

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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Report No: 50-369/97-12, 50-370/97-12
Licensee: Duke Power Company
Facility: McGuire Nuclear Station Units 1 and 2
Location: 12700 Hagers Ferry Rd.,
Huntersville NC 23117
Dates: August 4-8, 1997
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EXECUTIVE SUMMARY

McGUIRE NUCLEAR STATION UNITS 1 AND 2 NRC Inspection Report Nos. 50-369 and 370/97-12

This routine, announced inspection involved the observation and evaluation of the biennial emergency preparedness exercise. This plume exposure exercise consisted of partial participation by the state of North Carolina and full participation by the Risk Counties. The exercise was an off-hours exercise conducted from 3:00 a.m. to 11:22 a.m. on August 5, 1997. This report summarized the observations of the four-person NRC team that assessed the adequacy of the licensee's emergency preparedness program as the utility implemented its Emergency Plan and Procedures in response to the simulated accident scenario for the plume exposure exercise. The NRC evaluators concluded that the licensee successfully demonstrated its ability to implement the Radiological Emergency Plan in response to a simulated accident. One exercise weakness was identified because the follow-up notifications were not sufficient to keep offsite agencies aware of changing conditions. Summarized observations from the key emergency response facilities follow:

Control Room Simulator (CRS)

The Operations Shift Manager declared the Alert and became the Emergency Coordinator (EC). He effectively implemented his emergency procedure until relieved by the EC in the Technical Support Center.

Technical Support Center (TSC)

Good command and control by the EC in the TSC assisted the implementation of effective accident mitigation by the TSC staff.

Operational Support Center (OSC)

The OSC was activated timely and provided in-plant teams as directed by the TSC.

Emergency Operations Facility

The EOF Director was effective in coordinating licensee activities related to the emergency and providing information to the Federal, State, and local authorities responding to the simulated radiological emergency.

Media Center

The Media Center operated effectively in managing the coordination of information to the news media personnel.

Report Details

Summary of Exercise Events

This biennial emergency preparedness exercise included partial participation by the State of North Carolina and full participation by the Risk Counties. This plume exposure exercise was evaluated by an NRC inspection team and was conducted from 3:00 a.m. to 11:22 a.m. on August 5, 1997. Player critiques were conducted by the licensee's emergency response participants in the Emergency Response Facilities (ERFs) following termination of the exercise. The NRC exit meeting was conducted on August 7, 1997, following the licensee's presentation to management of exercise results.

VI. Plant Support

P4. Staff Knowledge and Performance in Emergency Preparedness (EP)

P4.1 Exercise Scenario

a. Inspection Scope (82302)

The inspectors reviewed the exercise scenario to determine whether provisions had been made to test the integrated capability and a major portion of the basic elements existing within the licensee's plan.

b. Observations and Findings

The licensee submitted its Exercise Objectives and scenario to the NRC in a timely manner. A review of the package indicated that the scenario was challenging and progressed from an Alert, to a Site Area Emergency (SAE), and then to a General Emergency (GE). The scenario fully exercised the onsite and offsite emergency organizations of the licensee and provided sufficient information to the State and local governmental agencies for their participation in the exercise.

c. Conclusion

The scenario developed for this exercise was effective for testing the integrated emergency response capability.

P4.2 Onsite Emergency Organization

a. Inspection Scope (82301)

The inspectors observed the functioning of the onsite emergency organization to determine whether the responsibilities for emergency response were defined and whether adequate staffing was available to respond to the simulated emergency.

b. Observations and Findings

The inspectors noted that the responsibilities for emergency response were clearly defined. The Operations Shift Manager assumed the responsibilities of the EC, and other personnel assumed their respective pre-established responsibilities as they responded to this off-hours exercise.

c. Conclusion

The initial on-duty Simulator staff and augmented call-out staff were sufficient to respond and perform defined emergency responsibilities.

P4.3 Emergency Classification System

a. Inspection Scope (82301)

The inspectors observed selected emergency response personnel to determine whether a standard emergency classification and action level scheme was in use by the licensee.

b. Observation and Findings

The licensee properly used their implementing procedures to correctly identify the conditions with the emergency classifications. The Alert was declared at 3:12 a.m. based on an Anticipated Transient Without a Scram (ATWS). A Site Area Emergency was declared at 7:57 a.m. based on the steam generator heat sink not being available. The General Emergency was declared at 9:24 a.m. when the feed and bleed mode of cooling could no longer be maintained.

c. Conclusion

The licensee had a standard system for emergency classifications and used it effectively to classify the off-normal events promptly and correctly.

P4.4 Notification Methods and Procedures

a. Inspection Scope (82301)

The inspectors observed the licensee's notification of State and local governmental organizations and emergency personnel to determine whether timely and substantive emergency information was provided in accordance with procedures.

b. Observations and Findings

The initial emergency notification to the offsite governmental agencies were made in a timely manner. However, the inspector noted that notification messages 3 thru 6, which were follow-up notifications to the Alert classification, all indicated that the plant condition was stable. In actuality, the plant conditions continued to degrade during

this period of time as reflected in the emergency description portion of the notification message. By 7:57 a.m. they had degraded such that a SAE was declared. This failure to provide a correct prognosis of the plant conditions to the offsite governmental agencies was identified as an exercise weakness. This was particularly significant during this off-hours exercise as it would probably impact the response of the offsite governmental agencies during the Alert condition. Inspector Follow-up Item 50-369, 50-370/97-12-01--Exercise Weakness for failure of the follow-up notifications after the Alert to keep offsite agencies aware of changing plant prognosis that could affect the offsite response.

c. Conclusion

The licensee demonstrated the ability to make initial notifications following an emergency declaration in a timely manner. However, the follow-up notifications following the Alert declaration did not properly identify the degrading plant conditions. This was identified as an exercise weakness.

P4.5 Emergency Communications

a. Inspection Scope (82301)

The inspectors observed the flow of communications within the emergency response organization and from and between the ERFs to determine whether provisions existed for the prompt transmission of emergency information.

b. Observation and Findings

The inspectors observed that the communications between the utility and offsite agencies and amongst the ERFs were effective for the prompt transmission of emergency information. Responsible personnel were kept informed of ongoing events and communicated effectively in performing accident mitigation and initiating protective actions for both onsite and offsite personnel.

c. Conclusion

Provisions existed for the prompt communications among principal response organizations to emergency personnel, and they were effectively used during the exercise to provide timely information and coordinate emergency response.

P4.6 Public Education and Information

a. Inspection Scope (82301)

The inspectors observed how information concerning the simulated emergency was made available to the public.

b. Observations and Findings

Duke Power Company established its Media Center at the Duke Power Electric Center located at 522 Church Street, Charlotte, N.C. The Media Center was activated in a timely manner and effectively coordinated the release of public information.

c. Conclusions

The Media Center and its staff were activated and organized in a manner that provided for the dissemination of timely and accurate information to the public via the news media.

P4.7 Emergency Facilities and Equipment

a. Inspection Scope (82301)

The inspectors observed the activation, staffing, and operation of selected ERFs to determine whether adequate emergency facilities and equipment were available and maintained to support an emergency response.

b. Observations and Findings

Control Room Simulator - An inspector observed that the on-shift designated crew in the Simulator acted promptly to initiate the emergency response. The facility and equipment supported the crew as they responded to the simulated emergency.

Technical Support Center - The TSC was promptly activated with assigned emergency response personnel. The facility layout provided for the necessary communication between the EC and his staff. The inspector noted electronic displays and computers were effectively used in the TSC.

Operational Support Center - The OSC was activated in accordance with procedures and in a timely manner. Congestion and noise were minimized and habitability of the facility was verified on a periodic basis. The facility and equipment supported OSC mission accomplishment. Team formation and briefings were reasonably timely.

Emergency Operations Facility. The EOF was activated in a timely manner and provided the necessary focus for communicating with offsite agencies. The inspector noted the video-conference between the EOF and TSC provided for the effective transfer of information between the respective facility leaders.

c. Conclusion

The ERFs were organized, equipped, and maintained in a manner that provided for the emergency response.

P4.8 Protective Responses

a. Inspection Scope (82301)

The inspectors observed the protective actions implemented for onsite personnel and the protective action recommendations (PARs) provided by the licensee to the offsite agencies.

b. Observations and Findings

The EC implemented appropriate protective actions for onsite personnel as the emergency classification escalated to a SAE. The EOF Director made the PARs to the State within 15 minutes of the GE declaration. The inspector observed good communication between the EOF Director and the representative in the EOF from the State of North Carolina.

c. Conclusion

The licensee demonstrated the ability to implement protective measures for onsite personnel and to make the required PARs for the protection of the public.

P4.9 Exercise Critique

a. Inspection Scope (82301)

The inspectors observed the facility critiques immediately following the exercise and portions of the controller/evaluator organization critique process to determine whether weaknesses noted in the licensee's emergency response organization were formally presented to licensee management.

b. Observations and Findings

The licensee conducted effective player critiques following exercise termination. From the player comments and the controller/evaluator observations, the controller/evaluator staff determined the performance of the emergency organization responding to the simulated accident to be generally satisfactory. A summary of this performance and supporting observations were provided to licensee management on August 7, 1997, just prior to the NRC Exit Meeting.

c. Conclusion

The controller/evaluator organization did a good job of analyzing exercise performance. Substantive comments were provided by the evaluators to their management.

V. Management Meetings

X1 Exit Meeting Summary

The Team Leader presented the inspection summary to members of licensee management at the conclusion of the inspection on August 7, 1997. The summary indicated satisfactory performance. No proprietary information is contained in this report.

PARTIAL LIST OF PERSON CONTACTED

Licensee

B. Barron, Site Vice President
A. Beaver, Specialist, Emergency Preparedness
R. Beckham, Radiation Protection Scientist
M. Cash, Manager, Compliance
M. Geddie, Station Manager
R. Hasty, Manager, Emergency Preparedness
C. Jennings, Public Affairs
B. Kinney, Public Affairs
T. Kuhr, Nuclear Emergency Planning Consultant
B. Sherrill, Radiological Protection General Supervisor

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

OPENED

50-369, 50-370/97-12-01: IFI Exercise Weakness Follow-up Notifications following the Alert declaration did not keep offsite agencies aware of changing plant conditions.

Attachment (11 pages):
Exercise Objectives, and
Narrative Summary

**McGUIRE NUCLEAR SITE
1997 EMERGENCY EXERCISE
EXERCISE OBJECTIVES**

A. SIMULATOR CONTROL ROOM

1. Demonstrate ability of the Operations Shift Manager to recognize conditions, classify emergencies, and assume the initial responsibilities of the Emergency Coordinator in a timely manner.
2. Demonstrate ability of the Control Room staff to make timely determination of the cause of the incident, perform mitigating actions, keep onsite personnel informed of the emergency situation through periodic announcements prior to TSC and OSC activation, and a precise and clear transfer of responsibilities from the Emergency Coordinator in the Control Room to the Emergency Coordinator in the Technical Support Center.
3. Demonstrate the ability of the Control Room staff to notify the State and Counties within 15 minutes after declaring an emergency or after changing the emergency classification.
4. Demonstrate the ability of the Control Room staff to alert, notify, and staff the TSC and OSC facilities after declaring an Alert or higher emergency classification.
5. Demonstrate the ability of the Control Room staff to notify the NRC no later than 1 hour after declaring one of the emergency classifications.
6. Demonstrate the assembly of station personnel within 30 minutes in a simulated emergency and provide accountability for any not present at the assembly location.
7. Test primary off-site communications equipment to the State EOC and County Warning Points, and the NRC including Selective Signaling System and the NRC Emergency Notification System.

8. Demonstrate the ability to alert, notify and staff the EOC after declaring an Alert or higher emergency classification or after a decision by the Emergency Coordinator during an Unusual Event.
9. Demonstrate proper use of message format and authentication methodology for messages transmitted to the State and Counties.
10. Test the adequacy and operability of emergency equipment and supplies.

B. TECHNICAL SUPPORT CENTER (TSC)

1. Demonstrate ability to perform a precise and clear transfer of responsibilities from the Control Room Emergency Coordinator to the TSC Emergency Coordinator.
2. Demonstrate the ability of the Site Emergency Coordinator to provide effective direction, command and control, to manage activities of classification, accident analysis, or mitigation and to perform periodic briefings for the TSC/OSC staff and personnel.
3. Demonstrate the ability of the TSC staff to notify the State and Counties within 15 minutes after declaring an emergency or after changing the emergency classification.
4. Demonstrate proper use of message format and authentication methodology for messages transmitted to the State and Counties.
5. Test communications equipment among on-site emergency facilities including plant extensions, intercoms, and on-site radio system.
6. Test primary off-site communications equipment to the State EOC and County Warning Points, and the NRC including Selective Signaling System and the NRC Emergency Notification System.
7. Test the adequacy and operability of emergency equipment and supplies.

8. Demonstrate ability to perform a precise and clear transfer of responsibilities from the TSC Emergency Coordinator to the EOF Director.
9. Demonstrate the ability to transmit data in accordance with station procedures, and to distribute this data according to Emergency Plan Implementing Procedures (EPIP).
10. Demonstrate the ability to provide data to the TSC and OSC in accordance with procedures.
11. Demonstrate the ability of the TSC staff to notify the NRC no later than 1 hour after declaring one of the emergency classifications.
12. Demonstrate adequate communications between the off-site monitoring teams and the TSC/EOF.
13. Demonstrate the ability to develop off-site dose projections in accordance with procedures.
14. Demonstrate the ability to continuously monitor and control emergency worker exposure.
15. Demonstrate the ability to determine on-site radiation levels and airborne radioiodine concentrations.
16. Demonstrate the ability to assess the incident and provide mitigation strategies.

C. OPERATIONS SUPPORT CENTER (OSC)

1. Demonstrate the ability to continuously monitor and control emergency worker exposure.
2. Demonstrate the ability to determine on-site radiation levels and airborne radioiodine concentrations.
3. Test the adequacy and operability of emergency equipment and supplies.
4. Demonstrate the ability to assess the incident and provide mitigation strategies.

D. EMERGENCY OPERATIONS FACILITY (EOF)

1. Demonstrate the ability of the EOF Director to provide effective direction, command and control, to manage activities of classification, accident analysis, or mitigation and to perform periodic briefings for the EOF staff and personnel.
2. Demonstrate the ability of the Emergency Operations Facility staff to notify the State and Counties within 15 minutes after declaring an emergency or after changing the emergency classification.
3. Demonstrate proper use of message format and authentication methodology for messages transmitted to the State and Counties.
4. Test primary off-site communications equipment to the State EOC and County Warning Points, and the NRC including Selective Signaling System and the NRC Emergency Notification System.
5. Test the adequacy and operability of emergency equipment and supplies.
6. Demonstrate ability to perform a precise and clear transfer of responsibilities from the Emergency Coordinator to the EOF Director.
7. Demonstrate adequate communications between the off-site monitoring teams and the TSC/EOF.
8. Demonstrate the ability to develop off-site dose projections in accordance with procedures.
9. Demonstrate the ability to collect soil, water and vegetation samples in accordance with procedures.
10. Demonstrate the ability to assess the incident and provide mitigation strategies.

E. SCENARIO COMMITTEE

1. Demonstrate the ability to control the scenario and provide accurate data for player use.

F. PUBLIC INFORMATION (NEWS GROUP)

1. Demonstrate the ability to provide accurate information to the news media in a timely manner and to provide effective rumor control according to the Emergency Plan Implementing Procedures.
2. Demonstrate the ability to coordinate information with state and county public information officers prior to its release.

McGuire Nuclear Site
Biennial Exercise Scenario
August 5, 1997
Partial Participation Exercise
Narrative Summary

This exercise will be a full station drill with the Simulator Control Room, Technical Support Center (TSC), Operations Support Center (OSC), and the Emergency Operations Facility (EOF) staffed with players, controllers and evaluators. The Media Center and the Joint Information Center (JIC) will be staffed because the State of North Carolina and Counties of Gaston, Mecklenburg, Lincoln, Cabarrus, Catawba and Iredell are playing in this exercise.

Time Event

0300 The plant is operating at full power. The operating train is "1A", and the "1A" Auxiliary Feedwater Pump is out of service.

0305 All three Hotwell Pumps fail due to mechanical/electrical faults, causing the turbine generator to trip and the reactor fails to trip as expected. Control Rods are manually inserted from the Control Room and a local manual reactor trip from outside the Control Room is effected. This event should result in the declaration of an ALERT Emergency Action Level (EAL).

Off-site authorities are notified. Alert and notification of responders is implemented. Minimum staffing of state and county emergency operations centers (EOCs) begins.

0310 The "1B" Auxiliary Feedwater Pump is lost due to an electrical fault/blackout on "1ETB". The #1 Turbine Driven Auxiliary Feedwater Pump remains as the only available source of feedwater to the Steam Generators.

0615 The #1 Turbine Driven Auxiliary Feedwater Pump trips and depletion of secondary side inventory on all Steam Generators commences.

Time Event

0745 Severely depleted secondary side inventory on all Steam Generators necessitates feed and bleed cooling of the reactor core. This event should result in the declaration of a SITE AREA EMERGENCY Emergency Action Level (EAL).

Notification of off-site authorities. State and county EOCs are fully staffed. Coordination of public notification should take place, with notification occurring via sirens, public address systems and the Emergency Action System (EAS). Activity at this time should also include the establishment of relocation centers, traffic control and personnel/vehicle monitoring/decontamination stations.

NOTE: There will be an actual activation of the sirens and the EAS at Site Area Emergency.

0800 An off-site release of noble gases begins due to a previously unidentified open containment penetration to the Reactor Building Annulus. The "1A" Annulus Ventilation Fan provides an atmospheric release by way of the Unit Vent Stack. As a result of the earlier blackout on "1ETB", radiation monitors (EMFs) 35, 36 and 37 (Unit Vent Stack Rad Monitors) may be out of service due to loss of power to their process sample blower. This would constitute an unmonitored release.

The release of noble gases to the atmosphere is from the reactor coolant system to the Unit Vent Stack, via feed and bleed cooling of the reactor core through the open containment penetration to the Annulus Ventilation System.

0900 The "1A" Charging Pump (high head injection) trips and reactor core feed and bleed cooling cannot be maintained, resulting in loss of decay heat removal capacity. Malfunctioning Pressurizer PORVs (power-operated relief valves) limit reactor coolant system depressurization capability. This event should result in the declaration of a GENERAL EMERGENCY Emergency Action Level (EAL).

Recommendations concerning protective actions should be made to off-site authorities. They, in turn, will coordinate public notification among themselves, with actual notifications occurring via sirens and the Emergency Action System (EAS).

NOTE: There will not be an activation of the sirens, or of EAS unless there was a problem with these activities at the earlier activation.

1100 Termination of the exercise.

DRILL

CONFIDENTIAL

(until after
exercise is
conducted)

McGUIR JCLEAR SITE

BIENNA 6 EXERCISE

AUGUST 1, 1997

- 0300 Simulator run starts.
- 0305 HWP 1B flow is lost due to a sheared coupling. HWP 1C auco starts and immediately trips due to a ground fault in its motor lead connection box. HWP 1A trips due to a phase-to-phase fault in the motor winding. All CBPs trip due to low-low suction pressure, which causes the CFPTs to trip. The turbine generator trips but automatic reactor trip fails. Manual reactor trip also fails but control rods can be inserted by the operator (ATWS event) and a local manual reactor trip is effective. Following initiation of emergency boration, a blackout occurs on 1ETB due to a fault in 1B KF pump motor with subsequent failure of its breaker to trip.

EXPECTED RESPONSE

- Go to EP/1/A/5000/E-0 "Reactor Trip or Safety Injection"
- Implement EP/1/A/5000/F-0 "Critical Safety Function Status Trees"
- Go to EP/1/A/5000/FR-S.1 "Response to Nuclear Generation/ATWS"
- Refer to RP/0/A/5700/000 "Classification of Emergency" and declare ALERT, event #4.1.5(2), ATWS
- Implement RP/0/A/5700/002 "Alert"
- Implement RP/0/A/5700/011 "Conducting a Site Assembly, Site Evacuation or Containment Evacuation"
- Go to EP/1/A/5000/E-0 "Reactor Trip or Safety Injection"
- Refer to AP/1/A/5500/07 "Loss of Electrical Power"
- Go to EP/1/A/5000/ES-0.1 "Reactor Trip Response"
- Go to OP/1/A/6100/02 "Controlling Procedure for Unit Shutdown"

THIS IS AN EXERCISE. THESE EVENTS HAVE NOT TAKEN PLACE. THESE EVENTS ARE BEING SIMULATED FOR EXERCISE PURPOSES ONLY.

DRILL

McGUIRE NUCLEAR SITE
BIENNIAL EXERCISE
AUGUST 5, 1997

0400 #1 TDCA pump stop valve trips due to a linkage problem.

EXPECTED RESPONSE

-When all S/G NR levels are less than 11%, go to
EP/1/A/5000/FR-H.1 "Response to Loss of Secondary
Heat Sink"

0500 #1 TDCA pump stop valve linkage repaired.

EXPECTED RESPONSE

-Feed S/Gs at greater than 450 gpm.

0615 #1 TDCA pump trips due to a broken oil line. Repairs
will take at least 5 hours.

EXPECTED RESPONSE

-When all S/G NR levels are less than 11%, go to
EP/1/A/5000/FR-H.1 "Response to Loss of Secondary
Heat Sink"

0745 When three S/Gs are less than 12% WR level, initiate
feed and bleed. Containment penetration M-346 which
had been previously misaligned open fails to isolate
upon SI initiation when 1VE-5A mechanically binds open.
1VE-6B fails to close due to 1ETB blackout and 1VE-9 is
failed open.

EXPECTED RESPONSE

- Refer to RP/0/A/5700/000 "Classification of Emergency"
and declare SITE AREA EMERGENCY, event #4.1.5(1)
#2
- Implement RP/0/A/5700/003 "Site Area Emergency"
- Implement RP/0/A/5700/011 "Conducting a Site Assembly,
Site Evacuation or Containment Evacuation" and
simulate evacuation of non-essential personnel.
- Control Room team identifies that Containment
penetration M-346 is failed open.

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DRILL

McGUIRE NUCLEAR SITE
BIENNIAL EXERCISE
AUGUST 5, 1997

=0800 Phase B isolation due to high-high Containment pressure. 1A VE train starts and commences release of noble gases to the environment via the unit vent.

EXPECTED RESULTS

-Field monitoring teams will eventually detect release plume and report off-site readings.

=0910 FWST level decreases to less than 150 inches.

EXPECTED RESULTS

-Go to EP/1/A/5000/ES-1.3 "Transfer to Cold Leg Recirc"

=0915 1A NV pump trips after 1ND-58A is opened.

EXPECTED RESULTS

-Refer to RP/0/A/5700/000 "Classification of Emergency" and declare GENERAL EMERGENCY, event #4.1.5(1), or others.

-Go to EP/1/A/5000/ECA-1.1 "Loss of Emergency Coolant Recirc"

=0930 1A CA pump restored to service. 1A NV pump restored to service.

EXPECTED RESULTS

-Commence feedir one S/G with CA.

-Reestablish feed portion of "feed and bleed cooling".

-Complete transfer to cold leg recirc and start to recover control of core exit temperature.

=1030 Possible recovery of plant parameters to such extent that the following procedural flowpath may be utilized long term.

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DRILL

McGUIRE NUCLEAR SITE
BIENNIAL EXERCISE
AUGUST 5, 1997

EXPECTED RESULTS

- Go to EP/1/A/5000/E-1 "Loss of Reactor or Secondary Coolant"
- Go to EP/1/A/5000/ES-1.1 "Safety Injection Termination"
- Go to OP/1/A/6100/02 "Controlling Procedure for Unit Shutdown"

1100 Termination of Exercise

THIS IS AN EXERCISE. THESE EVENTS HAVE NOT TAKEN PLACE. THESE EVENTS ARE BEING SIMULATED FOR EXERCISE PURPOSES ONLY.