Draft
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FUNCTIONAL REQUIREMENT
FOR SAFETY PARAMETER DISPLAY
TECHNICAL SUPPORT CENTER
EMERGENCY OFFSITE FACILITY
NUCLEAR DATA LINK

FUNCTIONAL CRITERIA FOR EMERGENCY FACILITIES

I. INTRODUCTION

This draft document describes a set of NRC functional requirements for nuclear power plant emergency facilities including the Safety Parameter Display System (SPDS), onsite Technical Support Center (TSC), near-site Emergency Operations Facility (EOF), and the Nuclear Data Link (NDL).

The accident at three Mile Island Unit 2 led to studies performed within and outside of the NRC which identified the need for extensive improvements in emergency preparedness at nuclear power plants. In particular, improvements were called for in the following areas:

1. management and coordination of all support personnel and organizations having a response role,
2. display and transmission of information needed to assess the accident and manage the licensee's response,
3. continuous assessment of actual and potential radiological consequences,
4. provisions (thru state and local agencies) for early warning and frequent clear instructions to the local affected population, and
5. provision of continuing accurate information to the general public.

The emergency response facilities, comprised of the SPDS, the TSC, the EOF, and the NDL, will operate as an integrated system to enhance plant emergency response capabilities. These facilities are designed to provide a graduated response to emergencies corresponding to the severity of the emergency. The levels of emergency response defined by NUREG 0610 (NUREG 0654, Appendix 1) are:

1. Notification of Unusual Event
2. Alert
3. Site Area Emergency
4. General Emergency

The required timing of emergency facility activation and staffing, the level of staffing, and the types of emergency response facilities utilized will be determined by the Emergency Action Level (EAL).

During normal plant operation and events in the Notification of Unusual Event class, which have a low potential for increasing risk to the public safety, the plant is managed and operated from the control room. The control room will have responsibility for all plant manipulations during all emergency classes.

The SPDS provides a display of the plant safety status in the control room and TSC to aid operating personnel make quick assessments of plant safety conditions. The SPDS operates during normal operation and during all emergency conditions.

The TSC is a facility near the control room to provide technical assistance to control room personnel during emergency conditions. The TSC activation is optional for Notification of Unusual Events and is required for Alert, Site Area Emergency, and General Emergency conditions. TSC staffing may vary according to the EAL. Plant operations management will shift from the control room to the TSC upon activation for Alert or higher EAL. The TSC will provide plant operations data for use by TSC personnel to make detailed evaluations of plant conditions and some radiological and meteorological data for evaluation of near-site risk potential. During the early stages of emergency conditions, the TSC will perform the functions of the EOF until those functions are staffed in the EOF.

The EOF is a facility near the plant to provide overall emergency response management and coordination of radiological assessments. EOF activation is required for Alert, Site Area Emergency, and General Emergency levels of response and is optional for lesser conditions. The EOF data system will support evaluations of potential or actual radioactive releases from the plant and any environmental consequences.

The NDL is a data system for transmission of a limited set of plant variables from the plant to the NRC Operations Center. This data will be utilized by the NRC to carry out its role to protect the public health and safety.

While the SPDS, TSC, EOF, and NDL facilities are designed to function effectively as an integrated system, this is not meant to imply that all components and systems for these facilities are designed to the same quality and reliability standards. The systems designs must be adequate to ensure that the functional requirements of each facility are satisfied. The operation of any subsystem of the overall facility must not act to degrade or interfere with the performance of any other subsystem. The data utilized by the SPDS, TSC, EOF and NDL are all part of a common data set. This data may be processed in an integrated data acquisition, storage, and processing system provided the design performance of the integrated system meets the most stringent design performance requirements of any subsystem.

During emergency conditions, it is essential that there be a continuing high level of interaction and communications between the personnel in the control room, the TSC, and the EOF, and between the licensee and the NRC to ensure that all emergency actions are fully coordinated and consistent. To accomplish this, a reliable dedicated communications system is required. The NDL provides the major data link for these needs.

The importance of the foregoing facilities cannot be overemphasized. To ensure their availability, it shall be a reportable occurrence if either the TSC or the EOF is not operational for a period exceeding eight hours. The occurrence report shall state compensatory measures taken during the time the TSC or EOF is not operational. There shall be a Limiting Condition for Operations in the plant Technical Specifications specifying that the plant will be shut down if the TSC or EOF is not operational for a period exceeding one week.

In drafting these requirements, the Safety Data Integration Group has defined a functional baseline from which detailed performance specifications may be derived at a later date. It is recognized that it would be impossible to meet all the requirements in this document by January 1, 1981. A schedule for the complete implementation of these facilities will be provided separately.

II. SAFETY PARAMETER DISPLAY SYSTEM

Human Factors Engineering shall be incorporated in the various aspects of the design of the Safety Parameter Display System (SPDS) to enhance the functional effectiveness of operating crew.

The SPDS is a required operating aid that will display to the control room personnel those variables that define the safety status of important plant systems. The SPDS is solely a monitoring system, not intended to replace any existing control room displays. Its purpose is to consolidate information that describes plant safety status and displays this information in a useful display.

The SPDS shall be operable as are plant safety systems, during normal and abnormal operating conditions. The SPDS shall be capable of displaying pertinent system(s) information during steady state and transient conditions. Early indication of when process limits are being approached or exceeded must be presented. The SPDS shall be capable of presenting the magnitudes and the trends of the variables as necessary to quickly assess the current status of the important plant process.

The SPDS is considered a vital source of information and the functional requirements of the other systems (TSC, EOF, NDL, RG 1.47, RG 1.97) should state the required interfaces with SPDS. Any interface with SPDS should be through isolation means to prevent any malfunctions from affecting either system.

LOCATION

The SPDS shall be located in the control room. The operation area of the SPDS may be separate from the normal control board, but readily accessable and visible from the normal operating area. If the SPDS is part of the control board, it shall be displayed in an easily recognizable configuration.

SIZE

The SPDS shall be of such size as to be compatible with the existing space in the control area. It shall not interfere with normal movement and shall allow full visual access to other control room operational systems and displays.

STAFFING

The SPDS shall be of such design that no operating personnel in addition to the normal control room operating staff are required for its operation.

ENGINEERING CONSIDERATIONS

The selection of variables to be displayed shall be those demonstrated by analysis, and possibly simulation, to be responsive to transient and accident sequences.

The SPDS shall have a dedicated audio signal to alert control room personnel whenever any safety parameter is approaching an unsafe condition. The SPDS may consist of several display formats as appropraite to monitor the various operational systems important to safety. In a given operating mode, these may be sequentially displayed to keep the control room operating personnel informed of the overall plant status. An individual display may be retained. A display indicating overall status shall be routinely displayed.

The SPDS shall be designed to include periodic testing to diagnose and recognize SPDS component degradation and malfunction.

The SPDS need not be limited to the functions stated above. It may include other functions which will allow the operating personnel to perform diagnoses as a further aid in assessing plant status.

The SPDS shall be the subject of technical specifications regarding availability. The availability shall be such that plant operation not go on for more than 24 hours without it. The total system performance specification will indicate that the systems need not be Class 1E. In addition, the system need not comply with the single failure criteria.

The sensors shall be environmentally and seismically qualified whereas processing and display devices shall be of proven high quality and reliability to achieve an unavailability goal of 1×10^{-3} for the system.

The SPDS shall be capable of functioning during and after the Operating Base Earthquake (OBE) and this is consistent with the functional purpose of the system.

The detailed performance specifications for the SPDS, consisting of design, qualification and operational requirements will be published separately.

III. TECHNICAL SUPPORT CENTER

A. Technical Support Center Function

The onsite Technical Support Center (TSC) is a required emergency response facility located in close proximity to the control room that will provide plant management and technical support to plant operations personnel during emergency conditions and emergency recovery operations from a location outside the control room.

The TSC shall be activated during Alert, Site Area Emergency, and General Emergency levels of emergency action as specified in NUREG 0610 (NUREG 0654, Appendix 1).

The TSC shall have facilities for senior plant management and for technical personnel representing the licensee and the NRC. TSC personnel will provide guidance to the control room operating personnel in the management of abnormal conditions and in accident mitigation. During recovery operations the TSC shall provide plant systems support for the management personnel who will be located in the near-site Emergency Operations Facility (EOF). The TSC will function as the primary information source to the EOF and to the NRC for plant operations. The TSC also shall provide the functions of the EOF until the EOF is staffed to provide those functions.

Comprehensive data to monitor reactor systems status and evaluate plant systems abnormalities shall be provided in the TSC. These monitoring and evaluation functions will require signal detection capability, data display capabilities to provide current value, time rate of change, time history displays, and information storage and recall capability. Sufficient data to determine the plant dynamic behavior prior to and throughout the course of an accident shall be available for analysis in the TSC. TSC personnel shall have ready access to up-to-date plant records and procedures to support technical analysis and evaluation of plant conditions during the emergency and recovery operations.

The TSC facilities may be used by designated TSC personnel for normal daily operations as well as for training and emergency drills provided that these activities do not interfere with the immediate activation of the TSC or the continuing TSC operations in the event of an accident. TSC facility use during normal operation shall be limited to activities that will enhance preparedness for the TSC to react to accident situations and that will ensure a higher TSC systems reliability than if the facility was to stand idle.

It shall be a reportable occurrence if the TSC is not operational for a period exceeding eight hours. The occurrence report shall state compensatory measures taken during the time the TSC is not operational. There shall be a Limiting Condition for Operations in the plant Technical Specifications specifying that the plant will be shut down if the TSC is not operational for a period exceeding one week.

B. Technical Support Center Location

The requirement for an onsite TSC was established to provide onsite facilities near the control room for detailed analysis of plant conditions and to alleviate the problem of control room overcrowding during an accident. The TSC shall be the emergency operations work area for designated senior plant management personnel, designated licensee engineering and technical personnel, a small staff of NRC personnel, and any other licensee designated personnel needed to provide the required technical support.

The TSC shall be located in close proximity to the control room to readily allow face-to-face interaction between control room personnel and the senior plant management working in the TSC. This proximity is also necessary to provide ready access to information in the control room that is not available in the TSC.

The TSC shall be located within approximately 50 yards actual travel distance from the control room and preferably will be in the same building. Provisions shall be made for the safe and timely movement of personnel between the TSC and the control room under all emergency conditions.

C. Technical Support Center Staffing

The TSC shall be staffed to perform its senior plant management function and to provide technical support to the control room operating staff during accidents. The TSC staff assignments shall be part of the licensee's emergency plan. The number and type of personnel assigned to the TSC and their time of arrival in the TSC may be specified to vary according to the class of emergency action level. A senior member of plant management shall coordinate activities in the TSC and interface with the control room and the EOF.

In order for the TSC to function effectively, the TSC staff must be aware of their responsibilities during an accident. To maintain proficiency, the TSC staff shall participate in TSC activation drills which shall be conducted periodically in accordance with the licensee's emergency plan.

(Requirements on staffing available on shift, timing of staffing augmentation and staff qualifications are under development.)

D. Technical Support Center Size

One of the problems that the TSC is expected to alleviate is overcrowding in the control room during an accident. Upon TSC activation, designated personnel are to report promptly to the TSC, leaving only essential operating personnel in the control room. The size of the TSC shall be sufficiently large to provide working space and facilities for the personnel assigned to the TSC at the maximum level of occupancy without crowding. The size of the TSC must provide for easy access to data displays, to plant records and historical data, and to communications equipment for all TSC personnel. A separate space in the TSC shall be provided for private NRC independent evaluations of plant conditions.

A predetermined number of licensee personnel with expertise in plant design and operation will be assigned to report to the TSC in accordance with the licencee's emergency plan. In some cases consultants designated by the licensee may be used to augment utility resources in the TSC. From the above considerations, the TSC shall be sized for at least 25 persons, including five NRC personnel. A typical size for a TSC is _____ square feet.

E. Technical Support Center Structure

The TSC facility must be able to withstand the most adverse conditions reasonably expected during an accident. While the TSC need not meet Seismic Category I criteria, the TSC shall be a substantial Non-Seismic Category I structure and shall be designed to prevent collapse under maximum wind and flood conditions.

F. Technical Support Center Habitability

Since the TSC is to provide direct management and technical support to the control room during an accident it shall have the same radiological habitability as the control room under accident conditions. The TSC need not meet Seismic Category I standards nor be qualified as an Engineered Safety Feature. TSC personnel shall be protected from radiological hazards, including direct radiation and airborne contaminants under accident operating conditions to the same degree as control room personnel. Applicable Criteria are specified in General Design Criterion 19 and Standard Review Plan 6.4. The TSC shall provide habitable facilities capable of continuous (24-hour) operations for a protracted period, considering the possibility that access may be restricted by radiological conditions outside the facility.

The TSC ventilation system shall function in a manner comparable to the control room ventilation system. Some exceptions to control room ventilation system requirements which are associated with low probability events are acceptable. A permanent TSC ventilation system which includes particulate and charcoal filters is required, as a minimum. However, the TSC ventilation system need not be Seismic Category I qualified, redundant, instrumented in the control room, or automatically activated to fulfill its role.

To ensure adequate radiological protection of TSC personnel, permanent radiation monitoring systems shall be installed in the TSC. These systems shall continuously indicate radiation dose rates and airborne radioactivity concentrations inside the TSC and shall include local alarms with trip levels set to provide early warning to TSC personnel of adverse conditions that may affect the habitability of the TSC.

Provision for adequate habitable alternate TSC facilities shall be provided should the TSC become uninhabitable.

G. Technical Support Center Communications

Reliable separate dedicated voice communications links shall be provided between the TSC and the control room, the EOF, and the NRC to provide 1) plant management communications, 2) to function as the primary information source on plant operations, and 3) to facilitate immediate exchange of information on plant status, recommended courses of action, actions taken, and the results of action taken. Priority access to dedicated backup communications links between these locations shall be provided to ensure reliable communications during an accident and during recovery operations. The TSC shall provide telephones by which NRC personnel in the TSC and EOF can communicate with each other and with outside locations.

H. Technical Support Center Instrumentation and Power Supplies

TSC instrumentation shall be qualitatively comparable in accuracy and reliability to corresponding equipment in the control room to provide data for technical analysis of the conditions of plant systems. The TSC instrumentation shall be able to display data needed to analyze plant conditions independently from actions in the control room without degrading or interfering with control room and plant functions. The TSC instrumentation need not meet safety grade Class 1E requirements.

Power supplies shall match the TSC instrumentation in quality and reliability. Once the TSC is activated, instrumentation power shall have a less than .001 unavailability. Circuit transients or power supply failures or fluctuations shall not cause a loss of any data vital to the TSC function. The TSC electrical equipment load shall not degrade the capability or reliability of any safety related power source.

I. Technical Support Center Technical Data and Data System

The data received and displayed in the TSC must be sufficient to enable the plant management, engineering, and technical personnel assigned there to aid the control room operators in handling emergency conditions. To provide this function, the displays shall include dedicated displays, trend information displays and callup displays of plant systems variables, in-plant radiological variables, and offsite radiological and meteorological information. This data set must be complete enough to permit assessment of the accident without interference with the control room emergency operation.
During the recovery operation the TSC data system will be the primary tool for reviewing the accident sequence, evaluating the extent of any damage, and determining the progress of repair operations. As a minimum, a complete data set of the variables defined as Type A, B, C, D, and E variables by Regulatory Guide 1.97 shall be available for analysis in the TSC throughout the course of the accident and during recovery operations.

The TSC data system shall record and provide access to accurate reliable data sufficient to determine the plant steady-state operating conditions prior to the accident, the transient conditions producing the initiating event, and the plant systems dynamic behavior throughout the course of the accident. The TSC data system shall meet or exceed the performance requirements specified by Regulatory Guide 1.97.

The TSC personnel are expected to be better able to evaluate plant status because the TSC data system will draw together information that is located in several different areas of the control room and will include historical data. The SPDS display shall be duplicated in the TSC to allow the TSC personnel to use this control room diagnostic tool. Data trending and time history display capability is required in the TSC to give TSC personnel a complete dynamic picture of the plant in its emergency state. Because of the importance of the

The EOF shall be the location where the licensee will provide current information on conditions potentially affecting the public to the NRC, State and local emergency response agencies. The State and local agencies shall provide official updates to the affected public.

The EOF also shall be a location for information dissemination to the public via the news media by designated licensee and NRC spokespersons in accordance with the licensee's emergency plan.

The EOF facility may be used by designated licensee personnel during normal daily operations as well as for training and emergency exercises provided that the daily use activities do not interfere with activation of the EOF or the continuing EOF operatins in the event of an accident. EOF use during normal operations shall be principally for activities that will enhance EOF personnel preparedness to react to accidents and that will ensure higher EOF systems reliability than if the facility was to stand idle.

It shall be a reportable occurrence if the EOF is not operational for a period exceeding eight hours. The occurrence report shall state compensatory measures taken during the time the EOF is not operational. There shall be a Limiting Condition for Operations in the plant Technical Specifications specifying that the plant will be shut down if the EOF is not operational for a period exceeding one week.

B. Emergency Operations Facility Location

The location of the EOF shall be balanced between close proximity to the plant to facilitate emergency response and recovery operations and sufficient distance from the plant to enhance habitability. The EOF must be located near the reactor site to provide management coordination of all emergency response resources that will be assembled near the reactor site. These resources may

include temporary and mobile facilities from the NRC and from other organizations providing emergency assistance The EOF must also be located near the reactor site where provisions shall be made for timely face-to-face communications between EOF management personnel and onsite personnel on an as - needed quick callup basis during accident mitigation and recovery operations. The EOF shall be located within approximately 1 mile of the reactor. If locations within this distance are not feasible and unobstructed access is assurred between the EOF and the plant, a distance as far as three miles may be acceptable.

C. Emergency Operations Facility Staffing

The EOF shall be staffed to provide overall management of the licensee's resources and continuous evaluation and coordination of licensee activities during and after an accident in accordance with the licensee's emergency plan. This will include staff to perform radiological impact assessments, to interface with offsite officials, and to manage offsite resources. The EOF staff assignments shall be part of the licensee's emergency plan. The number and type of personnel assigned to the EOF may be specified to vary according to the class of emergency action level. A senior member of the licensee's plant or corporate management shall coordinate all activities in the EOF and interface with the plant.

In order to function effectively, the EOF staff must be aware of their responsibilities during an accident. To maintain proficiency, the EOF staff shall participate in EOF activation drills which shall be conducted periodically in accordance with the licensee's emergency plan.

(Requirements on staffing available on shift, timing of staffing augmentation and staff qualifications are under development.)

D. Emergency Operations Facility Size

The size of the EOF shall be sufficiently large to provide working space and facilities for the personnel assigned to the EOF at the maximum level of occupancy without crowding. The size of the EOF shall be sufficient to provide room for all functional displays and provide for easy access to data displays, to plant records and historical data, and to communications equipment. The EOF shall be sized for at least 35 persons including ten NRC personnel.

The EOF shall have facilities to conduct press briefings. Adequate space must be provided to accommodate at least 20 press representatives at these briefings without interference with other EOF activities. One separate office to accommodate at least 3 NRC personnel shall be provided in the EOF. An EOF will typically be at least _____ square feet in size.

E. Emergency Operations Facility Structure

The EOF structure shall be a substantial structure that will provide significant shielding factors from direct radiation and moderate protection from airborne radioactivity. The EOF structure shall provide a shielding factor greater than five.

F. Emergency Operations Facility Habitability

Since the EOF is an emergency response facility, consideration must be given to habitability under accident conditions To protect the occupants during an accident, the EOF structure shall provide shielding against direct radiation from the plant, airborne activity, or ground contamination, and shall have the capability to isolate ventilation systems. Ventilation filtration systems having high efficiency particulate absorbtion (HEPA) filters shall be installed. Under extreme conditions, the EOF may become uninhabitable. For this case, an alternate EOF must be available at least 5 miles from the site. This alternate location may be a State or local operations center.

G. Emergency Operations Facility Communications

Adequate communications systems are necessary for the EOF to perform its accident management functions, coordinate offsite emergency response activities, disseminate information to responsible government agencies, coordinate the radiological monitoring teams, manage recovery operations and disseminate information to the public. As a minimum, priority access voice communication links shall be provided between the EOF and the TSC, the control room, the NRC, and state and local emergency response networks. Additional communication links are necessary for communications with the NRC, other Federal and state agencies, and designated emergency response personnel. The number of communication links required is site specific and shall be determined by the licensee's emergency response plan. Mobile communication links will be necessary for communication with field monitoring teams. Reliable primary and backup means of communication are required. Provisions for communications with State and local operations centers shall be provided in the control room and TSC to be used for initial notification and early recommendations to offsite authorities prior to staffing the EOF. The alternate EOF shall have basic communications to perform the primary EOFfunctions and shall have the capability of accomodating quick installation of a data transmission link to the plant. The EOF shall provide telephones by which NRC personnel in the TSC and EOF can communicate with each other and with outside locations. Arrangements shall be provided for onsite personnel to have face-to-face communications with EOF management personnel on short notice under all emergency operating conditions.

H. Emergency Operations Facility Instrumentation and Power Supplies

Instrumentation accuracy and reliability must be consistent with the data accuracy needed to assess environmental and radiological conditions, perform licensee resource management, and provide emergency response coordination in a timely manner. EOF instrumentation power supplies must be comparable in quality and reliability to the instrumentation they supply. There must not be

any loss of data vital to EOF functions from circuit transients or power supply failures or fluctuations. Once the EOF is activated, instrumentation and power supplies shall have a less than .001 unavailability. The EOF electrical equipment load shall not degrade the capability or reliability of any safety related power source.

I. Emergency Operations Facility Technical Data and Data System

Data received and displayed in the EOF must be sufficient to allow an accurate assessment of the actual and potential onsite and offsite environmental consequences of an accident. Data providing information on the general condition of the plant is also required in the EOF for utility resource management and recovery management. The EOF shall receive and have the capability to display the same plant data and radiological information that is transmitted to the NRC. Additional radiological, meteorological, seismic, and other environmental data shall be received, processed, and displayed as needed to assess environmental conditions, coordinate radiological monitoring activities, and coordinate implementation of offsite emergency plans. Provisions shall be made to transmit data between the EOF and the TSC. The SPDS display may be duplicated in the EOF to provide licensee management and NRC representatives a display of current reactor systems conditions and to facilitate communications between the control room, TSC and EOF personnel. Data trending and time history display capability shall be provided in the EOF for radiological and environmental data assessment. The EOF data system shall be protected from power supply failures and fluctuations to maintain reliable data acquisition, storage, and display capabilities. The EOF data system shall have a less than .001 unavailability.

Display capabilities must be provided to satisfy the varying needs of the different functional groups to be represented within the EOF, including utility corporate management, Federal, State and local officials, and radiological monitoring and environmental assessment personnel. If display capabilities for news media briefings are provided, they shall be separate from EOF functional displays.

Provisions shall be made to permit transfer of primary functions from the EOF to the alternate EOF without loss of data vital to the EOF functions or interruption of communications capabilities required to perform EOF functions if the EOF should become uninhabitable.

J. Emergency Operations Facility Records

The EOF shall have ready access to all up-to-date plant records, procedures, and emergency plans needed to exercise overall utility resources management and for recovery management. Additional up-to-date records related to licensee, State, and local emergency response plans, radiological records, onsite personnel control, offsite population distribution, and evacuation planning must be provided in the EOF. All records must be readily available in the EOF under emergency operating conditions.

V. NUCLEAR DATA LINK

General

In the event of an incident, the NRC must be prepared to make quick and critical decisions to protect the public health and safety. The most important of these decisions will be:

- Recommendations for protective measures, including evacuation where appropriate.
- Orders to licensees to take specific actions.
- In a situation where a licensee has demonstrated an inability to manage effectively the activities licensed by NRC, it may be appropriate for an NRC team to direct the licensee's employees in their operation of those licensed activities.
- Requests for assistance from other organizations.

These critical decisions must be supported by independent evaluations of the best information available. The NRC must be prepared to perform all essential evaluations despite the plans of other organizations. Maintaining the ability to perform these essential evaluations will assure the NRC's capability to assist when possible, direct when necessary, and inform the public factually on all activities.

Assist

NRC must be in a position to provide assistance, which may take many forms. The NRC will, for example, provide recommendations to FEMA or to the State or local agencies concerning protective measures, particularly evacuations. As was the case at TMI, if it is perceived that field measurements are inadequate, NRC personnel will again be called upon to conduct radiological and environmental surveys. Onsite NRC personnel may have to review and approve specific emergency operating procedures which the licensee would lack authority to implement without prior NRC approval under current rules and regulations. NRC personnel in Washington should have the opportunity to review and evaluate the implications of the incident and possible alternatives in terminating the incident with maximum protection of the health and safety of the public. Any assistance based on these scenarios or any others is meaningful only if the information used is timely, accurate, and responsive to the needs of the NRC.

Direct

Given the requirement to evaluate the actions of licensees, it follows that a regulatory agency must be prepared to provide direction to that licensee if it determines that proposed actions are not in the best interests of the public. For example, a licensee may find itself in a position where it no longer has sufficient resources to manage all the problems that result after an incident. The NRC should be in a position wherein it could step in to provide broad

management and technical expertise necessary to respond to such an incident or order a licensee to take appropriate actions. Such a posture requires that the NRC must be kept continually informed of plant status.

It is not intended that the NRC would exercise a direct command function of the plant under accident conditions from the remote Operations Center. The basis for this conclusion is simply the impracticality of reproducing in the Operations Center on a real-time basis, all plant control room data that would be required for effective command under accident conditions. Thus, principal responsibility for command resides with each utility. However, it is recognized that under certain unusual conditions, it may be appropriate for an NRC team to direct a licensee's employees in the operation of licensed activities. In this regard, the principal NRC command should be established at the particular plant where full information and capability would be available to perform such a function. Activities at the Operations Center would continue to support the activities being performed at the site.

Inform

NRC is responsible for informing officials and the general public about all aspects of the incident and response activities. The NRC is also responsible for the flow of essential information among the licensee, NRC, and State and Federal agencies.

Regardless of the specific legal responsibilities of licensees and the jurisdiction of State and local agencies, it is generally perceived that NRC has a specific responsibility to provide accurate assessments since it is the principle regulatory agency. Information loops need to be maintained at a very high level of timeliness, accuracy, and sufficiency throughout the course of an incident. Exchange of information among all Federal agencies may have to be coordinated by NRC in the event that the extensive plans of FEMA do not materialize.

NUCLEAR DATA LINK
DESCRIPTION AND FUNCTION

In the event of an emergency involving a licensed nuclear power reactor, the NRC must independently assess the seriousness of the event and its potential consequences to the health and safety of the public. Actions by state and federal governments to support the licensee in limiting the consequences of such an emergency will, in part, be based on this assessment. To perform this function, NRC must have prompt, accurate information on the status of the reactor, on the quantities of radioactivity released, and on site weather conditions.

The Nuclear Data Link (NDL) System will condition, process and transmit certain reactor process[1] radiological data and some site meteorological data from each operating nuclear power plant to NRC's Operations Center located in Bethesda, Maryland. The NDL System will consist of a plant subsystem, a transmission subsystem, and an Operations Center subsystem. Staff effort is being given to evaluating alternative methods of designing and operating these subsystems. Cost and functional considerations will influence the final NDL specifications and the manner in which each licensed facility will integrate his operation with the NDL. A functional block diagram is enclosed.

Plant Subsystem Requirements and Site Transmission Unit

Each licensee must provide a uniformly formatted data stream for the NDL meeting the following conditions:

a. The licensee shall provide essentially the same data as the variables listed in Appendix A of NUREG/CR-1451. (These requirements are intended to be a subset of instrumentation requirements listed in Regulatory Guide 1.97 plus some event monitoring parameters.)

b. The licensee shall provide the multiplexing, digitizing, unit conversion (using units as specified in Appendix A of NUREG/CR-1451), calibration and formatting. As the NDL - Operations Center must interface with all operating plants, individual facility data formats must be uniform and meet specifications as indicated in this document. Multiplexing, unit conversion, calibration and formatting of the NDL data shall be implemented using a separate and independent data acquisition system for all Regulatory Guide 1.97 variables and which is interfaced to properly condition and isolate transducer outputs. This data acquisition system can also provide data to the TSC, SMC and EOF systems.

c. The digitized data stream to the NRC terminal must meet the following conditions:

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1 Refer: NUREG/CR-1451 (SAND 80-1032)

1. Digitizing rate and resolution.

   Each NCL parameter specified shall be sampled at a one minute sampling rate with a minimum of 12 bit resolution. Each reading shall be time-tagged with an absolute time tag having a resolution of 1 second.

2. Format and transmission requirements to the NRC terminal.

   Data shall be transmitted to the NRC terminal in American Society for Communication Interchange (ASCII) code serial form meeting signal and level requirements of Electronic Industry Association (EIA) Standard RS-232-C. Data stream will meet the detailed header and text format requirements as specified by NRC specifications to be provided at a future date. The data stream must be continuous on one minute intervals.

3. Environmental requirements.

   The data acquisition system shall, in general, meet those environmental specifications required for the onsite Technical Support Center. Power supply for the acquisition system and formatting equipment shall be high reliability non-class IE power, battery backed to eliminate momentary interruptions.

d. The NRC terminal will interface with the data acquisition system as per c above. The NRC terminal shall be capable of supporting itself by battery back up for a minimum of two hours. The NRC terminal design will provide for monitoring the quality and tuning of data sent from the Data Acquisition system. Failure of the system to provide one minute record transfers will cause alarm operation notifications at the Operations Center per details to be outlined in the forthcoming specifications.

e. Supplementary Communications.

   The existing voice communication system between the various sites and the NRC Operations Center will be retained and be used to supplement and back up information exchanges between the site and the NRC Operations Center.

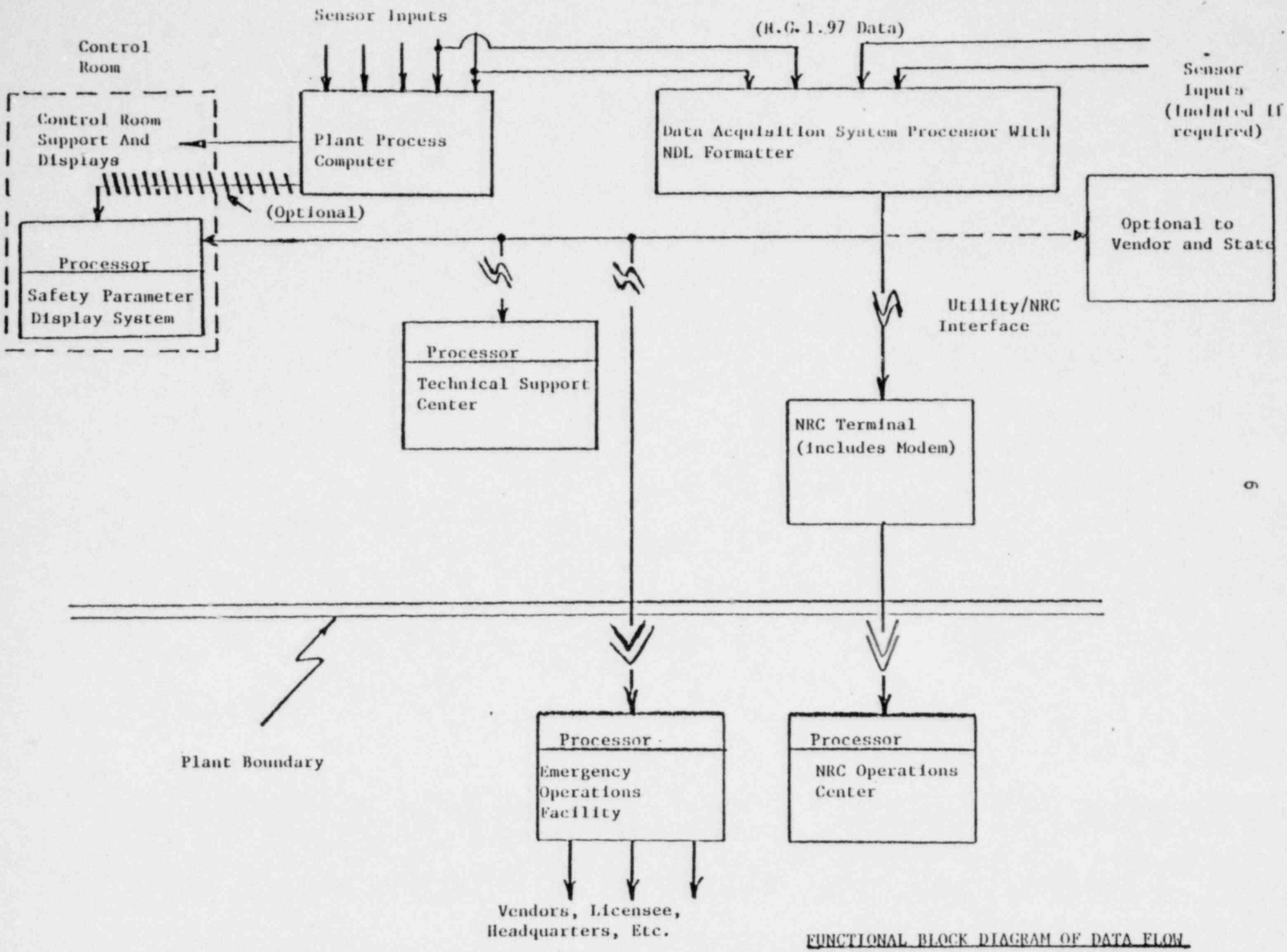
g. Detection of rapid data transients in neutron flux and containment pressure.

   There must be provisions for detection and observation of certain rapid data transients. Specific variables which will require the acquisition of peak and average data will be provided at a later date. Par. 4.2 and 4.5 of appendix A of NUREG/CR-1451 deals with the acquisition of the characteristics of rapid pulse data transients that may occur in neutron flux or containment pressure (containment, drywall or Torus). These rapid pulse data transients are impossible to detect at the one per minute sampling rates specified for the

NDL. As an alternative to increased digitizing complexity a recommended alternative is discussed in appendix E of NUREG/CR-1451. Under the alternative approach upon the occurrence of a significant rapid data transient, only the peak value and time-integral value of the pulse transient need be captured, digitized, and formatted for transmittal to the operation center.

h. Future expansion needs.

Basic design of the Data Acquisition system shall be capable of possible expansion of up to 140 data parameter items.



FUNCTIONAL BLOCK DIAGRAM OF DATA FLOW

TSC support function, the TSC data system must have high reliability and shall be designed to ensure that there is no loss of data vital to TSC functions due to power supply failure or fluctuations. The TSC data system shall have less than .001 unavailability. Actions in the control room shall not degrade of interfere with delivery of data to the TSC.

Data transmission links between the control room, the TSC, and the EOF shall be installed to provide data needed at those facilities to exercise their designated functions. Provisions for offsite transmission of information from the plant to the NRC and possibly to other locations must be included in the TSC and EOF. Provisions to transmit data to the NRC must be compatible with the Nuclear Data Link (NDL) input requirements as specified by the NRC. All data transmitted to the NRC via the NDL shall also be available for display in the TSC.

J. Technical Support Center Records

The Three Mile Island-2 accident uncovered a real need for a complete and up-to-date repository of plant records and procedures at the disposal of the technical analysts to aid the evaluation of emergency conditions. In particular, up-to-date as-built drawings of the plant systems are needed to diagnose sensor data, to evaluate parameter inconsistencies, and to identify and counteract faulty plant system elements. The TSC personnel shall have ready access to up-to-date records that include the current Plant Technical Specifications, Plant Operating Procedures, Emergency Operating Procedures, Final Safety Analysis Report, and current drawings, schematics and diagrams showing the as-is conditions of plant structures and systems down to the component level.

IV. EMERGENCY OPERATIONS FACILITY

A. Emergency Operations Facility Function

The near-site Emergency Operations Facility (EOF) is a required emergency response facility located near the reactor that will provide continuous coordination and evaluation of all licensee activities during an emergency having or potentially having environmental consequences. The EOF shall be activated during Alert, Site Area Emergency, and General Emergency levels of emergency action as specified in NUREG 0610 (NUREG 0654, Appendix 1).

Subsequent to the arrival of designated licensee management personnel at the EOF, as described in the licensee's emergency plan, overall management of licensee emergency response resources shall be based in the EOF separate from corporate management headquarters. The EOF also will function as the post-accident recovery management center for both onsite and offsite activities. To accomplish these functions, facilities shall be provided in the EOF for the collection and evaluation of all pertinent radiological, meteorological, and geophysical data.

The initial function of the EOF shall be to evaluate magnitude and effects of actual or potential radioactive releases from the plant and to recommend appropriate offsite protective measures. EOF personnel also shall coordinate onsite and offsite radiological monitoring during nuclear emergencies and recovery operations. These functions shall be performed by the control room or the TSC prior to activation of the EOF.

The EOF shall coordinate the licensee's emergency response activities with those of local, State, and Federal emergency response organizations, including the NRC and FEMA.

VI. REFERENCES

1. NUREG-0578 TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations, July 1979.
2. Discussion of Lessons Learned Short Term Requirements, letter to all operating plants from Harold G. Denton, October 30, 1979.
3. NUREG-0585 TMI-2 Lessons Learned Task Force Final Report, October 1979.
4. Regulatory Guide 1.97 (proposed Revision 2) Instrumentation for Light-Water-Cooled-Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, December 1979.
5. NUREG-0654 (FEMA-REP-1) Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, January 1980.
6. NRC Nuclear Data Link (NDL), letter to all operating nuclear plant from D. Eisenhut, March 12, 1980.
7. Clarification of NRC Requirements for Emergency Response facilities at Each Site, letter to licensees from D. Eisenhut, April 25, 1980.
8. NUREG-0660 NRC Action Plan Developed as a Result of the TMI-2 Accident, May 1980.