EVALUATION OF EMERGENCY RESPONSE FACILITIES FOR INDIAN POINT 3 NUCLEAR PLANT

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1. SUMMARY AND RECOMMENDATIONS

The Indian Point 3 ERF conceptual design package lacked the necessary information to evaluate the adequacy of the emrgency response facilities. Concerning the TSC, EOF, OSC and control room facilities, the following areas had little or no information:

A detailed locational diagram was not provided. The layout of the TSC was not available for review.

The radiation monitoring systems for the TSC were not specified.

More detailed information is needed concerning the staff of the TSC.

The licensee did not provide any information to evaluate how long it would take the TSC to become fully functional.

The design package did not address any specifics concerning communications.

There was insufficient detail provided on records availability and management in the TSC.

The design package provided no information on the control room.

The function of the OSC is not addressed.

Provisions for an alternate Health Physics control point are not addressed.

More specific information concerning the OSC communications is needed.

More detail needs to be provided on the EOF ventilation system.

The subject of protective clothing, respiratory equipment and potassium iodide was not addressed for the EOF.

No information was provided to determine how long it would take to activate the EOF.

The layouts of the EOF buildings provided no information on work stations and functions to be performed at the stations.

Insufficient detail was provided onthe subject of records availability and management for the EOF.

The ERF conceptual design report submitted for Indian Point Unit 3 indicates that the licensee plans to implement an ERF data acquisition and display system by sharing the plant process computer system. This system includes two 32-bit processors arranged in a redundant configuration, and

will drive the plant parameter displays in the control room, the TSC, and the EOF. Another computer system (MIDAS) will handle meteorological and dose calculation functions in the EOF for both Indian Point Units 2 and 3; this facility also includes a minicomputer which provides access to ARAC. A separate microprocessor-based display system will perform display operations for the seismically-qualified SPDS.

Fiberoptic modems and data channels will be used to connect plant parameter signals to the DAS/process computer system. The licensee states that the system has the ability to supply all required information to the Nuclear Data Link.

Statements and examples in the licesnee's report indicate that the number, type and format of alphanumeric and graphical display devices and hardcopy units in the ERF's are probably adequate.

The licensee has not provided enough information to enable a complete evaluation to be performed. In particular, more information is required on the following subjects:

The licensee intends to use the fiberoptic modems which transmit data to the DAS/process computer system to provide "isolation in accordance with GDC 24." Complete and detailed technical descriptions of these fiberoptic modems are required in order to determine if proper isolation is indeed being provided.

The statement is made that "extensive testing will be performed on the entire system to assure that the plant process computer programs do not degrade the integrity of data supplied to the TSC..." A complete description of the software running on the DAS/process computer system, as well as a description of the proposed test procedures is required to evaluate this claim.

The location of the connections of plant parameter data to the fiberoptic modem channels, as well as sampling rates, resolutions, and data transmission rates should be specified.

The subjects of computer system documantation, training, quality assurance, reliability and maintenance are not addressed.

COMMENT

2. TECHNICAL SUPPORT CENTER

2.1 Integration with Overall Planning

1. The design of the Technical Support Center (TSC) addresses the following goals:	
a. Provides plant management and technical support to plant operations personnel during emergency conditions;	Adequate response.
b. Relieves the reactor operators of peripheral duties and communications not directly related to reactor system manipulations;	Implied
c. Prevents congestion in the control room; and	Implied
d. Performs EOF functions for the Alert Emergency class and for the Site Area Emergency class and General Emergency class until the EOF is functional.	Subject not addressed.
2. The TSC shall be the emergency operations work area for designated technical, engineering, and senior licensee plant management personnel; any other licensee-designated personnel required to provide the needed technical support; and a small staff of NRC personnel.	Adequate response.
3. The TSC shall have facilities to support the plant management and technical personnel who will be assigned there during an emergency and will be the primary onsite communications center for the plant during the emergency. TSC personnel shall use the TSC data system to analyze the plant steady-state and dynamic behavior prior to and throughout the course of an accident. The results of this analysis will be used to provide guidance to the control room operating personnel in the management of abnormal conditions and in accident mitigation. TSC personnel will also use the environmental and	Insufficient information. Tasks listed are not specifically addressed.

	COMMENT
radiological information available from the TSC data system to perform the necessary functions of the EOF when this facility is not operable.	
4. Since the specific allocation of functions assigned to emergency facilities will differ from design to design, the proposal should clearly state which functions (Operations, Radiological Assessment, etc.) are assigned to the TSC.	Adequate response.
2.2 Location	
1. The TSC should:	
a. Be in the same building as the control room if possible; if not, then where is it located?	TSC is located in the western half of IP3. Administration Bldg. within 200 ft. of the Control Room.
b. Be within 2 minutes walking distance from the control room.	Claimed to be within 2 min walk.
Is the TSC within the security perimeter?	Yes
Must someone pass through security checkpoints to move from the TSC to the control room?	Yes: Access to control stations for TSC and Control Room.
What provisions have been made for passing through security checkpoints quickly and easily?	Not specified.
What stairways, corridors or equipment spaces must be traversed?	Subject not addressed.
Is the route between the TSC and control room exposed to air-scattered or direct radiation from the containment?	Subject not addressed.
What is the maximum exposure a person will receive while walking from the control room to the TSC during a design basis accident (less than or equal to 5 rem, including all other exposures, during the course of an accident)?	Subject not addressed.

	COMMENT
Does the route between the control room and the TSC have a radiological monitor or are there provisions for determining exposure rates periodically?	Subject not addressed.
c. Facilitate face to face interaction with control room personnel.	Subject not addressed.
Are there additional means (e.g., closed circuit TV) between the TSC and the control room to facilitate visual as well as auditory communication?	
What are the factors that impede face-to-face interaction?	
d. Afford access to any control room information not available in TSC data system.	Subject not addressed.
How can data not available in the TSC data system be provided to the TSC?	

2.3 Size

1. The TSC shall provide:

a. Working space, without crowding, for the personnel assigned to the TSC at the maximum level of occupancy (minimum size of working space provided shall be approximately 75 sq ft/person).	Adequate response. Approximately 75 sq. ft. per working space will be supplied for each individual within the TSC.
How much space is assigned to each work station?	Subject not addressed.
Is an operational sequence diagram provided that describes the interaction among operators, work stations and items of equipment?	Subject not addressed.

	COMMENT
Is a locational diagram provided that shows where personnel work stations and items of equipment will be placed? Is the scale of the diagram provided?	Figure 1, which was not inc luded in the design package showed general arrangement plans for the TSC.
Is each work station equipped for its function?	Subject not addressed.
Are personnel grouped by function? Does each work station have sufficient space to carry out its assigned function?	Subject not addressed.
Explain how the location of facilities and equipment is consistent with the patterns of interpersonal interaction and machine utilizations that will take place.	Subject not addressed.
Who needs access to which machines?	Subject not addressed.
What is the flow of information between persons and groups?	Subject not addressed.
Are personnel performing related tasks located adjacent to one another?	Subject not addressed.
Describe the organization of the work stations. Are they organized according to Figure 2.1?	Subject not addressed.
Describe how the workspaces are designed to control traffic and noise (mechanical and conversational).	Subject not addressed.
b. Space for TSC data system equipment needed to transmit data to other locations.	The TSC contains 1000 sq. ft for data system equip., with another 720 sq. ft. for access to displays.
Where is the data displayed?	
Show how layouts of displays are coordinated with working space layouts.	

	COMMENT
How much space is available for working with maps, diagrams, drawings, etc?	
Where are the maps, diagrams, drawings, etc. located?	
Is there a description of the characteristics of the machines in the TSC that provides a basis for determining their compatibility with anthropometric guidelines (e.g. Van Cott & Kinkade, Human Engineering Guide to Equipment Design)?	
Are the characteristics of the data display devices compatible with anthropometric guidelines?	
c. Sufficient space to repair, maintain, and service equipment, displays, and instrumentation.	Adequate response.
How much space is provided to allow access to backpanels for repair?	Subject not addressed.
What spare modules are available?	Subject not addressed.
d. Space for unhindered access to communications equipment by all TSC personnel who need communications capabilities to perform their functions.	380 sq. ft. available for communication equipment.
Is there a description of the layout of the telephones in the TSC?	Subject not addressed.
How much space is provided for each telephone? (one sq. ft. minimum)	
How can a ringing telephone be easily identified (i.e., do telephones light up when ringing)?	

	COMMENT
e. Space for storage of and/or access to plant records and historical data. How much work space is dedicated to this task?	Adequate response. 215 sq. ft. for document storage.
f. A separate room, adequate for at least three persons, to be used for private NRC consultations. Are three of the five NRC work stations afforded sufficient privacy for meetings and telephone conversations? Does this room have a speaker telephone? What size is this room? (200 sq. ft. minimum)	Insufficient information. 202 sq. ft. are available for private NRC consultations.
2. The TSC working space shall be sized for a minimum of 25 persons, including 20 persons designated by the licensee and five NRC personnel.	Adequate response. The TSC has 1811 sq. ft. of dedicated office space which is slightly less than the requirements.
How many people are assigned to the TSC by the emergency plan, including five NRC personnel?	The anticipated staff in the TSC is less than 20.
Is the work space adequate for these people to perform their functions?	Yes
2.4 Structure	
1. The TSC complex must be able to withstand reasonably expected adverse conditions.	Adequate response.
Can the TSC be operable during a 100-year flood?	The TSC structure is located above 15 ft. which is the highest postulated water level.
Can the TSC withstand a 100-year windstorm?	Appears to be adequate.
Is the TSC accessible during floods and storms?	Subject not addressed.

	COMMENT
2.5 Habitability	
1. The TSC shall have the same radiological habitability as the control room.	The TSC is not stated as having the same habitability as the control room.
Which accidents were analyzed to determine what radiation doses would be received in the TSC during the most severe accidents?	The integrated 30 day dose due to the internal TSC environment after a postulated LOCA, as determined by the radiation monitoring system is:
What are the whole body radiation doses during plume passage (less than or equal to 5 rem)?	Whole body gamma ray = 0.5rem Thyroid = 13.0rem Skin beta dose = 8.7 rem
2. The TSC ventilation system shall be functionally comparable to the control room system (i.e., high efficiency particulate air and charcoal filter). Automatic isolation is not required.	Not addressed as being comparable as the Control Room The filteration system has a combined efficency of 99.75%. Charcoal and HEPA filters used.
Briefly describe the HVAC system filtration system.	Adequate response.
Is the decontamination capability (D.F.) of the TSC system different from the control room system? Briefly describe the difference.	Not specifically addressed.
Is the HVAC system controlled to isolate the intake?	Yes
At what airborne activity level does isolation occur?	After a postulated LOCA as determined by monitors.
How is the level determined?	Instruments not specified.
Where are the sensors located?	Several feet from the air intake duct in the HVAC room. Location of local area radiation monitors given.

	COMMENT
3. Radiation monitoring systems shall be either permanently installed or shall be dedicated portable-type instruments (e.g., dose rate and airborne radiation detectors). Detectors shall be able to detect radioiodine as low as 1E-7 microcuries/cc. The licensee shall provide the TSC with installed radiation monitors or dedicated portable monitoring equipment.	Permanent radiation monitoring systems are installed and portable monitoring equipment dedicated to the TSC will be used.
Are dedicated dose-rate instruments, survey meters, and airborne radioactivity monitoring instruments assigned to the TSC?	Yes
Which instruments will be used?	Not specified.
How many of each?	Not specified.
Where are they located?	Not specified.
How was the type, number and placement of monitoring instruments determined?	Not specified.
What are the ranges of these instruments?	Not specified.
Do the instrument ranges cover the values expected if the TSC's HVAC decontamination capability fails during a DBA?	Yes
Who is assigned to monitor the TSC habitability?	Not specified.
What are the qualifications of this person?	Subject not addressed.
If there is no one assigned, are there fixed instruments equipped with audible and visual alarms?	Yes

	COMMENT
At what radiation levels will these instruments alarm?	Not specified.
Does the system provide a warning of the precautionary radiation levels in a timely manner to allow the TSC personnel to take protective actions?	Subject not addressed.
Are unattended instruments in continuous operation?	Subject not addressed.
How is iodine monitored?	Subject not addressed.
Is the detectibility for airborne I-131 as low as 1E-7 microcuries/cc?	Subject not addressed.
What is the reliability of the continuously-operating instruments, i.e., is there back-up power for the instruments? Do the instruments meet the manufacturers specifications for availability and accuracy? How often are the instruments calibrated?	Subject not addressed.
4. Supplies of protective clothing, respiratory equipment and potassium iodide shall be readily available to all TSC personnel.	Adequate response.
If this is not the case, how many individuals can be supplied?	
Are reserves of this equipment available in the TSC or some other nearby location?	Subject not addressed.
Where?	
Are instructions for use of KI available?	Subject not addressed.
How is the need for such supplies determined, i.e., when will personnel don respiratory equipment?	Subject not addressed.
Is the protection factor for respritory equipment equivalent to a full face mask?	Subject not addressed.

	COMMENT
2.6 Staffing (NUREG-0696 and PNL TSC/EOF Staffing Study)	
1. The TSC shall:	
a. Be fully functional within 30 minutes of activation.	Subject not addressed.
How long does it take TSC equipment to become fully functional?	
b. Consist of sufficient technical personnel needed to support the control room including individuals who can handle situations involving operations, maintenance, administration, security, Rad/chem, and communications (Figure 2.1 is an example only).	Insufficient information. The entire TSC staff is not given, however the design package states that less than 20 licensee personnel will be located in the TSC.
Has the licensee identified the tasks that may need to be performed and specified the characteristics (e.g. skills, experience and training) of the persons needed to accomplish these tasks?	Yes, the licensee has identified specific functions of the TSC.
2. Allocation of tasks to personnel should be validated by an analysis of error likely situations, especially those situations that might exceed the human operator's capability in the areas of perception, memory, information integration and manipulation of controls.	Subject not addressed.
What is the total number of personnel assigned to the TSC?	Less than 20 licensee personnel
Are there adequate numbers of personnel assigned to the TSC to carry out its function?	Insufficient information.

TSC ORGANIZATION

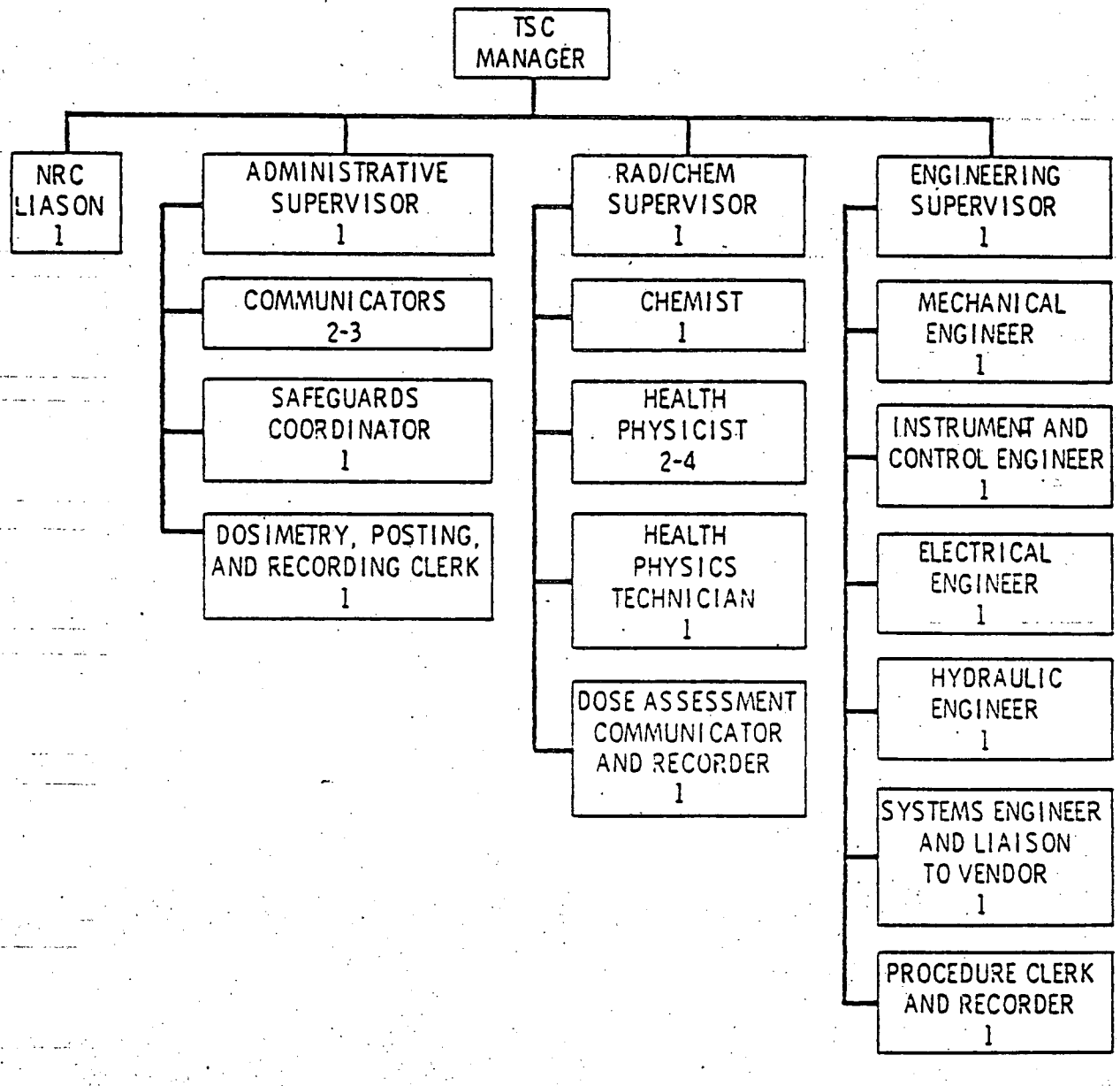


FIGURE 2.1

COMMENT

2.7 Communications

1. If existing licensee communications systems are to be used to meet TSC emergency requirements the licensee must demonstrate the system's ability to handle added TSC requirements under emergency conditions.

2. TSC telephone access to commercial common-carrier services must bypass any onsite or local offsite switching facilities that may be susceptable to loss of power during emergencies.

3. How many switchboard independent commercial telephone lines to the plant are available for use by the TSC during emergencies?

4. TSC voice communications must consist of a reliable primary and backup system and include:

   a. Hotline telephone in the NRC consultation room on the ENS to the NRC Operations Center.

      What is the backup system for communications to the NRC?

   b. Dedicated telephone in NRC office space on the NRC Health Physics Network.

      What is the backup system for communications to the NRC?

   c. Dedicated telephones to the control room, OSC, and EOF.

      Do these telephones provide non-interruptable service between the TSC, EOF or control room?

   d. Dial telephones that provide access to onsite and offsite locations.

The Licensee's document states that equipment specified in Section 2.7 of NUREG-0696 will be provided in the TSC. However, insufficient information is provided in the document in order to evaluate whether the criteria appearing under this section actually will be satisfied.

COMMENT

e. Intercommunications systems between any separate work areas within the TSC.

   Is there an intercom to connect the TSC manager and supervisors?

f. Communications to licensee mobile monitoring teams.

g. Communications to State and local operations centers.

h. Radio communications with onsite and offsite organizations and response groups.

5. At least two additional dial telephone lines must be provided for use by NRC personnel.

6. Facsimile transmission capability between the TSC, EOF and NRC Operations Center must also be provided.

7. Provision must be made for 24-hour per day notification to and activation of the State/local emergency response network, with 24-hour per day manning of communication links that initiate emergency response actions (NUREG-0654).

8. A coordinated communication link for fixed and mobile medical support facilities shall be provided (NUREG-0654).

9. Are there descriptions of how the following communications needs are met?

   TSC Manager with

   Corporate HQ
   Control Room
   EOF
   OSC
   NRC
   State/local governments
   Vendors

Administrative Supervisor with

- Corporate HQ
- Backup communications
- Security force
- EOF

Rad/Chem Supervisor with

- Radio to HP technicians
- HP control point
- OSC
- Chemical laboratory
- EOF
- State/local governments
- HPN

Engineering Supervisor with

- Corporate HQ
- Control Room
- OSC
- EOF
- Vendors
- NRC
- Radio to corrective action teams

2.8 Instrumentation, Data System Equipment, and Power Supplies

These methodologies are addressed in Sections 6, 7, 8 and 9.

2.9 Technical Data and Data System

These methodologies are addressed in sections 6, 7, 8 and 9.

COMMENT

2.10 Records Availability and Management

1. The TSC personnel shall have ready access to up-to-date records, operational specifications, and procedures that include but are not limited to:

   a. Plant meteorological data,

   b. SPD systems,

   c. Plant technical specifications,

   d. Plant operating procedures,

   e. Emergency operating procedures,

   f. Final Safety Analysis Report,

   g. Plant operating records,

   h. Plant operations reactor safety committee records and reports,

   i. Records needed to perform the functions of the EOF when it is not operational, and

   j. Up-to-date, as-built drawings, schematics, and diagrams showing conditions of plant structures and systems down to the component level, as well as in-plant locations of these systems.

   k. Checklists, guides, worksheets and other job performance aids.

The Licensee's document states that the records identified in Section 2.10 of NUREG-0696 will be supplied in the TSC. However, insufficient information is presented to determine whether the TSC will actually satisfy the criteria listed under this section.

2. The licensee shall have all of the above records in the TSC in current form when the facility is fully activated.

What procedures have been established to update these records as necessary to ensure that they are current and complete?

Describe the method of storage and presentation of the TSC records which ensures their availability and ease of access under emergency conditions.

Document control procedures will be modified to assure that updated copies of all the above records and procedures are stored in the TSC.

COMMENT

3.0 CONTROL ROOM

Subject not addressed.

3.1 Integration with Overall Planning

1. The design of the control room (CR) addresses the following goals during normal operation:

   a. The control room is the onsite location from which the nuclear power plant is operated. It contains the instrumentation, controls, and displays for:

      nuclear systems,
      reactor coolant systems,
      steam systems,
      electrical systems,
      safety systems, and
      accident monitoring systems.

   b. The control room is staffed during normal operations by a minimum of:

      a shift supervisor who is a senior licensed reactor operator and whose duty station may be in the immediate vicinity outside of the control room itself;

      a shift foreman who is a senior licensed reactor operator and whose duty station is in the control room;

      control room operators, two licensed reactor operators, whose duty stations are in the control room;

      auxiliary operators, two reactor operators, whose duty assignments are set by the shift supervisor.

COMMENT

2. The design of the control room addresses the following goals during emergency condition operations:

   a. At the start of an emergency situation, the control room staff performs the following functions:

      monitor plant parameters,
      analyze abnormal conditions,
      take corrective actions,
      classify emergency,
      make initial notification to shift supervisor, shift foreman, and shift technical advisor,
      establish initial trends in plant parameters,
      establish necessary control room staff changes,
      establish communications with plant emergency response teams,
      establish communications with Emergency Response Facilities, and
      manage plant operations.

3.2 Staffing

1. The personnel organization in the control room is shown in Figure 3-1.

2. The succession of authority if the senior person is incapacitated or unavailable must be addressed.

3. The functional organization in the control room during an abnormal event is shown in Figure 3-2.

COMMENT

3.3 Communications

1. The following onsite and offsite communication links for continuous information exchange must be available.

   commercial telephone
   dedicated telephone
   radio
   plant intercom

   Are these communication systems described?

2. The shift supervisor, shift foreman, and technical advisor or their designates must be immediately notified of an abnormal condition. Indicate expected average and maximum notification times.

3. After the TSC is operational, the control room staff must verify that TSC communication links with emergency teams are established and functional.

4. Verification must be made that information going to ERF's is correct.

3.4 ERF Phase

After the TSC is operational, does the Control Room staff relinquish the following functions:

managing plant operations, and

peripheral duties and communications not directly related to reactor system manipulations.

CONTROL ROOM ORGANIZATION

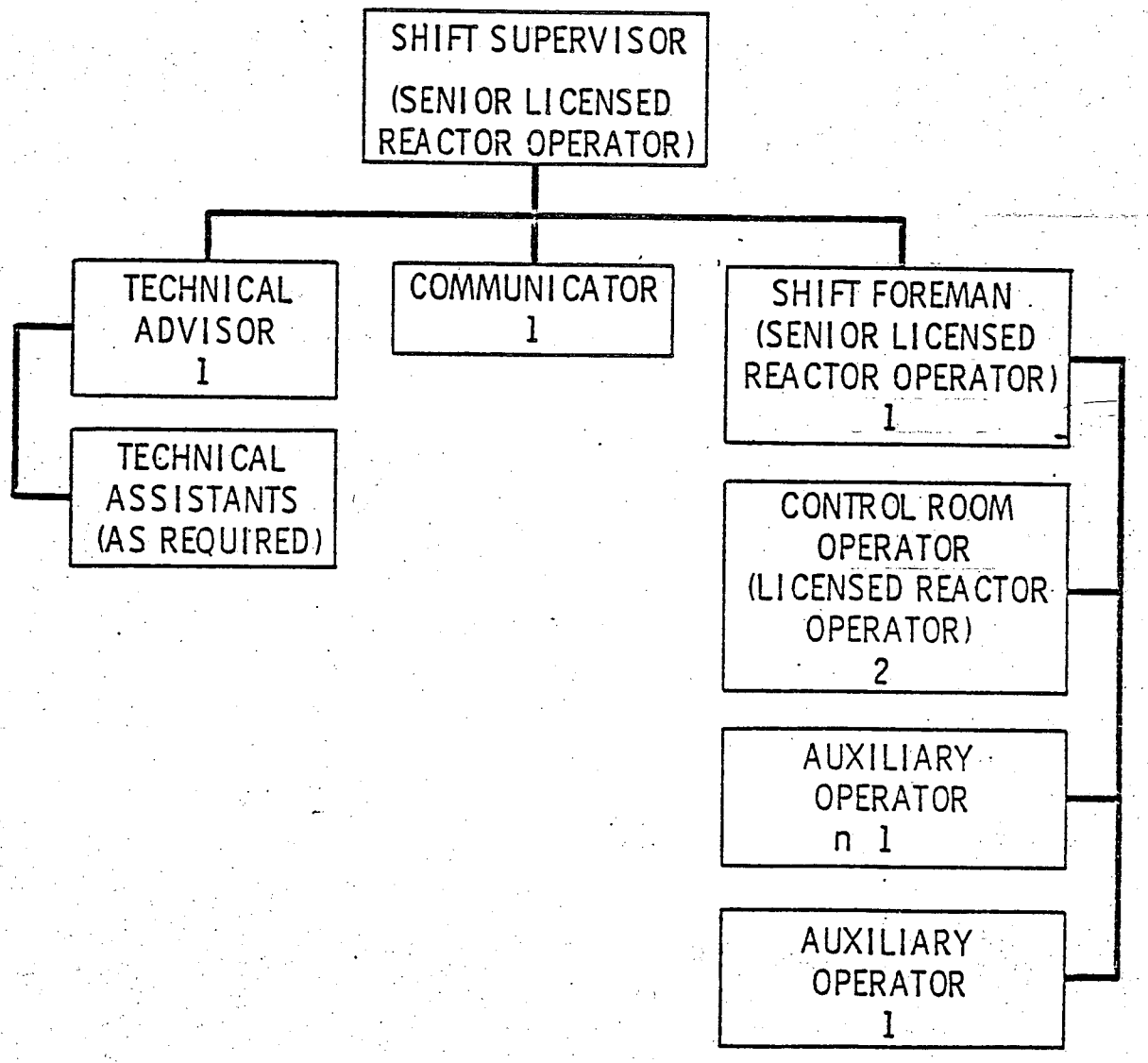
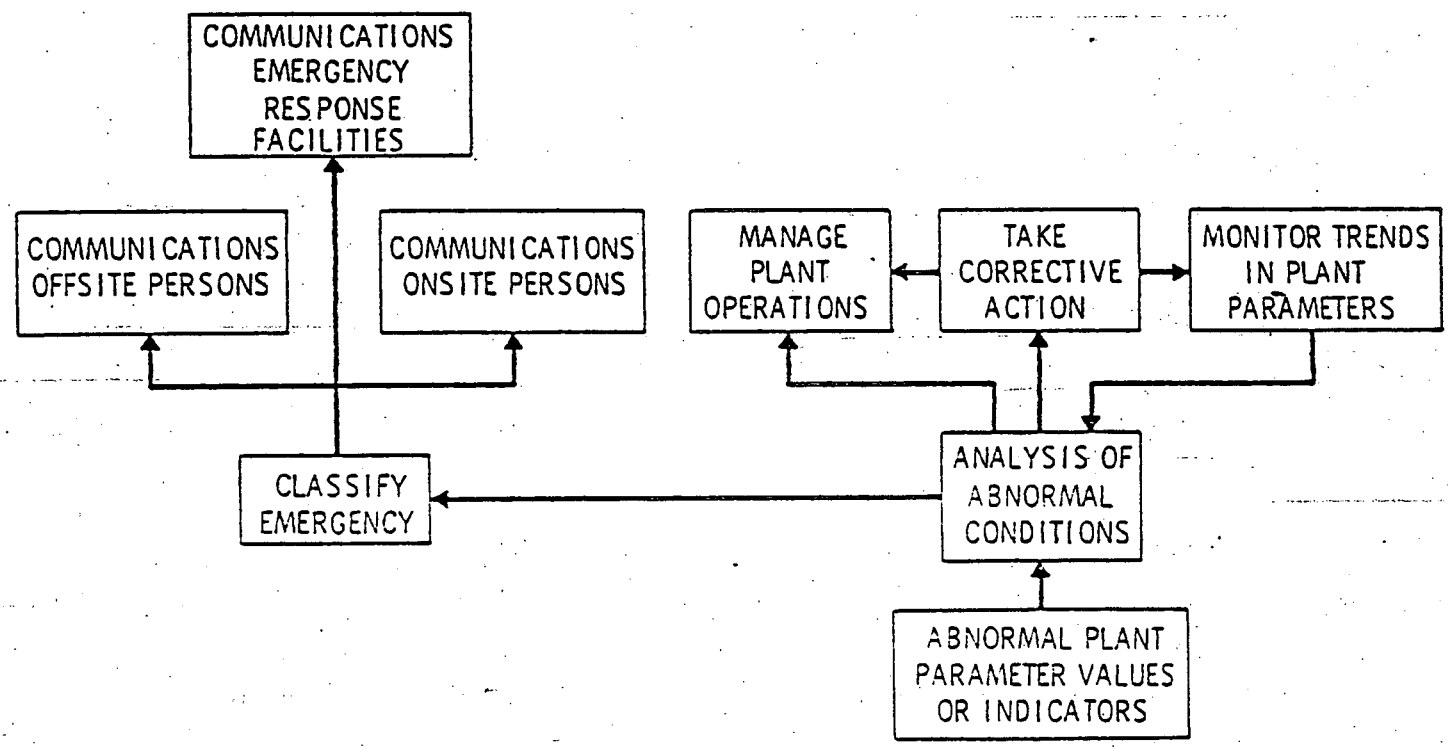


FIGURE 3.1

FUNCTIONAL ORGANIZATION - CONTROL ROOM



FUNCTIONAL UNTIL TSC OPERATIONAL

FIGURE 3.2

COMMENT

4. OPERATIONAL SUPPORT CENTER

4.1 Integration with Overall Planning

1. The design of the Operational Support Center (OSC) addresses the following goals: a. Provides a location where plant logistic support can be coordinated during an emergency, and b. Restricts control room access to those support personnel specifically requested by the shift supervisor.	Subject not addressed.
2. An onsite operational support center is separate from the control room and the TSC and is where licensee operations support personnel will assemble in an emergency.	The OSC is located in an area adjacent to the TSC.
Where is it located?	
Describe the isolation of the OSC from the TSC and control room.	Subject not addressed.
Where are the backup OSC sites and are they accessible (e.g. onsite or nearsite) and habitable?	Subject not addressed.
Will the back-up OSC be habitable if the primary OSC is not?	
3. Provision snall be made for an alternate health physics control point. Where is it located?	Subject not addressed.
4. The health physics control point shall be immediately accessible to the OSC. (i.e., will personnel traveling from the OSC to the H.P. control point receive less than 5 rem when combined with other exposures during the course of an accident?)	Subject not addressed.

	COMMENT
5. Can personnel access storage facilities without receiving greater than 5 rem (when combined with other exposures) during the course of an accident?	Subject not addressed.

4.2 Habitability

1. No specific habitability requirements are established for the OSC. Is the OSC as habitable as the control room? Discuss. Is the shielding comparable to the control room? Discuss. Is the ventilation comparable to the control room? Discuss.	The OSC shares the TSC's HVAC facilities.
2. If the OSC habitability is not comparable to that of the control room, procedures shall be available for evacuation of OSC personnel in the event of a large radioactive release. If OSC has to be evacuated, what are the criteria for evacuation? Have key people been selected to remain onsite (or nearsite) to continue OSC functions? Are other personnel, evacuated offsite from the OSC, available to provide additional OSC functions if required?	Subject not addressed.
3. How are radiation levels determined in the OSC?	Subject not addressed.

	COMMENT
4. Emergency supplies (protective clothing, respirators, survey meters, dosimeters and KI) shall be available in the OSC for all personnel assigned at the facility. What alternate supply arrangements have been made? Where are equipment and supplies stored? How does OSC staff obtain their equipment? (i.e., is it signed out, just taken, etc.)	Subject not addressed.
4.3 Communications 1. There shall be a direct and dedicated primary communication link with the control room and TSC. 2. Communications with the TSC and control room shall be available at the backup OSC. 3. A dial phone shall be available in the OSC for other onsite and offsite locations. 4. Direct voice intercommunications and/or reliable direct radio communications may be used for supplementing telephone links.	Insufficient information. The design package states that facilities will be established to meet NUREG-0696 requirements, however no specifies are given.

COMMENT

4.4 Staffing

1. Personnel shall be assigned to the OSC for:

   a. Damage Control
   b. Fire Brigade
   c. First Aid
   d. Radiation Control
   e. Decontamination
   f. Radiological and Environmental Surveys
   g. Maintenance/Repairs
   h. Other Operations Personnel

2. When the OSC is activated, it shall be supervised by licensee management personnel designated in the licensee's emergency plan to perform these functions.

   Who will be in charge of the OSC?

3. Team leaders shall be assigned for each functional group.

4.5 Size

1. The OSC shall be large enough to accommodate assigned personnel and equipment to be stored in the OSC (e.g. 15 sq. ft. per person for evaluative purposes only).

2. Decontamination facilities should be readily available.

   Where are they located?

COMMENT

5. EMERGENCY OPERATIONS FACILITY

5.1 Integration with Overall Emergency Planning

1. The design of the Emergency Operations Facility (EOF) addresses the following goals:

   a. Management of overall licensee emergency response; — Adequate response.

   b. Coordination of radiological and environmental assessment; — Adequate response.

   c. Determination of recommended public protective actions; and — Adequate response.

   d. Coordination of emergency response activities with Federal, State, and local agencies. — Adequate response.

2. The EOF shall be staffed by licensee, Federal, State, local and other emergency personnel designated by the emergency plan.

3. Facilities shall be provided in the EOF for the acquisition, display, and evaluation of all radiological, meteorological and plant system data pertinent to determining offsite protective measures.

4. The licensee shall use the EOF to coordinate its emergency response activities with those of the local, State, and Federal agencies, including the NRC. Licensee personnel in the EOF will assess potential offsite effects and make appropriate protective action recommendations for the public to State and local emergency response agencies. The EOF may be used as a location for information dissemination to the public via the news media by designated spokespersons in accordance with the licensee's emergency plan. The licensee

The EOF consists of two independent facilities, the Emergency Control Center (ECC) and Recovery Center (RC). The functions to be performed at the ECC include (1) coordination of radiological and environmental assessment (2) determination of recommended public protective actions and (3) coordination of emergency response activities with Federal, State, and local agencies. The RC will be the facility where the management of overall licensee emergency response will be performed.

	COMMENT
also may use the EOF as the post-accident recovery management center. Since the specific allocation of functions assigned to emergency facilities will differ from design to design, the proposal should clearly state which functions (Radiological Assessment, Security, Coordination with Offsite Agencies) are assigned to the EOF.	
5.2 Location, Structure and Habitability	
1. The siting of the EOF should include the following criteria:	
a. Whether the location facilitates carrying out the functions specified for the EOF (i.e., determination of public protective actions to be recommended by the licensee to offsite officials, and coordination of the licensee with Federal, State, and local organizations).	The ECC is located is Con Edison's Buchannan Service Center. The RC is located in the Simulator Bldg.
Describe the transportation network in the vicinity of the EOF adequate to assure rapid coverage of the EPZ by monitoring teams.	This cannot be determined from the Site Plot Plan in Figure III.
Is the EOF placed in a location that is readily accessible by road to Federal, State, local government officials as well as the licensee's corporate and site operations personnel?	This cannot be determined from the Site Plot Plan in Figure III.
Has the selection of the EOF location been coordinated with State/local officials?	Subject not addressed.

	COMMENT
b. What radiation doses would be expected when the EOF is accessed during DBA or other specified accident (less than or equal to 5 rem)?	Subject not addressed.
Is the EOF accessible during periods of radiation releases?	Subject not addressed.
Is there an alternate EOF?	Yes. Negotiating to use the New York State Office of Disaster Proparedness Southern District Office in Poughkeepsie.
2. The EOF must be able to withstand reasonable expected adverse conditions. (e.g., 100 year floods and high winds)	
How would the maximum 100-year water levels and winds affect the operation of the EOF?	Subject not addressed.
3. The EOF shall have a protection factor greater than or equal to five if located within 10 miles of TSC; no protection level is necessary if located beyond 10 miles of the TSC. Protection factor is defined in terms of the attenuation of 0.7 MeV gamma radiation.	The present walls of the ECC provide a protection factor of greater than five. The existing roof is being evaluated for upgrading to at least 5 or consistent with the wall structure.

	COMMENT
4. The EOF ventilation system shall be functionally comparable to the control room system and TSC (i.e., high efficiency particulate air filter; no charcoal) if located within 10 miles of TSC. If located beyond 10 miles from the TSC, the EOF needs no ventilation protection.	EOF buildings (RC, ECC) is claimed to have HVAC system which will accommidate HEPA filters (to be installed).
To what level will the HEPA filters reduce particulate levels?	Subject not addressed.
Is the HVAC system controlled to permit isolation of the intake?	Subject not addressed.
At what level of airborne activity is isolation performed?	Subject not addressed.
How is the level determined?	Subject not addressed.
Where are the sensors located?	Subject not addressed.
Where is this level monitored?	Subject not addressed.
5. Protective clothing, respiratory equipment and potassium iodide shall be readily available to all EOF personnel.	Subject not addressed.
If not, how many people would be supplied?	Subject not addressed.
Are reserves of supplies available?	Subject not addressed.
Where are they located?	Subject not addressed.
How is the need for these supplies determined? (i.e., when will respiratory equipment be used?)	Subject not addressed.
Is the protection factor for respiratory equipment equivalent to a full face mask?	Subject not addressed.
Are instructions for KI use provided in the EOF?	Subject not addressed.

	COMMENT
5.3 Staffing (NUREG-0696 and PNL TSC/EOF Staffing Study)	
1. The EOF shall:	
a. Be functional within one hour of activation;	Subject not addressed.
What equipment takes more than 60 minutes to become operational?	Subject not addressed.
How long does it take to fully staff the EOF?	Subject not addressed.
What is the procedure to ensure notification of the minimum EOF staff?	Subject not addressed.
b. Include staff to engage in onsite and offsite radiological monitoring and a senior management person to be in charge of all licensee activities in the EOF. An example of additional staffing needs for the EOF are given in Figure 5-1 (from the PNL TSC/EOF Staffing Study.)	Adequate response.
c. Has the licensee identified the tasks that may need to be performed and specified the characteristics (e.g. skills, experience and training) of the persons needed to accomplish these tasks?	Adequate response.
2. Allocation of tasks to personnel should be validated by an analysis of error likely situations, especially those situations that might exceed the human operator's capability in the areas of perception, memory, information integration and manipulation of controls.	
What is the total number of personnel assigned to the EOF? Are there adequate numbers of personnel assigned to the EOF to carry out its function?	16 people report to the ECC. The number reporting to the RC is not identified.

EOF ORGANIZATION

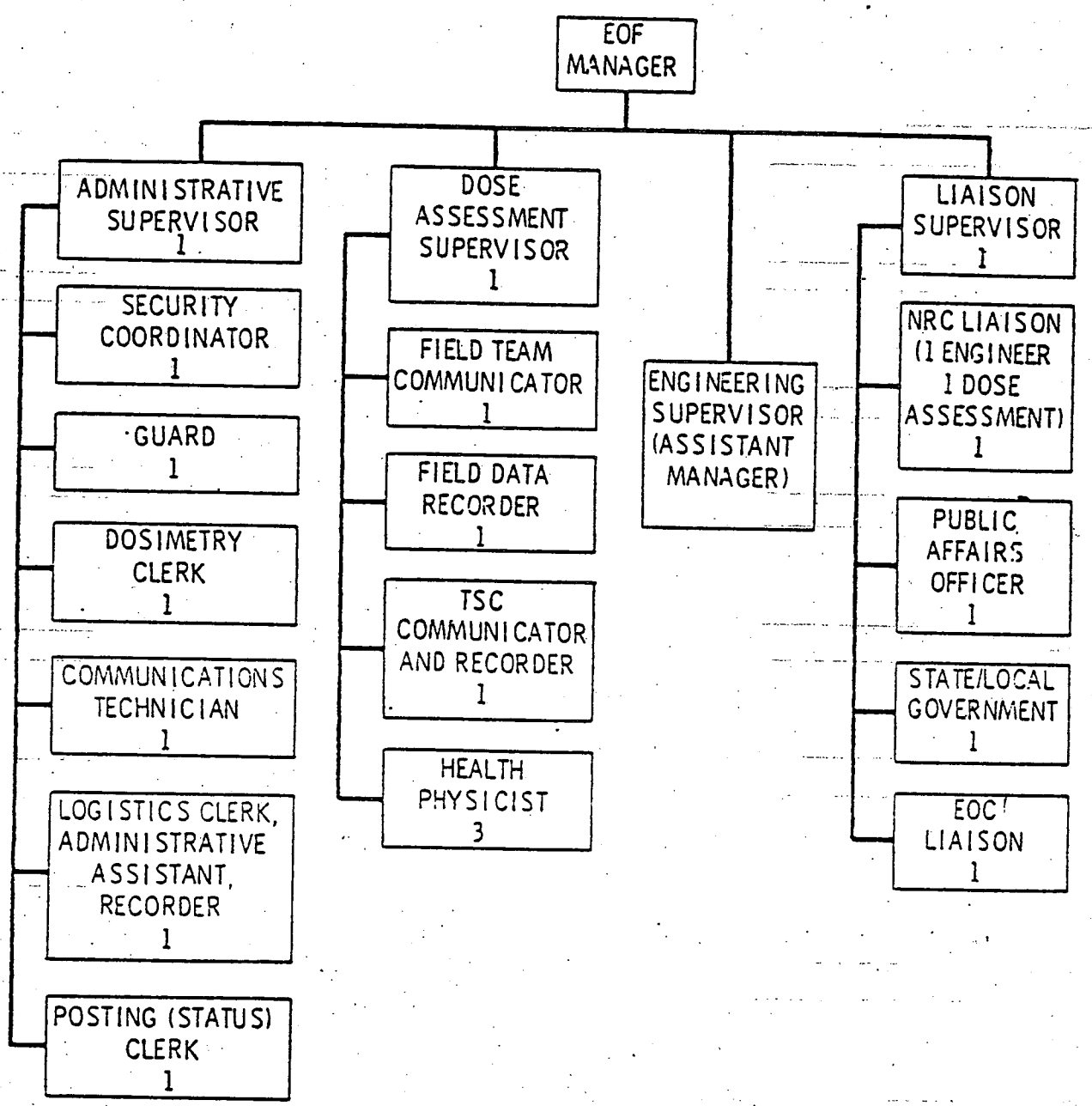


FIGURE 5.2

COMMENT

5.4 Size

1. The EOF building or building complex shall be large enough to provide:

a. Working space for the personnel assigned to the EOF as specified in the licensee's emergency plan, including State and local agency personnel, at the maximum level of occupancy without crowding (minimum size of total working space provided shall be approximately 75 sq ft/person);	Inadequate response. The licensee states there is 70.9 sq. ft. of working space per person in the ECC and 100 sq. ft. per person in the RC. However, the room layouts do not show work stations and the total square footage includes the computer room.
How much space is assigned to each work station?	Not specified.
Is an operational sequence diagram provided that describes the interaction among EOF staff, work stations and items of equipment?	No. The schematic diagram illustrates room divisions but does not identify personnel work stations and locations of equipment or whether personnel will be grouped by function.
Is a locational diagram provided that shows where personnel work stations and items of equipment will be placed? Is the scale of the diagram provided?	
Is each work station equipped for its function (i.e., manager, liaison, dose assessment, engineering, administration etc.)?	Insufficient information.
Are personnel grouped by function?	Subject not addressed.
Does each work station have sufficient space to carry out its assigned function?	Subject not addressed.
Explain how the location of facilities and equipment is consistent with the patterns of interpersonal interaction and machine utilizations that will take place.	Subject not addressed.
Who needs access to which machines?	Subject not addressed.

	COMMENT
What is the flow of information between persons and groups?	Subject not addressed.
Are personnel performing related tasks located adjacent to one another?	Subject not addressed.
Describe the organizations of the work stations. Are they organized according to Figure 5.2?	Subject not addressed.
Describe how the workspaces are designed to control traffic and noise (mechanical and conversational).	Subject not addressed.
b. Space for EOF data system equipment needed to transmit data to other locations.	Insufficient information. Licensee states adequate space is allotted but no details are provided for this to be evaluated.
Where is the data displayed?	
Are layouts of displays coordinated with working space layouts?	
How much space is there for working with maps, diagrams, drawings, etc.	
Where are the maps, diagrams, drawings, etc., located?	
Is there a description of the characteristics of the machines in the EOF that provides a basis for determining their compatibility with anthropometric guidelines (e.g. Van Cott & Kinkade, Human Engineering Guide to Equipment Design)?	
Are the characteristics of the data display devices compatible with anthropometric guidelines?	
c. Sufficient space to perform repair, maintenance, and service of equipment, displays, and instrumentation;	Insufficient information. Licensee states there is sufficient space but no details are provided for this to be evaluated.

	COMMENT
How much space is provided to allow access to back panels for repair?	
What spare modules are available?	
Is a working station assigned for repair and maintenance?	
d. Space for unhindered access to communications equipment by all EOF personnel who need communications capabilities to perform their functions.	Insufficient information. Licensee states this requirement is met but provides insufficient for evaluation.
Is there a description of the layout of the telephones in the EOF?	
How much space is provided for each telephone (about 1 sq. ft.)?	
How can a ringing telephone be easily identified (i.e., do phones light up when ringing)?	
e. Space for ready access to functional displays of EOF data.	
Is there space to display maps of the EPZ?	Subject not addressed.
f. Space for storage of plant records and historical data. Records, data and drawings may be kept in TSC if they can be displayed in the EOF by an automated method of retrieval.	
How much work space is dedicated to this task?	Subject not addressed.
g. Separate office space to accommodate at least five NRC personnel during periods that the EOF is activated.	A seperate office space is available in the RC and ECC.
How much office space is allocated for NRC use (at least 250-375 sq. ft.)?	Subject not addressed.
Does this room have a speaker telephone?	Subject not addressed.

	COMMENT
2. The EOF working space shall be large enough for at least 35 persons, including 25 persons designated by the licensee, 9 persons from NRC, and 1 person from FEMA. This minimum space shall be increased if the maximum staffing levels specified in the licensee's emergency plan, including representatives from State and local agencies, exceeds 25 persons.	
How many people are assigned to the EOF by the Emergency Plan including the NRC personnel and one FEMA person?	16 to the ECC and an unidentified number at the RC.
Is the workspace adequate for these people to perform their functions?	Insufficient information.
Are workspaces designed to control noise and traffic and to avoid unintended dissemination of confidential information?	Insufficient information.
Are provisions made for liaison persons from offsite organizations (if desired by these organizations)?	Insufficient information.

5.5 Radiological Monitoring

1. The licensee shall provide the EOF with installed radiation monitors or dedicated, portable monitoring equipment.	Dedicated dose rate instruments are available and include: Ebeerline RM-14 /HP210, Johnston Labs TRITON for airborne activity. It is implied there is 1 of each in each EOF facility. The range of these instruments is: (1) RM-14 = 500 5K, 50K CPM; (2) HP210 gamma sensitivity: 5K CPM /mR/hr, beta sensitivity 5-23% of beta activity under probe (15.5 cm sq.). This is hand held instrument: no info given as to how it will be employed. It is designed to measure beta surface contamination not airborn activity. (3) No information given on the range of the TRITON.
Are dedicated dose rate instruments, survey meters and airborne radioactivity monitoring instruments assigned to the EOF?	
Which instruments will be used?	
Where are instruments located?	
How many of each?	
How were types of, number of, and placement of monitors determined?	
What range do these instruments have?	

	COMMENT
2. These systems shall continuously indicate radiation dose rates, airborne radioactivity concentrations and the presence of radioiodine as low as 1E-7 microcuries/cc in the EOF.	Claimed.
Is someone assigned to monitor the EOF habitability when radiation releases are taking place?	Yes
What are the qualifications of this person?	Subject not addressed. Emergency director of ECC, HP personnel of RC.
If not, are there fixed instruments which are equipped with audible and visual alarms?	Instruments are alarmed.
At what radiation levels will these instruments alarm?	Can be set.
Are unattended instruments in continuous operation?	Subject not addressed.
How is iodine monitored?	Subject not addressed. Airsampler used after alarms go off.
Is the detection limit for airborne I-131 as low as 1E-7 microcurries/cc?	Claimed.
What is the reliability of the continuously operating instruments? (i.e., is there back-up power for the instruments? Do the instruments meet the manufacturers specifications for availability and accuracy? How often are the instruments calibrated?)	Subject not addressed.

	COMMENT
3. These monitoring systems shall include local alarms with trip levels set to provide early warning to EOF personnel of adverse conditions that may affect the habitability of the EOF.	Any set point from 10% of full scale to full scale.
What are the trip levels of these instruments?	RM-14 can be set as low as 10 uR/hr. Gamma beta set point hard to define.
Does the instrument system provide a warning of precautionary radiation levels in a timely manner to allow the EOF personnel to take protective actions?	Apparently.
4. Does the EOF have a counting room?	By implication; reference is to "shielding (sic) radiation detector."
What instruments are available in the counting room?	Subject not addressed.
Where are backup counting rooms located?	Subject not addressed.
Is the counting room or receiving room readily accessible to offsite EOF personnel and monitoring teams?	Subject not addressed.
Is the monitoring equipment stored at the EOF? If not, where is it stored?	Yes.
Supplies of protective clothing, respiratory equipment and KI shall be readily available for all personnel who may need access to the plant or may enter the airborn plume.	Subject not addressed.
Are instructions for the use of KI available?	Subject not addressed.
Are reserves of equipment available in the EOF or some nearby location?	Subject not addressed.
Where?	Subject not addressed.
How is the need for such supplies determined? i.e., when will personnel don respiratory equipment?	Subject not addressed.
Is the protection factor for respiratory equipment equivalent to a full face mask?	Subject not addressed.

COMMENT

5.6 Communications

1. EOF telephone access to commercial telephone common carrier services must bypass any local telephone switching facilities that may be susceptible to loss of power in emergencies.

   How many switchboard independent commercial telephone lines are available in the EOF?

2. EOF voice communications must consist of a reliable primary and backup system and include:

   a. Hotline telephone located in the NRC office space (and also in the licensee space if desired by the licensee) on the emergency notification system (ENS) to the NRC Operations Center; — Adequate response.

      What is the backup system for communications to the NRC? — Dial telephone.

   b. Dedicated telephone located in the NRC office space (and also in the licensee space if desired by the licensee) on the NRC Health physics network (HPN); — Adequate response.

      What is the backup system for communication to the NRC? — Dial telephone.

   c. Dedicated telephones for management communications with direct access to the TSC and the control room; — Adequate response.

      Do these telephones provide non-interruptable service between EOF and TSC or control room? — Subject not addressed.

   d. Dial telephones that provide access to onsite and offsite locations; — Adequate response.

	COMMENT
e. Intercommunications systems between work areas of the EOF, if needed for the EOF functional performance and if the EOF is comprised of separate functional areas;	Subject not addressed.
Is there an intercom to connect the EOF manager and supervisors?	Subject not addressed.
f. Radio communications to licensee mobile monitoring teams;	Adequate response.
Are there provisions to use commercial telephones as a backup?	Subject not addressed.
g. Communications to State and local operations centers;	Communications consoles are connected to the state/county hot line warning point network.
What are the primary and backup communications?	
Are they diverse, redundant and dedicated?	
h. Communications to facilities outside the EOF used to provide supplemental support for EOF evaluations.	Subject not addressed.
Are there primary and backup communications to corporate HQ?	Subject not addressed.
3. The EOF communication system shall also include designated telephones (in addition to the ENS and HPN telephones) for use by NRC personnel. The licensee shall provide at least two dial telephone lines for such NRC use when the EOF is activated. The licensee shall also furnish the onsite access facilities and cables to the NRC for the ENS and HPN telephones.	Adequate response.
4. Facsimile transmission capability between the EOF, the TSC, and the NRC Operations Center shall be provided.	
Is facsimile transmission capability installed and tested for compatibility with NRC and offsite authorities?	Insufficient information. Licensee states fascimile equipment can be provided.

	COMMENT
5. Are there descriptions of how the following communications needs are met?	Insufficient information.

EOF manager with

- Corporate HQ
- TSC
- Control Room
- NRC
- State Government
- Local Government
- EOF Supervisors

Administrative supervisor with

- Corporate HQ
- TSC Security communication center
- Outside telephone lines
- EOF manager
- Telefax
- Photocopying

Dose assessment supervisor with

- HPN telephone
- TSC
- EOF manager
- Outside line
- Radio to monitoring teams

Engineering supervisor with

- Control Room
- TSC
- Corporate
- Outside lines
- Vendors

Liaison supervisor with

- Corporate HQ
- NRC
- State Government
- Local Government
- TV Monitor (news stations)

COMMENT

5.7 Instrumentation, Data System Equipment, and Power Supplies

These methodologies are addressed in Sections 6, 7, 8, and 9.

5.8 Technical Data and Data System

These methodologies are addressed in Sections 6, 7, 8, and 9.

5.9 Records Availability and Management

1. EOF personnel shall have ready access to up-to-date records, operational specifications, and procedures that include but are not limited to:

   a. Plant meteorological data.

      Does the EOF have access to primary and backup meteorological data? — Adequate response.

      Are dose assessment procedures designed to use either data set?

   b. Up-to-date records related to licensee, State, and local emergency response plans. — Adequate response.

      Does the EOF have up-to-date copies of State, local and Federal emergency response plans and procedures?

   c. Safety Parameter Display System. — Adequate response.

   d. Offsite population distribution data. — Adequate response.

   e. Plant technical specifications. — Not specified.

      Are specifications, records, drawings, and reports the current ones (what are the most current dates)?

   f. Evacuation plans. — Adequate response.

	COMMENT
g. Plant operating procedures.	Not specified.
h. Environs radiological monitoring records.	Adequate response.
i. Emergency operating procedures.	Not specified.
j. Licensee employee radiation exposure histories.	Not specified.
k. Final Safety Analysis Report.	Not specified.
l. Up-to-date, as-built drawings, schematics, and diagrams showing:	Not specified.
Conditions of plant structures and systems down to the component level, and	
In-plant locations of these systems.	
m. Checklists, guides, worksheets and other job performance aids.	Not specified.
2. These records shall either be stored and maintained in the EOF (such as hard copy or microfiche) or shall be readily available via transmittal to the EOF from another records storage location. The method of storage and presentation of the EOF records shall ensure ease of access under emergency conditions. The records available to the EOF shall be completely updated as necessary to ensure currency and completeness.	
How are records stored and maintained in the EOF?	Subject not addressed.
Are records readily available for transmission to the EOF from another storage location?	Records can be obtained from TSC by facsimile transmittal
Are records stored so as to be readily and easily accessible?	
How are records updated?	
How are the records accessed?	

COMMENT

6. Data Acquisition System

6.1 DAS Functional Description

The function of a data acquisition system (DAS) in the context of this methodology document is to provide a basic source of data for all emergency response facilities. A functional block diagram, showing the facilities to be used for data acquisition and their functional interconnection to ERF's and other plant facilities should be provided. Figures 2 and 3 of NUREG-0696 are examples of such diagrams.

Figure II shows a block diagram of the computer configuration which will serve as the plant process computer as well as the ERF data acquisition system for plant parameters. Figure VII shows a block diagram of the MIDAS system which will acquire meteorological and environmental data.

6.2 DAS Facilities

It is anticipated that a dedicated data acquisition system, consisting of a single facility or a functionally integrated, physically distributed facility will be proposed for most sites. However, NUREG-0696 does not require that utilities provide specific, dedicated DAS facilities, only that they perform specific data acquisition functions. Some sites may propose to perform DAS functions by sharing other facilities such as the plant process control computer. In either case, any facilities used for the acquisition of any and all data relating to safety parameters and ERF's should address the following areas.

1. DAS Layout

Describe the layout of the DAS. A drawing or photograph of the system(s), showing equipment room layout and operator console(s) may be sufficient.

Figures IV, V and VI show the general building layouts, but they are not detailed enough to show the equipment layouts within the rooms. Figure I is referenced as a general arrangement of the TSC, but it was not included in the report.

	COMMENT
2. DAS Environment	
a. Where is the DAS located?	TSC, EOF, CR.
b. What fire protection facilities are provided?	Not specified.
c. Is the room temperature controlled?	Not specified.
What is the heat output of the equipment?	Not specified.
What is the heat removal capacity of the air conditioning system?	Not specified.
d. What humidity controls are provided?	Not specified.
e. Concerning electrical power:	
What power sources are available?	480V, 3-phase, 3-wire (Sect. 1.7)
What are the DAS power requirements?	Not specified.
Is the source uninterruptable?	Yes. (Sect. 1.7)
What is the backup source?	Standby emergency diesel generator (Sect. 1.7)
3. DAS Physical Security and Access	
a. Describe the security procedures which determine who may access DAS equipment.	Subject not addressed.
b. Identify the authorized personnel.	
Can the user stop the system via a normal display device?	
Can the user stop the system without entering the DAS resource restricted area or enclosure?	

6.3 DAS Equipment Specifications

In order to evaluate the capability of a proposed DAS to acquire and distribute data in a manner consistant with the functional criteria in NUREG-0696, the DAS equipment configuration must be understood in detail. The following questions are to

	COMMENT
be applied to any subsystem of a dedicated, distributed DAS, as well as to any system which shares DAS functions with other plant functions.	
1. Dedicated DAS	(Note: the MIDAS and ARAC PDP-11 systems are in the EOF and are shared with the Indian Point 2 unit operated by Con. Ed of New York.
What facilities are provided for the acquisition of data to be provided for ERF's?	Plant process computer system is used for ERF's; block diagram of Figure II shows configuration.
a. Specify the computer hardware configuration:	
What vendor?	Vendor and model not specified.
What model number?	
What is the processor's computation speed?_____instructions/sec.	Not specified.
What is the system's configuration?	
Number of processors:_____	2 (Figure II also shows "display generators" and a "remote environment monitoring computer" as blocks in the diagram; no detail of these subsystems is provided.)
For each processor or subsystem, indicate the following:	
Working storage:_____bytes.	Not specified.
What type? (core, MOS, etc.)	Not specified.
Error detection and/or correction capability?	Not specified.
On-line disk storage:	
Number of controllers:_____	4

	COMMENT
Number of drives:_____	4
Total capacity:_____bytes.	154M
Maximum access time:_____sec.	Not specified.
Minimum transfer rate:_____bytes/sec.	Not specified.
Tape storage:	
Drive type: (7 or 9 track)	Not specified.
Number of drives:_____	2
Maximum density:_____bytes/inch.	Not specified.
Speed:_____inches/sec.	75
Data Acquisition Hardware:	
Number of analog channels:_____	Not clearly stated. "...more than 1000 plant variables..." (Sect. 1.8)
Sampling rate per channel:_____samples/sec.	Not specified.
Resolution per channel:_____bits.	Not specified.
Number of digital channels:_____	Not clearly stated (See comment for analog channels above.)
Bits per digital channel:_____	Not specified.
Data communications hardware:	
Number of ports:_____	Not specified in detail. Reference is made to "high-speed modems" and "fiberoptic modems" but no details are provided.
Type of ports: (RS-232, V35, etc.)	
Average data rate per port:_____bits/sec.	
b. What software operating system is used?	Subject not addressed.

	COMMENT
c. Will this operating system software be specially modified for use with the DAS? If so, describe the proposed modifications and their justification.	Subject not addressed.
d. Identify any other software components of the DAS and their source.	Subject not addressed.
2. Additional Requirements for Non-dedicated DAS	
a. If the plant process control computer, or any other computer facility not fully dedicated to acquisition of data for ERF's, is to be employed, the following information must be understood in addition to that specified in 6.3.1.	The DAS "will also be used as the new plant process computer" (Sect. 1.7)
What facilities, hardware and software, are included in the configuration to insure that emergency response facility data acquisition functions and other functions do not interfere with and degrade each other?	"Extensive testing will be performed on the entire system to assure that the plant process computer programs do not degrade the integrity of data supplied to the TSC or the security of the software used to process TSC data." This subject must be addressed in much more detail to insure that the above statement is in fact true.
Does the configuration include dual processors with separate functions?	No. Dual processors are used in a redundant configuration, not for separate functions.
Do programs and data for the separate functions reside in physically separate working storage and on-line storage facilities?	Does not apply.
Does the operating system software provide for the implementation and isolation of	Insufficient information.

	COMMENT
separate functional tasks?	
What user-callable system services are provided to facilitate non-cooperating, concurrent processes?	Insufficient information.
How does the operating system deal with conflicting requests for system resources?	Insufficient information.
What is the system's deadlock avoidance mechanism?	Not specified.

6.4 Sensor Data to be Acquired

1. Plant variables of Type A, B, C, D, and E, as specified in Regulatory Guide 1.97 Revision 2 Table 1(BWR's) or 2(PWR's), are required; identify any exclusions, deviations, or additions and describe the justification for each.	"1000 plant variables including all those parameters specified as type A, B, C, D, and E variables in Regulatory Guide 1.97, Revision 2" (Sect. 1.8)
2. Meteorological data described in Regulatory Guide 1.23 Revision 1 is required; identify any exclusions, deviations, or additions and describe the justification for each.	"Through the MIDAS or ARAC systems, the EOF will have access to those meteorological variables specified in proposed revision 1 to Regulatory Guide 1.23" (Sect. 3.7)
3. For each automatically monitored sensor:	
At what location is the data from the sensor physically obtained for the DAS?	Not specified.
Is isolation provided? If so, describe.	"fiberoptic modems will provide the necessary isolation in accordance with GDC 24." (Sect. 1.7) Insufficient information. In order to determine if proper isolation is being provided, a description of the fiberoptic modems must be provided.

	COMMENT
Describe the cabling between the sensor and the DAS.	Fiberoptic channels via modems.
If the sensor signal is not connected directly to a DAS input, describe any and all intermediate circuits and/or equipment.	Fiberoptic modems.
At what rate is the sensor sampled:_____samples/sec.	Not specified.
At what resolution is the sensor data read:_____bits.	Not specified.
4. For any data which is entered by a manual process describe:	Not specified.
The method of entering the data.	
The time required to enter the data.	
Procedures which have been established for entering the data.	
Verification processes used to insure the data has been entered correctly and in a timely manner.	
6.5 Data to be Provided for Dose Assessment	MIDAS receives data from a met tower, radioactive effluent monitors, and "other environmental monitors with digital outputs" (Figure VII)
NUREG-0696 requires that, in addition to radiological and meteorological data specified in 6.4, the output obtained from a Class A transport and diffusion (dispersion) model, described in NUREG-0654, Revision 1, Appendix 2, be displayed in the EOF. If these transport and diffusion estimates are to be sent to the EOF via the DAS, identify:	
The source of these data;	
The manner in which these data enter the DAS;	
The volume of data generated by the model; and	Not specified.
The rate at which these data are	Not specified.

input to the DAS.

COMMENT

7. Data Display Systems

7.1 Functional Display Devices

Data is acquired and processed by the DAS for presentation in the TSC, the EOF, and on the SPDS displays in the control room. A functional description of the display devices used in each of these facilities is required to determine their ability to meet the requirements of NUREG-0696.

1. Displays Required

There must be a minimum of the following display units present in each ERF location.

a. Control Room Displays

The primary SPDS display must be in the control room.	Adequate response.

b. TSC Displays

There must be a dedicated mimic SPDS display unit in the TSC.	Adequate response.
Since trend information must be displayed, there must be at least one graphical display unit in the TSC. If trend information is not displayed on a graphical display unit, an alternate method of display must be provided and justified.	Adequate response.
There must be at least one dedicated terminal available to call up and display data specifically related to TSC functions (i.e., plant system variables other than those included in the SPDS).	Adequate response.
There must be at least one terminal dedicated for display of in-plant and offsite radiological variables and meteorological information, for	Not specified.

	COMMENT
exclusive use in performing EOF functions in the TSC.	
There must be at least one hardcopy device available for printing information displayed on the CRT's.	Adequate response.
There must be at least one hard copy device capable of displaying graphics information. It is not necessary for the graphics printer to have the resolution or color equivalent of the graphics screen.	Adequate response.
If static pictorial records such as area maps, building drawings, component drawings or system diagrams are kept on a computer for call up, a second dedicated graphics display device must be provided for this purpose.	Does not apply
c. EOF Displays	
There must be a dedicated mimic SPDS display unit in the EOF.	Adequate response.
There must be a dedicated display device for the monitoring function to monitor radiological, meteorological and plant variable data.	Adequate response.
If the radiological evaluation function in the EOF is performed with the aid of a computer, there must be a dedicated terminal for this function.	Adequate response.
There must be a dedicated display device for obtaining information needed by offsite officials.	Subject not addressed.
Since trending information must be displayed, a graphical display unit is required. This unit could also be used to display graphical data related to offsite dose predictions (i.e., plume dispersion, maps).	Adequate response.
If static pictorial records, such as area maps, building drawings, component drawings or system diagrams are kept on a computer for call-up, a second	Does not apply.

	COMMENT
dedicated graphics display device must be provided for this purpose.	
If a terminal is used for news media briefings, it must be an additional separate terminal.	Does not apply.
There must be at least one hardcopy device available which is capable of printing the displays on the CRT's.	Apparently adequate. Table I indicates several printers and hard-copiers.
There must be at least one hard copy device capable of displaying graphics information. It is not necessary for the graphics printer to have the resolution or color equivalent of the graphics screen.	Adequate response.

2. Display Device Functional Descriptions

For each parameter specified in 6.4 and 6.5 describe:	Section 4.2 states that the actual parameters to be displayed are currently under review and will be supplied in an addendum to the conceptual design submittal.
a. The information to be displayed at the TSC and the EOF.	
b. The format in which it will be displayed.	Figures VIII and IX show examples of level 1, 2 and 3 displays.
c. The method required to initiate the display of the parameter. (i.e., operator request, continuous display, etc.)	Not specified.
d. Describe the method for display of trending information.	Graphical displays with hardcopy.
e. Describe the method for recall and display of historical data.	Color graphic CRT's and line printers (Sect 1.8)

3. Display Device Hardware Description

What equipment is provided to display data

COMMENT

in the ERF's?

CRT Terminals:

Vendor name / Model Number?

I/O data rates?

As a minimum CRT screen capacity should be 80 characters by 24 lines. If the screens do not meet this requirement, specify their capacity and the justification for using the smaller capacity.

Define any special function keystroke input to be used.

What is the physical screen size?

Is there control over the character brightness?

If the terminal is intelligent, describe any special features that would be used, and how.

3 color graphic displays in the TSC, each with its own keyboard and hardcopy device. Table 1 indicates several CRT and hardcopy devices in the ECC/EOF. No further information is provided.

Hardcopy printers:

Vendor name / Model number?

Print rate (lines/minute)?

What is the number of characters per line?

What is the character set available?

Does the printer have graphics capabilities that will be used? If so, what are they and how will they be used?

A printer/plotter is provided for hardcopy output from the ARAC system.

Is the noise level generated by the printer when it is operating acceptable for the environment in which it is located?

COMMENT

Graphics equipment:

No specific information given.

Is the display hardware raster or vector driven?

If the device is vector driven, what is the addressibility (number of spatial resolution points on the display screen)? 512 X 256 is the minimum acceptable.

What is the line width of vectors drawn? 0.05 inches is the maximum acceptable.

What is the speed at which vectors are drawn on the screen (full screen vectors or inches per second)? 50 full screen vectors per second is the minimum acceptable.

If the display is a raster device, what is the pixel size and resolution (number of pixels on the screen)?

If the raster device is monochrome, how many levels of gray are available? How many are actually used?

If the device is color, how many different colors may be displayed simultaneously? How many are actually used?

What is the data transfer rate to the device? (specify pixels/second, vectors/second, or bits per second).

Does the data transfer rate support the device's display capability?

What is the refresh display rate of the display device? 30 Hertz is the minimum acceptable refresh rate.

Does the device have hardware vector

	COMMENT
generation capability?	
Does the device have hardware character generation capability?	
4. Availability of functional display data to the ERF display systems	Insufficient information.
a. What is the maximum response time to queries for information required during an emergency situation? The minimum acceptable response time is three seconds for at least 90% of the queries for information.	
b. If a response takes longer than 2-3 seconds, is the operator informed that the requested operation is in progress?	
c. If the displayed data is inconsistent or faulty, how is this deficiency indicated?	
5. Functional Display Format	Adequate response. (Figure VIII)
a. What is the primary format used for data display? (Actual examples are preferred).	
b. Is the display of sufficient quality and simplicity that it may be seen and understood from the distances required by staff location? Factors to consider:	
Is the most important information grouped in the upper-right-hand quadrant of the display?	Appearantly.
How are related items of information grouped together on the screen?	Grouped according to class of critical function
How are sub-areas of the display separated?	Separated by lines. Adequate response.
Does every display page have a header, and are the headers consistent?	Yes. Adequate response.
If color is used to highlight and	

	COMMENT
differentiate portions of display formats, how many different colors are used and for what purpose is each used?	Insufficient information.
What other display dimensions (reverse video, size, blinking characters, etc.) are used in the display formats and for what purpose is each used?	Insufficient information.
6. Operator Interface to System	Insufficient information.
a. Can the operator call up optional displays with simple word or keystroke commands? Some examples of commands should be provided.	
b. What is the maximum time required to enter a request for information? (30 seconds should be the maximum time).	
c. What are the levels of expertise needed to operate the system?	
7. Functional Display Position	
a. What is the number of displays in each facility (TSC and EOF)?	3 in TSC, 8 in ECC/EOF
b. What is the position of each display device in the room?	Insufficient information.
c. What is the maximum number of people who must view the display in an emergency situation?	Insufficient information.
d. What are the distances and angles at which the display must be viewed?	Not specified.
e. Are there any room illumination controls which must be utilized for proper viewing of the display devices?	Not specified.
7.2 SPDS	
1. Availability of safety parameter data for the SPDS displays	

	COMMENT
What are the safety parameters available to the SPDS?	Not specified.
Are there any times when any such parameters are unavailable?	Not specified.
2. Recognizability of the SPDS display	
What features of the SPDS display distinguish it from the other displays and devices in the ERF and control rooms?	One of four color graphic control room displays will be dedicated to SPDS.
3. SPDS Location	
a. Describe the location of the SPDS displays in the ERF's and control room.	"free-standing enclosures"
b. How does the location of the SPDS insure that it can be easily accessed by the staff members requiring the safety information displayed?	Insufficient information.
c. Is the SPDS physically compatible with the existing facilities?	Apparently.
d. Does the SPDS present a hazard or obstacle to normal operation of the ERF?	Apparently not.
4. SPDS Staffing	
The SPDS should require no staff in addition to that necessary for the operation of the ERF. How does the design of the SPDS insure that this is the case?	Insufficient information.
7.3 Other Display Devices	
If display devices other than those required by NUREG-0696 (EOF, TSC, and SPDS) are connected to the DAS, describe these devices and indicate their degree of impact on DAS performance.	Control room has 1E qualified backup SPDS with microprocessor and two alphanumeric displays with keyboards. Adequate response.

COMMENT

8. Data Communications

The subject of data communications is not addressed in sufficient detail to enable evaluation. Reference is made to "fiberoptic modems" and channels, and the statement is made that the TSC data system will be able to supply all required information to the NDL, but no specific technical information is provided.

8.1 Description

1. Provision must be made for adequate and reliable transfer of data among the components of the Data Acquisition System, and between the Data Acquisition System and the:

   Technical Support Center

   Emergency Operations Facility

   Safety Parameter Display System displays

   Nuclear Data Link communications equipment

   Meteorological Data Facility

2. Provision must also be made for access to meteorological data in the DAS by the NRC Operations Center, and certain state and local agencies, if this service is not provided by facilities other than the ERF.

3. Block diagrams should be provided to show these data paths and the methods of transmission employed.

8.2 General

1. Is the link capacity sufficient for the maximum required rate of transmission?

2. Can all of the data channels meet the 0.01 unavailability requirement as defined in NUREG 0696, Section 1.5, under all conditions above cold shutdown?

3. Is all powered data communications equipment on an uninterruptible power supply? — Yes.

4. How are the data channels protected from unauthorized modification?

COMMENT

5. Are all data channels, plus equipment spares, tested as part of the periodic testing program?

8.3 Added Questions for Data Links Using EIA Standard Interfaces

1. Do the voltage levels and impedances conform to the standard?

2. Does the data rate adhere to the standard for the distance spanned?

3. Are cables and connectors appropriate to the standard?

8.4 Added Questions for Voice-Frequency Links

1. Is error detection and correction provided, if not otherwise supplied by the protocal?

2. What provision is made for testing the voice-frequency segments?

3. Is the data rate within the specification for the modems for the distance spanned?

4. Are spare modems stored on site?

5. Are there redundant data links, physically separate and without common failure mode, in all locations where there is a reasonable probability of service failure?

8.5 Applicable Standards

Typical standards that may be specified for serial data and control signal transmission are:

> EIA Standard RS-232-C. "Interface between data terminal equipment and data communication equipment employing serial binary data interchange." August 1969.

COMMENT

FED-STD 1020. "Electrical characteristics of balanced voltage digital interface circuits." September 1975.

FED-STD 1030. "Electrical characteristics ot unbalanced voltage digital interface circuits." September 1975.

EIA Standard RS-422-A. "Electrical characteristics of balanced voltage digital interface circuits." December 1978.

EIA Standard RS-423-A. "Electrical characteristics of unbalanced voltage digital interface circuits." September 1978

EIA Standard RS-449. "General purpose 37-position and 9-position interface for data terminal equipment and data circuit-terminating equipment employing serial binary data interchange." November 1977.

COMMENT

9. System Support Requirements

These subjects were not addressed.

9.1 Documentation

1. Describe the location where documentation is stored and the personnel who require access to this documentation. The minimum documentation to be included must be a user or operators manual, functional system documentation, hardware documentation and software documentation.

2. User Documentation

   a. Is there an operator's manual or its equivalent for each display device or facility that is adequate to explain the use of the display as well as instructions for resolving problems?

   b. Does the documentation must include as a minimum:

      Table of Contents that is well indexed for easy reference?

      Description of how to use the manual?

      System startup procedure?

      System failure procedure?

      Reference to support services (both hardware and software)?

      Operating instructions for each piece of equipment?

      Operating instructions for each request the user may initiate and response to be received?

      References to other subsystems and documents?

   c. Is the user documentation self supporting such that no other documentation is necessary to operate the system?

COMMENT

d. Does the user documentation contain guidance on the limitation of instrument readings and their reliability following serious accidents?

3. Functional System Documentation

a. What documentation describes in detail the DAS, the communications systems and the display systems from a functional perspective, as well as the means of implementation?

b. Does this documentation have reference to all documentation for subsystems which interface to the DAS, communications equipment, and display systems?

4. Hardware Documentation

a. What hardware documentation provides information for the engineers or technicians other than the system designer to maintain the system?

b. Does this hardware documentation include:

Theory of Operation?

Mechanical Prints?

Electrical Prints?

5. Software Documentation

a. What documentation is available to maintain and evaluate the software?

b. What procedures are to be followed to insure that the code contains sufficient comments for efficient maintenance and verification of the software?

COMMENT

6. Documentation Update Procedure

a. What procedure which has been established for maintaining the manuals and other necessary documentation to assure that any changes in the DAS, communications system or display systems are reflected in this documentation.

b. Who will be responsible for the updates?

9.2 Training

Training for operators and maintenance personnel must be provided.

1. User Training

a. How will operators of display systems be trained?

b. Who will perform this training?

c. What review of the training procedure will be followed to respond to changes in the systems?

2. Maintenance Training

a. How will the maintenance personnel responsible for the DAS, communications equipment and display devices be trained?

b. How will the training of personnel be verified?

9.3 Quality Assurance

1. Software Verification/Validation

a. What verification or validation plan has been developed for the software for the DAS and display systems?

b. Does the test plan outline procedures for testing the following error types?

Logic Errors

Documentation Errors (especially in the User documentation)

Overload Errors

Timing Errors

Throughput and Capacity Errors

Fallback and Recovery Errors

c. Does the test plan specify the overall test and integration philosophy, strategies, and methodologies to be employed?

d. Who will perform the independent quality assurance function?

e. Is there an adequate method to verify that there is a correlation between output data from the DAS and readings observed by the operators in the control room? Describe this method.

A string test from the individual sensor through the necessary processors and cables to the data output device shall be a part of this method.

2. Hardware Verification/Validation

a. What is the verification or validation plan for the hardware necessary for the DAS, communications equipment and display systems?

b. Who will perform the independent quality assurance function on this hardware?

COMMENT

3. System Log

a. Will a system log be maintained?

b. Minimum information in this log should be:

All system modifications

All system failures including time, reason and resolution

All planned outages

9.4 Reliability

NUREG-0696 specifies that data systems, instrumentation, and facilities of ERF's shall operate with an unavailibity factor of 0.01, be down no more than 16 hours per calander quarter, and be restorable within 30 minutes whenever the reactor is above cold shutdown status. Furthermore, any equipment affecting SPDS shall operate with an unavailability factor of 0.2 during cold shutdown. In order to determine if DAS equipment, display devices, and communications equipment meet this criterion, the following information must be reviewed:

a. For each of the following subsystems:

DAS equipment,

Functional display devices,

SPDS display devices, and

Communications equipment,

review the following:

What is the claimed mean time between failures?

What is the claimed mean time to repair?

What is the vendor's recommended preventive maintenance schedule?

What backup systems or components are provided?

How much time is required to bring a backup system on-line?

b. How are these claims justified? (Valid examples include historical records of other users of similar equipment, vendor-provided records of long-term test runs, and records of acceptance tests run on the proposed equipment.)

COMMENT

9.5 Maintenance

In order to insure that the data systems, instrumentation, and facilities of ERF's meet the unavailability requirement the following minimum hardware and software maintenance requirements should be reviewed.

1. Hardware Maintenance

a. What is the hardware maintenance plan?

b. How does the plan work to assure minimum unavailability?

c. Concerning maintenance personnel:

What personnel are identified for the DAS, communications equipment and display systems?

Where are these personnel located?

How are the personnel qualified for the hardware they will be working with?

d. Concerning spare parts:

Where are spare parts located for minimum practical replacement time?

Where are critical items located on-site?

If spare parts are to be supplied by outside sources, what is the maximum availability delay that can be assured?

Is the quality of the spare parts equivalent to the original equipment?

e. Is maintenance support equipment available on demand?

COMMENT

f. What is the schedule and procedure for calibration and verification of test equipment?

2. Software Maintenance

a. What is the software maintenance and re-verification plan?

b. Who will maintain the software for the DAS and display systems?

c. What is the procedure for providing adequate qualified backup software maintenance personnel?

d. What is the DAS update procedure?

Does this procedure insure that:

Changes to the software are authorized?

Any changes to the software are adequately tested and validated before they are implemented?

A description and date of the change have been recorded in a manner which can be easily reviewed?