

EMERGENCY PREPAREDNESS

Safety Evaluation Report
related to the operation of
Zion Nuclear Generating Station, Units 1 and 2
Docket Nos. 50-295; 50-304
NRC Operating Licenses No. DPR-39; DPR-48
Commonwealth Edison Company

U. S. Nuclear Regulatory Commission

November 1982

INTRODUCTION

The Commonwealth Edison Company (hereinafter referred to as the licensee, the company, CECO) filed with the Nuclear Regulatory Commission revisions to the Commonwealth Edison Generating Stations Emergency Plan (GSEP) submittals dated January 3, April 24, June 4, July 30 and December 31, 1980; March 27, 1981; March 24 and July 30, 1982. The GSEP is a generic emergency plan applicable to all nuclear generating stations operated by CECO. Each GSEP contains a site specific annex that contains additional information and guidance specific to each nuclear station.

The Commission staff conducted a review of the GSEP and the Zion site specific annex dated April 1981 (both are hereinafter referred to as the plan) against the requirements of 50.47(b) and Appendix E of 10 CFR 50, and the criteria of the 16 planning standards in Part II of the "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Revision 1, dated November 1980. Comments resulting from this review were submitted to the licensee in a letter dated August 26, 1981, from Mr. James G. Keppler to Mr. Cordell Reed. The licensee responded to these comments by letter dated November 30, 1981, from Mr. L. O. DelGeorge to Mr. James G. Keppler and by issuing Revision 3 to both the GSEP and Zion site specific annex dated November 1981.

We have completed our review of the November 1981 GSEP and Zion site specific annex and pertinent correspondence dated December 31, 1980, from Mr. L. O. DelGeorge to Mr. H. R. Denton; June 1, 1981, from Mr. J. S. Abel to Mr. D. G. Eisenhut; October 1, 1981, and January 29, 1982, from Mr. F. G. Lentine to Mr. James G. Keppler; and January 19, May 28, and August 27, 1982, from Mr. L. G. DelGeorge to Mr. James G. Keppler.

This emergency preparedness safety evaluation report lists each standard in order followed by a summary of applicable portions of the plan as they apply principally to the licensee's planning standards. The final section of this report provides the staff review results and conclusions.

EMERGENCY PREPAREDNESS
SAFETY EVALUATION REPORT

A. Assignment of Responsibility (Organization Control)

Planning Standard

Primary responsibilities for emergency response by the nuclear facility licensee, and by State and local organizations within the Emergency Planning Zones have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.

Emergency Plan

The GSEP organization consists of three groups, each with a specific area of responsibility. The three groups are the Station Group, Recovery Group, and the Corporate Command Center (CCC) Group. The Station Group functions under a Station Director responsible for organizing and coordinating the emergency efforts at and within the immediate vicinity of the station. During emergencies of limited extent the CCC Group functions under a director and his staff, who are responsible for evaluating, coordinating, and directing the overall company activities involved in coping with the emergency. During more serious emergencies, such as any Site Area or General Emergency, the CCC Director is responsible for activating the Recovery Group. This group functions under the Recovery Manager, and would report to the nearsite Emergency Operations Facility (EOF). The CCC Group then becomes a support staff to the Recovery Group. The Recovery Manager's responsibilities include the evaluation, coordination, and direction of the overall company and industry response and management of the nuclear plant recovery operations.

The Shift Engineer of the Zion Station is initially designated as the Station Director. When an abnormal condition arises, it is his responsibility to make the initial determination of the severity of the emergency and to implement the plan. There is 24-hour per day communication capability between the station and Federal, State, and local response organizations to ensure the rapid transmittal of accurate notification information and emergency assessment data.

The offsite GSEP organizations shown in Figures 1 (limited activation) and 2 (full activation) specify the function and responsibilities for major elements and key individuals by title. Emergency response functions which are addressed in both organizations are as follows: command and control, logistics support, engineering support, medical care, manpower requirements, health physics, communications, accounting, legal, environmental, and public information. The full response offsite GSEP organization (Recovery Group) includes the following additional functions: technical support, scheduling and planning, design and construction support, waste systems radiation control support, training, administrative support, and advisory support.

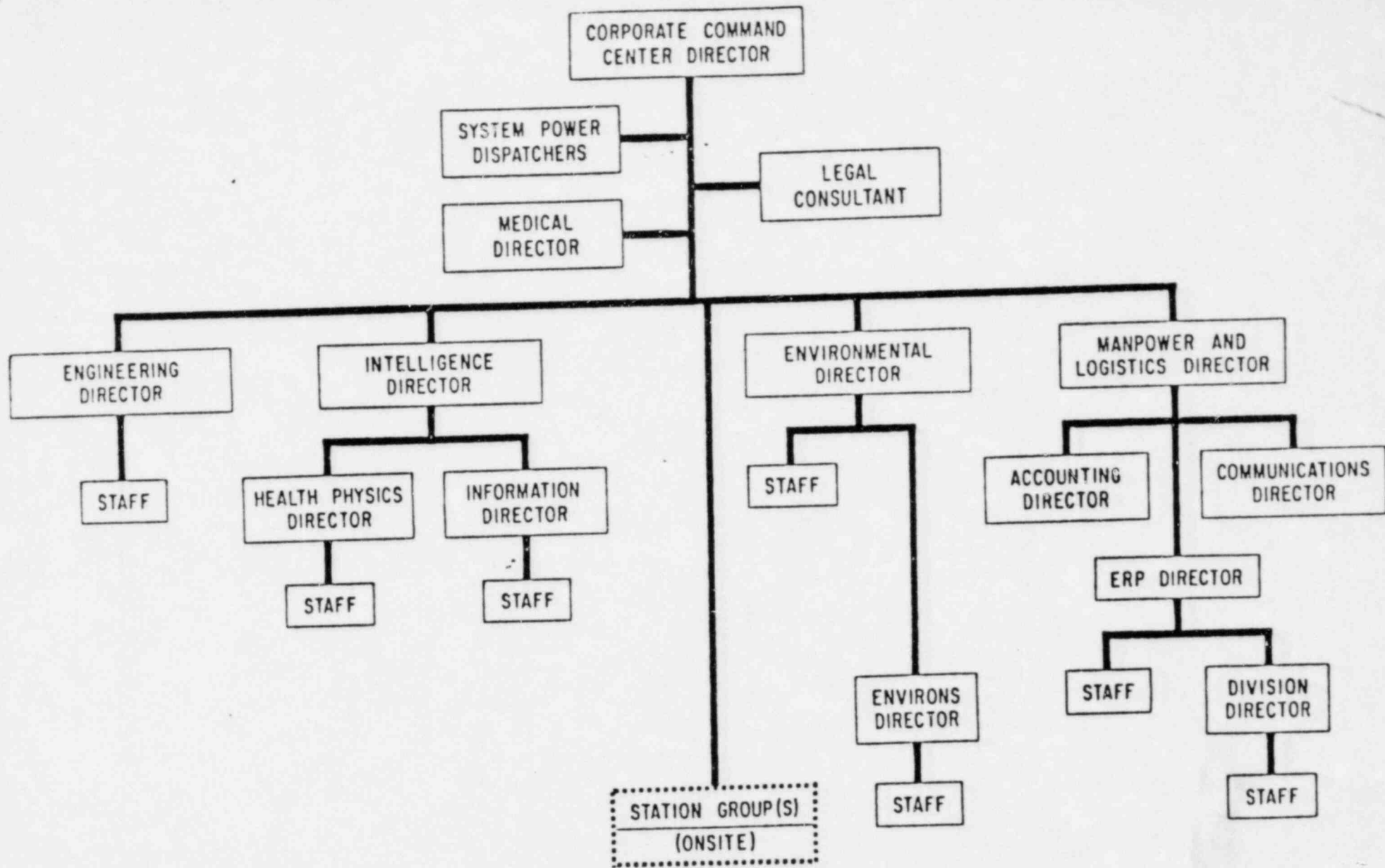


Figure 1 Limited response offsite GSEP organization

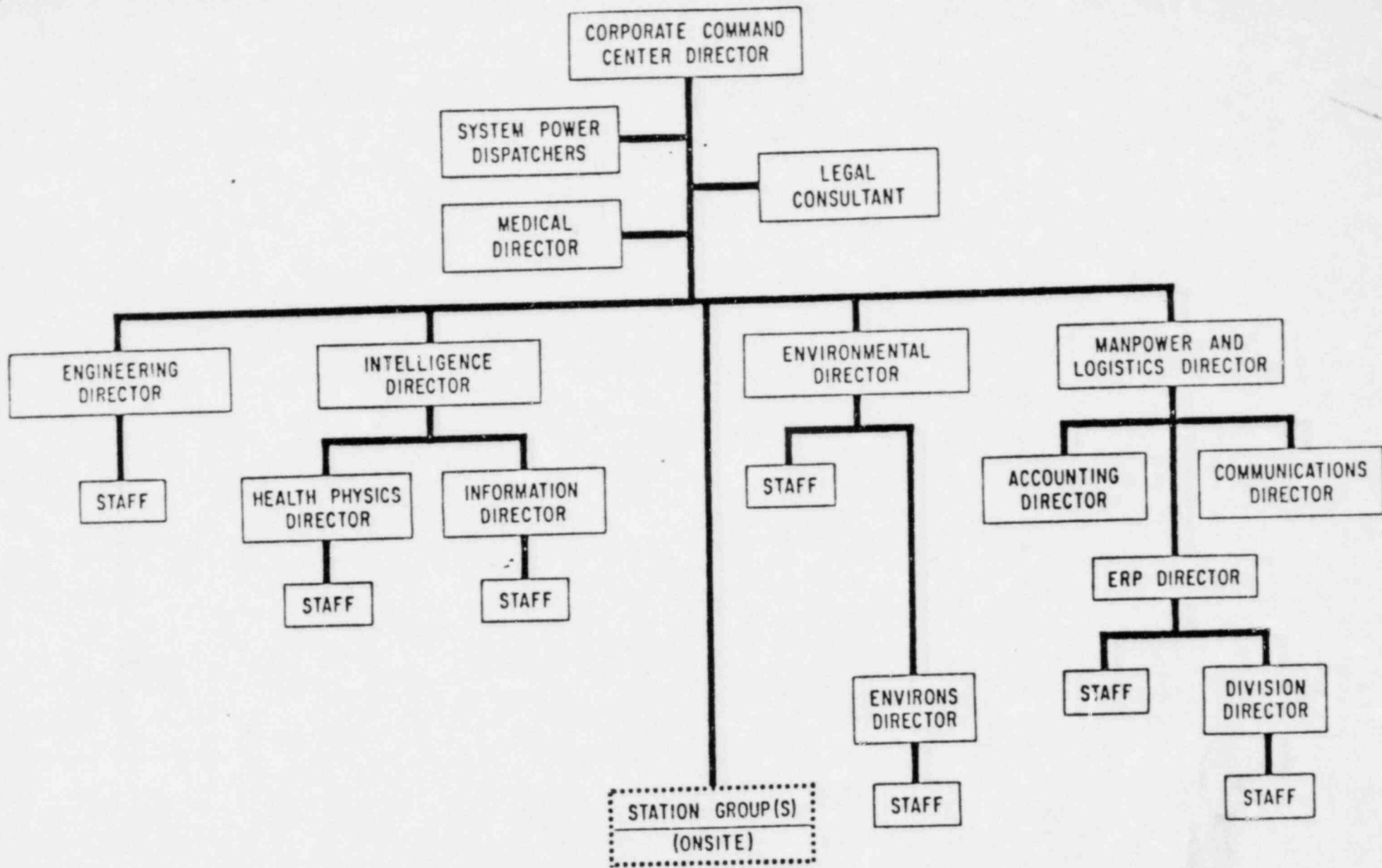


Figure 1 Limited response offsite GSEP organization

The CCC Director is responsible for initial coordination with governmental agencies and for manning the nearsite EOF. After the EOF is functional, the responsibility for coordination with governmental agencies shifts to the Recovery Manager.

The licensee has a sufficient pool of trained personnel available from other nuclear stations operated by CECO to ensure that all GSEP organizations are capable of continuous operations for a protracted period of time. This is ensured through corporate and station procedures delineating the responsibilities of the Administrative Director, Administration and Logistics Manager, and the Manpower and Logistics Director.

Formal agreements exist on file (with the exception given below) with appropriate agencies and organizations including law enforcement, fire protection, ambulance services, medical and hospital support, Institute for Nuclear Power Operations (INPO), Department of Energy (DOE), radiological support, and state and local authorities responsible for implementation of protective measures for the public. Currently, the City of Zion has not executed a letter of agreement with CECO. The City of Zion had four conditions which needed to be resolved concerning the following: (a) reimbursement of the City for its participation in radiological emergency preparedness exercises and training; (b) reimbursement of the City for the decontamination or replacement costs of any emergency vehicles contaminated while responding to an emergency at Zion; (c) reimbursement for the costs associated with maintaining six telephones on inactive status in the City Emergency Operations Center (EOC); and (d) payment of appropriate fees for building permits for all structures whether previously constructed, currently under construction, or to be constructed in the future. The licensee agreed to conditions (b), (c), and (d); and recent legislation passed in the State of Illinois provides that the Department of Nuclear Safety spend \$100,000 per year state-wide on such reimbursements to local governments. The licensee committed to continue their effort to assure that appropriate documentation of such agreement will be available prior to the 1982 Zion emergency exercise. Zion station has continued to receive excellent cooperation from the City agencies during the period during which no formal letter of agreement has existed.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate. Problems involving the letter of agreement with the City of Zion are addressed in NRC Inspection Report Nos. 50-295/82-11 and 50-304/82-09; and will be examined during a future inspection.

B. Onsite Emergency Organization (Closed, 295/81-13-19; 304/81-09-19)

Planning Standard

On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available, and the interfaces among various onsite response activities and offsite support and response activities are specified.

Emergency Plan

The normal station organization is shown in Figure 3. The Zion Station is managed by a Station Superintendent who is responsible for direct management of the station. During an emergency situation (normal working hours) the Station Superintendent is the Station Group Director. During periods when the Station Superintendent is unavailable, his responsibilities are delegated to alternates who satisfy the requirements of ANSI N18.1-1971, "Experience Requirements for Plant Manager."

The Shift Engineer (on duty 24 hours per day) is the initial Station Group Director and as such has the authority for declaring an emergency and recommending protective actions to local authorities. He is relieved of these duties upon arrival of the designated Station Director.

The onsite emergency organization (normal working hours) is called the Station Group. Figure 4 shows this organization. The major responsibilities and duties of the Station Group Directors are defined in the plan. As described in Section A, the onsite emergency organization is augmented by the Corporate Command Center Group and the Recovery Group.

The onsite emergency organization for non-normal working hours, backshifts, and holidays is described in the plan. Emergency assignments have been made, and the relationship between this emergency organization and the normal staff complement is shown in the plan. Positions and/or titles and qualifications of shift and plant personnel both onsite and offsite who are assigned major emergency functional duties are listed. Minimum shift manning requirements are in the plan, and guidance for shift augmentation based on the emergency classification is provided.

The plan has established the framework for a long-term augmented emergency organization. This organization is under the command and control of the Recovery Manager. Full activation of the Recovery Group is required for any Site Area or General Emergency. For accident situations classified as Unusual Events or Alerts, the Recovery Group would not be activated and the offsite GSEP organization would consist of the Corporate Command Center Group.

Interfaces between and among the CCC staff, Recovery Group staff, station staff, governmental and private sector organizations, and technical and engineering contractor groups have been specified in the plan.

The minimum onshift staffing levels discussed in the plan meet the objectives of Table B-1 in NUREG-0654, Revision 1. This onshift staff includes the following expertise: one Shift Engineer (Senior Reactor Operator (SRO)); one Shift Foreman (SRO); two Nuclear Station Operators (three if both units operating); three equipment operators/attendants (four if both units operating); two radiation chemistry technicians (RCTs); and one Shift Technical Advisor (STA).

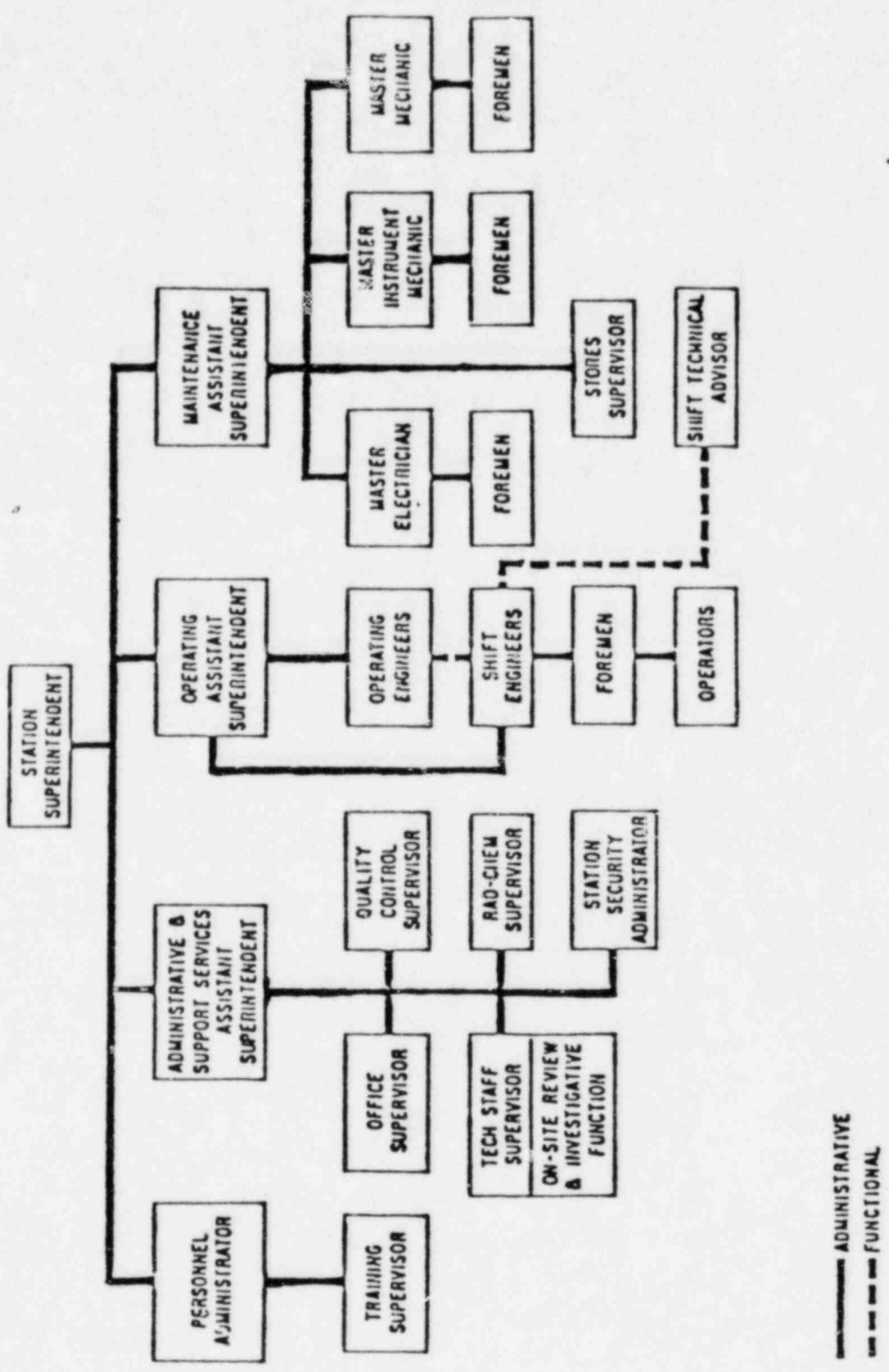


Figure 3 Normal nuclear plant organization

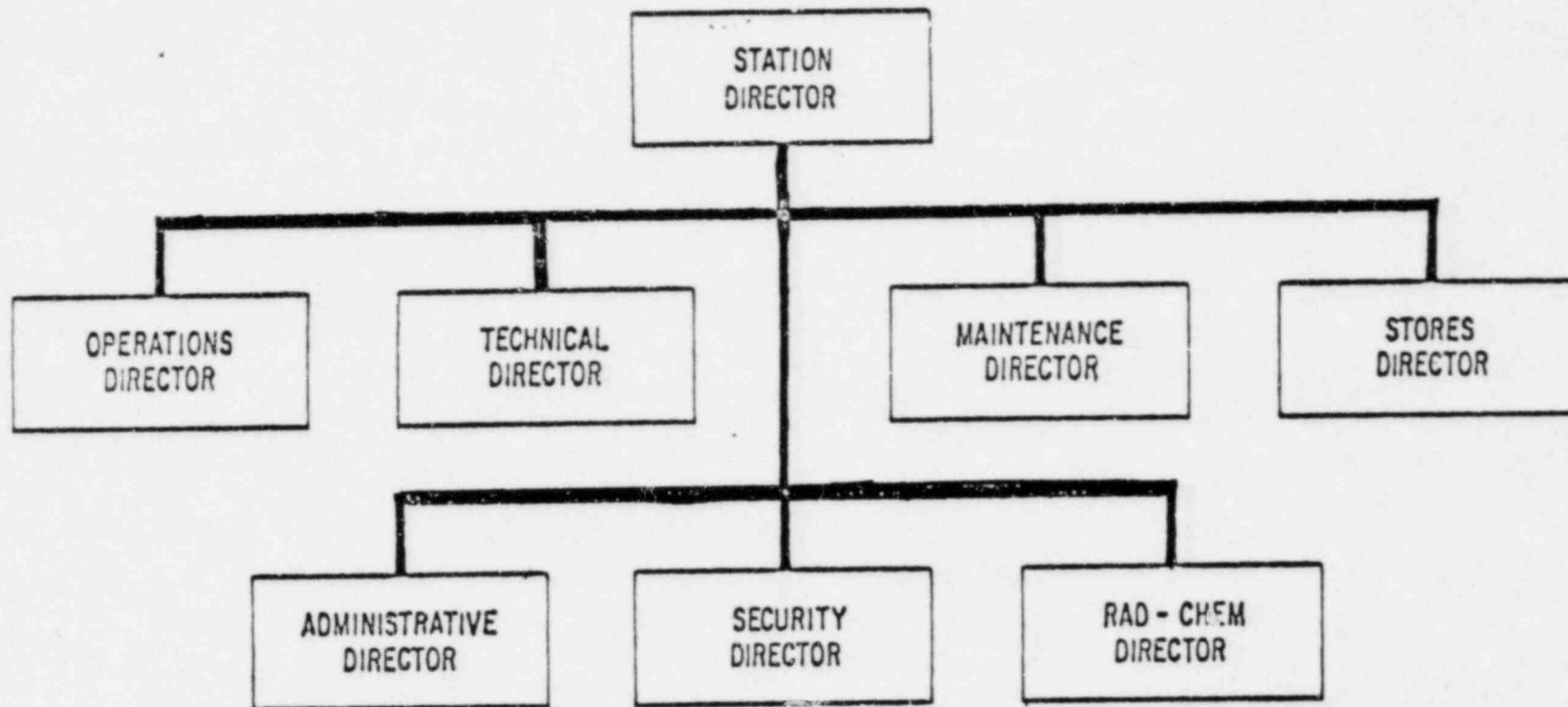


Figure 4 GSEP station group organization

The licensee's program for onshift augmentation within the first hour of a significant emergency is described in the plan. This augmentation will include 28 persons with the following expertise: all eight Station Group Directors; the Environs Director; seven RCTs for inplant, onsite, and offsite surveys; four radiation/chemistry personnel for protective actions; three engineers for plant system engineering, two electrical/mechanical personnel; one Instrument and Control Technician; one radwaste operator for equipment repair and corrective action; and one dedicated communicator. These personnel provide all the necessary functions defined in Table B-1 of NUREG-0654, Revision 1. The licensee has established a 24 hour duty-call individual who would be notified first after a station emergency. This individual would initiate a notification (call-list) procedure.

The procedure identifies individuals who are capable of performing the specific response functions which are identified in Table B-1 of NUREG-0654, Revision 1, and establishes a priority for notification based on the travel time to the facility. Further, unannounced offshift notification drills will be conducted at least every six months to ensure that the design objectives of Table B-1 can be achieved. Records will be maintained for inspection.

For activation of the EOF, the licensee has developed a Recovery Manager notification call list which will enable the responsible Corporate Duty Officer to notify the Recovery Manager who would require the least travel time to the nearsite EOF.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

C. Emergency Response Support and Resources

Planning Standard

Arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee's nearsite Emergency Operations Facility have been made, and other organizations capable of augmenting the planned response have been identified.

Emergency Plan

Arrangements for requesting and utilizing outside resources have been made including authority to request implementation of the DOE Radiological Assistance Plan and the Interagency Radiological Assistance Plan. Further, the licensee retains contractors to provide supporting services to the Zion Station. Among those services provided are: technical experts for accident analyses from INPO; environs radiological monitoring and radiochemical analyses; health physics support; meteorological support; and personnel dosimetry support. Either the Station Director, Recovery Manager, or CCC Director may request DOE assistance if that assistance is necessary or desirable.

The plan describes the present radiological laboratories at each CECo nuclear station (Dresden, Quad-Cities, Byron, and LaSalle). Because each nuclear station's management and resources are similar, each station can make available some of its equipment, manpower, and counting facilities to a station affected by an emergency situation.

The CECo organization provides for dispatching licensee representatives to the principal offsite governmental Emergency Operations Centers if requested. Working space is available for Federal, State, and local offsite representatives as well as contractor and other support groups in the licensee's nearsite EOF. The EOF is the central point for providing information needed by primary response agencies for implementation of protective actions. Completion and staff evaluation of a permanent EOF which meets the guidance of NUREG-0696 and SECY-82-1118 will be addressed in a separate report.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

D. Emergency Classification System (Closed, 295/82-13-20; 304/82-09-20)

Planning Standard

A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.

Emergency Plan

Five standard emergency classes (Transportation Accident, Unusual Event, Alert, Site Area Emergency, and General Emergency) have been established. Emergency Action Levels (EALs) are indicated in the plan based on onsite and offsite radiation monitoring information and based on readings from various plant sensors (such as pressure and temperature in containment, response of vital electrical systems or emergency core cooling systems, and vital equipment status). EALs for natural phenomena such as earthquakes, floods, and tornadoes have been developed. These EALs are used for rapid classification of emergency situations.

Steamline monitor readings for indication of steam generator tube rupture (EAL No. 18) will be incorporated into the EALs as soon as developed. Direct effluent readings of the Station Vent and Auxiliary Vent monitors are not yet available. After installation and calibration of the monitors, EAL No. 23 will be revised to reflect the appropriate readings for each classification level. Special Particulate, Iodine, and Noble Gas (SPING) monitor readings for a break in containment concurrent with a primary-to-secondary leak are being determined and will be incorporated into the Zion annex as soon as completed.

The plan states that predetermined emergency actions will be taken by the licensee in the event of an emergency. These emergency actions are consistent with the guidance in Appendix 1 of NUREG-0654, Revision 1. Further, the plan has identified example emergency conditions for each standard emergency classification. These initiating conditions include the examples given in Appendix 1 of NUREG-0654, Revision 1, and the analyzed accidents in the Zion Final Safety Evaluation Report (FSAR).

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

E. Notification Methods and Procedures (Closed, 295/81-13-21; 304/81-09-21)

Planning Standard

Procedures have been established for notification, by the licensee of State and local response organizations and for notification of emergency personnel by all response organizations, the content of initial and followup messages to response organizations and the public has been established; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established.

Emergency Plan

Procedures have been established for notification of State and local response organizations in case of emergency. The Shift Engineer has the authority and responsibility as Acting Station Director for initiating the emergency notification to these agencies during non-normal working hours. This notification scheme is partially shown in Figure 5; however, Wisconsin State and local governments are notified directly by the Station. This notification system has been developed by the State of Illinois and agreed to by the licensee. A duty Corporate Command Center Director and System Power Dispatcher are available 24 hours per day. The plan has established procedures which describe mutually agreeable bases for notification of offsite response organizations consistent with the standard emergency classification and action scheme set forth in Appendix 1 of NUREG-0654, Revision 1.

The plan has established procedures for notifying, alerting, and mobilizing licensee emergency response personnel. These procedures include both station and corporate personnel, and have been developed to ensure that personnel with the least travel time to the Station or EOF will be notified first.

The contents of the initial emergency messages to be sent from the plant have been established. The contents of these messages include: information about the class of emergency, whether a release of radioactive material has taken place, potentially affected population and areas, and whether protective measures may be necessary. The notification procedures used also include means for verification of messages.

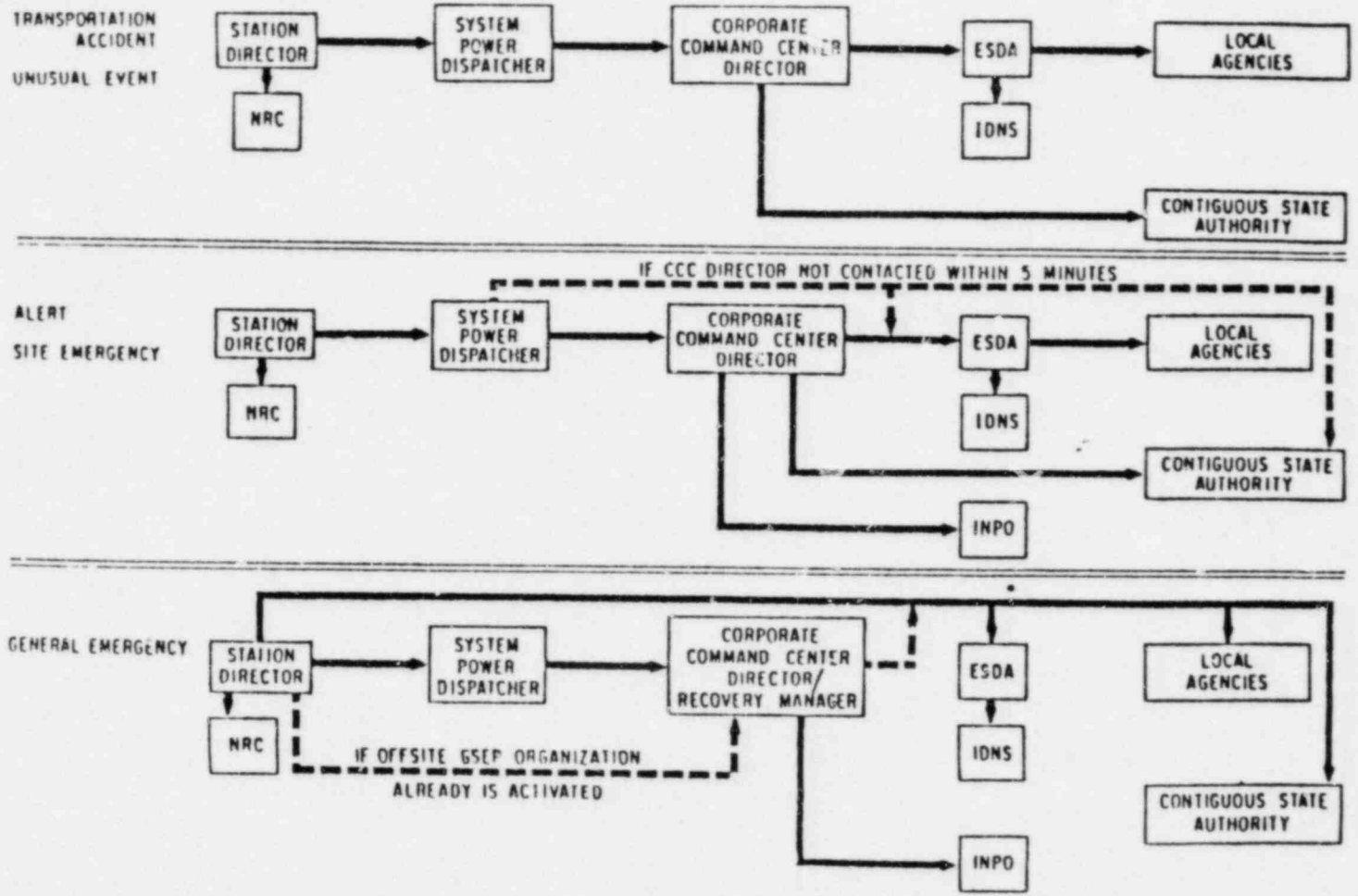


Figure 5 Simplified emergency notification scheme

CECo and the States have developed predetermined written messages intended for the public and consistent with the emergency classification scheme. These messages are part of the State Emergency Plan and are not included in the licensee's plan.

The plan has established provisions for followup messages to State and local authorities. These messages include necessary information about the accident that would be needed to determine the appropriate protective measures to be taken in both the ingestion and plume exposure pathway emergency planning zones (EPZs), following the guidance in NUREG-0654, Revision 1.

The prompt public notification system which is installed at Zion is described. The design of this system consists of three parts as follows: (a) a permanently installed outdoor notification system within the 0 to 5 mile radius which will essentially cover all inhabited areas with a minimum noise level of 60 db; (b) a permanently installed outdoor notification system covering the heavily populated areas within the 5 to 10 mile radius; and (c) a mobile notification system for the remainder of the area within the 5 to 10 mile radius. The notification capability consists of 65 fixed alerting sirens and a maximum of 330 emergency vehicles equipped with public address systems. In addition, electronic sirens have been installed in Illinois Beach State Park and these sirens have public address capability as well as public alert capability. Sounding of the alerting sirens by local officials will alert the public to the fact that they should turn on radios to the local Emergency Broadcast Station (EBS) for detailed information on the situation. The sounding of the alerting sirens and the deployment of the emergency vehicles is outlined in the Illinois Plan for Radiological Accidents (IPRA). The purpose of this notification system is to advise citizens to either take shelter or evacuate and to instruct them to tune to designated emergency information radio stations.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

F. Emergency Communications

Planning Standard

Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public.

Emergency Plan

The plan has established an extensive and reliable system for communications among the Zion Station, System Power Load Dispatcher (SPLD), division load dispatching, nearsite EOF, and the CCC. The system includes the use of normal and dedicated telephone lines, radio, mobile radio units, microwave voice channels, and handi-talkies, thus providing both a primary and several backup means for communications.

Two dedicated telephone communications systems, the Nuclear Accident Reporting System (NARS) and the National Alert Warning System (NAWAS), are provided for the notification of both Wisconsin and Illinois state and

local authorities in the event of an emergency. The NAWAS system links together the station control room, SPLD, Wisconsin state and local Emergency Operations Centers (EOC). The NARS system links together the station control room, CCC, onsite Technical Support Center (TSC), SPLD, nearsite EOF, and both Wisconsin and Illinois state and local EOCs. Initial contact points are manned 24 hours per day.

A microwave/radio communication system is provided for the purpose of voice communication between the CCC, station, mobile units, and field teams (handi-talkies). The system consists of two microwave channels, one voice channel and the other controlling a base radio station at the plant. Operating locations for the base radio station as well as access to the voice channel is the onsite TSC, the nearsite EOF, and the Shift Engineer's office.

The NRC has installed dedicated telephones from the Zion Station control room, TSC, and EOF to the NRC Incident Response Center in Washington, D.C. and the regional NRC office in Glen Ellyn, IL. Also, there is a separate dedicated telephone (Health Physics Network) between the NRC and the Zion Radiation Protection Office, TSC, and EOF.

Dedicated telephone communications exist between the CCC and the State of Illinois Department of Nuclear Safety Radiological Emergency Assessment Center (REAC). This link provides communication for the environmental monitoring and accident assessment efforts between CECO and the Illinois Department of Nuclear Safety REAC.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

G. Public Education and Information

Planning Standard

Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), the principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.

Emergency Plan

The plan provides for the dissemination of information to the public regarding how they will be notified and what their actions should be during an emergency. This information includes educational information on radiation, methods for notification during an emergency, protective actions planned if an emergency exists, and instructions on how to obtain additional information especially for the disabled or their caretakers and those without transportation. This public information brochure is mailed to all residents in the plume exposure EPZ of each nuclear station and is also provided to city halls, gas stations, state parks, campgrounds, and other areas where a transient population may

obtain a copy. These public information brochures will be distributed on an annual basis. These actions should ensure that the public information program reaches the permanent and transient adult population within the plume exposure EPZ.

The EOF provides support and interface between CECo, State, and local agencies, and the news media. The plan provides for dispatching the Emergency News Center Director to the EOF. An emergency news center functions under the direction of this person and is the single-point contact for disseminating information to the public. The Emergency News Center Director's responsibilities include coordinating information releases with Federal, State, and local agencies, and establishing coordinated arrangements for dealing with rumors.

A technical spokesperson knowledgeable about the affected station and its operations will be available to brief the press at the Emergency News Center.

CECo will offer programs at least annually to acquaint news media with the GSEP, information concerning radiation, and points of contact for release of public information in an emergency.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

H. Emergency Facilities and Equipment (Closed, 295/81-13-22; 304/81-09-22)

Planning Standard

Adequate emergency facilities and equipment to support the emergency response are provided and maintained.

Emergency Plan

Emergency facilities needed to support an emergency response have been provided including a TSC, EOF, CCC, and Operational Support Center (OSC). The TSC and OSC will be activated for any Alert or higher emergency classification. The EOF will be activated for any Site Area or General Emergency classification, and the CCC may be activated for lesser emergencies.

The TSC is located in the Auxiliary Building next to the Unit 2 side of the control room, and is sized for 26 persons and supporting equipment. Personnel in the TSC are protected from radiological hazards, including direct radiation and airborne contaminants under accident conditions to the same degree as control room personnel. To ensure adequate radiological protection, permanent radiation monitoring systems will be installed. These systems continuously indicate radiation dose rates and airborne radioactivity inside the TSC while in use. In addition, protective breathing apparatus and thyroid blocking agents are available for use as needed. The TSC has access to a complete set of as-built drawings and other records, including general arrangement diagrams, P&IDs, piping system isometrics, and the electrical schematics.

The OSC is located in the lunchroom at the 624 foot elevation of the service building and functions as a support center to the TSC. Operations support personnel will report to the OSC for assignment. A limited inventory of supplies are kept in the OSC. This inventory includes portable lighting, respirators, protective clothing, and portable survey instruments. Communications and management controls from the OSC to the TSC and control room are provided.

The CCC is located on the 12th floor of the Edison Building in downtown Chicago, and is the location from which the CCC Director will normally direct overall company activities involved in coping with an emergency. If the Recovery Group is activated at the EOF, then the CCC will be the location for a support staff reporting to the Recovery Group. In addition to the above functions, the CCC will serve as the corporate environmental center where environmental monitoring will be directed and offsite dose projections performed under the direction of the CCC Environmental Director. The CCC has dedicated communications with the control room, TSC, EOF, State of Illinois Emergency Services and Disaster Agency (ESDA), Illinois REAC, company cars, and field radios.

The Zion EOF is located at the Westinghouse Training Center within approximately one mile from the site, and the backup EOF is located at the Lake County EOC in Libertyville. This is in accordance with the guidance provided in NUREG-0696. The EOF will be utilized to evaluate and coordinate the emergency reentry/recovery operations on a continuing basis by the licensee. Liaison with Federal, State, and local officials will be maintained at this center, which will also be used for receipt and analysis of field monitoring data submitted by field teams.

CECo has submitted to the staff a detailed description of the emergency response facilities (TSC, EOF, and OF), Safety Parameter Display System (SPDS), and other upgrades which are discussed in NUREG-0696 by letter dated June 1, 1981. Completion and staff evaluation of the permanent EOF, TSC, OSC, and SPDS which meet the guidance of NUREG-0696 and SECY 82-111B will be addressed in a separate report.

Emergency preparedness procedures have been developed including quarterly inventory and operational readiness of emergency equipment and supplies. Sufficient equipment for emergency kits exists to ensure a minimum inventory in case of replacement delay. The station maintains portable survey instrumentation to assess inplant, onsite, and offsite contamination levels, exposure rates, and airborne gaseous, radioiodine, and particulate concentrations. Additionally, during emergency situations, emergency equipment and supplies can be obtained from an alternate CECO facility such as Dresden or LaSalle.

Onsite monitoring systems have been identified and established that are to be used to initiate emergency measures in accordance with Appendix 1 of NUREG-0654, Revision 1, as well as those monitors used for conducting assessment; e.g., seismic monitors, process and radiological monitors, and fire and combustion monitors. These systems include a meteorology system with wind speed and direction and temperature capability, installed process radiation monitors to measure deviations in radiation levels in

process lines that actually or potentially contain radioactive effluents, installed area radiation monitors to measure upward deviations in radiation levels in specific locations in the station, portable dose rate and radiation detection instruments, nonradiological process monitors (such as containment pressure and temperature, reactor system pressure and temperature), and laboratory counting and analysis facilities.

Provisions for offsite monitoring equipment have been made. Seismic data, respiratory protection equipment, portable detection instrumentation, and counting room equipment can be obtained from the Dresden, Byron, LaSalle and Quad-Cities stations. The Illinois Department of Nuclear Safety maintains a mobile laboratory equipped with radioassay capability to respond to radiation emergencies. Offsite meteorological data can currently be obtained from any of the licensee's other nuclear stations as well as the weather service.

The Environmental Emergency Coordinator is responsible for the receipt and analysis of all field monitoring data and the determination of where environmental sample media will be taken for analysis.

The meteorology equipment at the station currently meets the criteria of Regulatory Guide 1.23, "Onsite Meteorological Problems," dated February 17, 1972. CECO is currently upgrading the meteorological measurements program in accordance with NRC's February 29, 1980, Confirmatory Order, which is essentially identical to Task Item III.A.2 in NUREG-0737, "Clarification of TMI Action Plan Requirements." This upgrade includes the offsite dose calculation system (ODCS). The plan describes the ODCS and its objectives. These objectives include: (a) meet the meteorological criteria of NUREG-0654, Revision 1; (b) provide, where possible, redundant independent pathways of data transmission and redundant data processing computers for use in an emergency situation; (c) provide quick and reasonably accurate estimates of radiation dose to persons living offsite, including preparation of procedures and training of users required to accomplish this assessment; and (d) provide a method for meteorological contractors to secure meteorological data for assessment of routine releases and to detect equipment failure quickly. The plan indicates that EAL alarms based on offsite dose rates in accordance with Appendix 1 of NUREG-0654, Revision 1, will be factored into the Class A model. The station process computers will process this information and will produce initial transport and diffusion estimates within 15 minutes following classification of an accident. This information will be immediately available to the control room operators. The completion of this upgrade will be accomplished in accordance with the guidance provided in SECY 82-111B, and will be addressed in a separate report.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

I. Accident Assessment

Planning Standard

Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.

Emergency Plan

The plan contains several system and radiological effluent parameter values characteristic of a spectrum of off-normal conditions and accidents; however, not all values have been specified. By letter dated November 30, 1981, CECo has committed to include steamline monitor readings, effluent monitor readings, and SPING monitor readings that correspond to specific EALs in the plan when installation and calibration of the instrumentation has been completed. Parameter values and other reliable information are tabulated to cross-reference initiating conditions for each of the emergency classes. Specific alarm setpoints, both visual and audio, are in the control room to alert the operator. These EALs should be included in the next GSEP revision.

The onsite radiation monitoring and sampling system consists of (1) a process and radiological monitoring and sampling system, (2) an effluent radiological monitoring and sampling system, (3) an airborne radioactivity monitoring system, (4) an area radiation monitoring system, and (5) portable survey and counting equipment.

The plan described the offsite dose calculation system (ODCS) which meets the design objectives of the NRC Class A model. The system will be computerized and used to predict offsite doses on a real-time basis using effluent and meteorological monitors. The ODCS provides access to meteorological information at any CECo facility on a realtime basis, and can be accessed from the control room, TSC, EOF, and CCC. Provisions have been made in the system to allow access to meteorological data by the NRC and the Illinois Department of Nuclear Safety. The ODCS can determine the magnitude of a release or potential release by using any of the following: (1) evaluation of plant conditions, (2) offsite radiological measurements, and (3) dose projections offsite.

The plan describes the post-accident primary coolant and containment atmosphere sampling system. The post accident primary coolant sampling system provides samples from the reactor loops, pressurizer, accumulators, and the residual heat removal (RHR) system. The system will allow sample collection and analysis within exposure guidelines given in NUREG-0737. This system provides analytical capabilities for boron and isotopic analysis from diluted samples (1000 to 1), and online analysis of pH, dissolved oxygen, specific conductivity, chloride, and hydrogen. The containment atmosphere sampling system will provide representative grab samples at the time of an accident and fixed intervals thereafter.

High-range effluent monitors which measure noble gases will be installed in the effluent streams. Each of the two effluent streams will be provided with adequate flow monitoring and one wide-range monitor. These monitors will have a range of $1 \text{ E-}7 \text{ } \mu\text{Ci/cc}$ to $1 \text{ E+}5 \text{ } \mu\text{Ci/cc}$ and will be used to provide an estimate of the release. In addition, a radiological noble gas effluent monitoring system will be utilized to monitor possible releases through the safety and relief valves associated with the main steam lines. The range of these monitors is $1 \text{ E-}1 \text{ } \mu\text{Ci/cc}$ to $1 \text{ E+}3 \text{ } \mu\text{Ci/cc}$. These monitors will be utilized to assess offsite releases as a result of a steam generator tube rupture accident. Actual releases will be determined periodically by

collecting grab samples, counting the samples, and calculating the releases. This method provides accurate results regardless of whether the instrumentation used for assessment is inoperable or off scale. High-range containment radiation monitors are installed in each of the units. These redundant monitors have a range from 1 R/hr to 1 E+8 R/hr. Plots of activity in containment (Ci) versus containment radiation reading (R/hr) for each reactor are developed to aid the control room operator in an assessment of core damage. These values are related to EALs for rapid classification of an emergency condition.

The plan describes the inplant radioiodine instrumentation and radioiodine and particulate effluent monitors. Sample media are analyzed in the station counting room using a GeLi isotopic analyzer system. The iodine cartridges are purged to reduce the level of entrapped noble gases, and silver zeolite cartridges can be used to further reduce the interference from noble gases. Portable monitors (for example, an Eberline SAM-2) are also used to measure increasing levels of radioiodine during emergencies.

The plan describes the offsite radiological environmental monitoring program, including fixed continuous air samplers and a fixed thermoluminescent dosimeter (TLD) monitoring network which meets the NRC Radiological Assessment Branch Technical Position for Environmental Radiological Monitoring Program. Maps are provided showing the TLD and air sampler locations.

The plan describes the capabilities and resources for field monitoring within the plume exposure EPZ. Teams will have adequate monitoring equipment to locate and find the plume, and make airborne measurements of radioiodine to levels of 1 E-7 $\mu\text{Ci/cc}$. Adequate communications systems for the field teams are provided.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

J. Protective Response

Planning Standard

A range of protective actions have been developed for the plume exposure pathway EPZ for emergency workers and the public. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.

Emergency Plan

The plan describes the protective actions to be taken by onsite personnel. Onsite predetermined assembly areas are designated. The station has a siren system to signal personnel to assemble in these areas. Persons not having an emergency response assignment, including visitors and contractor personnel, are required to assemble when notified by the siren. Onsite accountability is the responsibility of the Zion Station Security Director, who will account for all individuals within the protected area

at the time the assembly is announced and be able to ascertain the names of missing individuals within 30 minutes utilizing the computerized security control system. If site evacuation is necessary (such as for any Site Area or General Emergency), personnel will be relocated and monitored at one or more of the following locations: (1) the Westinghouse Training Center (EOF), (2) Waukegan Generating Station, and (3) Waukegan District Headquarters. The plan indicates the evacuation routes to each of the relocation centers. Traffic control for onsite areas during a site evacuation will be the responsibility of the station security force. The plan describes how radiological monitoring and decontamination (if necessary) will be provided for evacuees at the offsite relocation site(s).

The plan makes provisions for respiratory protection, use of protective clothing, and use of radioprotective drugs for onsite emergency workers. The criteria for issuance of these protective measures are described in CECO radiation protection standards and radiation/chemistry procedures.

The plan provides the basis for recommendations for protective actions for the public. These protective action recommendations are consistent with the guidance set forth in Table 5.1 of the Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA-510/1-75-001) and the guidance of the U.S. Food and Drug Administration covering the contamination of human food and animal feed (Federal Register, Volume 43, No. 242, December 15, 1978). The plan summarizes possible recommended protective actions to be made to State and local agencies during an emergency. The plan clearly indicates that a prompt notification will be made directly to offsite authorities responsible for implementing protective measures within the plume exposure pathway and ingestion exposure pathway EPZs.

Population distribution by sector and distance within a 50 mile radius have been compiled and are included in the plan. Maps indicating major evacuation routes for the public and station personnel are provided in the plan. Detailed evacuation routes (maps) for the general public are contained in the State and local emergency plans.

Evacuation time estimates for the plume exposure pathway EPZ for adverse weather conditions, special facilities, and normal conditions have been specified in the plan. These time estimates are generally in accordance with Appendix 4 of NUREG-0654, Revision 1.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

K. Radiological Exposure Control

Planning Standard

Means for controlling radiological exposures in an emergency are established for emergency workers. The means for controlling radiological exposures shall include exposure guidelines consistent with EPA Emergency Worker and Life Saving Activity Protective Action Guides.

Emergency Plan

Emergency response personnel may receive radiation exposure in excess of the limits imposed by 10 CFR 20. Whenever possible, prior authorization of the Station Superintendent, CECO Medical Director, and the station's Radiation Protection Supervisor should be obtained. The plan contains emergency guidelines for whole body and thyroid doses consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides.

The station provides and distributes a self-reading and accumulative type dosimeter to personnel involved in emergency onsite response, regardless of company affiliation. Dose records for workers will be maintained and checked daily throughout the emergency.

Onsite contamination control procedures for personnel, equipment, and access control are in place. Decontamination of personnel and equipment is required when the contamination level exceeds predetermined values. Criteria for permitting return of contaminated areas and their contents to normal use are stated in the appropriate contamination control procedures.

The station will supply clothing and decontamination materials to onsite personnel required to relocate and found to be contaminated. In addition, the station will provide bioassay capabilities at the relocation sites.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

L. Medical and Public Health Support

Planning Standard

Arrangements are made for medical services for contaminated injured individuals.

Emergency Plan

The station provides for onsite first aid capability. Radiation protection personnel and selective supervisors are trained and qualified to administer first aid. At least one of these individuals is available on shift at all times.

Because of the specialized nature of the diagnosis and treatment of radiation injuries, CECO's Corporate Medical Officer maintains a roster of physicians especially competent in this area of medicine and available for the care of persons with these special problems. In addition, Radiation Management Corporation (RMC) provides medical support, including bioassay result interpretation.

CECO has made arrangements, confirmed in writing, with Victory Memorial Hospital in Waukegan. This hospital is capable of receiving and treating contaminated or overexposed persons. This hospital will be utilized for decontamination and initial treatment of persons with injuries involving radioactivity and requiring immediate hospital care. CECO will provide

medical consultants to aid in any special care necessary at this hospital. Backup medical support, confirmed in writing, is available at Northwestern Memorial Hospital in Chicago. This hospital would be used to treat significant radiological emergencies requiring extended specialized treatment. CECO will have available to the staff of this hospital its specialist who will provide the direction of the special care necessary for the treatment of persons having radiological injuries.

CECO had made arrangements confirmed in writing with the Safe-Way Ambulance Service to provide for transporting persons with injuries involving radioactivity from the Zion Station to a designated hospital. This service is available 24 hours per day. Radiation monitoring will be provided by the station whenever it becomes necessary to use the ambulance service to transport a contaminated person.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

M. Recovery and Reentry Planning and Postaccident Operations

Planning Standard

General plans for recovery and reentry are developed.

Emergency Plan

Procedures have been developed for entry to previously evacuated areas for the purpose of saving lives, search and rescue of missing and injured persons, or manipulation, repair, or recovery of critical equipment or systems.

The plan describes an extensive Recovery Organization (Figure 2) which follows the recommendations of the Atomic Industrial Forum and the Institute for Nuclear Power Operations. The Recovery Organization will be activated upon activation of the EOF, which will automatically take place for any Site Area or General Emergency. Designated CECO personnel will assemble at the EOF and assume additional responsibilities for assigned positions. These responsibilities are described in the plan. There will be three major emergency functions at the EOF: (1) the Recovery Center, (2) the Emergency Control Center, and (3) the Emergency News Center. The Recovery Center is the command post for direction of all recovery operations. The Emergency Control Center functions as a location from which to evaluate emergency situations (such as radiation releases) that affect the public. The Emergency News Center functions as the single contact point for disseminating information to the public.

The plan provides a method for estimating total population exposure. The ODCS provides the methodology in the Class B model (see Section H).

The Recovery Manager is responsible for determining that a recovery mode may be entered. The Recovery Manager is the designated individual from CECO who has requisite authority, management ability, and technical knowledge to manage recovery operations. The primary Recovery Manager

is the Division Vice-President, Nuclear Stations. Procedures have been developed which describe how emergency classifications will be reduced and closed out, and how members of the emergency response organizations will be informed of accident status changes.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

N. Exercises and Drills

Planning Standard

Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected.

Emergency Plan

The plan ensures that an annual exercise is conducted at Zion Station to test the adequacy of timing and content of implementing procedures and methods, to test equipment and communications networks, and to ensure that emergency personnel are familiar with their duties. Once every six years, an exercise should be scheduled between the hours of 6:00 p.m. and midnight, and another between midnight and 6:00 a.m.

Full-scale exercises which test as much of the plans (licensee, State, and local) as is reasonably achievable without mandatory public participation will be scheduled in order to permit agencies to fulfill their full-scale exercise frequency requirements as delineated in 10 CFR 50, Appendix E, Sections IV.F.1 and IV.F.2.

Small-scale exercises which test the adequacy of communication links, establish that emergency response agencies understand the concept of EALs, and test at least one other component of the offsite emergency response plans will be conducted each year that a full-scale exercise is not conducted.

A written scenario will be prepared for each annual exercise. This scenario will include: (a) the basic objectives of the exercise; (b) the date, time period, places, and participating organizations; (c) the simulated events; (d) the time schedule of real and simulated initiating events; (e) arrangements for qualified observers; and (f) a narrative summary describing the conduct of the exercise to include such things as simulated casualties, rescue of personnel, deployment of radiological monitoring teams, and public information activities.

A critique will be conducted as soon as practical after each exercise. The critique will evaluate the ability of the GSEP organization to respond to a simulated emergency situation as called for in the plan. The Supervisor of Radioecology and Emergency Planning will ensure that when deficiencies in the plan or corresponding implementing procedures are discovered during exercises and/or drills, such documents will be revised as necessary to ensure corrective actions are implemented.

Medical emergency drills, involving a simulated contaminated individual, will contain provisions for participation by local support services agencies (i.e., ambulance and offsite support hospital) and will be conducted annually. Health physics drills will be conducted semi-annually. These drills will include response to, and analysis of, simulated airborne and liquid samples within the plant. At least annually, these drills will include a test of postaccident sampling systems. Plant environs and radiological monitoring drills will be conducted annually. These drills will include collection and analysis of sample media such as soil, water, grass, and air. Fire drills will continue to be conducted in accordance with the station's Technical Specifications. The GSEP communications system described in Section 7.2 of the generic GSEP will be tested annually. These systems include communications between the station, State, and local Emergency Operations Centers (EOCs), and field assessment teams. The capability to notify the NRC from the control room, TSC, and nearsite EOF will be demonstrated at least monthly. The capability to notify other Federal emergency response organizations will be demonstrated from the corporate office at least quarterly. The capability to notify Illinois ESDA, Wisconsin Division of Emergency Government, and appropriate local agencies will be demonstrated at least monthly.

The plan also includes an Operator's Response Drill, Offshift Augmentation Drill, and Assembly and Accountability Drill. The Operator's Response Drill will be conducted annually to observe the operator's response to a reactor problem scenario. This drill may or may not be concurrent with the GSEP exercise. The Offshift Augmentation Drill will be conducted at least every six months to implement Zion's notification procedure. This drill will be unannounced on an offshift and documented to include the time each person is notified. This drill will serve to demonstrate the capability to augment the staff in a short period of time after declaration of an emergency. The Assembly and Accountability Drill will be conducted annually and includes identifying the locations of all individuals within the protected area after an assembly is announced.

Although the staff is not opposed to the addition of these three drills in the emergency plan, we wish to make it clear that operator response to reactor problem scenarios, and an assembly and accountability drill are major components of an onsite emergency exercise that must be tested in conjunction with the required full-scale exercise. Accordingly, the staff still expects these objectives to be included in the annual exercise to demonstrate compliance with 10 CFR 50, Appendix E requirements.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

0. Radiological Emergency Response Training

Planning Standard

Radiological emergency response training is provided to those who may be called on to assist in an emergency.

Emergency Plan

All Zion station personnel, including contractor personnel, will receive an initial orientation and annual review of the GSEP to ensure that they are aware of actions they should take during an emergency. CECo personnel with specific duties during an emergency (for example, directors in the GSEP organizations, accident assessment personnel, radiological monitoring teams, fire brigades, first aid teams, and security personnel) will receive initial and annual retraining on applicable portions of the plan. The proficiency of these emergency response personnel is ensured by the following means: (1) assigning persons to emergency duties which are similar to those performed as a part of their regular work assignment; (2) initial and annual retraining of emergency personnel on applicable generic and site-specific portions of the CSEP and corresponding Emergency Plan Implementing Procedures (EPIPs); and (3) participation in exercises and drills designed to sharpen those skills which they are expected to use during a radiological emergency. Records are maintained regarding all emergency personnel training.

Zion Station makes an annual written offer to train those non-CECo organizations referenced in the plan which will provide specialized services during a radiological emergency (such as fire-fighting, medical services, transport of injured, and other local support services personnel such as ESDA). This training is designed to acquaint the participants with the special problems potentially encountered during a radiological emergency, notification procedures, and their expected roles. Those organizations that must enter the site also receive training in site access procedures and the identity (by position and title) of those persons in the onsite organization who will control their support activities.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

P. Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans

Planning Standard

Responsibilities for plan development and review and for distribution of emergency plans are established, and planners are properly trained.

Emergency Plan

The Division Vice-President, Nuclear Stations has overall responsibility for radiological emergency response planning within CECo. A staff assigned to the Division Vice-President, Nuclear Stations has the responsibility for developing and updating the GSEP and coordinating the GSEP with other response organizations. This staff is headed by the Supervisor of Radioecology and Emergency Planning.

Training of emergency planning staff will be performed as a matter of practice. Actual training received is subject to the availability of appropriate courses and the availability of individuals to be scheduled for those courses.

To ensure that the plan and the corresponding implementing procedures are kept current and updated, the Supervisor of Radioecology and Emergency Planning will ensure the following: (1) each plan will be assigned a serial number; (2) an assigned record will be maintained of all plans; (3) plans will be distributed on a controlled basis to all individuals requiring them; (4) the plan will be reviewed and certified current on an annual basis and updated as needed; (5) all changes to the plan will be reviewed and approved by offsite and onsite review committees; (6) all persons in possession of the plan will receive authorized changes, which will be marked and dated to show where changes have been made; (7) names and phone numbers of GSEP organizations and support personnel will be reviewed and updated at least quarterly; and (8) EIPs for all GSEP organizations will be reviewed at least annually.

Each plan contains a detailed listing of supporting plans and their source. A section in the plan outlines the required content of implementing procedures, and lists the subjects of procedures required to implement the plan. The plan contains a specific table of contents.

An independent audit of the emergency plan and implementing procedures will be conducted on an annual basis by the CECO Quality Assurance Department. Actions shall be taken for evaluation and correction of all audit findings.

The staff finds this element of emergency preparedness, as described in the GSEP and Zion site specific annex, to be adequate.

Conclusion

Based on our review of the GSEP and Zion site specific annex for onsite emergency preparedness at Zion Station, we conclude that the licensee's emergency plan meets the planning standards of 10 CFR 50.47(b) and the requirements of 10 CFR 50, Appendix E. The review of the permanent Emergency Response Facilities (ERFs) will be discussed in a separate report.