

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos: 50-317, 50-318

License Nos: DPR-53, DPR-69

Report Nos: 50-317/99-10, 50-318/99-10

Licensee: Baltimore Gas & Electric Company

Facility: Calvert Cliffs Nuclear Power Plant

Dates: October 25 - 27, 1999

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## EXECUTIVE SUMMARY

Calvert Cliffs Nuclear Power Plant  
Full-Participation Emergency Preparedness Exercise Evaluation  
October 26, 1999  
Inspection Report Numbers 50-317&318/99-10

Based on the results of this inspection, it was determined that the overall performance of the emergency response organization demonstrated, with reasonable assurance, that onsite emergency plans are adequate and that the licensee is capable of implementing them. Simulated events were diagnosed accurately, emergency declarations were timely and accurate, offsite agencies were notified in a timely manner and protective action recommendations were appropriate.

The critique process was well implemented. Post-exercise facility debriefs were candid. At the formal critique, your staff identified a number of issues, in addition to those identified by the NRC. The most significant issues identified were prioritized for prompt corrective action. Overall, the critique was balanced with positive and negative findings and was appropriately self-critical.

## Report Details

### **P4 Staff Knowledge and Performance**

#### a. Exercise Evaluation Scope (IP 82301)

During this inspection, the inspectors observed and evaluated the licensee's biennial full-participation exercise in the simulator control room (SCR), the technical support center (TSC), the operations support center (OSC), and the emergency operations facility (EOF). The inspectors assessed the emergency response organization's (ERO) recognition of abnormal plant conditions, classification of emergency conditions, notification of offsite agencies, development of protective action recommendations (PARs), command and control, communications, utilization of repair and field monitoring teams, dose assessment and projections, and the overall implementation of the emergency plan. In addition, the inspectors observed the post-exercise critique to evaluate the licensee's self-assessment of the exercise.

#### b. Exercise Evaluation Observations and Findings

##### b.1 SCR

The SCR staff was quick to recognize off-normal conditions and to implement the appropriate procedures. The shift manager (SM) promptly entered and effectively utilized the emergency action levels (EALs) for the notice of unusual event classification and assumed the role of site emergency coordinator (SEC). Later in the scenario, the SM appropriately made the alert classification. The associated offsite notifications for the emergency classifications were initiated in a timely manner by the SCR communicator. Concern for plant and personnel safety was demonstrated throughout the exercise, for example, by crew awareness of plant conditions and by announcing warnings over the plant paging system. There was a good turnover between the SM and the plant general manager (PGM) when the individual assumed the role of SEC before departing to the TSC.

##### b.2 TSC

The TSC was staffed and activated in a timely manner following the alert declaration. The PGM successfully fulfilled the role of the SEC before transferring that function to the EOF. The PGM demonstrated good command and control by conducting frequent briefings, identifying and resolving discrepant information, soliciting input from the TSC staff, monitoring the repair priorities and status, and encouraging pro-active thinking in anticipation of degrading plant conditions. The PGM and TSC manager reviewed the EALs in anticipation of emergency classification upgrades. The TSC staff effectively implemented appropriate severe accident management (SAM) procedures as plant conditions warranted. Reactor engineers closely monitored reactor vessel level indication, core exit thermocouple temperatures, and assessed core damage throughout the exercise. The plant equipment status board was not kept current during the exercise. Although this resulted in no adverse impact, TSC staff members repeatedly inquired about charging pump and hydrogen recombiner status during the exercise.

**b.3** OSC

The OSC was staffed, activated, and fully functional within approximately 10 minutes of the alert declaration. Reliable voice communications were established between the OSC and the other emergency response centers. Good command and control was demonstrated by the OSC director. OSC congestion and noise levels were properly controlled. Discrepant information was quickly investigated, clarified and resolved. The OSC staff were periodically briefed on plant and radiological conditions. Habitability of the OSC was quickly confirmed and updated hourly. The radiation protection director gave early consideration of iodine-protective measures and potassium iodine administration. Repair activities were appropriately prioritized and repair teams were adequately tracked. However, the inspectors noted that the OSC plant equipment status board was not maintained up-to-date.

The inspectors observed a repair team in the field. The team was well briefed by maintenance supervision and radiation safety personnel prior to dispatch. Radiation safety technician provided good support and recommended access and egress routes to minimize exposure to the repair team. Repairs were made using emergency maintenance authorization and SAM instructions. The inspectors noted that two valves were not in the location specified by the SAM instructions. One valve specified by the SAM instruction could not be reached without erecting scaffolding. However, the repair team was resourceful and perseverant and was able to simulate completion of half of the SAM instruction. The licensee initiated an issue report (IR3-029-438) to place a generic concern related to the verification and validation of the SAM instructions in the corrective action program.

The inspectors observed several minor problems in the OSC. The inspectors observed recurring problems with some radiation survey instruments and facsimile machines. Information technology staff effectively supported the OSC and resolved computer problems; however, these drill players were not controlled and were not appropriately qualified to be issued dosimetry. The inspectors identified that while the OSC staff was issued dosimetry in a timely manner, the maintenance repair teams staged in the south service building cafeteria were not issued dosimetry as required by emergency plan procedures (ERPIP 700). No adverse consequences resulted from these problems and they were identified by the licensee during the formal critique.

**b.4** EOF

The EOF was staffed and activated in a timely manner. The SEC demonstrated very good command and control by conducting timely and informative briefings, demonstrating good team work with the PGM and eliciting pro-active thinking in anticipation of further plant degradation. The EOF staff supported the SEC's efforts by keeping the status boards updated, ensuring the radiological assessment coordinator was informed of changing conditions and questioned erroneous information. The SEC was excellent at repeat backs and diligently reviewed the EAL charts to ensure all parameters were met before escalating the classification. PARs were adequately upgraded based on the changing scenario events and conditions. The notifications were

timely and detailed briefings were performed by the SEC to the county and state agencies via teleconferencing.

There was approximately a 30 minute delay to recommend the evacuation of the entire 10 emergency planning zone (EPZ) due to a missed step in the procedure. This was self-identified and corrected by the players. The areas of immediate concern downwind of the plant had been evacuated; therefore, the delay to evacuate the remainder of the EPZ was of minimal significance. Upon further view by the inspectors, it was determined that other PAR procedures were unclear or not consistent. For example, ERPIP 202 Attachment 4.1.6 discusses a "puff plume" which was confusing to some of the players. Also, some PAR procedures addressed plant conditions while others addressed radiological conditions and resulted in a segmented approach to PAR development. These issues were identified by the licensee during the critique and an issue report was generated. During the exercise, the appropriate final PAR was developed and relayed to offsite agencies.

#### b.5 Dose Assessment

The licensee effectively performed the emergency dose calculation and assessment function at the EOF during this exercise. Selection of probable source terms was performed very well. Environmental transport and dose projections for hypothetical releases were accomplished for the most probable source terms and release paths prior to the scenario release start time. These provided valuable bounding data for the later assessment of the impact of the scenario release and timely input to PARs.

However, data from an earlier hypothetical dose projection resulted in some confusion when the licensee was considering the need to extend protective actions past ten miles. A later projection for the ongoing scenario release (with a release rate smaller than that of the earlier hypothetical dose projection) showed that protective actions past ten miles were required. This situation occurred when the computerized dose model switched automatically (by design) from an elevated to a ground level plume due a small change in wind speed while all other meteorological conditions for the two projections remained essentially the same. This small change in wind speed (a change from 6.26 to 6.71 miles per hour) and the resultant automatic change in plume release level caused the protective action guides (PAGs) to be exceeded beyond ten miles even though the release rate was less than that of the earlier hypothetical projection in which the PAGs were not exceeded beyond ten miles. During the exercise, the licensee did not demonstrate awareness of this automatic feature of the computer program, however, the licensee was able to eventually develop the appropriate PAR based upon the latter projection.

The operators of the computerized emergency dose projection model were otherwise proficient in its use and had an effective knowledge of the source term types and potential release paths. The operators made suggestions for hypothetical dose projections which were helpful to the assessing radiological assessment director (RAD). The operators were able to identify several errors in source term selection and in forecasted release duration before the errors caused any dose assessment difficulties.

Command and control of the dose assessment process and personnel was performed in a competent and proficient manner. The use of two RADs (directing and assessing) contributed significantly to the proficient functioning of this operation on this occasion. However, the procedure for this position described it as a singular person. This procedural situation could conceivably lead to problems in future situations since the separate responsibilities of the two RADs were not formalized. For example, during this exercise, the directing RAD declared the emergency dose assessment function in the EOF operational and in charge five minutes prior to informing the assessing RAD who, during those five minutes, was still going through turnover discussions with the interim RAD in the TSC.

In general, the quality and state of readiness of the facilities and equipment provided effective resources for the emergency dose assessment function. Meteorological and radiological data were received and posted on a regular and periodic basis. Numerous decisional aids including maps and procedural attachments were posted in clear view. Some equipment problems were encountered by the offsite monitoring teams including an inoperable primary radio link between the team leader and the teams. However, the backup radio link did function and was used until the primary link was repaired. Additional problems with a offsite monitoring team vehicle and some counting equipment resulted in a short delay in the deployment of the teams. These issues were identified by the licensee during the formal critique.

b.6 Licensee Exercise Critique

Immediately following the exercise, the licensee began its critique process with players providing debriefs at each of the facilities. Players were candid discussing both positive and negative comments regarding individual and equipment performance. Licensee controllers then compiled their observations and findings and presented them at the formal critique on October 8, 1999. The licensee identified a number of issues, in addition to the ones identified by the inspectors. Overall, the critique was thorough and self-critical.

c. Overall Exercise Conclusions

Based on the results of this inspection, it was determined that the overall performance of the ERO demonstrated, with reasonable assurance, that onsite emergency plans are adequate and that the licensee is capable of implementing them. Simulated events were diagnosed accurately, emergency declarations were timely and accurate, offsite agencies were notified in a timely manner and protective action recommendations were appropriate.

The critique process was well implemented. Post-exercise facility debriefs were candid. At the formal critique, the licensee identified a number of issues, in addition to those identified by the NRC. The most significant issues identified were prioritized for prompt corrective action. Overall, the critique was balanced with positive and negative findings and was appropriately self-critical.

**P8 Miscellaneous EP Issues****P8.1 Scenario Preparation and Exercise Control (IP 82302)**

An in-office review of the exercise objectives and scenario was conducted by the inspectors prior to the exercise. It was determined that the scenario was adequate to support the demonstration of the stated objectives and satisfactorily exercised a significant portion of the emergency response capabilities.

The inspectors observed that name plates, log books, speed-dial cards, and computer instructions had been pre-staged in the OSC. The lead evaluator in the TSC inappropriately asked if the EOF staff was aware that they would be evacuating themselves when the PAR was extended beyond the 10 mile EPZ. No significant issues resulted from these items.

**P8.2 Scenario Issues (IP 82302)**

The inspectors reviewed the practice scenario conducted by the licensee and observed a number of similarities with the evaluated scenario. Specifically, the same EALs were used for the alert, site emergency, and general emergency declarations for both the practice exercise and the evaluated exercise. Both scenarios simulated that excessive core damage had occurred and resulted in a reactor vessel melt through. Also, the radiological source terms were similar and the release points were the same for the two scenarios. Upon further review by the inspectors, it was recognized that once a severe accident occurs, the same EALs would be utilized and the source terms would be similar if the amount of core damage was similar.

For this evaluated exercise, the players were informed prior to the exercise to avoid using judgement when making emergency classifications. The players were instructed to wait until plant parameters met the EAL criteria before making an emergency declaration. This was done to maintain control of the exercise time line to ensure that offsite exercise objectives could be met. During the exercise, players recognized that with degrading conditions and no indication of the return of mitigation capability, they stated that they would have upgraded the emergency classifications sooner. Even though the inspectors understood the purpose of the licensee's direction to its players, there was concern that this could result in negative training on the part of the players and confusion and concern on the part of offsite officials as they observe the delay in upgrading the emergency classifications.

The inspectors acknowledge the licensee's creativity and willingness to challenge its ERO by utilizing a simulated severe accident during its evaluated exercise. However, there are negative aspects associated with these types of scenarios such as negative training and similarity with practice exercises.

**V. Management Meetings****X1 Exit Meeting**

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on October 27, 1999. The licensee acknowledged the inspectors' findings.

## INSPECTION PROCEDURES USED

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

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

## LIST OF ACRONYMS USED

EAL	Emergency Action Level
EOF	Emergency Operations Facility
EPZ	Emergency Planning Zone
ERO	Emergency Response Organization
OSC	Operations Support Center
PAG	Protective Action Guide
PAR	Protective Action Recommendation
PGM	Plant General Manager
RAD	Radiological Assessment Director
SAM	Severe Accident Management
SEC	Site Emergency Coordinator
SM	Shift Manager
TSC	Technical Support Center