouldn't be faxed. During this exercise, this had the negative effect of not keeping the TSC MTC apprised of OSC work priorities. Because of the three-way speaker phone mentioned earlier, the ED was kept apprised of the teams and their priorities, however, this resulted in not exercising the MTC's function.

The inspector observed excessive interaction between exercise controllers and participants in the OSC that was not necessary for exercise completion.

Emergency Operations Facility

The EOF was declared activated 36 minutes after the Site Area Emergency declaration.

The Emergency Response Manager (ERM) demonstrated good command and control in the EOF, through frequent briefings, delegation, establishing priorities and maintaining good communications with the other emergency facility managers. Also, the ERM demonstrated good interfaces, with representatives from the Commonwealth of Pennsylvania. During the ERM team and State briefings, the inspector observed that the ERM was asked specific questions by State representatives in which the ERM was not able to answer. The ERM did not solicit information from his team leaders in order to obtain the answer but was very good in ensuring the answer was forwarded, at a later time, to the State representatives once the answer was found. However, as the exercise progressed, the ERM was observed utilizing the EOF team leaders to assist him in responding to the State's questions which was a very good demonstration of integrating the expertise of his staff.

The EOF staff continuously and effectively tracked plant conditions and kept the ERM informed as events happened. Communications within the EOF and between other facilities was good. However, the ERM had difficulties in using the speaker telephone at his station, to which his staff assisted him in correcting.

PARs made to the Commonwealth of Pennsylvania were timely and correct for the affected areas of the 10-mile emergency planning zone. However, according to the licensee's evacuation procedures, there are no advisory recommendations for the unaffected areas of the 10-mile emergency planning zone. NUREG-0654-FEMA-REP-1, Revision 1, Supplement 3, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, recommends that unaffected areas of the emergency planning zone be advised to go indoors and monitor emergency alert system broadcasts. The sheltering recommendation, in effect, is placing the unaffected population indoors, so that information can be provided to them in case there is a change in conditions. The licensee correctly followed their evacuation procedure; however, they committed to reviewing this area of concern.

Dose Assessment

The dose assessment staff at the EOF promptly set up operations and assumed control from the TSC within one-half hour. The Dose Assessment Team Leader (DATL) provided good leadership for the team and had good interaction with the EOF engineering staff and emergency managers. The dose assessment staff reacted quickly to a sudden wind shift that put the assembly area for evacuating site personnel directly down wind. Good communications and discussions with pertinent portions of the ERO and managers resulted in a timely and appropriate resolution to this situation. The dose assessment staff demonstrated proficiency in the use of computers for dose projection, in the acquisition of plant parameters and meteorological data pertinent to dose assessment, and in developing good "what if" projections of exposure to members of the public. The staff, however, could not utilize the installed projection model to "back calculate" from a field sample to source term or to ascertain committed internal exposures from

measurements of radioactivity in the plume. PARs were promptly developed and provided to the ERM. The PARs were somewhat overly conservative, in that, they contained an additional sector on either side of the affected downwind sectors, beyond those specified by procedure for evacuation.

The Field Survey Group Leader (FSGL) was effective in directing the two utility field teams in looking for an unmonitored release, in finding the projected plume, and in determining the magnitude of the radiological exposure and plume width. The FSGL maintained awareness of the projected releases and provided frequent reminders to the team to be aware of minimizing their exposures and likely dose rates to be encountered at various times.

During the course of the exercise, no samples were analyzed for gamma emitting radionuclides from which to characterize the content of the release. These samples could have come either from the release point (the North Vent) or from field collected air samples. Consequently, the quality of the dose projections, which were all based on default radionuclide release mixes, was not verified. In addition, the response to short-lived fission gases of the effluent monitor (Wide Range Gas Monitor) at the North Vent, used to quantify the magnitude of the release, was not verified during the exercise to better estimate the release rate.

Overall, the licensee exhibited good dose assessment and PAR development capability. The staff made good use of procedures and checklists and the field team utilization was excellent.

Emergency News Center

Overall, the performance in the ENC was very good.

ENC personnel performed well during the exercise. They were very professional, calm and familiar with their responsibilities. Press releases were timely, informative, contained pertinent information and were distributed at the press conferences.

The performance of the corporate spokesperson, responsible for representing PECO Energy to the public, was an exercise strength. During news conferences, she was concise, believable and understandable. The mock reporters asked the spokesperson a lot of good challenging questions to which she responded in a calm and professional manner. In fact, the corporate spokesperson was very good at providing answers at later news conferences to questions that she couldn't answer at earlier news conferences, and cleared up incorrect information that had been disseminated.

ENC personnel made good use of the audio visual equipment available to them. In particular, the slides were very useful, clear and basic enough for reporters to easily understand.

The licensee ensured that the Commonwealths of Pennsylvania representatives were kept well informed and briefed prior to the news conferences. Those briefings appeared to be thorough and detailed.

Post-Exercise Critique

Immediately following the exercise, the licensee began its debrief/critique process. Players and controllers assembled in their assigned facilities and critiqued their exercise performance. These findings were collected and presented to the NRC on March 26, 1997 in a formal licensee critique.

The player debriefs after the exercise were very similar in the EOF, TSC, SCR and ENC. They were informative, included both written and verbal feedback from the players, controllers and observers. However, there was no players debrief at the conclusion of the exercise in the OSC. Players were given a critique form to complete, but not all players received the form. The exercise controllers met to discuss their observations, and took those observations to a post-exercise critique at the TSC. The inspector concluded that this process was ineffective in collecting constructive feedback from the players in the OSC and was unlike the players' critique process utilized in the other facilities. Also, the licensee's formal critique presentation to the players and the NRC was determined to be minimally acceptable. It was very brief, lacked detail, did not address if the exercise objectives had been met and was not very self-critical.

Exercise Scenario Development

The licensee submitted the exercise objectives and scenario for NRC review in a timely manner. After reviewing the scenario, the inspector discussed its contents with licensee representatives and concluded that it adequately tested the major portions of the E-Plan and ERPs. However, during the course of the exercise, the following problems with the scenario were identified: (1) a controller needed prompting by an NRC inspector, to stop plant cooldown prematurely so that plant conditions would be adequate in order for a later event to occur; and (2) toward the end of the exercise, the scenario drove the operators outside it's emergency operating procedures for mitigating the accident. (See paragraph b.1). This was not intentional according to the licensee's exercise objectives.

The EP Site Manager stated that the scenario was developed by one individual and tested on the simulator three times. In the past a "scenario development committee" would also review the scenario to provide technical comments and determine the adequacy and accuracy of the scenario events. This committee comprised engineers and operators to review and provide technical comments to attempt to foresee such problems as described in the

previous paragraph. That committee was disbanded in 1996. The licensee has committed to reestablishing the committee. The inspectors thought this to be an excellent initiative because it would provide an evaluation using engineers with technical knowledge and plant operations experience.

P8 Miscellaneous EP Issues

P8.1 Dose Assessment-Procedures

Subsequent to the exercise, the inspector reviewed several dose assessment procedures and discussed the following issues with the licensee.

Plans/procedures for obtaining rapid analysis of field samples.

The licensee does not have procedures describing how field samples with significant radioactivity are delivered to laboratory for gamma analysis. Definitive analytical data cannot be easily obtained in the field, but are necessary to quantify the magnitude of the release consequences.

Ability to determine CEDE/CDE implications from field samples.

A methodology is not defined to relate the radioisotopic content of an air sample (or other media) to internal exposure that would result from the passing radioactive plume.

Uncertainties in the analyses of air samples with GM instrumentation.

The licensee uses a Geiger Mueller radiological instrument to quantify I-131 in the field. The inspector stated that as a result of a release shortly after reactor shutdown, I-131 constitutes only about one-eighth of the total radioiodines in the plume. Additionally, noble gas daughter radioactivity may dominate by orders of magnitude the radioiodine activity on collection media. A simple field measurement of collection media with a Geiger Mueller instrument then cannot be used to quantify the amount of I-131. It can only be used as a screening device to ascertain the need for rapid gamma analyses.

The licensee stated that these areas would be evaluated for possible improvement. Some other specific procedures were also discussed as they related to these areas.

The inspector indicated that a comparison between the licensee's MESOREM JR dose assessment model and NRC's RASCAL dose assessment model would be performed during a future inspection.

V. Management Meetings**X1 Exit Meeting**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on June 26, 1997. The licensee acknowledged the inspector's findings.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Boise, Plant Manager, Limerick
 R. Kinard, Chesterbrook, Manager, EP
 M. Karney, Manager, Security and EP
 W. McFarland, Vice President, Limerick
 S. Mac Anish, Chesterbrook, Support Services Manager
 D. LeQuia, Director, Site Support
 T. Mscisz, Chesterbrook, Radiological Protection

Commonwealth of Pennsylvania

D. Ney, Nuclear Engineer, Bureau of Radiological Protection

NRC

N. Perry, Sr. Resident Inspector
 M. Modes, Chief, Emergency Preparedness and Safeguards Branch, DRS

INSPECTION PROCEDURES USED

82301: Evaluation of Exercises for Power Reactors
 82302: Review of Exercise Objectives and Scenarios for Power Reactors
 PECO Energy Emergency Response Plan
 Limerick Emergency Response Procedures
 ERP-C-1300, Rev.6: Emergency Operations Facility (EOF) Dose Assessment Team Leader
 ERP-C-1320, Rev.4: Emergency Operations Facility (EOF) Field Survey Group Leader
 ERP-300, Rev.17: TSC/MCR Dose Assessment Team
 ERP-340, Rev.06: Field Survey Group
 ERP-360, Rev.02: Adjustment of Wide Range Gas Monitor Conversion Factors
 HP-204, Rev.07: Rapid Assessment of Radioiodine Concentration

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

IFI 50-352/97-05-01; 50-353/97-05-01). The licensee did not integrate the expertise of the TSC engineering staff when making crucial decisions and failed to demonstrate the duties of the maintenance team coordinator effectively.

Closed

None

Discussed

None

LIST OF ACRONYMS USED

AED	Assistant Emergency Director
CED	Committed Effective Dose
CEDE	Committed Effective Dose Equivalent
DATL	Dost Assessment Team Leader
ED	Emergency Director
ENC	Emergency News Center
EOF	Emergency Operations Facility
E-Plan	Nuclear Emergency Plan
EP	Emergency Preparedness
ERF	Emergency Response Facility
ERM	Emergency Response Manager
ERP	Emergency Response Procedure
ERO	Emergency Response Organization
FSGL	Field Survey Group Leader
GE	General Emergency
IFI	Inspector Follow-up Item
MTC	Maintenance Team Coordinator
NRC	Nuclear Regulatory Commission
OSC	Operations Support Center
OSCD	Operations Support Center Director
PA	Public Address system
PAR	Protective Action Recommendation
SCR	Simulator Control Room
TSC	Technical Support Center
TST	Technical Support Team

ATTACHMENT 1

EMERGENCY RESPONSE PLAN AND IMPLEMENTING PROCEDURES REVIEWED

Document	Document Title	Revision No.
IRP-C-1000	EOF Activation/Deactivation	Rev. 3LG
IRP-C-1200	Emergency Response Manager	Rev. 6LG
IRP-C-1300	EOF Dose Assessment Team Leader	Rev. 6LG
IRP-C-1300-1	Dose Assessment Team Leader Initial Actions	Rev. 1LG
ERP-C-1300-6	Assessment Group Initial Actions	Rev. 0LG
ERP-C-1300-7	Obtaining EPDS MET/RAD Data	Rev. 0LG
ERP-C-1300-8	Use of Mode A/Mode B CDM	Rev. 0LG
ERP-C-1300-9	Obtaining Met Data from National Weather Svc.	Rev. 0LG
ERP-C-1320	EOF Field Survey Group Leader	Rev. 4LG
ERP-C-1320-1	Field Survey Group Leader Initial Actions	Rev. 1LG
ERP-C-1320-2	Field Survey Group Leader Turnover Sheet	Rev. 1LG
ERP-C-1400	Engineering Support Team	Rev. 3LG
ERP-C-1400-1	Engineering Support Team Checklist	Rev. 4LG
ERP-C-1500	Logistic Support Team	Rev. 2LG
ERP-C-1900	Recovery Phase Implementation	Rev. 2LG
ERP-C-1900-2	PBPS Recovery Acceptance Checklist	Rev. 1PB
ERP-C-1900-3	LGS Recovery Acceptance Checklist	Rev. 1LG
ERP-C-1900-4	Recovery Plan Outline	Rev. 1
ERP-230	Operations Support Center (OSC) Director	Rev. 9
ERP-640	Vehicle and Evacuee Control Group	Rev. 6PB
ERP-640	Appendix 1 and Appendix 2, DELETED	