

## Attachment 6

### Other Supporting Documentation Not Subject to Withholding

**Contents:**

1. EP-TM-1001 "Three Mile Island Station Permanently Defueled Emergency Plan" Rev 0
2. EP-TM-1001 Addendum 1 "Three Mile Island Station Permanently Defueled Emergency Action Levels and Technical Bases" Rev 0



**EXELON GENERATION**

**THREE MILE ISLAND**

**PERMANENTLY DEFUELED**

**EMERGENCY PLAN (PDEP)**

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**ADDENDUM 1 Three Mile Island Station Permanently Defueled Emergency  
Action Levels and Technical Bases**

## 1.0 INTRODUCTION

The Permanently Defueled Emergency Plan (PDEP) describes the facility's plan for responding to emergencies that may arise at the Three Mile Island Nuclear Station (TMI). The Emergency Plan encompasses both Three Mile Island Unit 1 (TMI-1) and Three Mile Island Unit 2 (TMI-2).

This plan is applicable after the TMI-1 has been permanently shutdown and defueled and sufficient time has passed (488 days after shutdown) for the hottest fuel assembly to have decayed such that there would be 10 hours prior to the onset of zirconium clad ignition should a beyond design basis event result in the loss of all water from the spent fuel pool (Reference 1). Per 10 CFR 50.82(a)(1)(i) and (ii) TMI-1 is a possession only facility with all irradiated fuel stored in the Spent Fuel Pool (SFP) and/or the Independent Spent Fuel Storage Installation (ISFSI) (when built). An analysis of the possible design basis events and consequences is presented in the Decommissioned Safety Analysis Report (DSAR) for TMI-1 and the Post-Defueling Monitored Storage Safety Analysis Report for TMI-2.

Exelon maintains the emergency planning responsibilities for TMI-2, which is owned by First Energy Corporation, through a service agreement.

This PDEP adequately addresses the risks associated with TMI's current conditions.

The analysis of the potential radiological impacts of postulated design basis accident in a permanently defueled condition indicates that any releases beyond the Site Boundary would be below the Environmental Protection Agency (EPA) Protective Action Guide (PAG) exposure levels. Additionally, postulated beyond design basis accidents have been analyzed showing that due to their slow progression there is sufficient time available to initiate appropriate mitigating actions to protect the health and safety of the public. Therefore, the PDEP adequately addresses the risk associated with TMI's permanently defueled condition and continues to provide adequate protection for facility personnel and the public. Exposure levels, which warrant pre-planned response measures, are limited to onsite areas. For this reason, the TMI's PDEP is focused on onsite actions.

### 1.1. Purpose

The purpose of the PDEP is to assure an adequate level of preparedness by which to cope with a spectrum of emergencies that could be postulated to occur, including the means to minimize radiation exposure to facility personnel. This plan integrates the necessary elements to provide effective emergency response considering cooperation and coordination of off-site organizations expected to respond to potential emergencies.

### 1.2. Scope

The PDEP has been developed to respond to potential radiological emergencies at TMI considering the permanently shut down and defueled status. Because there are no postulated accidents that would result in dose consequences that are large enough to require offsite emergency planning, the overall scope of this plan delineates the actions necessary to

safeguard onsite personnel and minimize damage to property. If determined appropriate by government officials, protective actions may be implemented to protect the public using an all hazards approach to emergency planning.

The concepts presented in this plan address the applicable regulations stipulated in 10 CFR 50.47, "Emergency Plans" and 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," as exempted. Exemptions to selected portions of 10 CFR 50.47(b), 10 CFR 50.47(c)(2) and 10 CFR Part 50, Appendix E were previously approved by the NRC. The plan is consistent with the remaining applicable guidelines established in NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Facilities" (NUREG-0654). Appendix 3 contains a cross-reference to the applicable guidance in NUREG-0654.

Abbreviations and acronyms used in this plan are included in Appendix 5.



## **2.0 SUMMARY OF EMERGENCY PLAN**

### **2.1. Overview of Permanently Defueled Emergency Plan**

In the event of an emergency at TMI, actions are required to identify and assess the nature of the emergency and to bring it under control in a manner that protects the health and safety of the public and facility personnel.

This plan describes the organization and responsibilities for implementing emergency measures. It describes interfaces with Federal, Commonwealth of Pennsylvania, and local organizations that may be notified in the event of an emergency and may provide assistance.

Emergency services are provided by local public and private entities. Fire support services are provided by:

- Bainbridge Volunteer Fire Company (Lancaster County)
- Middletown Volunteer Fire Department
- Londonderry Volunteer Fire Company
- Elizabethtown Fire Department
- Lower Swatara Volunteer Fire Department
- Susquehanna Area Regional Airport Authority (SARAA)

Law enforcement support services are provided by local, state, and federal law enforcement authorities, as appropriate. Ambulance service is provided by Londonderry Volunteer Fire Company.

Because there are no postulated accidents that would result in off-site dose consequences that are large enough to require off-site emergency planning, emergencies are divided into two classifications: 1) Notification of Unusual Event (Unusual Event) and 2) Alert. The classification scheme, developed in accordance with NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors", Revision 6, November 2012, has been discussed and agreed upon with responsible offsite organizations and is compatible with their respective emergency plans. If determined appropriate by government officials, protective actions may be implemented to protect the public using the existing all hazards emergency planning (i.e., Comprehensive Emergency Management Plan (CEMP)).

TMI is responsible for planning and implementing emergency measures within the Site Boundary. This plan is provided to meet this responsibility. To carry out specific emergency measures discussed in this plan, detailed emergency plan implementing procedures (EPIP) are established and maintained. A list of EPIPs is included in Appendix 2.

In addition to the description of activities and steps that can be implemented during an emergency, this plan also provides a general description of the steps taken to recover from an emergency situation. It also describes the training, drills, planning, and coordination appropriate to maintain an adequate level of emergency preparedness.

## 2.2. Objectives

The basic objectives of this plan are:

- 1) To establish a system for identification and classification of the emergency condition and initiation of response actions;
- 2) To establish an organization for the direction of activity within the facility to limit the consequences of the incident;
- 3) To establish an organization for control of surveillance activities to assess the extent and significance of any uncontrolled release of radioactive material;
- 4) To identify facilities, equipment and supplies available for emergency use;
- 5) To establish an engineering support organization to aid the facility personnel in limiting the consequences of and recovery from an event;
- 6) To establish the basic elements of an emergency recovery program;
- 7) To specify a system for coordination with federal, state, and local authorities and agencies for offsite support;
- 8) To develop a communications network between the facility and offsite authorities to provide notification of emergency situations;
- 9) To develop a training and Emergency Plan exercise program to assure constant effectiveness of the plan.

## 2.3. Actions in an Emergency

This plan is activated by the Shift Manager upon identification of an emergency situation based upon Emergency Action Level (EAL) criteria. The emergency measures described in the subsequent sections and emergency plan implementing procedures are implemented in accordance with the classification and nature of the emergency at the direction of the Shift Manager. Regulatory authorities and offsite support organizations are notified in accordance with this plan. The Shift Manager has authority and responsibility for control and mitigation of the emergency, including emergency response resources, coordination of radiological assessment activities, and recovery implementation.

If an emergency condition develops, the Shift Manager assumes the role of Emergency Director, including responsibilities for initiating emergency actions to limit the consequences of the incident and to bring the facility into a stable condition. The individual must:

- 1) Recognize the emergency condition by observation of EALs;
- 2) Classify the accident in accordance with the emergency classification system;
- 3) Initiate emergency procedure(s) applicable to the event;
- 4) Activate the facility emergency alarm system;
- 5) Notify state and local county authorities of emergency conditions;
- 6) Notify the NRC Operations Center;

- 7) Direct and coordinate all emergency response efforts until overall responsibility is assumed by another individual qualified as an Emergency Director.

#### **2.4. Emergency Response Facility**

The Control Room is the emergency response facility, which is utilized by the Emergency Response Organization (ERO) and is described in Section 5.0. Key site personnel are dispatched to perform accident assessments, implement corrective actions, and analyze accident data.

#### **2.5. Mobilization**

The mobilization scheme is based on the emergency notification plan. The notification system utilizes the facility public address system, commercial telephone lines, and the ERO notification system to notify and mobilize facility personnel. The mobilization scheme ensures that specific technical disciplines can be augmented within appropriate time frames. On-site staff are informed of an emergency condition through the use of the plant public address system, office telephone and/or wireless devices capable of receiving telephone calls and text messages. In the event that personnel required to staff emergency positions are not on-site at the time an emergency is declared, they may be contacted by commercial telephone including land lines and/or wireless devices capable of receiving telephone calls and text messages. Mobilization of the ERO will be conducted under the direction of the Emergency Director, according to personnel assignments and telephone numbers maintained in various telephone directories. Section 7.2, Figure 7.1 and Table 7.1 outline the minimum staffing requirements for the ERO at TMI.

#### **2.6. State and Local Government Notification and Response**

Notification to the Lead State authority (Pennsylvania Emergency Management Agency (PEMA)) and local counties (Dauphin and Lancaster) is required within 30 minutes after declaring an emergency. The commercial telephone network serves as the primary means to provide emergency notification to State and local agencies. It is used to provide initial and updated notifications and for general information flow between these agencies.

In the event the commercial telephone system is unavailable, wireless communications can be used to make emergency notifications. In addition, electronic means may be used to transmit the notification message.

As part of the State's CEMP, a cooperative arrangement exists among the Pennsylvania State authorities and TMI concerning radiological emergency preparedness. TMI's emergency classification system and notification messages are reviewed with the Commonwealth of Pennsylvania, Dauphin County, and Lancaster County on an annual basis.

#### **2.7. Federal Government Notification and Response**

Notification to the NRC Operations Center is made as soon as possible after State notifications and within 60 minutes of event classification or change in classification. Once notified of an emergency, the NRC evaluates the situation and determines the appropriate NRC response.

Depending on the severity of the accident and the emergency classification declared, the NRC activates its incident response operations in accordance with the NRC Incident Response Plan. If the emergency warrants, the NRC notifies the Federal Emergency Management Agency (FEMA) and other appropriate federal agencies to activate the federal emergency response organization in accordance with the National Response Framework (NRF). The NRF makes available the resources and capabilities of federal agencies to support facility, state and local governments, as necessary to respond to the specific nature of the emergency. Principal participants are the NRC, FEMA, Department of Energy (DOE), and Environmental Protection Agency (EPA).

## **2.8. Technical Support**

In the event of an emergency that requires personnel and other support resources beyond those available within the TMI organization, augmentation is available from other Exelon facilities and can be requested from various contractors. Additional technical and personnel support are provided to TMI through support plans listed in Appendix 2, List of Emergency Plan Implementing Procedures.

## **2.9. Mitigation of Consequences of Beyond Design Basis Events**

Strategies to mitigate a loss of SFP inventory and prevent a zirconium fire are contained within several operating procedures:

- OP-TM-AOP-035, "Loss of Spent Fuel Pool Cooling;"
- OP-AA-201-010-1001, "B.5.b Mitigating Strategies Equipment Expectations;"
- OP-TM-251-901, "High Capacity Fire Service Makeup to Spent Fuel Pool;"
- OP-TM-251-902, "Spent Fuel Pool Spray;"
- OP-TM-919-914, "Spent Fuel Pool Makeup Using FX-P-2A or FX-P-2B;"
- OP-TM-919-922, "FSG-6 – Makeup from Raw Water Sources;"
- OP-TM-919-000, " FLEX - Diverse and Flexible Coping Strategy and Advanced Accident Mitigation B.5.b (919)."

These mitigative strategies support NRC Order on Mitigative Strategies (EA-02-026) and implement the requirements of License Condition 2.c.(17), "Mitigation Strategy License Condition."

### 3.0 SITE DESCRIPTION

#### 3.1. Facility Description

Three Mile Island, Unit 1 (TMI-1) is owned by Exelon Generation. TMI-1 ceased power operations in September 2019 and certified that fuel had been permanently removed from the reactor vessel. The 10 CFR Part 50 license for TMI will no longer authorize operation of the reactor, emplacement or retention of fuel into the reactor vessel, as specified in 10 CFR 50.82(a)(2). TMI consists of a permanently shutdown pressurized water reactor. An ISFSI (when built) will be located on the facility site. The arrangement of the major TMI facilities is shown in Figure 3.1: TMI Site Arrangement.

TMI, Unit 2 (TMI-2) is owned by First Energy Corporation. The TMI-2 reactor was damaged during an accident in 1979 and is currently defueled and the plant maintained in long-term monitored storage. Monitoring of this facility is performed by Exelon through a service agreement with First Energy Corporation.

The TMI site is located in an area of low population density about 12 miles southeast of Harrisburg, Pennsylvania. The area is in Londonderry Township, Dauphin County, about 2.5 miles from the southern tip of Dauphin County, where the county is coterminous with York and Lancaster Counties.

The TMI site is part of an 814-acre tract consisting of TMI and several adjacent islands, which were purchased by a predecessor. The island, which is situated about 900 feet from the east bank and approximately one mile from the west bank of the Susquehanna River, is elongated parallel to the flow of the river with its longest axis oriented approximately due north and south. The north and south ends of the island have access bridges, which connect the island to State Highway Route 441. The north access bridge is used daily. Route 441 is a two-lane highway, which runs parallel to TMI on the east bank of the Susquehanna River and is more than 2,000 feet from the TMI reactors at the closest point. The exclusion area for TMI is a 2,000-foot radius, and for the purposes of Emergency Planning, the exclusion area and the site boundary are considered the same.

A Norfolk Southern one-track line runs adjacent and parallel to Route 441 on the east bank of the river. On the west bank of the river, there is a multi-track Norfolk Southern line at the river's edge about 1.25 miles west of the site and a black top, two lane road that runs parallel to it. There is a one-track railroad spur across the bridge on the north end of the island, which is used for site-related activities. A general area map showing the relative location of the TMI sites is shown as Figure 3.2.

#### 3.2. Area Characteristics and Land Use

##### Owner Controlled Area and Exclusion Area

The Owner Controlled Area (OCA) for the TMI includes all areas within the site perimeter security fence. At TMI, the minimum distance to the owner-controlled area boundary is measured from the centerline of the Fuel Handling Building to the western shoreline of the island, which is approximately 675 feet.

The Exclusion Area for the TMI is a 2,000-foot radius that includes a portion of TMI, the river surface around it, and a portion of Shelly Island. The minimum distance of 2,000 feet occurs on the shore of the mainland in a due easterly direction. The TMI-1 licensee retains complete authority to determine and maintain sufficient control of all activities including the authority to exclude or remove personnel and property for all land areas within the exclusion area. For the purposes of Emergency Planning, the exclusion area boundary and the Site Boundary are considered the same.

#### Population and Population Distribution

The nearest major population center is Harrisburg, Pennsylvania which is located approximately 12 miles northwest of TMI. This distance satisfies the requirements of 10 CFR 100 with respect to population center distance.

There are no schools located within two-miles from the facility. There are several recreational areas (Falmouth Fish Commission Access Area, Tri-County Boat Club and Canal Lock Boat Launch Area). There is some seasonal shift in population within a 5-mile radius of TMI since there are over 100 summer cabins on the islands within the area. Additional transients participate in boating activities in the vicinity of TMI.

#### Local Industry and Military Facilities

The TMI site is currently surrounded by farmlands within a 10-mile radius. Lands are used for dairy cattle, tobacco, poultry, vegetables, fruit, corn, wheat, and other products. A summary of land use for the risk counties is provided in Table 1 and the Defueled Safety Analysis Report (DSAR). The Susquehanna River is used for sport fishing and boating but is not used for commercial fishing. Manufacturing industries in the region produce clothing, wood products, shoes, electrical wiring devices, steel products, packed meat and other food. These activities, within a 10-mile radius of the site, are confined chiefly to the communities of Harrisburg, New Cumberland, Steelton, and Middletown. A listing of typical industries within 10 miles of TMI can be found in the site DSAR. There are gas and oil transmission lines located at a minimum distance of approximately 2 miles from TMI.

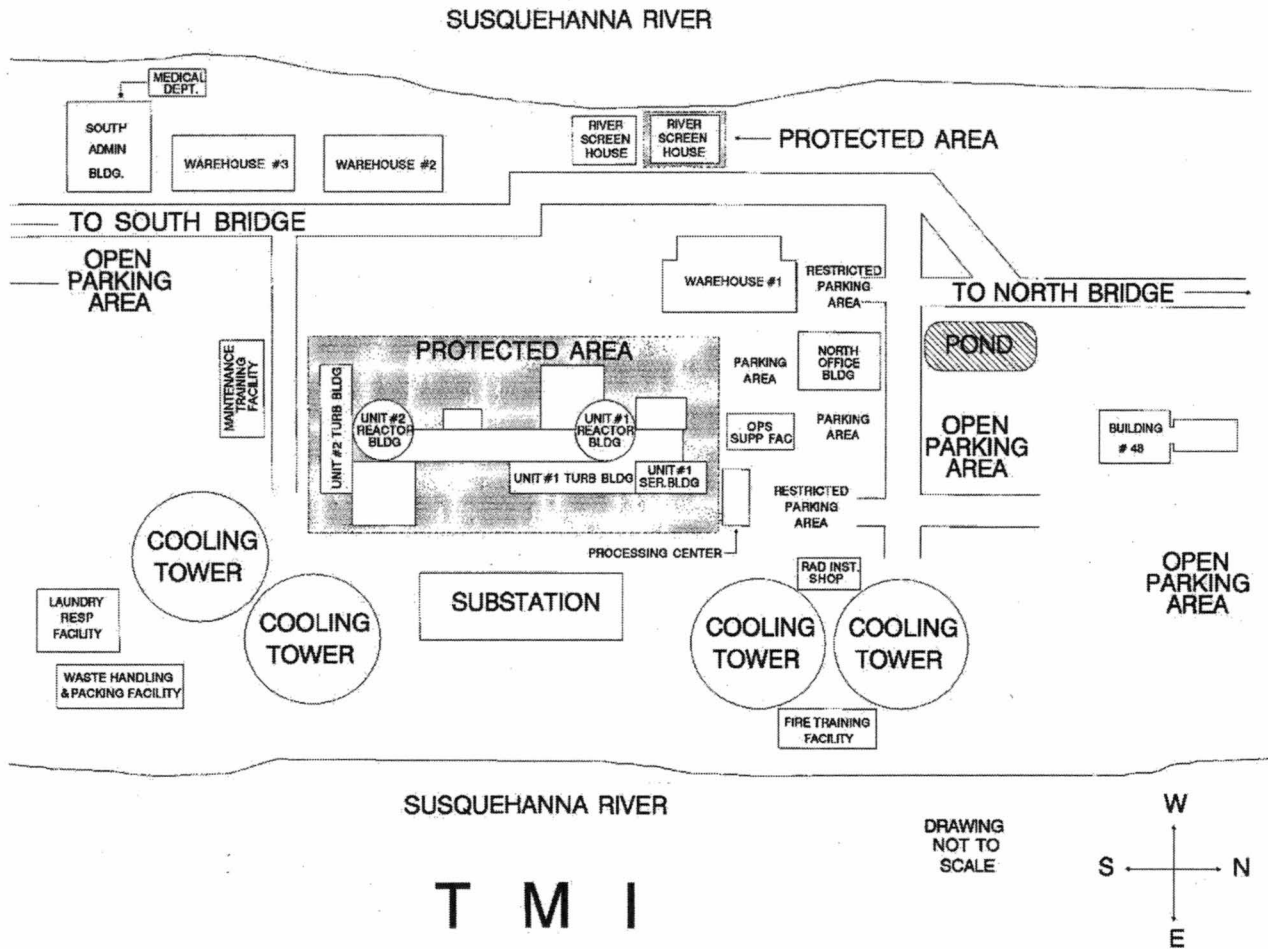
Approximately 3 miles downstream from the site is the York Haven hydro-electric project. The York Haven Station is operated on a "run-of-the-river" basis, and its power output is dependent primarily upon the water available. The reservoir is used for peaking operation during periods of low river flow. Brunner Island Station, a large steam-electric generating plant owned by the Talen Energy is located on the Susquehanna River approximately one mile downstream from the York Haven project. This station uses water from the river on a "once-through" basis for cooling water. Three other hydroelectric generating stations are also located downstream from TMI, with each project having a dam and reservoir on the Susquehanna River. The three stations are Safe Harbor, Holtwood, and Conowingo Hydroelectric Projects, located approximately 25, 31, and 47 miles south of TMI, respectively. There is also a coal fired, steam electric plant at Holtwood, and the Muddy Run Pumped Storage Project is associated with Conowingo Station. The Peach Bottom Atomic Power Station (PBAPS) is located along the west bank of the Susquehanna River, about 41 miles downstream of TMI, just north of the Maryland-Pennsylvania border and is the only nuclear plant within a 50-mile radius of TMI.

There are two airports within 10 miles of the TMI sites. Harrisburg International Airport (formerly Olmsted Air Force Base) is located on the east bank of the Susquehanna River approximately 2.5 miles northwest of the site. The Capital City Airport is located approximately 8 miles west-northwest of TMI. The vital areas of the TMI sites are designed to withstand a hypothetical aircraft accident.

Norfolk Southern lines are located on both sides of the Susquehanna River, the closest being the east bank, approximately 2,000 feet from the TMI Reactor Buildings. Routine traffic in liquified petroleum gas was identified on the railroad line, which passes along the east shore of the river. Analyses indicate that any missiles generated by this traffic would be less damaging than the postulated aircraft strike against which the plant is protected and that flammable gases would dissipate before reaching the TMI Nuclear Units.

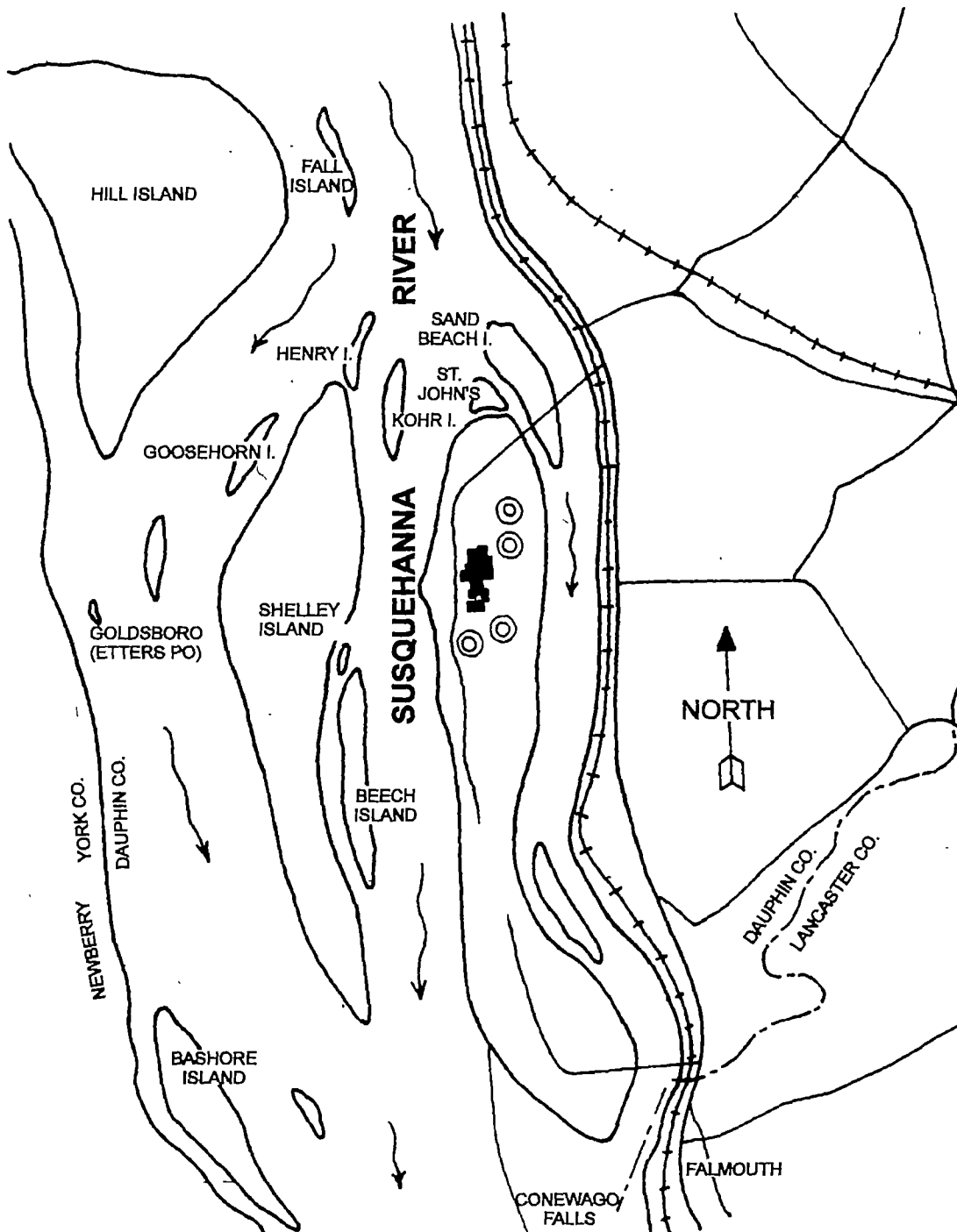
The closest military installation to the site is the Air National Guard facility at Harrisburg International Airport. There are no military firing ranges or missile facilities within a 10-mile radius of TMI. Other military facilities, however, are Army and Navy depots located at New Cumberland and Mechanicsburg, Pennsylvania, respectively.

**Figure 3.1: TMI Site Arrangement**





**Figure 3.2: TMI Site Relative Location**



#### 4.0 EMERGENCY CLASSIFICATION SYSTEM

The emergency classification system covers an entire spectrum of possible radiological and non-radiological emergencies at the TMI. The emergency classification system categorizes accidents and emergency situations, according to severity, into two emergency classification levels: Unusual Event and Alert.

The incidents leading to each of the emergency classifications are further identified by certain measurable and observable indicators of facility conditions or EALs. EALs addressed in Addendum 1 aid the operator in recognizing the potential of an incident immediately and assure that the first step in the emergency response is carried out. The classification of the event may change as the conditions change. TMI maintains the capability to assess, classify and declare an emergency condition in accordance with site procedures.

Emergency classifications are to be made as soon as conditions are present and recognizable for the classification in accordance with the applicable EALs; but within 30 minutes in all cases after the availability of indications to plant operators that an EAL threshold has been reached.

Incidents may be classified in a lower emergency classification level first, and then upgraded to the higher level if the situation deteriorates. An event will be terminated as described in Section 8.3, "Emergency Termination Criteria."

EALs and EAL bases were derived from NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors" Rev. 6, for classifying emergencies. Specifically, Appendix C of NEI 99-01, Rev. 6 contains a set of Initiating Conditions/ EALs for permanently defueled nuclear power plants that had previously operated under a 10 CFR Part 50 license and have permanently ceased operations, and Section 8 of NEI 99-01, Rev. 6 for the Independent Spent Fuel Storage Installation (ISFSI). The classification system referenced in NEI 99-01, Rev. 6 has been endorsed by the NRC and provides a standard method for classifying emergencies.

##### 4.1. Unusual Event

**EVENTS ARE IN PROGRESS OR HAVE OCCURRED WHICH INDICATE A POTENTIAL DEGRADATION OF THE LEVEL OF SAFETY OF THE FACILITY OR INDICATE A SECURITY THREAT TO FACILITY PROTECTION HAS BEEN INITIATED. NO RELEASES OF RADIOACTIVE MATERIAL REQUIRING OFFSITE RESPONSE OR MONITORING ARE EXPECTED UNLESS FURTHER DEGRADATION OF SAFETY SYSTEMS OCCURS.**

Unusual Event conditions do not cause serious damage to the facility. The purpose of the Unusual Event declaration is to:

- 1) provide for an increased awareness of abnormal conditions;
- 2) ensure that the first step in any response later found to be necessary has been carried out;
- 3) bring the ERO to a state of readiness;

- 4) provide for systematic handling of information and decision-making, and
- 5) augment on-shift personnel, if deemed necessary by the Emergency Director.

See Addendum 1 for a complete list of EALs corresponding to an Unusual Event.

#### **4.2. Alert**

**EVENTS ARE IN PROGRESS OR HAVE OCCURRED WHICH INVOLVE AN ACTUAL OR POTENTIAL SUBSTANTIAL DEGRADATION OF THE LEVEL OF SAFETY OF THE FACILITY OR A SECURITY EVENT THAT INVOLVES PROBABLE LIFE-THREATENING RISK TO SITE PERSONNEL OR DAMAGE TO SITE EQUIPMENT BECAUSE OF HOSTILE ACTION. ANY RELEASES ARE EXPECTED TO BE LIMITED TO SMALL FRACTIONS OF THE EPA PAG EXPOSURE LEVELS.**

The purpose of the Alert declaration is to:

- 1) activate the Emergency Response Organization to perform event mitigation and radiation monitoring, if required,
- 2) provide the Commonwealth of Pennsylvania, local agencies, and the NRC with current information on facility status, and
- 3) ensure that all necessary resources are being applied to accident mitigation.

The Alert status shall be maintained until termination of the event occurs. Offsite authorities will be informed of the change in the emergency status and the necessary documentation shall be completed as specified in the EPIPs.

Facility responses associated with this event classification assure that sufficient emergency response personnel are mobilized and respond to event conditions. Actual releases of radioactivity which exceed Technical Specification limits may be involved, thus radiation monitoring and dose projection may be required.

See Addendum 1 for a complete list of EALs corresponding to an Alert.

#### **4.3. Emergency Classification System Review by State and Local Authorities**

The emergency classification system specified above and the EALs presented in Addendum 1, are reviewed with the applicable state and county authorities annually.

## **5.0 EMERGENCY RESPONSE FACILITIES AND EQUIPMENT**

Following the declaration of an emergency, the activities of the emergency response organization are coordinated in the Control Room. Descriptions of TMI facilities and assessment capabilities are presented below.

### **5.1. Control Room**

The Control Room is where facility systems and equipment parameters are monitored and is continuously occupied as per Technical Specifications. Control Room personnel assess facility conditions, evaluate the magnitude and potential consequences of abnormal conditions, initiate preventative, mitigating and corrective actions and perform notifications. The Control Room is the onsite center for emergency command and control.

The Control Room staff coordinates all phases of emergency response and corrective action required to restore the facility to a safe condition. Classification and subsequent declaration of the appropriate emergency condition by the Shift Manager may result in activation of the ERO. The Control Room staff's attention focuses on mitigating the emergency as the ERO reports to their designated locations and is delegated emergency functions.

When activated, the ERO reports to the Emergency Director to assist the on-shift staff in the assessment, mitigation and response to an emergency and to support the dispatch of emergency teams. The composition of the ERO is addressed in Section 7.2.

ERO activation may be modified or suspended if the safety of personnel may be jeopardized by a security event or other event hazardous to personnel.

The Control Room contains communications equipment, emergency radiation monitoring equipment, and emergency respiratory devices. Adjacent rooms store radiation protection clothing and other emergency supplies. The ERO has access to up-to-date technical documentation, including drawings, system information and procedures to enable mitigation planning and support of Control Room staff.

The Control Room is the general assembly area for emergency mitigation and radiation protection personnel.

### **5.2. Assessment Capability**

The activation of the Emergency Plan and the continued assessment of accident conditions require monitoring and assessment capabilities. TMI maintains and operates on-site monitoring systems needed to provide data that is essential for initiating emergency measures and performing accident assessment, including dose assessment and assessing the magnitude of a release. This includes monitoring systems for plant processes, radiological conditions, meteorological conditions, and fire hazards. The essential monitoring systems needed are incorporated in the EALs specified in

Addendum 1. This section briefly describes monitoring systems as well as other assessment capabilities.

#### **5.2.1. Process Monitors**

Annunciator and computer alarms are provided for a variety of parameters including the SFP cooling system to indicate SFP level, temperature, and pump status.

The manner in which process monitors are used for accident recognition and classification is given in the detailed EAL listings in Addendum 1.

#### **5.2.2. Radiological Monitors**

A number of radiation monitors and monitoring systems are provided on process and effluent liquid and gaseous lines that serve directly or indirectly as discharge route for radioactive materials. These monitors, which include Control Room readout and alarm functions, exist in order that appropriate action can be initiated to limit fuel damage and/or contain radioactive material.

The onsite Radiation Monitoring System (RMS) contributes to personnel protection, equipment monitoring, data gathering, and accident assessment by measuring and recording radiation levels and concentrations of radioactive material at selected locations within the facility. The RMS alarms and initiates required emergency actions when radiation levels or radionuclide concentrations exceed predetermined levels. Area, liquid, and atmospheric monitoring subsystems are required to perform these functions.

The general description of the radiation monitors is provided below, specific details on these monitoring systems such as location, monitoring channels, type, etc., are contained in the DSAR Section 4.4.

The data from these subsystems are displayed by readout in the Control Room. Recorders and/or the facility process computer are located in the Control Room.

##### **5.2.2.1. Area Radiation Monitors**

The TMI area radiation monitoring subsystem is comprised of channels, which utilize an ion chamber detector housed in a weatherproof container.

##### **5.2.2.2. Liquid Radiation Monitoring Subsystem**

The liquid radiation monitoring subsystem is comprised of monitors, each of which has a sampler, detector, and Control Room ratemeter module (exceptions are the IWTS/IWFS discharge monitor and waste treatment system discharge monitor). The monitors provide visual indications in the Control Room.

##### **5.2.2.3. Atmospheric Radiation Monitoring**

Each installed atmospheric monitor is comprised of a particulate measuring channel, a gaseous measuring channel and may include an iodine measuring channel. The atmospheric radiation monitor subsystem is comprised of monitors with fixed and movable

particulate filters, and fixed radioiodine filters. Representative samples are obtained by means of a sampling head placed in a ventilation duct.

Movable airborne monitors are typically used in the spent fuel handling area during fuel handling operations and in the radiochemical laboratory during laboratory sample preparation operations. These monitors are supplemented with various other portable radiation monitors. Each monitor contains three channels for particulate, iodine, and gaseous monitoring, respectively.

#### **5.2.3. Meteorological and Seismic**

The National Weather Service (NWS) provides meteorological information (e.g., wind speed, temperature, and wind direction) from several locations in the vicinity of TMI. This information is available by telephone or the internet.

Seismic information can be obtained from the U.S. Geological Surveys (USGS) National Earthquake Center by telephone or internet.

Meteorological data can be remotely interrogated by telephone by NRC and Commonwealth of Pennsylvania.

#### **5.2.4. Fire Detection and Suppression Equipment**

The fire protection system has been designed to detect and extinguish potential fires. The system is designed in accordance with the standards of the National Fire Protection Association (NFPA) and recommendations of the Nuclear Electric Insurance Limited (NEIL). Fire detectors are located throughout the facility with alarms and indicators in the Control Room. The fire protection system is described in the Three Mile Island Fire Protection Program.

#### **5.2.5. Assessment Facilities and Equipment**

Offsite fire departments listed in Appendix 4 notify the facility of any fire which might have an impact on the facility. Local Law Enforcement Agencies notify Facility Security of any situation in the area which might have an impact on the facility.

TMI has access to outside analytical assistance and laboratory facilities from other non-affected Exelon nuclear sites, State and Federal agencies and other utilities. These laboratories can act as backup facilities in the event that the affected facility's radiochemistry counting room and laboratory become unusable or the offsite radiological monitoring and environmental sampling operation exceeds the capacity or capability of the facility laboratory during an emergency. It is estimated that these laboratories will be able to respond within several hours from initial notification.

The above facilities have the capability to perform laboratory analyses of various environmental samples (e.g., terrestrial, marine and air). It is also estimated that the analytical assistance and laboratory support will be able to respond within four (4) to eight (8) hours from initial notification.

## 6.0 COMMUNICATIONS

Various modes of communication are available to facility staff to transmit information within TMI and to various locations offsite during normal and emergency conditions.

This section describes the provisions utilized for prompt communications among principal emergency response organizations, communications with the ERO and communications with the general public. Figure 6.1 depicts the notification paths and the organizational titles from the Exelon Emergency Response Facility (ERF) to federal, state and local emergency response organizations, and industry support agencies.

Exelon has extensive and reliable communication systems installed at TMI. Examples of the communications systems may include telephone lines, fiber-optic voice channels, cell phones, satellite phones, mobile radio units, handi-talkies and computer peripherals. Communication systems provide:

- 1) Local Commercial Telephone System

The commercial telephone system provides for emergency notification system between TMI, and the State and local agencies (see Section 2.6). It will be used to provide initial and follow-up notifications and for general information flow between these agencies.

In addition, facility communication links exist to ensure appropriate information transfer capabilities during an emergency. The facility may also utilize its Public Address System, facility radios and notification devices to augment its emergency communications.

- 2) ERO Notification

In the event that personnel required to staff ERO positions are not on-site at the time an emergency is declared, they may be contacted by commercial telephone including land lines and/or wireless devices capable of receiving telephone calls and text messages. Mobilization of the ERO will be conducted under the direction of the Emergency Director, according to personnel assignments and telephone numbers maintained in various telephone directories.

- 3) NRC Communications - Emergency Notification System (ENS)

Communications with the NRC Operations Center will be performed via the NRC ENS circuit or commercial telephone line. This line will be used for event notification and status updates. The ENS is a dedicated telephone system in place between the Control Room and the NRC. Installation and use of these NRC telephones is under the direction of the NRC.

4) Radio Communications

Radio communication equipment used during normal facility operations will be used in an emergency to communicate with mobile units and to provide backup to the telephone system.

At TMI, radio capabilities include the following frequencies from Control Room, CAS/SAS and mobile vehicle / portable units, as applicable:

- TMI Operations Frequencies
- TMI Security Frequency
- Environmental and Radiological System Frequency
- Maintenance and Rad Con Frequency

5) Facility Warning System

In addition, facility communication links exist to ensure appropriate information transfer capabilities during an emergency. The facility may also utilize its Facility Warning System, facility radios and pagers to augment its emergency communications. The Facility Warning System consists of the following:

- 1) Alarms: Audible alarms are a quick and effective means of communicating emergency warnings on the site. Alarms currently installed at Three Mile Island include:

- Facility Emergency Alarm
- Fire Alarm

Each alarm provides a distinctive sound that all site personnel and contractors are trained to recognize and respond to. The Facility Emergency Alarm will be followed by an announcement that provides emergency information such as class of emergency declared, accountability directions, radiological precautions, etc.

The Control Room alarm systems consist of overhead annunciators, panel annunciators and computer alarms. The overhead and panel annunciators consist of flashing translucent tiles and audible indicators (i.e., buzzer or horn). The computer alarms use annunciators and also provide specific data using the alarm printer. At TMI-1, alarm data is also provided by CRTs.

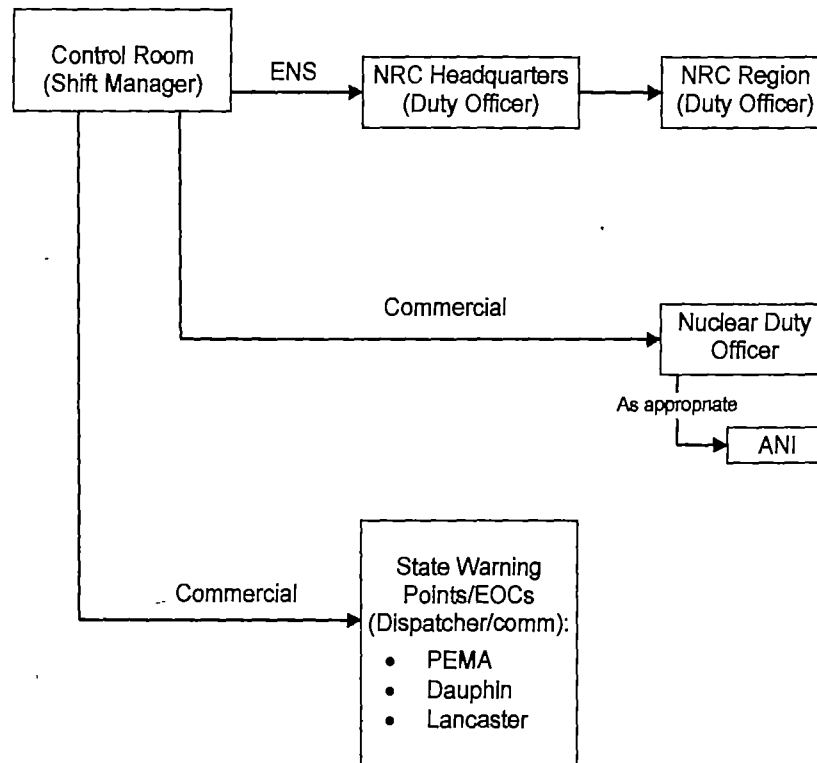
- 2) Facility Paging System: The Facility Paging System provides facility-wide paging from the Control Room and all remote stations plus private communications during normal operating conditions.

The facility paging system provides immediate warning and instructions to onsite personnel in the event of an emergency. Phone stations and



speakers of this subsystem are located in key locations within the facility.

**Figure 6.1: Exelon Notification Scheme**



## 7.0 ORGANIZATION

This section describes how the normal facility and support organizations transform into an emergency response organization to effectively deal with any incident at TMI.

### 7.1. Normal Facility Organization

The personnel and resources of TMI's normal facility and management organization consist of the onsite facility organization supported by the engineering and management organizations located offsite. The relationship and content of these onsite and offsite organizations are specified in the facility Technical Specifications and the TMI Defueled Quality Assurance Program (DQAP).

The minimum staff required to conduct routine and immediate emergency mitigation is maintained at the facility. During normal conditions, the minimum staff on duty at the facility during all shifts consists of one (1) Shift Manager, two (2) Non-Certified Operators, one (1) Radiation Protection Technician and security personnel as indicated in Figure 7.1 and Table 7.1. Security and Fire Brigade personnel are staffed in accordance with the Site Security Plan and Fire Protection Plan. The responsibility for monitoring the status of the facility and approving all onsite activities is assigned to the Shift Manager. When an emergency situation becomes apparent, the Shift Manager shall assume the position of Emergency Director once the emergency classification has been made. Additional personnel are available on an on-call basis to respond to facility emergencies.

#### 7.1.1. Shift Manager/Emergency Director

The Shift Manager position is staffed at the facility 24 hours a day and is the senior management position at the facility during off-hours. This position is responsible for monitoring facility conditions and approving onsite activities. The position has the authority, management ability, and technical knowledge to classify and declare a facility emergency and assume the Emergency Director role.

The Emergency Director shall assume command and control upon declaration of an event. The Emergency Director is responsible for the direction of the total emergency response and has the company authority to accomplish the following responsibilities, which cannot be delegated:

1. Classification of event
2. Approval of emergency notification (Task of making notifications may be delegated)
3. Authorization of emergency exposure controls in excess of 5 Rem TEDE and the issuance of potassium iodide (KI), for Exelon Generation emergency workers per EPA-400 (radiation exposures in excess of 10 CFR Part 20 limits).

Other responsibilities assumed by the Emergency Director include:

1. Notification of the emergency classification to the NRC, Commonwealth of Pennsylvania, Dauphin County, and Lancaster County.
2. Management of available facility resources

3. Initiation of mitigating actions
4. Initiation of corrective actions
5. Initiation of onsite protective actions
6. Decision to call for offsite assistance (police, fire or ambulance)
7. Augment the ERO staff as deemed necessary
8. Coordinate Security activities
9. Terminate the emergency condition when appropriate
10. Performance of initial Dose Assessment
11. Maintain a record of event activities

#### **7.1.2. Non-Certified Operator**

The Non-Certified Operators, on-shift 24 hours a day, performs system and component manipulations. The organizational relationship to the Shift Manager/Emergency Director is the same during normal and abnormal situations.

#### **7.1.3. Radiation Protection Technician**

The Radiation Protection Technician, on-shift 24 hours a day, is available to monitor personnel exposure, determine if radiological conditions preclude access to areas necessary to maintain SFP cooling, and to provide timely field survey results, if necessary.

#### **7.1.4. Security**

Security staffing is maintained in accordance with the Security Plan. The Security Force will report to the Emergency Director when implementing the PDEP.

### **7.2. Emergency Response Organization**

The TMI ERO is activated at an Alert classification. However, it can be activated in part or in whole at the discretion of the Emergency Director for an Unusual Event.

Plans and procedures are in place to ensure the timely activation of the ERO. The goal of the ERO is to augment the on-shift staff within 2 hours of an Alert classification. The designated on-shift and augmented TMI ERO staff are capable of continuous (24-hour) operations for a protracted period.

The minimum augmented staff consists of a Technical Coordinator and a Radiation Protection Coordinator. Augmented staff provides the technical expertise required to assist the Emergency Director. The on-shift staff is augmented by additional personnel that report as directed after receiving notification of an emergency requiring augmented staff.

Designated members of the on-shift staff fulfill roles within the ERO appropriate with their training and experience. For example, Radiation Protection personnel would be expected to undertake radiation protection activities, Security personnel would undertake security activities, engineering personnel would focus on facility assessment, provide technical

support, and assist in recovery operations as designated by the Technical Coordinator, Operations personnel would focus on facility operations.

The TMI ERO is illustrated in Figure 7.1. Table 7.1 provides a representation of the functional responsibilities of the on-shift and ERO positions that fulfill the emergency staffing requirements.

#### **7.2.1. Technical Coordinator**

The Technical Coordinator reports to the Emergency Director. During an emergency, the responsibilities of the Technical Coordinator include:

1. Evaluate technical data pertinent to facility conditions
2. Augment the emergency staff as deemed necessary
3. Designate engineering support, as necessary, to evaluate facility conditions and provide technical support,
4. Recommend mitigating and corrective actions
5. Direct search and rescue operations
6. Coordinate maintenance and equipment restoration
7. Establish and maintain communications as desired by the Emergency Director
8. Maintain a record of event activities

#### **7.2.2. Radiation Protection Coordinator**

The Radiation Protection Coordinator reports to the Emergency Director. During an emergency, the responsibilities of the Radiation Protection Coordinator include:

1. Monitor personnel accumulated dose
2. Advise the Emergency Director concerning Radiological EALs
3. Augment the emergency staff as deemed necessary
4. Direct radiological monitoring and analysis
5. Perform Dose Assessment
6. Coordinate decontamination activities
7. Establish and maintain communications as desired by the Emergency Director
8. Maintain a record of event activities

#### **7.2.3. Extensions of the Three Mile Island Emergency Response Organization**

##### **7.2.3.1. Local Services**

Arrangements have been made for the extension of the ERO's capability to address emergencies. Arrangements are in place through letters of agreement for ambulance services, treatment of contaminated and injured patients, fire support services, and law enforcement response as requested by the facility. Evidence of agreements with participating local services is listed in Appendix 4.

#### 7.2.3.2. Federal Government Support

Resources of federal agencies appropriate to an emergency condition are made available in accordance with the National Response Framework. This plan and the resources behind it are activated through the facility notification of the NRC.

#### 7.2.3.3. Additional Support

Dependent upon the emergency condition and response needs, the TMI ERO can be augmented by personnel and equipment support from the remainder of the Exelon Generation organization. This support capability is outlined in the Emergency Plan Implementing Procedures referenced in Appendix 2.

#### 7.2.4. Recovery Organization

The emergency measures presented in this plan are actions designated to mitigate the consequences of the accident in a manner that affords the maximum protection to facility personnel. Planning for recovery involves the development of general principles and an organizational capability that can be adapted to any emergency situation. Upon termination of an emergency, the Emergency Director assembles the recovery organization, as necessary, to address the specific emergency circumstances of the terminated event.

The Emergency Director directs the recovery organization and is responsible for:

- Ensuring the facility is maintained in a safe condition;
- Managing onsite recovery activities during the initial recovery phase; and
- Keeping corporate support apprised of recovery activities and requirements.

The remainder of the recovery organization consists of the normal plant and emergency organizations described in Section 7.1 and 7.2, as necessary, to provide the radiological and technical expertise required to assist the Emergency Director restore the plant to normal conditions.

The following is a brief summary of the recovery organization's responsibilities:

1. Maintain comprehensive radiological surveillance of the facility to assure continuous control and recognition of problems;
2. Control access to the area and exposure to workers;
3. Decontaminate affected areas and/or equipment;
4. Conduct clean-up and restoration activities;
5. Isolate and repair damaged systems;
6. Document all proceedings of the accident and review the effectiveness of the emergency organization in reducing public hazard and/or facility damage.

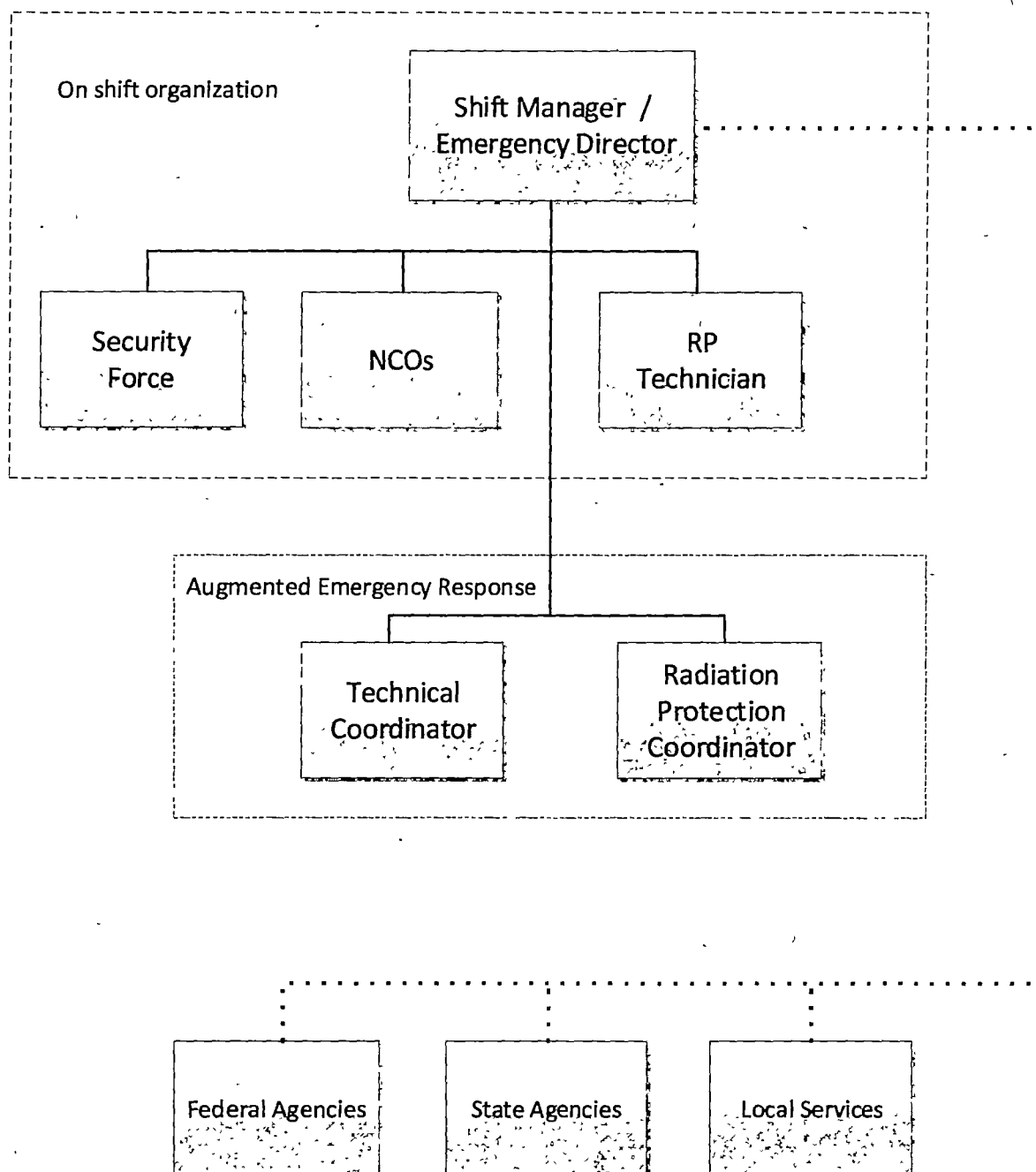
The organization relies on facility staff and/or resources to restore the facility to normal conditions. The expertise provided through the support plans is available to aid with the necessary corrective actions required to control and/or restore normal facility status.

When facility conditions allow a transition from the emergency phase to the recovery phase, the Emergency Director conducts a facility emergency management meeting to discuss the recovery organization. The actions taken by this organization concerning termination of the emergency proceeds in accordance with a recovery plan developed specifically for the accident conditions.

### **7.3. Coordination with State and Local Government Authorities**

Section 6.0 describes the communications network between TMI and the Commonwealth of Pennsylvania and local counties as a means of promptly notifying appropriate authorities under accident conditions.

The Shift Manager initiates notification of Pennsylvania and local county authorities, providing them with applicable information utilizing an established message format that describes the accident status. The Emergency Director, or designee, issues periodic reports to Commonwealth of Pennsylvania authorities.

**Figure 7.1: Normal On-Shift and Emergency Response Organization**

**Note:** Fire Brigade is staffed in accordance with the Fire Protection Program.

**Table 7.1: Minimum On-Shift and ERO Staffing Requirements**

MAJOR FUNCTIONAL AREA	MAJOR TASKS	LOCATION	TMI EMERGENCY POSITION, TITLE, OR EXPERTISE	# ON-SHIFT	TMI AUGMENTED STAFF CAPABILITY FOR RESPONSE IN 2 HOURS
Facility Operations and assessment of Operational Aspects / Fire Brigade	Facility Equipment	Control Room	Non-Certified Operator*	1	-
Emergency Direction and Control	Emergency Director	Control Room	Shift Manager*	1	-
Notification/Communication	Notify Licensee, State local and Federal personnel and maintain communications	Control Room			-
Radiological Accident Assessment and Support of Operational Accident Assessment  Protective Actions (In-Facility)	Onsite Dose Assessment and Monitoring	As Directed by the Emergency Director	Radiation Protection Coordinator	-	1 (may augment the ERO with Radiation Monitoring Personnel as deemed necessary)
	In-Facility Surveys Radiation Protection a. Access Control b. HP Coverage for Repair, Corrective Actions, Search and Rescue, First Aid, and Firefighting c. Personnel Monitoring d. Dosimetry	On-Scene	Radiation Protection Technician*	1	-
Engineering Support	Technical Direction	As Directed by the Emergency Director	Technical Coordinator	-	1 (may augment the ERO with technical support and emergency repair personnel as deemed necessary)
Facility Condition Evaluation, Repair, and Corrective Action	Repair, Mitigation, and Corrective Action	As Directed by the Emergency Director	Non-Certified Operator*	1	-
Firefighting	Firefighting	On-Scene	Fire Brigade	Per the Fire Protection Plan	-
Rescue Operations/First Aid	Rescue and First Aid	On-Scene	First Aid Qualified	**	-
Site Access Control and Accountability	Security, Firefighting, Communications, and Personnel Accountability	Per the Physical Security Plan	Security Personnel	Per the Physical Security Plan	-

\* On-Shift personnel required to direct or perform site-specific mitigation strategies required for a catastrophic loss of SFP inventory

\*\* May be provided by shift personnel assigned other functions.



## **8.0 EMERGENCY RESPONSE**

### **8.1. Emergency Condition Recognition and Classification**

TMI maintains the capability to assess, classify, and declare an emergency condition in accordance with facility procedures. The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification in accordance with the applicable EALs; but within 30 minutes in all cases after the availability of indications to operators that an EAL threshold has been reached.

Section 4.0 presents the emergency classification system used for categorizing the spectrum of possible emergency conditions into one of two emergency classes. The process of condition recognition, immediate response to correct the condition, event classification, and initiation of the appropriate emergency implementing procedures are critical responsibilities of the Shift Manager and the on-shift crew.

Site procedures contain the listing of conditions that represents each of the two emergency categories and the detailed EALs that allow the Shift Manager to determine the emergency classification. Once the emergency is classified, the applicable emergency implementing procedure is initiated, the ERO is activated and the notification of offsite authorities is initiated. The activation of the ERO brings to the assistance of the on-shift personnel the various support elements described in this plan. Specific support elements are implemented as detailed in the emergency implementing procedures. See Appendix 2 for a listing of these procedures.

### **8.2. Activation of the Emergency Response Organization**

Classification of an accident condition requires that the facility staff recognize that pre-established EALs associated with an emergency condition, as defined in Addendum 1, have been reached or exceeded. Depending upon the specific action levels attained, the Shift Manager declares one of the following: Unusual Event or Alert. The Shift Manager activates the ERO if facility conditions reach predetermined EALs. The ERO shall be activated at the Alert classification.

#### **8.2.1. Unusual Event Response**

Addendum 1 defines the conditions that require the declaration of an Unusual Event. An Unusual Event does not activate the ERO but may require augmentation of on-shift resources to address the event. However, the ERO may be activated, in part or in whole, at any time at the discretion of the Shift Manager/Emergency Director. Offsite emergency organizations are notified for informational purposes, and aid from offsite fire, medical, and security organizations may be required depending on the nature of the event.

The response required as a result of this declaration of an Unusual Event varies according to the specified event, but a general summary of actions taken is described below:

1. The emergency condition is recognized and classified by the Shift Manager;

2. Emergency classification is announced over the facility page system;
3. The on-duty and selected facility personnel respond as directed by the Shift Manager and assume assigned functions;
4. Control Room personnel notify the Pennsylvania State and local county authorities;
5. The NRC Operation Center is notified;
6. Other support is requested as necessary;
7. Additional personnel report to the facility as requested by the Shift Manager;
8. The Shift Manager/Emergency Director directs the activities of emergency response personnel;
9. If necessary, appropriate emergency medical, fire department, or law enforcement agencies are notified and requested to respond;
10. The public information representative is notified and handles public information associated with the event; and
11. The Shift Manager/Emergency Director terminates the Unusual Event status and closes out the event with a verbal summary to offsite authorities or escalates to higher level emergency classification.

The Unusual Event status will be maintained until an escalation in emergency class occurs or the event is terminated. Offsite authorities will be informed of the change in the emergency status and the necessary documentation will be completed as specified in site procedures.

#### **8.2.2. Alert Response**

An Alert requires actions to assure that sufficient emergency response personnel are mobilized to respond to the accident conditions at the site. Notification is made to State officials and follow-up information is provided as needed to offsite emergency organizations. In an Alert, the steps listed in the Unusual Event Response section and the following are performed:

1. Initiate ERO augmentation;
2. The Shift Manager/ Emergency Director evaluates the need to evacuate, and if necessary directs the evacuation of, all non-essential personnel from the facility;
3. If sufficient personnel are not available onsite, off-duty personnel are called in as specified in the emergency implementing procedures;
4. The Emergency Director assumes total responsibility for overall emergency response actions and recovery;
5. The Emergency Director reaches agreement with offsite authorities concerning termination of the event and closes out the event by verbal summary to offsite

authorities. If an event is a reportable occurrence, a written summary is issued to these authorities in an appropriate time frame through distribution by the Emergency Director.

The Alert status shall be maintained until termination of the event occurs. Off-site authorities will be informed of the change in the emergency status and the necessary documentation shall be completed as specified in site procedures.

### **8.3. Emergency Termination Criteria**

An extensive review of facility parameters including SFP parameters and process and radiation monitoring systems, in conjunction with the pre-established EALs is required to terminate an emergency.

Termination of an emergency status is the responsibility of the Emergency Director. The decision will be based on the following considerations:

1. Conditions no longer meet an EAL and it appears unlikely that conditions will deteriorate;
2. Facility releases of radioactive materials to the environment are under control (within Technical Specifications);
3. In-Facility radiation levels are stable or decreasing, and are acceptable given facility conditions;
4. Operability and integrity of power supplies, electrical equipment and facility instrumentation including radiation monitoring equipment is acceptable;
5. All required notifications have been made;
6. Radiological and facility conditions permit resumption of normal occupational exposure limits to continue mitigation/repair activities.

## **9.0 RADIOLOGICAL ASSESSMENT AND PROTECTIVE MEASURES**

### **9.1. Radiological Assessment**

#### **9.1.1. Initial Radiological Dose Projection**

TMI has developed a method to quickly determine the projected radiological conditions at the Site boundary. During the initial stages of an emergency, the Shift Manager or designated individual is responsible to perform the initial evaluation of radiological conditions. The initial evaluation is accomplished in accordance with site procedures.

### **9.2. Radiological Exposure Control**

During a facility emergency, abnormally high levels of radiation and/or radioactivity may be encountered by facility personnel. All reasonable measures shall be taken to control the radiation exposure to emergency response personnel providing rescue, first aid, decontamination, emergency transportation, medical treatment services, or corrective or assessment actions within applicable limits specified in 10 CFR Part 20.

Table 9.1 specifies the guidelines on emergency dose limits for personnel providing emergency response duties consistent with Table 2-2, "Guidance on Dose Limits for Workers Performing Emergency Services," provided in the EPA PAG Manual (Reference 13). The Shift Manager/Emergency Director has the responsibility to authorize emergency dose commitments in excess of 10 CFR Part 20 limits. This authorization is coordinated with the assistance of the Radiation Protection Coordinator. Exposure to individuals providing emergency functions will be consistent with the limits specified in Table 9.1 with every attempt made to keep exposures As Low As Reasonably Achievable (ALARA).

The Radiation Protection Coordinator is responsible for developing emergency radiological protection programs for ERO and augmented personnel. Emergency kits are provided with self-reading dosimeters. Each member reporting to the site will be provided a Dosimeter of Legal Record (DLR). Dose records will be maintained based upon the results of the self-reading dosimeters. This information is cross-referenced with the DLR data. The capability exists for the emergency processing of DLRs on a 24-hour per day basis. Emergency workers are instructed to read self-reading dosimeters frequently, and DLRs may be processed with increased periodicity.

### **9.3. Protective Measures**

#### **9.3.1. Site Personnel Accountability**

Accountability should be considered and used as a protective action whenever a site-wide risk to health and safety exists and prudence dictates. If personnel accountability is required, at the direction of the Emergency Director, all individuals at the site (including non-essential employees, visitors, and contractor personnel) shall be notified by sounding the facility alarm and making announcements over the Public Address System. Following announcement of an emergency declaration, and when accountability has been

requested, facility personnel are responsible for reporting to designated areas and aiding Security in the accountability process.

Accountability of all personnel on the site should be accomplished within 60 minutes of the accountability announcement. If personnel are unaccounted for, teams shall be dispatched to locate the missing personnel. Accountability may be modified or suspended if the safety of personnel may be jeopardized by a Security event or other event hazardous to personnel.

### **9.3.2. Site Egress Control Methods**

All visitors and unnecessary contractors are evacuated from the facility at the discretion of the Emergency Director. In the event of a suspected radiological release, personnel are monitored for radioactive contamination prior to leaving the Protected Area. Portable radiation survey meters are available to monitor for potential contamination.

### **9.3.3. Contamination Control and Decontamination Capability**

During emergency conditions, TMI maintains normal plant decontamination and contamination control measures as closely as possible. However, these measures may be modified by the Emergency Director should conditions warrant.

TMI maintains contamination control measures to address area access control, drinking water and food supplies, and the return of areas and items to normal use.

- a. Contaminated areas are isolated as restricted areas with appropriate radiological protection and access control. Personnel leaving contaminated areas are monitored to ensure both themselves and their clothing are not contaminated. Supplies, instruments, and equipment that are in contaminated areas or have been brought into contaminated areas will be monitored prior to removal. Items found to be contaminated, will be decontaminated using normal plant decontamination techniques and facilities or may be disposed of as radioactive waste.
- b. Should the potential exist for contamination of on-site food or drinking water supplies that renders these supplies non-consumable, TMI will make arrangements for transport of non-contaminated off-site supplies.
- c. TMI permits areas and items to be returned to normal use following conduct of appropriate surveys and verification that contamination levels have returned to acceptable levels.

TMI maintains an in-plant decontamination capability. Waste generated through the use of this system is collected and processed by the plant liquid radwaste system. Survey instrumentation for personnel "frisking" and sensitive body burden monitoring equipment are available. Decontamination is performed under the direction of the Radiation Protection Coordinator.

**9.3.4. Use of Onsite Protective Equipment and Supplies**

The facility supplies of personnel radiation protection equipment and gear are utilized to support the emergency response effort. Equipment such as respiratory protection gear and protective clothing is assigned to emergency response organization members and facility response personnel in accordance with established facility radiation protection criteria.

**9.3.5. Fire Fighting**

Strategies have been developed for firefighting and fire protection in specific critical areas of the facility. The Fire Protection Program describes the fire protection organization and individual responsibilities.

**9.4. Aid to Affected Personnel**

This section describes the arrangements for medical services for contaminated injured individuals sent from the facility.

**9.4.1. Offsite Hospital and Medical Services**

Hospital personnel have been trained and hospitals are equipped to handle contaminated or radiation injured individuals. Specifically, training of medical support personnel at the agreement hospitals will include basic training on the nature of radiological emergencies, diagnosis and treatment, and follow-up medical care. Facility personnel are available to assist medical personnel with decontamination, radiation exposure and contamination control. Arrangements, by letter of agreement or contract, are maintained by the facility with a qualified hospital located in the vicinity of each nuclear facility for receiving and treating contaminated or exposed persons with injuries requiring immediate hospital care. Exelon shall provide medical consultants to aid in any special care necessary at these facilities.

Arrangements are also maintained with a qualified medical facility well equipped and staffed for dealing with persons having radiation injuries and whenever necessary, such persons will be transferred to this hospital facility for extended specialized treatment. Exelon will have available to the staff of this hospital, medical consultants who will provide the direction of the special care necessary for the treatment of persons having radiation injuries.

These agreements are verified annually. Refer to Appendix 4 for details.

**9.4.2. Onsite First Aid Capability**

Three Mile Island maintains onsite first aid supplies and equipment necessary for the treatment of contaminated or injured persons. In general, physicians or nurses are not staffed at Three Mile Island, and as such, medical treatment given to injured persons is of a "first aid" nature. Additionally, the Radiation Protection Technicians at Three Mile Island are experienced in control of radioactive contamination and decontamination work. Facility

personnel are also trained and qualified to administer first aid. The functions of facility personnel in handling onsite injured people are:

1. Afford rescue;
2. Administer first aid including such resuscitative measures as are deemed necessary;
3. Begin decontamination procedures; and
4. Arrange for suitable transportation to a hospital when required.

Primary attention shall be directed to the actual factors involved in the treatment of casualties, such as: control of bleeding, resuscitation including heart and lung, control of bleeding after resuscitation, protection of wounds from bacterial or radioactive contamination and the immobilization of fractures.

Facility personnel provide an initial estimate of the magnitude of surface contamination of the injured and preliminary estimates of total body dose to the injured. Primary rapid and simple decontamination of the surface of the body (when possible and advisable) before transportation to a designated hospital may be carry out as directed or performed by Radiation Protection personnel. When more professional care is needed, injured persons are transported to a local clinic or hospital. Contaminated and injured persons are transported to a dedicated specified facility.

#### **9.4.3. Medical Service Facilities**

Because of the specialized nature of the diagnosis and treatment of radiation injuries, Corporate Emergency Preparedness maintains an agreement with Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is a radiological emergency response team of physicians, nurses, health physicists and necessary support personnel on 24-hour call to provide consultative or direct medical or radiological assistance at the REAC/TS facility or at the accident site. Specifically, the team has expertise in and is equipped to conduct: medical and radiological triage; decontamination procedures and therapies for external contamination and internally deposited radionuclides, including chelation therapy; diagnostic and prognostic assessments or radiation-induced injuries; and radiation dose estimates by methods that include cytogenetic analysis, bioassay, and in vivo counting.

In addition to REAC/TS, the Facility Annex may identify additional medical consultants, based on agreements with local hospitals, to support personnel training and medical response.

#### **9.4.4. Medical Transportation**

Arrangements are made for prompt ambulance transport of persons with injuries involving radioactivity to designated hospitals. Such service is available on a 24-hour per day basis and is confirmed by letter of agreement. Radiation monitoring services shall be provided by Three Mile Island whenever it becomes necessary to use the ambulance service for the transportation of contaminated persons. The local ambulance/first aid organization as

listed in Appendix 4 can be contacted directly through commercial phone line from the TMI control room or as dispatched by the State EOCs.

A qualified Radiation Protection person shall accompany the ambulance to the hospital. Additional Radiation Protection personnel may be contacted and dispatched to local hospitals to assist in the monitoring and decontamination of the injured victim and hospital and ambulance facilities and personnel.

### 9.5. Protective Actions for Onsite Personnel

This section of the plan describes the means for controlling emergency worker radiological exposures during an emergency, as well as the measures that are used by Exelon to provide necessary assistance to persons injured or exposed to radiation and/or radioactive materials. Exposure guidelines in this section are consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides described in EPA 400-R-92-001 (EPA-400) (Reference 13).

#### 9.5.1. Emergency Exposure Guidelines

Being licensed by the NRC, all Exelon nuclear facilities maintain personnel exposure control programs in accordance with 10 CFR 20 under normal operating conditions. The Emergency Director is assigned the non-delegable responsibility for authorizing personnel exposure levels under emergency conditions per EPA-400. In emergency situations, workers may receive exposure under a variety of circumstances in order to assure safety and protection of others and of valuable property. These exposures will be justified if the maximum risks or costs to others that are avoided by their actions outweigh the risks to which the workers are subjected. The Emergency Worker Dose Limits are as follows:

**Table 9.1: Emergency Dose Limits**

Dose Limit (Rem TEDE)	Activity	Condition
0-5 Rem	All	Personnel should be kept within normal 10 CFR 20 limits during bona fide emergencies, except as authorized for activities as indicated below.
5-10 Rem	Protecting valuable property	Lower dose not practicable.
10-25 Rem	Lifesaving or protection of large populations	Lower dose not practicable.
>25 Rem	Lifesaving or protection of large populations	Only on a voluntary basis to persons fully aware of the risks involved.

Limit dose to the lens of the eye to 3 times the above values and doses to any other organ (including skin and body extremities) to 10 times the above values.



Whenever possible, the concurrence of the facility's Radiation Protection (Department) Manager should be secured before exposing individuals to dose equivalents beyond the EPA-PAG Manual lower limit.

#### **9.5.2. Emergency Radiation Protection Program**

The Radiation Protection Coordinator is the individual responsible for the implementation of the radiation protection actions during an emergency. Radiation protection guidelines include the following:

- Volunteers over forty-five years of age are considered first for any emergency response action requiring exposure greater than normal limits. Routine dose limits shall not be extended to emergency dose limits for declared pregnant individuals. As in the case of normal occupational exposure, doses received under emergency conditions should be maintained as low as reasonably achievable.
- Persons undertaking any emergency operation in which the dose will exceed 25 Rem TEDE should do so only on a voluntary basis and with full awareness of the risks involved including the numerical levels of dose at which acute effects of radiation will be incurred and numerical estimates of the risk of delayed effects.
- In the context of the emergency limits, exposure of workers that is incurred for the protection of large populations may be considered justified for situations in which the collective dose avoided by the emergency operation is significantly larger than that incurred by the workers involved.
- Exposure accountability is maintained, and proper personnel radiological monitoring equipment is provided for all personnel during emergency conditions.
- Access to high radiation areas is only permitted with prior approval of the applicable Radiation Protection Coordinator. Personnel are not allowed to enter known or potential high radiation areas unless their exposure has been properly evaluated.
- Periodic habitability surveys of emergency facilities are performed during an emergency. If the facility is determined to be uninhabitable, the facility is evacuated in order to prevent or minimize exposure to radiation and radioactive materials. Alternate assembly areas are established, as necessary, to relocate and monitor evacuated personnel.

#### **9.5.3. Personnel Monitoring**

Emergency workers will receive DLR badges and personal self-reading dosimeters capable of measuring expected exposures on a real time basis. The capability exists for the emergency processing of DLRs on a 24-hour per day basis, if necessary.

Emergency worker dose records are maintained by the Radiation Protection Coordinator (as appropriate) in accordance with the emergency and radiological protection

procedures. Emergency workers are instructed to read their dosimeters frequently. DLRs may be processed with increased periodicity.

#### **9.5.4. Non-Exelon Personnel Exposure Authorization**

The responsibility for authorizing non-Exelon emergency workers (i.e. state and local agency emergency workers) to receive exposures in excess of the EPA General Public Protective Action Guides rests with the state and county organizations, except when such emergency workers are onsite. Authorization of exposures in excess of EPA General Public Protective Action Guides, in this latter instance, rests with the Emergency Director.

#### **9.5.5. Contamination and Decontamination**

During an emergency, the Emergency Director is responsible for preventing or minimizing personnel exposure to radioactive materials deposited on the ground or other surfaces.

- a. During emergency conditions, normal facility contamination control criteria will be adhered to as much as possible. However, these limits may be modified by the Emergency Director per existing Radiation Protection procedures, should conditions warrant.
- b. Personnel found to be contaminated will normally be attended to at decontamination areas located onsite. Temporary decontamination areas can also be set up inside at various locations. Decontamination showers and supplies are provided onsite with additional personnel decontamination equipment and capabilities. Shower and sink drains in the controlled area is processed and monitored prior to discharge. Potentially contaminated emergency vehicles will be surveyed before they are allowed to leave the facility or offsite assembly area. If the survey area is not suitable for monitoring and decontamination due to radiological or other concerns, vehicles will be surveyed at an alternate location.

#### **9.5.6. Contamination Control Measures**

Controls are established 24 hours per day to contain the spread of loose surface radioactive contamination.

- a. Contaminated areas are isolated as restricted areas with appropriate radiological protection and access control. Personnel leaving contaminated areas are monitored to ensure they and their clothing are not contaminated. If contamination above acceptable levels is found, they will be decontaminated in accordance with facility procedures. If normal decontamination procedures do not reduce personnel contamination to acceptable levels, the case will be referred to a competent medical authority. Supplies, instruments, and equipment that are in contaminated areas or have been brought into contaminated areas will be monitored prior to removal. If found to be contaminated, they will be decontaminated using normal facility decontamination techniques and facilities or may be disposed of as radwaste. Contaminated vehicles will be decontaminated before being released.

- b. Measures will be taken to control onsite access to potentially contaminated potable water and food supplies. Under emergency conditions when uncontrolled releases of activity have occurred, eating, drinking, smoking, and chewing are prohibited in all facility emergency response facilities until such time as habitability surveys indicate that such activities are permissible.
- c. Restricted areas and contaminated items will be returned to normal use when contamination levels have been returned to acceptable levels. Contamination control criteria for returning areas and items to normal use are contained in the facility procedures.

## **10.0 EMERGENCY NOTIFICATION AND PUBLIC INFORMATION**

### **10.1. Emergency Notification**

The Shift Manager is responsible for the notification of an emergency declaration to the Commonwealth of Pennsylvania and local counties (Dauphin and Lancaster). Notification is to be made as soon as possible and with 30 minutes after declaring an emergency.

The format and contents of the initial message between the facility and State/local authorities are specified in notification procedures and have been established with the review and agreement of responsible state authorities.

The Pennsylvania Emergency Management Agency or local counties may request the following information from TMI:

1. Date and time of the incident;
2. Emergency classification;
3. Status of the facility;
4. Whether a release has occurred, is occurring, or is anticipated to occur;
5. Actual or projected dose rates at the Site boundary;
6. Whether or not Offsite assistance is needed.

Follow-up reports are provided as additional information describing the emergency situation becomes available and on an as-needed basis until such time that the emergency condition has been terminated.

### **10.2. Public Information**

Any emergency generates a continuous and intensive demand for up-to-date information. The spokesperson function would typically be performed by Communications personnel. Communication personnel will be notified of an emergency declaration and would serve as a spokesperson. However, the function could also be performed by plant or corporate management. Upon receiving notification of an emergency declaration, the spokesperson contacts the Control Room and receives a brief description of the event.

The spokesperson monitors media activity and coordinates with senior management to address rumors and disseminate information to the public. The spokesperson will participate in news conferences as appropriate with Federal, State and local emergency response organizations conducted from the site or at other locations, as necessary. The spokesperson is available for media inquiries and the positional duties include maintaining liaison with local media and coordinating with Federal, State and local emergency response organizations to disseminate appropriate information regarding an emergency at TMI. Federal, State and local emergency response organizations maintain the capability to disseminate appropriate information regarding an emergency at TMI.

As part of its normal corporate structure, Exelon maintains a corporate communications office that can be called to provide additional resources, as necessary.

## **11.0 MAINTAINING EMERGENCY PREPAREDNESS**

### **11.1. Drills and Exercises**

An exercise tests the execution of the overall facility emergency preparedness and the integration of this preparedness. A drill is a supervised instruction period aimed at testing, developing and maintaining skills in a particular response function.

Emergency exercises and drills are conducted to test and evaluate the adequacy of emergency facilities, equipment, procedures, communication channels, actions of emergency response personnel, and coordination between offsite organizations and the facility.

A summary of exercises and drills and associated elements is outlined below.

#### **11.1.1. Radiation Emergency Exercises and Drills**

Biennial exercises shall be conducted to test the timing and content of implementing procedures and methods; to test emergency equipment and communication networks; and to ensure that emergency personnel are familiar with their duties. TMI offers the following organizations the opportunity to participate to the extent assistance would be expected during an emergency declaration; however, participation is not required:

1. Commonwealth of Pennsylvania
2. Local Agencies (Dauphin and Lancaster Counties)
3. Local Hospitals
4. Local Fire Departments
5. Law Enforcement
6. Rescue, Inc. Ambulance Service

At least one drill involving a combination of some of the principal functional areas of emergency response shall be conducted in the interval between biennial exercises.

Communication checks with offsite agencies, fire drills, medical drills, radiological monitoring drills and health physics drills are performed as indicated in the following sections.

#### **11.1.2. Communication Tests**

To ensure that emergency communications systems described in Section 6.0 of this plan are operable, communications tests are conducted as outlined below.

1. Communication channels with the state government of Pennsylvania and local agencies are tested monthly. These communications tests will include the aspect of understanding the content of messages.
2. The ENS is tested monthly.

3. The following communication systems, as detailed in Section 6.0 of this plan, are used on a frequent basis, therefore periodic testing of these systems is not necessary:

- Mobile UHF Radio System
- Facility Intercom System
- Commercial Telephone System

#### **11.1.3. Augmentation Drills**

Semi-annual, off hours, unannounced, communications drill, utilizing commercial telephone, to estimate emergency personnel response times. No actual travel is required. Participants provide an estimation of the time it would take to report to their designated ERO position. This drill shall serve to demonstrate the capability to augment the on-shift staff after declaration of an emergency.

#### **11.1.4. Fire Drills**

To test and evaluate the response and training of the facility's fire brigade, fire drills are conducted in accordance with the TMI Fire Protection Program.

#### **11.1.5. Medical Drills**

To evaluate the training of the facility's medical response and offsite medical response (ambulance and hospital), a medical drill is conducted annually with a simulated contaminated injured individual. This drill can be performed as part of an Emergency Plan drill or exercise.

#### **11.1.6. Radiological Monitoring Drills**

Facility environs and radiological monitoring drills are conducted annually. These drills include monitoring of accessible areas within the facility and include collection and analysis of airborne sample media, communications, and record keeping performed by members of the emergency team. This drill can be performed as part of an Emergency Plan drill or exercise.

#### **11.1.7. Health Physics Drills**

Health Physics drills are conducted semi-annually involving response to, and analysis of, simulated elevated in-facility airborne and liquid samples and direct radiation measurements in the environment. A drill can be performed as part of an Emergency Plan drill or exercise.

#### **11.1.8. Security Drills**

The purpose of the security drill is to maintain key skills, specifically the site-specific team skills necessary to mitigate security-based events. Security drills are conducted in accordance with the TMI Physical Security Plan.

### 11.1.9. Scenarios

The EP Specialist is responsible for an Emergency Plan drill or exercise. The EP Specialist's responsibilities include developing the exercise/drill scenario, the accident time sequence, and the selection and training of the controllers required to evaluate the effectiveness of the TMI Emergency Preparedness Program. In accordance with applicable portions to Section IV.G to NSIR/DPR-ISG-01, the drill or exercise scenarios will vary from year to year.

A scenario is prepared by the scenario development team (if needed) for each exercise/drill to be conducted. The contents of the scenario include, but are not limited to, the following:

1. Basic objective(s);
2. Date, time period, place and participating organizations;
3. Simulation lists;
4. Time schedule of real and simulated initiating events;
5. A narrative summary describing the conduct of the drill or exercise to include such items as simulated casualties, search and rescue of personnel, deployment of radiological monitoring teams, and public information affairs; and
6. List of controllers and participants.

The scenarios are designed to allow free play in exercising the decision-making process associated with such emergency response actions as exposure control, emergency classification, and the ERO and additional staff augmentation process.

Security based scenarios to test and evaluate security response capabilities will be conducted in accordance with security drills and exercise procedures and may be conducted during Emergency Plan drills or exercises.

Starting times and pre-notification for exercises are coordinated with and agreed upon by all participating organizations.

### 11.1.10. Evaluation of Exercises

To evaluate the performance of participating facility personnel and the adequacy of emergency facilities, equipment and procedures during an exercise, the Exercise Coordinator obtains qualified controllers which includes resources outside the facility to evaluate and critique the exercise.

When feasible, personnel designated as controllers are assigned to an Emergency Plan area germane to their area of expertise. Controllers are provided general instruction concerning their specific observation function. Each controller is requested to observe the implementation of the emergency plan element assigned to him or her, and then to record and report observed inadequacies.



A critique is conducted at the conclusion of the exercise with facility personnel. After the critique, the controllers submit a written evaluation to the Exercise Coordinator in which the exercise performance is evaluated against the objectives. All comments and/or recommendations are documented.

Weaknesses and/or deficiencies identified in an exercise critique are processed in accordance with the site corrective actions program.

#### **11.1.11. Emergency Plan Audit**

The TMI Emergency Plan is independently audited. The audit is conducted as part of the Decommissioning Quality Assurance Program in accordance with 10 CFR 50.54(t). All aspects of emergency preparedness, including exercise documentation, capabilities, procedures, and interfaces with state and local governments are audited.

### **11.2. Training**

Radiological emergency response training is provided to those who may be called on to assist in an emergency. TMI Management is responsible to ensure all members of the Emergency Response Organization receive the required initial training and continuing training.

#### **11.2.1. Emergency Response Training**

The training program for ERO personnel is based on applicable requirements of Appendix E to 10 CFR Part 50 and position-specific responsibilities as defined in the PDEP. Emergency response personnel in the following categories receive initial training and annual retraining.

#### **11.2.2. Emergency Response Organization Training**

Shift Managers/Emergency Directors, Technical Coordinators, and Radiation Protection Coordinators shall have training conducted such that proficiency is maintained on topics listed below. These topics should be covered as a minimum on an annual basis.

- Emergency Action Level Classification
- Dose Assessment
- Federal, State, and local notification procedures
- ERO Augmentation
- Emergency Exposure Control
- Mitigating strategies for a catastrophic loss of spent fuel pool inventory

TMI personnel available during emergencies to perform emergency response activities as an extension of their normal duties receive duty specific training. This includes facility on-shift personnel, maintenance, radiation protection, and security personnel. Personnel assigned to liaison with offsite fire departments are trained in accordance with the Fire

Protection Program, including mitigating strategies required for a catastrophic loss of SFP inventory. Personnel assigned the responsibility of first aid response will be trained with courses equivalent to Red Cross First Aid, CPR, or AED for Lay Responders or equivalent.

#### **11.2.3. General Employee Training**

An overview of the Emergency Plan is given to all personnel allowed unescorted access into the Protected Area at TMI. Personnel receive this information during initial and requalification training. This training includes identification of the emergency alarm, the fire alarm and the steps to follow for a facility and site evacuation.

#### **11.2.4. Local Support Services Personnel Training**

Training is offered annually to offsite organizations which may provide specialized services during an emergency at TMI (fire-fighting, medical services, transport of contaminated and/or injured personnel, etc.). The training shall be structured to meet the needs of that organization with respect to the nature of their support. Topics of event notification, site access, basic radiation protection and interface activities are included in the training.

#### **11.2.5. Documentation of Training**

TMI procedures outline the process to document training of the TMI Emergency Response Organization. An Emergency Planning procedure is used to verify training provided to offsite organizations.

### **11.3. Review and Updating of Plan and Procedures**

The Emergency Plan is reviewed at least annually. All recommendations for changes to the Emergency Plan or associated implementing procedures are reviewed in accordance with 10 CFR 50.54(q). The Emergency Plan is submitted to TMI's On-Site Safety Review Committee for approval.

Written agreements with outside support organizations and government agencies are evaluated annually to determine if these agreements are still valid. If agreements are not valid, then they are renewed and updated.

Revisions to the Emergency Plan are made in accordance with current regulations and guidelines. Changes to the Emergency Plan are forwarded to organizations and individuals with a responsibility for implementation of the Plan.

Telephone number listings associated with the emergency notification process are verified quarterly.

**11.4. Maintenance and Inventory of Emergency Equipment and Supplies**

Periodic inventory, testing, and calibration of emergency equipment and supplies are conducted in accordance with approved facility procedures. This equipment includes, but is not limited to:

- Portable radiation monitoring equipment
- Emergency medical response equipment
- Dosimeters
- Portable radios

Emergency equipment and instrumentation shall be inventoried, inspected and operationally checked periodically as indicated by the procedure and after each use. Sufficient reserves of equipment and instrumentation are stocked to replace emergency equipment and instrumentation removed from service for calibration and/or repair.

**11.5. Responsibility for the Planning Effort**

The facility Plant Manager has overall responsibility for implementation of the Emergency Plan at TMI. The overall Emergency Plan is maintained by Corporate Emergency Preparedness. The Emergency Preparedness Specialist is assisted by Corporate Emergency Preparedness. The specific duties include, but are not limited to, the following:

1. Revise and update the Emergency Plan;
2. Maintain the Emergency Plan implementing procedures so that they are updated and current with the Emergency Plan;
3. Represent the facility in offsite Emergency Plan interfaces;
4. Represent the facility in NRC emergency planning appraisals and audits; and
5. Maintain drill and exercise documentation and coordinate implementation of corrective actions deemed necessary following drills and exercises.

The Emergency Preparedness Specialist is responsible for maintaining an adequate knowledge of regulations, planning techniques and the latest applications of emergency equipment and supplies.

**APPENDIX 1: REFERENCES**

References consulted in the writing of this Emergency Plan are listed in this section. With exception of regulatory requirements, inclusion of material on this list does not imply adherence to all criteria or guidance stated in each individual reference.

1. C-1101-202-E410-476, "DECOM Spent Fuel Pool Thermohydraulic Analysis," Revision 1, dated June 10, 2018
2. 10 CFR 50.47, "Emergency plans"
3. 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors"
4. 10 CFR 50 Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities"
5. 10 CFR 20, "Standards for Protection Against Radiation"
6. 10 CFR 70, 73, and 100
7. 10 CFR 72.32, "Emergency plan"
8. NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, dated November 1980
9. NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73"
10. NUREG-1140, "A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees"
11. NUREG-1567, "Spent Fuel Dry Storage Facilities"
12. NEI 99-01, Revision 6, "Development of Emergency Action Levels for Nuclear Power Plants," dated November 2012
13. EPA 400-R-92-001 "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," dated October 1991 (reprinted May 1992)
14. Exelon Nuclear Defueled Quality Assurance Program (DQAP), NO-DC-10
15. "Federal Bureau of Investigation and Nuclear Regulatory Commission Memorandum of Understanding for Cooperation Regarding Threat, Theft, or Sabotage in U.S. Nuclear Industry," Federal Register, Vol. 44, p. 75535, dated December 20, 1979
16. "Voluntary Assistance Agreement By and Among Electric Utilities Involved in Transportation of Nuclear Materials," dated November 1, 1980
17. Comprehensive Environmental Response, Compensation and Liability Act of 1980.
18. American Nuclear Insurers Bulletin #5B (1981), "Accident Notification Procedures for Liability Insureds"

**APPENDIX 1: REFERENCES**

19. Letter from William J. Dircks, Executive Director for Operations, NRC, to Dr. Donald F. Knuth, President KMC, Inc. dated October 26, 1981
20. ANI/MAELU Engineering Inspection Criteria for Nuclear Liability Insurance, Section 6.0, Rev. 1, Emergency Planning
21. NRC RIS 2006-12, "Endorsement of Nuclear Energy Institute Guidance Enhancement to Emergency Preparedness Programs for Hostile Action."
22. NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events"
23. NRC Information Notice 2009-01, "National Response Framework"
24. NRC NSIR/DPR-ISG-01, "Interim Staff Guidance – Emergency Planning for Nuclear Power Plants," Revision 0, November 2011 (ADAMS Ascension No. ML113010523)

**APPENDIX 2: INDEX OF EMERGENCY PLAN IMPLEMENTING PROCEDURES**

Document	Document Title
EP-TM-1001 Addendum 1	PERMANENTLY DEFUELED EMERGENCY ACTION LEVELS AND TECHNICAL BASES
EP-TM-110	ASSESSMENT OF EMERGENCIES
EP-TM-111	EMERGENCY CLASSIFICATION
EP-TM-112	EMERGENCY RESPONSE ORGANIZATION ACTIVATION AND OPERATION
EP-TM-113	PERSONNEL PROTECTIVE ACTIONS
EP-TM-114	NOTIFICATIONS
EP-TM-115	TERMINATION
EP-TM-120	EMERGENCY PLAN ADMINISTRATION
EP-TM-121	EMERGENCY RESPONSE FACILITIES AND EQUIPMENT READINESS
EP-TM-122	DRILLS AND EXERCISE PROGRAM
EP-TM-123	COMPUTER PROGRAMS
EP-TM-124	INVENTORIES AND SURVEILLANCES
TQ-TM-113	ERO TRAINING AND QUALIFICATION

**APPENDIX 3: PROCEDURE CROSS-REFERENCE TO NUREG-0654**

NUREG-0654 Criteria	Planning Standard (10 CFR 50.47)	Planning Requirement (Appendix E. IV)	TMI PDEP Section
II.A	(b)(1)* Assignment of Responsibility (Organization Control)	A.1*, 2, 4*, 7*	6.0 7.0 Appendix 4
II.B	(b)(2) Onsite Emergency Organization	A.1*, 2, 4*, 9*; C.1*	7.0 9.0
II.C	(b)(3)* Emergency Response Support and Resources	A.6, 7*	7.0 Appendix 4
II.D	(b)(4)* Emergency Classification System	B.1*, 2; C.1*, 2*	4.0 8.0 Addendum 1
II.E	(b)(5)* Notification Methods and Procedures	A.6, 7*; C.1*, 2*; D.1*, 3*; E*	7.0 8.0 10.0 Appendix 2
II.F	(b)(6)* Public Education and Information	C.1*; D.1*, 3*; E*	6.0 8.0 11.0
II.G	(b)(7)* Public Education and Information	A.7*; D.2*	10.0
II.H	(b)(8) Emergency Facilities and Equipment	E*; G	5.0 7.0 8.0 11.0
II.I	(b)(9)* Accident Assessment	A.4*; B.1*; C.2*; E*	5.0 9.0 Addendum 1
II.J	(b)(10)* Protective Response	C.1*; E*; I	9.0
II.K	(b)(11) Radiological Exposure Control	E*	9.0
II.L	(b)(12) Medical and Public Health Support	A.6, 7*; E*	7.0 9.0
II.M	(b)(13) Recovery and Reentry Planning and Post-Accident Operations	H	7.0
II.N	(b)(14) Exercises and Drills	E.9*; F*	11.0
II.O	(b)(15) Radiological Emergency Response Training	F*	7.0 9.0 11.0
II.P	(b)(16) Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans	G	11.0

\* As exempted.

**APPENDIX 4: LIST OF LETTERS OF AGREEMENT**

**Letters with Corporate Exelon:**

**Organization/Agreement Type**

Department of Energy (DOE) Radiation Emergency  
Assistance Center/Training Site, REAC/TS (Letter on File)

Medical Consultant

Environmental, Inc. (P.O.)  
Radiological Environmental Monitoring

Landauer, Inc. (P.O.)  
Emergency Dosimetry

Murray & Trettel, Inc. (P.O.)  
Meteorological Support

Teledyne Brown Engineering (P.O.)  
Bioassay Analysis/Radiochemical Analysis

Red Alert Service (P.O.)  
Fire Foam Supply



**APPENDIX 4: LIST OF LETTERS OF AGREEMENT****Three Mile Island Specific Letters of Agreement**

The following is a listing of letters of agreement, memorandum of understanding, and contracts specific to emergency response activities in support of the TMI Station.

NOTE: While this list reflects letters of agreement currently in effect, it is possible that the list may change for a number of reasons. The EP Specialist will consider the impact that a loss of an agency will have on the emergency response process.

**1. Medical Support Organizations and Personnel**

- Londonderry Volunteer Fire Company (ambulance service)
- South Central Emergency Medical Services Inc.
- Northwest Emergency Medical Services
- Hershey Medical Center
- Pinnacle Health Harrisburg Hospital

**2. Firefighting Organizations**

NOTE: These are supplemented by Mutual Aid agreements with other firefighting as organizations.

- Bainbridge Volunteer Fire Company (Lancaster Co.)
- Middletown Volunteer Fire Department
- Londonderry Volunteer Fire Company
- Elizabethtown Fire Department
- Lower Swatara Volunteer Fire Department
- Susquehanna Area Regional Airport Authority (SARAA)

**3. Law Enforcement Agencies**

- Pennsylvania State Police (letter of agreement maintained by Security)

**4. Local County Response Agencies**

- Pennsylvania Emergency Management Agency Memorandum of Understanding (MOU) (letter on file)

NOTE: Documentation of agreement for Dauphin and Lancaster counties are contained as part of the agreement with PEMA.

**5. Other Agencies**

- Norfolk Southern Railway Company
- AREVA\*
- Harrisburg Area Community College
- Londonderry Volunteer Fire Department (staging area)

**APPENDIX 5: GLOSSARY OF TERMS AND ACRONYMS****Glossary of Terms**

Accident Assessment	Accident assessment consists of a variety of actions taken to determine the nature, effects and severity of an accident and includes evaluation of spent fuel cooling and integrity, meteorological observations, seismic observations, fire reports, radiological dose projections, and radiological and environmental monitoring.
Alert Classification	See definition in Section 4.2.
Annual	Frequency of occurrence equal to once per calendar year, January 1 to December 31.
Assessment Actions	Those actions taken during or after an emergency to obtain and process information that is necessary to make decisions to implement specific emergency measures.
Classification	The classification of emergencies is divided into TWO (2) categories or conditions, covering the postulated spectrum of emergency situations. The two (2) emergency classifications (Unusual Event and Alert) are characterized by Emergency Action Levels (EALs) or event initiating conditions and address emergencies of increasing severity.
Comprehensive Emergency Management Plan (CEMP)	A CEMP is often referred to as a synonym for "all hazards planning." It is an emergency operation plan that is flexible enough for use in all emergencies. A CEMP is addressed in the Federal Emergency Management Agency's (FEMA's) Comprehensive Preparedness Guide (CPG) 101, "Developing and Maintaining Emergency Operations Plans."
Corrective Action	Those emergency measures taken to lessen or terminate an emergency situation at or near the source of the problem in order to reduce the magnitude of a radiological release.
Dose Projection	The calculated estimate of a radiation dose to individuals at a given location (normally off-site), determined from the source term/quantity of radioactive material (Q) released, and the appropriate meteorological dispersion parameters (X/Q).

**APPENDIX 5: GLOSSARY OF TERMS AND ACRONYMS**

Emergency Action Levels (EALs)	A pre-determined, site-specific, observable threshold for a facility Initiating Condition that places the facility in a given emergency class.
Emergency Preparedness	A state of readiness that provides reasonable assurance that adequate protective measures can and will be taken upon implementation of the Emergency Plan in the event of a radiological emergency.
Exercise	An event that tests the integrated capability of a major portion of the basic elements existing within emergency preparedness plans and organizations.
Hostile Action	See Section 6.2 of Addendum 1.
Initiating Condition	See Section 6.2 of Addendum 1.
ISFSI	See Section 6.2 of Addendum 1.
Monthly	Frequency of occurrence equal to once per calendar month.
Off-Site	The area around a nuclear facility that lies outside the station's "Site Boundary".
Offsite Dose Calculation Manual (ODCM)	<p>The ODCM presents a discussion of the following:</p> <ol style="list-style-type: none"><li>1. The ways in which nuclear power stations can affect their environment radiologically</li><li>2. The regulations which limit radiological effluents from the nuclear power stations; and</li><li>3. The methodology used by the nuclear power stations to assess radiological impact on the environment and compliance with regulations.</li></ol>
On-Site	The area around a nuclear facility that lies within the station's "Site Boundary".

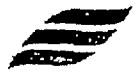
**APPENDIX 5: GLOSSARY OF TERMS AND ACRONYMS**

Plant Operator	Any member of the plant staff who, by virtue of training and experience, is qualified to assess the indications or reports for validity and to compare the same to the EALs in the licensee's emergency classification scheme. A "plant operator" does not encompass plant personnel such as chemists, radiation protection technicians, craft personnel, security personnel, and others whose positions require they report, rather than assess, abnormal conditions to the control room.
Projected Dose	That calculated dose that some individuals in the population group may receive if no protective actions are implemented. Projected doses are calculated to establish an upper limit boundary.
Protected Area	See Section 6.2 of Addendum 1.
Protective Action	Measures taken to effectively mitigate the consequences of an accident by minimizing the radiological exposure that would likely occur if such actions were not taken.
Release	A ' <i>Release in Progress</i> ' is defined as <u>ANY</u> radioactive release that is a result of, or caused by, the emergency event.
Site Boundary	Three Mile Island's Site Boundary is described in detail in the ODCM. For the purposes of Emergency Planning, the exclusion area boundary and the Site Boundary are considered the same.
Site Evacuation	The evacuation of non-essential personnel from the facility site.
Source Term	Radioisotope inventory or amount of radioisotope released to the environment, often as a function of time.
Unusual Event Classification	See definition in Section 4.1.

**APPENDIX 5: GLOSSARY OF TERMS AND ACRONYMS****ACRONYMS**

Any abbreviation followed by a lower case 's' denotes the plural form of the term.

ARM	Area Radiation Monitor
BRP	Bureau of Radiation Protection (Pennsylvania)
CFR	Code of Federal Regulations
CR	Control Room
DER	Department of Environmental Resources (Pennsylvania)
DLR	Dosimeter of Legal Record
DOE	U. S. Department of Energy
DOT	U. S. Department of Transportation
DSAR	Decommissioned Safety Analysis Report
EAL	Emergency Action Level
ENS	Emergency Notification System (NRC)
EPA	U. S. Environmental Protection Agency
GET	General Employee Training
IWTS/IWFS	Industrial Waste Treatment System / Industrial Waste Filtration System
NRC	U. S. Nuclear Regulatory Commission
NRF	National Response Framework
NWS	National Weather Service
PAG	Protective Action Guide
PDEP	Permanently Defueled Emergency Plan
PEMA	Pennsylvania Emergency Management Agency
RMS	Radiation Monitoring System



**Exelon** Generation.

**EP-TM-1001 Addendum 1**

Revision 0

## **EXELON GENERATION**

### **THREE MILE ISLAND STATION PERMANENTLY DEFUELED EMERGENCY ACTION LEVELS AND TECHNICAL BASES**



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## **1.0 PURPOSE**

This document provides the detailed set of Emergency Action Levels (EALs) applicable to the Three Mile Island Nuclear Station (TMI) and the associated Technical Bases using the EAL development methodology found in NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors," Revision 6 (NEI 99-01, Rev. 6). As a permanently defueled facility, TMI will use the Recognition Category "PD" (Permanently Defueled) to provide a site-specific emergency classification scheme including a set of Initiating Conditions (ICs) and EALs associated with the permanently defueled condition and a Recognition Category "E" IC/EAL for the Independent Spent Fuel Storage Installation (ISFSI). Permanently defueled station ICs and EALs are addressed in Appendix C of NEI 99-01, Rev. 6. All recommendations for changes to this document or associated implementing procedures are reviewed in accordance with 10 CFR 50.54(q).

This document should be used to facilitate review of the TMI EALs, provide historical documentation for future reference, and serve as a resource for training. Individuals responsible for the classification of events will refer to the ICs and EALs contained in the matrix of this document. They may use the information in the associated "Basis" and "Notes" sections as a reference in support of EAL interpretation. An EAL matrix may be provided as a user aid.

Emergency classifications are to be made as soon as conditions are present and recognizable for the classification in accordance with the applicable EALs; but within 30 minutes in all cases after the availability of indications to operators that an EAL threshold has been reached. Use of this document for assistance is not intended to delay the emergency classification.

## **2.0 DISCUSSION**

### **2.1 Permanently Defueled Facility**

NEI 99-01, Appendix C, Rev. 6, provides guidance for an emergency classification scheme applicable to a permanently defueled facility. This is a facility that generated spent fuel under a 10 CFR Part 50 license, has permanently ceased operations and will store the spent fuel onsite for an extended period of time. The emergency classification levels applicable to permanently defueled facility are consistent with the requirements of 10 CFR Part 50 and NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, Rev. 1" (NUREG-0654).

In order to relax the emergency plan requirements applicable to an operating station, the owner of a permanently defueled station must demonstrate that no credible event can result in a significant radiological release beyond the site boundary. Exelon has confirmed that the source term and motive force available in the permanently defueled condition are insufficient to warrant classifications of a Site Area Emergency or General Emergency.

Therefore, the generic ICs and EALs applicable to a permanently defueled facility may only result in either a Notification of UNUSUAL EVENT (UNUSUAL EVENT) or ALERT classification.

## **2.2 Independent Spent Fuel Storage Installation**

Selected guidance in NEI 99-01, Rev. 6, is applicable to licensees electing to use their 10 CFR Part 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone Independent Spent Fuel Storage Installation (ISFSI). The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR Part 50. The initiating conditions germane to a 10 CFR 72.32 emergency plan (as described in NUREG-1567, "Spent Fuel Dry Storage Facilities") are subsumed within the classification scheme for a 10 CFR 50.47 emergency plan.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, "A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees" (NUREG-1140). NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 Rem Total Effective Dose Equivalent.

Regarding the above information, the expectations for an offsite response to an ALERT classified under a 10 CFR 72.32 emergency plan are generally consistent with those for an UNUSUAL EVENT in a 10 CFR 50.47 emergency plan (e.g., to provide assistance if requested). Also, the licensee's Emergency Response Organization (ERO) required for 10 CFR 72.32 emergency plan is different from that prescribed for a 10 CFR 50.47 emergency plan (e.g., there is no emergency technical support function required).

## **3.0 KEY TERMINOLOGY USED**

There are several key terms that appear throughout the NEI 99-01, Rev. 6, methodology. These terms are introduced in this section to support understanding of subsequent material.

### **3.1 Emergency Classification Levels (ECLs)**

One of a set of names or titles established by the U.S. Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The ECLs that remain applicable to TMI, in ascending order of severity, are:

#### **3.1.1 UNUSUAL EVENT (UE)**

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the facility or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

**Purpose:** The purpose of this classification is to assure that the first step in future response has been carried out, to bring the operations staff to a state of readiness, and to provide systematic handling of UNUSUAL EVENT information and decision-making.

### 3.1.2 ALERT

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guides (PAG) exposure levels.

**Purpose:** The purpose of this classification is to assure that emergency personnel are readily available to respond if the situation becomes more serious or to perform confirmatory radiation monitoring, if required, and provide offsite authorities current information on facility status and parameters.

### 3.2 Initiating Condition (IC)

An event or condition that aligns with the definition of one of the two ECLs by virtue of the potential or actual effects or consequences.

**Discussion:** An IC describes an event or condition, the severity or consequences of which meets the definition of an ECL. An IC can be expressed as a continuous, measurable parameter (e.g., radiation monitor readings) or an event (e.g., an earthquake).

Appendix 1 of NUREG-0654 does not contain example EALs for each ECL, but rather ICs (i.e., conditions that indicate that a radiological emergency, or events that could lead to a radiological emergency, have occurred). NUREG-0654 states that the ICs form the basis for establishment by a licensee of the specific facility instrumentation readings (as applicable) which, if exceeded, would initiate the emergency classification. Thus, it is the specific instrument readings that would be the EALs.

### 3.3 Emergency Action Level (EAL)

A pre-determined, site-specific, observable threshold for an IC that, when met or exceeded, places the facility in a given ECL.

**Discussion:** EAL statements may utilize a variety of criteria including instrument readings and status indications, observable events, results of calculations and analyses, entry into particular procedures, and the occurrence of natural phenomena.

## 4.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

### 4.1 General Considerations

When making an emergency classification, the Emergency Director must consider all information having a bearing on the proper assessment of an IC. This includes the EAL plus Notes and the informing Basis information.

All emergency classification assessments should be based upon valid indications, reports or conditions. A valid indication, report, or condition is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be accomplished through an instrument channel check, response on related or redundant

indicators, or direct observation by personnel. The validation of indications should be completed in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 60 minutes, etc.), the Emergency Director should not wait until the applicable time has elapsed but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that 1) the activity proceeds as planned and 2) the facility remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain, or modify a system or component. In these cases, the controls associated with the planning, preparation, and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 CFR 50.72.

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., gaseous and liquid effluent sampling, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the declaration period starts with the availability of the analysis results that show the threshold to be exceeded (i.e., this is the time that the EAL information is first available).

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01, Rev. 6, scheme provides the Emergency Director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the ECL definitions (refer to PD-HU3 and PD-HA3). The Emergency Director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition.

#### **4.2 Classification Methodology**

To make an emergency classification, the user will compare an event or condition (i.e., the relevant facility indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL(s) must be consistent with the related Notes. If an EAL has been met or exceeded, then the IC is considered met and the associated ECL is declared in accordance with facility procedures.

When assessing an EAL that specifies a time duration for the off-normal condition, the EAL time duration runs concurrently with the emergency classification time duration.

### **4.3 Classification of Multiple Events and Conditions**

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an UNUSUAL EVENT EAL and an ALERT EAL are met, an ALERT should be declared.

There is no "additive" effect from multiple EALs meeting the same ECL. For example:

- If two UNUSUAL EVENT EALs are met, an UNUSUAL EVENT should be declared.

Related guidance concerning classification of rapidly escalating events or conditions is provided in Regulatory Issue Summary (RIS) 2007-02, "Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events."

### **4.4 Classification of Imminent Conditions**

Although EALs provide specific thresholds, the Emergency Director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the Emergency Director, meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all ECLs, this approach is particularly important at the higher ECL since it provides additional time for implementation of protective measures.

### **4.5 Emergency Classification Level Upgrading and Termination**

An ECL may be terminated when the event or condition that meets the IC and EAL no longer exists. Events will not be downgraded.

As noted above, guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02.

### **4.6 Classification of Short-Lived Events**

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events would be an earthquake or explosion.

### **4.7 Classification of Transient Conditions**

It is important to stress that the emergency classification assessment period is not a "grace period" during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event; emergency classification assessments must be deliberate and timely, with no undue delays.

### **4.8 After-the-Fact Discovery of an Emergency Event or Condition**

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an

event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition not being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022, "Event Report Guidelines 10 CFR 50.72 and 50.73," is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR 50.72 within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

#### **4.9 Retraction of an Emergency Declaration**

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022.

#### **4.10 Response to a TMI-2 Emergency**

TMI-2 alarms will be monitored on a 24-hour a day basis remotely from Unit 1 or by another appropriate location in the event of a failure of the remote monitoring system. For failures of specific local alarm capabilities, local conditions will be monitored in accordance with the applicable procedures.

A TMI-2 related emergency will be reported to the TMI-1 Control Room. TMI-1 Control Room personnel will assess and evaluate the situation; classify the event as required based on impact to TMI-1 and the site per the EALs; and provide the appropriate response. When direct monitoring is in effect the individual may leave the monitoring point in order to provide direct assistance to the TMI response team provided that he/she does not leave the monitoring point unattended in excess of one hour for any single event.

**5.0 REFERENCES****5.1 Developmental**

- 5.1.1 NEI 99-01 Revision 6, Development of Emergency Action Levels for Non-Passive Reactors, November 2012
- 5.1.2 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities
- 5.1.3 RIS 2007-02, Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2007
- 5.1.4 NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 50.73
- 5.1.5 10 CFR 50.72, Immediate Notification Requirements for Operating Nuclear Power Reactors
- 5.1.6 NUREG-0654/FEMA-REP-1, Rev. 1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants
- 5.1.7 10 CFR 72.32, Emergency Plan
- 5.1.8 NUREG-1567, Spent Fuel Dry Storage Facilities
- 5.1.9 10 CFR 50.47, Emergency Plans
- 5.1.10 NUREG-1140, A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees
- 5.1.11 NSIR/ISG-02, Interim Staff Guidance, Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants

**5.2 Implementing**

- 5.2.1 EP-TM-1001, Permanently Defueled Emergency Plan
- 5.2.2 EP-TM-1001, Addendum 1, Emergency Action Levels and Technical Bases

**5.3 Commitments**

None

## 6.0 ACRONYMS & DEFINITIONS

### 6.1 Acronyms

AOP .....	Abnormal Operating Procedure
CDE .....	Committed Dose Equivalent
CFR .....	Code of Federal Regulations
cpm .....	Counts per Minute
EAL .....	Emergency Action Level
ECL .....	Emergency Classification Level
EPA .....	Environmental Protection Agency
FAA .....	Federal Aviation Administration
FBI .....	Federal Bureau of Investigation
FEMA .....	Federal Emergency Management Agency
ISFSI .....	Independent Spent Fuel Storage Installation
IC .....	Initiating Condition
mRem .....	milli-Roentgen Equivalent Man
NEI .....	Nuclear Energy Institute
NORAD .....	North American Aerospace Defense Command
NPP .....	Nuclear Power Plant
NRC .....	Nuclear Regulatory Commission
ODCM .....	Off-site Dose Calculation Manual
PAG .....	Protective Action Guide
PD .....	Permanently Defueled
Rem .....	Roentgen Equivalent Man
TEDE .....	Total Effective Dose Equivalent
μCi/cc .....	micro Curies per Cubic Centimeter
UFSAR/DSAR .....	Updated Final/Defueled Safety Analysis Report

### 6.2 Definitions

NOTE: Selected terms used in IC and EAL statements are set in all capital letters (e.g., ALL CAPS).

**ALERT:** Refer to Section 3.1.2.

**CONFINEMENT BOUNDARY:** The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

**Emergency Action Level (EAL):** Refer to Section 3.3.

**Emergency Classification Level (ECL):** Refer to Section 3.1.

**Initiating Condition (IC):** Refer to Section 3.2.

**EXPLOSION:** A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high



energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

FIRE: Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fire. Observation of flame is preferred but is NOT required if large quantities of smoke and heat are observed.

HOSTAGE: A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION: An act toward a Nuclear Power Plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

HOSTILE FORCE: Any individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

IMMINENT: The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

NORMAL LEVELS: As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value.

OWNER CONTROLLED AREA (OCA): The property associated with the station and owned by the company. Access is normally limited to persons entering for official business.

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

SECURITY CONDITION: Any Security Event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A SECURITY CONDITION does not involve a HOSTILE ACTION.

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

UNUSUAL EVENT (UE): Refer to Section 3.1.1

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

## **7.0 ATTACHMENTS**

Attachment 1: EAL Matrices

Attachment 2: EAL Bases

## Attachment 1 - EALs Matrices

Table PD-1: Recognition Category "PD" Initiating Condition Matrix

UNUSUAL EVENT	ALERT
<b>PD-RU1</b> Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.	<b>PD-RA1</b> Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.
<b>PD-RU2</b> UNPLANNED rise in facility radiation levels.	<b>PD-RA2</b> UNPLANNED rise in facility radiation levels that impedes facility access required to maintain spent fuel integrity.
<b>PD-MU1</b> UNPLANNED spent fuel pool temperature rise.	
<b>PD-HU1</b> Confirmed SECURITY CONDITION or threat.	<b>PD-HA1</b> HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.
<b>PD-HU2</b> Hazardous Event affecting equipment necessary for spent fuel cooling.	
<b>PD-HU3</b> Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.	<b>PD-HA3</b> Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT.

Table E-1: Recognition Category "E" Initiating Condition Matrix

UNUSUAL EVENT
<b>E-HU1</b> Damage to a loaded cask CONFINEMENT BOUNDARY.

## Attachment 1 - EALs Matrices

ALERT		UNUSUAL EVENT	
Abnormal Rad Levels / Radiological Effluents			
Radiological Effluents	<p><b>PD-RA1</b> Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.</p> <p><u><b>Emergency Action Level (EAL):</b></u></p> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• The Emergency Director should declare the ALERT promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</li><li>• If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes</li><li>• Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.</li><li>• The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.</li></ul> <p>1. Readings on <b>RM-A-8GH (Station Vent)</b> &gt; <b>1.43 E+03 cpm</b> for <b>≥ 15 minutes</b>. <b>OR</b></p> <p>2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of <b>EITHER</b></p> <p>a. &gt; <b>10 mRem TEDE</b> <b>OR</b></p> <p>b. &gt; <b>50 mRem CDE Thyroid</b></p> <p><b>OR</b></p> <p>3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than <b>EITHER</b> of the following at or beyond the site boundary</p> <p>a. <b>10 mRem TEDE</b> for <b>60 minutes</b> of exposure <b>OR</b></p> <p>b. <b>50 mRem CDE Thyroid</b> for <b>60 minutes</b> of exposure</p> <p><b>OR</b></p> <p>4. Field survey results at or beyond the site boundary indicate <b>EITHER</b></p> <p>a. Gamma (closed window) dose rates &gt; <b>10 mR/hr</b> are expected to continue for <b>≥ 60 minutes</b> <b>OR</b></p> <p>b. Analyses of field survey samples indicate &gt; <b>50 mRem CDE Thyroid</b> for <b>60 minutes</b> of inhalation.</p>	<p><b>PD-RU1</b> Release of gaseous or liquid radioactivity to the environment greater than 2 times the ODCM limit for 60 minutes or longer.</p> <p><u><b>Emergency Action Level (EAL):</b></u></p> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• The Emergency Director should declare the UNUSUAL EVENT promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.</li><li>• If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes</li><li>• Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.</li></ul> <p>1. Reading on discharge permit specified effluent monitors &gt; <b>2 times alarm setpoint</b> established by a current radioactive release discharge permit for <b>≥ 60 minutes</b> <b>OR</b></p> <p>2. Readings on <b>RM-A-8G (Station Vent)</b> &gt; <b>9.5 E+05 cpm</b> for <b>≥ 60 minutes</b> <b>OR</b></p> <p>3. Confirmed sample analyses for gaseous or liquid releases indicates a concentration or release rates &gt; <b>2 times ODCM Limit</b> with a release duration of <b>≥ 60 minutes</b>.</p>	

## Attachment 1 - EALs Matrices

ALERT		UNUSUAL EVENT
Abnormal Rad Levels / Radiological Effluents		
Area Rad Levels	<p><b>PD-RA2</b> UNPLANNED rise in facility radiation levels that impedes facility access required to maintain spent fuel integrity.</p> <p><u>Emergency Action Level (EAL):</u></p> <ol style="list-style-type: none"> <li>UNPLANNED dose rate &gt; <b>15 mR/hr</b> in <b>ANY</b> of the following areas required for continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: <ul style="list-style-type: none"> <li>Control Room</li> <li>Central Alarm Station (by survey)</li> </ul> </li> <li>UNPLANNED Area Radiation Monitor readings or survey results indicate a rise of &gt; <b>100 mR/hr</b> over <b>NORMAL LEVELS</b> that impedes access to <b>ANY</b> of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: <ul style="list-style-type: none"> <li>Fuel Handling Building Operating Floor</li> <li>SFP Cooling Pump /Heat Exchanger Area</li> <li>NSCCW Pump / Heat Exchanger Areas</li> </ul> </li> </ol>	<p><b>PD-RU2</b> UNPLANNED rise in facility radiation levels.</p> <p><u>Emergency Action Level (EAL):</u></p> <ol style="list-style-type: none"> <li>a. UNPLANNED water level drop in the Spent Fuel Pool as indicated by <b>ANY</b> of the following: <ul style="list-style-type: none"> <li>Spent Fuel Pool water level &lt; <b>342' 6"</b> (<b>23.167'</b> on SF-LI-1219A/B)</li> <li>Indication or report of an UNPLANNED drop in water level.</li> </ul> </li> </ol> <p><b>AND</b></p> <ol style="list-style-type: none"> <li>UNPLANNED Area Radiation Monitor reading rise on <b>RM-G-9</b> FHB Bridge radiation monitor.</li> </ol> <p><b>OR</b></p> <ol style="list-style-type: none"> <li>Area radiation monitor reading or survey result indicates an UNPLANNED rise of <b>25 mR/hr</b> over <b>NORMAL LEVELS</b>.</li> </ol>

ALERT		UNUSUAL EVENT
System Malfunctions		
Spent Fuel Pool		<p><b>PD-MU1</b> UNPLANNED Spent Fuel Pool temperature rise.</p> <p><u>Emergency Action Level (EAL):</u></p> <ol style="list-style-type: none"> <li>UNPLANNED Spent Fuel Pool temperature rise to &gt; <b>160°F</b>.</li> </ol>

## Attachment 1 - EALs Matrices

ALERT		UNUSUAL EVENT	
Hazards and Other Conditions Affecting Facility Safety			
Security	<p><b>PD-HA1</b> HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.</p> <p><u>Emergency Action Level (EAL):</u></p> <p>1. A validated notification from NRC of an aircraft attack threat <b>&lt; 30 minutes</b> from the site.</p> <p><b>OR</b></p> <p>2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA.</p>	<p><b>PD-HU1</b> Confirmed SECURITY CONDITION or threat.</p> <p><u>Emergency Action Level (EAL):</u></p> <p>1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities.</p> <p><b>OR</b></p> <p>2. A validated notification from the NRC providing information of an aircraft threat.</p> <p><b>OR</b></p> <p>3. Notification by the Security Force of a SECURITY CONDITION that does <u>not</u> involve a HOSTILE ACTION.</p>	
			<p><b>PD-HU2</b> Hazardous Event affecting equipment necessary for spent fuel cooling.</p> <p><u>Emergency Action Level (EAL):</u></p> <p>1. a) The occurrence of <b>ANY</b> of the following hazardous events:</p> <ul style="list-style-type: none"><li>• Seismic event (earthquake)</li><li>• Internal or external flooding event</li><li>• High winds or tornado strike</li><li>• FIRE</li><li>• EXPLOSION</li><li>• Other events with similar hazard characteristics as determined by the Shift Manager</li></ul> <p><b>AND</b></p> <p>b) The event has damaged at least one train of a system needed for Spent Fuel Cooling</p> <p><b>AND</b></p> <p>c) The damaged train(s) <u>cannot</u>, or potentially <u>cannot</u>, perform its design function based on <b>EITHER</b>:</p> <ul style="list-style-type: none"><li>• Indications of degraded performance</li><li>• VISIBLE DAMAGE</li></ul>
Hazardous Event			

## Attachment 1 - EALs Matrices

ALERT		UNUSUAL EVENT	
Hazards and Other Conditions Affecting Facility Safety			
Emergency Director Judgment	<p><b>PD-HA3</b> Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT.</p> <p><u>Emergency Action Level (EAL):</u></p> <p>Other conditions exist which, in the judgment of the Emergency Director, indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.</p>	<p><b>PD-HU3</b> Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.</p> <p><u>Emergency Action Level (EAL):</u></p> <p>Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the facility or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of equipment required for spent fuel cooling occurs.</p>	

ALERT		UNUSUAL EVENT	
ISFSI Malfunction			
ISFSI		E-HU1    Damage to a loaded cask CONFINEMENT BOUNDARY.	
		<u>Emergency Action Level (EAL):</u> Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading > 2 times the ISFSI Technical Specification allowable levels.	

**Attachment 2 - EAL Bases****Recognition Category PD EAL Basis**

Recognition Category PD provides a stand-alone set of ICs/EALs for a Permanently Defueled nuclear facility to consider for use in developing a site-specific emergency classification scheme. For development, it was assumed that the plant had operated under a 10 CFR Part 50 license and that the operating company has permanently ceased plant operations. Further, the company intends to store the spent fuel within the plant for some period of time.

When in a permanently defueled condition, the plant licensee typically receives approval from the NRC for exemption from specific emergency planning requirements. These exemptions reflect the lowered radiological source term and risks associated with spent fuel pool storage relative to reactor at-power operation. Source terms and accident analyses associated with plausible accidents are documented in the station's Final Safety Analysis Report (FSAR), as updated. As a result, each licensee will need to develop a site-specific emergency classification scheme using the NRC-approved exemptions, revised source terms, and revised accident analyses as documented in the station's FSAR.

Recognition Category PD uses the same ECLs as operating reactors; however, the source term and accident analyses limit the ECLs to an UNUSUAL EVENT and ALERT. The UNUSUAL EVENT ICs provide for an increased awareness of abnormal conditions while the ALERT ICs are specific to actual or potential impacts to spent fuel. The source terms and release motive forces associated with a permanently defueled facility would not be sufficient to require declaration of a Site Area Emergency or General Emergency.

A permanently defueled facility is essentially a spent fuel storage facility with the spent fuel stored in a pool of water that serves as both a cooling medium (i.e., removal of decay heat) and shield from direct radiation. These primary functions of the spent fuel storage pool are the focus of the Recognition Category PD ICs and EALs. Radiological effluent IC and EALs were included to provide a basis for classifying events that cannot be readily classified based on an observable events or facility conditions alone.

In NEI 99-01, Rev. 6, appropriate ICs and EALs from Recognition Categories A [R], C, F, H, and S [M] were modified and included in Recognition Category PD to address a spectrum of the events that may affect a spent fuel pool. The Recognition Category PD ICs and EALs reflect the relevant guidance in this document (e.g., the importance of avoiding both over-classification and under-classification). TMI has developed this emergency classification scheme using the NRC-approved exemptions, and site-specific source terms, and accident analyses. Security-related events are also included.

The following table, Table PD-1: Recognition Category "PD" Initiating Condition Matrix, provides a summary of initiating conditions associated with Recognition Category PD.

**Recognition Category E EAL Basis**

Recognition Category E provides an IC/EAL for an ISFSI. An ISFSI is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a cask must escape its packaging and enter the



**Attachment 2 - EAL Bases**

atmosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel. Formal offsite planning is not required because the postulated worst-case accident involving an ISFSI has insignificant consequences to the public health and safety.

## Attachment 2 - EAL Bases

## PD-RA1

**Initiating Condition:**

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.

**Emergency Action Level (EAL):****Notes:**

- The Emergency Director should declare the ALERT promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

1. Readings on RM-A-8GH (Station Vent) > 1.43 E+03 cpm for ≥ 15 minutes.

OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER:

- a. > 10 mRem TEDE

OR

- b. > 50 mRem CDE Thyroid

OR

3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than EITHER of the following at or beyond the site boundary

- a. 10 mRem TEDE for 60 minutes of exposure

OR

- b. 50 mRem CDE Thyroid for 60 minutes of exposure

OR

## Attachment 2 - EAL Bases

## PD-RA1 (cont)

**Emergency Action Level (EAL) (cont):**

4. Field survey results at or beyond the site boundary indicate **EITHER:**

- a. Gamma (closed window) dose rates > 10 mR/hr are expected to continue for  $\geq 60$  minutes

**OR**

- b. Analyses of field survey samples indicate > 50 mRem CDE Thyroid for 60 minutes of inhalation.

**Basis:**

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the facility as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of facility conditions alone. The inclusion of both facility condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1000 mRem while the 50 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-AA1
2. OP 1101-2.1 Radiation Monitoring System Setpoints
3. DSAR Section 4.4 Radiation Monitoring System
4. OP-TM-MAP-C0101, Radiation Level HI
5. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
6. EP-EAL-0616, Three Mile Island Criteria for Choosing Radiological Liquid Effluent EAL Threshold Values

## Attachment 2 - EAL Bases

## PD-RU1

**Initiating Condition:**

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

**Emergency Action Level (EAL):****Notes:**

- The Emergency Director should declare the UNUSUAL EVENT promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
  1. Reading on discharge permit specified monitor > **2 times alarm setpoint** established by a current radioactive release discharge permit for **≥ 60 minutes:**  
**OR**
  2. Readings on **RM-A-8G > 9.5 E+05 cpm** for **≥ 60 minutes:**  
**OR**
  3. Confirmed sample analyses for gaseous or liquid releases indicate a concentration or release rates > **2 times ODCM Limit** with a release duration of **≥ 60 minutes.**

**Basis:**

This IC addresses a potential decrease in the level of safety of the facility as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

## Attachment 2 - EAL Bases

## PD-RU1 (cont)

TMI-1 incorporated design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of facility conditions alone. The inclusion of both facility condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

EAL #1 addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. This EAL will typically be associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

The declaration criteria will be based on the monitor and monitor setpoints specified in the Discharge Permit.

EAL #2 addresses normally occurring continuous radioactivity releases from monitored gaseous effluent pathways. For the defueled condition the only remaining release path is through the Station Vent and is monitored by RM-A-8G.

EAL #3 addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).

Escalation of the emergency classification level would be via IC PD-RA1.

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-AU1
2. OP 1101-2.1 Radiation Monitoring System Setpoints
3. DSAR Section 4.4 Radiation Monitoring System
4. Offsite Dose Calculation (ODCM)
5. OP-TM-MAP-C0101, Radiation Level HI
6. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)

## Attachment 2 - EAL Bases

## PD-RA2

**Initiating Condition:**

UNPLANNED rise in facility radiation levels that impedes facility access required to maintain spent fuel integrity.

**Emergency Action Level (EAL):**

1. UNPLANNED dose rate  $> 15$  mR/hr in ANY of the following areas required for continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity:
  - Control Room
  - Central Alarm Station (by survey)

OR

2. UNPLANNED Area Radiation Monitor readings or survey results indicate a rise of  $> 100$  mR/hr over NORMAL LEVELS that impedes access to ANY of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity:
  - Fuel Handling Building Operating Floor
  - SFP Cooling Pump /Heat Exchanger Area
  - NSCCW Pump / Heat Exchanger Areas

**Basis:**

This IC addresses increased radiation levels that impede necessary access to areas containing equipment that must be operated manually or that requires local monitoring, in order to maintain systems needed to maintain spent fuel integrity. As used here, 'impede' includes hindering or interfering, provided that the interference or delay is sufficient to significantly threaten necessary facility access. It is this impaired access that results in the actual or potential substantial degradation of the level of safety of the facility.

This IC does not apply to anticipated temporary increases due to planned events:

This IC addresses elevated radiation levels in certain facility rooms/areas sufficient to preclude or impede personnel from performing actions necessary to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity. As such, it represents an actual or potential substantial degradation of the level of safety of the facility.

Assuming all facility equipment is operating as designed, normal operation is capable from the Control Room (CR). The areas listed in EAL #2 are facility areas that contain equipment which require a manual/local action necessary when moving fuel or manipulating SFP cooling equipment.

**Attachment 2 - EAL Bases**

**PD-RA2 (cont)**

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-AA2

## Attachment 2 - EAL Bases

## PD-RU2

**Initiating Condition:**

UNPLANNED rise in facility radiation levels.

**Emergency Action Level (EAL):**

1. a. UNPLANNED water level drop in the Spent Fuel Pool as indicated by **ANY** of the following:
  - Spent Fuel Pool water level < **342' 6"** (**23.167'** on SF-LI-1219A/B)
  - Indication or report of an UNPLANNED drop in water level.
- AND
- b. UNPLANNED Area Radiation Monitor reading rise on **RM-G-9** FHB Bridge radiation monitor.
- OR
2. Area radiation monitor reading or survey result indicates an UNPLANNED rise of **25 mR/hr** over NORMAL LEVELS.

**Basis:**

This IC addresses a loss in water level above irradiated fuel sufficient to cause elevated radiation levels. This condition could be a precursor to a more serious event and is also indicative of a minor loss in the ability to control radiation levels within the facility. It is therefore a potential degradation in the level of safety of the facility

**EAL #1 Basis:**

A water level loss will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from facility personnel (e.g., from a refueling crew) or video camera observations (if available) or from any other temporarily installed monitoring instrumentation. A significant drop in the water level may also cause a rise in the radiation levels of adjacent areas that can be detected by Spent Fuel Bridge Radiation monitor (RM-G-9).

Spent Fuel Pool (SFP) water level of 342'6" (mean sea level), is the entry condition for OP-TM-AOP-035, Loss of Spent Fuel Pool Cooling, and is lower than the SFP low level alarm at 343'6". The IC level corresponds to 23.167' above the top of fuel assemblies and is read on SF-LI-1219A/B.

The effects of planned evolutions should be considered. Note that EAL #1 is applicable only in cases where the elevated reading is due to an UNPLANNED water level drop.



**Attachment 2 - EAL Bases**

EAL #2 Basis:

This excludes radiation level increases that result from planned activities such as use of radiographic sources and movement of radioactive waste materials.

Escalation of the emergency classification level would be via IC PD-RA1 OR PD-RA2.

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-AU2
2. OP-TM-AOP-035, "Loss of Spent Fuel Pool Cooling"
3. PLB, "Panel Left Annunciator B", Alarms PLB-2-9 "Spent Fuel Pool A Level Low" and PLB-2-10 "Spent Fuel Pool B Level Low"
4. RP-AA-203 Exposure Control and Authorization
5. NRC Order EA-12-051
6. NEI 12-02

## Attachment 2 - EAL Bases

## PD-MU1

**Initiating Condition:**

UNPLANNED spent fuel pool temperature rise.

**Emergency Action Level (EAL):**

1. UNPLANNED Spent Fuel Pool temperature rise to  $> 160^{\circ}\text{F}$ .

**Basis:**

This IC addresses a condition that is a precursor to a more serious event and represents a potential degradation in the level of safety of the facility. If uncorrected, boiling in the pool will occur, and result in a loss of pool level and increased radiation levels.

Whenever irradiate fuel is stored in the spent fuel pool, the pool water temperature shall be maintained below  $160^{\circ}\text{F}$  (Reference 2). This is the entry point into OP-TM-AOP-035, Loss of Spent Fuel Pool Cooling. Operators will provide initial mitigation for a loss of SFP Cooling based on SFP high temperature alarm set at  $130^{\circ}\text{F}$ . Based on Calculations in the Decom SFP Thermal Hydraulic Analysis (Reference 4) for a loss of SFP Cooling at 488 days after shutdown the heat up rate in the SFP would be approximately  $1.35^{\circ}\text{F}/\text{Hr}$ . Using the Entry Condition for the Loss of Spent Fuel Pool Cooling Procedure as the EAL provides the precursor for additional action and still provides approximately 70 hours to mitigate before SFP boiling were to occur.

Escalation of the emergency classification level would be via PD-RA1 or PD-RA2.

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-SU1
2. OP-TM-AOP-035, Loss of Spent Fuel Pool Cooling
3. PLB, "Panel Left Annunciator B", Alarms PLB-3-9 "Spent Fuel Pool A Hi Temp" and PLB-3-10 "Spent Fuel Pool B Hi Temp"
4. C-1101-202-E410-476, "DECOM Spent Fuel Pool TH Analysis - CMT 614944"

## Attachment 2 - EAL Bases

## PD-HA1

**Initiating Condition:**

HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

**Emergency Action Level (EAL):**

1. A validated notification from NRC of an aircraft attack threat < 30 minutes from the site.

OR

2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA.

**Basis:**

This IC addresses the notification of an aircraft attack threat or an occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the facility and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the facility staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The ALERT declaration will also heighten the awareness of Offsite Response Organizations (ORO), allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

## Attachment 2 - EAL Bases

## PD-HA1 (cont)

**Basis (cont):****EAL #1 Basis:**

The EAL addresses the threat from the impact of an aircraft on the facility, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that facility personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with OP-TM-AOP-008, Security Threat/Intrusion.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

**EAL #2 Basis:**

This EAL is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes any action directed against an ISFSI that is located outside the facility PROTECTED AREA.

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-HA1
2. Station Security Plan – Appendix C
3. OP-TM-AOP-008, Security Threat / Intrusion

## Attachment 2 - EAL Bases

## PD-HU1

**Initiating Condition:**

Confirmed SECURITY CONDITION or threat.

**Emergency Action Level (EAL):**

1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities.  
OR
2. A validated notification from the NRC providing information of an aircraft threat.  
OR
3. Notification by the Security Force of a SECURITY CONDITION that does not involve a HOSTILE ACTION.

**Basis:**

This IC addresses events that pose a threat to facility personnel or spent fuel cooling system equipment, and thus represent a potential degradation in the level of facility safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR § 73.71 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs PD-HA1.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to facility personnel and OROs.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

**EAL #1 Basis:**

Addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-AA-101-132.

**EAL #2 Basis:**

Addresses the threat from the impact of an aircraft on the facility. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with OP-TM-AOP-008, Security Threat/Intrusion.

## Attachment 2 - EAL Bases

**PD-HU1 (cont)****Basis (cont):**

EAL #3 Basis:

References Security Force because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

Escalation of the emergency classification level would be via IC PD-HA1.

**Basis Reference(s):**

1. NEI 99-01 Rev 6, PD-HU1
2. Station Security Plan – Appendix C
3. OP-TM-AOP-008, Security Threat / Intrusion
4. SY-AA-101-132, Security Assessment and Response to Unusual Activities

## Attachment 2 - EAL Bases

## PD-HU2

**Initiating Condition:**

Hazardous Event affecting equipment necessary for spent fuel cooling.

**Emergency Action Level (EAL):**

1. a) The occurrence of ANY of the following hazardous events:

- Seismic event (earthquake)
- Internal or external flooding event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

**AND**

b) The event has damaged at least one train of a system needed for Spent Fuel Cooling

**AND**

c) The damaged train(s) cannot, or potentially cannot, perform its design function based on **EITHER**:

- Indications of degraded performance
- VISIBLE DAMAGE

**Basis:**

This IC addresses a hazardous event that causes damage to at least one train of a system needed for spent fuel cooling. The damage must be of sufficient magnitude that the system(s) train cannot, or potentially cannot, perform its design function. This condition reduces the margin to a loss or potential loss of the fuel clad barrier, and therefore represents a potential degradation of the level of safety of the facility.

For the first bullet in EAL 1.c, indications of degraded performance apply to in service/operating systems or components that are needed for spent fuel cooling.

## Attachment 2 - EAL Bases

**PD-HU2 (cont)**

For the second bullet in EAL 1.c, VISIBLE DAMAGE applies to equipment needed for spent fuel cooling that is not in service/operating or readily apparent through indications alone. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

Escalation of the emergency classification level could, depending upon the event, be based on any of the ALERT ICs: PD-RA1, PD-RA2, PD-HA1 or PD-HA3.

**Basis Reference(s):**

1. NEI 99-01, Rev 6, PD-HU2
2. OP-TM-AOP-001, Fire
3. OP-TM-AOP-002, Flood
4. OP-TM-AOP-003, Earthquake
5. OP-TM-AOP-004, Tornado/High Winds



## Attachment 2 - EAL Bases

## PD-HA3

**Initiating Condition:**

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT.

**Emergency Action Level (EAL):**

Other conditions exist which, in the judgment of the Emergency Director, indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an ALERT.

**Basis Reference(s):**

1. NEI 99-01, Rev 6, PD-HA3

## Attachment 2 - EAL Bases

## PD-HU3

**Initiating Condition:**

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.

**Emergency Action Level (EAL):**

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the facility or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of equipment required for spent fuel cooling occurs.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an UNUSUAL EVENT.

**Basis Reference(s):**

1. NEI 99-01, Rev 6, PD-HU3

## Attachment 2 - EAL Bases

## E-HU1

**Initiating Condition**

Damage to a loaded cask CONFINEMENT BOUNDARY.

**Emergency Action Level (EAL):**

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading > 2 times the ISFSI Technical Specification allowable levels.

**Basis:**

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The word cask, as used in this EAL, refers to the storage container in use at the site for dry storage of irradiated fuel. The issues of concern are the creation of a potential or actual release path to the environment, degradation of any fuel assemblies' due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The cask technical specification multiple of "2 times" which is also used in Recognition Category R IC PD-RU1, is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

Security-related events for ISFSIs are covered under ICs PD-HU1 and PD-HA1.

**Basis Reference(s):**

1. NEI 99-01, Rev 6, E-HU1
2. Certificate of Compliance 72.1031 NAC MAGNASTOR® Canister