CONSTELLATION NUCLEAR

RADIOLOGICAL EMERGENCY PLAN ANNEX

FOR CRANE CLEAN ENERGY CENTER (CRANE)

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0	February 2002
1	May 2003
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4	November 2005
5	January 2006
6	February 2006
7	June 2006
8	May 2007
9	July 2007
10	January 2008
11	June 2008
12	August 2008
13	March 2009
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15	May 2010
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18	July 2012
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25	July 2017
26	August 2017
27	November 2017
28	March 2018
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30	September 2019
31	September 2020
32	TBD
33	TBD

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Revision History Summary:

In 2017, Constellation (at the time Exelon) announced the intent to permanently shut down the operating Unit-1 reactor at Three Mile Island Station by the fall of 2019. Constellation revised the station Emergency Plan to establish the Three Mile Island Station Emergency Plan as an independent Emergency Plan separated and de-linked from the fleet Standardized Radiological Emergency Plan (Standard Plan). This allowed decommissioning changes to be made to the Station Emergency Plan without impacting the Standard Plan.

A new Emergency Plan procedure was created for Three Mile Island. It contained regulatory commitments applicable to Three Mile Island which were in the fleet Standardized Radiological Emergency Plan. The new procedure was EP-TM-1000, *Three Mile Island (TMI) Station Radiological Emergency Plan*. The 10CFR.54(q) evaluation #17-122 evaluated the changes between the Standard Plan, the Station Annex, and EP-TM-1000.

Upon implementation, the revised Three Mile Island Emergency Plan was independent of the fleet Emergency Plan. The new Three Mile Island Emergency Plan formed the regulatory basis for developing and submitting License Amendment Requests to the NRC to support decommissioning.

In 2024 Constellation announced the intent to restart Three Mile Island Station Unit 1 as the Crane Clean Energy Center, pending NRC approval. Constellation is revising the station Emergency Plan to support restart. The Emergency Plan in place at the time operations were halted was EP-TM-1000 Revision 0. EP-TM-1000 Revision 1 updated the List of Corporate LOAs and update the definition of the Exercise Cycle to eight years. Subsequent revisions to EP-TM-1000 implemented approved regulatory exemptions as the station progressed through the stages of decommissioning. EP-AA-1009, TMI Radiological Emergency Plan Annex, Revision 29 was in effect at the time. As with EP-TM-1000, subsequent revisions to EP-AA-1009 reflected the station's progression through the stages of decommissioning.

The Emergency Plan document was renumbered and revised to reflect the transition from EP-TM-1000 Rev. 1 to EP-CR-1000 Rev. 0. The station annex was revised to reflect the transition from EP-AA-1009 Rev. 29 to EP-AA-1009 Rev. 32.

Section 1: Introduction

As required in the conditions set forth by the Nuclear Regulatory Commission (NRC) for the operating licenses for the Constellation Nuclear Stations, the management of Constellation recognizes its responsibility and authority to operate and maintain the nuclear power stations in such a manner as to provide for the safety of the general public.

The Constellation Emergency Preparedness Program consists of the Constellation Nuclear Standardized Radiological Emergency Plan ("Standard Plan"), Station Annexes, emergency plan implementing procedures, and associated program administrative procedures. The Standard Plan outlines the basis for response actions that would be implemented in an emergency. Planning efforts common to all Constellation Nuclear stations are encompassed within the Standard Plan.

This document serves as the Crane Clean Energy Center (CRANE) Annex and contains information and guidance that is unique to the station. The Station Annex is subject to the same review and audit requirements as the Radiological Emergency Plan.

1.1 Facility Description

Crane Clean Energy Center is operated by Constellation Nuclear. CRANE Unit #1 is an 870 Mwe, pressurized water-type, nuclear steam supply system supplied by Babcock & Wilcox Company.

TMI Unit 2 is owned by Energy Solutions. The TMI Unit 2 reactor was damaged during an accident in 1979 and is currently de-fueled and the plant maintained in long-term monitored storage. The arrangement of the major CRANE and TMI-2 facilities is shown in Figures CRANE 1-1 and CRANE 1-2. The Crane Emergency Preparedness Program includes both CRANE and TMI-2.

CRANE 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 CRANE site is part of an 814-acre tract consisting of CRANE 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 CRANE on the east bank of the Susquehanna River and is more than 2,000 feet from the CRANE reactors at the closest point.

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 CRANE sites is shown as Figure CRANE 1-2.

In addition to the information listed above, specific details concerning the CRANE Site are included in the Updated Final Safety Analysis Report (UFSAR).

1.2 Emergency Planning Zones

CRANE has taken into consideration the information and data presented above, guidance provided by the Environmental Protection Agency (EPA), NRC and the Pennsylvania Emergency Management Agency (PEMA), as well as other important factors such as organizational capabilities, availability of emergency facilities and equipment, and the methods for implementing the Emergency Plan in defining the Emergency Planning Zones (EPZs) for the CRANE. As a result, an EPZ having an approximate radial distance of 10 miles from the site has been defined as the “Plume Exposure Pathway”. An EPZ having a radial distance of 50 miles from the site has been defined as the “Ingestion Exposure Pathway”.

Figure CRANE 1-4 illustrates the respective boundaries of for the Plume Exposure and Ingestion Pathways.

1.2.1 Owner Controlled Area, Exclusion Area and Low Population Zone

1. The Owner Controlled Area for the CRANE site includes all areas within the perimeter security fence. 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.

2. The Exclusion Area for the CRANE site is a 2,000 foot radius that includes a portion of CRANE, 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 CRANE 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. A map showing the exclusion area boundary is included as Figure CRANE 1-3. For the purposes of Emergency Planning, the exclusion area boundary and the site boundary are considered the same.

3. The Low Population Zone (LPZ) has a minimum distance of 2 miles to its outer boundary. The area of the Low Population Zone is also shown in Figure CRANE 1-3.

1.2.2 Population and Population Distribution

As previously discussed, LPZ has been defined with a minimum distance of 2 miles from its outer boundary to the CRANE site. The nearest major population center is Harrisburg, Pennsylvania which is located approximately 12 miles northwest of CRANE. This distance satisfies the requirements of 10 CFR 100 with respect to population center distance. The population of residential areas, typical enrollment in various schools, and the hospital patient capacity in the surrounding area can be found in the CRANE Evacuation Time Estimate (ETE) Study.

Within the two-mile LPZ, there are no schools. 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 CRANE since there are over 100 summer cabins on the islands within the area. Additional transients participate in boating activities in the vicinity of CRANE.

1.2.3 Local Industrial and Military Facilities

The CRANE 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 FSAR. 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 CRANE can be found in the site Updated Final Safety Analysis Report (UFSAR). There are gas and oil transmission lines located at a minimum distance of approximately 2 miles from CRANE.

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 Pennsylvania Power & Light Company 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 CRANE, 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 CRANE, 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 CRANE, just north of the Maryland-Pennsylvania border and is the only nuclear plant within a 50-mile radius of CRANE.

There are two airports within 10 miles of the CRANE 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 CRANE. The vital areas of the CRANE 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 CRANE 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 CRANE 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 CRANE. Other military facilities, however, are Army and Navy depots located at New Cumberland and Mechanicsburg, Pennsylvania, respectively.

1.3 Participating Governmental Agencies

The Constellation Nuclear Radiological Emergency Plan (REP) Annex for CRANE was developed in coordination with the Commonwealth of Pennsylvania Emergency plan. In addition, specific State requirements for reporting of emergencies, providing information and data, and recommending protective actions, have been integrated directly into the Emergency Plan Implementing Procedures. In considering the Plume Exposure Pathway, there are also county plans that have been considered in the development of the REP Annex for CRANE. The State Plan designates PEMA

as the lead state agency for radiological emergency response planning and the state agency through which the Governor will exercise coordination and control during emergency. The State Plan is an integrated document setting forth the resources and responsibilities of all relevant state agencies. Significant plans from the State Departments of Agriculture, Environmental Resources, Bureau of Radiation Protection (BRP) are included in the State Plan.

1.3.1 Federal Agencies

A summary of Federal response agencies, responsibilities and activities, as described under the National Response Framework (NRF), is contained in the Standard Plan. Specifics related to support for CRANE Station are listed below.

1. **The Department of the Army (local Ordinance Detachment)** will provide an Explosive Ordinance Disposal capability in response to requests for assistance in the event of a bomb threat.

2. **The Federal Aviation Administration (FAA)** will ensure air traffic is diverted in the event of an emergency situation with a potential for radioactive release.

3. **National Weather Service (NWS)** will provide backup meteorological information upon request.

1.3.2 State Agencies

The planning for and response to a radiological emergency at the CRANE site is the joint responsibility of CRANE and the state/county/local governmental agencies. CRANE is responsible for onsite emergency response. In order to fulfill this responsibility, CRANE relies on various offsite agencies, both governmental and private, to provide assistance beyond that available onsite. The Commonwealth of Pennsylvania, through the various state, county and local agencies, is responsible for offsite emergency response. In order to fulfill this responsibility, the state relies on CRANE to provide necessary information on plant status and radiation releases. Recognizing the joint nature of their responsibilities, CRANE and the relevant governmental agencies have coordinated their emergency planning and have provided for adequate and redundant communication systems to coordinate their response during an emergency event.

1. **Pennsylvania Emergency Management Agency (PEMA)**

   PEMA is responsible to coordinate emergency services in the Commonwealth of Pennsylvania. Should a radiological emergency occur at the CRANE site that requires the implementation of state, county, and local government radiological emergency response plans, the state agency through which the Governor will exercise coordination/control will be PEMA. However, as in all emergencies, the Governor retains directional control.

   PEMA exercises authority over all non-licensee offsite organizations, who are a part of the emergency response team in the CRANE Plume Exposure and Ingestion Pathways. This authority is based on the provisions of Section 7313 of the State of Pennsylvania Emergency Management Services Code 35 PA (C.S.A. Sections 7101-7707) also referred to as Pamphlet Law 1332. By law, PEMA is authorized to:

   - Provide emergency direction and control of Commonwealth of Pennsylvania and local disaster emergency operations.

   - Accept aid and coordinate assistance provided by Federal Agencies under provisions of the Federal Disaster Relief Act of 1974.

2. **Department of Environmental Protection**

   The Department of Environmental Protection (DEP), under the administration and technical direction of the Secretary, is responsible for gathering and evaluating technical information and for supplying such information and technical advice and recommendations to PEMA and the Pennsylvania Emergency Management Council.

   Within the DEP, the Bureau of Radiation Protection (BRP) has been delegated responsibility for radiological emergencies. Specific responsibilities assigned to the DEP/BRP that are appropriate to radiological emergencies are defined in the State Plan. To provide for emergency response capability, the BRP has made provisions for 24 hour per day interface with PEMA.

1.3.3 County Agencies

Pamphlet Law 1332 states that, "each political subdivision of this Commonwealth is directed and authorized to establish a local emergency management organization in accordance with the plan and program of the PEMA. Each local organization shall have responsibility for emergency management, response and recovery within the territorial limits of the political subdivision within which it is organized and, in addition, shall conduct such services outside of its jurisdictional limits as may be required under this part." Therefore, each County and Local Emergency Management Coordinator in the State is responsible for establishing an emergency management organization within their respective jurisdiction, developing plans and preparing for emergency operations.

With respect to the CRANE Plume Exposure Pathway, Dauphin, York, Cumberland, Lancaster and Lebanon Counties have prepared Radiological Emergency Response Plans that are coordinated with both the State's Disaster Operations Plan and the REP Annex for CRANE Station. Local government plans are either included directly within the respective County plan or are maintained as separate but coordinated documents. The county Emergency Operations Centers (EOCs) are the location of the County dispatcher for police, fire, rescue and emergency medical services and is manned by dispatchers on a 24-hour basis. In the event of a PEMA communications breakdown, Dauphin County will act as the primary Communicator with PEMA, BRP, and the other four risk counties.

1.3.4 Additional Support Agencies

The nature of an emergency may require augmenting the emergency organizations with assistance from additional personnel and organizations. In order to ensure that support from local law enforcement, fire departments, hospitals, ambulance services and other organizations will be available on relatively short notice, agreements have been established with personnel and organizations. Agreements from offsite individuals, groups and agencies that support CRANE may take one of the following forms:

- Contracts
- Letters of Agreement
- Memoranda of Understanding
- Formal Emergency Plans

Refer to Appendix 2 for a listing of offsite support organizations.

FIGURE CRANE 1-1: CRANE Site Arrangement

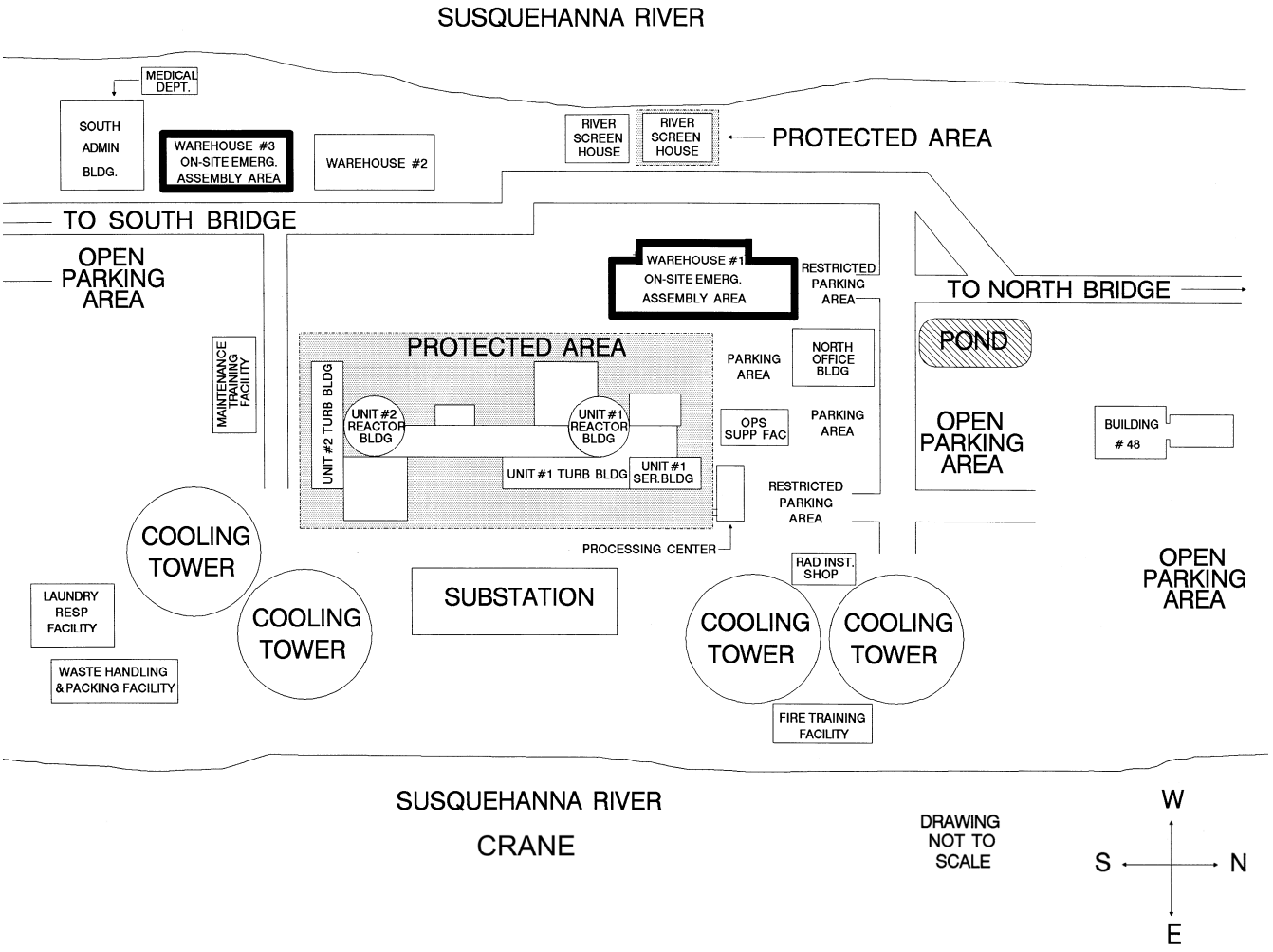


FIGURE CRANE 1-2: Relative Location of the CRANE Site

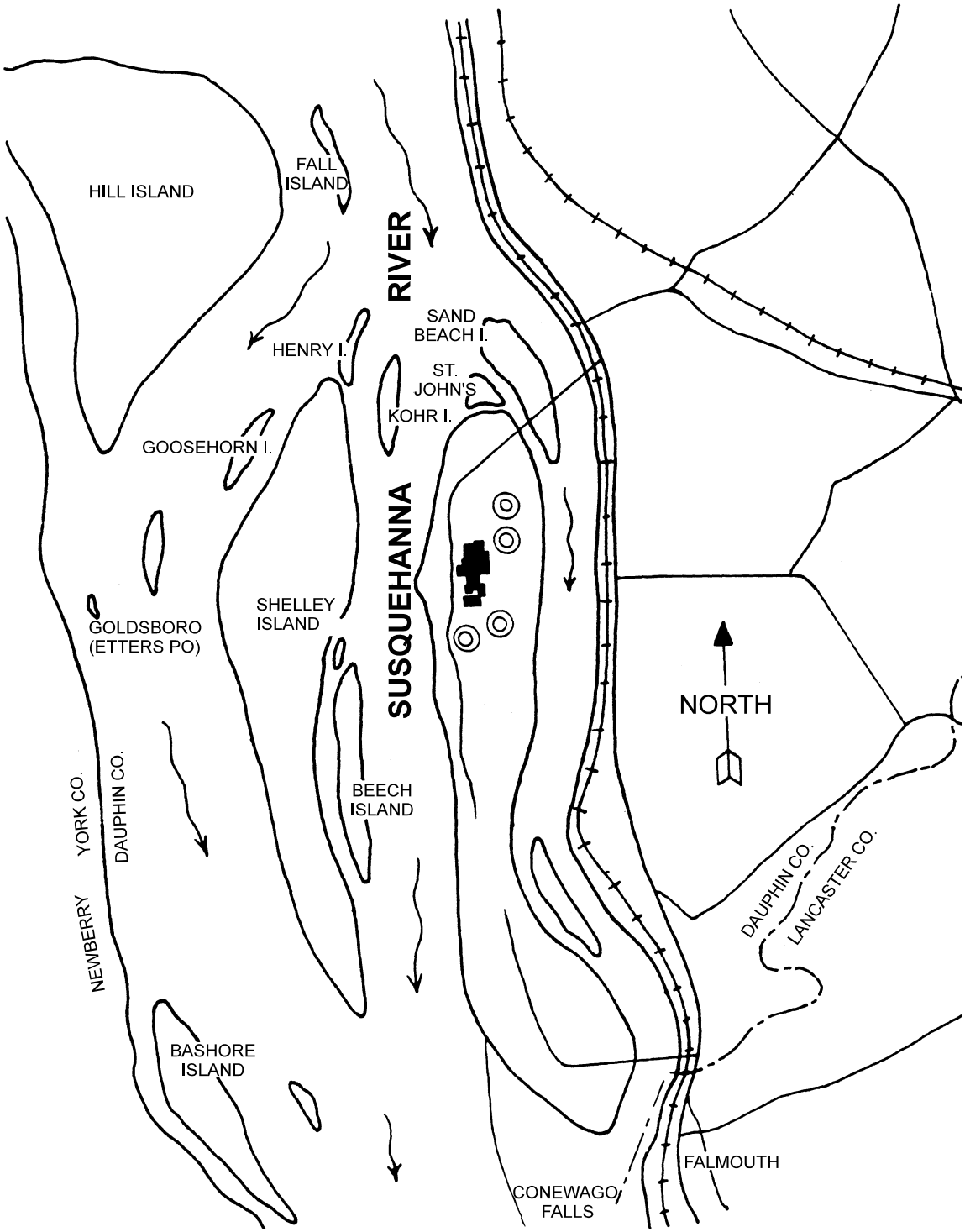


FIGURE CRANE 1-3: CRANE Site Exclusion Area and Low Population Zone

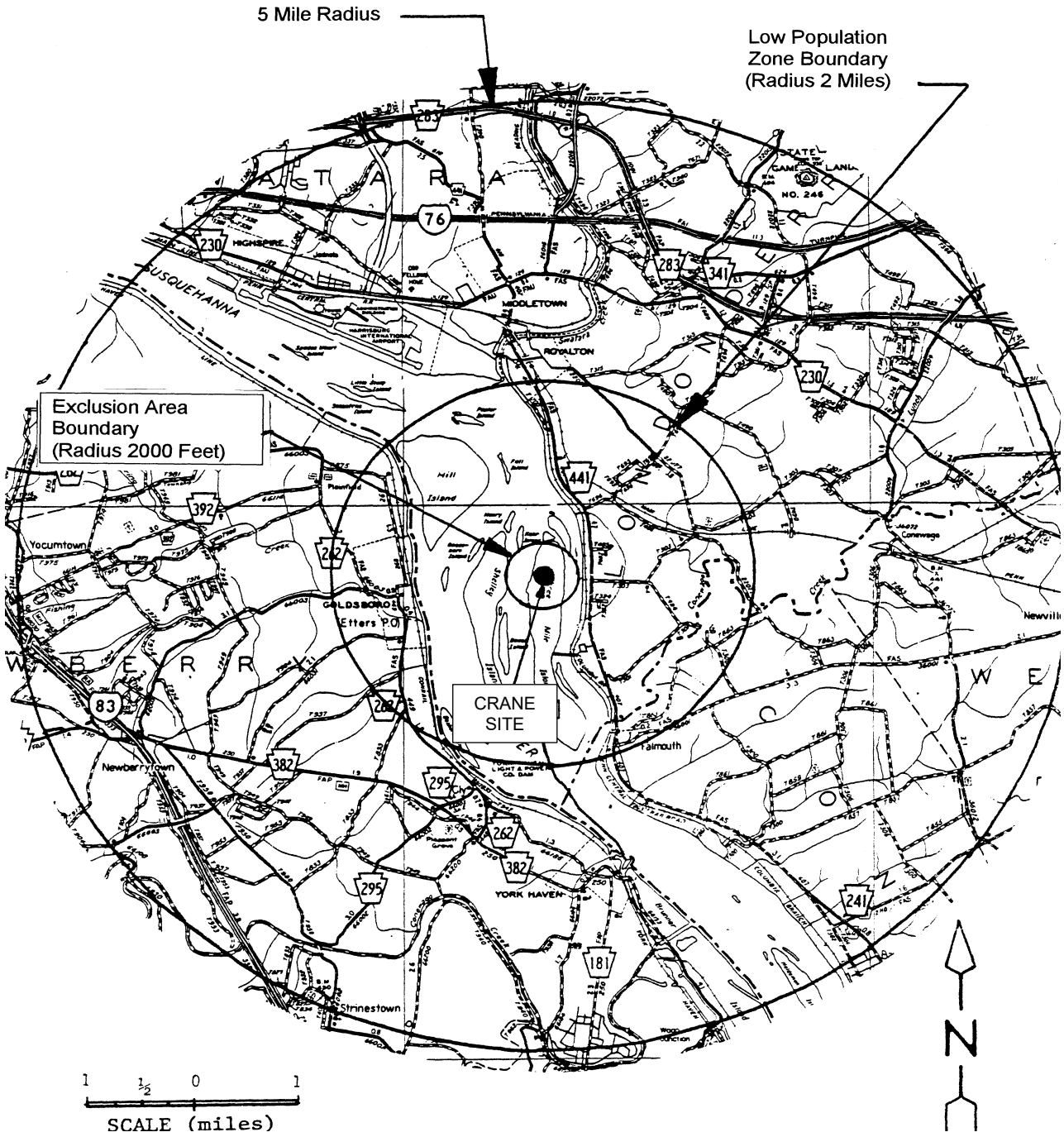
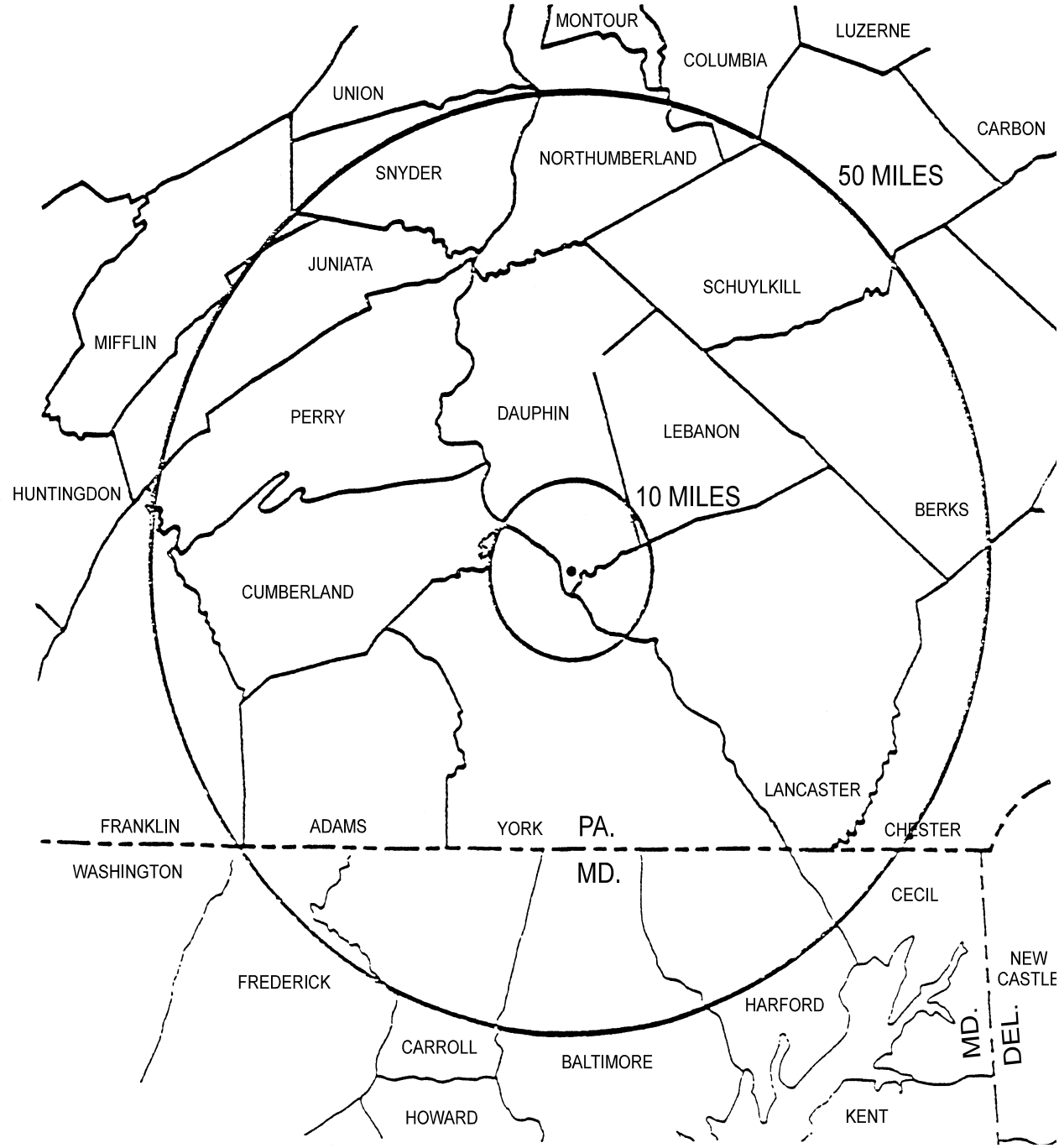


FIGURE CRANE 1-4: Plume Exposure and Ingestion Pathway EPZs

Risk Counties: Cumberland, Dauphin, Lancaster, Lebanon, York



Section 2: Organizational Control of Emergencies

Crane's Emergency Response Organization (ERO) and its key positions are described in the Constellation Radiological Emergency Plan for Crane (EP-CR-1000). This section describes interfaces among Constellation Nuclear emergency response personnel and specifies the offsite support available to respond to the nuclear generating stations.

2.1 ~~Shift Organization Staffing~~

~~**Initial response to any emergency is by the normal plant organization present at the site. This organization includes positions that are onsite 24 hours per day and is described in Section B.1 of the Crane Radiological Emergency Plan. The Normal Shift Organization will be augmented, in an emergency, with designated/additional Emergency Response Organization (ERO) personnel within 60 minutes following the declaration of an Alert or higher emergency classification as specified under Table CRANE B-1. ERO activation is described in Section H.4 of Crane Radiological Emergency Plan.**~~

~~**Table CRANE B-1 outlines ERO positions required to meet minimum staffing and full augmentation of the on-shift complement at an Alert or higher classification, and the major tasks assigned to each position. Responsibilities for each position are described in Section B.5 of the Crane Radiological Emergency Plan.**~~

~~2.2.1 Shift Dose Assessment~~

~~**A designated, qualified shift member will perform the on-shift dose assessment function. This Shift Dose Assessor will provide radiological assessment input and radiological support to the Control Room. This position reports to and advises the Shift Manager (Shift Emergency Director) in regards to in-plant, onsite and offsite radiological conditions.**~~

~~**The individual in the position performs dose projections, coordinates the initial mobilization of field monitoring teams, if a release is underway, and assists in formulating dose-based Protective Action Recommendations (PARs).**~~

~~2.2.2 Shift Communicator~~

~~**This position is responsible to make notifications to offsite agencies until properly relieved by the TSC or EOF, and assisting in the activation of the ERO callout system as directed.**~~

Shift Technical Advisor (STA) / Incident Assessor

The responsibilities of the STA are delineated on OP-AA-101-111, "Roles and Responsibilities of On-Shift Personnel." If the STA is the Shift Manager or Unit Supervisor, then another Senior Reactor Operator (SRO) shall assist as Incident Assessor during unexpected conditions and transients.

~~2.1.4 Repair Team Lead~~

~~**A designated person on-shift shall fill the Repair Team Lead position until relieved by the ERO OSC Director. This position reports to the Shift Emergency Director until control of the OSC is transferred to the TSC.**~~

~~**2.1.1** The following functions will be performed by trained members of the normal shift complement:~~

~~1. **Firefighting**~~

~~Specific personnel on each shift (Site Fire Brigade) are trained in firefighting to ensure such capability will be available 24 hours per day. The Fire Brigade, under the direction of the Fire Brigade Team Leader or another individual designated by him, shall respond to all confirmed fire alarms or as directed by the Control Room and report to the location of the fire with assigned equipment. During the normal work week, additional qualified firefighting personnel will, as necessary, be obtained from the normal on-site organization. Assistance will be requested from local fire departments through the county dispatcher / appropriate local dispatch system.~~

~~2. **First Aid and Search and Rescue**~~

~~Medical emergencies and search and rescue operations will be the responsibility of the First Aid and Search and Rescue Teams. Specific personnel on each shift are trained in first aid techniques to ensure such assistance will be available 24 hours per day. Assistance will be requested from outside medical support personnel or organizations as deemed necessary.~~

~~**2.3**~~ 2.2 Emergency Response Organization (ERO) Staffing

2.2 Emergency Response Organization (ERO) Staffing

Refer to Table CRANE B-1, Minimum Staffing Requirements for CRANE, in the Crane Radiological Emergency Plan for a description of 60-minute and full augmentation commitments. An illustration of the overall Constellation ERO command structure is provided in the Crane Radiological Emergency Plan, Figure CRANE B-1a.

~~2.3.1~~2.2.1 Emergency Onsite Organization (Figure CRANE B-1b)

~~2.3.2~~2.2.2 Emergency Offsite Organization (Figure CRANE B-1c)

2.2.3 Emergency Public Information Organization (Figure CRANE B-1d)

~~2.4~~2.3 Emergency Response Organization (ERO) Training

Training is conducted in accordance with TQ-AA-113, “ERO Training and Qualification.” Retraining is performed on an annual basis, which is defined as once per calendar year not to exceed 18 months between training sessions.

CRANE will offer training for hospital personnel, and ambulance and rescue, police and fire departments required to support implementation of the CRANE Emergency Plan. This training shall include the procedures for notification, basic radiation protection and their expected roles. For those support organizations that must enter the site, training shall also include site access procedures and the identity (by title) of the individual in the site emergency organization who will control the organization’s support activities.

2.4 Non-Constellation Nuclear Support Groups

The nature of an emergency may require augmenting the emergency organizations with assistance from additional personnel and organizations. In order to ensure that support from local law enforcement, fire departments, hospitals, ambulance services and other organizations will be available on relatively short notice, agreements have been established with personnel and organizations. Agreements from offsite individuals, groups and agencies that support CRANE may take one of the following forms:

- Contracts
- Letters of Agreement
- Memoranda of Understanding
- Formal Emergency Plans

Refer to Appendix 2 for a listing of these support organizations.

2.4.1 Miscellaneous Organizations

- Other utilities
- Institute for Nuclear Power Operations (INPO)
- American Nuclear Insurers (ANI)
- ~~AREVA~~Framatome
- Aviation services

2.4.2 Norfolk Southern Railroad Company

The Norfolk Southern Railway track crosses the access to the facility, and impeding site access could impact the implementation of time sensitive emergency actions. Theses emergency actions include augmentation of the Emergency Response Organization, use of off-site assistance, and evacuation of non-essential personnel. Therefore, a Memorandum Of Understanding (MOU) has been established with Norfolk Southern Railway Company. The purpose of the MOU is to ensure that stopped or disabled train traffic does not impede access to the island across the North Bridge for the duration of the emergency. This will provide reasonable assurances that there is sufficient time to allow implementation of emergency actions at CRANE in the event of a declared emergency. The MOU with Norfolk Southern Railway Company will be reviewed every five years.

The CRANE Staffing Tables and supporting information are re-located in EP-CR-1000.

Section 3: Classification of Emergencies

The CRANE Emergency Action Levels and supporting information are re-located in EP-AA-1009, Addendum 3.

Section 4: Emergency Measures

4.1 Notification of the Emergency Organization

Notifications for the Crane Clean Energy Center are in accordance with Section E.3 of the Crane Radiological Emergency Plan. For initial notification/escalation of Unusual Event, Alert and Site Area and General Emergencies, CRANE will notify the following offsite agencies within 15 minutes of event declaration:

- Pennsylvania Emergency Management Agency (PEMA)
- Dauphin County
- York County
- Lancaster County
- Lebanon County
- Cumberland County

Within one hour of event classification but immediately following notification of PEMA and the risk counties, CRANE will also notify the Nuclear Regulatory Commission.

Upon notification of an emergency at Crane Clean Energy Center, the Pennsylvania Bureau of Radiation Protection (BRP) will contact the appropriate station to verify that an emergency exists and to obtain technical information and then makes recommendations to PEMA regarding protective actions for the public. The BRP Support Plan For Fixed Nuclear Facility Incidents utilizes the Protective Action Guidelines in the U.S. Environmental Protection Agency (EPA) 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents".

In addition to the initial notification and verification, communication channels will be maintained between the facility and offsite emergency response organizations to allow for any further dissemination and update of information concerning the emergency.

The Commonwealth of Pennsylvania, in accordance with the State Radiological Emergency Response Plan, will coordinate offsite emergency support from Federal, State and local agencies

Constellation will provide follow-up information to the BRP or other off-site authorities. The follow-up information will keep these authorities apprised of existing or potential radiological releases, meteorological conditions, projected doses and contamination levels, licensee actions, recommend protective actions and other information pertinent to the authorities' responsibilities. The information may be provided over open communication paths or in person to BRP personnel.

4.1.1 Offsite Agency Response

1. **Risk Counties (Within Plume Exposure Pathway)**

   - The dispatcher at the Risk Counties shall notify their County Emergency Management Coordinator or his designated alternate.
   - The County Office of Emergency Management shall notify county and municipal personnel, as appropriate.
   - Dauphin County - Act as central communications agency in the event of a PEMA/CRANE communication breakdown.

2. **Pennsylvania Emergency Management Agency (PEMA)**

   Upon receiving notification of an emergency from the site, the PEMA Duty Officer Agency shall immediately notify the State Bureau of Radiation Protection (BRP).

   PEMA will also notify the following personnel, organizations, and agencies as appropriate in accordance with their standard operating procedures:

   a. Other affected County Emergency Management Agencies
   c. Other affected states
   d. Selected State agencies
   e. Selected Federal agencies

3. **Department of Environmental Protection / Bureau of Radiation Protection (DEP/BRP)**

   The Incident Manager, who receives the notification from PEMA, shall:

   - Contact the licensee to: (1) Verify actual origin of the emergency message; (2) Determine the classification of the emergency; and (3) Obtain and assess information and data pertaining to the emergency.
   - Initiate activation of the BRP emergency response organization, if appropriate.
   - Advise the PEMA Duty Officer or Operations Officer of the BRP initial assessment of the emergency.
   - Notify selected Federal agencies, as appropriate.

4.2 Assessment Actions

The effluent radiation monitoring system provides indications of gross releases of gaseous and liquid radioactivity. By applying calibration factors, meteorological data, or river flow, the gross indications are used to calculate approximate release rates in μCi/sec and dose rates at specific distances along the release pathways. Particulate and iodine analysis depends on collecting installed filter papers and charcoal cartridges for analysis in the counting room. Similar calculation procedures are applied to approximate release rates and dose rates due to iodine.

Detectors are strategically located throughout the plant. These detectors indicate and alarm locally and in the Control Room. They serve the purpose of indicating current dose rates in those areas and are used for local evacuation action levels and re-entry operations.

Certain plant operating systems contain radiation monitors. These systems are described in the CRANE UFSAR.

Portable monitoring instruments and sampling equipment consist of such items that are utilized and maintained on-site for normal day-to-day plant operations and are thus available for emergency use.

Refer to Section 5.2 for a listing of assessment resources.

4.2.1 Radiological Assessment and Offsite Monitoring

For the emergency assessment of gaseous releases, refer to the description of the dose projection model contained in Part II, Section I.4 of the Standard Plan.

For liquid releases, the radionuclide concentration at any downstream location is determined by taking liquid effluent concentrations and applying the effluent flow rate and volumetric flow rate of the receiving water. Downstream users will be notified to curtail intake if the projected concentration is above the level specified in the procedures.

4.2.2 Source Term Determination

Should the effluent radiation monitors be off-scale or otherwise inoperable, assessment of releases and off-site exposure would be made using the containment monitor readings, point of release grab samples, and pathway samples.

A detailed core damage assessment methodology has been established under Section 6.0 of the CRANE Technical Support Center Calculation Guides. The process used is based on measured physical and chemical parameters that occur in the plant when the core is damaged. Three (3) methods have been developed under Section 6.0 of the CRANE Technical Support Center Calculation Guides (per TDR 431) to determine core damage estimates:

1. In-core thermocouple temperature correlations to fuel conditions;

2. Radiation monitor and hydrogen production correlations based on fuel and plant system conditions; and

3. Chemical measurement correlations based on radionuclide inventory released into reactor coolant during core damage.

Throughout each emergency situation, continuing assessment will occur. Assessment actions at Crane Clean Energy Center may include an evaluation of plant conditions; in-plant, onsite, and initial offsite radiological measurements; and initial estimates of offsite doses. Core damage information is used to refine dose assessments and confirm or extend initial protective action recommendations. Crane Clean Energy Center utilizes EP-AA-110-302, Core Damage Assessment (PWR) as the basis methodology of post-accident core damage assessment. This methodology utilizes real-time plant indications. In addition, Crane Clean Energy Center may use samples of plant fluids and atmospheres as inputs to the CDAM (Core Damage Assessment Methodology) program for core damage estimation.

4.3 Protective Actions for the Offsite Public

The responsibility for actions to protect persons in offsite areas rests with the State and is described in detail in the State Emergency Plan and implemented in conjunction with the county emergency plans.

DEP/BRP is the specific agency responsible for evaluating information from the CRANE staff and all other sources and recommending to PEMA that protective actions be taken. The BRP has sheltering and evacuation as protective action options. The most appropriate protective action for a particular situation will depend on the magnitude of the release, duration of the release, wind speed, wind direction, time of day and transportation constraints. In the case of a General Emergency, circumstances may indicate the immediate need to initiate some precautionary protective action. This judgment is the responsibility of the BRP and should be based on an evaluation of the current plant conditions, dose projections relative to the PAG's and expected subsequent plant operations/evaluations.

Off-site it is the responsibility of the State Department of Agriculture, in conjunction with the Department of Environmental Protection, to issue guidance and coordinate actions to control contaminated agricultural products.

The means to warn or advise involved persons is a responsibility of the risk county. The risk county, in coordination with the State, is also responsible for the preparation and dissemination of information material for the general public on protective actions including necessary information (evacuation routes, maps, etc.) for the implementation of protective measures in the Plume Exposure Pathway.

The population within the 10-Mile Emergency Planning Zone (Plume Exposure Pathway) will be provided, on a periodic basis, information describing the methods by which they will be notified of an emergency and specific instructions that should be followed upon receipt of such notification.

4.3.1 Alert and Notification System (ANS) ~~Sirens~~

The capability exists for the prompt notification of the general public within the Plume Exposure Pathway Emergency Planning Zone (EPZ) for CRANE.

The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA. A more specific description of the various prompt public notification systems is presented in the FEMA ANS Design Report for Crane.

~~The ANS is comprised of sirens distributed throughout the 5 risk counties that fall within the CRANE Plume Exposure EPZ. A complete description of the siren system to include siren ratings, siren coverage, and location is located with the Emergency Preparedness Department. The CRANE Station ANS meets the guidelines of Appendix 3 to 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. as identified in each site specific siren acoustical evaluation.~~

~~After State authorities have been notified, the ANS (sirens) and Emergency Alert System (EAS) are the primary means of notifying the population within the Plume Exposure Pathway (10-Mile EPZ). The risk counties can activate the sirens located in their portion of the county that falls within the same Plume Exposure Pathway EPZ. The signal is a three to five minute steady tone that alerts the population to tune their radios or television to the local EAS station. PEMA and risk counties will then broadcast emergency information messages advising the population of what actions should be taken, if any.~~

~~Backup means of notification is achieved through Route Alerting, which is contained within the State and respective counties' Radiological Emergency Response Plans and procedures. The means consists of utilizing vehicles with public address (PA) systems in the event the primary method of alerting and notification is unavailable. The backup method has the capability to alert and notify the public within the plume exposure pathway EPZ within a reasonable time but does not need to meet the 15-minute design objective for the primary prompt public alert and notification system.~~

4.3.2 Evacuation Time Estimates

The ETE study uses population data from the decennial census which includes parts of five Pennsylvania counties: Cumberland, Dauphin, Lancaster, Lebanon and York. The evacuation times are based on a detailed consideration of the EPZ roadway network and population distribution. The ETE Study, contained in EP-AA-1009 Addendum 2, Evacuation Time Estimates for the Exposure Pathway Emergency Planning Zone, presents evacuation times for daytime and nighttime scenarios under various weather conditions for the evacuation of various areas around the CRANE Station, once a decision has been made to evacuate.

4.3.3 Potassium Iodide (KI)

The Department of Health, Commonwealth of Pennsylvania, is responsible for providing advice to PEMA on the planning for the use, stockpiling and distribution of Potassium Iodide (KI) or other thyroid blocking agents and such other radiological health materials as may be required for the protection of the general public. Their decision shall also be based on U.S. FDA guidance.

Based on the criteria established under the Commonwealth of Pennsylvania Operations Plan, the CRANE Station will recommend to government officials that the general public be notified to take KI at a General Emergency classification in those areas were an evacuation or shelter has been recommended. This notification will be approved by the Emergency Director in Command and Control of PAR decision-making and off-site notifications and performed as part of the State / local notifications described under Sections II.B.4 and II.E.3 of the Crane Radiological Emergency Plan.

4.3.4 Public Information

a. Publications

Public information on protective actions is prepared and disseminated annually to provide clear instructions to the population-at -risk. Constellation Nuclear assists PEMA and risk counties in the preparation and distribution of their respective public information.

Pamphlets outlining public education response actions are readily available for transients in the 10-Mile EPZ. In addition, emergency information is provided to the operators of other recreational areas in the 10-Mile EPZ, as defined by the Commonwealth of Pennsylvania and risk counties.

These public information publications ~~(including telephone book emergency information, etc.)~~ instruct the public to follow the wireless emergency alerts. ~~go indoors and turn on their radios when they hear the ANS sirens operating.~~ These publications also identify the local radio stations to which the public should tune in for information related to the emergency. Additional materials (e.g., such as rumor control numbers, evacuation routes, etc) may also be included in these publications based on agreements with responsible State and risk county agencies.

b. News Media Education

Information kits are available to news media personnel. These kits include information on a variety of nuclear power plant related subjects.

4.3.5 Protective Action Recommendations (PARs) for the General Public

To aid the Emergency Response Organization during a developing emergency situation, EP-AA-111, "Emergency Classification and Protective Action Recommendations" has been developed.

4.4 Protective Actions for Onsite Personnel

During an emergency, personnel may be required to temporarily relocate to prevent or minimize exposure to radiation and radioactive materials. The following subsections discuss the policies applying to sheltering, evacuation and personnel accountability during emergencies at the CRANE site.

At the time an emergency is declared, an announcement is made on the site public *address* system to all personnel within the Owner Controlled area. The announcement will include the classifications of the event, a brief description of the event, and actions taken by site personnel. Shift personnel will proceed to their emergency assignments.

The CRANE licensee retains complete authority to determine and maintain sufficient control of all activities including the authority to exclude or remove personnel and property for land areas within the exclusion area and contamination will, thereby, be controlled. In addition, there are no areas for producing agricultural products within the exclusion area. In-plant contamination control will be in accordance with approved Radiological Controls procedures.

The primary protective measures for onsite personnel during an emergency is prompt evacuation from areas, which are affected by significant radiation, contamination, airborne radioactivity or other personnel hazards. All persons onsite at the time an emergency is declared shall be notified by means of the plant page supplemented by designated personnel providing notification in areas that the page does not cover.

4.4.1 Emergency Personnel Exposure

Exposure to personnel remaining onsite as or in support of ERO activities will be monitored. This may be accomplished through continuous monitoring for habitability at designated emergency and support facilities. Dosimetry will be issued to personnel leaving or working outside a monitored facility and will be available to ERO personnel located inside a site emergency facility, in the event of a radiological release or elevated plant radiation levels, as applicable, per approved procedures. Additional provisions have been made for dosimetry issue at the site entrance gates or other locations, if required. Dosimetry will be periodically read and recorded in accordance with approved RP procedures.

Emergency personnel, including those involved in the removal of injured persons, undertaking corrective actions, performing assessment or personnel decontamination, and providing first aid and support to ambulance services will have their radiation dose controlled in accordance with approved procedures and normal Radiation Protection (RP) practices.

When offsite emergency personnel are called to respond to CRANE, station RP support is provided to support these activities, which include the monitoring and control of radiation exposure and evaluation of radiological hazards.

4.4.2 Radiological Monitoring and Decontamination

Personnel and equipment decontamination will be initially accomplished at the Radiation Protection Access Control Point where specialized equipment and supplies are available. Procedures are written with specific details for decontamination. For personnel within the Protected Area, emergency situations, which require decontamination will be handled in accordance with these procedures.

All personnel leaving a Radiological Controlled Area (RCA) will be monitored for contamination. Any individual found to have contamination levels in excess of thresholds established in RP procedures will be considered contaminated.

Personnel found to be contaminated will undergo decontamination by radiological controls personnel (or other designated personnel as specified in Radiation Protection Procedures). Measures will be taken to prevent the spread of contamination. Such measures may include isolating affected areas, placing contaminated personnel in "clean" protective clothing before moving, and decontaminating affected personnel, their clothing and equipment prior to release, in accordance with applicable station Radiation Protection Procedures.

In the event that a release of contaminants has occurred or is occurring, in-plant potable water systems will be secured to prevent possible contamination. If food and water supplies are brought in for emergency personnel who remain on-site these supplies will be packaged in sealed containers and will be monitored by Radiation Protection personnel (using standard Rad Con practices and procedures) prior to use or consumption and on a normal routine basis. Any food or water supplies discovered as contaminated will immediately be disposed of as waste and will not be used.

Upon receipt of information that the emergency has entered recovery phase, in-plant facilities and areas will be surveyed, sampled, and cleared for use, or controlled as necessary, in accordance with applicable Radiation Protection practices.

4.4.3 Personnel Accountability / Site Evacuation

Upon declaration of a Site Area Emergency, General Emergency and/or at the discretion of the Station Emergency Director, essential personnel within the Protected Area will be accounted for at the Control Room, TSC and OSC unless other factors (e.g., security events) advise against it.

Non-essential personnel will be directed to proceed to their vehicles directly and to evacuate to designated Remote Assembly Areas or dismissed to their homes. The Station Emergency Director based on the prevailing radiological conditions will determine evacuation routes. This evacuation will be accomplished using private vehicles.

In support of these operations, a sweep of buildings, trailers, and other areas of the Owner Controlled area will commence to ensure that all persons have assembled and/or evacuated the site.

Refer to Section J of the Crane Radiological Emergency Plan for specific requirements for the initiation and completion of personnel accountability and the evacuation of non-essential personnel from the site. Search and rescue operations will be implemented to locate any missing persons.

4.4.4 Monitoring of Evacuees

At the Remote Assembly Areas (Figures CRANE 4-1 and CRANE 4-2), personnel and vehicles from the CRANE site will be monitored for radioactive contamination, if necessary. Individuals found to be contaminated will be decontaminated in accordance with applicable Radiation Protection Procedures. Vehicles found to be contaminated will be impounded until they can be decontaminated. Inclement weather will not affect the direction of the traffic flow but may increase evacuation times.

If anyone is found to be contaminated, showers, sinks and decontaminating supplies are available in close proximity to the plant. Equipment for decontamination personnel will be stored in Emergency Supply Lockers. Portable survey instruments are available and routinely calibrated for use in decontamination operations. All skin contamination problems will be treated using accepted Radiation Protection practices.

For contaminated personnel inside the Protected Area, the preferred decontamination facility will be those onsite at the CRANE Site Laboratory, if accessible; otherwise, offsite facilities will be used.

The registering and monitoring of the general public evacuating from the Plume Exposure Pathway EPZ, as described in Section II.J.12 of the Crane Radiological Emergency Plan, will occur at designated facilities per the respective State and County Radiological Emergency Response Plans.

4.5 Severe Accident Management

Accident management consists of those actions taken during the course of an accident, by the Emergency response Organization (ERO), specifically: plant operations, technical support, and plant management staff in order to:

- Prevent the accident from progressing to core damage;
- Terminate core damage once it begins;
- Maintain the capability of the containment as long as possible; and
- Minimize on-site and off-site releases and their effects.

The later three actions constitute a subset of accident management, referred to as Severe Accident Management (SAM) or severe accident mitigation. The Severe Accident Management Plan Procedures (SAMPs) provide sound technical strategies for maximizing the effectiveness of equipment and personnel in preventing, mitigating and terminating severe accidents.

Implementation of SAMPs is a collaborative effort between the Shift Manager and the Station Emergency Director in the TSC (once activated). The Station Emergency Director maintains ultimate responsibility for direction of mitigating strategies. Designated TSC personnel are also trained to assist in evaluating plant conditions using the SAM Technical Support Guidelines (TSG).

FIGURE CRANE 4-1: Remote Assembly Area – CRANE Training Center

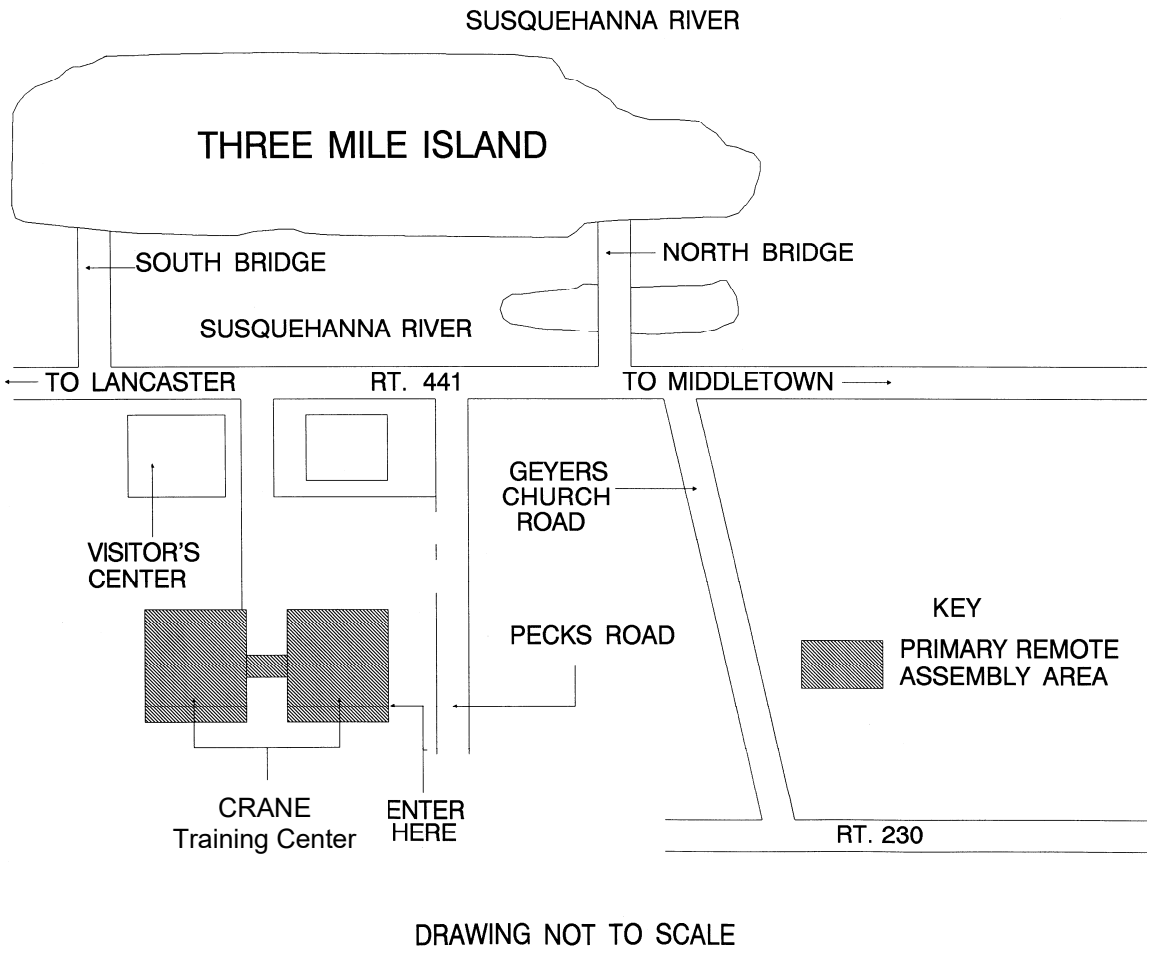
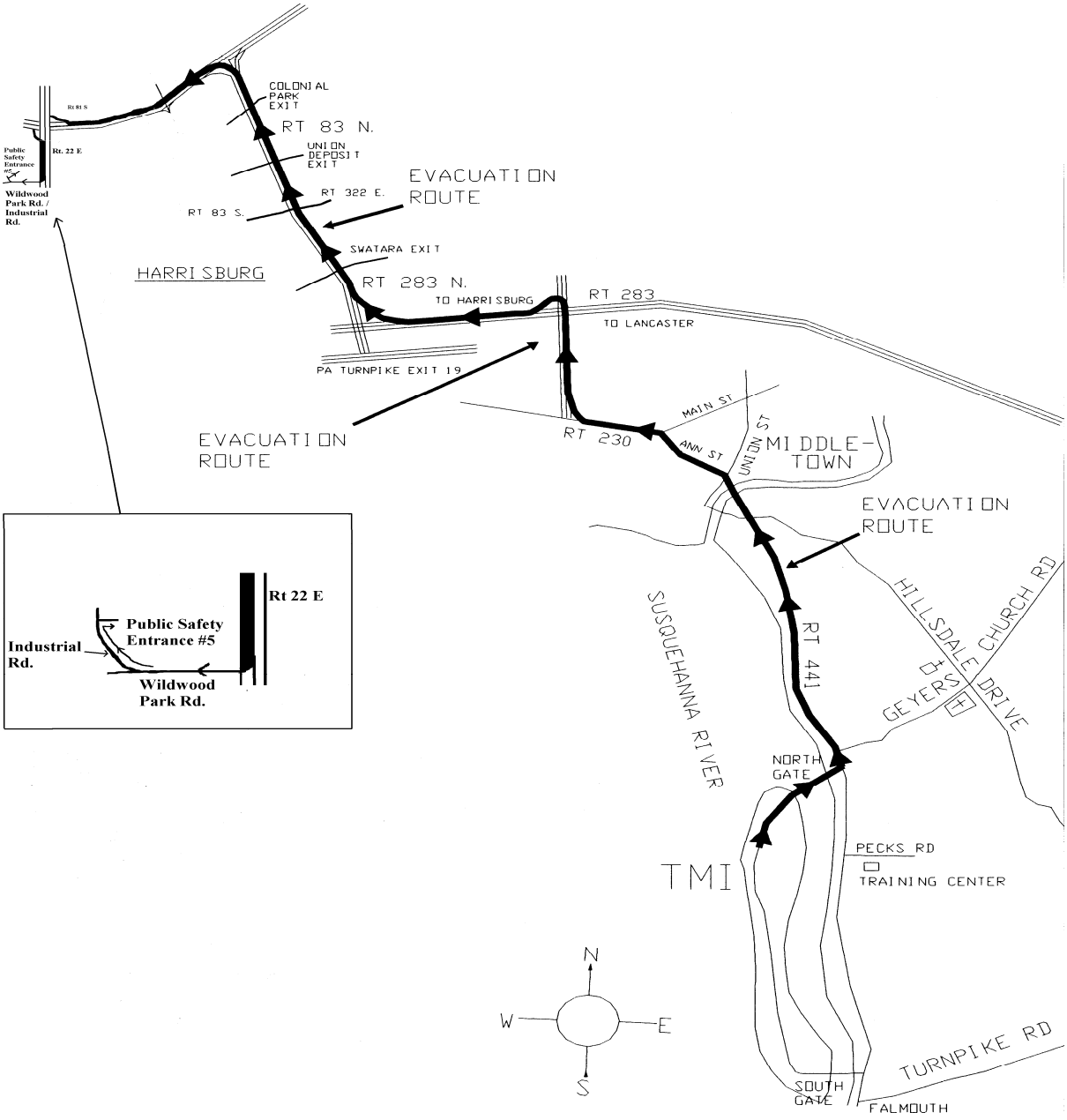


FIGURE CRANE 4-2: Remote Assembly Area – Harrisburg Area Community College



Section 5: Emergency Facilities and Equipment

5.1 Emergency Response Facilities

5.1.1 Station Control Room

The Control Room and Shift Manager's Office are designed to be habitable under accident conditions. These areas are located in seismically-rated structures and have adequate shielding to permit safe occupation for extended periods of time. The CRANE Control Room ventilation system has redundant fans and chillers and is provided with radiation and smoke detectors with appropriate alarms and interlocks. Provisions have been made for air from the control rooms to be recirculated through high efficiency particulate air (HEPA) and activated charcoal filters. Fresh air is drawn through underground ventilation tunnels which have been provided with protection against combustible vapors, incipient explosions or fires. The tunnels are Seismic Class I rated and also designed for a hypothetical aircraft incident.

Emergency lighting, power, ventilation system, and shielding walls enable operators to remain in the Control Room to ensure that the reactor will be maintained in a safe condition. In addition, the operators will be able to evaluate plant conditions and relay pertinent information to appropriate onsite and offsite personnel, organizations, and agencies during emergencies. To ensure the operations shift and other personnel assembled at the location can remain self-sufficient, emergency equipment and supplies will be stored in or near the Control Room. The location, type and quantity of emergency equipment and supplies available is specified in the Emergency Plan Administrative Procedures.

5.1.2 Technical Support Center (TSC)

The TSC is located on the 1st floor of the Operations Support Facility (OSF), which is outside but adjacent to the Protected Area. The TSC meets the requirements of NUREG-0696 for size and habitability, including a filtered HVAC system that can be isolated in the event of a radiological accident.

A backup electrical power source is designated in the event of a loss of the normal power supply. Uninterruptible power supply (UPS) capability is provided to designated electrical outlets to ensure that a transient loss of power does not occur to significant communications, dose projection, and data acquisition and display systems.

A room is provided for use by NRC response team members and the Resident Inspector during a declared emergency event. This conference room provides a workspace and telephone communications for a minimum of five (5) people.

Records and drawings, which describe conditions and layout of structures, systems, and components, are contained in filing cabinets inside the TSC.

5.1.3 Operational Support Center (OSC)

The OSC is located on the 305' Elevation of the Service Building. The OSC conforms to the requirements of Section H.1.c of the Crane Radiological Emergency Plan.

The OSC serves as a muster area for shift personnel and as a location to organize and dispatch emergency response teams (i.e., onsite radiological monitoring, fire brigade, rescue operations, damage control, and maintenance). Emergency equipment and supplies, including portable radios, portable lighting, protective clothing, and respirators, are maintained in emergency lockers located or adjacent to in the OSC. Additional emergency equipment, such as gamma and air monitoring equipment can be made promptly available to the OSC if needed.

In the event the OSC is not habitable, personnel report to backup facilities that can be designated based upon specific event conditions.

5.1.4 Emergency Operations Facility (EOF)

The dedicated Emergency Operations Facility (EOF) is located at 175 North Caln Road, Coatesville, PA, approximately 50 miles from the CRANE Site.

Primary staffing of the Coatesville facility will be from the Constellation Energy Mid-Atlantic Region Office located in Kennett Square, PA, which is approximately 18 miles drive (11 miles straight line distance) from the Coatesville facility.

Plant Monitoring System data is available through the Emergency Preparedness Data System (EPDS) at the EOF. The Coatesville facility has a designated diesel generator and UPS as a backup power source in the event of a loss of normal power.

The EOF equipment includes:

- Supplies and equipment for EOF personnel, and
- Sanitary and food preparation facilities.

Separate offices are provided for Constellation Energy, NRC, State representatives and other emergency personnel.

5.1.5 Joint Information Center (JIC)

The Joint Information Center (JIC) is the facility in which media personnel gather to receive information related to the emergency event. The JIC is co-located with the EOF at 175 North Caln Road, Coatesville, Pennsylvania.

5.1.6 Alternative Facility

The Alternative Facility maintains the capability for staging the TSC/OSC emergency response organization personnel in the event of a hostile action. This alternative facility has the capability for communications with the emergency operations facility, control room, and plant security and the capability for engineering assessment activities, including damage control team planning and preparation. Consistent with NRC EPFAQ No. 2013-005, the EOF will satisfy the offsite notification responsibilities for the Alternative Facility. The Alternative Facility is located at the Londonderry Fire Hall 2655 Foxianna Road, Middletown, Pennsylvania. **(CM-1, ref. AR 1362747.44)**

5.2 Assessment Resources

5.2.1 Radiation Monitoring System

The onsite Radiation Monitoring System 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 plant. The Radiation Monitoring System 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. Specific details regarding radiation monitoring and effluent monitoring systems can be found in system design descriptions (SDDs), site Final Safety Analysis Reports, and the CRANE Radiation Monitoring Setpoint Procedures.

The data from these subsystems are displayed by readout in the Control Room. Selected channels are recorded by recorders and/or the plant process computer, which are also located in the Control Room.

In general the radiation monitoring equipment is designed in accordance with the following:

- Each monitoring station has adjustable alarm, alert, and power supply failure alarms.
- Solid-state circuitry is used except for primary detectors.
- Most AC operated radiation monitoring equipment, except for the pump assemblies, is provided with power from the battery-backed, inverter-fed vital power supply bus.
- Each radiation monitor is capable of being checked periodically with solenoid actuated check sources.
- A pulse generator or solid sources are used for electrically checking each monitor or subsystem.
- The modules are designed so that an alarm and/or indication is initiated when failure occurs anywhere in the channel.

1. **Area Radiation Monitoring**

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

2. **Containment Radiation Monitors**

   Post accident radiation levels in containment are monitored by two channels of fully qualified high range area monitors. These monitors are ion chamber detectors and are designed to withstand a LOCA. Readout modules are located for these detectors on the radiation monitoring panel in the control room.

   The set points on this monitor could be used to indicate to the operator that the Emergency Action Levels (EALs) were reached under the Fission Product Barrier loss matrix provided in Section 3.

3. **Atmospheric Radiation Monitoring**

   Each installed atmospheric monitor (except the condenser off-gas, ESF ventilation exhaust and waste gas monitor) is comprised of a particulate measuring channel, iodine measuring channel, and a gaseous 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 refueling 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.

4. **Liquid Radiation Monitoring**

   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, waste treatment system discharge monitor and the turbine building sump pump). The monitors provide visual indications in the Control Room. The CRANE Primary Coolant Letdown monitor also contains a high range channel.

5. **Post Accident Sampling System (PASS)**

   Liquid Reactor Coolant System Post Accident Sample System (PASS) samples may be taken from the pressurizer and decay heat and reactor coolant letdown systems. Liquid samples may be analyzed for isotopic concentration, boron concentration, chloride concentration and dissolved gases.

The Containment Atmosphere Post Accident Sampling System (CATPASS) is used to sampling isotopic concentration in the containment atmosphere. MAP-5 microprocessor stations sample iodine and particulates in condenser off-gas and auxiliary and reactor building exhausts.

5.2.2 Fire Protection Devices

CRANE has implemented and maintains a Fire Protection Program as described in the updated FSAR for CRANE. The Fire Protection Program is controlled under CRANE license conditions.

5.2.3 Seismic Monitoring

Strong motion recording systems at CRANE measures ground motion and structural vibrating response caused by an earthquake occurring in the vicinity of the site. Cassette magnetic tape recorders located in the CRANE Control Room receive information supplied by triaxial sensor units which are firmly mounted on the Reactor Building. One triaxial sensor unit is attached immediately outside of the containment wall at the base of the Reactor Building. A second triaxial sensor is situated along the same Reactor Building axis but is attached to the Reactor Building ring girder. The triaxial sensor units begin to supply seismic data to the magnetic tape recorder after a signal is sent to the sensors by a remote starter unit. A remote starter unit attached to the base of the Reactor Building provides a signal for its systems sensor units when the starter unit detects a ground acceleration greater than a present threshold level. The remote starter also actuates an annunciator in the CRANE control room labeled "Threshold Seismic Condition". If the ground acceleration exceeds the horizontal or vertical setpoints, a seismic trigger, also mounted on the base of the Reactor Building, will cause a CRANE annunciator labeled "Operating Basis Earthquake" to actuate.

The time history of a ground motion and resulting vibrating response can be displayed by using magnetic tape cassettes containing the recorded data, and the magnetic tape playback system in the control rooms. The magnetic tape playback system produces visual playouts of selected magnetically recorded data. This is accomplished with a strip chart recorder built into the playback system. A visual playout allows quick analysis of the earthquake. The magnetic tapes are available also for detailed analysis.

Peak reading accelerographs are anchored to Class 1 selected items. These accelerographs will produce a permanent record of the peak amplitude of the low frequency accelerations caused by seismic disturbances.

This record is in the form of magnetic erasure clips which must be developed using the magnetic developer kit. After developing, these clips can be examined to verify seismic response which had been determined analytically.

5.2.4 Onsite Meteorological Monitors

At CRANE, basic meteorological information is obtained from a weather tower maintained at the north end of the Island. Real time information can be obtained from the plant process computer.

The meteorological measurement system is deployed on a 150 ft. tower. It measures wind speed and wind direction at 98 ft. and 145 ft. above grade. There are redundant speed and direction sensors at the 98 ft. level. Temperature is measured at both 31 ft. and 145 ft. from two sets of platinum sensors. Temperature difference (ΔT) is also derived and recorded. A recorder located inside the meteorological building adjacent to the weather tower records all of the above information. The Control Room also has a recorder with wind speed, direction, temperature, and differential temperature which is an indication of atmospheric stability.

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

Protective Measures personnel are capable of making real-time offsite estimates of atmospheric effluent transport and diffusion following an accidental airborne radioactive release from the plant. Real time meteorological information is obtained from the plant process computer. The recorder at the meteorological building located at the north end of CRANE has a storage capacity of several months of data. Beyond that time period the meteorological data is permanently stored in a history file. Back-up meteorological information is available from the National Weather Service directly and indirectly from other sources that collect National Weather Service information.

5.2.5 Process Monitors

Process monitors measure appropriate parameters that are indicative of the status of various plant systems and the reactors. These parameters are displayed and recorded in the Control Room, or at local panels in the plant

5.2.6 Laboratory Facilities

The CRANE laboratory facility is equipped to provide the water chemistry and radiochemical analysis support required during normal plant operations and emergencies.

5.3 Protective Facilities and Equipment

Personnel protective action is a function of the nature of the hazard (e.g., preparing for a hurricane is somewhat different from preparing for radiological hazards). Preplanned responses to basic hazards, high wind, flooding, earthquakes, and radiation exposure, are an integral part of the Emergency Plan. A fundamental concept in personnel protection is the evacuation of all individuals not essential to the operation, safety, security, and damage control of the plant. Obviously some hazards can occur before significant protective action can be applied (e.g., earthquake). When the situation permits positive action, the appropriate alarms are sounded and all personnel on the site either assume assigned emergency responsibilities or prepare for evacuation.

Provision has been made for adequate supplies and protective equipment for all personnel who may be required to perform emergency activities. Specific quantities of each type are detailed in station procedures and include equipment for personnel monitoring, determining the magnitude and continuously assessing the impact of the release of radioactive material, decontaminating personnel and providing emergency first aid. Additionally, a current prescription and adequate supplies of potassium iodide are maintained for issue to personnel exposed or suspected of exposure to radioactive iodine.

Onsite locations have been designated as emergency assembly points or areas where emergency teams will be assembled in accordance with the Emergency Plan Implementing Procedures or as directed by the Station Emergency Director. Major locations for onsite protective equipment and supplies are the Control Room, access control point, and processing center. Additional information regarding protective facilities can be obtained by consulting the UFSAR.

5.3.1 First Aid and Medical Equipment

A first aid facility is designed to support a wide range of immediate care requirements ranging from simple first aid to procedures requiring a physician.

Small kits placed throughout the plant provide the most readily available first aid. These kits contain items typically needed to care for minor injuries. Typical contents can be referenced in Table CRANE 5-1. The next level of first aid equipment is found at first aid stations. The medical staff can also provide Advanced Life Support and routine trauma care.

5.3.2 Damage Control Equipment

The CRANE plant site is extensively equipped to conduct preventive maintenance and repairs on mechanical, structural, electrical, and instrumentation and controls equipment found in the plant.

In addition to the equipment and materials required for normal maintenance, other items are available to handle extraordinary maintenance jobs that might arise in damage control. Selection of damage control equipment inventory is based upon (a) mitigating the consequences of flooding, (b) personnel rescue, (c) checking the uncontrolled flow of fluids from process systems, and (d) elimination of electrical hazards. Typical equipment available for damage control can be found in Table CRANE 5-1.

5.3.3 Radiation Protection Equipment

The CRANE plant site maintains an inventory of protective clothing, respiratory equipment, survey instruments and supplies to provide adequate contamination control for all personnel expected to be onsite who might be affected in the event of an emergency.

The supplies are maintained, updated, inventoried and calibrated, as appropriate, on a regular basis in accordance with applicable procedures. Storage locations of emergency supplies can be found in the site implementing documents. Typical equipment available can be found in Table CRANE 5-1.

5.3.4 Emergency Equipment Readiness

Designated emergency equipment and supplies and their storage locations will be listed in the Emergency Plan Implementing Documents. Such equipment and supplies will be maintained, inventoried, inspected and calibrated in accordance with approved site procedures. Equipment, supplies, and parts having shelf-lives will be checked and replaced as necessary.

To insure that the necessary emergency equipment is maintained and available for use during emergency situations, readiness checklists have been developed and incorporated in Administrative Procedures. These checklists facilitate detailed inventory and calibration/functional checks of equipment contained in the emergency kits/lockers. The inventory checklists will be performed on a quarterly basis and to insure interim readiness, all kits/lockers are sealed or locked as appropriate.

Any deficiencies found during the inventory and inspection will be either cleared immediately or documented for corrective action. A report of each inventory and inspection, including documented deficiencies, will be prepared and submitted to the Emergency Preparedness Manager. He will ensure that cognizant department heads assign personnel to correct deficiencies and shall ensure that identified deficiencies are corrected in a reasonable period of time.

5.4 First Aid and Medical Facilities

5.4.1 Decontamination and Medical Response

Emergency first aid and medical treatment will be given to injured personnel who may or may not be contaminated. ~~Shift personnel, trained in first aid, will be available onsite on a 24-hour per day basis and will assist contaminated personnel at the scene of the accident.~~ Provisions have been made, through agreements, to ensure contaminated and injured personnel will receive specialized medical treatment, if necessary. Local hospitals in the vicinity of the CRANE site have agreed to accept contaminated patients for emergency medical and surgical treatment and/or observation.

A comprehensive program of radiological control for injured/contaminated personnel has been developed and will be instituted when necessary during an emergency. The primary emphasis will be to initially address traumatic or life-threatening injuries since radiation injuries may not be immediately life threatening. Detailed instructions for treatment and transportation of contaminated and injured individuals are specified in appropriate procedures.

5.4.2 Medical Transportation

Agreements have been made with local medical support organizations to provide ambulance services to the site. Ambulance personnel will be certified in accordance with State regulations. CRANE will offer training to the squad members in the treatment and transportation of contaminated injured individuals. CRANE will provide radiological control technicians if available to assist the squads enroute to the hospital. CRANE or local first aid squads provide ambulance service for the facility.

When affected personnel must be transported, measures will be taken to prevent the spread of contamination. Such measures will include placing affected personnel in "clean" protective clothing or wrapping them in blankets. The Emergency Director will insure that these organizations, which provide the transportation and treatment, are alerted.

Detailed instructions for treatment and transportation of contaminated and injured individuals are specified in appropriate procedures.

A Letter of Agreement is established with the local Emergency Medical Services agencies to provide Emergency Medical Services in response to a Radiological Event including a Hostile Action Based Event. This includes transportation of patients from CRANE, including those who may have been exposed to radiation or may have injuries complicated by radioactive contamination, to the Penn State Milton S. Hershey Medical Center (HMC) or UPMC Pinnacle Harrisburg Hospital upon dispatch by the Dauphin County Emergency Dispatch.

5.4.3 Medical Treatment

Arrangements for hospital and medical services for injured or contaminated / overexposed personnel are provided for by letters of agreement.

The first level of treatment can be given on-site by personnel trained in first aid. If the severity of the injury requires more extensive or prolonged treatment, the patient will be transported for the second level of assistance. For conventional injuries (that is, non-radiation injuries), the patient will be transported to any of the local hospitals.

Arrangements for hospital and medical services for injured and/or contaminated/overexposed personnel are provided by UPMC Pinnacle Harrisburg Hospital and Penn State Milton S. Hershey Medical Center. These hospitals have agreed to accept contaminated patients for emergency medical and surgical treatment or observation. Detailed plans and procedures are in place for decontamination and treatment of contaminated patients.

A Letter of Agreement is established for UPMC Pinnacle Harrisburg Hospital and Penn State Milton S. Hershey Medical Center to provide assistance in support of the Radiological Emergency Plan at Crane Clean Energy Center to the extent of their capabilities should an emergency situation, including hostile action based event, occur at the Crane Clean Energy Center.

5.5 Communications

5.5.1 Emergency Communications

The provisions utilized for prompt communications among principal emergency response organizations, communications with the ERO and communications with the general public are described in Part II, Section F: Emergency Communications, of the Crane Radiological Emergency Plan.

5.5.2 Radio Communications

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

At CRANE, radio capabilities include the following frequencies from Control Room, OSC, TSC, CAS/SAS and mobile vehicle / potable units, as applicable:

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

Dedicated channels on the redundant T-1 lines to the CRANE radio bay station in the TSC Radiological Assessment Room will allow access from the existing Coatesville multi-channel, fixed base radio system used under the common Emergency Plan for LGS & PBAPS. At the TSC bay station, the T-1 lines will tie into the Station Radio System, thus allowing the use of the existing Environmental and Radiological Frequency for communications with field survey team within the CRANE 10-mile Emergency Planning Zone (EPZ).

The fixed base radio repeaters, antenna system and radio consoles for the Coatesville EOF are powered from a variety of emergency AC sources (diesel backup and alternate battery supplies).

5.5.3 Station Warning System

1. **Alarms**

   Audible alarms are a quick and effective means of communicating emergency warnings on the site. Alarms currently installed at CRANE include:

   - Station Emergency Alarm
   - Fire Alarm
   - Reactor Building Evacuation Alarm

   Each alarm provides a distinctive sound that all site personnel and contractors are trained to recognize and respond to. The Station Emergency Alarm will be followed by an announcement that provides emergency information such as class of emergency declared, accountability directions, radiological precautions, etc. At CRANE, the Reactor Building evacuation alarm is supplemented with flashing lights at specific locations in the Reactor Building to provide both audible and visual warnings.

   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 CRANE, alarm data is also provided by CRTs.

2. **Plant Paging System**

The Plant Paging System provides plant-wide paging from the Control Room and all remote stations plus private communications during normal operating conditions.

The plant 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 vital plant areas.

5.6 Law Enforcement Agencies

A Letter of Agreement is established for Local Law Enforcement to support Crane Clean Energy Center to respond to a Radiological Event including a Hostile Action Based Event, in conjunction with the National Incident Management System in accordance with the established communications protocol.

5.7 Fire Fighting Organizations

A Letter of Agreement is established for the Local Fire Departments to respond to a Radiological Event including a Hostile Action Based Event, in conjunction with the Mutual Aid System, upon dispatch by the Dauphin and/or Lancaster County Emergency Dispatch Service

TABLE CRANE 5-1: Inventory of Emergency Kits By General Category

The following is a list of typical equipment available for use during emergencies. While specific equipment designations and items may be subject to change, equivalent emergency activity capabilities will be maintained. Procedures define the specific locations, types, and amounts of equipment for emergency use and define requirements for applicable surveillance, testing, maintenance, and inventory activities to ensure that the equipment is in a state of readiness.

I. RADIATION MONITORING

A. Typical Contents

1. Full Face Respirators with Canisters
2. Survey Instruments - Radiation Survey Meters, Countrate Meters
3. Dosimetry Equipment - Dosimeters/Chargers
4. Protective Clothing
5. Air Sampler and Cartridges
6. Support Materials - Paper, Pencils, Envelopes, Maps, Procedures, Etc.

II. FIRST AID

A. Minor Injury

1. Contain items typically needed for minor injuries.
2. Placed throughout Plant

B. Employee Kits

1. Contain sufficient quantities to serve expected needs of approximately 100 employees.

   NOTE: Locations as determined by Medical Department.

   a. Stretchers

   b. Employee size first aid kits

C. First Aid and Medical Facility

1. Equipment inventory to support professional medical treatment.
2. Contains equipment necessary for examination of patients.

III. DAMAGE CONTROL

A. Typical Equipment Available

1. Hand tools
2. Cutting/Welding equipment
3. Patching materials
4. Portable blowers
5. Submersible pumps
6. Electrical equipment

APPENDIX 1: NUREG-0654 CROSS-REFERENCE

Annex Section	NUREG-0654
1.0	Part I, Section A
1.1	Part I, Section B
1.2	Part I, Section D
1.3	Part I, Section D
Figure CRANE 1-1	Part I, Section D
Figure CRANE 1-2	Part II, Section J.10
Figure CRANE 1-3	Part II, Section J.10
Figure CRANE 1-4	Part II, Section J.10 & 11
2.0	Part II, Section B.1
2.1	Part II, Section B.5
2.2	Part II, Section A.3
2.3	Part II, Section C.3
2.4	Part II, Section B.1 & 2
Table CRANE 2-1	Part II, Section B (Table B-1)
Figure CRANE 2-1	Part II, Section B.1
Figure CRANE 2-2	Part II, Section B.6
Figure CRANE 2-3	Part II, Section B.5 & 7
Figure CRANE 2-4	Part II, Section B.5 & 7
3.0	Part II, Section D
3.1	Part II, Section D.1 & 2
3.2	Part II, Section D.1 & 2
3.3	Part II, Section D.1 & 2
3.4	Not Applicable
3.5	Part II, Section D.3
Table CRANE 3-1	Part II, Section D.1 & 2
Table CRANE 3-2	Part II, Section D.1 & 2
4.1	Part II, Section E.1 & J.7
4.2	Part II, Section I.2 & 3
4.3	Part II, Section J.10.f
4.3.1	Part II, Section E.6
4.3.2	Part II, Section J.8
4.3.3	Part II, Section J.6.c
4.3.4.a	Part II, Section G.1 & 2
4.3.4.b	Part II, Section G.5
4.3.5	Part II, Section J.7
4.4.1	Part II, Section K.5 & 7
4.4.2	Part II, Section J.5
4.4.3	Part II, Section J.3
4.5	Not Applicable
EP-AA-111	Part II, Section I.2 & 3
Figure CRANE 4-1	Part II, Section J.4
Figure CRANE 4-2	Part II, Section J.4
5.1.1	Part II, Section B.1
5.1.2	Part II, Section H.1
5.1.3	Part II, Section H.1
5.1.4	Part II, Section H.2 & G.3.b
5.1.5	Part II, Section G.3.a
5.2.1	Part II, Section H.5.b, H.6.c &I.2
5.2.2	Part II, Section H.5.d

APPENDIX 1: NUREG-0654 CROSS-REFERENCE

Annex Section	NUREG-0654
5.2.3	Part II, Section H.5.a
5.2.4	Part II, Section H.5.a & 8
5.2.5	Part II, Section H.5.c
5.2.6	Part II, Section H.6.c
5.2.7	Not Applicable
5.2.8	Part II, Section H.6.b & 7, I.9-10
5.3	Part II, Section H.9-10
5.4	Part II, Section L.1 & 2
5.5	Part II, Section F.1
Table CRANE 5-1	Part II, Section H.11
Appendix 1	Part II, Section P.8
Appendix 2	Part II, Section P.4

APPENDIX 2: SITE-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 CRANE Station. Letters of agreement, memorandum of understanding, and contracts common to multiple Constellation Nuclear stations are listed under Appendix 3 to the Constellation Nuclear Standardized Radiological Emergency Plan.

Local County Response Agencies

- Memorandum of Understanding (MOU) / Letters of Agreement (LOA) still under development and have not been finalized yet

Medical Support Organizations and Personnel

- Memorandum of Understanding (MOU) / Letters of Agreement (LOA) still under development and have not been finalized yet

Firefighting Organizations

- Memorandum of Understanding (MOU) / Letters of Agreement (LOA) still under development and have not been finalized yet

Other Agencies

- Memorandum of Understanding (MOU) / Letters of Agreement (LOA) still under development and have not been finalized yet

Law Enforcement Agencies

- Memorandum of Understanding (MOU) / Letters of Agreement (LOA) still under development and have not been finalized yet