March 11, 1981

SECY-81-153

POLICY ISSUE
(Notation Vote)

For: The Commissioners

From: Executive Director for Operations

Subject: NUCLEAR DATA LINK (NDL) MANAGEMENT PLAN

Purpose: To respond to the Commission's request that the specifications for the Nuclear Data Link be developed (July 15, 1980 memorandum from Chilk to Dircks) and to seek Commission approval to proceed with a prototype NDL according to the management plan recommended by the staff.

Background: The staff has previously provided the Commission with information and plans regarding the Nuclear Data Link concept and implementation in SECY 80-35, 80-35A, and 80-326. These papers were presented at a Commission briefing at Open Meetings on February 7, 1980, May 15, 1980, and July 11, 1980, respectively. As a result of the last briefing, the staff was instructed to develop NDL system specifications for open bidding purposes and the selection of contractors to implement the selected system. This paper is to update the Commission on various actions and activities related to the NDL and request further guidance regarding the implementation of the NDL.

Discussion: At the last meeting on the NDL, the Commission also discussed the publication of NUREG-0696, "Functional Requirements for Safety Parameter Display, Technical Support Center, Emergency Operations Facility and Nuclear Data Link," which provides guidance to licensees and other emergency preparedness planners to design an integrated emergency resource capability, including the NDL. This document was published as a final report during February 1981. The NDL section of NUREG-0696 is provided in Enclosure 1.

In addition, to obtain an independent evaluation of the NDL approach and specifications developed by Sandia for the NRC, the staff requested the Research Triangle Institute (RTI) and the National Aeronautics and Space Administration (NASA) to review the published work available on the NDL concept developed by Sandia and the staff and comment on the technical aspects of the concept. The NASA report is Enclosure 2 and the RTI report is Enclosure 3. In general, each concluded that the Sandia design concept appears to be appropriate for the NDL mission. Each group found it somewhat

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difficult to verify the Sandia cost estimates but felt that projected NRC costs indicated were not unreasonable. These reviews have provided cogent comments which help to refine system design and indicate areas of possible cost savings. I have instructed the staff to prepare for separate transmission to the Commission, a memorandum discussing the comments received from NASA.

It should be emphasized that with respect to scheduling the NDL, implementation of the data acquisition system for the Technical Support Center (TSC), Emergency Operations Facility (EOF), Safety Parameter Display System (SPDS), and the NDL must be in parallel. It appears now that these necessarily concurrent actions will result in the initial operational capability of the NDL being achieved in about four years, at the earliest, from the time the Commission instructs the staff to move forward with the recommended management plan to implement the NDL. Additional time may be required depending on the course of action chosen.

This paper sets forth alternative program management plans that were evaluated by the staff. The division of responsibilities under these plans, the estimated NRC staff needed under each plan, and advantages and disadvantages of the alternatives are presented in Enclosure 4.

Program Management Concepts

The following program management plans have been considered for NDL implementation.

Plan A:

NRC Program Office/Contractor Implementation

Under this plan, NRC would establish a Program Office and select, via competitive bidding, a contractor. The Request for Proposal could allow a range of implementation alternatives to encourage potential contractors to adapt existing technology and equipment to the NDL functional needs.

Plan B:

NRC Program Manager/Sandia Implementation

This plan would be an extension of the NRC/Sandia working arrangement now in use for development of the NDL functions. Under this plan, Sandia would be assigned responsibilities both as Systems Integrator and prime system implementor. Sandia's services would be obtained through the established NRC/DOE agreement and Sandia would in turn contract for certain goods and services

Plan C:

NRC Program Manager/Outside Technical Integrator Manages Program/Systems Contractor

Under this plan, as in plan B, many of the tasks traditionally associated with an NRC Program Office would be assigned to another

organization (in this case, the Technical Integrator). Implementation would be carried out via competitive bidding conducted by the NRC with assistance in evaluation by the Technical Integrator. Once let, the contract or contracts would be managed by the Technical Integrator. Potential Technical Integrators could include a National Laboratory, a not-for-profit organization, or an industry organization competitively selected.

Conclusion: The staff has compared the advantages and disadvantages of the various alternatives. (See Enclosure 4.) None of these arrangements has a clearly preeminent advantage over the others. However the staff believes that plan A or C should be selected. There would be some delay in implementing the program using plan A or C over use of plan B. This is tolerable, however, in view of the major disadvantages of plan B even though the delay would put the implementation somewhat beyond the parallel development of the other emergency response facilities. A detailed description of the implementation of the NDL in accordance with plan C is included in the Technical Integrator RFP (Enclosure 5) prepared by Sandia.

The staff believes that plan C may be more advantageous than plan A because there would be a much more limited staff buildup. If plan C is selected, several alternatives for the Technical Integrator for implementing the NDL should be considered. Sandia would be a possible candidate for Technical Integrator since Sandia has acquired a great deal of expertise in developing the NDL concept and thus costs implicit in transfer of system cognizance and other planning would not be incurred. However, the staff believes that a fresh perspective on the problem may be desirable.

The staff has broached with NASA the idea of NASA assisting NRC in managing the NDL implementation. NASA has not been encouraging, but high-level negotiations might bring forth a willingness to assist NRC in this project. If NASA would accept designation as the Technical Integrator, they have indicated that they would have to, in turn, select one of their laboratories, such as the Jet Propulsion Laboratory, to perform the task. We believe that project costs would be comparable to the same scheme using Sandia as Technical Integrator.

The designation of any government or not-for-profit entity as systems manager would involve similar costs and schedule considerations. Selection of a firm from private industry as Technical Integrator is also a possibility. It would be preferable that, if a private contractor is selected as Technical Integrator, it should be excluded from furnishing hardware, or other operational requirements for the final implementation or the concept would in some respects revert to plan A with the NRC needing to perform all tasks associated with procurement.

NRC could determine the availability of companies to be employed as Technical Integrator by publishing a request for expressions of interest in the appropriate trade press. Responses could then be evaluated and a determination could be made of the method of selecting the Technical Integrator.

Recommendation: That the Commission:

Instruct the staff to move forward under plan C to implement a prototype of the NDL using the approach and specifications developed by Sandia and appropriately modified to reflect the cogent comments of RTI, NASA, and internal review. Instruct the staff that the NDL prototype is to be implemented between the NRC operations center and two facilities (one BWR and one PWR) in the following steps:

(a) Proceed to solicit expressions of interest from profit and not-for-profit entities for the Technical Integrator role. Based on these submittals proceed to select an entity for the Technical Integrator role.

(b) Proceed with other NDL tasks by solicitation for bid through the competitive process once the Technical Integrator is chosen to manage the contracted tasks.

William J. Dircks
Executive Director for Operations

Enclosures:
1 - NDL Section of NUREG-0696, Rev. 1
2 - RTI Report
3 - NASA Report
4 - Comparison of Management Plan Alternatives
5 - Technical Integrator RFP

Commissioners' comments should be provided directly to the Office of the Secretary by c.o.b. Thursday, March 26, 1981.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT March 19, 1981, with an information copy to the Office of the Secretary. 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

NDL Section of NUREG-0696,

Revision 1

6. NUCLEAR DATA LINK

6.1 Function

When a significant incident occurs at a nuclear power plant, the NRC will activate the Executive Team (ET) at the NRC Operations Center to oversee the agency response. The ET for reactor events consists of the Director of the NRC response (Chairman or designated alternate), the Executive Director for Operations, the Director of the Office of Inspection and Enforcement, and the Director of the Office of Nuclear Reactor Regulation. When the ET is activated, the Regional Director and Regional support staff leave immediately for the affected site, and a headquarters technical support group is called in to provide assistance to the ET and to NRC site personnel.

The primary role of each of these components of the NRC Incident Response Program is to monitor the event, independently evaluate the situation, provide advice and assistance to the licensee and offsite authorities, and inform officials and the general public about the radiological conditions on site and around the facility and the physical condition of facility.

Until the Regional Director (or other designated senior NRC official) arrives at the site, the NRC Operations Center must carry out the roles described above. When the Regional Director or other designated senior NRC official arrives at the site, it is contemplated that responsibility for managing the NRC operations in and around the plant will be transferred to that individual at the site (i.e., NRC Director of Site Operations.)

After the responsibility for managing the NRC site operations has been transferred to the Director of Site Operations, the headquarters technical support groups will provide direct support to him by continuing to evaluate information provided by site personnel. In addition, certain key decisions, particularly those relating to recommendations for actions affecting the general public and those involving changes in the NRC's role in responding to the accident, may remain with the Director of the NRC response. The NRC role will not extend to any manipulation of nuclear power plant controls nor will it normally include directing licensee actions. However, in extreme cases, NRC may direct that certain operations be performed by the licensee at the nuclear plant. In such an unlikely situation, it is expected that any direction from NRC would be provided to licensee management from the Director of Site Operations after his arrival onsite or from the Director of NRC response (Chairman or designated alternate) prior to that time. (A more detailed description of the manner in which NRC will respond to significant incidents can be found in NUREG-0728, "Report to Congress: NRC Incident Response Plan," and in NUREG-0730, "Report to Congress on the Acquisition of Reactor Data for the NRC Operations Center".) To fulfill these functions of providing support, NRC must have reliable and timely data from the nuclear power plant. This will be obtained through a nuclear data link (NDL), a data transmission system designed to send a specified set of variables from the plant to the NRC Operations Center.

6.2 Description

The nuclear data link (NDL) processes and transmits certain reactor process variables, and radiological and site meteorological data from each operating nuclear power plant to the NRC Operations Center. The NDL system is comprised of a data acquisition system, an NDL terminal (both of which are located on site), and an Operations Center system at NRC headquarters. Figure 1 shows a block diagram of how the NDL could be connected to the emergency response data acquisition system and is explained in the following paragraphs.

The data acquisition system (DAS) acquires data for the variables listed in Reg. Guide 1.97, Rev. 2, and Reg. Guide 1.23 and also may include other site-specific variables for transmission to the TSC, EOF, and SPDS as determined by

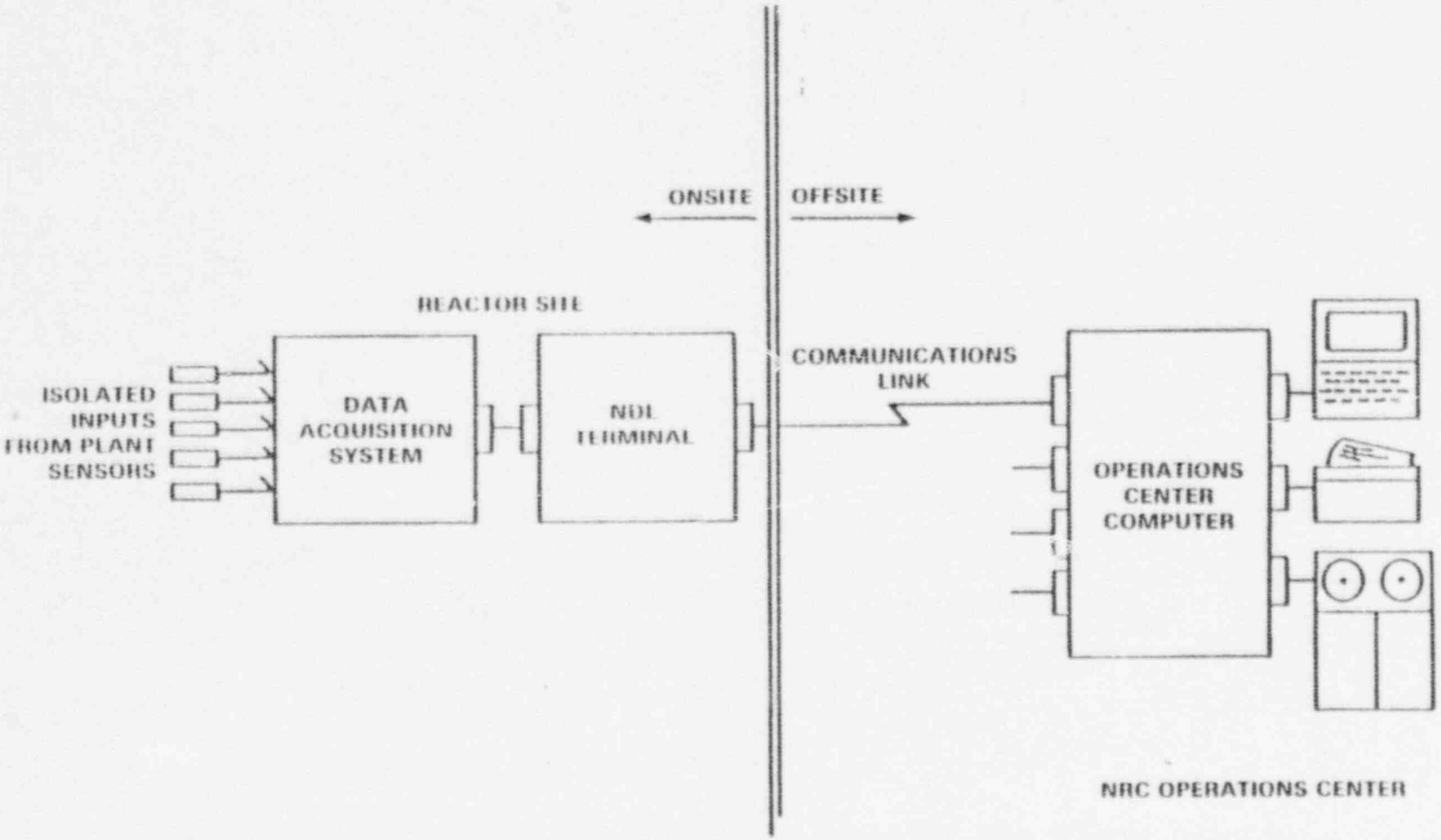

Figure 1. NDL System Overview

the licensee. The DAS also has Reg. Guide 1.97 data available to be transmitted to the NRC Operations Center over the NDL and to vendors and State or local authorities over other data links. Reg. Guide 1.97 information currently lists approximately 60 variables, depending on whether a PWR or BWR facility is being considered. The DAS performs multiplexing of incoming signals and conversion of raw data into engineering units. The data are scaled and time tagged appropriately and converted into a standardized, digital format for transmission.

Sensor sampling by the DAS and data transmission to the NDL terminal must occur at intervals of not greater than one minute. The analog-to-digital conversion performed on the input data transmitted shall have 12-bit resolution. Each reading shall be time tagged.

A data-access approach discussed in Appendix E of NUREG/CR-1451 may be used for transients. With that approach, the peak value and time integral of the transient are captured, digitized, formatted and transmitted at one-minute intervals.

An NDL terminal at the plant may accept data from the DAS and transmit it to the NRC Operations Center. The terminal would handle the communications protocol as well as error detection and correction. The NDL terminal hardware and software would be a standardized unit specified by the NRC. Specifications for this unit would be developed as a part of the NDL system design.

The Operations Center system makes data obtained from the licensee facility available for viewing in the NRC Operations Center. Facilities for retention of data will exist at the NRC Operations Center. The Operations Center subsystem, as presently envisioned, will include a general-purpose computer that is capable of receiving data from any plant. Video data terminals, printers, magnetic memory storage, and miscellaneous peripherals will comprise the balance of the equipment at the NRC Operations Center. The peripherals provide the man-machine interface to access and display numerical and graphical representations of parametric data and provide data storage capabilities. The computer may be used to maintain a file of current data from each reactor site. When an incident occurs, long-term data retrieval and storage begins in the NRC Operations Center. Stored data from at least a 2-week period shall be available for recall and display, as well as for analysis and verification by NRC personnel.

6.3 NDL Interface

The interface between the data acquisition system and the NDL will require the use of a common communications protocol, to be defined later.

6.4 Environment

The DAS and the NDL interface shall meet the same environmental specifications that apply to the onsite technical support center. Power supply for the acquisition system and formatting equipment shall be high-reliability non-Class 1E power that is backed by battery power to eliminate momentary interruptions.

The licensee is responsible for the correction of any failure that results in degraded plant data being delivered to the NDL communications link at the specified intervals.

7. ACQUISITION AND CONTROL OF TECHNICAL DATA

7.1 Sources of Technical Data

Parameters specified in Reg. Guide 1.97, Rev. 2, and Reg. Guide 1.23 shall be provided to the data acquisition system (DAS). Isolation devices are needed for all signal interfaces with safety systems to prevent interference, degradation, or damage to any element of the safety system as specified in General Design Criterion 24, "Separation of Protection and Control Systems," and IEEE Standard 279-1971, Section 4.7, "Control and Protection System Interaction." The signals may be provided at a control room interface or input connection to the process control computer. These inputs shall not be processed by a software-programmable device, or any device controlled indirectly by software, before entering the DAS except for data received in accordance with Reg. Guide 1.23.

7.2 Acquisition of Data

Examples of data acquisition and distribution systems are shown in Figures 2 and 3 of this document. The configuration in Figure 3 is the anticipated data acquisition system that will be implemented. If the conditions of Section 2.8 are met, the configuration shown in Figure 2 could be acceptable. All inputs that interface with safety system signals must be isolated by an isolation device prior to connection to the DAS.

7.3 DAS Functional Limitations

The DAS must not be subject to external demands for processing or services that could degrade the needed reliability under accident conditions and must not be interrupted, delayed or in any way impeded or degraded in its function by any such external demands or software installation or changes in any plant equipment. The only exception is the system's internal calibration and self-diagnostic routines. Output data from the DAS must be consistent with readings observed by the operators in the control room. To achieve this objective, verification and validation tests shall be performed to assure correlation of data obtained from each source.

7.4 DAS Design, Verification, and Configuration Control

Because the data acquisition system may be the basic source of data for all of the emergency facilities, its hardware and software configurations and changes shall be verified for reliability. Tests to demonstrate and evaluate the integrity of software and the integrated system are needed. These tests should be performed with the system operating continuously on live input signals in addition to satisfactory performance of static and dynamic test cases.

ENCLOSURE 2