UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 14 1984

MEMORANDUM FOR: Richard C. DeYoung, Director
Office of Inspection and Enforcement

THRU: Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

50-369

FROM: Kenneth E. Perkins, Chief
Incident Response Branch
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

SUBJECT: EMERGENCY RESPONSE DATA SYSTEM DEVELOPMENT EXERCISE
JULY 19, 1984

A limited exercise was held on July 19, 1984, for the purpose of evaluating the benefits of electronic data transmission from a nuclear facility to the Emergency Operations Center. Duke Power Company provided data transmissions from the McGuire plant, while NRC contractors played the roles of licensee personnel for simulated Emergency Notification System (ENS) and Health Physics Network (HPN) communications. NRC Headquarters participation was limited to the Reactor Safety Team, the Protective Measures Team, and the Executive Team Coordinator and Director. Region II participation was limited to those personnel necessary to support the five communications links being exercised: McGuire electronic data, ENS, HPN, and the Reactor Safety Team and Protective Measures Team counterpart links.

PURPOSE AND OBJECTIVES

The goal of this exercise was to develop better understanding of the role for electronic data transmission in NRC's emergency response activities. Specific objectives were:

1. Test the ability of the Emergency Operations Center and Incident Response Center to simultaneously receive electronic data transmissions from a nuclear power plant.

2. Evaluate the flow of electronically transmitted data through the activities of the Reactor Safety Team and Protective Measures Team.

3. Investigate the value of regularly updated, time tagged, reliable data on the Teams deliberations.

4. Test the adequacy of the parameter set designated for electronic transmission.

5. Investigate the effect on the quantity and quality of voice communications over ENS, HPN and the counterpart links.

6. Consider the relative burden on the licensee of providing the data by such a system in an emergency.

Scenario

The scenario began with a small break Loss of Coolant Accident (LOCA) and declaration of Site Area emergency at 0400 EDT. Engineered Safety Features (ESF) actuation occurred normally until 0800 EDT, when problems developed with the A train charging pumps and Safety Injection (SI) pumps due to trash in the recirculation sump. Offsite power was lost at 0830 EDT, due to a plane crash. Emergency diesel generator A started, but diesel generator B had been taken out-of-service for maintenance prior to the event. By 0835 EDT, both trains of Emergency Core Cooling System (ECCS) were inoperable, placing the unit in a core melt sequence and causing declaration of a General Emergency. Uncontrolled core heating led to gross fuel failure by 1100 EDT. At 1200 EDT., the B Emergency Diesel was returned to service and core injection flow and containment spray were reestablished. However, an air return fan inside containment shattered, damaging a penetration with a fan blade. This caused an airborne release to the environment until 1230 EDT, when containment pressure was reduced to atmospheric pressure.

The data transmissions from the McGuire plant were commenced at 0800 EDT and included data back to 0400 EDT. Participants were briefed at 0810 EDT, and the exercise was conducted from 0830 to 1230 EDT.

The Initial Activation Mode was purposely maintained for the duration of exercise play.

CRITIQUE

1. Electronic Data Transmission and Reception

The Duke Power Company utilized their Crisis Management Data Transmission System to simulate the output of a more limited type of Emergency Response Data System (ERDS) being conceptually developed by NRC. A preestablished set of 69 data points were transmitted over Federal Telecommunication System (FTS) lines to the Region 2 Incident Response Center and the Headquarters Operations Center. Data from the beginning of the scenario at 0400 EDT was transmitted beginning at 0800 EDT. Regular update transmissions were made at 15 minute intervals from 0830 through 1230 EDT.

A single terminal at the Region 2 Incident Response Center and two terminals at Headquarters (one each for the Reactor Safety Team and Protective Measures Team) were used to receive the data.

System log-on was initiated separately from each of the 3 terminals, using dataphones and 1200 band modems. Log-on was accomplished without difficulty, and the circuits were not interrupted for the duration of the exercise. Telephone line quality was sufficient to avoid transmission errors.

2. Evaluation of Information Flow at Headquarters

Individual data terminals were provided for the Regional Safety Team (RST) and Protective Measures Team (PMT). The RST terminal was in the team room, while the PMT terminal was across the hall from that team room. Initially, hard copy was produced at both terminals, but, due to printer noise, the RST later chose to obtain hard copy by xeroxing the PMT output. An individual in the RST room then began manning the video console and visually extracting specific parameters for which the team wanted the fastest possible updates.

Both teams promptly began trend analysis of some parameters. During debriefing, both teams expressed the desire for trending capabilities. Both teams also agreed that more frequent updates were desirable for critical parameters during the rapidly moving scenario sequences. Although the teams did not feel inundated by the data flow of 69 parameters at 15 minute intervals, some members expressed concern that only selected parameter updates be presented to them at the accelerated frequency. These concerns can be addressed by procedural means or electronic data handling after the data is received at the Operations Center.

3. Value of Electronic Data Transmissions to RST and PMT Deliberation

The availability of reliable, time-tagged data greatly enhanced the teams' effectiveness. The speed with which the teams began functioning was much more rapid. Very little time was lost in seeking or organizing basic data. Both teams agreed that this resulted in a major improvement in their abilities to focus on the events of the scenario and to concentrate on predicting its course.

The unpredictable containment penetration damage at 1200 EDT provided a test of the teams' ability to promptly identify unanticipated events, using the new data. The PMT did correctly identify that containment pressure (a variable they were closely watching) was dropping earlier and more quickly than expected from spray initiation. However, when investigating the cause, the PMT member failed to note that the vent monitor had simultaneously gone off-scale high. The phenomenon was attributed to a scenario problem until the RST informed the PMT that the plant had made voice notification (over ENS) of a containment liner leak. This suggests that some data overload may have occurred in the PMT room. (This difficulty can be addressed by procedural improvements or electronic data handling after the data is received at the Operations Center.)

Regional personnel indicated that the electronic data transmissions would have great value to their Base Team during Standby Mode, and that it would provide a better data base for Headquarters to support the Site Team during Full Activation.

4. Adequacy of Predetermined Parameter List

The conceptualization of ERDS involves selection from licensees' preexisting electronic data systems only those parameters which NRC has determined to be important to its emergency response functions. Due to the close parallel between the roles of the licensee's Emergency Operations Facility and the NRC's Operation Center, most parameters which are important to the NRC's role are expected to be available on the licensee's data systems.

The Duke Power Company's data system allows simultaneous access to any 252 of approximately 8000 data points logged by the plant process computer. For purposes of this exercise, Duke's preformatted data set (67 parameters) was slightly altered to eliminate data not on NRC's list and to add some tank levels and radioactivity release data not routinely transmitted by Duke.

During the exercise, the NRC teams found the data set to be adequate. The only supplemental parameter requested over ENS was reactor vessel level, which is on NRC's list but still being implemented on Duke's system. The RST also expressed interest in steam generator pressure data (which had been deleted from Duke's usual data set), but concluded that it was not essential to their deliberations, given other parameters on the list.

Although no single scenario can completely test the adequacy of the list, the results of this exercise indicate that the NRC's parameter list is a good guide for data point selection.

5. Effects of Electronic Data Transmission on the Voice Link Activity

As previously mentioned, the use of the electronic data transmissions virtually eliminated routine data transmissions over ENS. Questions to verify and/or correct previously transmitted data were completely eliminated. The amount of data requested over HPN was greatly reduced. (Many PMT data requests are for offsite dose projections and measurements, which are not on licensee's electronic data systems).

The contractors acting as the licensee's communicators for ENS and HPN both indicated that the questions they received were less confused and more likely to be promptly and competently handled by the licensee's communicators.

Although the Site Team was not exercised, Regional personnel expressed the opinion that the electronic data transmissions would greatly reduce the burden of data transmission which usually was placed upon Site Team members whenever they communicated with the Headquarters Operations Center.

Conclusions

The exercise has demonstrated that there is great value in using electronic data transmission for obtaining a very modest set of reliable, time-tagged data at modest frequency. Reactor Safety Team and Protective Measures Team activities were substantially more efficient and their assessments

were more timely. Both Teams exhibited a major improvement in their abilities to focus on the significant factors and to predict the course of events. Questions posed to the licensee were better focused. The burden on the licensee's ENS and HPN communicators was substantially reduced.

The Region indicated that such a data transmission system would assist them in determining the safety significance of an incident when the agency is in "Standby". The Region also stated that such a system would relieve the burden on the Site Team for verbal transmission of data to Headquarters and provide a better basis for Headquarters analytical support to the Site Team in Expanded Activation.

The exercise also demonstrated that the electronic data system a utility produces for its own emergency use is likely to provide ready access to a major portion of the basic parameters desired by NRC. By developing the flexibility to accept data from such preexisting utility systems, the NRC can correct the majority of the data deficiencies being experienced in the Operations Center.

The Duke Power Company is continuing to make the outputs of their data transmission system available to the NRC in case it is needed for an actual event. This system alone covers 7 of the approximately 90 power reactors now in operation or near operation.

Original Signed By
Kenneth E. Perkins

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* For Concurrence see previous page.

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