Emergency Response Facilities

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Toledo Edison Company

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I. Development of Fundamental Emergency Response Concepts by the Toledo Edison Company

Immediately following the Three Mile Island accident in 1979, Toledo Edison commissioned a Corporate Task Force to evaluate its overall radiological emergency response capability for the Davis-Besse Nuclear Power Station. The Task Force convened in June with represented experience from Operations, Emergency Planning, Engineering, Licensing, Security, Quality Assurance and Public Relations. The Task Force was chaired by the Vice President of Administrative Services.

The Task Force underwent a period of review that included familiarization with the then current Davis-Besse emergency plan and capabilities, available emergency planning documents as well as industry and governmental agency reports related to the TMI-2 event. In July, 1979, a fact-finding group met with Metropolitan Edison and General Public Utilities personnel at Three Mile Island to acquire first hand information related to emergency response problems.

Functional needs were identified in areas of in-plant accident assessment, off-site radiological assessment, communications, logistics, security, technical augmentation, public information, governmental interface and community relations. All the reviews pointed toward a basic concept that centralized accident management was essential to minimize problems associated with control and coordination of emergency response activities. Facility options were then evaluated on this basis. The Toledo Edison emergency organization was restructured similar to the recommendations from the Atomic Industrial Forum's Emergency Response Subcommittee. Facilities for this organization were developed from the following criteria that indicated that facilities should:

a) Provide adequate data and communications for plant conditions and radiological assessment of emergency situations;

b) Optimize the emergency response organization's ability to provide overall accident management;

c) Address all known NRC guidance;

d) Provide complete isolation of Toledo Edison technical assessment activities from public/media interference;

e) Provide for controlled media interactions with each technical post-accident area of concern. (Overall coordination, station operations, plant assessment, offsite assessment, etc.);

f) Be located such that transportation time for face-to-face interaction of all functional directors and Toledo Edison management is held to a minimum;

g) Be located to minimize the potential of public/media interface and delay of functional directors that are in transit when required by f) above;

h) Be located such that transportation time for face-to-face interaction of all functional directors and Toledo Edison management with governmental organizations is minimized;

i) Be located such that any potential impact of precautionary or required protective actions in a two, five or ten mile radius does not degrade direct communications capability among all functional directors as well as governmental interfaces.

The following facilities were identified as vital to meeting the needs as identified by the Toledo Edison Task Force:

1. An onsite technical support center (TSC) for accident assessment;

2. An emergency control center (ECC) for Toledo Edison offsite radiological assessment and coordination;

3. A site emergency operations center (SEOC) to provide a Toledo Edison interface area for governmental organizations (this is in addition to the currently established offsite EOC located in Port Clinton, Ohio ten miles away);

4. An area for Toledo Edison briefing and coordination activities;

5. A radiological testing laboratory (RTL) for environmental monitoring and assessment support;

6. A public relations area for coordination of public information activities;

7. Media briefing area for direct media interface;

8. A security office to coordinate expanded security needs;

9. Limited berthing and dining facilities.

During all discussions with TMI personnel and from the numerous evaluations of the accident, the key element missing from the TMI-2 event was centralized accident management control. This thread is consistent in the overall emergency planning activities of Toledo Edison and became the focus for our emergency response facilities, eliminating many of the problems identified by the various Commissions and TMI study groups. Placing all the aforementioned facilities in one central location under one roof allowed for maximum utilization of Toledo Edison's personnel resources and management talents. The centralized but segregated "site boundary" concept for a new emergency plan facility was selected and identified in Toledo Edison's letter to the NRC of December 27, 1979.

Due to the centralized arrangement, the only conditions requiring compensation are related to Control Room/TSC transit. During the design and siting phase of the facility a major effort was made to ensure that circumstances requiring transportation of personnel between various locations were kept to a minimum. The following measures were taken to optimize the total approach:

1. The emergency response organization places Station management (Assistant Station Superintendent) and Station operations management in the Control Room during TSC activation. This ensures direct corporate management presence involved in Station operations;

2. A sophisticated data acquisition and display system is installed in the TSC to ensure real time and historical information as well as data manipulation capability. Inputs are provided via the station computer as well as directly from plant instrumentation. The full range of display capabilities are also accessible in the Control Room and ECC;

3. Dedicated telephone communication loop systems provide direct voice contact for detailed technical information independent of planning and policy communications loops;

4. A closed circuit video system is available in the TSC for general Control Room activity monitoring.

To provide unencumbered access between the Control Room and the facility when absolutely necessary, all transportation should be within Toledo Edison's owner controlled area on restricted roadways. Vehicles will be designated so they can proceed door to door between the plant entrance and the facility. This provides a transit time between the TSC and Control Room of less than four minutes.

During a June 27, 1980 presentation by Toledo Edison to the NRC emergency planning staff on this facility, we again highlighted our philosophy:

An overall centralized accident management scheme is essential to ensure that public health and safety are protected in an accident. That protection, we feel, can be best achieved by locating certain key facilities together. By having these at the same location, we have concentrated the technical assessment and management roles to assure a close-coupled response to expected conditions while allowing for fully informed and flexible decisionmaking. In addition, we have facilities for personal interaction with local, state and federal officials to provide information and discussion as needed.

Other aspects of the facility enhance the "Centralized Accident Management" concept. An area for the NRC I&E regional organization director is provided and conference facilities allow corporate and onsite management interfacing without removing onsite managers from functional areas.

At Toledo Edison, any separation of these facilities is considered to not only degrade efforts in accident mitigation, but increase confusion therefore contributing to ineffective management control and information flow.

II. Emergency Response Facilities

A. Introduction

The emergency response facilities at Toledo Edison are located in two major areas on the Davis-Besse Nuclear Power Station site. (See Figure II-1) The power block area of the Station houses the Control Room and the Operations Support Center. Remaining NUREG 0696 facilities are housed in the Davis-Besse Administration Building, specially designed and equipped to provide Toledo Edison and other emergency response organizations with a control point for the centralized accident management concept.

Following this basic philosophy, the Administration Building contains the Technical Support Center (TSC) and all functional areas of the Emergency Operations Facility (EOF) under one roof. The functions of the EOF are served in the Administration Building by the Emergency Control Center (ECC) and the Site Emergency Operations Center (SEOC). The ECC coordinates activities to protect public health and safety, including communications with state and local officials. The SEOC provides a working area for these state and local officials.

Additional emergency response facilities provided in the Administration Building include the Radiological Testing Laboratory (RTL), Public Relations (PR) offices, Briefing Area, and dedicated offices for both Toledo Edison corporate management and NRC emergency response personnel.

B. Site Location and Description

The Davis-Besse Nuclear Power Station (Davis-Besse) is located on the southwestern shore of Lake Erie. The site consists of 954 acres which originally varied in elevation from below lake level to approximately 6 feet above lake low water datum level, elevation 568.6 feet International Great Lakes Datum (IGLD). The site area surrounding the main power block has been built up to a grade elevation of 584.0 feet IGLD. A wave protection dike has been constructed to elevation 591.0 feet along the north and east sides of the station to provide protection from wave effects during the probable maximum meteorological event. State Route 2 is located immediately adjacent to the western site boundary and provides access to the station and the Davis-Besse Administration Building.

The Administration Building is constructed on original soil, approximately 5,000 feet inland from the shoreline of Lake Erie. The grade elevation of this area is 576.0 feet. The built-up area of the main power block is situated such that the main power block lies between the Administration Building and Lake Erie.

The Outdoor Power Structure supplying emergency power for the Administration Building is located east of the building and the existing railroad easement, as shown in Figure II-1. Meteorological data for the Davis-Besse site is collected from the 340-foot and 35-foot meteorological towers located in the southwest corner of the site.

Other emergency response operation centers that will interface with those located in the Davis-Besse Administration Building are listed below:

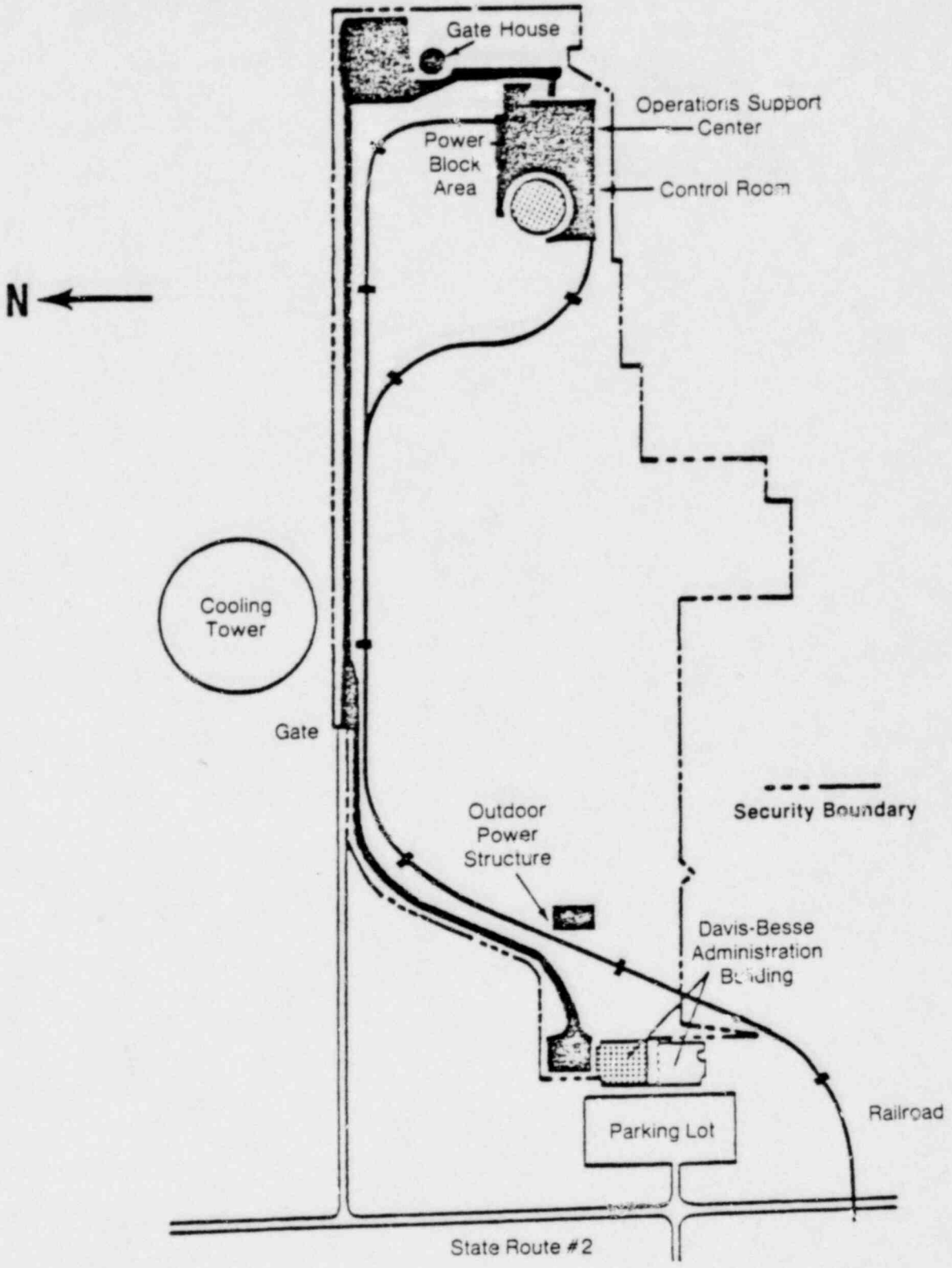
a. Emergency Support Center - This center consists of designated areas of Toledo Edison's offices in the Edison Plaza located in Toledo, Ohio, approximately 21 miles from Davis-Besse.

b. Operations Support Center - Described in Section III.A.

c. Control Room - Described in Section III.B.

d. County Emergency Operations Center - This center is located in the Ottawa County Courthouse in Port Clinton, Ohio, and is approximately 10 miles from Davis-Besse.

e. State Emergency Operations Center - The primary location of this center is in Worthington, Ohio, which is approximately 125 miles from Davis-Besse.



DAVIS-BESSE ADMINISTRATION BUILDING

Figure II-1
Davis-Besse Nuclear Power Station
Security Boundary

III. Davis-Besse Nuclear Power Station

Two of the emergency response facilities for Davis-Besse Nuclear Power Station are located within the Station proper, the Control Room and the Operations Support Center.

A. Control Room

The Control Room is located in the main power block of the Station and maintains control of Station operation during emergency conditions. Control Room personnel perform the functions of the TSC and ECC personnel, as required, until these centers are staffed and functioning.

B. Operations Support Center

The Operations Support Center is located onsite, on the fourth floor of the Davis-Besse Station turbine building. This center provides an area for station personnel to assemble for subsequent assignment to duties in support of emergency operations. The Davis-Besse Emergency Plan identifies that the Operations Support Center is supervised by the Davis-Besse Maintenance Engineer and his responsibilities are delineated within the Plan's Implementing Procedures. Station procedures also identify appropriate evacuation measures if required. Communications capability for the OSC is discussed in Section VI.A on Communications.

IV. Davis-Besse Administration Building

A. Introduction

The Davis-Besse Administration Building, which houses the remaining onsite emergency response facilities, serves a dual purpose for Toledo Edison. On a day-to-day basis it will be an administrative support facility for Davis-Besse Station, housing such activities as emergency planning, site and station engineering, reliability, and some Station non-operations functions. Selected senior Station and Company management also will be located in the facility.

In addition, the Lobby and Briefing Area is designed to serve as a Visitor/Public Information Center, with a full time public relations staff. Many of the building systems, identified later in the submittal as key emergency response systems, will be used routinely for daily work functions by the personnel normally located here. This is to ensure the high degree of familiarity needed in critical situations. Daily use activities will not interfere with emergency functions when required.

At the first declaration of emergency conditions which activate the Davis-Besse Emergency Plan, the first floor (Figure IV-1) of the building shifts to support the emergency response activity. During normal working hours the technical support and radiological assessment functions can begin almost immediately. Additional support would be readily available only one floor away in the site engineering and Station Technical Services groups.

The structure, location, habitability and security of the Davis-Besse Administration Building will be discussed later in this submittal as will the vital support systems such as electrical, communications, and data.

Emergency response facility design, development, qualification and installation is to be verified and validated where appropriate by the requisite organization.

B. Technical Support Center (Figures IV-2 and IV-3)

The primary function of the Technical Support Center is to support the organization that provides management and technical support to Station operations personnel during emergency conditions, to prevent or mitigate the consequences of accidents. It provides direct voice, video and data communication with the Control Room and serves as the primary communications contact with the offsite emergency organization. The TSC also functions as the technical information source to the Emergency Control Center and from Toledo Edison to the Nuclear Regulatory Commission.

The TSC contains a Control Room closed circuit television monitor and a Data Acquisition and Display System which provides a continuous indication of station parameters or derived variables representative of the safety status of the Station. This enables the TSC staff to provide technical aid to the Control Room Operators in handling emergency conditions and recovery operations. Radiological and meteorological data are also provided.

The TSC is activated during Alert, Site Emergency and General Emergency conditions. TSC personnel perform the functions of the Emergency Control Center personnel until the ECC is functional (i.e., perform radiological assessments, recommend offsite protective actions, interface with offsite organizations).

1. Location

   The Technical Support Center is located within the restricted area of the first floor of the Administration Building. It is situated in the immediate proximity of the ECC, Site Emergency Operations Center (SEOC), the Toledo Edison Conference Room and the two areas designated as private office space for the NRC Site Director, and Toledo Edison corporate management (apartments 1 and 2).

   Movement of personnel from the TSC to the Control Room, if required, will be facilitated by placement of a dedicated vehicle at the north entrance to the restricted side of the Building. The transportation route is entirely contained within the owner controlled area of the site. Radiological provisions for safe movement of these personnel will be addressed in the appropriate supporting procedures to the Davis-Besse Emergency Plan.

2. Staffing and Training

   Staffing for the Technical Support Center is currently addressed in the Davis-Besse Emergency Plan and Procedures. The Station Operations Manager and the Onsite Assessment Manager are the senior corporate staff members assigned responsibility for the TSC activities. Training programs addressing personnel responsibilities and TSC operation will be used to ensure a high degree of capability in this area. Specific responsibilities are addressed in the Davis-Besse Emergency Plan. In addition to its daily use by the Station Technical Services, the TSC will be used during annual emergency drills and exercises as identified in the Davis-Besse Emergency Plan.

3. Size

   The TSC consists of separate areas that provide work space for 25 people, with approximately 100 square feet of space per person. There is access to the TSC from the central corridor of the restricted portion of the Administration Building. The TSC main work area has space for 15 work stations and one

conference table for eight people. The area, furnishings, and equipment are designed to provide maximum flexibility with problem-solving areas in clear view of a central coordinator's console. Separate, acoustically treated areas provide an equipment room housing the computer hardware and programmers' area, and a records storage area. One of the three screen-separated areas is provided for use by NRC representatives. Additional, private NRC office space will be discussed later in this submittal.

Overall visual transparency is maintained by keeping the main work area open. Where temporary partitions are required, self-supporting, sound-absorbing screens are provided.

Architectural materials and finishes are generally of commercial grade. The room has a raised-pedestal, carpeted floor and the ceiling is suspended acoustical tile. The north and west walls of the TSC are concrete block, and the south and east walls are of metal studs, insulation, and drywall. All partitions within the TSC are metal stud and drywall. Partitions, ceilings, and doors are sound-attenuating.

The Data Acquisition and Display System (DADS) within the TSC consists of colorgraphic displays with overhead monitors, a hard-copy device capable of reproducing the image from any of the colorgraphic monitors, a line printer/plotter, and trend recorders. The equipment is arranged to be highly visible and easily accessible. A detailed description of the DADS appears later in the submittal.

The TSC records storage area serves to store and control the station records and procedures necessary to aid TSC personnel in evaluating emergency conditions. All documents will be maintained in a current revision condition and will be controlled so as to insure their availability during emergency response operations. Documents that are stored in the TSC records storage area are designated for use in the TSC only and they include at least the following:

- Station technical specifications.
- Station operating procedures.
- Emergency operating procedures.
- Final Safety Analysis Report (FSAR).
- Latest drawings, schematics, and diagrams showing the station structures and systems.

All documents will be hard copy to ensure immediate availability and provisions are included for reproduction of these documents.

4. Design Bases

The habitability provisions of the TSC, including radiological shielding, air conditioning, lighting, and acoustical attenuation, are designed to minimize environmental stresses. Exterior shielding provides radiation protection from postulated accident conditions. Interior shielding protects against possible radiation accumulated on the ventilation system charcoal adsorbers. The habitability requirements are designed to be the same as the Control Room. Sound control is provided to maintain acoustic integrity.

Habitability, data systems and communications for the TSC will be discussed separately.

C. Emergency Operations Facility

The functions of the Emergency Operations Facility -

- Management of Toledo Edison's emergency response activities;
- Coordination of radiological and environmental assessment;
- Determination of recommended public protective actions;
- Coordination of emergency sponse activities with Federal, State and local agencies

are accomplished in several specialized areas on the first floor of the Davis-Besse Administration Building.

These include:

- Emergency Control Center (ECC)
- Site Emergency Operations Center (SEOC)
- Toledo Edison Conference Room
- Public Relations Offices/Briefing Area
- Radiological Testing Lab
- Apartments 1 and 2
- Administrative Offices

EMERGENCY CONTROL CENTER (Figure IV-4)

The ECC's primary function is to provide a centralized management focal point for protective action planning and continuous coordination and control of onsite and offsite emergency activities having, or potentially having, radiological consequences. The ECC staff provides management assistance in the decision-making process to protect the public health and safety.

The ECC contains radiological monitoring, meteorological monitoring, station system data, and communications equipment which enables the

ECC staff to continuously coordinate and control mobile monitoring teams and protective action planning efforts.

The ECC staff evaluates the magnitude and effects of actual or potential radioactive releases from the station during emergency or recovery conditions and recommends appropriate offsite protective measures. The evaluation is based on Station conditions and radiological and meteorological data.

The ECC is activated during Site Emergency and General Emergency conditions, as specified in the Davis-Besse Emergency Plan. Staffing is identified in the Davis-Besse Emergency Plan.

1. Location

   The Emergency Control Center is located within the restricted area of the first floor of the Administration Building in the immediate proximity of the TSC, SEOC, Toledo Edison Conference Room and areas designated as private offices for the NRC Site Director and Toledo Edison corporate management (apartments 1 and 2).

2. Staffing and Training

   Staffing for the ECC is addressed in the Davis-Besse Emergency Plan and Procedures. The Emergency Operations Manager is the senior corporate official responsible for overall radiological assessment functions including radiological monitoring and recommendations on public protective actions. He will provide guidance in all interaction with public officials. The Davis-Besse Emergency Plan identifies specific responsibilities of persons assigned to the ECC.

   An ongoing training program provides for continuous updating of all key emergency response personnel on requirements and responsibilities in emergency conditions. The ECC functions as the center for all radiological assessment activity, relieving the TSC of these functions once the ECC is fully staffed. It is used for this same function during all drills and exercises.

3. Size

   The Emergency Control Center (ECC) provides space for occupancy of at least 16 people. It also serves as a stagging area for the radiation monitoring teams. Individual work stations, a 10-person conference table, and a 5-person table are provided. The area, furnishings, and equipment are designed for flexibility. A large status board, map, one colorgraphic cathode ray tube (CRT), one overhead monitor, and one hard-copy device for the DADS are visible from all work stations.

   The architectural materials and finishes are similar to those supplied for the TSC. The room has a raised-pedestal, carpeted

floor. The ceiling is suspended acoustical tile. The walls are concrete or masonry with an interior facing of metal studs, insulation, and drywall.

The ECC documents are kept in file cabinets and book shelves inside the ECC. Documents that are stored in the ECC are designated for use in the ECC only, and they include at least the following:

- Station procedures and emergency plans needed to exercise overall utility resources management and for recovery management.
- Records related to licensee, state, and local emergency response plans.
- Radiological records.
- Documents describing onsite personnel control, offsite population distribution, and station and area evacuation information.

All documents will be maintained in a current revision condition and will be hard copy to ensure immediate availability. Provisions are made for reproduction of these documents.

4. Design Bases

The habitability provisions of the ECC, including radiological shielding, air conditioning, and acoustical attenuation, are similar to those of the TSC. Protective equipment is available within the ECC for use by the radiological assessment team. Special consideration is given to sound control to provide acoustical privacy during telephone communications. Habitability, data systems and communications for the ECC will be discussed separately.

SITE EMERGENCY OPERATIONS CENTER (See Figure IV-1)

The primary function of the Site Emergency Operations Center (SEOC) is to provide a radiologically and structurally protected area for office space, communications, and accommodations for state and local officials. The SEOC is located within the nonrestricted portion of the Administration Building, but is also within easy access of the ECC. It is designed to accommodate up to eight state and local government personnel at a conference table.

Architectural materials and finishes of commercial grade were used for construction of the SEOC. The SEOC has carpeting on a concrete floor and a suspended acoustical tile ceiling. The walls are concrete unit masonry.

The habitability provisions, including radiological shielding, air conditioning, and acoustical attenuation, are designed to minimize

environmental stresses, and are similar to those specified for the TSC. The office space is provided with appropriate communications. The SEOC may be used as an additional conference room during normal station operations.

TOLEDO EDISON CONFERENCE ROOM

During emergency conditions, the Toledo Edison conference room adjacent to the ECC will be used as office space for Toledo Edison corporate management personnel. In Site Emergency and General Emergency conditions, this area would serve as a conference and briefing facility for the most senior corporate officials who are at the site directing the emergency response. This office space is provided with appropriate communications and is radiologically and structurally protected.

PUBLIC RELATIONS OFFICES/BRIEFING AREA

Offices

The Public Relations (PR) offices are located on the nonrestricted side of the Administration Building. These offices provide radiologically and structurally protected space for PR contacts with individual media people and a work area for PR releases by Toledo Edison during normal and emergency station operations.

Three separate offices and a storage room comprise the PR office area. One of the offices is designated for use by NRC PR personnel. Another office is capable of accommodating up to eight people in a conference style arrangement. The storage room adjacent to the PR offices provides space for office supplies, informational literature, and materials for the visitor information center in the Administration Building lobby.

The PR offices are located next to the SEOC. The architectural features of the PR offices are similar to those of the SEOC.

During normal station operation, the PR offices are occupied by a PR management staff member on a permanent basis. Under emergency conditions, one office is provided for the PR vice president or media relations supervisor. The other office provides a work area for one PR person and conference space for up to eight people. Television monitors are provided in one office with tape capability for each of the three major television networks.

Briefing Area

The Briefing Area is located on the nonrestricted side of the Administration Building. This area provides a radiologically and structurally protected location for press gatherings, briefings, and PR releases.

The Briefing Area is made up of a foyer, a briefing room, and a storage room. The briefing room provides space for an anticipated

gathering of approximately 200 people. The storage room is provided for audio-visual equipment, additional furniture, and other displays and literature as required.

The foyer of the Briefing Area is located adjacent to the main reception lobby of the Administration Building. It contains the public access lavatories and the space for 20 telephone housings. The briefing room contains a stage with a speaker's table and a lectern, tables and chairs to accommodate the press, and front and rear projection areas. The room is capable of being subdivided by means of a motorized sliding door. A double door is provided for main access into the briefing room from the lobby. Provisions for voice amplification and stage lighting are made for the Briefing Area.

The office located adjacent to the Briefing Area may be used by emergency response personnel during emergency conditions as required. This office is provided with communications and is radiologically and structurally protected.

LOBBY

The lobby and mezzanine areas have no required emergency response function, however, they may be used during emergency conditions as a reception area and information display center for the news media. Although these areas are structurally adequate, no special provisions for radiological habitability are provided.

The lobby area provides space for the control of access into the various areas of the Administration Building. It also provides an area for coat closets and various models, graphics, and displays. An elevator is provided in the lobby to service the administrative offices on the second floor. The lobby is located in the center of the Administration Building, in a nonrestricted area. The staircases in the main lobby lead to the mezzanine, which serves as an observation area of the Davis-Besse Station. These areas are not radiologically protected.

RADIOLOGICAL TESTING LAB

The primary function of the Radiological Testing Laboratory (RTL) is to provide a facility located near the TSC and ECC for a limited amount of radiological counting and analysis of low-level environmental samples. The RTL may act as a staging area for the field radiation sample teams. High-level reactor coolant samples will not be analyzed in the RTL. The RTL is located in the restricted side of the Administration Building.

The RTL provides a structurally secure area for all expected site environmental conditions, and has the same radiological habitability requirements as the Control Room under accident conditions.

The RTL is located near the north entrance of the Administration Building. Primary access is from the north vestibule. A second

access is provided by a double door for loading and unloading equipment. Permanent work stations are provided for up to four people, and additional space is allotted for temporary occupation by field personnel. A conference table with six to eight chairs is also provided. Some major equipment components are designed to be easily removable for potential utilization in the field.

The floor of the RTL is vinyl asbestos tile on concrete. Suspended acoustical tile is used for the ceiling. The walls are concrete or masonry. The north exterior wall is insulated, and the east wall which separates the RTL from the east mechanical room includes a sound barrier. All architectural materials and finishes are of commercial grade.

The RTL may be used by the chemistry and health physics group during normal station operation.

APARTMENTS 1 and 2

During normal station operation, two efficiency apartments are provided for the shift technical advisors. During emergency operation, Apartment 1 will be used as additional office space for the NRC Site Director and staff. Apartment 2 is assigned to Toledo Edison corporate management.

Both apartments are provided with appropriate communications and are radiologically and structurally protected.

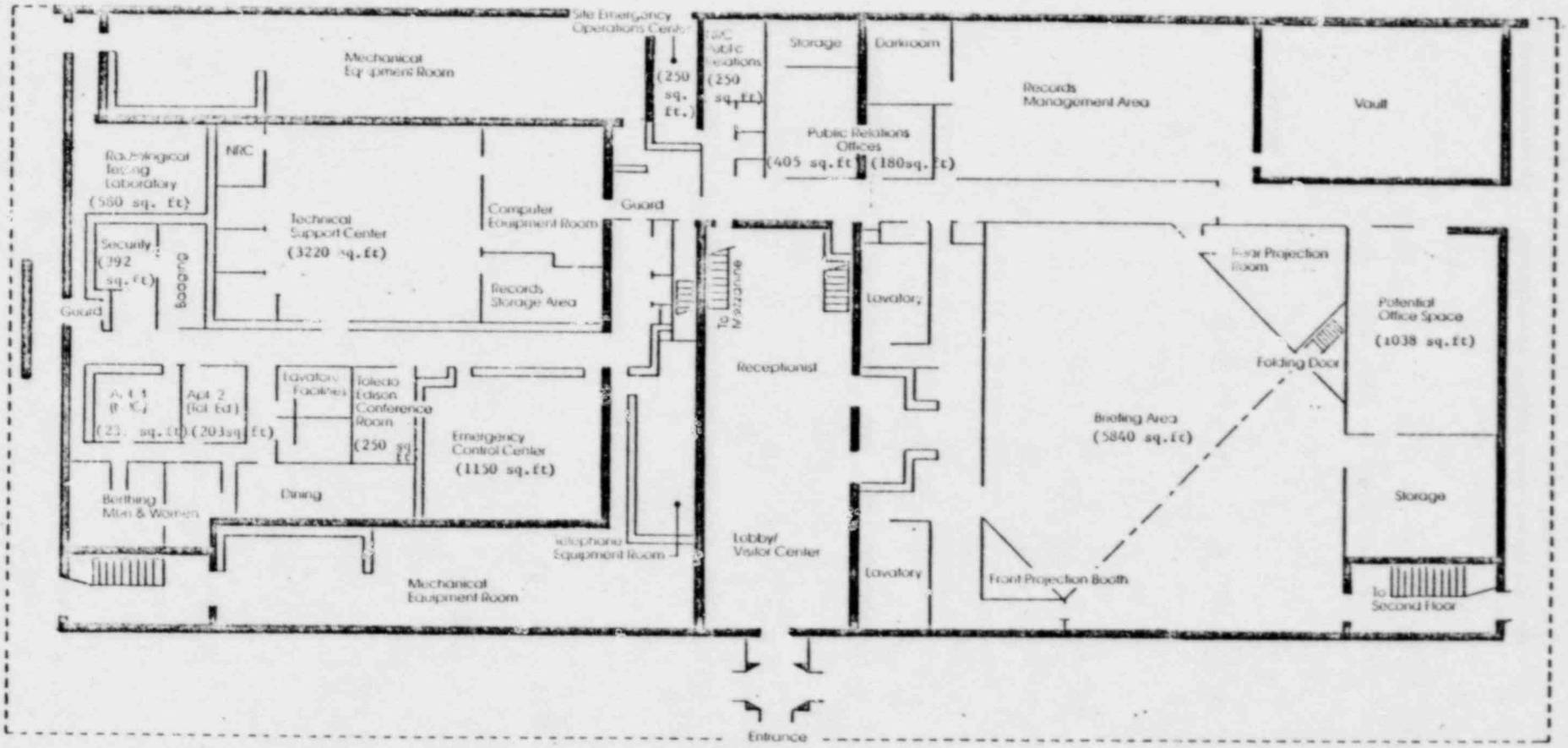
The apartments are located within the restricted portion of the Administration Building, near the berthing and dining areas. Each apartment is furnished with standard efficiency apartment furniture.

The apartments have carpeted floors and suspended acoustical tile ceilings. Ceramic tile is used on the bathroom floors and the ceiling is drywall. The apartment walls are typically metal stud and wallboard with an acoustical barrier within the wall cavity for attenuation of sound between apartments and to the adjacent corridor.

ADMINISTRATIVE OFFICES

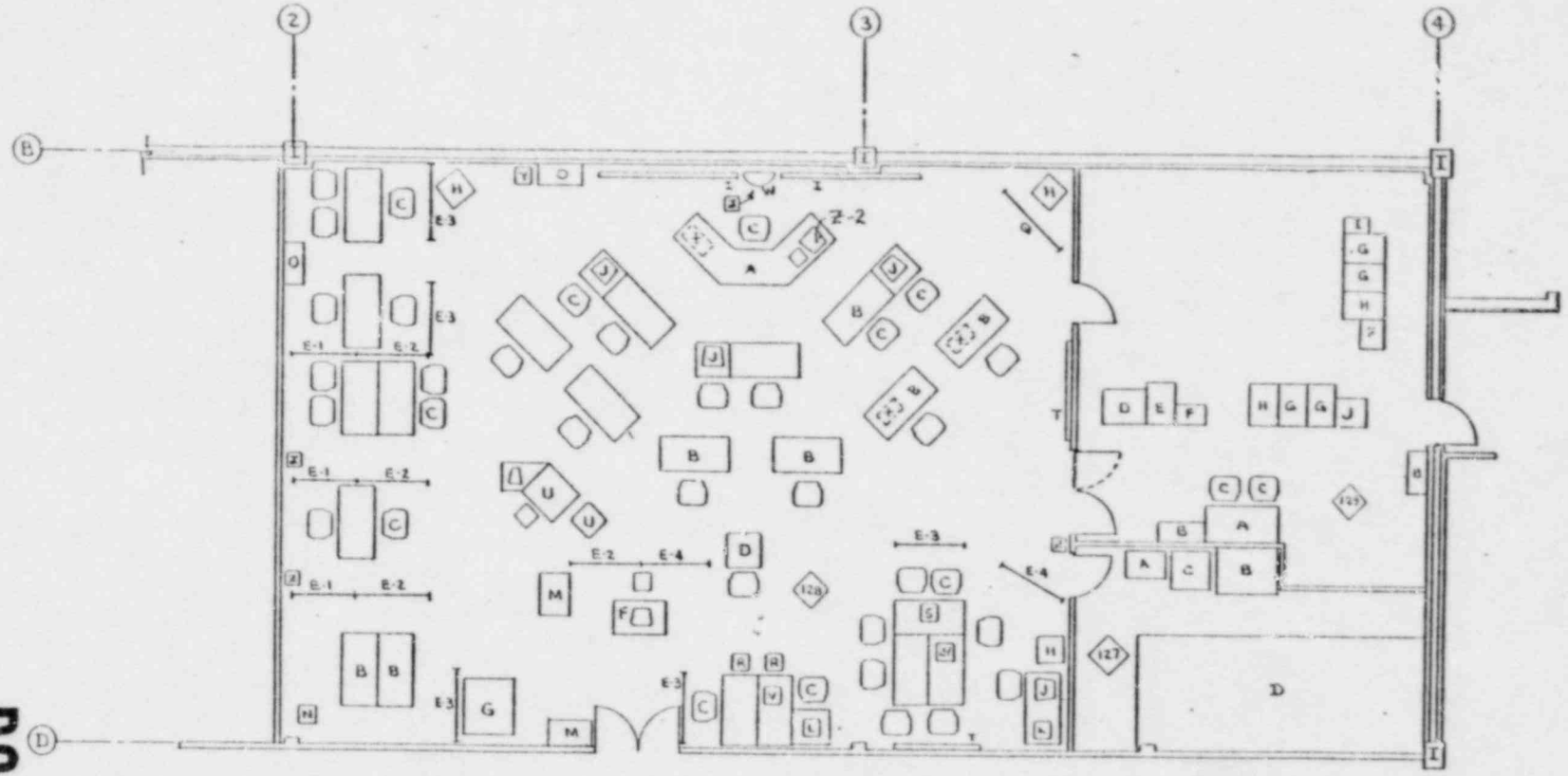
During normal station operation, the administrative offices on the second floor of the Davis-Besse Administration Building provide additional office space for the Nuclear Mission staff.

Although the administrative offices have no required emergency response function, they can provide space during emergency conditions for 200 additional emergency response staff for station assessment, monitoring, and recovery operations. Although these offices are structurally adequate, no special provisions for radiological habitability or emergency power are provided.



DAVIS-BESSE ADMINISTRATION BUILDING

Figure IV-1
Davis-Besse Administration Building
First Floor Plan



DAVIS-BESSE ADMINISTRATION BUILDING

Figure IV-2
Technical Support Center Layout

ROOM NO 125

MARK	QUAN	DESCRIPTION
A	1	COORDINATOR'S CONSOLE W/ CRT
B	22	WORK TABLE 30" X 60"
C	36	CHAIR W/ARM
D	5	TABLE 30" X 30"
E-1	3	TACKBOARD SCREEN 5'X6'
E 2	4	SCREEN 5'X6'
E-3	5	" 5'X6'
E 4	2	SCREEN / MAGNETIC WRITING ONE SIDE 5'X6'
F	1	SECRETARY DESK W/ TYPEWRITER + CHAIR W/O ARMS
G	1	LIGHT TABLE
H	3	OVERHEAD MONITOR
I	2	MAGNETIC WRITING BOARD - WALL MOUNTED FLUSH
J	6	CRT
K	1	TELECOPIER
L	1	TELETYPE
M	2	COAT CABINET 36" X 24"
N	8	STACKABLE CHAIR
O	2	BOOKCASE - 2 SHELF 36" X 10"
Q	1	STATUS BOARD - PORTABLE ON CASTERS 4' X 6'
R	2	X/Y PLOTTER
S	1	CALL DIRECTOR TELEPHONE W/ SPEAKER - MICROPHONE
T	2	CORKBOARD
U	1	RECORDS MGT TERMINAL + CHAIR W/O ARMS
V	1	HARD COPY PRINTER
W	1	WALLCLOCK 24" DIA
X	10	ROLLABLE FILE DRAWERS UNDER TABLES - TYPICAL
Y	1	EMERGENCY RADIO COMMUNICATION
Z-2	4	GAI-TRONICS (WALL MOUNTED)
Z-1	1	GAI-TRONICS (DESK TOP)
Z-2	1	CLOSED-CIRCUIT TELEVISION

ROOM NO 127

MARK	QUAN	DESCRIPTION
A	1	MICROFILM - READER / PRINTER
B	3	FLAT FILE - 5 DRAWER 49.5" X 38.5"
C	1	STICK FILE 30" X 30" X 42"
D		HIGH DENSITY - MOVEABLE SHELF FILES

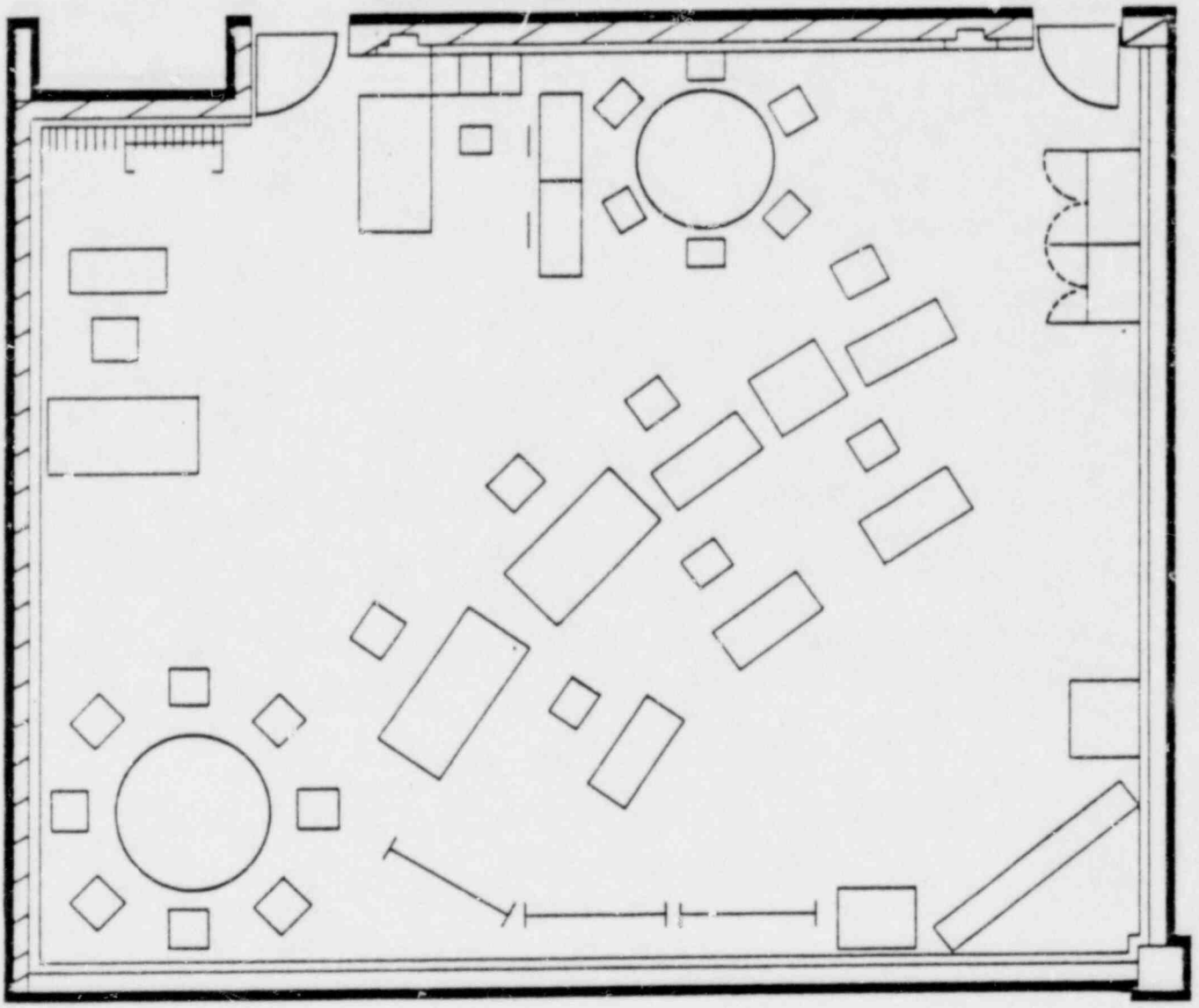
ROOM NO 129

MARK	QUAN	DESCRIPTION
A	1	WORK TABLE 30" X 60"
B	2	FILE CABINET 15" X 36"
C	2	CHAIR W/O ARMS
D	1	PRINTER 2'-6" X 3'
E	1	MAGNETIC TAPE 2' X 3'
F	2	TERMINAL 1'-9" X 2'
G	4	DISC 2' X 3'
H	2	CPU 2' X 3'
I	1	EMR 1'-6" X 2'
J	1	TELEPHONE MODEM

DAVIS-BESSE ADMINISTRATION BUILDING

Figure IV-3
Technical Support Center
Layout Legend

Emergency Control Center



DAVIS-BESSE ADMINISTRATION BUILDING

Figure IV-4
Emergency Control Center Layout

V. Design Concepts

A. Location

The Davis-Besse Administration Building is located on the western edge of the Davis-Besse site, fronting on State Route 2. It is located at the site security boundary such that the boundary separates the restricted from the nonrestricted side of the Building.

The distance between the Building and the Control Room is 2100 feet. A paved surface road within the site security boundary is provided and is completely under the control of Toledo Edison.

Vehicular transport time to the Control Room is under four minutes.

B. Structure

The Davis-Besse Administration Building was designed in accordance with portions of the following codes and regulations.

1. ANSI A58.1-72 - Building Code Requirements for Minimum Design Loads in Buildings and Other Structures

2. Uniform Building Code (UBC), 1979 Edition

3. Ohio Basic Building Code (OBBC), June 1979 Edition

4. AISC, Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, November 1, 1978

5. ACI 318-77, Building Code Requirements for Reinforced Concrete

Design Loads

a. Dead Loads (D) - include the weight of the framing, roof, floor, partitions and all permanent equipment and materials.

b. Live Loads (L) - include the following design live loads and equipment handling loads.

Minimum design live loads:

Mechanical and equipment rooms	150 psf
Corridors, stairs, lobby	100 psf
Office areas	80 psf
Partitions	20 psf
Roof (including snow)	30 psf

c. Wind Loads (W) - designed in accordance with Section 2311 of UBC, 1979 Edition.

Wind load is based on 100 year recurrence interval. The maximum wind velocity considered is 90 mph at 30 feet above grade.

d. Seismic Loads (E) - considered in accordance with Section 2312 of the UBC.

The Davis-Besse site is within UBC Seismic Zone 1. However, the Administration Building is designed to the more stringent requirements of Seismic Zone 2. Additionally, the occupancy importance factor of 1.5 specified for "essential facilities" was used.

e. Flooding - The limiting condition in the consideration of flooding at the Davis-Besse site is the wind tide effect on the western shore of Lake Erie. The highest water level recorded to date is approximately 576.5 feet International Great Lakes Datum (IGLD). This water level occurred during the early 1970's as a result of wind tide.

Due to the fact that the water levels at Davis-Besse are recorded in the intake canal system and do not reach the same maximum elevations as the lake, the maximum recorded lake level at the site is estimated to be 577.0 feet IGLD. The highest water level used for the design of the Administration Building is 578.0 IGLD.

Shielding

Concrete thicknesses were established to limit personnel exposures.

The external walls of the first floor of the Administration Building act as shield walls and have a thickness of 6 inches of poured concrete. The second floor slab has an effective thickness of 6 inches. A shield wall of 6-inch poured concrete and 10-inch solid block is provided between the charcoal filter and the first floor emergency response area.

Layout

The Administration Building is designed to allow easy egress from all areas through an uninterrupted system of corridors connecting emergency exits located at the north, south, and west walls of the Administration Building. Emergency exits located at the north and south walls are alarmed. The west-wall exit is located in the main lobby. Two stairways are located at the northwest and southwest corners of the Administration Building to allow emergency egress from the administrative offices on the second floor.

A common corridor provides easy access between the TSC, ECC, SEOC, and RTL. The main lobby provides separation between the restricted

areas of the Administration Building and the Briefing Area, which is located at the south end of the Administration Building.

C. Security

A security office, badging room, and three separate guard stations combine to support the following security provisions.

Administration Building security provides for monitoring and controlling personnel access into and within the restricted area. The security office serves as headquarters for these activities. The badging room provides an area for issuing access color-coded badges. The guards control access at each point of entry into the restricted area of the Administration Building. Color-coded badges are to be used to identify personnel who are permitted access to restricted areas within the Administration Building.

The central guard station monitors egress points, interior radiation levels, and fire system alarms from the Administration Building's Central Control and Monitoring System (CCMS).

The unguarded emergency exits can be opened in the direction of egress only, and are alarmed. A central data gathering panel serves as the transponder between the remote fire and security sensors and the central processing unit.

Access to the Administration Building is provided through the main lobby security receptionist. Under emergency operation, trained security personnel are stationed at the two points of entry into the restricted area and in the main lobby.

The central guard station is located in the lobby and is equipped with the central processing unit and operator's console for the CCMS.

The Administration Building is provided with limited fenestration and personnel access at the first-floor level. Additionally, the Administration Building is located such that the fence at the site security boundary prohibits outside access from the public areas to the restricted area.

D. Habitability

The building heating, ventilating, and air conditioning (HVAC) system provides HVAC for inside design conditions allowing personnel comfort during operation of the Administration Building, including station emergency conditions. It also provides personnel radiological protection from airborne contaminants under emergency conditions to the same degree as the Control Room in accordance with General Design Criterion 19.

The building areas are maintained at 72F dry bulb and 50% relative humidity for winter and 78F dry bulb, 65F wet bulb for summer. The

computer room is maintained at 72F dry bulb, 60F wet bulb. The normal system provides particulate removal using filters with an average dust spot efficiency of 55%.

Initiation from the Administration Building Central Control and Monitoring System (CCMS) will bring the outside and recirculating air filtration units into operation to provide high-efficiency filtration and adsorption of airborne radioactivity. The units provide a filtration DOP (dioctyl phtnalate) efficiency of 99.97% and charcoal adsorption efficiency of 95% to provide for 30 days habitability while limiting exposure.

To prevent outdoor air infiltration during activation of the makeup air filtering units, no exhaust fans operate and the outside airflow is at least 0.5 volume changes per hour to maintain a positive building pressure of approximately 1/8 inch water gage.

Redundant ventilation systems are not provided. However, should the ventilation system serving the Technical Support Center (TSC), Emergency Control Center (ECC), and Site Emergency Operations Center (SEOC) fail, the ventilation system serving the Briefing Area can be diverted as a backup.

The office space on the second floor, which has no required emergency response function, has a separate HVAC system. The HVAC for the first floor lobby is provided from the second floor system.

Description

The HVAC system consists of several subsystems. In general there are 3 zones, two of which have a normal and emergency mode to provide radiological protection for the first floor. The remaining zone provides normal ventilation to the second floor and first floor lobby. (Figure V-1)

The air handling unit for Zone 1 serving the TSC, ECC, RTL, SEOC, and PR office mixes outside air and recirculation air, providing a variable air volume flow of 14,740 cfm to these areas. An automatic economizer control system is included, which optimizes the amount of energy consumption through seasonal changes.

The air handling unit consists of a mixing section for mixing makeup and recirculation air, a normal filter section for particulate removal, a cooling coil section which utilizes chilled water from a central chilled water loop, and a fan with variable inlet vanes. The flow is controlled by a flow monitoring station in the discharge duct to maintain proper duct pressure.

Air is distributed by ducting to these areas through air terminal units which contain hot water reheat coils. Temperature is controlled in these areas by modulating airflow and heat input at the terminal units by the room thermostats.

Smoke detectors are provided in the supply and return ducts to close outside and return dampers and shut down the air handling unit when smoke is detected.

Radiation monitors are provided in the Administration Building and can be used in deciding whether to use the emergency makeup air filtering units. Upon automatic or manual initiation, the 4,000 cfm makeup air filtering unit is brought into service. All area exhaust fans are tripped and their isolation dampers are closed. All of the 2,050 cfm makeup air and 1,950 cfm recycled air goes through the makeup air filtering unit and is directed to the mixing box of the air handling unit to be mixed with the remaining recycled air.

The makeup air filter consists of a mixing section to mix makeup and recycled air, a cartridge type prefilter section with a dust spot efficiency of 50 to 55%, a HEPA filter section with a DOP efficiency of 99.97%, an electric heating coil section to maintain the relative humidity below 70% to enhance the capability of the charcoal adsorber, a charcoal adsorber section with a 95% efficiency to remove airborne radioiodine, a second HEPA filter section to retain carryover, and a fan with variable inlet vanes. The fan is controlled by a flow monitoring station in the discharge duct to maintain the 4,000 cfm flowrate. The adsorber is designed for a residence time of 0.25 second per 2 inches of adsorber bed. The adsorber bed depth is 2 inches. Charcoal test canisters are provided in accordance with ANSI Standard N509, Appendix A.

The air handling unit serving the Briefing Area is similar to the unit for Zone 1, except it contains a hot water heating coil to provide heating and the fan has a two-speed motor. The hot water is supplied from the centralized heating water system. Air is distributed by ducting to the Briefing Area. This zone also has a makeup filter unit similar in construction and operation to Zone 1. Design airflow is 1,500 cfm makeup air and 2,500 cfm recycled air.

Upon failure of the Zone 1 air handling unit or makeup air handling unit, the Zone 2 units can be remote-manually lined up to serve the Zone 1 area. The Zone 2 air handling unit fan runs at a high speed to provide 14,740 cfm of air. Motor-operated isolation dampers operate to align the interconnecting ducting.

Upon loss of normal offsite power, ventilation to all the emergency response areas on the first floor is maintained by the emergency diesel generator-powered system.

Radiation Protection and Monitoring

The main function of the radiation protection and monitoring system is to provide radiation protection to emergency response personnel in the Administration Building during emergencies involving a radiation release from the Station.

The radiation doses to the emergency response personnel in the Administration Building through the duration of the postulated design basis accident discussed in Chapter 15 of the Davis-Besse Final Safety Analysis Report (FSAR) do not exceed the guideline values given in 10 CFR 50, Appendix A, Criterion 19 and Standard Review Plan 6.4. The dose guidelines are as follows:

1.	Whole body, rem	5
2.	Thyroid, rem	30
3.	Beta skin, rem	30

The radioactivity concentrations outside the Administration Building are based on the design basis assumptions of Regulatory Guide 1.4 and specific Davis-Besse assumptions. These assumptions are as follows:

1. One hundred percent of the equilibrium radioactive noble gas inventory and 25% of the equilibrium radioactive iodine inventory developed from maximum full-power operation of the station are assumed to be available for leakage from the primary containment.

   The following fractions are assumed for the chemical form of iodine:

a.	Elemental	0.91
b.	Particulate	0.05
c.	Organic	0.04

2. The airborne fission products are assumed to leak from the containment at a rate of 0.5% per day for 0 to 24 hours and 0.25% per day for 24 to 720 hours.

3. Credit for decay during holdup in the containment and credit for spray removal are considered using the following spray removal constants:

a.	Elemental iodine	0.163/hr
b.	Particulate iodine	0.134/hr
c.	Organic iodine	0/hr

   Spray removal credit is terminated at a decontamination factor of 100 for both elemental and particulate iodine.

4. The annular region between the containment vessel and the shield building is at atmospheric pressure at the commencement of the accident; 13 minutes are required to obtain a negative pressure in this region. It is assumed that all activity escaping the containment vessel during this time is released directly to the atmosphere

without benefit of filtration or mixing. After the negative pressure has been obtained, 1.5% of the leakage is directed to the environment and the other 98.5% is collected by the emergency ventilation system and exhausted through 95% efficient charcoal filters.

5. The atmospheric dispersion factor (X/Q) values at the Administration Building are based on the following assumptions:

   a. The Administration Building is assumed to be approximately 600 meters (2,100 feet) from the release location.

   b. For the 0- to 2-hour time period, a X/Q of 1.9×10^{-4} s/m^3 at the site boundary, 730 meters from the containment.

   c. For the 0- to 8, 155-hour time period, the highest annual average site boundary X/Q of 3.8×10^{-6} s/m^3.

   d. Meteorology of Pasquill stability Category F with average wind speed of 2 mph during the 0- to 2-hour time period.

   e. The variation of X/Qs for different time intervals at the Administration Building at 600 meters is assumed to be approximately the same as the variation for corresponding time intervals at the site boundary at 730 meters.

   f. Building wake correction, where applicable, is based on a minimum cross-sectional area of the containment building of 3,129 square meters.

   Based on these assumptions and data, the following X/Qs were estimated at the Administration Building:

. 0 to 8 hours	1.35×10^{-4}	s/m^3
. 8 to 24 hours	9.8×10^{-5}	s/m^3
. 24 to 96 hours	4.8×10^{-5}	s/m^3
. 96 to 720 hours	1.75×10^{-5}	s/m^3

The radiation protection of the emergency response area of the Administration Building is evaluated based on the previous assumptions and the HVAC system design parameters as stated. The HVAC for the Administration Building is divided into different zones. The HVAC intake and recirculation flowrates are different for these zones. For the Administration Building design parameters, the thyroid dose is approximately proportional to the HVAC intake flowrate. Because the HVAC intake flowrate for HVAC Zone 1 is higher than that for the other zones, the following applicable Zone 1 parameters are used in the estimation of radiation doses.

1. The filtered air intake flowrate is 2,050 cfm.

2. The unfiltered inleakage is 10 cfm.

3. The filtered recirculation flowrate is 1,950 cfm.

4. The intake and recirculation filter efficiency is 95%.

5. The volume is 150,000 cubic feet.

6. The occupancy factors are:

a.	0 to 24 hours	1
b.	1 to 4 days	0.6
c.	4 to 30 days	0.4

7. The external walls of the emergency response area of the Administration Building act as shield walls and have a thickness of 6 inches of poured concrete. The second floor slab has an effective thickness of 6 inches. A shield wall of 6-inch poured concrete and 10-inch solid block is provided between the charcoal filter and the emergency response area. The combined dose contribution from shine from the containment, shine from the outside cloud, and the activity buildup on the charcoal filters is estimated to be 1 rem for 30 days. The calculated doses are below the guideline values of General Design Criterion 19.

Maximum Whole Body Dose During
a Design Basis Accident (DBA)
at the DBAB

	Calculated (rem)	General Design Criterion 19 Guidelines (rem)
Airborne contribution	0.21	
Shine from containment, filters, and outside cloud	1.00	
Total	1.21	5
Thyroid dose	5.4	30
Beta skin	2.55	30

The radiation monitoring system provides an indication of airborne radioactivity concentrations and the dose rates in the emergency response area of the Administration Building. An alarm is to be provided when the radiation levels exceed the predetermined trip setpoint. The Administration Building has provisions for sampling and monitoring iodine in the emergency response area of the building.

Emergency response personnel are warned against free egress from the Administration Building during periods of high radiation levels

outside the Administration Building by a protective action notification system consisting of blue flashing strobe lights at all doors leading outside. These warning lights are manually activated at the coordinator's console in the TSC. Clear instructions are to be posted at each Administration Building door leading outside.

In the event of loss of offsite power, the radiation protection and monitoring systems are supplied with electrical power from the Uninterruptible Power Supply (UPS).

VI. Support Systems

A. Communications

The communications capabilities at the Davis-Besse Administration Building fall into several categories, including several separate telephone networks, radio and public address systems. Each category is discussed separately below.

1. Telephone Communications

a. Toledo Edison facilities

Telephone communications at the Administration Building are divided into 3 distinct systems.

1. Emergency Plan Loop Telephones (Figure VI-1)

The primary telephone network is the Emergency Plan telephone system which consists of four voice communication loops tied to the Edison Plaza Ohio Bell Centrex system. This provides complete independence from the General Telephone system serving the area surrounding Davis-Besse.

This system is designed to be used on a "talk loop" basis. A talk loop is a group of people in communication with each other in a conference mode. This capability is the basis for the original concept of the system. Hence, it has been designated to have the ability to establish four separate communication talk loops between the emergency facilities. This is to ensure the reliable and timely exchange of information between the emergency organizations during an incident at the Davis-Besse Nuclear Power Station.

The emergency facilities in which these loops are to be established are as follows:

Facility	Location
Plant Control Center (Control Room area)	Davis-Besse Station (4th floor of Auxiliary Building)
Technical Support Center	Davis-Besse Administration Building
Emergency Control Center	Davis-Besse Administration Building

Operations Support Center	Davis-Besse Station 4th floor of Turbine Building
Emergency Operations Center	County: Port Clinton (Ottawa County Courthouse)
Public Relations/ Briefing Area	Davis-Besse Administration Building
Emergency Support Center	Toledo (Edison Plaza)

The four talk loops that can be established between the above facilities are as follows:

1. Technical Data Loop

   Provides a voice link for technical data for the following:

   - Plant Control Center (Control Room/ Shift Supervisors' office)
   - Technical Support Center
   - Emergency Control Center
   - Emergency Support Center

2. Technical Management Loop

   Provides dedicated communications for plant operational decisions among the following:

   - Technical Support Center
   - Emergency Control Center
   - Plant Control Center (Control Room/ Shift Supervisors' office)
   - Operations Support Center
   - Emergency Support Center

3. Policy Management Loop

   Provides dedicated communications for corporate policy decisions among the following:

   - Technical Support Center
   - Emergency Control Center
   - Emergency Support Center

More than 50 of the Centrex lines will be on a microwave link to reduce the dependence on telephone land lines.

3. General Telephone Site System

In additon to the Ohio Bell Centrex network, the regular Station telephone system supplies upwards of 550 lines for intra-station calling and access to the General Telephone land-line network. This system operates by a GTD-1000 with conference call and call-forwarding capability. This GTD-1000 is fully operational without an attendant 24 hours a day. Additional features which further increase or restrict its capabilities are available but require an attendant.

B. Public Official Interface (Figure VI-2)

In order to provide direct, immediate and continuing contact with the Ottawa County and State of Ohio public officials a direct 3-way ring-down network is installed between the Administration Building, the Ottawa County Courthouse and the State Disaster Services Agency headquarters in Worthington.

The system is a dedicated GTE/Ohio Bell link with telephones that ring in the other two locations whenever the receiver is lifted at a third location.

These units are located in the ECC and TSC of the Administration Building, the Assembly Room (EOC) at the Ottawa County Courthouse and the State EOC area in Worthington. Each has headset capability for continuous, long-term conversation.

For direct notification of public officials, an unlisted GTE telephone has been installed in the Ottawa County Sheriff's Office. Procedures for use of these systems are included in the Davis-Besse Emergency Plan.

C. NRC

The Emergency Notification System (ENS) and Health Physics Network (HPN) phone system will be installed in all required locations at the Administration Building, including the TSC, ECC and RTL.

In addition, areas designated as NRC office space will have telephone units through both Centrex and GTD-1000 for access offsite and onsite.

4. Media

Located directly outside the entrance to the Briefing Area are 20 Charge-call telephones on Ohio Bell foreign exchange lines and direct GTE land lines. These will allow direct media access by phone to any offsite location.

5. Radio Communications

The Davis-Besse Station radio system is designed to provide communications between all control points and all portable or mobile radios on the frequency. Mobile radios in designated vehicles are used for radiation monitoring teams, portables for in-plant firefighting teams.

Control points are provided in the Administration Building at the ECC, TSC and Security office, Central and Secondary Alarm Station, as well as the Control Room. This system is interactive with the Toledo Edison radio system for extended range capability and provides direct radio contact to the Ottawa County Sheriff. This is independent from the Station security radio system.

6. Public Address/Intercom

There are two separate systems servicing the Administration Building. The primary system is the extension of the Station Gai-tronics paging/intercom system to the TSC and ECC. This system provides a direct communications link to all areas within the plant. Both wall mount and desk set units are provided in both locations with headsets for all units.

The internal Administration Building public address system is provided for general building announcements.

B. Electrical Distribution System

The electrical power distribution system for the Davis-Besse Administration Building is designed to provide continuous electrical service for startup, normal, and emergency operations of the equipment installed in the Administration Building.

The Toledo Edison system grid provides reliable offsite electrical power and redundant locally generated power supplies to maintain continuity of service for the systems required by the emergency response area of the Administration Building. This basic electrical distribution is shown in Figure VI-3.

Both the normal and limited capacity backup 12.47 KV supplies to the Administration Building originate from offsite sources

independent of the station electrical system and therefore in no way effects the safety related station system. The 12.47 KV/480 V transformer normally supplies all Administration Building loads.

Equipment identified for emergency operation is connected to power supplies that can be automatically energized by an emergency diesel generator following the loss of voltage from the normal power supplies. The emergency diesel generator starts automatically following a loss of voltage signal from the 480 V Automatic Transfer Switch. The diesel generator is sized to handle all emergency powered loads. A 7-day fuel supply tank is connected to the diesel generator. A day tank is also provided.

Critical loads such as data acquisition, radiation monitoring, communications, and other instrumentation requiring continuous power with close tolerances for voltage and frequency deviation are energized from the Uninterruptible Power Supply. The Uninterruptible Power Supply (UPS) is composed of a battery-backed inverter and a static voltage regulator. A static switch normally aligned to the inverter supplies this power. The static switch will automatically transfer to the alternate supply, which comes from the static voltage regulator, upon short circuit or degraded voltage and frequency of the inverter.

C. Technical Data Acquisition/Display Systems

1. Data Acquisition and Display System (DADS)

The effective response to an emergency situation must be based on accurate, timely information. The information required varies greatly with each emergency response function performed and varies still further with the type of emergency. To adequately fulfill the data requirements of personnel in the Control Room, Technical Support Center, and Emergency Control Center, and at other offsite locations, Toledo Edison has selected a powerful, reliable, flexible, computer based Data Acquisiton and Display System (DADS). Figure VI-4 depicts the basic system. The DADS has sufficient size and flexibility to accommodate the development of different informational displays to compliment the performance of the various emergency response functions. These display formats are being developed and will be optimized through an evaluation process involving the functional users. This is expected to be an ongoing program resulting in refined displays as experience, insight and capabilities are evaluated.

The DADS is also sufficiently large to accommodate the day-to-day use of the system as an operational tool with

no adverse effects on its performance in an emergency situation. The system will be routinely used by plant operators and staff as an aid for normal plant operations, as a data analysis tool, and as a powerful training device. The following design bases were used in the conceptual development of the DADS.

Design Bases

Emergency Response Design Bases

a. The DADS provides the data communication required for Technical Support Center (TSC) personnel to perform accident assessment.

b. The DADS provides the data communication required for TSC and Emergency Control Center (ECC) personnel to perform radiological assessments of onsite and offsite conditions.

c. The DADS provides operating personnel in the Control Room with additional station monitoring capabilities in such a format to allow rapid assessments of Station safety status.

d. The DADS has the capability for data transfer to offsite facilities.

e. Operation of the DADS is highly reliable and does not affect the operation of any safety system.

f. For operation in the Control Room, the DADS requires no operating personnel in addition to the normal Control Room staff.

g. Because the function of the DADS is to aid in the detection and monitoring of transients and accidents, it is capable of functioning during and following most events expected to occur during the life of the Station.

Nonemergency Response Design Bases

a. The DADS provides day-to-day information on core and Station performance to Station operating personnel in the Control Room and to personnel in the Davis-Besse Administration Building and Edison Plaza.

Basic System

The DADS is a dual-computer, disk-based data acquisition and display system with one computer normally controlling data acquisition and the other controlling data display.

The two computers, their four supporting disks, a magnetic tape unit, a line printer, two system consoles, the demultiplexer components of the multiplexed data stream, and the modems are located in the equipment room of the TSC, adjacent to the TSC records storage area. One printer/plotter, two three-point trend recorders, a CRT hard-copy device, and four colorgraphic CRTs with three slaved overhead monitors are provided in the TSC for use by technical assessment personnel. One colorgraphic CRT with one slaved overhead monitor and one CRT hard-copy device are provied in the ECC for use by radiological assessment personnel. In the Control Room, the Station operating staff is provided with two colorgraphic CRTs with slaved overhead monitors. An additional CRT is provided in the Edison Plaza in Toledo to allow communication with the DADS.

The flexible capability of the DADS for varied data outputs provides each functional user in the emergency response activity centers with the power to determine the information and format to be displayed according to the user's needs. If required, each user may duplicate the outputs received by others to assist in communications. The number of data display devices in each emergency response activity center assures sufficient information will be available in each location to properly perform the necessary response functions. The location of the devices along with the slaved overhead monitors assures ready information availability to all functional users in each area thus maximizing the use of the devices.

To insure high quality and reliability the hardware architecture of the system is built around two Prime 550 mainframes and multiple Ramtek colorgraphic CRTs. This is further enhanced by the use of redundant components and power supplies. Although the DADS is normally a dual-computer system, the capability exists for the DADS to continue all functions on one of the two computers.

The CRT display devices are interchangeable and with at least two units in each general emergency response activity area, the loss of a single CRT will not substantially affect the display of data. The DADS is energized from the Uninterruptible Power Supply (UPS) as described in Section VI.B.

Input Parameters

The input parameters for the DADS are collected from three sources. One source of inputs is from the existing station processing computer. This consists of over 5,000 station inputs, including radiological and meteorological data,

that can be used to diagnose the Station's safety status. Selected key station parameters and meteorological data are available for use independently from the Station process computer.

The selected key Station parameters are listed in Table VI-1.

These parameters are transmitted to the DADS via a highly reliable dedicated multiplexing device capable of transmitting the data set at a rate of at least once per second. The list of parameters was selected to assure a reliable source of information for the rapid assessment of Station safety status during emergency situations. Where input parameters are obtained from safety related systems, a safety grade isolation device assures proper separation of the safety system and the DADS.

The meteorological data necessary for the proper evaluation of offsite radiological conditions is also separately supplied to the DADS via a highly reliable, dedicated data link.

The DADS input parameters discussed above provide a data base suitable for the rapid performance of emergency response functions. The DADS input parameters may be expanded in scope as Toledo Edison evaluates and responds to the criteria of Reg. Guide 1.97 and as Station data acquisition equipment (including the Station process computer) is modified and enhanced.

Software/Displays

The data received from the Station process computer and the local multiplexers are stored during normal operation. The most recent two hours of selected data are always stored on the circular disk files, and new data are written over the oldest as new data are acquired. When any of several predetermined key signals occur, new data are stored on a long-term file on the disk and the two hours of data prior to the trip event are automatically saved, as are the new data on the long-term file.

The design of the DADS allows the data stored on disk to be examined or used in any of several different methods. In general, data examined may be current (real-time), recent (circular files), or old (long-term storage files). Output may be sent to a printer/plotter or to a CRT. The format of data output will be both general, such as point and group displays, and specific, as in displays formatted to support individual emergency response functions. A

powerful graphics software package is available for use with the color CRTs providing ample flexibility for the design of human engineered display formats.

Critical displays (such as SPDS) will be designed to provide the required data with the least amount of user input; typically, one or two button access to displays will be available. The capability exists for predetermined displays to be generated automatically on key CRT displays when any of several predetermined key plant events occur.

For less critical displays where greater flexibility is desirable (such as those used for analysis and evaluation in the TSC), increased user inputs allow the tailoring of display formats to suit the requirements of the situation. Such user inputs will be simple in nature and generally will be fully prompted by the computer such that only minimal pretraining and use of written instructions will be required.

The software developed for the displays supporting emergency response functions will be validated and verified to assure that the displayed data is accurate. The software will be protected by sufficent levels of security to assure that software changes are made only by authorized personnel and only under carefully controlled and documented procedures.

2. Safety Parameter Display System (SPDS)

The design goal of the Safety Parameter Display System is to provide the Control Room operator with sufficient information to accurately and quickly assess the safety status of the plant. The creation of the SPDS displays is an ongoing project requiring considerable input and feedback from the Control Room operators. The displays must be designed appropriately from a human factors standpoint and must present the minimum amount of information necessary to meet the design objective. Considering the process required to develop the SPDS, no finalized set of specifications exist for the Davis-Besse displays, nor should they. A brief statement describing the current Toledo Edison philosophy with respect to the contents of the SPDS can be made here, however.

Toledo Edison is currently particpating, with other B&W owners, in a program to develop symptom oriented operator guidelines to respond to abnormal transients (ATOG program). The development of these guidelines is the single most important safety improvement in the aftermath of the TMI-2 incident. The Davis-Besse SPDS will be designed to compliment the ATOG guidelines. The SPDS will consist of

several pages of displays presented on the two Control Room CRTs of the DADS. The format of displayed data is flexible; some data may be presented as simple alpha-numeric information; other parameters may be presented in some graphic manner either singly or as a combination of two or more variables. Still other data may be analysed and compared to some predetermined limit limits and alarmed.

Parameters representing the safety status of all the plant functions listed in Section 5.5 of NUREG-0696 will not necessarily be displayed at all times. The safety status of some plant functions can easily be determined by simple computer limit checks thus freeing the operator to concentrate on the more complex safety functions. As an example, the safety function of reactivity control may be monitored by assuring that the indicated neutron power decays normally following a reactor trip and does not increase unexpectedly. By allowing the computer to perform these checks and alarming only when neutron flux varies unexpectedly, the operator is not bothered with extraneous nuclear instrumentation indications on his displays.

Of the two DADS CRTs in the Control Room, one will always be presenting one of the SPDS displays; the other may be used for operational support information but will quickly revert (automatically or through a simple manual action) to the SPDS series of displays in any abnormal operational event. The display presented on the dedicated CRT during normal operation and any displays automatically called up for some predetermined event will be dependent on the initial operating mode and type of event.

The location of the two Control Room CRTs and slaves is such that all Control Room personnel will have access to the data. The final position of the equipment will be determined along with the SPDS evaluation program and will also be considered during the Control Room evaluation program.

The input parameter list given in Table VI-1 and discussed above provides the majority of the information used by the SPDS (note that not all the parameters listed will necessarily be used). These inputs are the most reliable source of data to the DADS, nevertheless, where feasible, real time data validation will be performed for redundant inputs or inputs for which some algorithmic relationship can be developed. Inputs exhibiting abnormal behavior will be identified to the operator who will assure that the affected safety function of the display is provided by other means if necessary.

A separate, concentrated, seismically qualified backup SPDS is not planned for the Davis-Besse Control Room. the existing seismically qualified instrumentation in the Control Room will easily fulfill the required functions of

the SPDS. Manual analysis methods will be developed for those functions necessary to properly support the ATOG guidelines and data from existing Control Room instrumentation will be used to implement them. The ongoing Control Room reviews to improve human factors considerations will assure that the manual analysis methods are easily performed.

3. Nuclear Data Link (NDL)

The DADS is capable of transmitting plant data to offsite organizations; therefore, the NDL concept presents no major technical problem to Toledo Edison. However, the NDL program is not yet fully defined and its development will determine the identification of the specific needs and use of the interface. This would result in a definition of time response and system functions. Only then can the specifics of hardware and data be developed.

Toledo Edison believes that a joint effort by the NRC and the utilities to define the NDL program is essential if a system for providing the greatest enhancement of safety is to be developed. We are willing to cooperate with the NRC and other utilities and industry groups to aid in the further development of this concept.

TD 89A/1-39

Davis Besse
Emergency Telephone Communications System

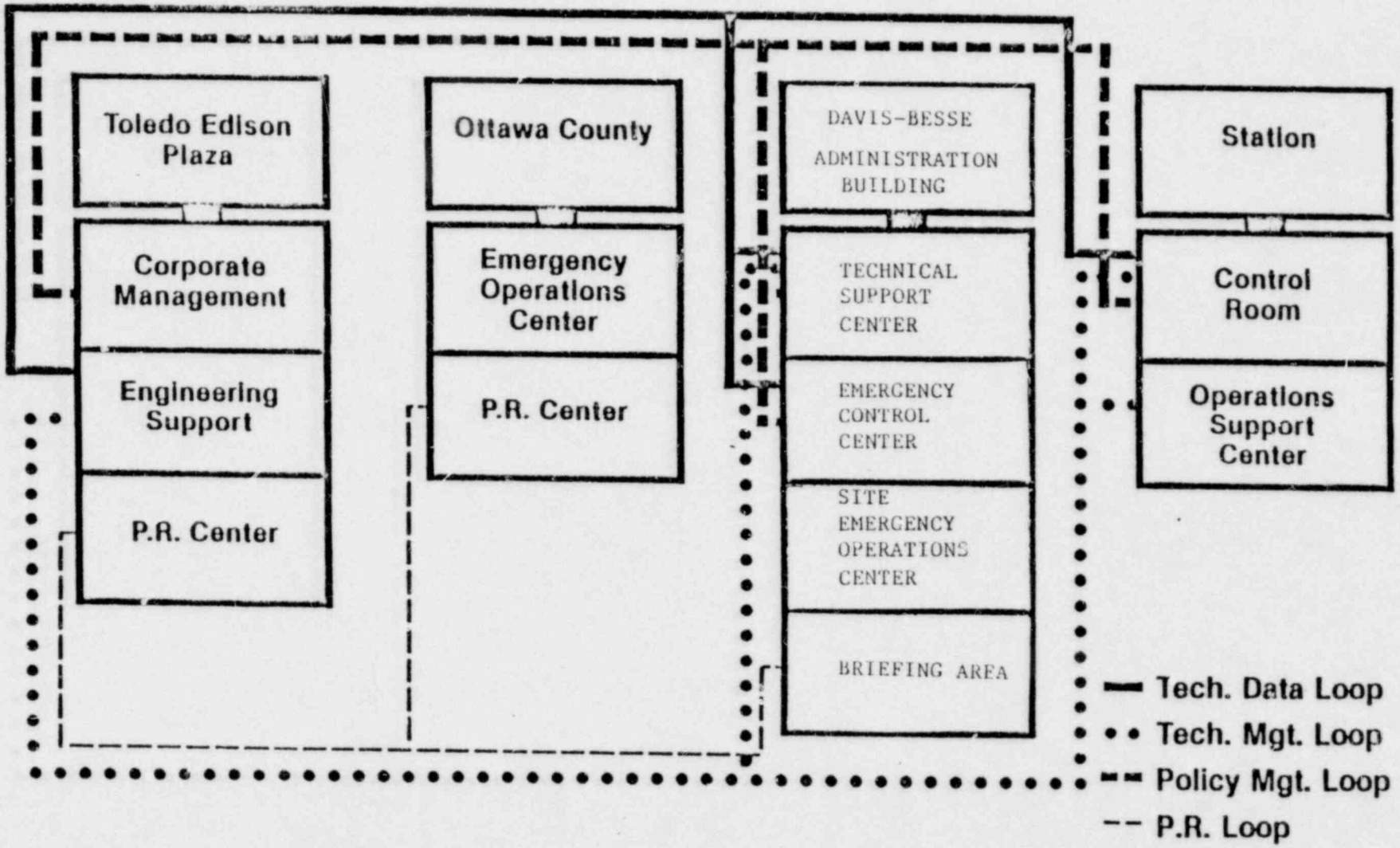


Figure VI-1

Davis Besse
Emergency Telephone Communications System

Governmental Interface Communications

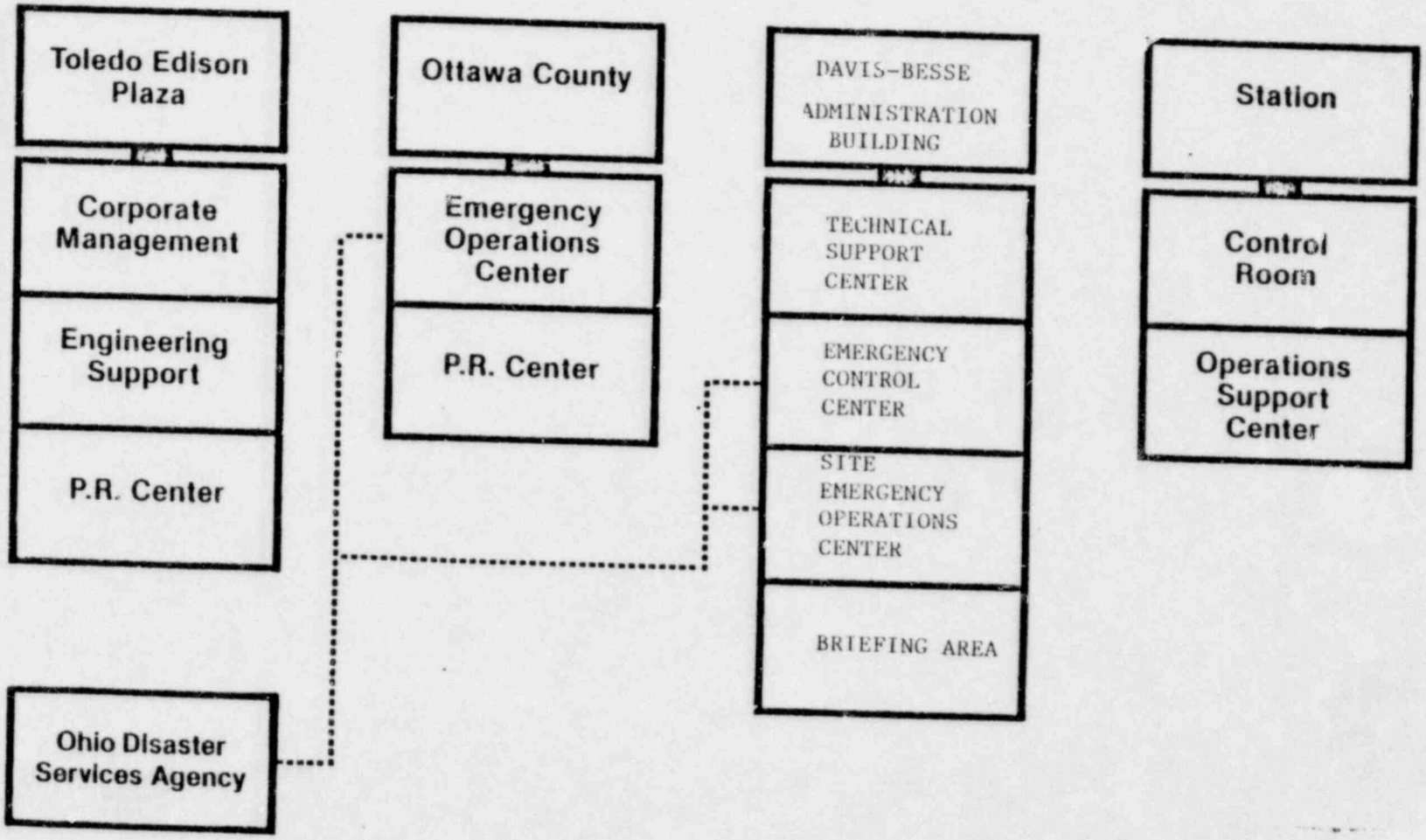


Figure VI-2

Davis-Besse Nuclear Power Station
Electrical Distribution Systems

DAVIS-BESSE ADMINISTRATION BUILDING

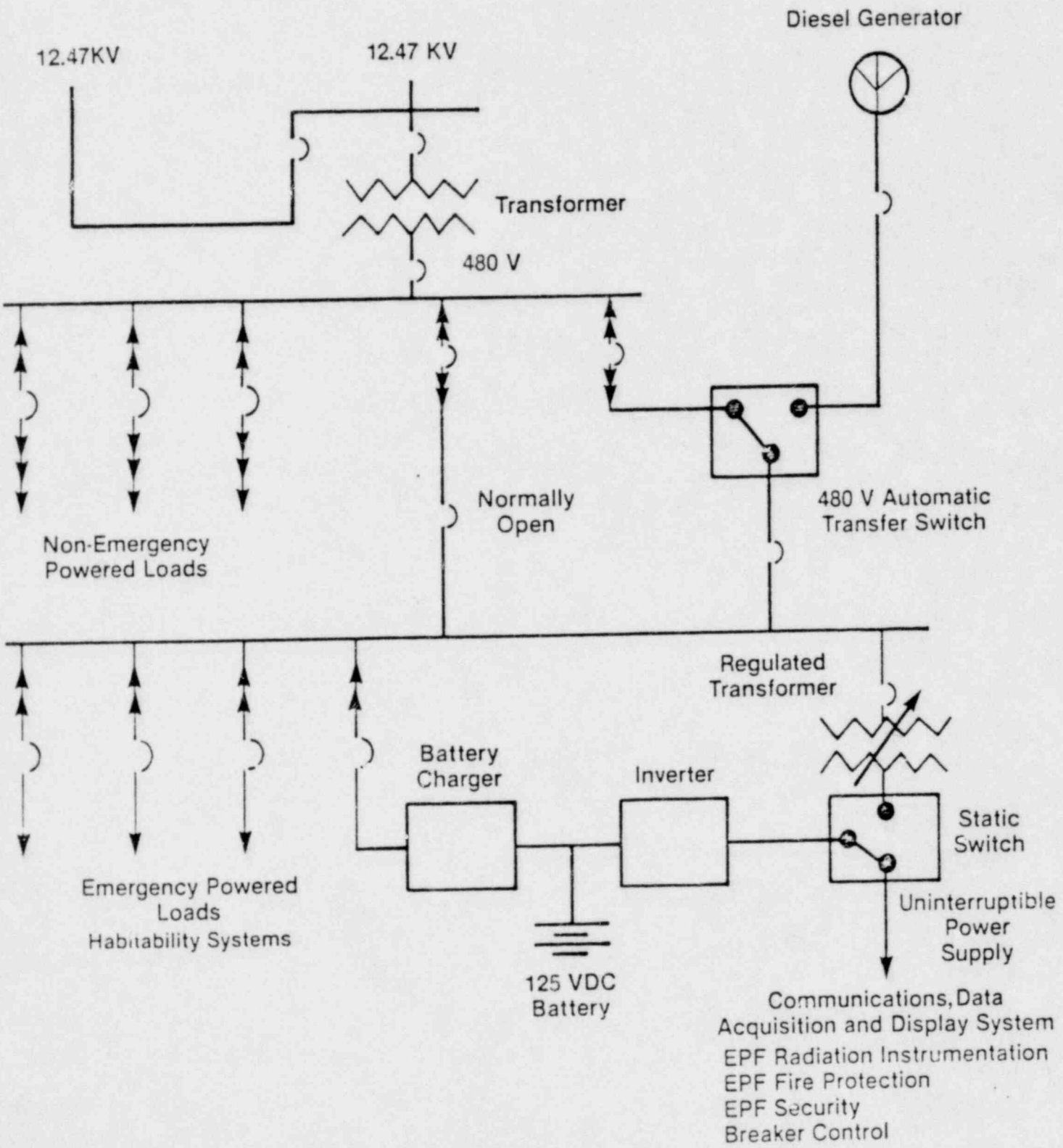
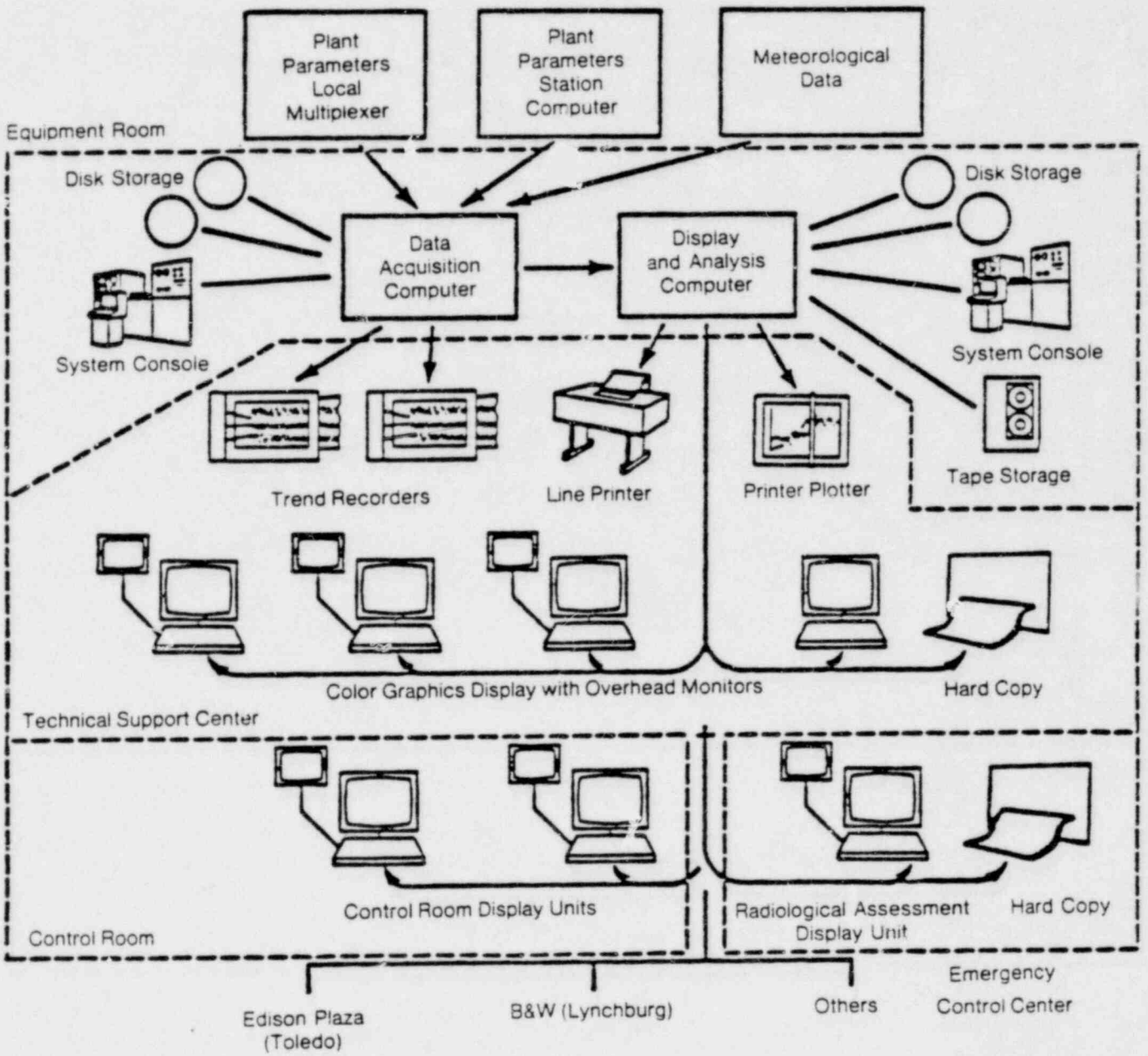


Figure VI-3

Davis-Besse
Data Acquisition and Display System

Basic System
Input Parameters
Parameter Processing

Technical Support Center
Emergency Control Center
Control Room
Offsite Data Transmission



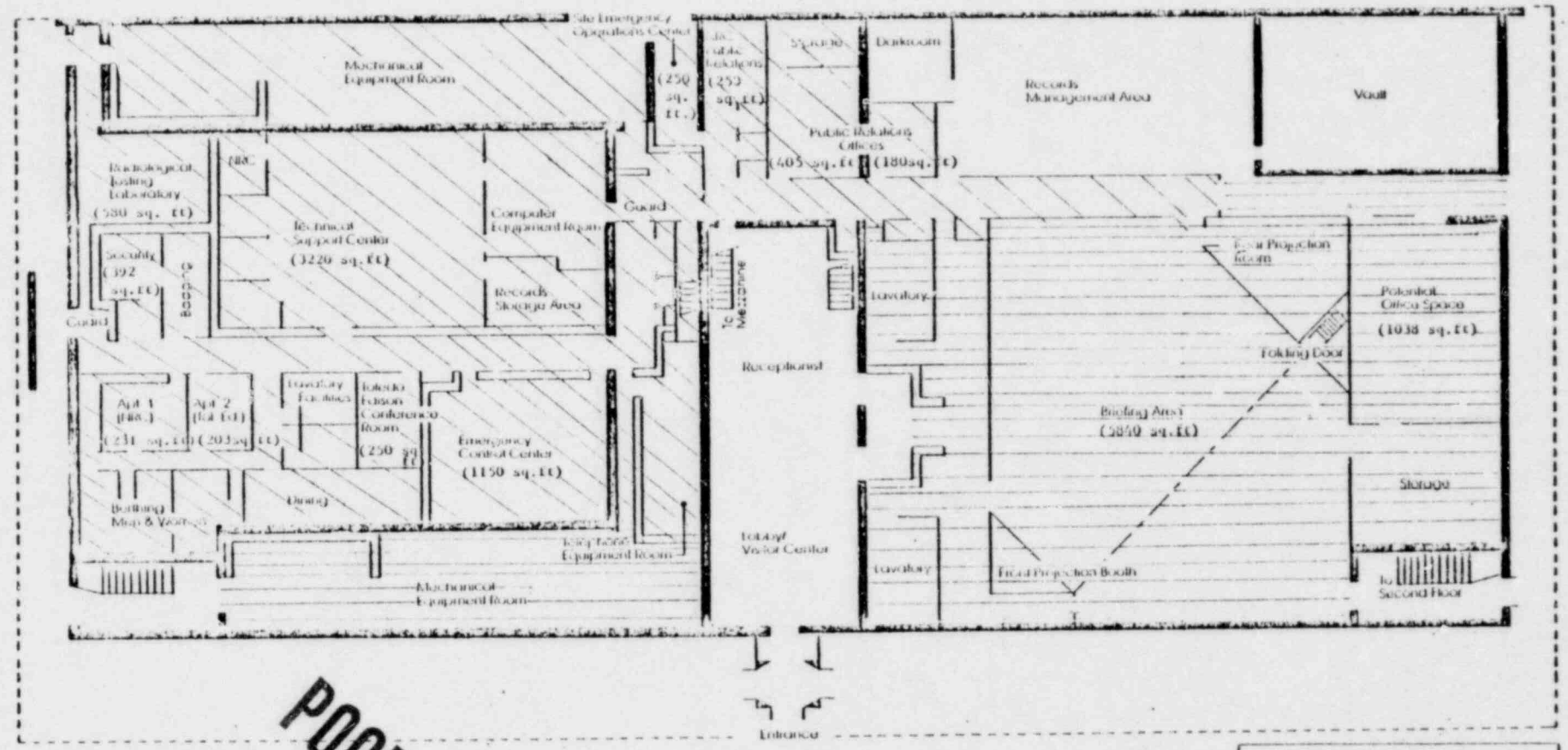
DAVIS-BESSE ADMINISTRATION BUILDING

Figure VI-4
Data Acquisition and Display System

TABLE VI-1

DATA ACQUISITION AND DISPLAY SYSTEM
KEY PARAMETER INPUT LIST

Auxiliary Feed Pump 1 (2) Discharge Pressure
Auxiliary Feed Pump Turbine 1 (2) Speed
Borated Water Storage Tank Level
Containment Spray Pump 1 (2) Discharge Flow
Containment Hydrogen Concentration
Containment Normal Sump Level
Containment Wide Range Level
Containment Wide Range Pressure
Containment Wide Range Radiation
Generator Gross Power
High Pressure Injection 1-1 (1-2, 2-1, 2-2) Flow
Incore Outlet Thermocouple Temperature (16 total)
Low Pressure Injection 1 (2) Flow
Main Feedwater Temperature to Integrated Control System
Main Feedwater 1 (2) Compensated Flow
Main Feedwater 1 (2) Control Valve Position
Main Feedwater 1 (2) Startup Control Valve Position
Main Feedwater 1 (2) Startup Flow
Reactor Coolant Average Narrow Range Temperature
Reactor Coolant Hot Leg Subcooled Margin Channel A (B)
Reactor Coolant Loop 1 (2) Hot Leg Flow
Reactor Coolant Loop 1 (2) Hot Leg Wide Range Pressure
Reactor Coolant Loop 1 (2) Hot Leg Wide Range Temperature
Reactor Coolant Makeup Tank Level
Reactor Coolant Pressurizer Compensated Level
Reactor Coolant Pressurizer Pressure Relief Valve Position 1(2)
Reactor Coolant Pressurizer Power Operated Relief Valve Position
Reactor Coolant Pressurizer Quench Tank Level
Reactor Coolant Pressurizer Quench Tank Pressure
Reactor Coolant Pressurizer Temperature
Reactor Coolant Pump 1-1 (1-2, 2-1, 2-2) Discharge Cold Leg
Wide Range Temperature
Reactor Protection System Auctioneered Average Power
Reactor Protection System Channel 1 (2,3,4) Power Range Flux
Reactor Protection System Channel 1(2) Source Range Flux
Reactor Protection System Channel 3(4) Intermediate Range Flux
Steam Generator 1(2) Auxiliary Feedwater Flow
Steam Generator 1(2) Operate Range Level
Steam Generator 1 (2) Outlet Steam Pressure
Steam Generator 1(2) Outlet Steam Temperature
Steam Generator 1(2) Startup Range Level
Unit Vent Iodine-131 Radiation
Unit Vent Particulate Radiation
Unit Vent Xenon-133 Radiation



DAVIS-BESSE ADMINISTRATION BUILDING

First Floor--HVAC Zones

Figure V-1