December 26, 1984

POLICY ISSUE SECY-84-481

(Notation Vote)

For: The Commissioners

From: William J. Dircks
Executive Director for Operations

Subject: UPGRADING THE NRC OPERATIONS CENTER'S EMERGENCY DATA ACQUISITION CAPABILITY

Purpose: To inform the Commission of staff activities and conclusions that led to the Emergency Response Data System (ERDS) concept and to obtain approval of a letter to the Congress.

Background: As a result of the March 28, 1979 accident at Three Mile Island Unit 2, the NRC and others recognized a need to substantially improve NRC's capability to acquire data on plant conditions during emergencies. The staff's response to this need included a proposal for a Nuclear Data Link (NDL). A conceptual design for a NDL was produced under contract with Sandia National Laboratories, and, in April 1981, the Commission directed the staff to proceed with an NDL prototype program. However, beginning in June 1981, a series of Congressional actions and requests have caused the NRC to reassess releasing a Request for Proposals to conduct a prototype study. In the FY 1983 Pay Raise Supplement and the FY 1984 Appropriations Bills, the Congress took actions that effectively rejected several NRC requests to the Congress to allow the NDL to proceed. However, the NRC's FY 1984-85 Authorization requires the NDL concept to be included as part of any analysis of alternative means for upgrading NRC data acquisition.

The FY 1984-85 Authorization Act requires analysis of four issues before an NDL or similar system can be implemented: (1) the appropriate role of the Commission during an accident, (2) the information needed by the Commission to support that role, (3) the alternative means of acquiring that data, and (4) any changes in Commission authority necessary to enhance Commission response to nuclear emergencies. The Act also requires a cost-benefit analysis of the alternatives considered for acquiring the data.

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The staff proceeded to address the questions raised by the Congress and to compare several alternatives for upgrading emergency data acquisition capabilities for the Operations Center. Alternative conceptual approaches were developed; their positive and negative attributes were tabulated; and these attributes were then compared to experiences gained during the Federal Field Exercise, other drills, and actual events.

The staff concluded that the design which best addresses the Congressional criticisms of the NDL, while meeting the requirements of NRC, is one which utilizes electronic data transmission systems already being developed by licensees for their own emergency response facilities. This concept, called the Emergency Response Data System (ERDS), was tested with the assistance of Duke Power Company in July 1984.

Discussion: The Commission has defined the NRC's primary role in an emergency at a licensed nuclear facility as one of monitoring the licensee to assure that appropriate recommendations are made with respect to offsite protective actions. The Office of the Executive Legal Director has reviewed existing legislation and determined that NRC's legal authority provides a sufficient basis for the Commission's emergency response role.

The NRC believes that its response role can best be carried out by a Site Team from the appropriate Regional Office. The Regional Site Team, however, will require from 2 to 6 hours for transit, during which time Headquarters must lead the NRC's initial response, including addressing requests for information, advice, and assistance, particularly from the governor(s) of the affected state(s). Once in place, the Regional Site Team cannot represent a full complement of experts for dealing with all pertinent aspects of a major event. Headquarters provides the Site Team with the additional expertise and analytic support it requires to independently assess the risks posed by the event.

To fulfill the NRC's role, both the Site and Headquarters Teams require accurate, timely data on four types of parameters: (1) core and coolant system conditions must be known well enough to assess the extent or likelihood of core damage; (2) conditions inside the containment building must be known well enough to assess the likelihood of its failure; (3) radioactivity release rates must be available promptly to assess the immediacy and degree of public danger; and (4) the data from the plant's meteorological tower is necessary to assess the distributions of potential or actual impact on the

public. A list of the particular parameters considered necessary to these assessments is included as Enclosure 1.

Experience with the voice-only emergency communications link, currently utilized for data transmission, has demonstrated that excessive amounts of time are needed for the routine transmission of data and for verification or correction of data that appear questionable. Error rates have been excessive; initiations have been slow; frequency of updates have been unreliable. In addition, the current system creates an excessive drain on the time of valuable experts. When errors occur, they frequently create false issues which, at best, divert experts from the real problems for seriously long periods of time. At worst, incorrect data may cause the NRC to respond to offsite officials with inaccurate or outdated advice that results in the implementation of inappropriate protective actions.

Several options have been considered for upgrading the data acquisition capabilities at the Operations Center. These are described in Enclosure 2. The options include various means of acquiring the data: manually, automatically using existing systems, or automatically using new systems. Appropriate options for transmitting the data to the Operations Center were considered: electronically formatted data, image facsimile, or by voice through specially qualified communicators.

The criteria used to compare these options are delineated in Enclosure 3. Many of these criteria were developed from problems encountered during the NRC's participation in various actual events and exercises, particularly the Federal Field Exercise in March 1984. Other criteria have been gleaned from previous criticisms of the NDL design concept. The criteria involve accuracy, reliability, timeliness, completeness, costs (in dollars and expert personnel), and backfitting requirements. The detailed consideration of each option against each criterion is explained and the comparison of the options is summarized in Enclosure 4.

The staff has determined that automatic transmission of selected parameters from licensees' existing electronic data systems is the option that is most capable of providing acceptably complete and reliable data on a timely basis at reasonable cost with the minimum potential for burdening the licensee in an emergency. Most licensees either already have developed or are developing electronic data systems for their emergency response facilities (ERFs). Because the role of the licensees' ERFs is similar to the role of the NRC during emergencies, the licensees' data systems already include most of the parameters desired by NRC. Those few parameters which

are not included in any particular licensee's system can be communicated by voice over the Emergency Notification System (ENS), thus avoiding backfitting requirements on the licensee to include additional parameters on their electronic data systems. Data would be accepted in whatever format the licensee uses and reformatted at the Operations Center, as necessary. Because of the wide diversity of data systems utilized by the licensees, the best means for extracting the NRC's parameters from each system would be determined on a case-by-case basis. The licensees would have control over transmission and would use the system only during emergencies. This option has been named the Emergency Response Data System (ERDS). The design concept for the ERDS is outlined in Enclosure 5.

To test the ERDS concept, the Duke Power Company agreed to participate in a limited exercise, utilizing their existing Crises Management Data Transmission System. Duke had previously been the Atomic Industrial Forum Observer in the Operations Center during Federal Field Exercise in March 1984. This had permitted them to note firsthand the various data problems being experienced by the NRC.

During the test on July 19, 1984, data transmissions from the Duke System were intentionally limited to a list of 69 specific data points to test the appropriateness of the NRC's parameter list. The test was remarkably successful in fulfilling its goals. The time needed to startup the Reactor Safety Team and Protective Measures Team was significantly reduced, and their assessments were made more quickly throughout the exercise. The nature of their deliberations was also markedly changed; their ability to focus on the events and to predict the future course of the scenario was greatly enhanced by having hardcopy of time-tagged data in unambiguous units. The nature of voice communications over the ENS and Health Physics Network (HPN) telephones also were greatly improved. Very little basic data was transferred by voice. Where voice communications were used, the questions were framed much better and the answers regarding the licensee's knowledge and plans were much more timely.

Region II personnel indicated that the ERDS would be similarly valuable to their Regional Base Team during Standby Mode and that it would provide a better basis for Headquarters analytical support for their Site Team during Expanded Activation. They also pointed out that the availability of electronic data during Expanded Activation would greatly reduce the burden on the Site Team to verbally transmit data to Headquarters to obtain Headquarters support. A report on the ERDS development drill is provided in Enclosure 6.

An estimate of the system costs is included in Enclosure 7. The estimate delineates the site and headquarters components of the costs. The estimate also describes a breakout of costs between the NRC and licensees. The cost figures are based on a review of the available information describing licensees' data systems and a determination of the proportion of licensees that represent a trivial interface problem to those that are more complex. Precise site costs will have to be determined on a case-by-case basis.

<u>Conclusions</u>:

[redacted]

Recommendation: [redacted]

William J. Dircks
Executive Director for Operations

Enclosures:
1. Plant parameters identified as necessary inputs to reactor safety team and protective measures team
2. Options considered
3. Criteria for improving technical data acquisition
4. Comparisons of options for Operations Center emergency data acquisition
5. ERDS Design Concept
6. ERDS Development Drill Report
7. ERDS Cost Estimate
8. Letter to Congress

Commissioners' comments should be provided directly to the Office of the Secretary by c.o.b. January 10, 1985.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT January 3, 1985, with an information copy to SECY. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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ENCLOSURE 1

PLANT PARAMETERS IDENTIFIED AS NECESSARY INPUTS TO REACTOR SAFETY TEAM AND PROTECTIVE MEASURES TEAM

These parameters have been selected as immediate indicators of core and containment status and determinates of offsite dose.

Parameters that vary too frequently and/or rapidly for voice update by telephone can best be handled by an automatic data system.

Some other parameters, such as meteorology, should also be included on the system to minimize errors, whenever those parameters are available in electronic data format.

PWR PARAMETER LISTS

Primary Coolant System	Pressure Temperatures - hot leg Temperatures - cold leg Temperatures - core exit thermocouples Subcooling margin Pressurizer level RCS charging/makeup flow Reactor vessel level (when available) Reactor coolant flow Neutron flux - startup range
Secondary Coolant System	Steam generator levels Main feedwater flows Auxiliary/Emergency feedwater flows
Safety Injection	High pressure safety injection flows Low pressure safety injection flows Safety injection flows (Westinghouse) Borated water storage tank level
Containment	Containment pressure Containment temperatures Hydrogen concentration Containment sump levels
Radiation Monitoring System	Reactor coolant radioactivity Containment radiation level Condenser air removal radiation level Effluent radiation monitors Process radiation monitor levels
Meteorological	Wind speed Wind direction Atmospheric stability

BWR PARAMETER LISTS

Reactor Coolant System	Reactor pressure Reactor vessel level Feedwater flow Neutron flux-Startup range
Safety Injection	RCIC flow HPCI/HPCS flow Core spray flow LPCI flow Condensate storage tank level
Containment	Drywell pressure Drywell temperature Hydrogen & Oxygen Concentration Drywell sump level Suppression pool temperature Suppression pool level
Radiation Monitoring Systems	Reactor coolant radioactivity level Primary containment radiation level Condenser off-gas radiation levels Effluent radiation monitor Process radiation levels
Meteorological	Wind speed Wind direction Atmospheric stability

ENCLOSURE 3

CRITERIA FOR IMPROVING TECHNICAL DATA ACQUISITION

- ACCURACY:
  - MINIMIZE ERRORS IN ACQUIRING DATA FROM PLANT SENSORS
  - MINIMIZE ERRORS IN TRANSMITTING DATA TO OPERATIONS CENTER
- RELIABILITY:
  - AVAILABILITY FOR PROMPT IMPLEMENTATION UPON OCCURRENCE OF AN EVENT
  - DEPENDABILITY OF ROUTINE UPDATING
- TIMELINESS:
  - MINIMIZE DELAY INITIATING DATA TRANSMISSION
  - MINIMIZE TIME ELAPSED BETWEEN DATA ACQUISITION AND AVAILABILITY IN OPERATIONS CENTER
- COMPLETENESS:
  - OBTAIN SUFFICIENT NUMBER OF PARAMETERS
  - MAINTAIN ASSOCIATIONS OF TIME AND SOURCE AMONG VARIOUS DATA
- COST:
  - OBTAIN FAVORABLE COST-BENEFIT COMPARISON WITH OTHER ALTERNATIVES
- PERSONNEL REQUIREMENTS:
  - MINIMIZE NUMBER OF TECHNICAL EXPERTS NEEDED TO OPERATE SYSTEM
- BACKFITTING REQUIREMENTS:
  - MINIMIZE REQUIREMENTS ON LICENSEE AND INTRUSION TO PLANT SYSTEMS

CONSIDERATIONS FOR FULLY AUTOMATED
SYSTEM TAKING DATA FROM PLANT SENSORS
(NUCLEAR DATA LINK)

- ACCURACY IS EXCELLENT BECAUSE THERE ARE NO HUMAN INTERFACES.
- RELIABILITY IS EXCELLENT BECAUSE THERE ARE NO HUMAN INTERFACES.
- TIMELINESS IS EXCELLENT BECAUSE SYSTEM IS IMMEDIATELY AVAILABLE AND CAPABLE OF RAPID TRANSMISSION WITH FREQUENT UPDATING.
- COMPLETENESS IS POTENTIALLY EXCELLENT BECAUSE ANY NECESSARY PARAMETER CAN BE ACCESSED.
- COST IS HIGH BECAUSE A TOTALLY NEW SYSTEM MUST BE DEVELOPED FOR EACH PLANT.
- NO PERSONNEL ARE REQUIRED FOR ACQUISITION, TRANSMISSION, OR RECEIPT OF DATA.
- BACKFITTING REQUIREMENTS WOULD BE EXTENSIVE ON LICENSEES FOR EQUIPMENT AT PLANTS.

CONSIDERATIONS FOR AUTOMATED
SYSTEM ACCESSING LICENSEES'
EXISTING ELECTRONIC
DATA SYSTEMS
(EMERGENCY RESPONSE DATA SYSTEM)

- ACCURACY IS EXCELLENT BECAUSE THERE ARE NO HUMAN INTERFACES.

- RELIABILITY IS EXCELLENT BECAUSE THERE ARE NO HUMAN INTERFACES, AND MANY SYSTEMS (SUCH AS SPDS) WILL INCORPORATE AUTOMATIC DATA VALIDATION.

- TIMELINESS IS EXCELLENT BECAUSE THE SYSTEM IS IMMEDIATELY AVAILABLE AND CAPABLE OF RAPID TRANSMISSION WITH FREQUENT UPDATING. PROMPTNESS OF INITIATION MAY VARY DEPENDING UPON LICENSEES' SYSTEM CONFIGURATIONS. IN SOME CASES, ACTIVATION MAY NOT OCCUR UNTIL THE LICENSEE MANS ITS TECHNICAL SUPPORT CENTER.

- COMPLETENESS IS EXPECTED TO BE GENERALLY EXCELLENT BECAUSE THE PRIMARY OBJECTIVE OF THE SPDS REQUIREMENT IS TO PROVIDE THE LICENSEE WITH A TOOL FOR QUICKLY ASSESSING THE OVERALL HEALTH OF THE PLANT, I.E., THE SAME NEED THAT THE NRC FACES. IT IS EXPECTED THAT THERE WOULD BE MINIMAL REQUESTS FOR SUPPLEMENTAL INFORMATION TO BE TRANSMITTED BY VOICE.

- COST IS RELATIVELY LOW BECAUSE MOST LICENSEES ARE ALREADY INSTALLING SYSTEMS TO TRANSMIT DATA AMONG THEIR OWN ERFS, BUT THERE WILL BE SUBSTANTIAL HARDWARE AND SOFTWARE INTERFACE REQUIREMENTS AT THE OPERATIONS CENTER TO RECEIVE THE DIVERSE SIGNALS AND FORMATS.

- NO PERSONNEL ARE REQUIRED FOR ACQUISITION, TRANSMISSION, OR RECEIPT OF DATA ON SPDS. SUPPLEMENTAL VOICE TRANSMISSIONS ARE NOT EXPECTED TO OVERBURDEN EXISTING VOICE LINKS.

- BACKFITTING ON PLANT SYSTEMS WOULD BE MINIMAL IN THAT LICENSEES ONLY WOULD HAVE TO PROVIDE ONE ADDITIONAL OUTPUT PORT ON THE SPDS OR OTHER ERF DATA SYSTEM.

CONSIDERATIONS FOR MANUAL DATA
ACQUISITION AND TERMINAL ENTRY
FOR ELECTRONIC TRANSMISSION

- ACCURACY IS POOR BECAUSE MANUAL DATA ACQUISITION AND ENCODING IS SUBJECT TO INSTRUMENT READING ERRORS, HANDWRITING READING ERRORS, AND TYPOGRAPHICAL ERRORS.
- RELIABILITY IS POOR BECAUSE MANUAL DATA ACQUISITION IS EASILY INTERRUPTED. INITIATION WOULD NOT BE PROMPT BECAUSE OF PERSONNEL REQUIREMENTS.
- TIMELINESS IS ONLY FAIR BECAUSE ACQUISITION AND ENTRY ARE TIME CONSUMING, BUT DATA HANDLING THEREAFTER AT NRC IS AUTOMATIC. DATA VERIFICATION COULD CAUSE MORE EXTENSIVE DELAYS.
- COMPLETENESS IS POTENTIALLY GOOD, BUT ACQUISITION TIME MAY LIMIT NUMBER OF PARAMETERS THAT CAN BE HANDLED.
- COSTS ARE MODEST, INCLUDING AT LEAST A TERMINAL AND A MODEM FOR EACH REACTOR.
- PERSONNEL REQUIREMENTS INCLUDE AT LEAST ONE PERSON KNOWLEDGEABLE IN PLANT OPERATIONS TO ACQUIRE DATA AND ONE TECHNICAL TYPIST TO ENTER DATA ON TERMINAL. VERIFICATION OF DATA WOULD REQUIRE AT LEAST ONE HIGHLY EXPERT INDIVIDUAL.
- BACKFITTING OF PLANT EQUIPMENT WOULD NOT BE REQUIRED.

CONSIDERATIONS FOR A SYSTEM TO TELEFAX MANUALLY ACQUIRED DATA TO NRC

- ACCURACY IS POOR BECAUSE MANUAL DATA ACQUISITION AND ENTRY (AT NRC) IS SUBJECT TO INSTRUMENT READING ERRORS, HANDWRITING READING ERRORS, AND TYPOGRAPHICAL ERRORS. VERIFICATION WOULD BE DIFFICULT BECAUSE TYPIST WOULD NOT BE IN ROOM WITH PLANT PERSONNEL.
- RELIABILITY IS POOR BECAUSE MANUAL DATA ACQUISITION IS EASILY INTERRUPTED. INITIATION MAY NOT BE PROMPT BECAUSE OF PERSONNEL REQUIREMENTS.
- TIMELINESS IS ONLY FAIR BECAUSE ACQUISITION AND ENTRY ARE TIME CONSUMING, BUT DATA HANDLING THEREAFTER AT NRC IS AUTOMATIC. DATA VERIFICATION WOULD REQUIRE RETURN TELEFAX AND MORE DELAY.
- COMPLETENESS IS POTENTIALLY GOOD, BUT ACQUISITION TIME MAY LIMIT NUMBER OF PARAMETERS THAT CAN BE HANDLED.
- COSTS ARE MODEST, INCLUDING A COMPATIBLE TELEFAX IN EACH CONTROL ROOM.
- PERSONNEL REQUIREMENTS INCLUDE ONE PERSON KNOWLEDGEABLE IN REACTOR OPERATIONS TO ACQUIRE DATA AND ONE NRC EMPLOYEE TO ENTER DATA.
- BACKFITTING TO PLANT SYSTEMS IS NOT REQUIRED.

CONSIDERATIONS FOR A SYSTEM USING MANUAL ACQUISITION AND VOICE TRANSMISSION

- RELIABILITY IS POOR BECAUSE MANUAL DATA ACQUISITION MAY BE EASILY INTERRUPTED. INITIATION WOULD NOT BE PROMPT BECAUSE OF PERSONNEL REQUIREMENTS.

- ACCURACY HAS BEEN SHOWN TO BE UNACCEPTABLE FOR VOICE RELAY OF DATA. DETECTION OF INSTRUMENT READING ERRORS, HANDWRITING READING ERRORS, AND TYPOGRAPHIC ERRORS (AT NRC) WOULD DEPEND ON VOICE LINK READBACK FOR DETECTION AND CORRECTION.

- TIMELINESS HAS BEEN SHOWN TO BE UNACCEPTABLE BECAUSE MANUAL DATA ACQUISITION AND VOICE RELAY IS TOO SLOW TO TRANSMIT REQUIRED DATA.

- COMPLETENESS IS POOR BECAUSE TRANSMISSION TIME REQUIREMENTS SERIOUSLY LIMIT NUMBER OF PARAMETERS THAT CAN BE HANDLED. SOURCE AND TIME REFERENCE HAVE BEEN DEMONSTRATED TO BE DIFFICULT TO MAINTAIN WITH DATA RELAYED BY VOICE.

- COSTS ARE NOT INCURRED UNLESS ADDITIONAL TELEPHONE LINKS ARE UTILIZED TO INCREASE DATA TRANSMISSION/VERIFICATION RATE.

- PERSONNEL REQUIREMENTS INCLUDE ONE INDIVIDUAL KNOWLEDGEABLE IN PLANT OPERATIONS TO ACQUIRE DATA AT THE SITE AND ONE TECHNICAL TYPIST TO ENTER DATA AT NRC. ADDITIONAL TELEPHONE LINES WOULD REQUIRE PAIRS OF ADDITIONAL COMMUNICATORS.

- BACKFITTING WOULD NOT BE REQUIRED.

ENCLOSURE 5

EMERGENCY RESPONSE DATA SYSTEM (ERDS)
DESIGN CONCEPT

Data Acquisition

Parameter inputs to ERDS would be obtained from an existing computer system (e.g. SPDS, plant computer, EOF data systems, etc.) at the plant.

Data Transmission

Data will be transmitted to the NRC Operations Center by modem to commercial telephone line or a dedicated line maintained by NRC (e.g. ENS).

Data Collection

A central processing system located in the NRC Operations Center will receive the data stream by modem. The system will be designed to receive all varied data streams and to reformat the data into a consistent format. The reformatted data will be output to CRTs and printer.

Parameter List

The parameter list would include those parameters necessary to ensure that appropriate protective action is being taken with respect to offsite recommendations. The list would be limited to those parameters involving plant status, radiological and meteorological conditions.

Licensees will not be required to backfit their systems to include additional parameters to provide data on NRC's parameter list. Data that is not available from the electronic data stream can be provided by voice over existing phone lines.

Transmission Frequency

The updating frequency of the licensees' systems will determine transmission frequency to NRC. If more frequent updates are required than those provided electronically by a particular licensee, the increased frequency will be accomplished (for a very limited subset of parameters) by voice over existing telephone lines.

Control

The licensee will have complete control over data transmission. ERDS would be "switched on" by the licensee in the early stage of a declared emergency.

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

ENCLOSURE 6

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

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.

Kenneth E. Perkins, Chief
Incident Response Branch
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ENCLOSURE 7

ERDS COST ESTIMATE

	NRC	Combined Licensees	Total
Site Costs:			
Hardware @ $6.5 K/site		$ 740 K	$ 740 K
Software @ $21.8 K/site		$2,486 K	$2,486 K
Design @ $3.2 K/site		$ 367 K	$ 367 K
Implementation @ $10.1 K/site	$ 527 K	$ 628 K	$1,155 K
Headquarters Costs:			
Hardware	$ 58 K		$ 58 K
Software	$ 270 K		$ 270 K
Design and Implementation	$ 395 K		$ 395 K
Total	$1,250 K	$4,221 K	$5,471 K