

5. EMERGENCY FACILITIES AND EQUIPMENT

5.1 Introduction

Most DOE facilities and sites have established emergency facilities and equipment to support response activities. The intent of this guide is to clarify requirements of the order to ensure that all such emergency facilities and equipment are considered by the emergency management program and that activities conducted at these emergency facilities are fully integrated. Purchases of new equipment, construction of new emergency facilities or designation of additional emergency facilities are not intended, if the current arrangement adequately supports the activities of the ERO.

DOE O 151.1 requires that emergency facilities and equipment be established and maintained for effective emergency response. The Operational Emergency Base Program requirements are driven by worker safety and environmental concerns and result from compliance with other DOE orders, Federal codes and regulations, and local and state regulations. These requirements mandate the ability of the site/facility to properly notify, implement protective actions for, and maintain accountability of, affected employees in the event of an emergency.

Facilities and equipment necessary to support the Operational Emergency Hazardous Material Program build upon those required for the Base Program. Additional requirements include a facility to serve as a command center, an alternate command center in the event the primary is not available, and adequate equipment and supplies to meet the needs determined by the results of the Hazards Assessment. Depending upon these results, additional emergency facilities may be necessary, such as technical support; security; personnel assembly/control; decontamination; medical services; process control; and chemical/radiological analytic laboratories.

For either the Base or Hazardous Materials Programs, equipment and facilities throughout each site, which may be under different administrative organizations, should be integrated to provide an overall, sitewide response capability.

This chapter describes how the Hazards Survey and Assessment processes are used to help determine facility and equipment needs. General design and siting considerations are provided for each type of response facility. Suggestions for equipment to support response functions are provided. The user is provided with qualitative guidance to help identify needs and to design and procure facilities and equipment.

Base Program. DOE O 151.1 requirements for the Operational Emergency Base Program are basically driven by worker safety and environmental concerns. These

requirements mandate the ability of the site/facility to properly notify, take protective actions, and maintain accountability of affected employees in the event of an emergency. The results of the Hazards Survey are used to help determine if the minimum requirements of the Base Program are being met. Section 5.2 provides a discussion of this process. The guidance provided in the remainder of the chapter is aimed at the needs of the Hazardous Materials Program; however, the information may be useful in addressing the needs of a Base Program.

5.2 Role of Hazards Survey

The qualitative results of the facility/site-specific Hazards Survey serves as the key technical basis for identifying the types and levels of emergency facilities and equipment to support an emergency response. Results from the Hazards Survey should be used to verify that the following minimum emergency facility and equipment requirements are satisfied:

- (1) **Notification/Communication Equipment.** The facility/site must have the ability to notify all affected onsite individuals of an emergency condition in a timely manner and direct them appropriately. This is usually conveyed by a public address system and/or alarm sirens, horn blasts, etc. Notification to emergency responders (e.g. fire, medical, police departments) are usually conducted on a radio/telephone, hard line/battery-type redundant system to reasonably assure communication at all times. This same system will also serve to notify other appropriate Federal, state, tribal, and local organizations, as well as additional DOE entities (as prescribed by DOE O 232.1). Many DOE facilities/sites have designated radio frequencies and dedicated telephone lines to be used only for emergency purposes. OSHA standards in 29 CFR 1910.165 are directly applicable. If offsite response forces will be integrated into the overall facility/site response, communications must be compatible. The facility/site may need to provide mobile, compatible links to these organizations or establish other means of communications, such as exchanging liaisons.
- (2) **Protective Actions.** Depending on the type of emergency at a facility/site, the effective sheltering or transporting of onsite personnel for evacuation purposes may be desirable or necessary. Pre-designating the locations of these potential shelters and rally points for evacuation are critical in order to support onsite direction and coordination actions (e.g. temporary billeting, transportation) and obtaining accurate accountability of personnel. Understanding the peak, onsite number of personnel which could potentially be affected by the emergency (as developed by the Hazards Survey) will help determine the size/type of sheltering facility, numbers/types of vehicles needed to support their evacuation, and optimum personnel accountability system.

- (3) **Accountability Processing.** The capability to accurately determine the whereabouts and current status of onsite personnel during an emergency requires that the facility/site maintain a personnel accountability system. The complexity of the system could be no more than a "roll call," if it serves to accurately determine accountability after evacuation. Whatever is to be used, from simple "roll calls" to fully automated badge-reader systems, considerations must be given to optimum placement, utility needs, and mobility requirements.

A Base Program site/facility, especially a minimal program, will probably not need to take advantage of the guidance contained in the remainder of this chapter.

5.3 Role of Hazards Assessment

Hazards Assessment results used to identify the emergency facility and equipment needs include the following.

- Hazardous material(s) forms, quantities, and locations.
- Release modes.
- Concentrations, magnitude, and severity at various receptor points.
- Emergency class(es) corresponding to analyzed events.
- Time to consequence.
- Persistence of released material in the environment.
- Effective and appropriate protective actions.
- EPZs.
- Demographics of potentially affected areas.
- Onsite and offsite organizations potentially affected by the material(s) released.
- Impact of hazardous material releases on positions requiring occupancy for safe operation, security, or monitoring.

Specific results from the Hazards Assessment and how they may influence the emergency facility and equipment needs include the following.

- **Estimated duration of hazardous material releases.** This output of the Hazards Assessment can be used to determine facilities and equipment features such as sophisticated prompt notification systems; EOC HVAC system filtration capability; the equipment to be staged for field monitoring teams; and plans for extended occupancy of emergency facilities.
- **Potential for successful mitigative actions.** This output can be used to determine the facilities and equipment features such as facilities, equipment, and staffing plans for mitigation oriented functions, such as technical support and operations support; coordination of onsite and offsite firefighting assets; and the degree to which emergency facilities are equipped with analytical tools (e.g., drawings, computers, and work-space for problem-solving teams).
- **Measurement or consequence assessment methods that are applicable for the material and release types.** This output can be used to determine facilities and equipment features, such as use of manual-versus-computerized consequence assessment methods; adequacy of installed monitoring and detection instrumentation; specific field team instruments; and the level of sophistication of meteorological instruments and ability to access forecast information.
- **Events and hazardous materials involving security considerations.** This output can be used to determine facilities and equipment features, such as secure communications between emergency facilities; processing, storing, and discussing classified information within emergency facilities, thus establishing the level of physical security to be provided at emergency facilities; respiratory protection equipment for security personnel; and hazardous materials monitoring equipment for security personnel and vehicles.

The Hazards Assessment results can be used to help identify potential locations and habitability requirements for emergency facilities. Consequence estimates derived from the Hazards Assessment will identify areas potentially affected by hazardous materials releases. The need for a determination of habitability or an alternate EOC/command center can be eliminated if a primary EOC/command center can be located outside any potentially affected area. Habitability requirements for an EOC/command center located within a potentially affected area should be determined by the consequence estimates. An existing structure may have the necessary features to maintain habitability. The consequence estimates can also be used to determine a suitable location for the alternate. Staging facilities/areas could also be identified for such diverse emergency needs as personnel evacuation and accountability, decontamination sites, and casualty management locations through this process.

Comparison of emergency facility and equipment needs identified through the results of the Hazards Assessment with existing facilities and equipment can help eliminate duplication and redundancy. Selected equipment, such as radiation or hazardous material detection instruments, self-contained breathing apparatus, and emergency repair materials, as necessary, may need to be dedicated for emergency use only. However, whenever possible, existing facilities and equipment should be used to meet these needs.

The need for and the types of additional facilities and equipment should be determined on the basis of lessening the onsite and offsite consequences of an incident or accident. Establishing sophisticated facilities and equipment (e.g., technical support center and operations support center) to support mitigation activities may not be appropriate, for example, if the likely duration of hazardous material releases is shorter than the time needed to activate emergency response resources. Mitigation-oriented facilities may not be necessary if most of the more severe analyzed accidents are massive puff releases. However, if some portion of the severe accidents involve prolonged releases, complex process systems, or conditions that deteriorate over time (e.g., a fire spreading throughout a facility containing multiple hazard sources), then mitigation-oriented facilities and equipment may be warranted.

Examples of enhanced mitigation activities include enhanced firefighting capability; ability to modify or create impromptu operations and maintenance procedures; staging areas for tools and personnel; and command and control infrastructures necessary to carry out mitigation activities.

A thorough assessment of the potential magnitude of consequences will help the emergency planner develop logistical contingencies to support all response activities through emergency termination and recovery. These include adequate housing, vehicles, food services, and general services and consumables (e.g., office supplies and equipment, construction materials, and minor repairs to computer equipment).

5.4 Emergency Response Facilities

5.4.1 Emergency Operations Center (EOC)

The EOC is the primary emergency facility for allowing the Emergency Management Team (EMT) component of the ERO to fulfill its emergency response functions and responsibilities. Its design and operations should provide for effective emergency response based on an analysis of emergency response needs, with consideration given to human interface requirements.

To be considered habitable, the EOC should remain operational and life-supporting for an extended period of time under accident conditions (as derived from the facility Hazards Assessment) and maintain its structural integrity under various design basis events, including natural phenomena. A habitable EOC should satisfy the following criteria.

- **Breathable atmosphere.** The HVAC system should be designed to maintain safe oxygen levels, provide for air contaminant removal and filtration to prevent intake of contaminated outside air, and establish a positive pressure to prevent the infiltration of contaminated air. Equipment should be available to confirm that the atmosphere remains uncontaminated.
- **Shielding.** Sufficient shielding from radioactive materials should be provided to permit continued occupancy of the EOC for its maximum expected activation time without exceeding recommended exposure levels.
- **Back-up emergency power.** A loss of normal electrical power should not preclude the EOC from performing its functions.

The design of the EOC should follow human-factor principles for comfort, noise reduction, lighting, and work-group interfaces. Controlled access should maintain security, accountability, and order within the EOC. Sufficient space and equipment should be provided to permit the EMT to effectively and efficiently perform its functions, especially command and control. The facilities should promote the active support of on-scene responders, versus simply providing an incident-tracking capability.

A resource area with current, electronic, and hard-copy reference materials, such as operating procedures, technical safety requirements, emergency plans and procedures, safety analyses, offsite demographic data, evacuation plans, and environmental monitoring records, should be designated and maintained to allow for ready accessibility and use by the EMT.

If the EOC is a dual-use facility, then plans and procedures should be in place and tested to ensure the facility can be rapidly converted into an EOC.

5.4.2 Alternate EOC

An alternate EOC must be available if the primary EOC becomes uninhabitable. The alternate does not have to duplicate every design feature and equipment of the primary as long as it allows the EMT to perform necessary functions in an effective manner. The following points should be considered in the design and operation of an alternate.

The alternate EOC should be located where the likelihood of both the primary EOC and the alternate being rendered uninhabitable by the same event is minimized. Consideration should be given to placing the alternate outside the EPZ or 180 degrees opposite (i.e., upwind from the prevailing wind direction) the EOC. Monitoring equipment should be available to confirm the habitability of the alternate. Accessibility and ability to provide controlled access and secure communications should be considered in selecting the alternate location.

Communications and information processing systems for the alternate EOC should meet the same capability specifications as for the primary. Back-up communications, such as cellular phones, should be made available to maintain command and control.

Reference material, including plans, procedures, and maps, should be available in the alternate EOC or provisions made to obtain them from other emergency facilities as needed.

Transfer and activation procedures should be prepared for shifting responsibilities from the primary EOC to the alternate during an emergency.

5.4.3 Command Center

All aspects of an EOC, as discussed above, are directly relevant to a command center. However, the mandatory, prescriptive requirements of an EOC are not applicable. At a minimum, a command center must ensure it has the capability to effectively integrate all of the following five functional elements.

- Command, which also includes safety, public information, and liaison.
- Operations.
- Planning.
- Logistics.
- Finance.

This configuration meets the intent of OSHA requirements in 29 CFR 1910.120(q) and describes the basic functional make-up of an Incident Command System. However, depending upon the actual emergency, these elements and their sub-elements should be tailored to needs dictated by the event, not by an automatic, one-size-fits-all configuration. A command center must, therefore, be able to flexibly support management of the site/facility response while coordinating and meeting its Federal, state, tribal, and local obligations.

5.4.4 Joint Information Center (JIC)

The Order requires that a designated facility exist to “provide support in media services, public inquiry, media inquiry, JIC management and administrative activities, and media monitoring.” The JIC should be located to facilitate access by the media and public. A collocated JIC, with local, state, tribal, and other Federal officials, is encouraged to present a coordinated response to the public. Volume IV, Chapter 4 details further considerations for JIC facilities and equipment requirements.

5.4.5 Other Emergency Facilities

In addition to the primary EOC, alternate EOC, command center, and the JIC, a variety of other emergency facilities may be necessary to accommodate the response activities as determined by the facility Hazards Survey/Assessment. Variations in the physical arrangement of other augmenting emergency facilities depend on the size, nature, and organization of the facility/site ERO. These aspects may include the following.

- A **manned operations area**, such as the control room or process control station from which facility operations are controlled or monitored. This is where an emergency would most likely be detected and reported and initial mitigative actions implemented.
- A **technical support center** from which detailed technical support and assistance is provided to the ERO. This is where activities such as technical assessments and engineering support are coordinated.
- An **operations support center** from which activities involving maintenance, health physics, industrial hygiene, and operations resource personnel are coordinated and directed. This is typically the dispatching point for field monitoring teams, search and rescue teams, damage control and equipment repair teams, and emergency equipment operators.

Other facilities used on a routine basis to support facility/site response activities during an Operational Emergency could be considered emergency facilities. Examples include security patrol headquarters, notification centers, medical stations, decontamination stations, assembly points, and central alarm stations.

An analysis of the functional requirements of the ERO, integrating results from the Hazards Survey/Assessment, may result in combining similar functions in an emergency facility. Examples of potential emergency facility arrangements include the following.

- Combining all emergency response control and coordination functions in an EOC/command center, with separate specialty functions in rooms or partitioned areas.
- Combining the technical support center and EOC/command center.
- Combining the technical support center and operations support center.
- Establishing individual facility technical support centers and operational support centers, along with a common EOC/command center for the entire site.
- Dividing operations support center functions among multiple emergency facilities (e.g., repair, monitoring, and operations staff staged in separate locations).

5.5 Emergency Response Equipment

5.5.1 Command, Control, and Communications Equipment

Command, control, and communications are the most important functions of the ERO. Primary, as well as back-up, equipment and alternative processes (to include redundant manual systems) must be considered to ensure a continually functioning set of command, control, and communication capabilities.

Decision aids and information displays to support the command and control functions of the ERO should be provided. Equipment to be considered includes the following.

- Status boards should provide a synopsis of the emergency. Key information should be presented on the status boards, including facility and system parameters; effluent releases; environmental monitoring and measurements; consequence assessments; protective actions; notifications; accountability; and search and rescue. Status boards offer information to the ERO at a glance, confirming reports that response actions have been made and that future actions have been identified.
- Data from installed instrumentation (e.g., meteorological and source term) critical to command and control (i.e., protective actions, classification, etc.) should be available to appropriate ERO personnel.

Primary and back-up communications systems should be provided to ensure effective communications critical to command and control of emergency response activities. Further guidance on communication and information processing systems is contained in the *Final Report of the Department of Energy Task Force on Compatibility of Emergency Operations Center Communications and Information Processing Systems*.

- While the Compatibility Study provides guidance on the communications links necessary to pass information to DOE elements, consideration must also be given to compatible communications systems to pass notification reports to other Federal, state, tribal, and local government agencies. Standard procedures and forms should be developed to ensure that information can be passed quickly and accurately during an emergency.
- Secure communications equipment is necessary for transmitting classified information.
- Additional guidance impacting the design of communications systems used for notifications reports can be found in Volume III, Chapter 4 and Volume III, Chapter 2.
- Primary and back-up communication links for mobile personnel, such as field teams and incident commanders, should be provided, tested, and maintained. If offsite response forces will be integrated into the overall facility/site response, communications must be compatible. The facility/site may be required to provide mobile, compatible communications links to these offsite organizations.
- Communications networks used to support daily operations at a facility/site should be compatible with the networks established to exercise command and control of emergency response. For example, fire departments and brigades, security patrols, and craft departments often have established radio networks to communicate with central dispatch facilities. Equipment within the EOC/command center may be needed to ensure that direction provided by the Emergency Director or "Incident Commander" is accurately and quickly transmitted to all emergency response elements.

5.5.2 Consequence Assessment Equipment

The level of sophistication required for consequence assessment capabilities, such as meteorological data acquisition, calculational model complexity, accident range instrumentation, data entry, and field monitoring capabilities, should be determined based on the results of the Hazards Survey/Assessment. Volume IV, Chapter 1 provides recommended methods based on maximum event classification at the facility.

Adequate equipment should be staged and readily available to provide hazard characterizations to site personnel and the public and to permit prompt protective action response. Installed monitoring systems needed for accident characterization should have back-up power to ensure continued operability in an accident.

Field monitoring equipment should be capable of measuring data on concentrations/exposures of interest during emergency response. If plans include the deployment of joint DOE/state/local monitoring teams, then standardized or compatible monitoring and communication equipment should be used. Instruments suitable for determining occupational exposures during normal operations may not be capable of recording accident event concentrations. (Regardless of the choice of instrument types, consequence assessment data/results should be compatible in terms of engineering units, conversion factors, and the severity thresholds.)

5.5.3 Protective Action Equipment

Hazards Assessment results concerning affected areas and the nature of hazards, the types of possible effects, the time to those effects, and the population affected are useful for determining requirements for equipment, materials, and facilities needed for protective action implementation. Detailed guidance is provided in Volume IV, Chapter 2.

Respiratory protection and protective clothing may be necessary to protect workers in a contaminated environment, to allow escape, and to protect emergency workers during re-entry to a contaminated facility. The type of respiratory protection and protective clothing should be based on the Hazards Assessment and consequence determination. The possibility of inhalation and absorption through the skin should be considered in determining the type and quantity of protective clothing. Additional discussion of requirements for personnel protective equipment can be found in Hazardous Waste Operations and Emergency Responses (HAZWOPER) standards; Appendix B, 29 CFR 1910.120; 29 CFR 1910.132 through 1910.140; and NFPA Standards 1991, 1992, 1993 and 1999. Additional guidance is contained in Volume X.

Specific locations within the facility, such as security posts or operations control rooms, are critical and may have to be continuously manned. The Hazards Assessment should be used to determine requirements for protective equipment that should be available at these locations.

Consideration should be given to standardization of equipment needed for implementing protective actions across a facility/site. This would enable routine operating stocks maintained by organizations, such as the fire department and the hazardous materials response group, to be pooled with any dedicated emergency equipment inventory. Standard equipment allows for ease of maintenance and greater flexibility during response.

Transportation equipment should be provided, or identified as readily available, such as by means of a Memorandum of Agreement (MOA), for use in evacuating nonessential personnel within the onsite EPZ to a safe location following an evacuation order. The

determination of suitable modes of transportation should consider disabled workers. Transportation equipment could include automobiles, buses, vans, ambulances, and cargo vehicles. This equipment can either be owned and maintained by the site or facility, or may be available from state, local, or private organizations via a contract or MOAs.

5.5.4 Medical Equipment

Sufficient medical equipment should be available to treat both workers and responders who may be injured during an emergency. Emergency planners should coordinate closely with medical professionals to ensure that appropriate treatment is available for analyzed accident scenarios, the types and nature of injuries that must be treated, the kinds of contamination that can be expected, the number of personnel that could become casualties, and the time-frames during which treatment must be provided to be effective. The types and amounts of medical equipment needed to respond to a mass casualty event should be evaluated and planned for.

DOE O 440.1 and its supporting guidance document provides further information on requirements for onsite and offsite medical equipment requirements. In addition, Volume IV, Chapter 3 should be consulted.

5.5.5 Public Information Equipment

Audio-visual and data processing equipment dedicated to communications with the media and the public should be available. While some equipment may be dedicated to public information activities as part of normal operations, assets may need to be upgraded to accommodate the vastly greater demands for public information dissemination that will be generated in an emergency situation. While members of the media will have some equipment needed to execute assignments, a greater demand for onsite support interfaces (e.g., phone lines, power supplies, etc.) should be anticipated. Detailed guidance in this area is provided in Volume IV, Chapter 4.

5.5.6 Additional Support Equipment

Access control equipment for the EOC and any other emergency facility is essential to ensure that the ERO functions without interruption or disruption. Access control equipment may be necessary to ensure that access to temporarily sensitive security areas or potentially contaminated areas is restricted. If an atmospheric release may affect areas beyond facility boundaries, coordination should occur with offsite authorities regarding the equipment necessary to extend a perimeter beyond the traditional facility and/or site boundary for access control purposes. The security force is usually tasked to carry out access control activities.

Fire departments or brigades normally make up a substantial portion of the emergency response force at a facility/site. DOE O 420.1 requires that a “Baseline Needs Assessment” establish the minimum required capabilities of fire fighting forces. Once determined, these capabilities are required to be reflected in the emergency plan. Emergency planners should coordinate with counterparts in the fire protection organization to ensure that all hazards noted in the Hazard Survey and Hazards Assessment are incorporated, as appropriate, into the “Baseline Needs Assessment.” DOE G 420.1/B-0/440.1/E-0, the implementation guide for fire safety requirements in DOE O 420.1 and DOE O 440.1, provides assistance in conducting the “Baseline Needs Assessment.”

Spill containment equipment and supplies should be available for immediate use following declaration of an emergency, if necessary, based on the Hazards Survey/Assessment. This includes containment equipment (e.g., booms and berm-making equipment) to minimize the environmental impacts of runoff (such as from a tank failure or firefighting efforts). Other equipment needs might include heavy construction equipment, portable power supplies, temporary sanitation equipment, specialized tools, and replacement parts. Additional supplies that might be required include personnel protective equipment, dosimeters, medical supplies, office supplies, fire fighting expendables, and construction supplies. As with fire, medical, and hazardous material equipment, consideration should be given to arranging these resources with offsite organizations. The availability of such offsite resources, including the names of equipment operators, should be documented in MOAs.

Emergency response personnel should have at their disposal the necessary equipment for reentry and recovery activities. Although maintaining an onsite inventory of all equipment possibly required for reentry and recovery efforts is not practical, a resource list for short-notice procurement should be available. Additional guidance is provided in Volume IV, Chapter 2 and Volume IV, Chapter 6.

Logistic support can be arranged through elements of the ERO or from other Federal, state, tribal, local, or private sources. Commitments to have these resources available immediately as needed can be ensured through MOAs. Examples of facilities and services that could be needed include hazardous materials response, bomb removal, hostage negotiations, medical/morgue services, critical incident tress teams, analytical laboratory services, aerial survey support, personnel transportation, food services, contaminated laundry service, and dosimetry support. Planners should consider the potential impact of resources from offsite organizations not being available in the event of a disaster that affects a large area. Additional information on establishing interfaces with offsite response groups is provided in Volume III, Chapter 2.

Administrative support such as document and clerical services may be required during emergencies.

5.6 Bibliography

DOE O 151.1Chg 2. *Comprehensive Emergency Management System*. August 21, 1996.

DOE O 232.1A. *Occurrence Reporting and Processing of Operations Information*. July 21, 1997.

DOE O 440.1 Chg 2. *Worker Protection For DOE Federal And Contractor Employees*. October 21, 1996.

Final Report of the Department of Energy Task Force on Compatibility of Emergency Operations Center Communications and Information Processing Systems. Department of Energy. May 1991.

Title 29 CFR 1910, Subpart I (29 CFR 1910.132 through 1910.140). *Personal Protective Equipment*.

Title 29 CFR 1910.165. *Employee Alarm Systems*.

Title 29 CFR 1910.120, Appendix B. *General Description And Discussion of The Levels of Protection And Protective Gear*.

NFPA Standard 1991. *Standard on Vapor-protective Suits for Hazardous Chemical Emergencies (EPA Level A Protective Clothing)*. National Fire Protection Association.

NFPA Standard 1992. *Standard on Liquid Splash-protective Suits for Hazardous Chemical Emergencies (EPA Level B Protective Clothing)*. National Fire Protection Association.

NFPA Standard 1993. *Standard on Liquid Splash-protective Suits for Non-emergency, Non-flammable Hazardous Chemical Situations (EPA Level B Protective Clothing)*. National Fire Protection Association.

NFPA Standard 1999. *Protective Clothing For Emergency Medical Operations*. National Fire Protection Association.

Incident Command System. Fire Protection Publications. Oklahoma State University. Stillwater, OK. 1983.