FINAL

DESCRIPTION OF SUPPLY SYSTEM EMERGENCY RESPONSE FACILITIES IN NUREG 0696 FORMAT

May 1982

Contents

FIGURES

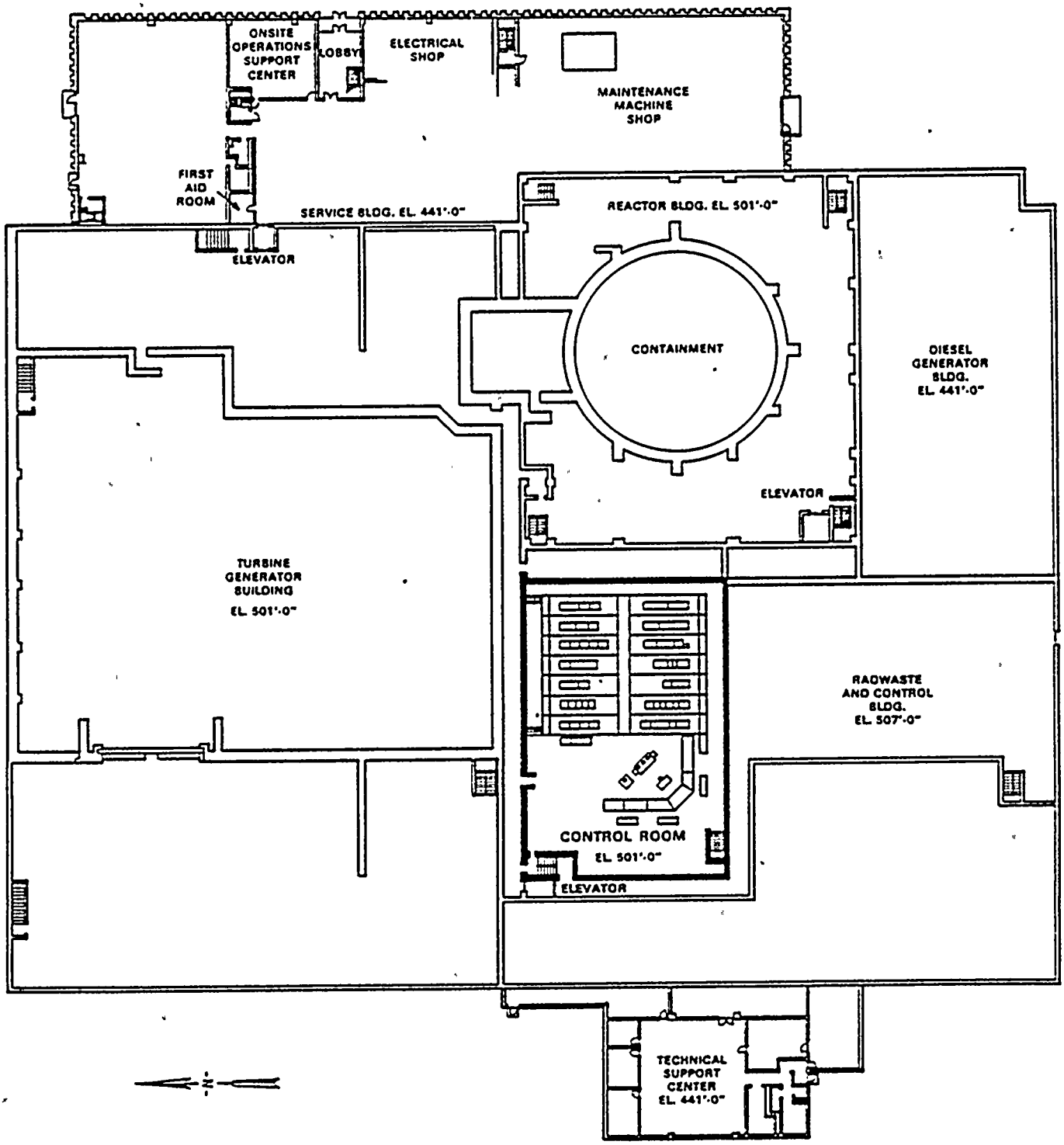


FIGURE 10-1. WNP-2 CONTROL ROOM LOCATION

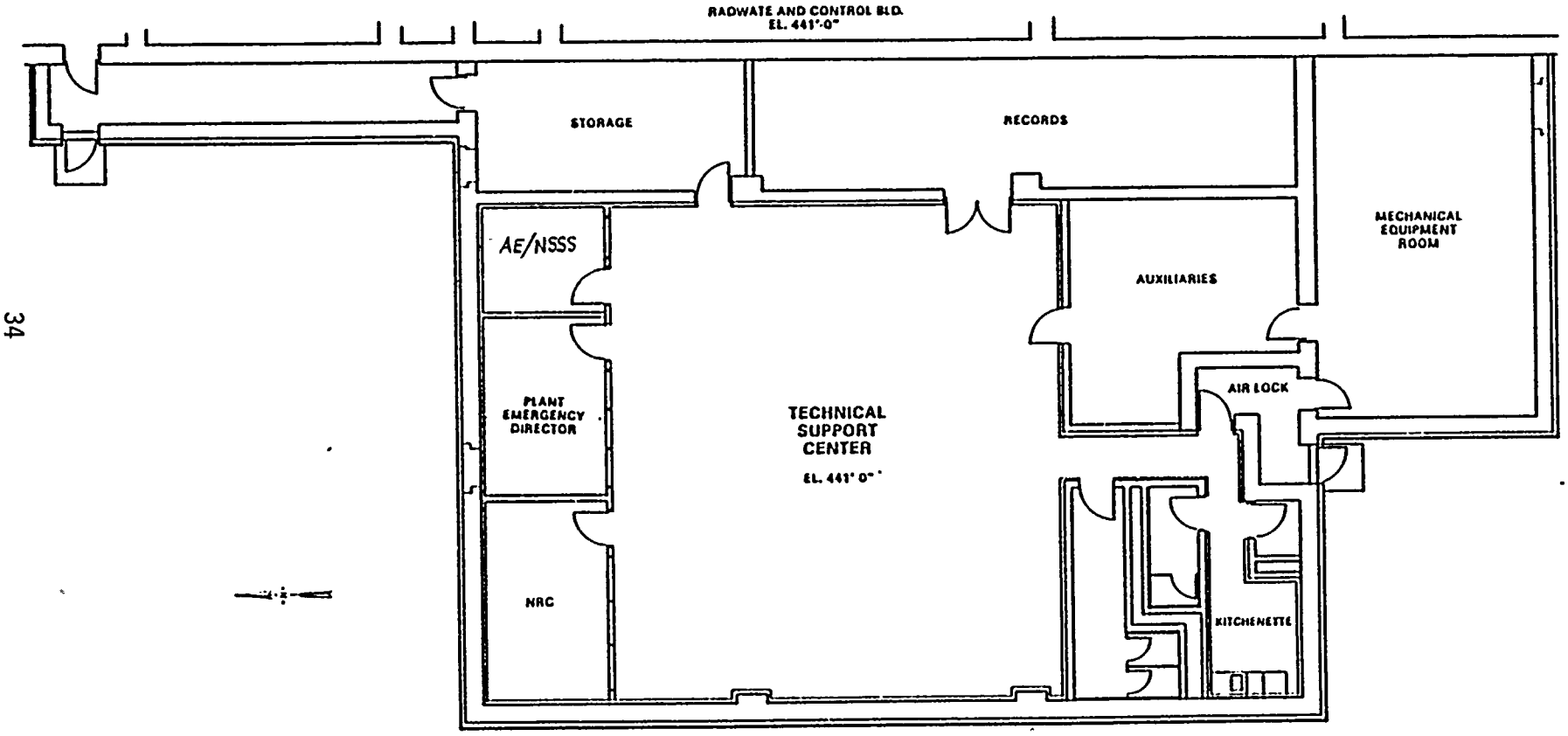


FIGURE 10-2 WNP-2 TECHNICAL SUPPORT CENTER

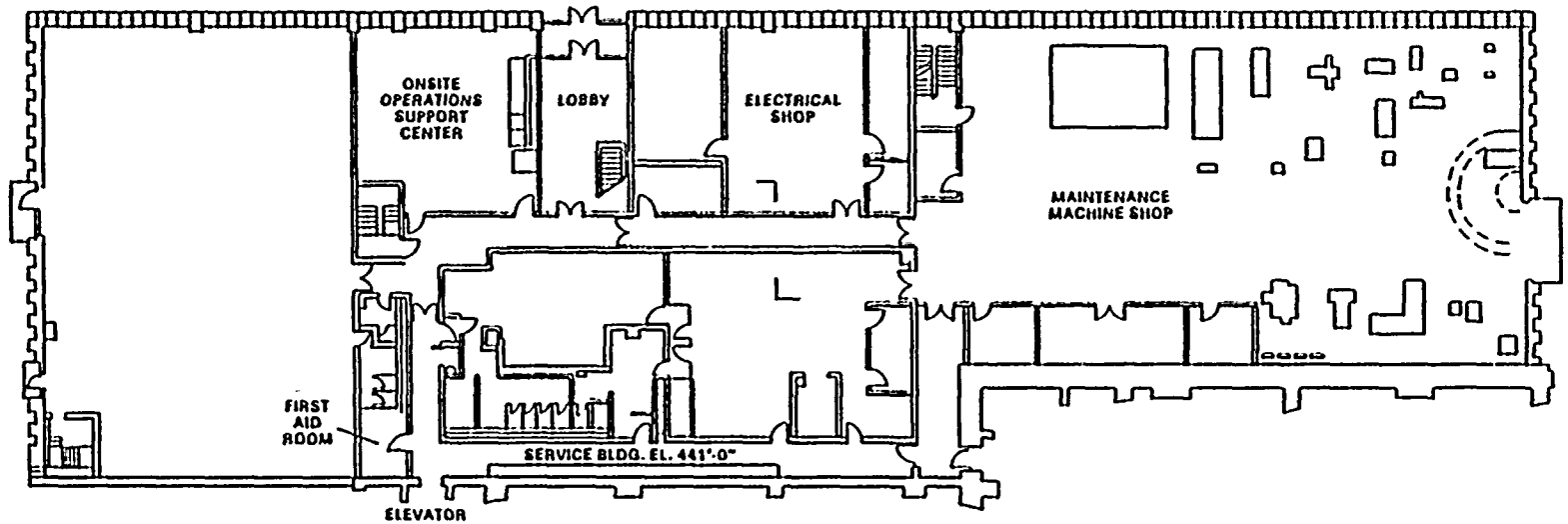


FIGURE 10-3 WNP-2 OPERATIONS SUPPORT CENTER

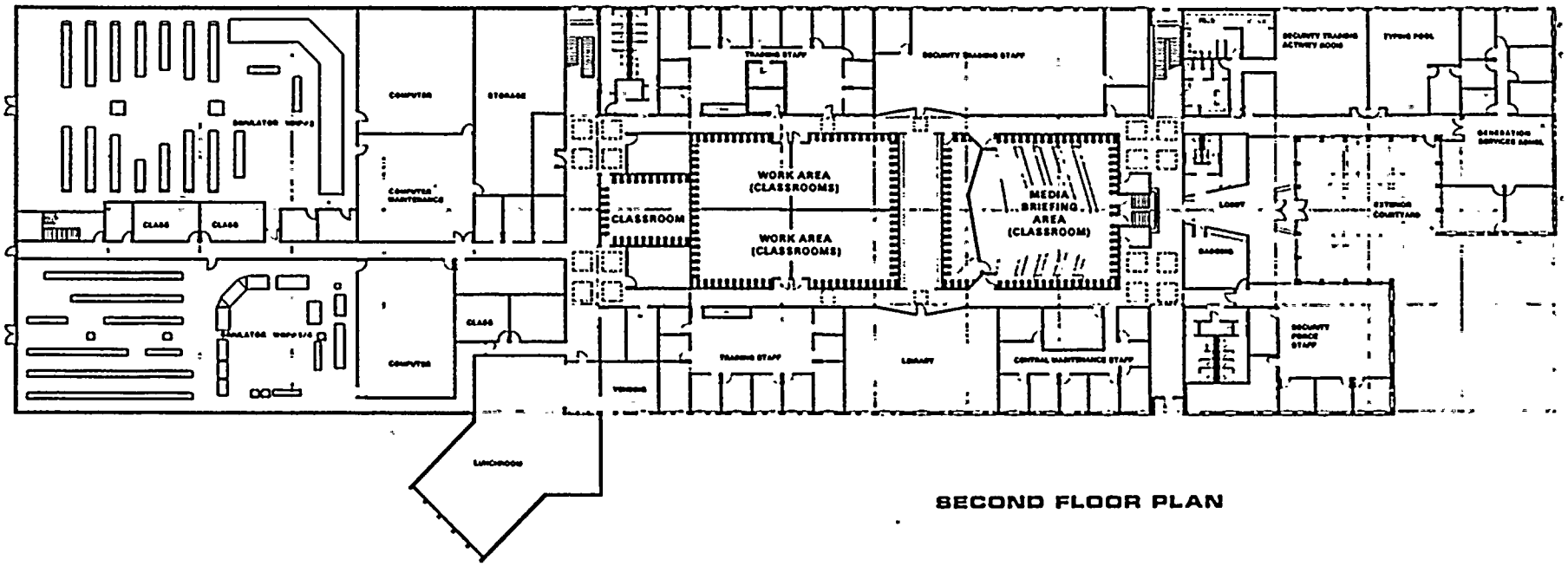
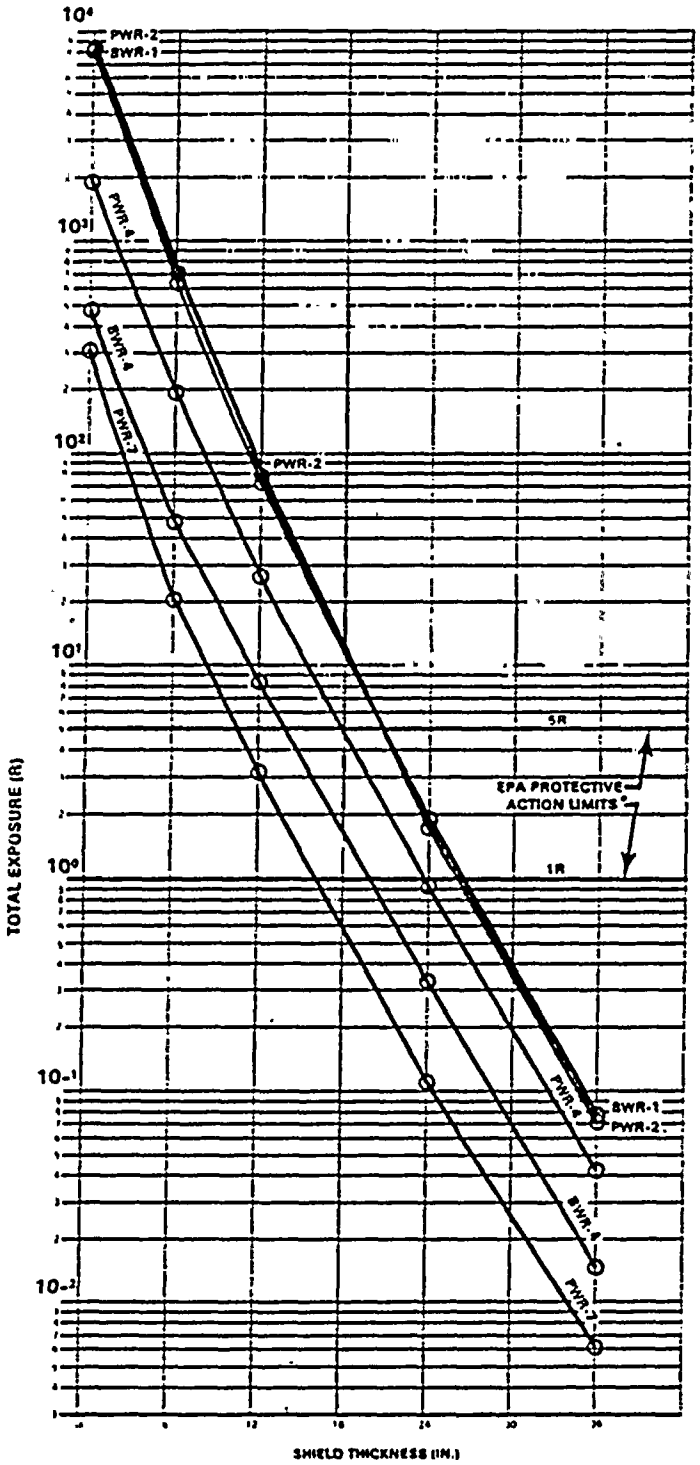
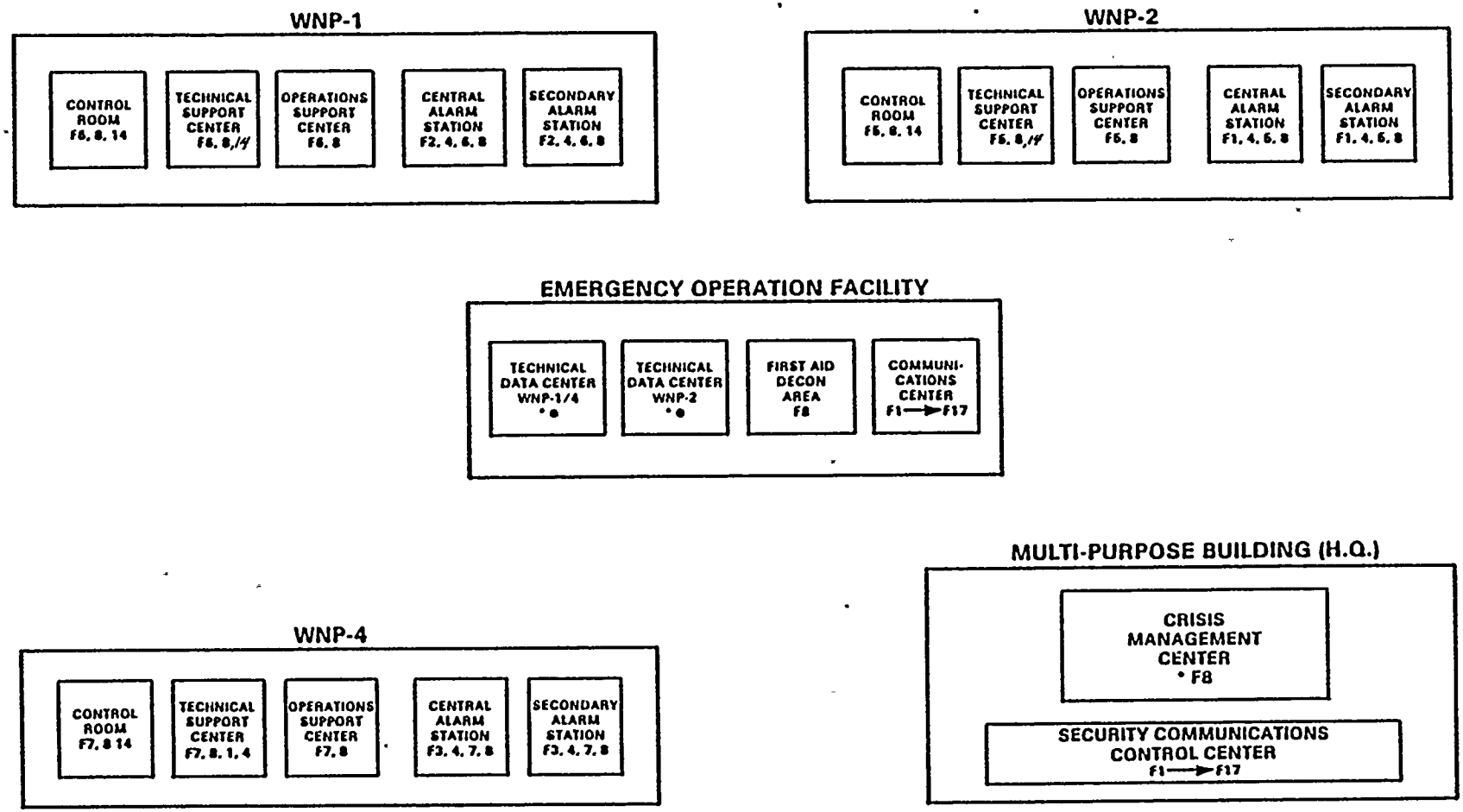


FIGURE 10-8. PLANT SUPPORT FACILITY



*EPA PROTECTIVE ACTION LIMITS WERE USED AS THE SHIELDING DESIGN CRITERIA SUCH THAT WORKERS IN THE EOF WOULD NOT EXCEED THE 5 REM UPPER LIMIT.

FIGURE 10-9. TOTAL WHOLE BODY EXPOSURE INSIDE THE EMERGENCY OPERATIONS FACILITY VS. SHIELD THICKNESS FOR VARIOUS CORE MELT ACCIDENTS



F1-SECURITY TACTICAL WNP-2
F2-SECURITY TACTICAL WNP-1
F3-SECURITY TACTICAL WNP-4
F4-SECURITY AREA WIDE
F5-OPERATIONS/MAINTENANCE 2
F6-OPERATION/MAINTENANCE 1
F7-OPERATIONS/MAINTENANCE 4
F8-OPERATION/MAINTENANCE AREA WIDE
F9 RADIO PAGING
F10-DEPARTMENT OF ENERGY: HANFORD PATROL
F11-DEPARTMENT OF ENERGY: HANFORD FIRE
F12-DEPARTMENT OF ENERGY: HANFORD TRANSPORTATION
F13-DEPARTMENT OF ENERGY: HANFORD EMERGENCY RESPONSE
F14-WASHINGTON STATE, FEMA, SUPPLY SYSTEM EMERGENCY RESPONSE
F15-BENTON COUNTY SHERIFF
F16-EXXON EMERGENCY RESPONSE
F17-MARINE CHANNEL
* RADIO MONITOR SPEAKER
● WEATHER RADIO RECEIVER

FIGURE 8-1 RADIO COMMUNICATION SYSTEM

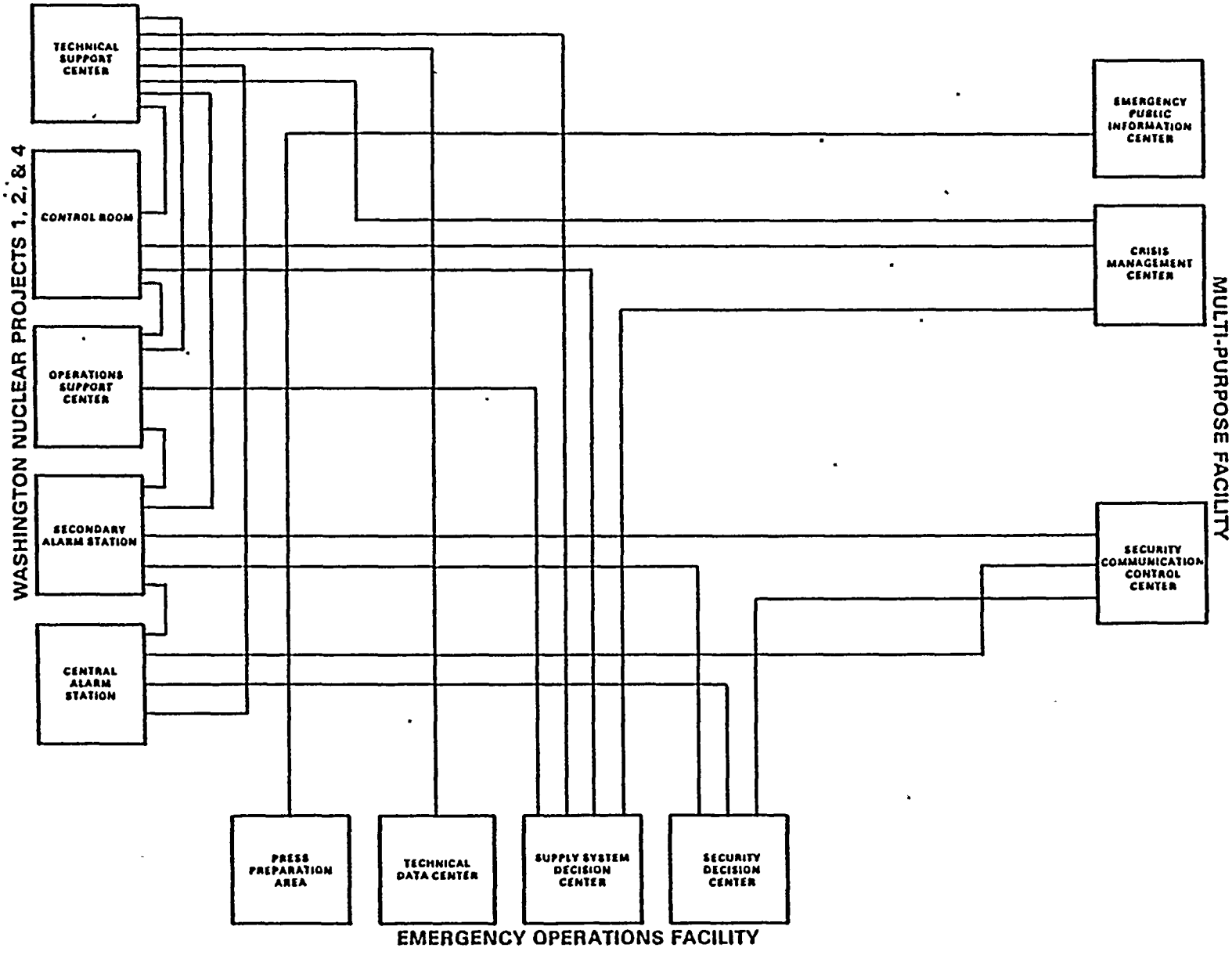


FIGURE 8-2 DEDICATED TELEPHONE CIRCIUTS (SUPPLY SYSTEM EMERGENCY CENTERS)

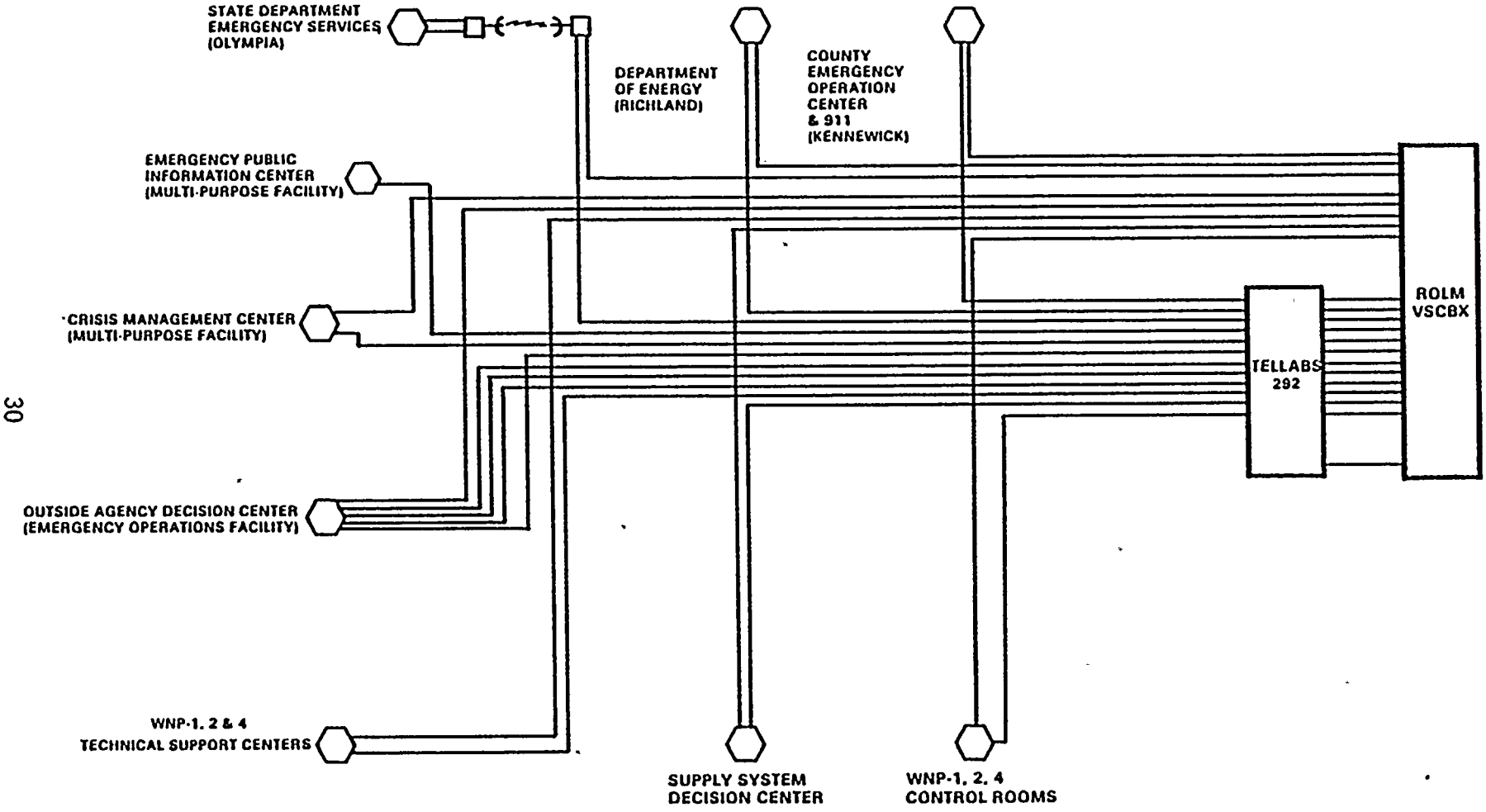


FIGURE 8-3 DEDICATED TELEPHONE CIRCUITS (RESPONSE AGENCIES)

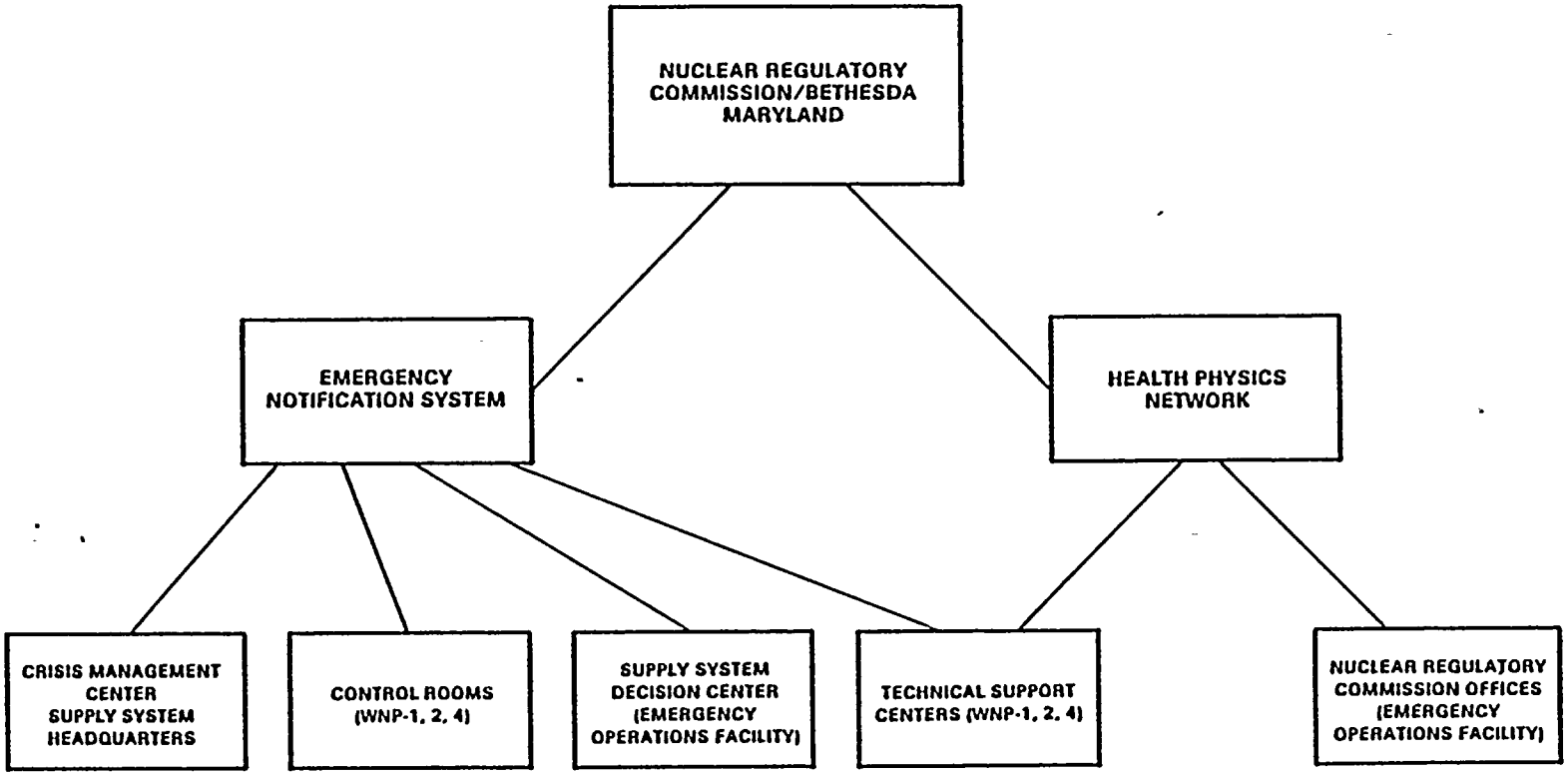


FIGURE 8-4 DEDICATED TELEPHONE CIRCIUTS (NUCLEAR REGULATORY COMMISSION)

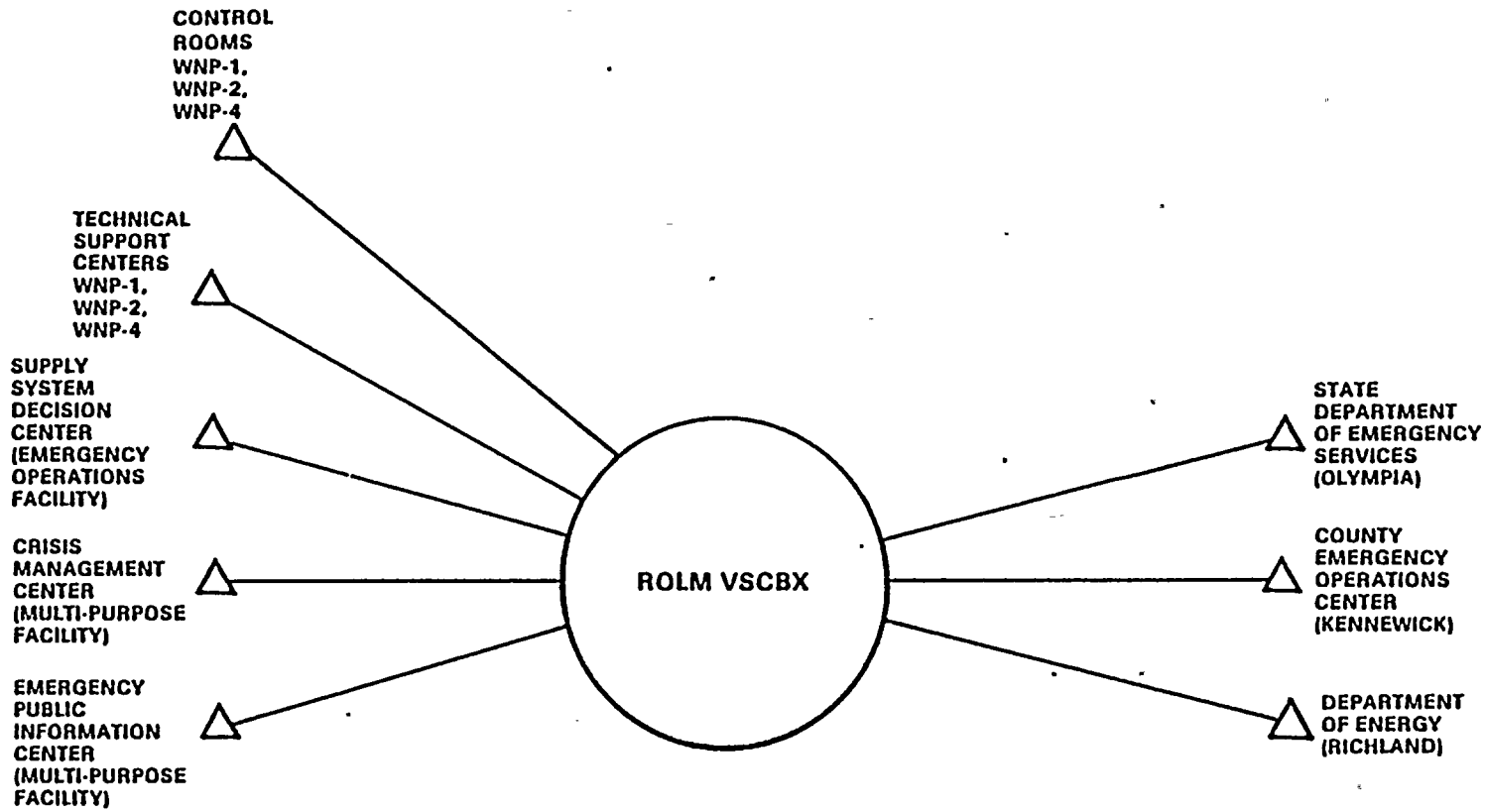


FIGURE 8-5 FACSIMILE NETWORK

4.5 Radiological Monitoring

To ensure adequate radiological protection of EOF personnel, radiation monitoring systems are provided in the EOF. The first level of defense is the ventilation intake detector. This detector is connected to the ventilation system and will automatically close the outside air intake if radiation setpoints are exceeded. Within the EOF structure is a radiation monitor which will alarm if radiation levels become high and an air sampler to collect airborne activity on a filter and charcoal cartridge. The samples can then be analyzed in the Radiological Laboratory within the EOF to detect iodine down to 10^{-7} microcuries/cc.

4.6 Communications

The EOF has a reliable voice communications capability to the TSC, the OSC, the control room, NRC, and state and local emergency operations centers. Figures 8-1 through 8-5 from the Hanford Site Emergency Preparedness Plan (attached) show the various communications systems. Administratively, the normal communication path between the EOF and the control room will be through the TSC. The primary functions of the EOF voice communications systems will be:

- o EOF management communications with the plant emergency director and the Technical Support Center director at the TSC.
- o Communications to manage Supply System emergency response resources.
- o Communications to coordinate radiological monitoring.
- o Communications to coordinate offsite emergency response activities.
- o Communications to disseminate information and recommended protective actions to responsible government agencies.

The EOF voice communications facilities include reliable primary and backup means of communication. Telephones are the primary means, with radio capability to communicate with the plant, headquarters, Department of Energy, County Sheriff, County Emergency Operations Center, Coast Guard, and field teams provided as backup. Figure 8-1 of the Hanford Site Emergency Preparedness Plan (attached) illustrates the Supply System radio capability. All company communications equipment is on emergency power. Priorities or class of service can be assigned to phones through the private telephone system. Phones which will be used during the emergency will be given access to outside lines. All other phones will be restricted to only intra-company calls.

The EOF voice communication equipment includes:

- o Hotline telephone (located in the Supply System Decision Center) via the NRC Emergency Notification System (ENS) to the NRC Operations Center.
- o Dedicated telephone (located in the NRC office space) via the NRC Health Physics Network (HPN).

- Dedicated telephones for management communications with direct access to the TSC and the control room.
- Dial telephones reserved for EOF use to provide access to onsite and offsite locations.
- Public address system interconnected to the private telephone system for paging capability.
- Intercommunications systems between work areas of the EOF, using the private company telephone system for EOF functional performance.
- Radio communications to Supply System, local, state, and federal mobile monitoring teams.
- Communications to state and local operations centers.

The EOF communication system includes designated telephones (in addition to the ENS and HPN telephones) for use by NRC personnel. At least three dial telephone lines are available for such NRC use while the EOF is activated. Also furnished are access facilities and cables to the NRC for the ENS and HPN telephones.

Facsimile transmission capability between the EOF, the TSC, and the NRC Operations Center is provided. Figure 8-5 of the Hanford Site Emergency Preparedness Plan identifies the facsimile network for the Supply System, local, and state agencies.

4.7 Instrumentation, Data System Equipment, and Power Supplies

The EOF is provided with equipment to receive and display plant condition data. These data will be analyzed at the EOF and information on plant conditions exchanged with the Technical Support Center director at the TSC. The EOF data system equipment performs these functions independently from actions in the control room and without degrading or interfering with control room and plant functions. Signals to the EOF are received from sensors providing signals to safety system equipment or displays. Suitable isolation in accordance with GDC 22, 23, and 24 is provided to ensure that the EOF systems cannot degrade performance of the safety system equipment or displays.

The EOF electrical equipment load does not degrade the capability or reliability of any safety-related power source. Circuit transients or power supply failures and fluctuations will not cause a loss of any stored data vital to the EOF functions due to the availability of redundant computer systems and since this data is available in other locations such as the control room and meteorological tower. Also, back-up manual dose projection procedures are established. Vital computer equipment is on uninterruptable power.

The plant process computer is not used as part of the EOF data system. A Prime 750 and PDP 1144 computer will be used for the EOF data system. These

are the same computers used for the TSC data system. The Emergency Dose Projection System also uses a Prime 750 computer. The GDS and Emergency Dose Projection Systems use 19-inch colorgraphics terminals: one in the Dose Assessment Center and two in the EOF Technical Data Center. Additionally, a standard CRT display is available in the Dose Assessment Center. Printer/plotters are provided in both areas. The design of the EOF data system equipment includes human-factors engineering.

4.8 Technical Data and Data System

The EOF technical data system will receive, store, process, and display information sufficient to perform assessments of the actual and potential onsite and offsite environmental consequences of an emergency condition. Data providing information on the general condition of the plant is also available for display in the EOF.

The EOF data set includes radiological, meteorological, and other environmental data as needed to:

- Assess environmental conditions.
- Coordinate radiological monitoring activities.
- Recommend implementation of offsite emergency plans.

Sensor data of the Type A, B, C, D, and E variables specified in Regulatory Guide 1.97, Revision 2, is available for display in the EOF. All data that is available for display in the TSC is available to the EOF.

The accuracy of data in the EOF is consistent with the data accuracy needed to perform the EOF functions and is equivalent to that for the data displayed in the TSC. The time resolution of data requisition is sufficient to provide data without loss of information during transient conditions. The time resolution required for each sensor signal is dependent upon the potential transient behavior of the variable being measured.

Data storage capability is provided for the EOF data set. At least 2 hours of pre-event data and 12 hours of post-event data can be recorded. The sample frequency is chosen to be consistent with the use of the data. Capacity to record at least two weeks of additional post-event data with reduced time resolution is also provided. Archival data storage and the capability to transfer data between active memory and archival data storage without interrupting EOF data acquisition and displays is provided for all EOF data. Four data display devices are provided in the EOF to allow EOF personnel to perform their assigned tasks with unhindered access to alphanumeric and/or graphical representations of:

- Plant systems variables.
- In-plant radiological variables.
- Meteorological information.
- Offsite radiological information.

Trend information display and time-history display capability is available in the EOF to give EOF personnel a dynamic view of plant systems, radiological

status, and environmental status during an emergency. The EOF displays are designed so that call-up, manipulation, and presentation of data can be easily performed. This is accomplished by both separate display units and by logically separating information display pages available on a call-up basis at each data display unit. The EOF data display formats present information so that it can be easily understood by EOF personnel operating the system. Human-factors engineering is incorporated in the design of the EOF.

The plant Graphics Display System information is part of the data system displayed in the EOF. This duplication will provide Supply System management and NRC representatives information about the current reactor systems status and will facilitate communications among the control room, TSC, and EOF.

4.9 Records Availability and Management

The EOF has ready access to necessary up-to-date plant records, procedures, and emergency plans needed to exercise overall management of Supply System emergency response resources. The EOF records include but are not limited to:

- o Plant Technical Specifications.
- o Plant Operating Procedures.
- o Emergency Operating Procedures.
- o Final Safety Analysis Report.
- o Up-to-date records related to Supply System, state, and local emergency response plans.
- o Offsite population distribution data.
- o Evacuation plans.
- o Environs radiological monitoring records.
- o Supply System employee radiation exposure histories.
- o Up-to-date drawings, schematics, and diagrams showing:
  - Conditions of plant structures and systems down to the component level.
  - In-plant locations of these systems.

These records are stored and maintained in the EOF (hard copy and/or microfiche). The method of storage and presentation of the EOF records provides ease of access under emergency conditions. The records available to the EOF are kept updated as necessary to ensure currency and completeness.

5. GRAPHICS DISPLAY SYSTEM (SAFETY PARAMETER DISPLAY SYSTEM)

5.1 Function

WNP-2 has adopted the BWR Owner's Group concept of SPDS which incorporates the requirements of NUREG-0696 as described below; however, the name chosen for this system is the Graphic Display System (GDS). Therefore, for purposes of this discussion, the term GDS will be used instead of SPDS.

The purpose of the GDS is to assist control room personnel in evaluating the safety status of the plant. The GDS is to provide a continuous indication of plant parameters and derived variables representative of the safety status of the plant. The primary function of the GDS is to aid the operator in the rapid detection of abnormal operating conditions.

It is recognized that, upon the detection of an abnormal plant status, it is desirable to provide additional information to analyze and diagnose the cause of the abnormality, execute corrective actions, and monitor plant response as a secondary GDS function.

As an operator aid, the GDS serves to concentrate a minimum set of plant parameters from which the plant safety status can be assessed. The grouping of parameters is based on the function of enhancing the operator's capability to assess plant status in a timely manner without surveying the entire control room instrumentation.

Human-factors engineering has been incorporated into the various aspects of the GDS design to enhance the functional effectiveness of control room personnel. The design of the primary display formats has been made as simple as possible, consistent with the required function, and includes coding techniques to assist the operator's memory recall for the detection and recognition of unsafe operating conditions. The human-factored concentration of these signals will aid the operator in functionally comparing signals in the assessment of safety status.

All data for display will be validated, where practicable, on a real-time basis as part of the display to control room personnel. Operator training in the use of the GDS will provide guidance for the resolution of unsuccessful data evaluation.

The GDS will be in operation during normal and abnormal operating conditions and will be capable of displaying pertinent information during steady-state and transient conditions. The GDS will be capable of presenting the magnitudes and the trends of parameters or derived variables as necessary to allow rapid assessment of the current plant status by control room personnel.

The parameter trending display will contain recent and current magnitudes of the parameter as a function of time. The derivation and presentation of parameter trending during upset conditions is a task that is automated, thus freeing the operator to interpret the trends rather than generate them.

A qualification program will be established to demonstrate GDS conformance to its functional criteria.

5.2 Location

The GDS will be located in the control room, with additional GDS-type displays provided in the TSC and the EOF. The GDS will consist of two colorgraphic CRTs and will be part of the normal control board, thus making it readily accessible and visible to the shift supervisor, control room senior reactor operator, shift technical advisor, and reactor operators from the normal operating area.

5.3 Size

The GDS display screens are high-density, 19-inch diagonal, colorgraphic CRTs. The GDS screens are readable from the emergency operating station of

the control room senior reactor operator. They do not interfere with normal movement or with full visual access to other control room operating systems and displays.

5.4 Staffing

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

5.5 Display Considerations

The GDS displays are based on the BWR Owner's Group displays that have been developed through stringent human factors and analyses and detailed operator test programs using a BWR simulator.

The display format is provided in three levels. Level 1 provides current status of the following functions:

- Reactivity control.
- Reactor core cooling.
- Reactor coolant pressure boundary.
- Containment integrity.
- Reactivity control.

Level 2 provides for more detailed information of the above parameters in two formats: (1) current status bar charts, and (2) a time trend of the pertinent parameter.

Level 3 provides computer-generated data, mostly in graph format, to be used as an aid to the operator in implementing the emergency operating procedures.

Each display is readily called up by the press of a clearly delineated function button touch pad. The system is designed such that future changes can be easily accommodated by a change in the software.

5.6 Design Criteria

The sensors and signal conditioners (such as preamplifiers, isolation devices, etc.) are designed and qualified to meet Class 1E standards where required for those parameters that are also used by safety systems. Furthermore, sensors and signal conditioners for those parameters of the GDS identical to the parameters specified within Regulatory Guide 1.97 are designed and qualified to the criteria stated in Regulatory Guide 1.97. For GDS application, Class 1E qualified devices from the sensor to a post-accident-accessible location, such as outside containment, and then non-1E devices from containment to the display, are used on the presumption that these components can be repaired or replaced in an accident environment. The processing and display devices of the GDS shall be of proven high quality and reliability.

The function of the GDS is to aid the operator in the interpretation of transients and accidents. This function is provided during and following all events expected to occur during the life of the plant, including earthquakes.

To achieve this function, the display system will not only take adequate account of human factors--the man/machine interface--but is also sufficiently durable to function during and after earthquakes. Because of current technology, it is not possible to satisfy these criteria within one system. Therefore, in recognition of the restraints imposed by current technology, the chosen alternative was to design the overall system function with a primary and a backup display system: (1) the primary GDS display has high performance and flexibility but is not seismically qualified, and (2) the backup display system is operable during and following earthquakes and consists of the normal control room displays needed to comply with Regulatory Guide 1.97.

In all cases, in both the primary GDS display and the backup system, the seismically qualified portion of the display is sufficiently human-factored in its design to allow the control room operations staff to perform the safety status assessment task in a timely manner.

6. NUCLEAR DATA LINK

The Supply System, at this time, is not implementing a Nuclear Data Link (NDL). The uncertainty of the specific requirements for the system and the major work load already directed toward the GDS system and the dose projection system has precluded any activity toward an NDL. However, the computerized system which implements the GDS system is sufficiently flexible to include an NDL once the requirements for the system become mandatory. In addition, the TSC, EOF, and control room have facsimile capability. All information which would be available to the NRC over the NDL can be transmitted over the facsimile system to the NRC offices.

7. ACQUISITION AND CONTROL OF TECHNICAL DATA

7.1 Sources of Technical Data

Parameters specified in Regulatory Guide 1.97, Revision 2, are collected by the Transient Data Acquisition System (TDAS). Isolation devices are provided for all signal interfaces with safety systems to prevent interference, degradation, or damage to any element of the safety system as specified in General Design Criterion 24, "Separation of Protection and Control Systems," and IEEE Standard 279-1971, Section 4.7, "Control and Protection System Interaction." The signals are provided to the control room Central Control Unit via remote modules.

7.2 Acquisition of Data

The WNP-2 data acquisition and distribution systems are shown in Figure 7-1 (attached).

7.3 TDAS Functional Limitations

The TDAS is not subject to external demands that could degrade its reliability under accident conditions. The only exception is the system's internal calibration and self-diagnostic routines. Output data from the TDAS is consistent with readings observed by the operators in the control room. To achieve this objective, verification and validation tests will be performed to assure correlation of data obtained from each source.

7.4 TDAS Design, Verification, and Configuration Control

Because the technical data acquisition system is a source of data for the emergency facilities, tests to demonstrate and evaluate the integrity of software and the integrated system will be performed.

8. EMERGENCY RESPONSE FACILITY INTEGRATION

During emergency conditions, it is essential that there be a continuous high level of interaction and communication among key personnel in the control room, emergency response facilities, and NRC to ensure that all emergency actions are fully understood and coordinated.

The Supply System's emergency response facilities (ERFs) are designed to function as an integrated system and to provide coordinated support to the control room during emergency operating conditions. They are integrated into the WNP-2 emergency plan and procedures to facilitate coordination with state and local emergency response facilities.

The systems design of Supply System ERFs ensures that the following functional criteria are satisifed:

- The operation of any ERF system or subsystem will not degrade the performance or reliability of any reactor safety or control system or of any safety-related displays in the control room.
- Actions in the control room and operation of control room systems will not degrade or interfere with the functional operation of ERF systems.
- Normal operation of any system or subsystem in the ERFs will not degrade or interfere with the functional operation of other systems in those facilities.
- The TDAS hardware and software is protected against unauthorized manipulation of or interference with input signals, data processing, data storage, and data output.

Regulatory Guide 1.97, Revision 2, establishes criteria for accident-monitoring instrumentation to be displayed in the control room. The minimum data set that will be available for display and use in the TSC and EOF includes the Type A, B, C, D, and E variables specified in Regulatory Guide 1.97 and those displayed by the GDS.

9. VERIFICATION AND VALIDATION CRITERIA

The installation and operation of the control room, TSC, and EOF systems will be verified and validated by qualified personnel to a degree commensurate with safety classification requirements in order to provide assurance that reliable systems will be available during an emergency.

These systems are designed to allow operator recognition of malfunctions and automatic indication of out-of-range parameter values.

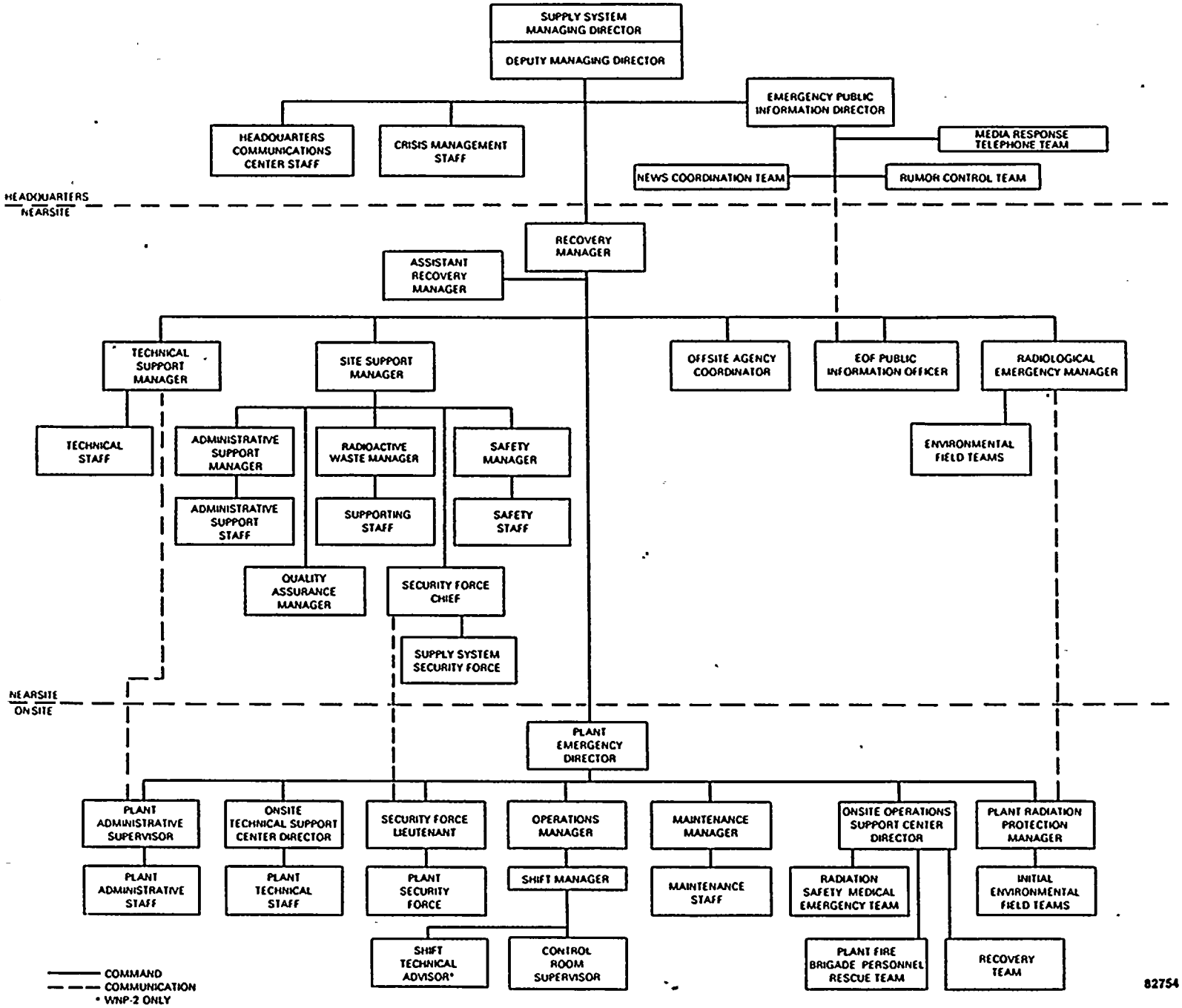


FIGURE 4-3 WNP-1, 2, 4 EMERGENCY ORGANIZATION

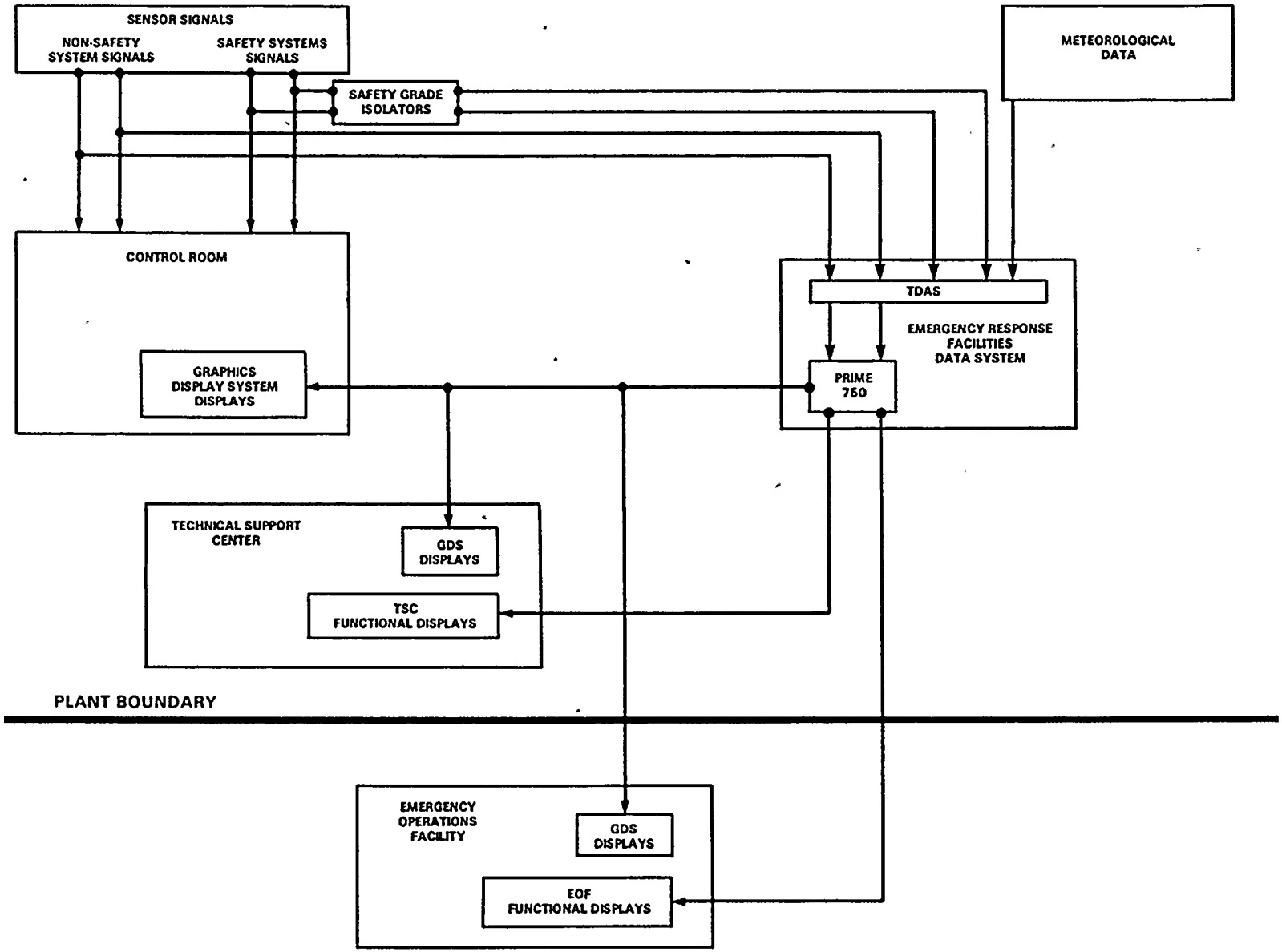


FIGURE 7-1 FUNCTIONAL BLOCK DIAGRAM FLOW

has telephone access to commercial telephone common-carrier services that bypass any onsite or local offsite telephone switching facilities that may be susceptible to loss of power during emergencies. Spare commercial telephone lines to the plant are not identified for use by the TSC during emergencies. However, the private telephone system provides the ability to establish "classes" of service for each company telephone. Through this capability, only telephones identified for emergency use will be classified to have access to outside lines, thereby reserving all available trunk lines for emergency use.

The TSC voice communications equipment includes:

- Hotline telephone (located in the NRC consultation room) via the NRC Emergency Notification System (ENS) to the NRC Operations Center.
- Dedicated telephone (located in the NRC consultation room) via the NRC Health Physics Network (HPN).
- Dedicated telephones for management communications with direct access to the control room, the OSC, and the EOF.
- Dial telephones that provide access to onsite and offsite locations.
- Communications are available to Supply System mobile monitoring teams and to state and local operations centers prior to EOF activation.

The TSC communication system also includes designated telephones (in addition to the ENS and HPN telephones) for use by NRC personnel. At least two dial telephone lines are available for such NRC use when the TSC is activated. The Supply System will furnish onsite access facilities and cables to the NRC for the ENS and HPN telephones.

Facsimile transmission capability between the TSC, the EOF, the Department of Energy, state and county emergency operations centers, and the NRC Operations Center is also provided.

2.8 Instrumentation, Data System Equipment, and Power Supplies

Equipment is provided in the control room to receive, store, and display data needed in the TSC to analyze plant conditions. The data system equipment performs these functions independent of actions in the control room and without degrading or interfering with control room and plant functions. Suitable isolation is provided in accordance with GDC 24 to ensure that the TSC systems will not degrade performance of the safety system equipment or displays.

The TSC electrical equipment load does not degrade the capability or reliability of any safety-related power source. Circuit transients or power-supply failures and fluctuations will not cause a loss of any stored data vital to the TSC functions as this data is resident within the control room computers. Backup power is provided to maintain continuity of TSC functions and to immediately resume data acquisition, storage, and display of TSC data if loss of the primary TSC power sources occurs.

The plant process computer is not part of the GDS. A Prime 750 and a PDP 1144 will be the computers used for this system. The Graphic Display System (GDS) utilizes 19-inch colorgraphics terminals. Human-factors engineering has been incorporated in the design of the graphics available through the TSC data system.

2.9 Technical Data and Data System

The GDS technical data system will receive, store, and process information acquired from different areas of the plant for display as needed to perform the TSC function. The data available for display in the TSC enables plant management, engineering, and technical personnel assigned there to aid control room operators in handling emergency conditions. The data system shall provide access to accurate and reliable information sufficient to determine:

- o Plant steady-state operating conditions prior to the accident.
- o Transient conditions producing the initiating event.
- o Plant system dynamic behavior throughout the course of the accident.

The GDS may be used for:

- o Reviewing the accident sequence.
- o Determining appropriate mitigating actions.
- o Evaluating the extent of any damage.
- o Determining plant status during recovery operations.

The data sets available to the GDS are complete enough to permit accurate assessment of the accident without interference from the control room emergency operation. As a minimum, the sets of Type A, B, C, D, and E variables specified in Regulatory Guide 1.97, Revision 2, "Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," are available for interrogation, display, and printout in the TSC. In addition, all sensor data and calculated variables not specified in Regulatory Guide 1.97 but included in the data sets for the GDS and EOF are available for display. There are no provisions for transmission of the TSC displays to non-Supply System locations.

The accuracy of the data displayed is the same as that displayed in the control room. The time resolution of data acquisition is sufficient to provide data without loss of information during transient conditions. The time resolution for each sensor signal will depend upon the potential transient behavior of the variable being measured. The TSC data displays of Regulatory Guide 1.97 variables meet the criteria for TSC data but do not necessarily meet the Regulatory Guide 1.97 design and qualification criteria for display of those variables in the control room.

Data storage and recall capability is provided for the TSC data set. At least 2 hours of pre-event data and 12 hours of post-event data will be recorded. The sample frequency will be chosen to be consistent with the use of the data. Capacity to record at least two weeks of additional post-event data

with reduced time resolution is provided. Archival data storage and the capability to transfer data between active memory and archival data storage without interrupting TSC data acquisition and displays is provided for all TSC data.

Two colorgraphics CRT terminals, one standard CRT data display, and two printer/plotter devices are provided in the TSC to allow all TSC personnel to perform their assigned tasks with unhindered access to data. The TSC displays include but are not limited to alphanumeric and/or graphical representations of:

- o Plant systems variables.
- o In-plant radiological variables.
- o Meteorological information.
- o Offsite radiological information.

Trend information display and time-history display capability is provided in the TSC to give TSC personnel a dynamic view of the plant status during abnormal operating conditions. The TSC displays are designed so that call-up, manipulation, and presentation of data can be easily performed. The TSC data display formats present information so that it can be easily understood by the TSC personnel performing analyses. The GDS information is part of the TSC data system.

2.10 Records Availability and Management

The TSC has a complete and up-to-date repository of necessary plant records and procedures at the disposal of TSC personnel to aid in their technical analyses and evaluations of emergency conditions. In particular, up-to-date, as-built drawings of the plant systems are available to enable TSC personnel to diagnose sensor data, evaluate data inconsistencies, and identify and counteract faulty plant system elements.

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

- o Plant Technical Specifications.
- o Plant Operating Procedures.
- o Emergency Operating Procedures.
- o Final Safety Analysis Report.
- o Operations and Maintenance Manuals.
- o Architect/Engineer and vendor information.
- o Records needed to perform the functions of the EOF when it is not operational.
- o Up-to-date, as-built drawings, schematics, and diagrams showing:
  - Conditions of plant structures and systems, down to the component level.
  - In-plant locations of these systems.

All of the above records will be available in the TSC in current form when this facility is fully implemented. These records will be updated as necessary to ensure currency and completeness. The storage and presentation of the TSC records provide easy access under emergency conditions.

Plant operating records and Plant Operations Safety Committee records and reports will be located in the plant Service Building in an area near to the Operations Support Center.

3. OPERATIONS SUPPORT CENTER

3.1 Function

The Operations Support Center (OSC) is an onsite area located in the Service Building lunchroom at grade level. This area will be used as an assembly area to conduct personnel accountability for plant evacuees. The OSC is also the location where the in-plant teams will receive and respond to instructions. The OSC director is in charge of the area and will dispatch teams upon request of the plant emergency director or control room or as conditions dictate. Three teams are established:

- Radiation Safety/Medical Emergency Team.
- Fire Brigade/Personnel Rescue Team.
- Recovery Team.

3.2 Habitability

The OSC does not have special shielding or ventilation systems. By being in the Service Building, some protection is afforded by the fact that no piping associated with the reactor systems transverses the area. In the event the OSC became uninhabitable, personnel would evacuate to the EOF, TSC, or headquarters. The decision as to where personnel will evacuate will be made by the plant emergency director. Key personnel, depending on the type of the emergency, would be directed to the TSC. Personnel with the potential to be needed if conditions worsen would be sent to the EOF. Nonessential personnel would be sent to the headquarters complex.

3.3 Communications

The OSC has a dedicated communications system with links to the control room, TSC, and EOF. Additionally, at least one dial telephone is available in the OSC.

4. EMERGENCY OPERATIONS FACILITY (PLANT SUPPORT FACILITY)

4.1 Function

The Plant Support Facility is located 0.75 miles southwest of WNP-2, 1.3 miles west-southwest of WNP-1, and 1.4 miles southwest of WNP-4. This facility is used to support normal plant operations for all three plants and includes a 20,000-square-foot shielded area in the lower level for the Emergency Operations Facility.

A floor plan of the Plant Support Facility is shown in Figure 10-8 of the Hanford Site Emergency Preparedness Plan (attached). The Emergency Operations Facility contains several functional areas which are provided for various groups and will be activated for a Site Area or General Emergency or for lesser emergencies when deemed necessary by the plant emergency director.

The Emergency Operations Facility (EOF) is under the direction of the recovery manager and assists the plant by handling those functions associated with evaluating and minimizing the offsite effects of the accident and supporting the TSC and control room with technical data analyses. These include such functions as field monitoring, dose projections, area security, interfacing with outside organizations, recommendations of protective actions for the public, assisting the plant technical staff, public relations, administrative services, scheduling of personnel, and establishing a recovery program.

Facilities are provided in the EOF for the acquisition, display, and evaluation of radiological, meteorological, and plant data pertinent to determine offsite protective measures. These are available through the Supply System-developed Emergency Dose Projection System which is a computerized system using colorgraphics terminals to display data and doses in the 10-Mile Emergency Planning Zone.

The Supply System will use the EOF to coordinate its emergency response activities and recovery operations with local, state, and federal agencies, including the NRC. Supply System personnel in the EOF will use the evaluations of offsite effects to make protective action recommendations for the public to state and local emergency response agencies.

State and local agencies are responsible for implementing emergency response actions involving the general public. The state and local agencies operate from the EOF and from their own control centers in Kennewick and Olympia, Washington. Co-location of offsite authorities at the EOF for the purpose of offsite dose estimation has been agreed to by the Supply System, Department of Energy, Benton/Franklin Counties, and the state.

The Media Briefing Preparation Area is established in the EOF for public affairs personnel to develop press releases and/or information sheets which will then be sent by facsimile to the Joint Emergency Information Center located in the Supply System Headquarters Building approximately ten miles from WNP-2. From there, press statements are made by Supply System, county, state, and federal officials.

The Media Briefing Area, located upstairs in the Plant Support Facility above the EOF, can be used to brief press personnel who have been brought to the EOF for tours during the emergency.

Industrial-level security is provided for the Plant Support Facility during normal use. When the EOF is activated during an emergency, access will be controlled through the Security Alarm Station located in the protected area. Through the use of closed-circuit TV, access can be controlled through the main entrance and the side entrance of the Plant Support Facility and through the entrance into the shielded EOF. All other access doors will be locked.

To maintain a proper level of readiness, the EOF shall be activated periodically for training and for emergency preparedness exercises as specified in the Hanford Site Emergency Preparedness Plan. The EOF is used by the Supply System for normal daily operations as well as for training and exercises. Use of the EOF during normal operations is limited to activities that will not degrade EOF activation, operations, or reliability.

4.2 . Location, Structure, and Habitability

Determination of the location of the EOF and that a backup facility was not required considered the following factors:

- The location provides optimum functional and availability characteristics for carrying out functions specified for the EOF (i.e., overall strategic direction of Supply System onsite and support operations, determination of public protective actions to be recommended by the Supply System to offsite officials, and coordination of Supply System activities with federal, state, and local organizations).

- The EOF functions would not be interrupted during radiation releases for which it would be necessary to recommend protective actions for the public.

When considering these points, the best decision was to build a facility hardened to withstand even the most severe radiological conditions near the plants. The original NRC guidlines on the EOF, issued in 1979 and 1980, placed the EOF close to the plants. This can be found in the following references:

- Draft NUREG 0696, 1980, Section IV.B, page 16.

- Draft NUREG 0654, January 1980, Section H2, page 44.

- Second NUREG 0654 draft, October 1980, Section H2, page 47.

- Letter from Darrel Eisenhut to all power reactor licensees. Subject: Clarifications of NRC Requirements for Emergency Response Facilities at Each Site; April 25, 1980, page 3.

- FEMA Guidance Memorandum #3, April 1, 1980.

The Supply System, following this guidance, constructed the EOF approximately 0.75 miles southwest of WNP-2. To ensure habitability, calculations were performed analyzing the Class 9 reactor accidents from WASH 1400. The results of this analysis are provided in Figure 10-9 of the Hanford Site Emergency Preparedness Plan (attached). Based upon the EPA Protective Action Guides, a concrete-equivalent shielding of two feet was selected. This is provided by a two-foot-thick ceiling and wall that divides the EOF from the rest of the building and the use of dirt on the sides of the outer walls. Special ventilation is provided using charcoal and HEPA filters with automatic detectors which close off the outside air intake and go to a recirculation mode if the plume activity exceeds a selected set point.

A backup EOF is not identified. Although the Supply System does not totally meet the criteria in Table 2, page 18 of NUREG 0696, we consider our approach to the EOF habitability criteria to be technically acceptable.

4.3 Staffing and Training

The EOF is staffed to provide the overall management of Supply System resources and the continuous evaluation and coordination of Supply System activities during and after an accident. Upon EOF activation, designated personnel will report to the EOF within approximately one hour with a sufficient staff to support the plant. The recovery manager is in charge of all activities in the EOF. The EOF staff is shown in Figure 4.3 of the Hanford Site Emergency Preparedness Plan (attached) and is fully described in Section 4.0 of the plan. The staffing for each emergency class is detailed in the Emergency Plan Implementing Procedures. Basically, at the Alert level, key personnel, including dose assessment personnel, will respond. At the Site Area or General Emergency, the EOF is fully activated. Operating procedures and staff training in the use of data systems and instrumentation include precautions concerning the limitations of the equipment.

In order to function effectively, EOF staff personnel must be aware of their responsibilities during an accident. To maintain proficiency, the EOF staff participates in EOF activation drills which are conducted periodically in accordance with the Hanford Site Emergency Preparedness Plan. These drills include operation of all facilities that will be used to perform the EOF functions, including any support facilities located outside the EOF.

4.4 Size

The EOF Building is large enough to provide the following:

- Working space for the personnel assigned to the EOF, including state and local agency personnel, at the maximum level of occupancy without crowding.
- Space for EOF data system equipment needed to transmit data to other locations.
- Sufficient space to perform repair, maintenance, and service of equipment, displays, and instrumentation.
- Space for ready access to communications equipment by all EOF personnel needing communications capabilities to perform their functions.
- Space for ready access to functional displays of EOF data.
- Space for storage of plant records and historical data or space for means to readily acquire and display those records.
- Separate office space to accommodate at least five NRC personnel during periods that the EOF is activated for emergencies.

The EOF work space is sized for over 50 persons including personnel from outside agencies and the NRC. Of the 20,000-square-foot EOF, very little space is not useable as work area.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S EMERGENCY RESPONSE FACILITIES

1. INTRODUCTION

The facilities and systems described in this report have been established by the Washington Public Power Supply System to provide improved emergency response to an accident. The facilities include the control room, Onsite Technical Support Center (TSC), Onsite Operations Support Center (OSC), and Nearsite Emergency Operations Facility (EOF). The systems include the Graphics Display System (GDS) and the Technical Data Acquisition System (TDAS). The Safety Parameter Display System (SPDS) functional requirements are included in the capabilities of the GDS. The Supply System is not developing a Nuclear Data Link (NDL) capability.

1.1 Background

As a result of the Three Mile Island accident, improvements were identified by the Nuclear Regulatory Commission relating to emergency response facilities. These improvements were identified in NUREG 0696, "Functional Criteria for Emergency Response Facilities," dated February 1981. The Nuclear Regulatory Commission reviewed the Supply System's Emergency Response Plan for the Hanford Reservation, Revision 2, dated December 1981, and requested a comparison of the Supply System emergency facilities with NUREG 0696. This report provides that comparison and follows the format of NUREG 0696.

1.2 Control Room

The control room is located on the 501' level of the Radwaste and Control Building. It contains instrumentation, controls, and displays for:

- Nuclear systems.
- Reactor coolant systems.
- Steam systems.
- Electrical systems.
- Safety systems (including engineered safety features).
- Accident monitoring systems.

The control room is normally staffed by a shift manager, one control room supervisor, one shift support supervisor, two reactor operators, one shift technical advisor, and three equipment operators. Two health physics/chemistry technicians and a security force are also on shift to support plant operations. Maintenance personnel will also be on shift as needed.

1.3 Emergency Response Facilities

1.3.1 Technical Support Center

The Technical Support Center (TSC) is a new structure located adjacent to the west wall of the Radwaste Building at grade level (441'). See attached Figures 10-1 and 10-2 from the Hanford Site Emergency Preparedness Plan. The TSC

has approximately 5500 square feet of floor space to provide work areas for plant management and the technical support staff. Technical data displays (GDS) and plant records are available within the TSC. The TSC will function as the primary plant communication center during an emergency with dedicated phone circuits to the other emergency centers and plant radio frequencies for coordinating team activities. The plant emergency director (plant manager) is in charge of plant response to the emergency and will normally function from the TSC. Reporting to the plant emergency director is the Technical Support Center director who is in charge of the activities in the TSC to support the control room. The TSC facilities will be used during normal operating conditions as a work station for plant personnel.

1.3.2 Operations Support Center

The Operations Support Center (OSC) is located in the lunch room of the Service Building, ground floor (441'). See attached Figure 10-3 from the Hanford Site Emergency Preparedness Plan. The OSC is approximately 1,100 square feet in area and is used as an assembly area during plant evacuations for plant personnel and emergency team members. Unnecessary plant personnel may then be evacuated from the site. Dedicated communications exist with the control room, TSC, and EOF.

1.3.3 Emergency Operations Facility

The Emergency Operations Facility (EOF) is located 0.75 miles southwest of WNP-2. The EOF provides for management of the overall Supply System emergency response (including coordination with federal, state, and local officials), coordination of radiological and environmental assessments, and determination of recommended public protective actions. Figure 10-8 from the Hanford Site Emergency Preparedness Plan shows the floor plan for the EOF. The EOF has access to the same technical data as the TSC and the necessary plant records to assist in the diagnosis of plant conditions. The recovery manager is responsible for the overall Supply System emergency effort and conducts operations from the EOF. Reporting to the recovery manager is the technical manager who coordinates technical activities with the TSC. Also reporting to the recovery manager is the site support manager who functions as a key supporter of plant activities. The Supply System emergency organization is shown in the attached Figure 4.3 from the Hanford Site Emergency Preparedness Plan.

1.3.4 Graphics Display System (Safety Parameter Display System)

WNP-2 will use the Graphic Display System (GDS) as developed by the BWR Owner's Group as the basis for meeting this requirement. The GDS provides a display of plant parameters from which the safety status of operations may be assessed in the control room, TSC, and EOF. The primary function of the GDS is to help operating personnel in the control room make quick assessments of plant safety status. Similar GDS displays in the TSC and EOF improve the exchange of information between these facilities and the control room and assist corporate and plant management in their decision-making process. The GDS is operated during normal plant operations and during all classes of emergencies. The GDS has the capability for operator interaction and can be used for diagnostic analysis. The displays are computer generated and thus have the flexibility to allow future modifications.

1.3.5 Nuclear Data Link

The Supply System, at this time, is not implementing a Nuclear Data Link (NDL). The uncertainty of the specific requirements for the system and the major work load already directed toward the GDS system and the dose projection system has precluded any activity toward an NDL. However, the computerized system which implements the GDS system is sufficiently flexible to include a NDL if the requirements for the system become mandatory. In addition, the TSC, EOF, and control room have facsimile capability. All information which would be available to the NRC over the NDL can be transmitted over the facsimile system to the NRC offices.

1.4 Activation and Use

The activation and use of the Emergency Response Facilities (ERF) is determined by the emergency class and by the specific conditions surrounding the accident and are specified in the Hanford Site Emergency Preparedness Plan. In summary:

- o The GDS is operational during plant operating conditions, including accidents.
- o The TSC and OSC are activated for an Alert or higher emergency classification.
- o The EOF is partially activated at an Alert and completely activated for a Site Area or General Emergency.
- o The Headquarters Emergency Center and Joint Public Information Center are activated for a Site Area or General Emergency. The Joint Public Information Center may be activated sooner, depending upon the public's perception of the threat from the emergency.
- o The plant emergency director or recovery manager may activate any facility at any emergency classification to ensure a proper response to the emergency.

Until the TSC, OSC, and EOF are activated, all functions of these facilities will be performed in the control room. When the TSC is functional, emergency response functions, except direct supervision of reactor operations and manipulation of reactor system controls, shall shift to the TSC. Plant administration, technical support functions, and contact with offsite activities to assist control room operators will be performed in the TSC. The OSC provides a place for operations support personnel to be in direct communication with the control room, TSC, and other operations managers for assignment to duties in support of emergency operations. When the EOF is activated, the functions of providing overall emergency response management, monitoring and assessing radiological effluent and the environs, making offsite dose projections, providing recommendations to state and local officials, and coordinating with federal officials will shift to the EOF. See Table 1 for an outline of the transfer of emergency response functions from the control room to the TSC and EOF under the various emergency classes.

The level of staffing of the ERFs may vary according to the severity of the emergency condition. The staffing criteria for each emergency class is fully detailed in the WNP-2 Emergency Plan Implementing Procedures.

1.5 Reliability

Good engineering practice will be utilized in design, construction, and maintenance of data systems, instrumentation, and facilities needed for emergency response in order to achieve reliable system performance. The control room, TSC, EOF, and headquarters all have emergency generators for critical operations and uninterruptable power is available for key control room computer equipment. The control room instrumentation provides the backup to the GDS system. A primary and a secondary communications center are established. A net of five company computers provides a backup capability for the emergency dose projection system computer. The EDPS functions are also backed up by procedures specifying hand calculation techniques. Through the use of backup facilities and equipment, the ability to respond to an emergency is provided with a high level of confidence.

Table 1. Transfer of Emergency Response Functions from the Control Room to the Technical Support Center and the Emergency Operations Facility

Emergency Response Functions	Emergency Class			
	Unusual Event	Alert	Site Area Emergency	General Emergency
Supervision of reactor operations and manipulation of controls	CR	CR	CR	CR
Management of plant	CR(TSC)	TSC	TSC	TSC
Technical support to reactor operations	CR(TSC)	TSC	TSC	TSC
Management of corporate emergency response resources	CR(TSC,EOF)	TSC(EOF)	EOF	EOF
Radiological effluent and environs monitoring, assessment, and dose projections	CR(TSC,EOF)	TSC(EOF)	EOF	EOF
Inform federal, state, and local emergency response organizations and make recommendations for public protective actions	CR(TSC,EOF)	TSC(EOF)	EOF	EOF
Event monitoring by NRC regional emergency response team*	(CR)	TSC(EOF)	TSC & EOF	TSC & EOF
Management of recovery operations	CR(TSC,EOF)	TSC	TSC & EOF	TSC & EOF

NOTE: (CR), (TSC), (EOF), or (TSC, EOF) indicates that activation of this facility (or the performance of this function) is optional for the indicated emergency class.

*One NRC individual also may be stationed in the control room.

2. TECHNICAL SUPPORT CENTER

2.1 Function

The Onsite Technical Support Center (TSC) will provide the following functions:

- Provide plant management and technical support to plant operations personnel during emergency conditions.
- Relieve the reactor operators of peripheral duties and communications not directly related to reactor system manipulations.
- Prevent congestion in the control room.
- Perform the EOF function until it becomes operational.

The TSC is the emergency operations work area for designated technical, engineering, and senior Supply System plant management personnel, any other Supply System designated personnel required to provide the needed technical support; and a small staff of NRC and A/E or NSSS personnel. The primary role of the NRC in the TSC will be to observe plant operation and provide advisory support to plant management. The Technical Support Center director will use the resources of the TSC to provide guidance and technical assistance to the shift manager in the control room. However, all manipulations shall be performed by the control room licensed operators.

The TSC has facilities to support plant management and technical personnel who will be assigned there during an emergency and will be the primary in-plant communications center for the plant during the emergency. TSC personnel will use the GDS 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 control room operating personnel in the management of abnormal conditions and in accident mitigation. TSC personnel will also use the environmental and radiological information available from the GDS to perform the necessary functions of the EOF when this facility is not operational. The TSC will also be used to provide technical support during recovery operations following an emergency.

The TSC facilities are used by the plant technical staff for normal daily operations as well as for training and emergency drills. Use of the TSC facility during normal operation is limited to activities that will not degrade TSC preparedness to react to abnormal conditions or reduce TSC systems' reliability. The shift technical advisor may use the TSC facilities in performing his duties during normal operating conditions in addition to using them during emergencies.

2.2 Location

The onsite TSC provides a facility near the control room for detailed analyses of plant conditions during abnormal conditions or emergencies by trained and competent technical staff. During recent events at nuclear power plants,

telephone communications between the facilities were ineffective in providing all of the necessary management interaction and technical information exchange. This demonstrates the need for face-to-face communications between TSC and control room personnel. Therefore, the TSC is located as close as possible to the control room in a new structure attached to the Radwaste Building. The walking time from the TSC to the control room is less than two minutes. The close location will facilitate face-to-face interaction between control room personnel and senior plant managers working in the TSC. This proximity also will provide access to information in the control room that is not available through the GDS.

Provisions are made for the safe and timely movement of personnel between the TSC and the control room under emergency conditions. These provisions include consideration of the effects of direct radiation and airborne radioactivity from in-plant sources on personnel traveling between the two facilities. Anticontamination clothing, respiratory protection, and other protective gear are available to protect personnel in transit. The two-minute travel time between the TSC and the control room does not include time required to put on any necessary radiological protective gear. There are no major security barriers between these two facilities other than the access control station for the control room.

2.3 Staffing and Training

Upon activation of the TSC, designated personnel shall report directly to the TSC and achieve full functional operation as quickly as possible. During day shifts, this will be less than 30 minutes. During backshifts, this will be less than one hour. Activation of the TSC provides that only designated operating personnel are in the control room during the emergency and that needed technical support will be provided without obstructing actual plant manipulations or overcrowding the control room.

The TSC staff consists of sufficient technical, engineering, and senior designated officials to provide the needed support to the control room during emergency conditions. Consultants may be designated to augment Supply System resources in the TSC as needed. The Technical Support Center director coordinates activities in the TSC and interfaces with the control room, the OSC, and the EOF.

The level of staffing of the TSC may vary according to the severity of the emergency condition. The staffing for each emergency class is fully detailed in the Supply System WNP-2 Emergency Plan Implementing Procedures.

For the TSC to function effectively, TSC staff personnel must be aware of their responsibilities during an accident. To accomplish this, a training program is established for the TSC personnel. All TSC staff will take the basic emergency planning class plus a more in-depth class relating to the TSC function and how the TSC interacts with other emergency centers. In addition, persons assigned specific duties will be provided additional training in such areas as emergency management, accident assessment, and offsite dose assessment. The TSC will be involved with drills during the year to ensure readiness, including a program involving simulated GDS displays and interaction

with the WNP-2 simulator control room to provide an element of realism to the drill program. The Hanford Site Emergency Preparedness Plan, Chapter 17, and the Emergency Plan Implementing Procedures provide more detail concerning the drill/exercise program.

2.4 Size

The TSC is a new structure adjacent to the Radwaste Building. The facility is large enough to provide:

- o A total of approximately 5500 square feet of space, of which approximately 4000 square feet is available for the TSC data system display, equipment, and work areas.
- o Sufficient space to perform repair, maintenance, and service of equipment, displays, and instrumentation.
- o Space for data transmission equipment needed to transmit data originating in the TSC to other locations.
- o Space for personnel access to functional displays of TSC data.
- o Communications areas to provide radio contact with plant teams and persons dispatched to the field until the EOF is operational.
- o Space for storage of and access to plant records and historical data.
- o A separate NRC room for several NRC personnel.
- o A separate room for the plant emergency director.
- o A kitchenette.
- o A storage area for protective clothing, respirators, and other equipment.

The TSC working space is sized to provide work areas and office space for a minimum of 25 persons, including 5 NRC personnel.

2.5 Structure

The TSC is designed and built to withstand the most adverse conditions reasonably expected during the design life of the plant including adequate capabilities for earthquakes, high winds, and floods. The 100-year flood and high winds are used as the design basis. The facility is a well-engineered structure designed to withstand earthquakes, but is not designed to meet the Seismic Category I requirements. The facility is designed to Seismic Category II requirements.

2.6 Habitability

Since the TSC is to provide direct management and technical support to the control room during an accident, it is designed to have the same radiological

habitability as the control room under accident conditions. TSC personnel are protected from radiological hazards, including direct radiation and airborne radioactivity from in-plant sources under accident conditions, to the same degree as control room personnel. Eighteen-inch concrete walls and ceilings are provided.

The TSC ventilation system normally obtains outside air through louvers and ducting on the south wall of the mechanical equipment room. In an emergency, the normal air inlet isolates and make-up air is drawn from the control room remote air intake system, thereby providing a reliable source of good air, including access to the two remote air intakes located away from the WNP-2 facility. The TSC ventilation system includes both HEPA and charcoal filters. Sufficient potassium iodide is also provided for personnel assigned to the TSC.

To ensure adequate radiological protection of TSC personnel, radiation monitoring systems are provided in the TSC. These monitoring systems consist of installed monitors and portable monitoring equipment dedicated to the TSC. These systems will continuously indicate radiation dose rates and airborne radioactivity concentrations inside the TSC while it is in use during an emergency. These monitoring systems 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. Detectors are able to distinguish the presence or absence of radioiodines at concentrations as low as 10^{-7} microcuries/cc.

Equipment that protects personnel is provided in the TSC for the staff who must travel between the TSC and the control room or the EOF under adverse radiological conditions. Protective equipment (protective clothing and potassium iodide) is also provided to allow TSC personnel to continue to function during the presence of low-level airborne radioactivity or radioactive surface contamination. This equipment is properly maintained in accordance with plant procedures to assure availability during an emergency.

If the TSC becomes uninhabitable, the TSC plant management function shall be transferred to the control room and other functions to the EOF.

2.7 Communications

The TSC will be the primary in-plant communications center during an emergency. Dedicated voice communication to the various emergency centers and offsite agencies is provided. Figures 8-1 through 8-5 from the Hanford Site Emergency Preparedness Plan (attached) show the various communications systems. The primary function of this voice communication system is to provide plant management with communications for the immediate exchange of information on plant status and operations. Provisions for communications with state and local operations centers are provided in the TSC to provide early notification and recommendations to offsite authorities prior to activation of the EOF.

The TSC voice communications facilities include means for reliable primary and backup communication. The TSC voice communications include a private telephone system, commercial telephones, radio network, and a facsimile system to accomplish the TSC functions during emergency operating conditions. The TSC