TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

June 2, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Denton:

In the Matter of the Application of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

References: (1) Letter from Darrell G. Eisenhut (NRC) to TVA dated February 18, 1981, "Post-TMI Requirements for the Emergency Operations Facility (Generic Letter 81-10)"

(2) Letter from Darrell G. Eisenhut (NRC) to H. G. Parris dated March 19, 1981

(3) Letter from L. M. Mills to A. Schwencer (NRC) dated March 31, 1981

Enclosed are 20 copies of TVA's response to Reference 1, Generic Letter 81-10, requiring information as to TVA's conceptual design for emergency response facilities and appropriate implementation dates. This submittal also serves to address condition 2.C.23.I of Sequoyah Nuclear Plant (SNP) Operating License No. DPR-77. The enclosed response is a section-by-section review of NUREG-0696 as it relates to TVA's plans for upgraded emergency response facilities.

Based on NRC approval in concept of TVA's centralized emergency management system, as provided in Reference 2, this letter further serves to provide a formal request for an exemption from the requirements of section 50.47(b) and paragraph D of Appendix E of 10 CFR Part 50, regarding a near-site Emergency Operations Facility (EOF) at SNP. NRC concerns with respect to the NRC near-site facilities are addressed in the enclosed section on the Local Recovery Center.

In conjunction with the enclosed description of TVA's upgraded emergency response facilities, TVA proposes the following implementation schedule.

1. TVA's centralized emergency centers are implemented as described in the enclosure with the exception of the proposed data systems.

2. The Local Recovery Center (LRC) shall be implemented and SNP Radiological Emergency Plan (REP) revised to reflect this facility by June 1, 1982.

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3. Access to meteorological and radiological data, using the Chattanooga Central Emergency Control Center (CECC) central processor, shall be implemented at all appropriate emergency centers by June 1, 1982.

4. The Sequoyah Technical Support Center (TSC), including the TSC data system, will be operational by July 1, 1983. This date is based on the present outage schedule, emergency procurement of material, and implementation of the exact data base as defined in the enclosure. Note also that this date is approximately one year earlier than the previous date submitted (refer to Reference 3).

Changes or modifications to material described in this submittal will delay implementation at Sequoyah and significantly impact design and implementation of such facilities at our future plants. To prevent such delays, we request prompt review of this submittal so that we may proceed with our efforts to meet the proposed implementation dates.

We are available to meet with the NRC to further discuss this submittal and address any NRC questions or concerns to assist in a prompt approval of our conceptual design.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Sworn to and subscribed before me
this 2nd day of June 1981

Bryant M. Lowery
Notary Public

My Commission Expires 4/4/82

Enclosure (20)

SUBMITTAL

TO

U. S. NUCLEAR REGULATORY COMMISSION

BY

TENNESSEE VALLEY AUTHORITY

ON

CONCEPTUAL DESIGN OF EMERGENCY

RESPONSE FACILITIES

SEQUOYAH NUCLEAR PLANT

JUNE 1, 1981

1.0 INTRODUCTION

Since the accident at Three Mile Island, TVA has recognized the need for a highly reliable and effective emergency management system. During the past year, TVA has proceeded in upgrading its existing emergency facilities and communications and planning for future systems in an effort to meet the emergency management functions as defined in NUREG-0696, these three functions being: (1) management of the overall emergency response, (2) coordination of radiation assessments, and (3) management of recovery operations. To perform these functions, TVA is very confident that well-prepared emergency plans and well-trained emergency staffs, coupled with the existing TVA emergency facilities and proposed facilities (as defined in this submittal), provide a viable system for managing and responding to an emergency situation at Sequoyah Nuclear Plant (SNP).

The following sections define TVA's existing and proposed emergency response facilities, communications, data systems, etc., and show how TVA's overall integrated emergency management system will indeed comply with the functional criteria defined in NUREG-0696.

2.0 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 operation
- Prevent congestion in the control room
- Conduct detailed off-line analysis of plant conditions and trends to support and augment control room analysis
- Serve as a primary communication link to the control room for obtaining additional plant data
- Retrieve accident data for postaccident assessments and plant recovery

The TSC will be the emergency operations work area for designated technical, engineering, and management personnel; and a small staff of NRC personnel. The TSC supervisor will use the resources of the TSC to provide guidance and technical assistance to the control room during an emergency. The TSC will have facilities to support plant management and technical personnel who will be assigned there during an emergency.

2.2 Location

The onsite TSC at Sequoyah Nuclear Plant will be located adjacent to the control room in the control building (refer to Figure 1). The walking time from the TSC to the control room will be well within the recommended 2 minute guideline. This proximity will also provide access to information in the control room that is not available in the TSC parameter set.

Since the TSC is located in the same building as the control room there can be safe and timely movement of personnel between the TSC and control room under emergency conditions. There will be no major security barriers between these two facilities other than access control stations. However, adequate access to the main control room will be established and maintained.

2.3 Staffing and Training

The staffing and training of personnel assigned to the TSC will be in accordance with the NRC approved Sequoyah Nuclear Plant (SNP) Radiological Emergency Plan (REP) and REP Implementing Procedure. Document (REP-IPD).

2.4 Size

The TSC will be large enough to provide:

- Working space for the personnel assigned to the TSC
- Space for the TSC data display equipment
- Space for communications equipment
- Space for storage of and/or access to plant records
- A separate room for private NRC consultations

The proposed physical arrangement of the technical support center conceptual design is shown in Figure 2. It is composed of three distinct areas: an operations room, a conference room, and a private NRC office area. The operations room is the heart of the TSC. It contains the data displays (three CRT's), high-speed line printer, telecopier, videocopier, and up-to-date plant drawings, records, emergency plans, procedures, etc., necessary to carry out the TSC support function. Seating and work space is provided for 20 people. Additional seating can be provided at the work tables around the outer wall. The conference room with seating capacity for eight will provide a location where technical discussions and debates can be conducted without disturbing personnel working in the operations room. In addition, a private office area for NRC is provided. This area is shown with two desks, two tables, and seating capacity for four people.

The arrangement has seating capacity for 32 people with the option of adding additional seating capacity around the outer work tables. The working space for the TSC complex is approximately 1460 square feet.

2.5 Structure

The TSC will be located in a seismic category 1 structure.

2.6 Habitability

The habitability system for this area is the same one provided for the main control room. The air supply is filtered by an Engineered Safety Features (ESF) system and is monitored for contaminants. Stay times for the TSC are the same as the main control room.

2.7 Communications

The TSC shall be the primary onsite communications center for the plant during an emergency. Primary and backup voice communications shall be provided in the TSC to communicate with all TVA emergency facilities. Communications shall also be available between the TSC and plant main control room and operations support center.

TVA will provide the following communications in the TSC:

- TVA microwave telephone system
- Bell telephones
- Priority access dedicated voice communications circuit (4-way tie for the Central Emergency Control Center (CECC), Knoxville Emergency Control Center (KECC), Muscle Shoals Emergency Control Center (MSECC), and SNP TSC)
- Extension off dedicated voice circuit from the Emergency Control Center (Main control room) to the CECC
- Intercom to tie the TSC to the main control rooms, shift engineer's office, auxiliary control rooms, and the main control room electrical control desk
- Connections to the sound-powered telephone system
- Extension off the NRC dedicated communications circuits (ENS and HPN)
- Two phone lines dedicated for NRC personnel
- Facsimile machine and required phone line

2.8 Instrumentation, Data System Equipment, and Power Supplies

The technical support center data system will be a computerized, current generation, real time monitoring system. It will provide the capability to gather, store, and display information needed to support the TSC function. The system will operate independent of actions in the control room. As such, it will not disrupt or interfere with control room operations. When signals to the data system are derived from sensors providing input to safety equipment or displays, isolation will be provided to ensure that the TSC system will not degrade the performance of safety system equipment or displays.

Figure 3 shows the TSC data system configuration. There are three major hardware subsystems: input, processor, and display subsystems. With the exception of the processor (computer), a multiple or dual component design scheme is utilized. This concept minimizes the effect of component failure on system functions.

The input subsystem consists of two intelligent multiplexers. Each multiplexer will contain a microprocessor, memory, and point cards for analog or discrete inputs. This configuration will:

- Allow variations and/or changes in sampling frequency for both analog and digital inputs

- Improve data throughput by utilizing direct memory access between computer and multiplexer

- Permit extensive data error checking to verify accurate data transfer between multiplexer and computer

To the extent practical, like or redundant inputs are divided between each multiplexer to minimize data loss if a multiplexer were to fail. In addition, spare communication cables will be installed between each multiplexer and the processor to minimize repair time should a communications cable fail.

The processor subsystem consists of a small computer with data storage unit and required peripheral devices. This system will process and store plant data for use in the technical support center and control room.

Scan rates for analog inputs will be 1/10, 1, 2, 5, 10, 20, or 60 seconds. The scan rate for digital inputs will be 1 second. If experience shows that the rates chosen are inappropriate, the scan rate can be adjusted for any input parameter.

All processed data, analog and digital, will be tagged: "good," "bad," "questionable," or "entered." Good or bad will be based on sensor quality checks and data transfer error checks. Entered data will be tagged "entered." This data validity check will, to the extent possible, ensure that accurate information is provided to the TSC and control room.

Two hours of pre-event and 12 hours of post-event data storage will be provided. The scan rate (storage rate) chosen for each parameter will be consistent with the use of that parameter in post-accident analysis.

Spare computer capacity will be provided to accommodate a reasonable amount of additional function. The system will also be designed with the capability to expand the input and output subsystems.

The display system will be the primary man-machine interface. Included will be graphics CRT's with keyboards, videocopiers, and a high-speed printer.

The videocopier produces a black and white copy of CRT screens and will be located in the TSC. The high-speed printer will operate at 285 lines per minute and will be located in the TSC.

The technical support center output devices will be arranged in separate work stations in order to allow task groups to gather around the different stations to analyze and request various data.

The power system for the TSC data system has been developed using a reliable, high-quality system comparable to that for similar type main control room equipment. This system will supply power to all components required for the TSC data handling system (refer to Figure 4). The TSC power system equipment will be implemented using field tested commercial grade products. All power system components will be qualitatively comparable to that type component supplying power for similar type main control room equipment. The TSC power system will not interfere with the standby emergency system; therefore, it will not degrade the capability or reliability for the safety-related power systems.

The TSC data system will receive power from an uninterruptible power supply (UPS). The UPS will normally receive 480-volt ac power from a unit board. A manual switch will be provided to transfer the power supply from the 480-volt unit board to a 480-volt ac turbine common board. However, in the event the 480-volt supply is lost, the UPS will automatically be transferred, via a diode auctioneered circuit, to an existing plant 250-volt dc battery system. In addition, circuit transients or power-supply failures and fluctuations will not cause a loss of any stored data vital to TSC functions. In the unlikely event power is unavailable for more than 30 minutes, the TSC data acquisition system will be designed to resume storage and display upon TSC power system restoration.

The TSC data system reliability is designed to achieve an operational unavailability goal of 0.01 during all plant operation conditions above cold shutdown.

The design of the TSC data system equipment will incorporate human factor engineering.

2.9 Technical Data and Data System

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

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

In developing the parameter set, the following list of events were considered:

- Large Break LOCA
- Intermediate Break LOCA
- Small Break LOCA
- Interface LOCA
- TMI Type Transient/LOCA
- Loss of Generator
- Loss of AC Power
- Loss of DC Power
- Turbine Bypass Valves Open
- Loss of Feedwater
- Steamline Break
- Steam Generator Tube Rupture
- Rod Ejection
- Uncontrolled Boron Dilution
- Loss of Reactor Coolant Flow
- Inadvertent Safety Injection

It is recognized that this listing does not encompass all possible abnormal or emergency events (known and unknown) that could occur at a nuclear plant. However, we believe that the events listed cover such a broad spectrum that a parameter set derived from this listing would provide sufficient information to support the role of the TSC. In addition, the location of the TSC (within 2 minutes of the control room) will permit ready access to data not included in the TSC parameter set.

To support the role of the TSC, the parameter set must be adequate to permit: (1) evaluation of mitigation efforts, (2) validation of mitigation efforts, and (3) evaluation of plant status. These functional requirements of the parameter set are explained below.

Evaluation of Mitigation Efforts--These are the parameters used to assess the accuracy of event identification and the effectiveness of manual and automatic actions that are taken to mitigate the event.

Validation of Mitigation Efforts--These are the parameters used to validate the effectiveness of operator action to mitigate the event or provide an alternate means of assessing the effectiveness of mitigation efforts should the primary indicator fail. These parameters will be used independently or in combination to verify the response or trend of a primary indicator; they are not intended to verify numerical values.

Evaluation of Plant Status--These parameters are used to assess the nuclear and thermal-hydraulic state of the plant, to estimate damage to fuel and radioactivity barriers, and assist the control room in determining the cause of the event. Verifying operability of safety systems and determining the cause of the event are the principal plant status evaluation functions performed by the main control room.

The above criteria were used to develop the parameter set listed in Table 1.

Data storage and recall capability will be provided. This will include at least 2 hours of pre-event data and 12 hours of post-event data. The sample frequency will be consistent with the use of the data.

A sufficient number of data display and printout devices will be provided in the TSC to allow all TSC personnel to perform their assigned tasks (refer to Figure 3). Trend information display or time-history display capability will be provided to give TSC personnel a dynamic view of the plant status during abnormal operating conditions. The TSC displays will be designed so that call up, manipulation, and presentation of data can be easily performed.

2.10 Records Availability and Management

The TSC will have a repository of plant records and procedures at the disposal of TSC personnel to aid in their technical analysis and evaluation of emergency conditions. The following reference materials are presently provided in the TSC in accordance with the NRC approved SNP REP and REP-IPD.

- Sequoyah Nuclear Plant FSAR
- Sequoyah Nuclear Plant Technical Specifications
- Surveillance Instructions (Selected)
- Technical Instructions (Selected)
- Radiological Control Instructions

- Hazard Control Instructions
- System Operating Instructions
- General Operating Instructions
- SNP-REP and REP Implementing Procedures Document
- Spill Prevention Control Plan
- Plant Functional Drawings
- Abnormal Operating Instructions
- Emergency Operation Instructions

3.0 OPERATIONAL SUPPORT CENTER

The Operational Support Center (OSC) has already been provided to NRC in the NRC approved SNP REP and REP-iPD.

4.0 CENTRALIZED EMERGENCY OPERATIONS FACILITY (EOF)

TVA utilizes a centralized emergency management system in support of Sequoyah Nuclear Plant (SNP). The centralized EOF design consists of three corporate emergency centers and includes a near-site local recovery center to accomodate TVA, NRC, and other emergency response personnel. This system includes proper assignment of responsibilities and facilities for carrying out the following functions in an emergency situation:

- Management of Overall TVA emergency response,
- Coordination of radiological and environmental assessments,
- Recommendations of public protective actions, and
- Coordination of emergency response activities with Federal and State agencies.

Following is a description of the four facilities which make up TVA's centralized EOF design.

4.1 Central Emergency Control Center (CECC)

4.1.1 Function

The CECC houses the staff responsible for the management of the overall emergency response and providing direct technical support to the affected plant. This staff is composed of a CECC Director, Technical Assistants, the Operations Duty Specialist, the Division of Nuclear Power Emergency (DNPE) Staff, Information Office Staff, and representatives of key TVA organizations.

The CECC Director is responsible for coordinating the TVA emergency response and is the primary interface with state agencies, making appropriate recommendations in regards to public protective action.

The CECC provides the essential coordination activities with State and Federal agencies as necessary.

4.1.2 Location, Structure, and Habitability

The CECC is located on the first floor of a 17 story office building in Chattanooga, TN. This building provides offices for the Manager of Power, Power Public Information, the Regulatory Staff, and all of the corporate personnel for the Division of Nuclear Power.

The CECC is located far enough away from any nuclear site so as not to require any special habitability considerations.

4.1.3 Staffing and Training

Staffing and training requirements for the CECC are in accordance with the NRC approved SNP REP and REP-IPD.

4.1.4 Size

The CECC provides working space and facilities for all assigned staff. Some 4,600 square feet of floor space has been allocated for the staff to carry out its role (refer to Figure 5). Included is 1,500 square feet of dedicated space for the CECC staff, a 300 square foot conference room, 700 square feet dedicated for operations duty specialist functions, the duty specialist being the 24-hour per day manned position assigned as initial contact for radiological emergencies, and 2,100 square feet of office space that can be made immediately available for NRC and other agency representatives. In addition, a 3,000 square foot room is set aside for media briefing during exercises and actual emergencies and is located adjacent to the secured area of the CECC.

4.1.5 Radiological Monitoring

Due to the location of the CECC, radiation monitoring systems are not required.

4.1.6 Communications

Advanced communications have been provided in the CECC for dissemination of information to responsible emergency organizations. The CECC contains primary and backup systems to communicate with the Muscle Shoals Emergency Center (MSECC), Knoxville Emergency Control Center (KECC), Local Recovery Center (LRC), Sequovah Technical Support Center (TSC), all corporate information offices, and the primary emergency centers for the State of Tennessee (located in Nashville, TN and at Lovell Field in Chattanooga, TN).

These communications systems are as follows:

- Priority access dedicated voice communications (established between the CECC, MSECC, KECC, plant control room, plant TSC, Corporate Information Offices, and the primary emergency centers for the State of Tennessee).
- Bell Telephones
- TVA Microwave Telephone System
- Federal Telephone System (FTS)

- NAWAS
- Facsimile Machines
- TVA's Power Systems Operation Radio
- Cathode Ray Tube (CRT) System (To transmit hard-copy information between all TVA emergency centers and State emergency centers).
- Personnel pagers (personnel pagers have been assigned to emergency support personnel).

Further description of the CECC communication systems are provided in the NRC approved SNP REP and REP-IPD.

In addition to the above, TVA requests that the NRC install extensions off the NRC's ENS and HPN circuits in the CECC.

4.1.7 Instrumentation, Data System Equipment, and Power Supply

The CECC instrumentation design consists of CRT's to provide the necessary data, as processed through a CECC central processor, to analyze and exchange information on plant conditions.

4.1.8 Technical Data and Data System

The entire plant TSC data base and SPDS display capability (plant system data as well as meteorological and radiological data) will be data-linked to a CECC central data processor (refer to Figure 9). This data will be available "Real Time" to CECC personnel. Access to this data base will allow for quick assessments of environmental conditions, proper coordination of radiological monitoring activities, and appropriate recommendations to off-site authorities for public protective actions.

4.1.9 Records Availability and Management

The CECC has ready access to up-to-date plant drawings, records, procedures, emergency plans, Vendor material, etc., for assisting in overall management of emergency response resources. A corporate document control center is located in the same building as the CECC. This center is accessible in the event of an emergency.

4.2 Muscle Shoals Emergency Control Center (MSECC)

4.2.1 Functions

The MSECC houses the staff responsible for performing radiological and environmental assessments, dose projections, and for making protective action recommendations to the CECC.

TVA provides well-equipped emergency vans for each plant with additional vans available at Muscle Shoals, Alabama and Vonore, Tennessee, to respond to radiological emergencies at any plant site. These vans are radio equipped and carry extensive environmental monitoring equipment. One van can be operating immediately with others available within about an hour of notification. These vans are directed through the field operations command center of the MSECC.

The MSECC is responsible for environmental and radiological assessments and formulating recommendations for off-site protective actions. Provisions have been made for a media briefing center in close proximity to the MSECC. Security will be provided to the MSECC as necessary.

4.2.2 Location, Structure, and Habitability

The MSECC is located in the River Oaks Building in Muscle Shoals, Alabama, headquarters of TVA's Office of Health and Safety.

The MSECC is located far enough away from any nuclear site so as not to require any special habitability considerations.

4.2.3 Staffing and Training

Staffing and training requirements for the MSECC are in accordance with the NRC approved SNP REP and REP-TPD.

4.2.4 Size

The MSECC provides adequate working space and facilities for all assigned staff. Some 1,500 square feet of floor space has been allocated for this staff to carry out its role (refer to Figure 6). Included is 1,000 square feet of space for the MSECC director and support staff.

4.2.5 Radiological Monitoring

Due to the location of the MSECC, radiation monitoring systems are not required.

4.2.6 Communications

Advance communication systems have been provided in the MSECC for receipt of data from field monitoring teams and for dissemination of information to responsible organizations. Priority access dedicated telephone communications have been established between

the MSECC, CECC, KECC, Sequoyah TSC, all corporate information offices, and the State of Tennessee emergency center in Nashville, TN. Redundant communications are provided through other installed systems as mentioned for the CECC. Additionally, key-response personnel from the MSECC are also on pagers.

The MSECC also has radio communications in place for directing use of the emergency monitoring vans. TVA requests that the NRC provide communications circuits for the NRC's ENS and HPN telephone communication system as appropriate.

4.2.7 Instrumentation, Data Systems Equipment, and Power Supplies

The MSECC instrumentation design consists of CRT's to provide the necessary data, as processed through the CECC central processor, to analyze and exchange information on environmental conditions. There is also a dedicated "line printing" terminal for executing dose assessment models.

4.2.8 Technical Data and Data System

The MSECC will have access to all meteorological and radiological data necessary for directing field monitoring teams and for executing predictive dose models (refer to Figure 9). These codes are executed remotely by the MSECC staff on the CECC central processor to allow for complete assessment of direct readings and sample analysis.

4.2.9 Records Availability and Management

The MSECC contains and/or has ready access to all applicable records and documents necessary for carrying out dose and environmental assessment functions. Included is environs radiological monitoring records, employee radiation exposure histories, as well as off-site population distribution data.

4.3 Knoxville Emergency Control Center (KECC)

4.3.1 Functions

The KECC is a support center to the CECC which houses the staff responsible for providing detailed technical support in such areas as accident analysis, source term analysis, and engineering/material/logistic support during implementation of corrective actions during a nuclear plant emergency and through subsequent recovery operations, by drawing upon the technical resources of the entire Division of Engineering Design.

The KECC provides technical support to the CECC or MSECC as requested. The KECC also serves as the communications center for other essential TVA Knoxville offices.

Provisions have been made for a facility in close proximity to the KECC for media briefing. Security will be provided for these areas as necessary.

4.3.2 Location, Structure, and Habitability

The KECC is located in Knoxville, TN in an office building complex which houses the Office of Engineering Design and Construction, the TVA General Manager, and the TVA Board of Directors.

The KECC is located far enough away from any nuclear site so as not to require any special habitability consideration.

4.3.3 Staffing and Training

Staffing and training requirements for the KECC are in accordance with the NRC approved SNP REP and REP-IPD.

4.3.4 Size

The KECC provides working space and facilities for all assigned staff. A 500 square foot conference room has been adapted for this staff to carry out its role (refer to Figure 7).

4.3.5 Radiological Monitoring

Due to the location of the KECC, radiation monitoring systems are not required.

4.3.6 Communications

Advance communication systems have been provided in the KECC for dissemination of information to other emergency organizations. Priority access dedicated telephone communications have been established between the KECC, CECC, MSECC, Sequoyah TSC, all corporate information offices, and the State of Tennessee emergency center in Nashville, TN. Redundant communications are provided through other installed systems as mentioned for the CECC.

4.3.7 Instrumentation, Data Systems Equipment, and Power Supplies

The KECC instrumentation design consists of CRT's to provide the necessary data for accident analysis, source term analysis, and engineering support. This data will be extracted from the CECC central processor.

4.3.8 Technical Data and Data System

Appropriate data will be provided to the KECC staff, as necessary, to allow for timely assistance in engineering support (refer to Figure 9).

4.3.9 Records Availability and Management

The KECC has ready access to up-to-date plant drawings, records, emergency plans, procedures, vendor materials, etc., necessary to carry out their function to support the CECC. A corporate document control center is maintained within the same office complex.

4.4 Local Recovery Center (LRC)

4.4.1 Functions

The function of the LRC is to provide a near-site facility for TVA recovery management as well as NRC emergency response personnel and other emergency and/or recovery personnel.

The LRC provides adequate space for TVA and others who will locate there to support the CECC in providing recovery support.

The LRC will provide dedicated space for NRC personnel containing adequate supplies, communications, and data necessary for them to carry out appropriate functions.

4.4.2 Location, Structure, and Habitability

The LRC for Sequoyah will be the Power Operations Training Center (POTC) located approximately 1.5 miles from the plant. There are no special habitability considerations for the LRC.

4.4.3 Staffing and Training

Staffing and training of LRC personnel will be in accordance to the revised SNP REP upon implementation of the LRC.

4.4.4 Size

An office complex consisting of six office areas located on the second floor of the POTC, and a storage area shall be dedicated solely to NRC personnel in the event of an emergency. This area is designated as Rooms 18, 79, 80, 81, 82, 83, and 84, elevation 732.0 and contains approximately 1,100 square feet of space (refer to Figure 8). The remaining areas of the training center (offices, classrooms, etc., approximately 88,000 square feet total) would also be available as an overflow work area for NRC as well as TVA and other response personnel necessary to carry out required recovery efforts. Sufficient supply of desks, chairs, tables, etc., are available.

4.4.5 Radiological Monitoring

No permanent radiation monitoring system is installed in the LRC.

4.4.6 Communications

The LRC will have voice communications to enable personnel to communicate with the CECC, KECC, MSECC, and Sequoyah TSC.

The following voice communications are available in the dedicated NRC office area:

- Bell Telephones (10 phone sets)
- TVA Microwave Telephone System
- Federal Telephone Systems (FTS)

We request that the NRC provide extensions off the NRC's ENS and HPN circuits in this office area.

Other equipment available for use by NRC and other personnel at the POTC includes:

- Facsimile machine
- Copy Machines
- Hand Calculators
- Tape Recorders
- Plant specific drawings, manuals, procedures, etc.

4.4.7 Instrumentation, Data System Equipment, and Power Supplies

The LRC instrumentation design consists of CRT's to provide necessary data to all recovery personnel.

4.4.8 Technical Data and Data System

The LRC will have access to the TSC data base and SPDS display capability (plant system data as well as meteorological and radiological data), as necessary, from the CECC central processor (refer to Figure 9).

4.4.9 Records Availability and Management

The LRC contains a sufficient supply of plant drawings, procedures, vendor manuals, emergency plans, etc., that may be required by NRC personnel.

5.0 SAFETY PARAMETER DISPLAY SYSTEM

5.1 Function

The purpose of the safety parameters display system (SPDS) is to assist control room personnel in evaluating the safety status of the plant. The SPDS will provide an indication of plant parameters or derived variables representative of the safety status of the plant via CRT display. The primary functions of the SPDS will be to aid the operator in the rapid detection of abnormal operating conditions. He will use the SPDS for an initial "quick look". Confirmation will be achieved by surveying the other control room instrumentation before taking action.

As an operator aid, the SPDS serves to concentrate a minimum set of plant parameters from which the plant safety status can be assessed. Human-factors engineering will be incorporated in the various aspects of the SPDS design to enhance the functional effectiveness of control room personnel.

The SPDS will be in operation during normal and abnormal operating conditions. The SPDS will be capable of displaying pertinent information during steady-state and transient conditions.

5.2 Location

The SPDS will be located in the control room. The SPDS may be physically separated from the normal control board; however it will be readily accessible and visible to the control room operators.

5.3 Size

The SPDS will be of such size as to be compatible with the existing space in the control room. It will not interfere with normal movement or with visual access to other control room operating systems and displays.

5.4 Staffing

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

5.5 Display Considerations

The display will be responsive to transient and accident sequences and will be sufficient to indicate the status of the plant. Flexibility to allow for interaction by the operator will be included into the display design. The SPDS will have expansion capability and the flexibility to allow for future modifications and additions.

The important plant functions related to the SPDS display shall include:

- Reactivity control
- Reactor core cooling and heat removal from primary system
- Reactor coolant system integrity
- Radioactivity control
- Containment integrity

Table 2 lists the SPDS data set developed to aid the operator in detecting or inferring the status of the above functions. He will use the displayed information to aid in quickly identifying abnormal events and determining required actions. Before taking any action the operator will consult the primary indicators on the control board to verify the SPDS indications.

5.6 Design Criteria

Most of the sensor signals for the SPDS will be taken from existing control room instrumentation. All safety circuits monitored will be appropriately isolated. The isolator design will preserve channel independence and ensure the integrity of the safety system in case of SPDS malfunction. Description of instrument quality, accuracy, and reliability will be addressed as a part of TVA's submittal to the NRC on our plans to meet the intent of Regulatory Guide 1.97.

The SPDS will be implemented emphasizing human-factors engineering. The following are examples of good human-factor principles:

- Integration into the existing control room to minimize disturbance to existing instrumentation interfaces, but blended into the overall architectural scheme as much as possible.
- Consistent use symbols and alphanumeric texts.
- Format density will be engineered considering the amount of information the operator is able to perceive and understand.
- Presenting data that can be comprehended easily and rapidly.

The SPDS display function will be supported by dual CRT's to enhance availability of the function to the control room operator. In the event one CRT fails, a backup CRT will be available to display the SPDS parameters. In the unlikely event the SPDS primary and backup CRT's fail, the operator will rely on the existing, conventional instrumentation in the control room to determine overall plant safety status. TVA considers this an acceptable "backup" since the operator must consult this instrumentation before taking action.

The SPDS is designed to meet an operational unavailability goal of 0.01.

6.0 NUCLEAR DATA LINK

TVA does not intend to provide a nuclear data link. Advanced communications and data systems are available in all TVA emergency facilities. Furthermore, TVA will provide for NRC's attendance in these facilities and will provide data, as necessary, to NRC personnel.

7.0 ACQUISITION AND CONTROL OF TECHNICAL DATA

The acquisition and control of technical data for the ERF's has already been provided in the previous sections.

8.0 EMERGENCY RESPONSE FACILITY INTEGRATION

The overall integration of TVA's emergency response facilities, communications, etc., is as defined in the SNP REP and REP-IPD. Overall integration of the proposed data systems into these facilities are as defined in the previous sections.

TVA will continue to upgrade its emergency organizations, facilities, and plans as required and/or as new data systems, etc., are implemented.

9.0 VERIFICATION AND VALIDATION

TVA will employ good engineering judgment and design and control methods in the review and approval of systems and facilities.

The REP, REP-IPD, facilities, organizations, etc., are periodically reviewed by TVA's quality assurance organizations and nuclear safety review staffs.

DATA REQUIREMENT FOR ACCIDENT MANAGEMENT

TECHNICAL SUPPORT CENTER

TABLE 1

Variable	Mitigation	Validation	Status
Core Exit Temperature	X	X	X
Hot Leg Temperature	X	X	X
Cold Leg Temperature	X	X	X
Reactor Coolant Pressure	X	X	X
Neutron Flux (Source)	X	X	X
Reactor Coolant Activity (Sample)	X		X
Pressurizer Level	X	X	X
Boron Concentration (Sample)		X	X
Containment Pressure	X		X
Containment Activity			X
Containment Hydrogen	X		X
Containment Sump Level	X	X	X
Steam Generator Liquid Level	X		X
Steam Generator Pressure	X		X
Refueling Water Storage Tank Level			X
Containment Temperature		X	X
Pressurizer Relief Tank Level			X
Pressurizer Relief Tank Pressure			X
Reactor Coolant Pump Status or Flow			X
Centrifugal Charging Pump Injection Flow		X	X
Safety Injection Flow		X	X
Residual Heat Removal Discharge Flow		X	X
Residual Heat Removal Heat Exchanger Discharge Temperature		X	X
Auxiliary Feedwater Pump Flow		X	X
Condenser Off-Gas Activity			X
Condensate Storage Tank Level			X
Containment Spray Flow			X
Gaseous Effluent Activity at Identified Release Points	X		

DATA REQUIREMENT FOR ACCIDENT MANAGEMENT

SAFETY PARAMETER DISPLAY PANEL

TABLE 2

Variable
Neutron Flux (<1% Power)
RCS Cold Leg Temperature
RCS Hot Leg Temperature or Core Exit Temperature
RCS Pressure
Pressurizer Water Level
Steam Generator Water Level
Steam Generator Pressure
Containment Pressure
Containment Area Radiation
Condenser Off-gas Activity
Gaseous Effluent Activity of Identified Release Point

POOR ORIGINAL

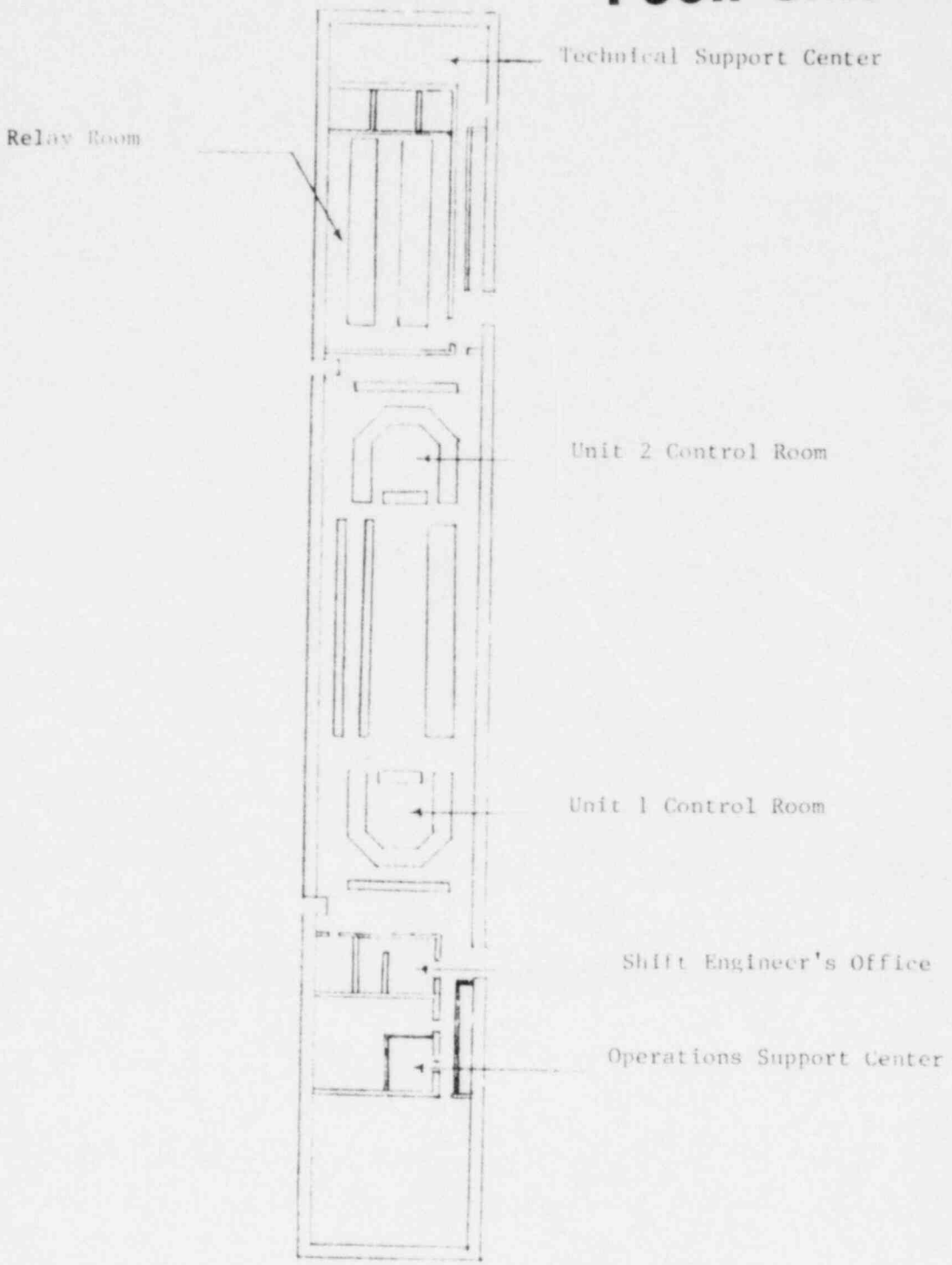


FIGURE 1 Elevation 732 Control Building Showing Location of Technical Support Center With Respect to Control Room

POOR ORIGINAL

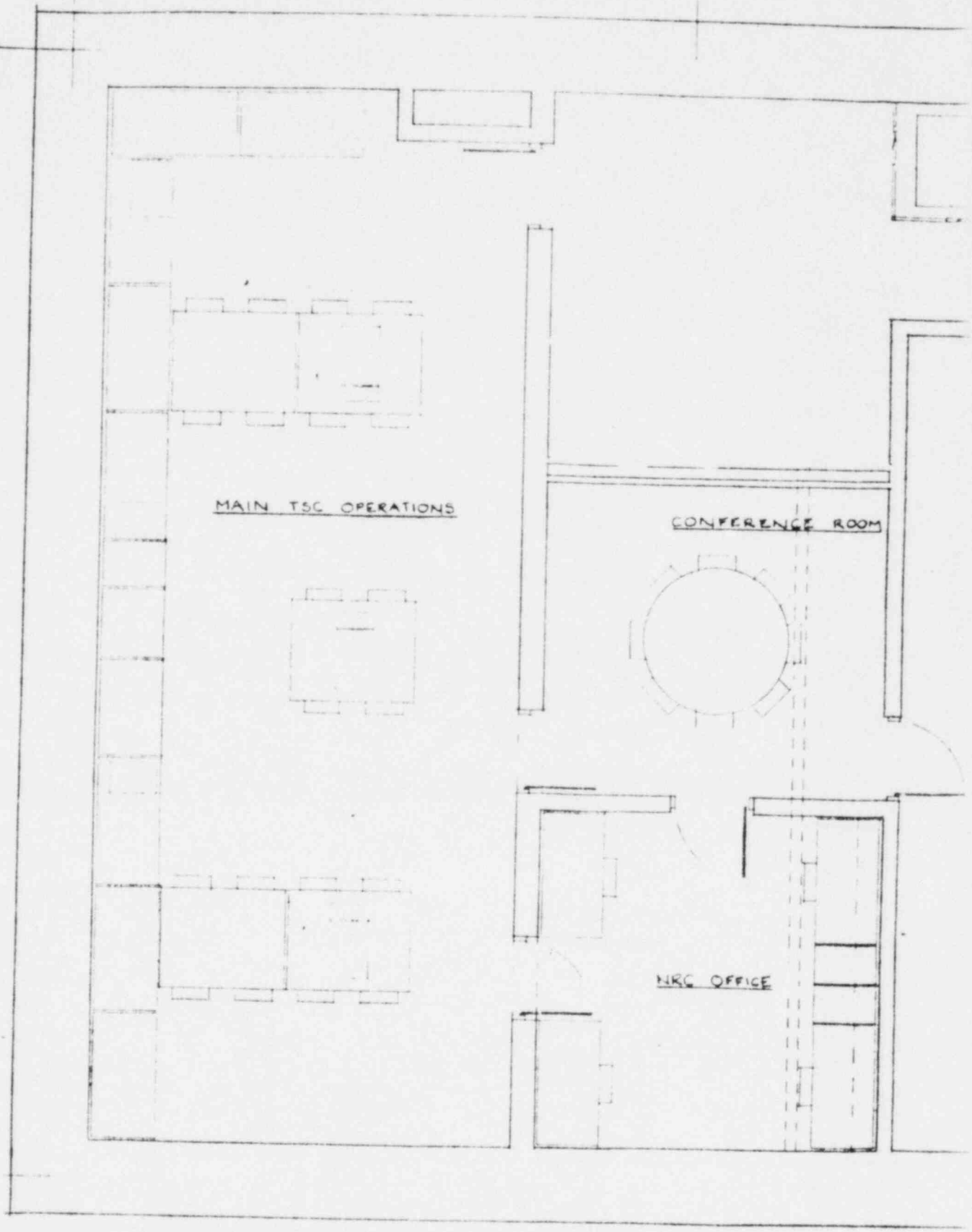
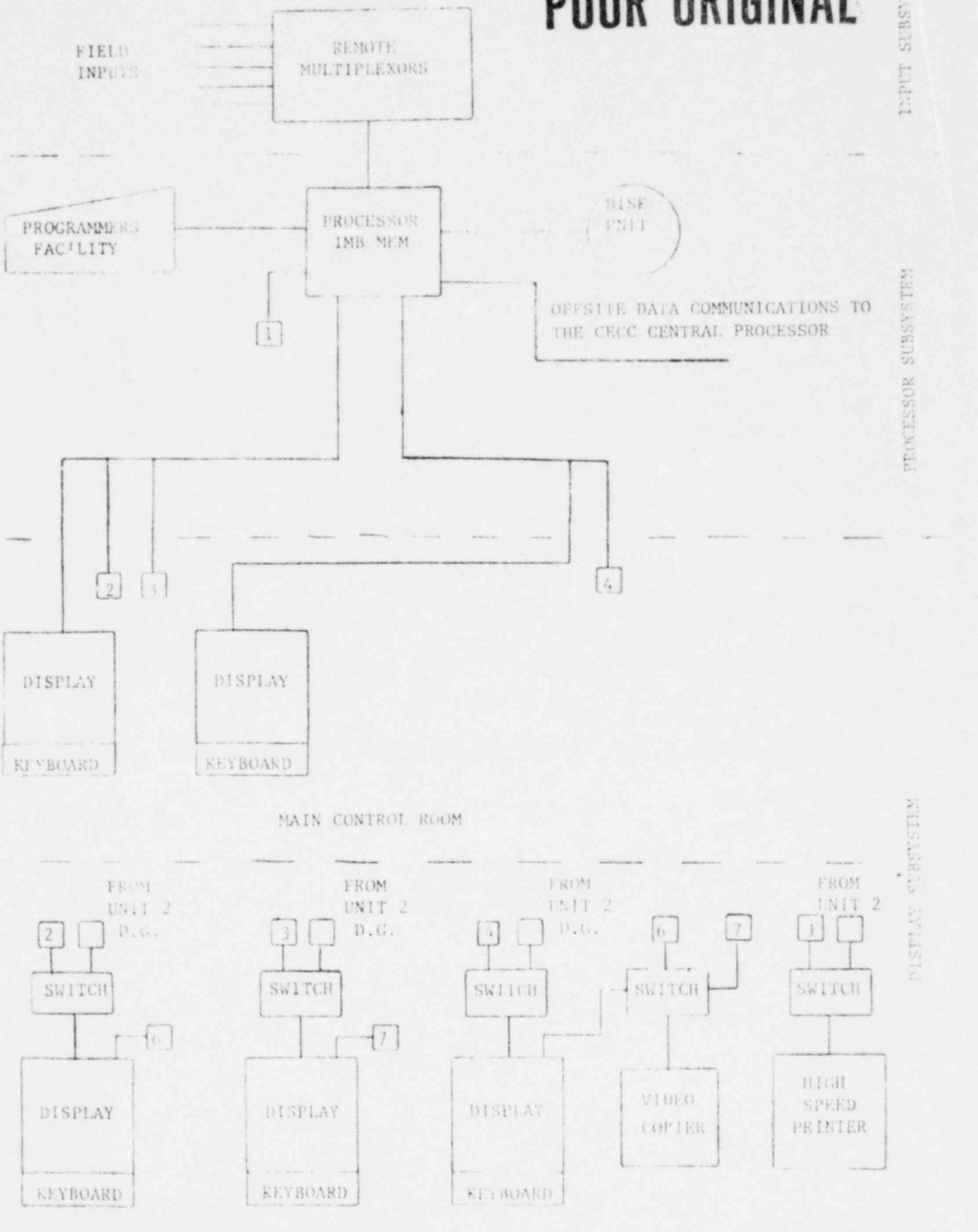


FIGURE Sequoyah Nuclear Plant - Proposed Technical Support Center Layout

SEQUOYAH'S EMERGENCY RESPONSE FACILITIES
DATA PROCESSING SYSTEM
FIGURE 3

POOR ORIGINAL



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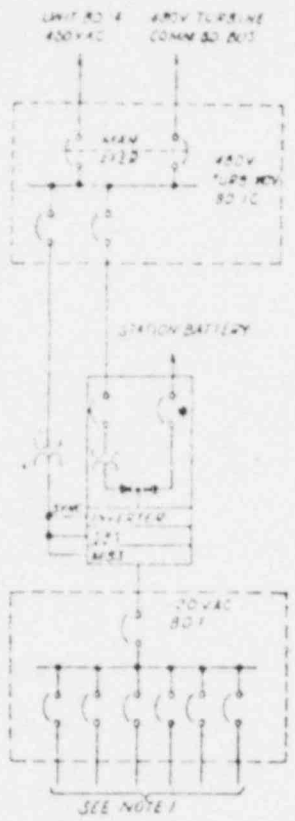
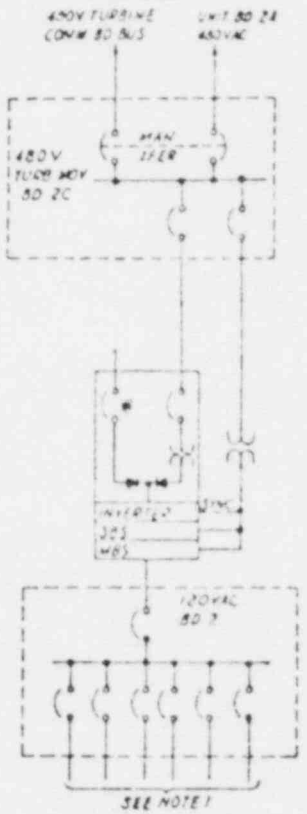


Unit 1



Unit 2

SBS = STATIC BYPASS SWITCH
MBS = MANUAL BYPASS SWITCH
UPS = UNINTERRUPTIBLE POWER SUPPLY
● = BREAKER EQUIPPED WITH 30 MINUTE TIME DELAY SHUNT TRIP

NOTES
1. THE FOLLOWING COMPONENTS WILL BE POWERED FROM THIS SYSTEM:
   a. PSP
   b. MULTIPLEXER CABINETS
   c. EMIS
   d. LINE PRINTER
   e. VIDEO COPIER
2. THE 480V AC TURB MOV BDS 1C & 2C & THE 250V DC STATION BATTERIES NOS 1 & 2 ARE EXISTING COMPONENTS

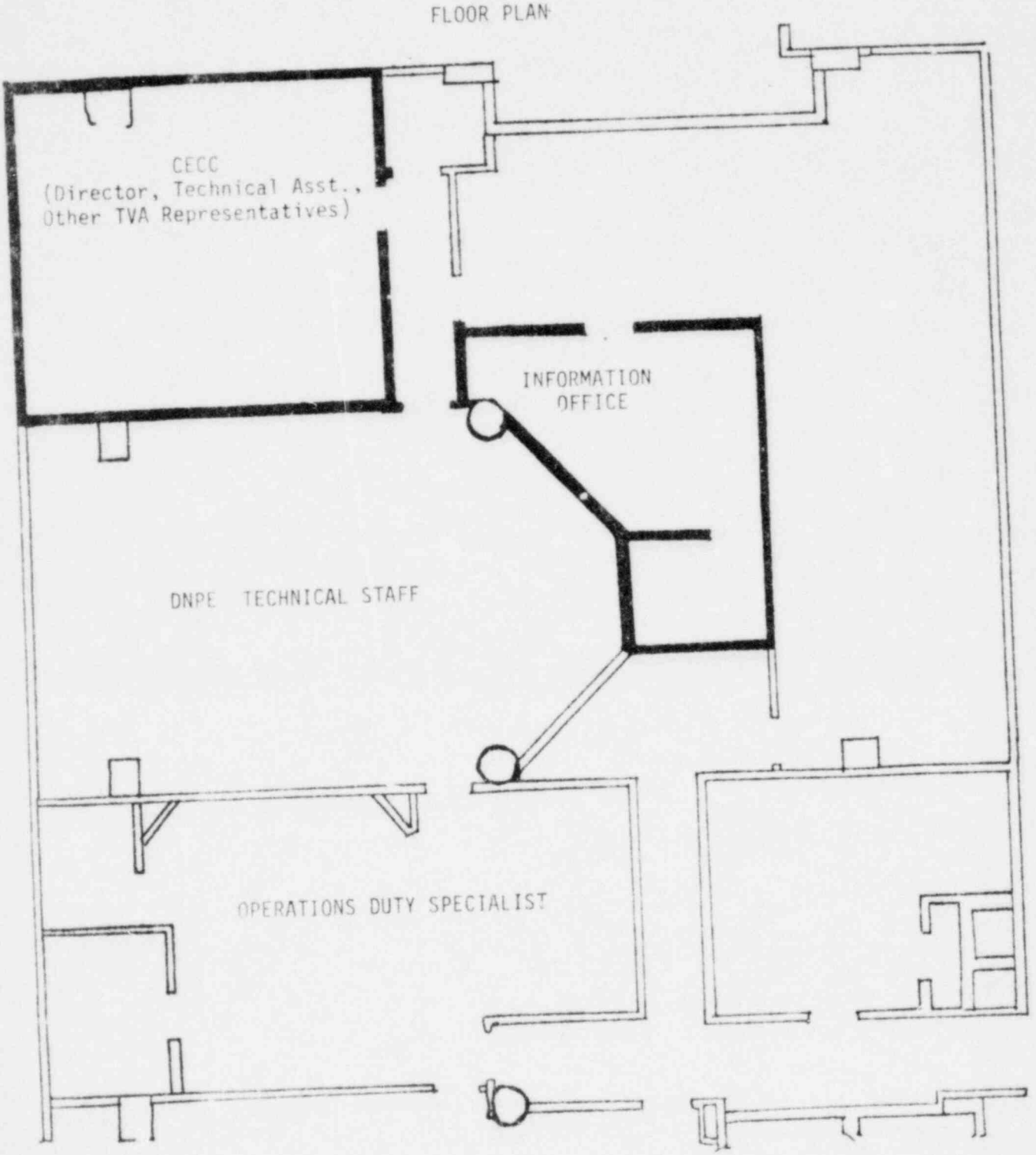
FIGURE 4 - Technical Support Center Power Systems

SEQUOYAH NUCLEAR PLANT
UNITS 1 & 2

FIGURE 5

CENTRAL EMERGENCY CONTROL CENTER

FLOOR PLAN



Additional NRC/TVA Emergency
Response Personnel

POOR ORIGINAL

FIGURE 6

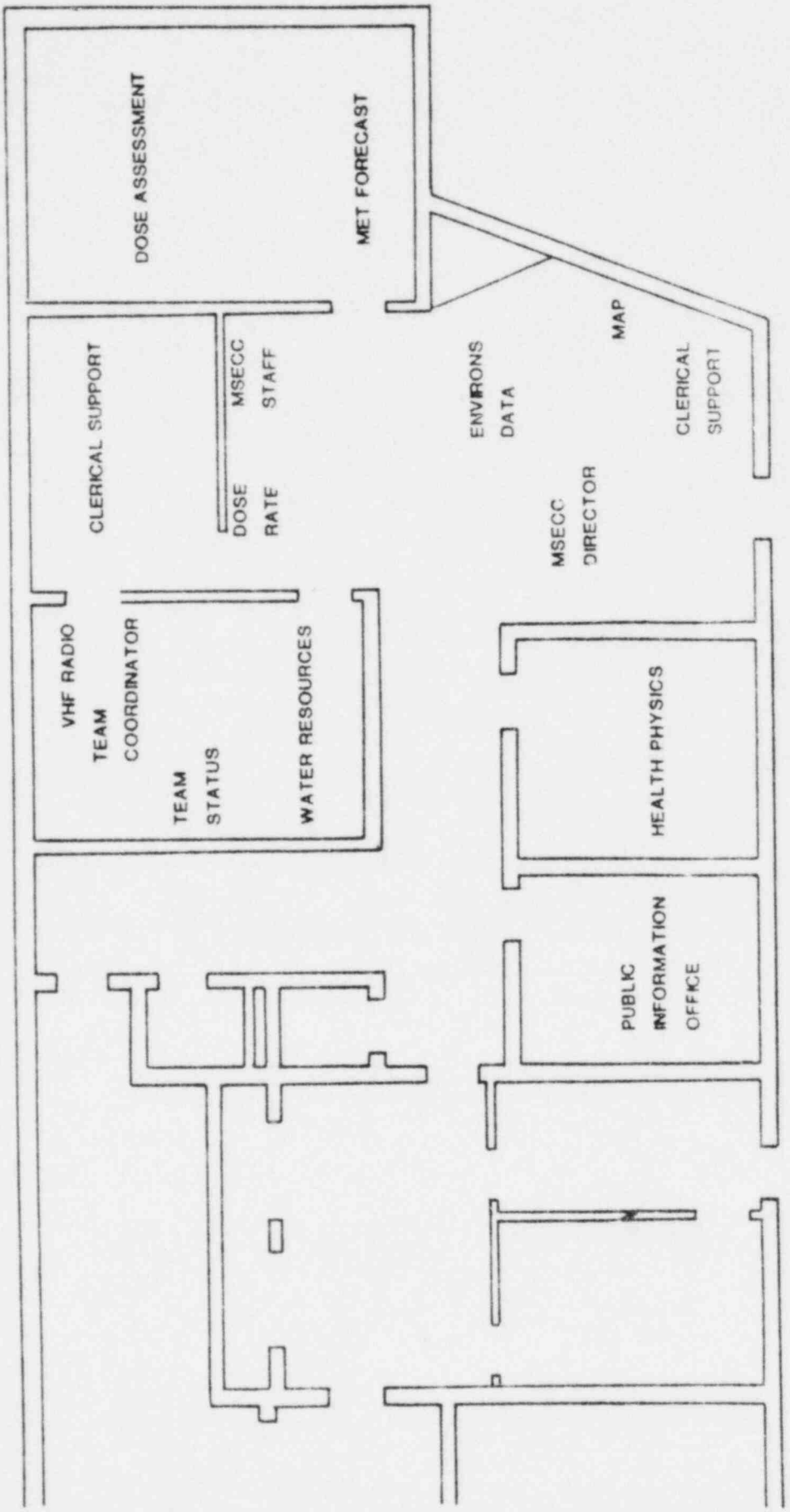


FIGURE 6

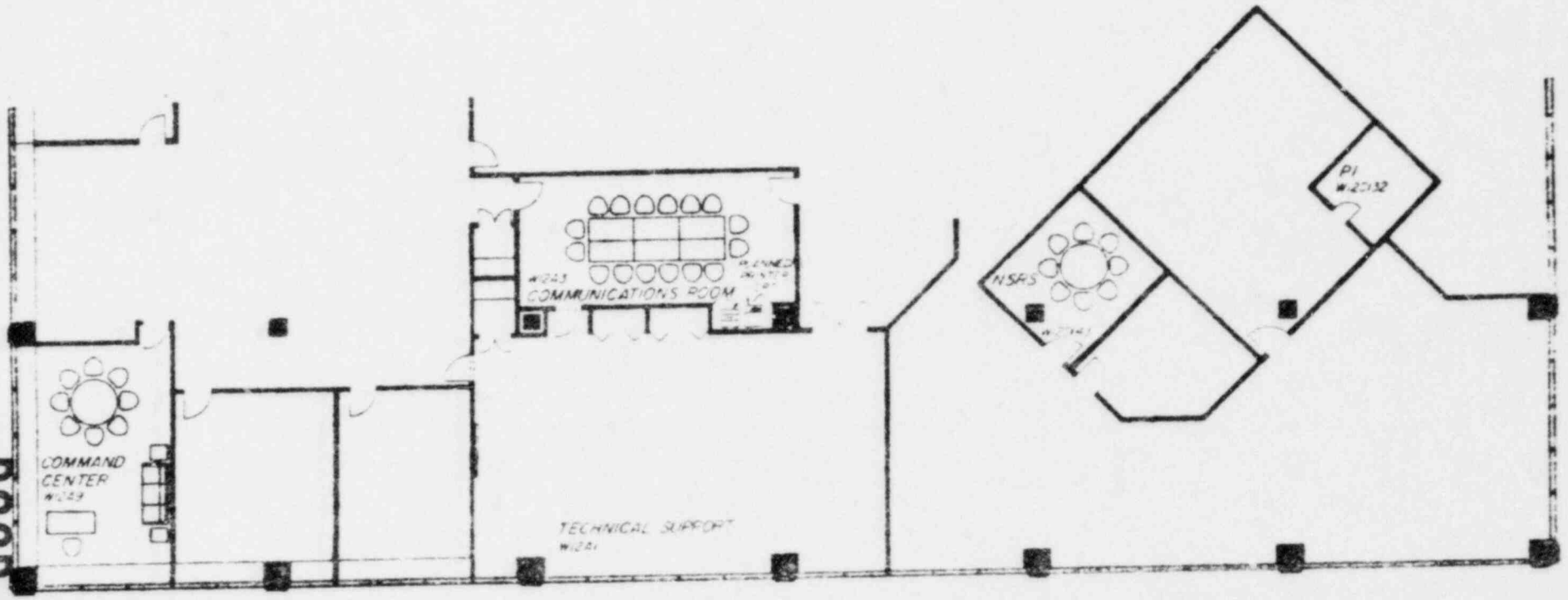
MUSCLE SHOALS EMERGENCY CONTROL CENTER

FLOOR PLAN

POOR ORIGINAL

FIGURE 7

KNOXVILLE EMERGENCY CONTROL CENTER
W12, KNOXVILLE TOWERS, 400 COMMERCE AVENUE

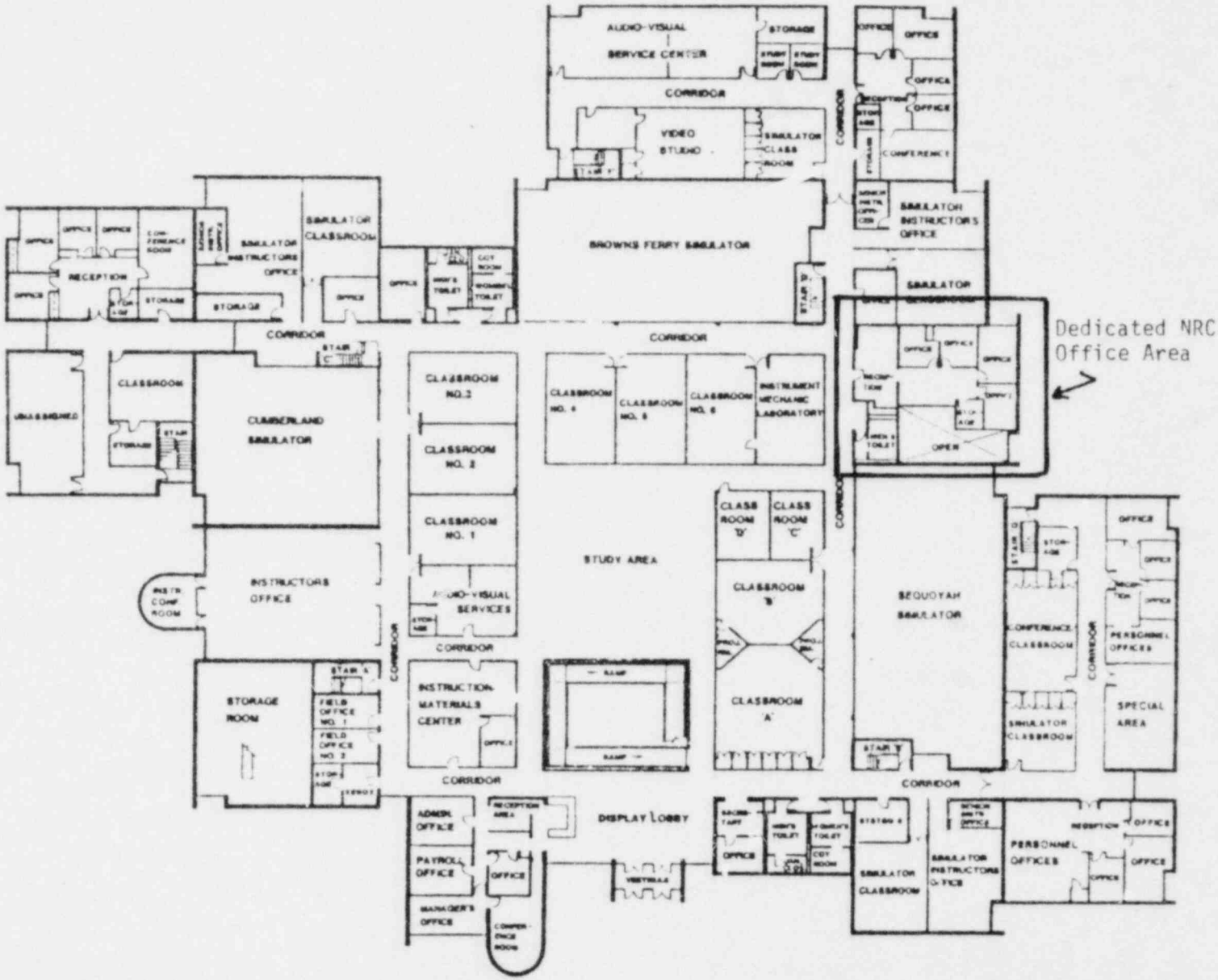


KNOXVILLE EMERGENCY CONTROL CENTER
W12, KNOXVILLE TOWERS, 400 COMMERCE AVENUE

POOR ORIGINAL

FIGURE 7

FIGURE 8
SNP - LOCAL RECOVERY CENTER
POWER OPERATIONS TRAINING CENTER

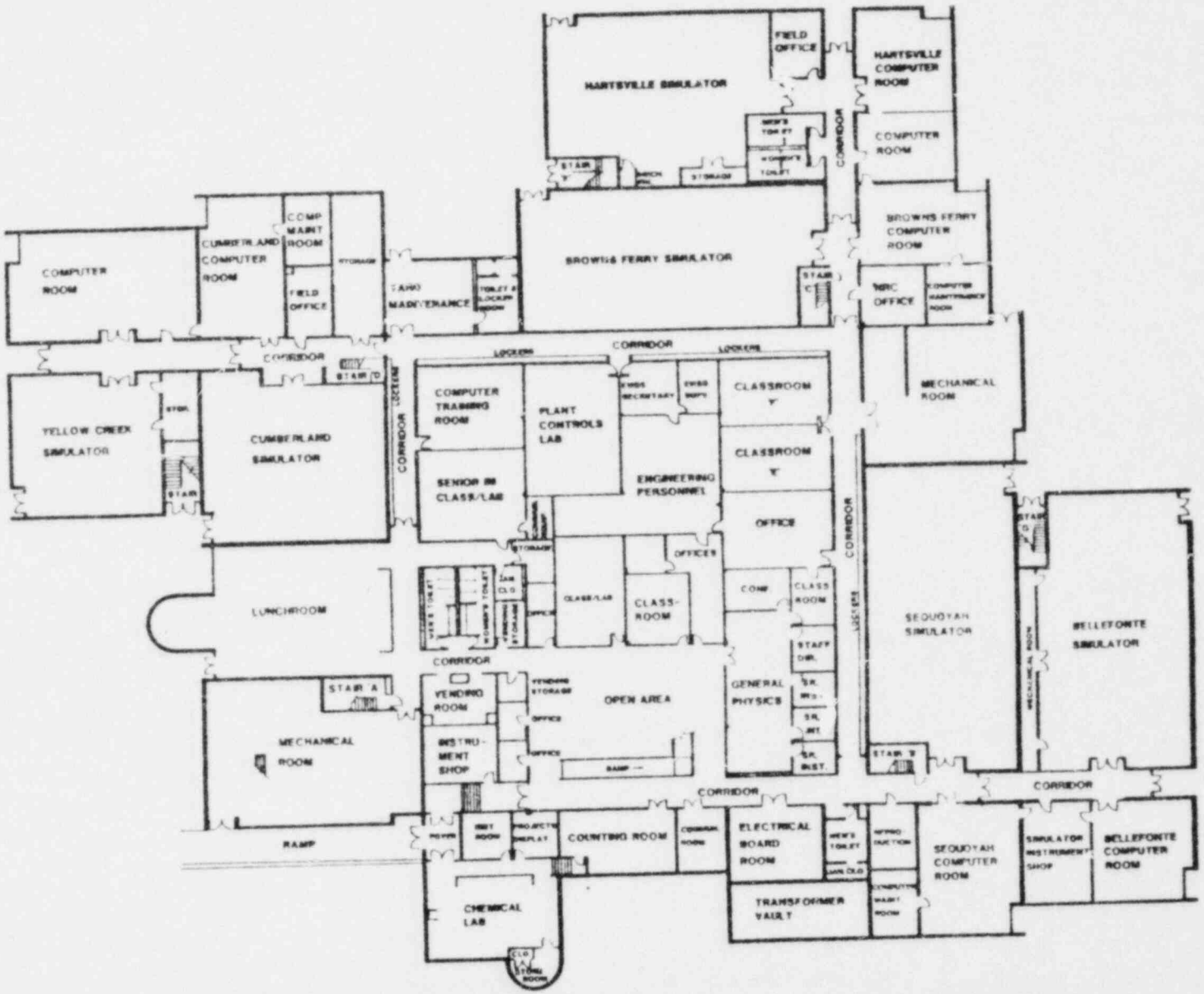


UPPER LEVEL

FIGURE 8
Page 1 of 2

POOR ORIGINAL

FIGURE 8
SNP - LOCAL RECOVERY CENTER
POWER OPERATIONS TRAINING CENTER



LOWER LEVEL

FIGURE 8
Page 2 of 2

POOR ORIGINAL

RADIOLOGICAL EMERGENCY NETWORK

DATA COMMUNICATIONS SYSTEMS

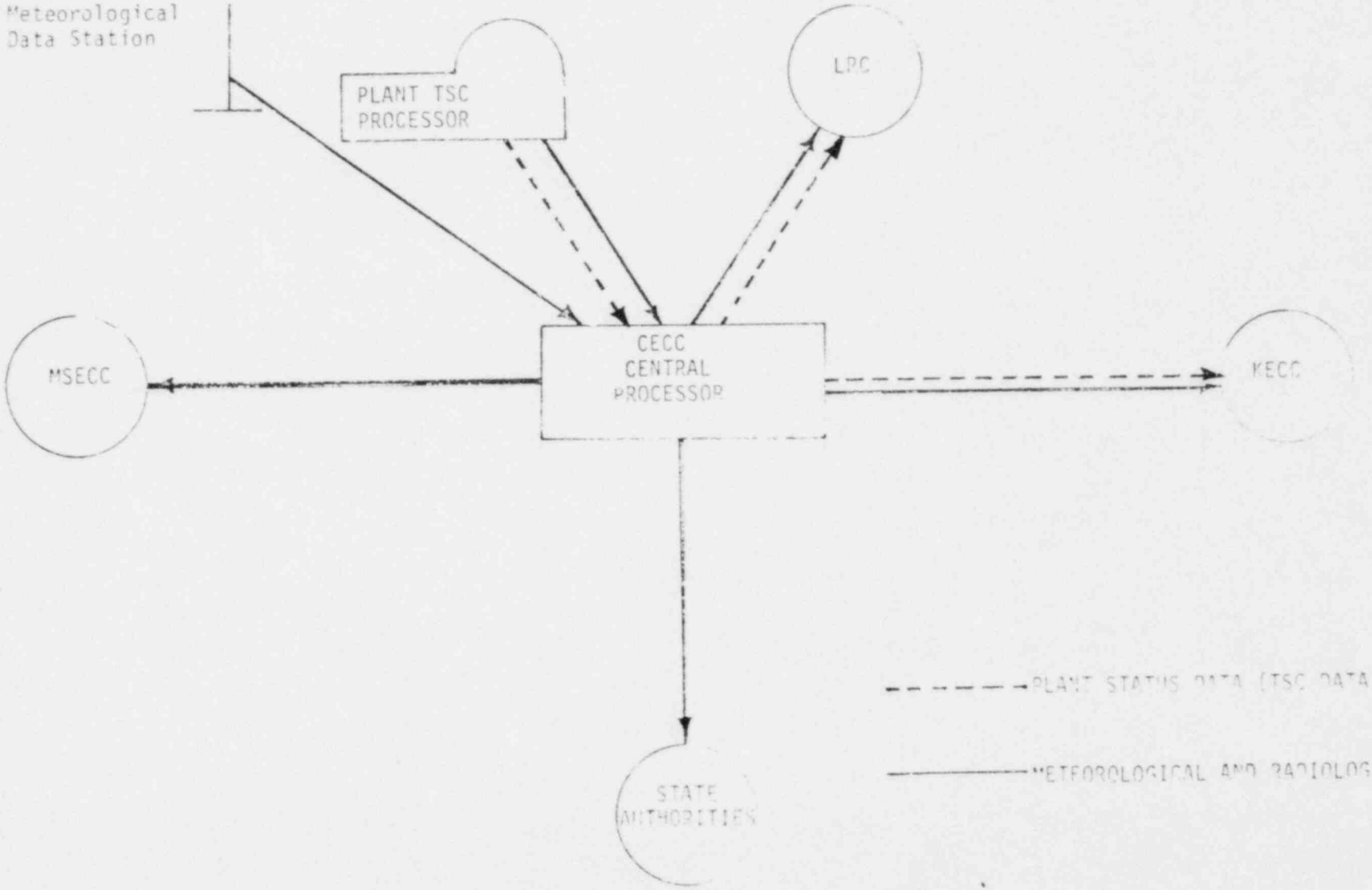


FIGURE 9

POOR ORIGINAL