

ENCLOSURE 10

SHINE MEDICAL TECHNOLOGIES, LLC

SHINE MEDICAL TECHNOLOGIES, LLC APPLICATION FOR AN OPERATING LICENSE

**EMERGENCY PLAN
PUBLIC VERSION**

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1 INTRODUCTION

1.1 Purpose

The purpose of the SHINE Medical Technologies, Inc. (SHINE) emergency plan is to describe the essential elements of advance planning and necessary provisions for coping with and mitigating the consequences of emergencies within and beyond the SHINE site boundary. The plan is primarily focused on situations that may cause or threaten to cause radiological hazards that could affect employee or public health and safety. The plan also includes provisions for coping with other onsite emergency situations commensurate with their severity.

1.2 Scope

This emergency plan applies to the SHINE facility.

This plan was written to conform with 10 CFR 50, Appendix E, following the guidance of:

- Regulatory Guide 2.6, Revision 2, Emergency Planning for Research and Test Reactors and Other Non-Power Production and Utilization Facilities;
- ANSI/ANS-15.16-2015, Emergency Planning for Research Reactors;
- ANSI/ANS-8.23-2007, Nuclear Criticality Accident Emergency Planning and Response; and
- NUREG-0849, Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors.
- NUREG-1520, Revision 2, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility

1.3 Overview

The emergency plan includes descriptions of the facility and organizations, and of emergency classifications, responses, recovery processes, and preparedness.

SHINE management is committed to ensuring this emergency plan is established, exercised and maintained.

Emergency personnel may deviate from actions described in the plan for unusual or unanticipated conditions at the direction of the Emergency Director. Reasonable actions that depart from license conditions or technical specifications may be authorized by a senior licensed operator in accordance with 10 CFR 50.54(x) and (y) if immediately needed to protect the public health and safety, and no action consistent with license conditions and technical specifications that can provide adequate or equivalent protection is immediately apparent.

1.4 SHINE Facility

The SHINE facility is owned and operated by SHINE Medical Technologies, Inc., and is located at 4021 South US Highway 51, Janesville WI, 53546.

The SHINE facility includes the following structures (see Figure 1):

- Main production facility
- Resource building
- Material staging building
- Storage building

The SHINE facility involves the use of a non-reactor based, subcritical fission process for the purpose of manufacturing medical isotopes. The SHINE facility contains irradiation units (IUs), each with a target solution vessel (TSV) with a licensed fission power of 125 kWth, located in the irradiation facility (IF) area of the main production facility. Also located in the IF are rooms and cells housing off-gas handling equipment, cooling equipment, tritium purification equipment, and an area for servicing neutron drivers.

The radioisotope production facility (RPF) area of the main production facility contains a hot cell bank (the "supercell"); below-grade vaults containing tanks, other process components, and storage space; two laboratories; and areas for waste-handling, cooling, and other equipment. The remaining areas of the facility, the control room area and the administrative annex area, contain the control room, electrical equipment, additional auxiliary equipment, and other miscellaneous areas. The general layout of the main production facility is provided in Figure 2.

1.5 Site Description

The SHINE site consists of an approximately 91-acre parcel in the City of Janesville, Rock County, Wisconsin. The dominant land use in the region is agricultural/cultivated crops. The northern limits of the City of Beloit are located approximately 4 miles to the south. The SHINE site is accessed from U.S. Highway 51.

The figures provided in Appendix 1 depict major features of the SHINE site and surrounding area:

- Figure 1 contains the site boundary, fences, gates, roads and parking lots on site, onsite structures and tanks, and U.S. Highway 51.
- Figure 2 shows the general arrangement layout of the main production facility, which includes the following four areas:
 - Irradiation facility (IF)
 - Radioisotope production facility (RPF)
 - Control room area
 - Administrative annex area
- Figure 3 provides an aerial view of the area surrounding the SHINE site, including the location of onsite structures and sensitive facilities near the SHINE site (0-1 mile), including churches, parks, residences, airstrips, and educational facilities. Farms are distributed throughout the one-mile radius of the SHINE site. There are no medical facilities within one mile of the SHINE site.
- Figure 4 shows a general area map, constructed from U.S. Geological Survey (USGS) topographical quadrangles (7.5 minute series), and includes the SHINE facility site boundary.
- Figures 5 through 8 show the individual USGS topographical quadrangles (7.5 minute series) containing or adjacent to the SHINE site.

1.6 Facility Activities and Materials

The licensed activities and other major activities conducted at the SHINE facility include:

- Preparation and irradiation of uranyl sulfate target solution; and
- Extraction, purification and packaging of medical isotopes from irradiated target solution inside hot cells;

The SHINE facility contains radioactive and hazardous materials that are part of the overall medical isotope production process. Appendix 2 provides the types, quantities and locations of radioactive and hazardous materials normally on the SHINE site.

1.7 Facility Emissions

The SHINE main production facility contains a facility vent stack at a height of 67 ft and a flow rate of approximately 26,200 cfm. The stack uses high efficiency particulate air (HEPA) filters and single stage high efficiency gas adsorption (HEGA) filter equipment for emission control. A stack release monitor provides information on radiation released from the facility stack.

1.8 Community Right to Know

SHINE certifies that the responsibilities under the Emergency Planning and Community Right To Know Act (EPCRA) of 1986 (Title III, Public Law 99-499) in accordance with 10 CFR 70.22(i)(3)(xiii) will be met.

1.9 Accident Summary

The following general types of accidents may require the implementation of protective actions:

- Failure of the primary system boundary leading to a spill of target solution inside an irradiation unit (IU) cell.
- Malfunction of the TSV off-gas system (TOGS) leading to a gaseous release of fission products inside an IU or TOGS shielded cell.
- Failure of one or more neutron drivers leading to a release of gaseous tritium inside an IU cell.
- Failure of tritium-containing equipment leading to a release of gaseous tritium inside the tritium purification system (TPS) room or the IF general area.
- Malfunction of isotope extraction equipment leading to a spill of target solution or other radioactive material inside the supercell.
- Leak or spill of target solution or other radioactive material into a tank vault or pipe trench, or other shielded location.
- Fire in a process vessel vent system (PVVS) carbon guard bed or carbon delay bed.
- Unshielded criticality accident in the uranium storage or target solution preparation areas.

Additional information on potential facility accidents can be found in Chapter 13 of the SHINE Final Safety Analysis Report (FSAR).

Measures and equipment used to respond to and detect accidents and to detect releases are described in Section 9.

2 DEFINITIONS

- 2.1 Drill:** Supervised instruction intended to test, develop, maintain, and practice the skills required in a particular emergency response activity. A drill may be a component of an exercise.
- 2.2 Emergency action levels (EALs):** Specific instrument readings or observations, radiological dose or dose rates, or specific contamination levels of airborne, waterborne, or surface-deposited radioactive materials that may be used as recognized conditions that result in actions such as a) establishing emergency classes and b) initiating appropriate emergency measures.
- 2.3 Emergency:** An emergency is a condition that calls for immediate action, beyond the scope of normal operating procedures, to avoid an accident or to mitigate the consequences of one.
- 2.4 Emergency classes:** Emergency classes are classes of accidents grouped by severity level for which predetermined emergency measures should be taken or considered. In order of increasing severity, the emergency classes applicable to this plan consist of 1) Notification of Unusual Event, 2) Alert, and 3) Site Area Emergency, consistent with ANSI/ANS-15.16-2015.
- 2.5 Emergency plan:** An emergency plan is a document that provides the basis for actions to cope with an emergency. It outlines the objectives to be met by the emergency procedures and defines the authority and responsibilities to achieve such objectives.
- 2.6 Emergency plan implementing procedures (EPIPs):** EPIPs are documented instructions that detail the implementation actions and methods required to achieve the objectives of the emergency plan.
- 2.7 Emergency planning zone (EPZ):** Area for which emergency planning is performed to assure that prompt and effective actions can be taken to protect the public in the event of an accident. The SHINE EPZ is the operations boundary.
- 2.8 Emergency response:** Actions taken from the time of identification of a suspected, imminent, or actual accident or event to stabilization of the event, including the assumption that an accident has occurred, response to the emergency, and actions to begin subsequent recovery operations.
- 2.9 Exercise:** An activity that tests one or more portions of the integrated capability of emergency response plans, equipment, and organizations.
- 2.10 Hostile action:** An act towards a facility or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate the licensee to achieve an end.
- 2.11 Immediate evacuation zone:** The area surrounding a potential accident location that must be evacuated without hesitation if an alarm signal (e.g., criticality accident alarm or radiation area alarm) is activated.

- 2.12 Non-essential personnel:** Those personnel not needed for the continuing existence or functioning of the Emergency Response Organization (ERO). They are personnel not required to fill certain positions in the ERO. Identification of non-essential personnel is circumstance-oriented as determined by the Emergency Director.
- 2.13 Offsite:** The geographical area that is beyond the site boundary.
- 2.14 Onsite:** The geographical area that is within the site boundary.
- 2.15 Operations boundary:** The area within the site boundary where the shift supervisor has direct authority over all activities. The area within this boundary has prearranged evacuation procedures known to personnel frequenting the area. The controlled access area fence and the perimeter walls of the main production facility, the material staging building, the storage building, and the resource building are the SHINE operations boundary.
- 2.16 Protective actions:** Actions to be taken to prevent or minimize exposure to radiation, radioactive materials, and other hazardous materials following a release.
- 2.17 Radiologically Controlled Area (RCA):** An area where access is controlled by SHINE to limit exposure to radiological hazards.
- 2.18 Site boundary:** The site boundary is that boundary, not necessarily having restrictive barriers, surrounding the operations boundary wherein the Emergency Director may directly initiate emergency activities. The area within the site boundary may be frequented by people unacquainted with the facility operations. The SHINE site boundary is the property line of the SHINE site. The site boundary is synonymous with the (owner) controlled area.
- 2.19 Technical staff:** Personnel with specific skills and experience who can assist in the implementation of the requirements defined in this plan. Such personnel may include, but are not limited to, criticality safety, health and safety, and facility process support personnel. Technical staff includes, but is not limited to, engineering, radiation protection and maintenance personnel.

3 ORGANIZATION AND RESPONSIBILITIES

3.1 Emergency Response Organization

The Emergency Response Organization (ERO) is responsible for taking actions in an emergency to avoid an accident or to mitigate the consequences of one. The ERO is staffed with trained and qualified ERO personnel. ERO members attend formal initial and continuing training and participate in drills and exercises. The ERO consists of two groups: 1) the facility emergency organization and 2) the emergency support organizations.

Figure 9 illustrates the interrelationship between the facility emergency organization and the emergency support organizations within the total emergency response effort.

The facility emergency organization consists of SHINE staff members who are onsite at the time of the emergency or who may be called in to assist as required.

The emergency support organizations are those organizations and agencies that may be called upon for specific assistance based on the type of emergency. The roles of these agencies are described in Section 3.4. Agreement letters with these support agencies can be found in Appendix 3.

The ERO described in this section comprise the key positions of the recovery organization.

Additional information on ERO roles and responsibilities is provided in the EPIP addressing Emergency Response Organization Responsibilities.

3.2 Normal Facility Operating Organization

The initial response to any emergency is by the normal SHINE facility on-shift organization present at the site. Off-shift personnel may be called in to assist as required, as described in Section 7.

3.2.1 Normal Operating Organization.

- Chief Executive Officer (CEO): The CEO is responsible for the overall management and leadership of the company.
- Chief Operating Officer (COO): The COO is responsible for overall company operations.
- Plant Manager: The Plant Manager is responsible for the overall operation of the facility.
- Operations: The facility operations personnel are responsible for the operation of the facility, and the safe, reliable, efficient plant operations.
- Security: The facility Security personnel are responsible for the physical security of the facility.
- Engineering: The facility engineering personnel are responsible for providing technical expertise and support of facility operation and maintenance, and for controlling the physical facility configuration to ensure that facility operation, maintenance and configuration are maintained in accordance with the design basis. Engineering personnel are part of the facility technical staff and include criticality safety engineers, i.e., individuals with experience, training and qualification in criticality safety.

- **Radiation Protection:** The facility radiation protection personnel are responsible for handling and monitoring of radioactive materials. Radiation protection personnel are part of the facility technical staff.
- **Maintenance:** The facility maintenance personnel are responsible for performing maintenance on facility equipment in accordance with facility procedures, instructions and technical requirements.
- **Chemistry:** The facility chemistry personnel are responsible for sampling, analysis, material control and accounting, and product quality control activities. They are considered part of the facility technical staff.
- **Executive, support, administrative, and other personnel ("support personnel"):** These individuals have various responsibilities involving procurement, licensing, quality, training, finance, etc., and may include personnel normally stationed offsite.

3.2.2 On-shift personnel, include, but are not limited to

- **Shift supervisor:** A senior licensed operator responsible for the safe operation of the facility.
- **Licensed operators (including any additional on-shift senior licensed operators, if present):** Responsible for ensuring licensed activities are conducted safely and in accordance with the facility license and procedures.
- **Non-licensed operating staff:** Responsible for conducting operations in the facility in accordance with procedures and under the direction of licensed operators.
- **Security Personnel:** The facility Security personnel are responsible for the physical security of the facility.

The organization for managing and operating the SHINE facility is provided in Figure 10.

3.3 Facility Emergency Organization

The facility emergency organization is initially staffed by on-shift personnel. Upon activation of the ERO, designated off-shift personnel will be notified to report to the Emergency Support Center (ESC), once it has been activated, or the control room if the ESC has not yet been activated.

Sufficient SHINE staff, with relevant expertise, comprise the facility emergency organization, such that SHINE is able to maintain a continuous around-the clock emergency response effort for as long as necessary.

The duties of the below listed ERO roles may be assumed by any of the individuals authorized for that role upon their arrival at the facility, and be passed from one individual to another, but only after being thoroughly briefed on status of the event and the currently proposed plan of action.

Individuals may delegate their actual duties, with the exception of the non-delegable responsibilities of the Emergency Director, but may not delegate the responsibility for their duties.

The facility emergency organization is shown in Figure 11.

3.3.1 Emergency Director

The Emergency Director is authorized to and responsible for directing and coordinating the overall emergency response. The role of the Emergency Director is initially filled by the on-shift shift supervisor. Only individuals who have received Emergency Director training are authorized to assume the Emergency Director responsibilities. In the event

the shift supervisor or the subsequent Emergency Director is absent from the facility or incapacitated, the Emergency Director responsibility will be assumed by the most senior operations department individual onsite, until a relief Emergency Director arrives at the facility. The Emergency Director has the following non-delegable responsibilities:

- Emergency event classification and decision to declare an emergency;
- Decision to activate the ERO;
- Decision to initiate onsite protective actions;
- Decision to notify offsite response authorities;
- Decision to request support from offsite organizations;
- Authorization of reentry into portions of the facility or site that may have been evacuated during the emergency;
- Authorization of volunteer emergency workers to incur radiation exposures in excess of normal 10 CFR 20 occupational limits; and
- Decision to terminate the emergency and initiate recovery actions.

The Emergency Director has the following additional, delegable, responsibilities:

- Activation of the ERO;
- Notification of offsite response authorities when a Notification of Unusual Event, Alert, or Site Area Emergency has been declared within 15 minutes of event classification;
- Notification of the NRC Operations Center within one hour of declaring the emergency;
- Assessment of damage to and status of the facility's capabilities to safely control radioactive material or hazardous chemicals associated with licensed activities;
- Prioritizing responses to concurrent emergencies; and
- Informing the ERO of planned emergency organization actions or changes.

3.3.2 Shift Supervisor

The shift supervisor acts as the initial Emergency Director upon declaration of an emergency. In the event the shift supervisor is absent from the facility or incapacitated, the most senior licensed operator will assume the shift supervisor responsibilities, in accordance with facility procedures. While acting as the Emergency Director, the shift supervisor will take immediate action during an emergency and will activate the ERO, as appropriate. Additionally, the shift supervisor has the following responsibilities, whether or not acting as the Emergency Director:

- Implementing immediate actions to respond to the emergency in accordance with facility emergency procedures;
- Directing and supervising the activities of the control room staff;

- The responsibility for the safe operation of the plant in compliance with the facility NRC operating license, technical specifications, facility operating procedures and the requirements for their use. During an emergency, personnel may deviate from actions described in the plan for unusual or unanticipated conditions.

3.3.3 Emergency Communicator

The Emergency Communicator assists the Emergency Director in the execution of the Emergency Director's duties. The role of the Emergency Communicator is initially filled by an individual onsite, typically a member of the normal on-shift staff or onsite support personnel, appointed by the Emergency Director. A relief Emergency Communicator may be called in as part of the ERO activation, if required. The individuals authorized to assume the role of the Emergency Communicator are various SHINE personnel, including support personnel, who are designated to fill the roll, as described in the EPIP addressing Emergency Response Organization Responsibilities. In the event the Emergency Communicator becomes absent from the facility or incapacitated, the Emergency Director shall appoint another individual present at the facility to assume the role of Emergency Communicator until a relief Emergency Communicator arrives at the facility.

The Emergency Communicator is responsible for

- Exchanging information with offsite authorities responsible for coordinating and implementing offsite emergency measures, including transmitting dose projections and monitoring and surveying information;
- Relating information about the emergency situation to the news media and the public; and
- Ensuring a record of the events during and following the emergency is maintained.

3.3.4 Radiation Safety Coordinator

The Radiation Safety Coordinator is responsible for making radiological assessments and advising the Emergency Director, including responsibility for

- Making onsite and offsite dose assessments and projections;
- Recommending protective actions; and
- Identifying exposed personnel and determining their radiation dose.

The Radiation Safety Coordinator is called-in upon activation of the ERO. The individuals authorized to assume the responsibilities of the Radiation Safety Coordinator are radiation protection department personnel and members of the facility technical staff with radiation protection experience. In the event the Radiation Safety Coordinator is absent from the facility or incapacitated, the Technical Support Coordinator will assume the responsibilities until a relief Radiation Safety Coordinator arrives at the facility.

3.3.5 Technical Support Coordinator

The Technical Support Coordinator is responsible for coordinating the technical response to the event, including

- Performing technical assessments of facility emergencies;

- Assisting the Emergency Director and Radiation Safety Coordinator in technical matters; and
- Coordinating the technical staff to augment the ERO on an as needed basis to support accident assessment and mitigation activities.

The individuals authorized to assume the responsibilities of the Technical Support Coordinator are members of the facility technical staff. In the event the Technical Support Coordinator is absent from the facility or incapacitated, the Radiation Safety Coordinator will assume the responsibilities until a relief Technical Support Coordinator arrives at the facility.

3.3.6 Criticality Safety Engineer

A criticality safety engineer is called-in upon activation of the ERO if a criticality event is suspected or confirmed, at the discretion of the Emergency Director or Technical Support Coordinator. The criticality safety engineer, when required, is responsible for

- Advising and assisting the Emergency Director in responding to the criticality accident; and
- Assisting the Radiation Safety Coordinator in conducting a radiological dose assessment appropriate for a criticality accident.

The criticality safety engineer role is filled by a designated, criticality safety qualified and trained facility engineer. If the criticality safety engineer is absent or incapacitated when required, the Radiation Safety Coordinator assumes the responsibilities until a relief criticality safety engineer arrives at the facility.

3.3.7 Security Personnel

Security personnel that are present at the facility when an emergency is declared will implement EIPs appropriate to the event classification. In the event Security personnel become absent or incapacitated, additional Security personnel may be called-in, if required. Security personnel are responsible for

- Performing personnel Accountability, if required;
- Implementing access control of facility areas, at the direction of the Emergency Director, if required.

3.3.8 Operations Personnel

Operations personnel that are present at the facility when an emergency is declared will implement EIPs appropriate to the event classification. In the event operations personnel become absent or incapacitated, additional operations personnel may be called-in, if required.

Operations personnel are responsible for

- Monitoring facility instrumentation and reporting results to the Emergency Director;
- Implementing corrective actions at the direction of the Emergency Director.

3.3.9 Assessment Teams

Assessment Teams are comprised of facility operations, technical staff, or support personnel who have completed Assessment Team training, who may be called-in upon activation of the ERO by the Emergency Director, as required for the situation. Assessment Team personnel assigned to perform duties related to monitoring or collecting radiation dose rates and contamination levels are trained and qualified to do so. In the event Assessment Team personnel become absent or incapacitated, additional Assessment Team personnel may be called-in, if required.

Assessment Teams are responsible for

- Collecting onsite and offsite field monitoring data;
- Monitoring radiation dose rates and contamination levels; and
- Assessing collateral damage to the facility.

3.3.10 Reentry and Damage Control Teams

Reentry and Damage Control Teams are comprised of facility operations, technical staff, or support personnel who have completed Reentry and Damage Control Team training, who may be called-in upon activation of the ERO by the Emergency Director, as required by accident conditions. Reentry and Damage Control Team personnel are trained in emergency response and reentry. Individuals may be assigned to both Assessment and Reentry and Damage Control Teams, depending on their experience, training and qualifications. In the event Reentry and Damage Control Team personnel become absent or incapacitated, additional Reentry and Damage Control Team personnel may be called-in, if required. Reentry and Damage Control Teams are responsible for

- Reentering an immediate evacuation zone during the emergency on a voluntary basis after being informed of the potential hazards and risks; and
- Performing actions associated with controlling and stabilizing emergency events in-progress, at the direction of the Emergency Director.

3.4 Emergency Support Organizations

In the event the decision is made by the Emergency Director to request support from offsite organizations, the following offsite support agencies and organizations would provide assistance as described below. Written agreements with these agencies can be found in Appendix 3. Local government agencies and organizations will be initially notified as described in Section 7 by contacting the Rock County 911 Communications Center. SHINE does not anticipate the need for State or Federal assistance.

3.4.1 Janesville Fire Department

- Fire Support

If offsite fire support is needed, the Rock County 911 Communications Center will dispatch Janesville Fire Department personnel. The nearest Janesville Fire Station is Station #2, approximately 2.5 mi from the SHINE facility. If additional fire equipment is needed, or if the Janesville Fire Department is unavailable, the Rock County 911 Communications Center will activate existing mutual aid agreements with neighboring communities for dispatch of fire equipment and personnel to the site. In instances where radioactive/hazardous materials are involved, the Emergency Director or

designee will ensure information and assistance is provided to the responding offsite personnel.

Information specific to the SHINE facility is located in the Rock County 911 Communications Center's response information binder, which includes a prohibition on the use of firefighting foam inside the facility, due to criticality safety concerns.

- First Aid Support

If immediate onsite first aid support is needed, the Rock County 911 Communications Center will dispatch Janesville Fire Department personnel. The Fire Department employs emergency medical technicians and individuals trained in first aid and qualified to provide immediate medical assistance required for radiological emergencies onsite.

- Ambulance Services

Transportation of an injured person from the SHINE facility to an offsite medical facility will be provided by Janesville Fire Department ambulances and dispatched by the Rock County 911 Communications Center. In the event that the Janesville Fire Department ambulances are not available, the Rock County 911 Communication Center will activate existing mutual aid agreements with neighboring communities for dispatch of an ambulance to the SHINE site.

- Hazardous Materials Response

If hazardous materials assistance is needed, the Janesville Fire Department Hazardous Material (HazMat) Response Team will be dispatched by the Rock County 911 Communication Center or by the local Fire Department Incident Commander.

3.4.2 Janesville Police Department

If law enforcement support is needed, the Rock County 911 Communications Center will dispatch law enforcement personnel. If needed, the Janesville Police Department will contact the Rock County Sheriff's Department or Wisconsin State Patrol, which maintain sheriff's deputies and State troopers in the Janesville area that can respond if additional resources are needed. Emergency law enforcement support may include the following:

- Providing traffic control;
- Controlling access to areas affected by the emergency;
- Assisting security personnel;
- Responding to emergencies at the facility, as necessary.

3.4.3 Hospitals

The following local hospital has medical services available and staff that are trained and prepared to handle radiological emergencies:

- SSM Health St. Mary's Hospital - 3400 East Racine Street - Janesville WI

Any radiation exposed or contaminated injured individuals from the site would be transported to one of the above facilities for treatment.

3.4.4 Rock County Emergency Management

The Rock County Emergency Management organization is responsible for coordinating major emergencies, disaster response and recovery efforts in support of county and local governments. Rock County Emergency Management may provide additional resources to the response effort at its discretion.

3.5 Maintaining Emergency Preparedness

The following individuals have roles related to maintaining emergency preparedness. Activities related to maintaining emergency preparedness are periodic or ongoing, and not required to be performed as part of the activation of the facility emergency organization. However, individuals responsible for maintaining emergency preparedness may also have roles in the facility emergency organization.

3.5.1 Operations Manager

The Operations Manager is responsible for

- Coordinating emergency preparedness planning;
- Reviewing and updating the emergency plan and procedures;
- Coordinating plans with other applicable organizations, and
- Ensuring that any written arrangements with offsite agencies are reviewed and renewed, as necessary.

The Operations Manager may delegate these responsibilities and authorities to any designated member of the Operations organization.

3.5.2 Criticality Safety Lead Engineer

The Criticality Safety Lead Engineer is responsible for

- Identifying potential criticality accident locations;
- Evaluating and characterizing potential criticality accidents, including making radiological dose predictions;
- Defining the immediate evacuation zone around the potential criticality accident locations; and
- Participating in the planning, conduct, and evaluation of exercises and drills.

These responsibilities may be delegated to any designated, qualified criticality safety engineer.

3.5.3 Radiation Protection Manager

The Radiation Protection Manager is responsible for

- Determining the instrumentation and equipment requirements for emergency response activities.
- Ensuring instrumentation and equipment is calibrated and maintained as required.

These responsibilities may be delegated to any designated member of the radiation protection organization.

3.5.4 Rock County Emergency Management

The Rock County Emergency Management organization is responsible for preparing response agencies, volunteer organizations, the private sector, and citizens to respond to and recover from disasters through planning and training.

4 EMERGENCY CLASSIFICATION SYSTEM

4.1 Basis for Emergency Classifications

The emergency plan provides for classification of emergencies into three standardized classes according to the severity of offsite radiological consequences: 1) Notification of Unusual Event, 2) Alert, and 3) Site Area Emergency, consistent with Table 1 of ANSI/ANS-15.16-2015. There are no credible accidents identified for the SHINE facility that would result in radiological levels exceeding the action levels for General Emergencies specified in Table 1 of ANSI/ANS-15.16-2015 at the site boundary. Therefore, the emergency plan does not include provisions for the General Emergency classification of event.

4.2 Emergencies Less Severe Than Notification of Unusual Events

SHINE recognizes emergencies of lesser consequences than the Notification of Unusual Event classification. These include physical occurrences within the facility requiring facility emergency organization response. The initial assessment of these events should indicate that it is unlikely that an offsite hazard will be created. Protective evacuations or isolations of certain areas within the facility may be necessary. Responses to these emergencies of lesser consequence than a Notification of Unusual Event are based on the recognition of immediate need for onsite staff to implement emergency measures to provide aid to affected persons or to mitigate the consequences of damage to equipment; coupled with assessing radiological monitors to determine if the possibility of a more serious emergency is present.

Situations of lesser consequence than Notification of Unusual Events that may warrant implementation of portions of this emergency plan or select EIPs include:

- 1) Severe injuries to personnel;
- 2) Fires in the incipient stage or industrial safety hazards;
- 3) Transportation accidents less than one mile from the facility involving radioactive or licensed material;
- 4) Spills or releases of non-radioactive hazardous materials not associated with processing of licensed materials; or
- 5) Other situations that warrant precautionary activation of the ERO, at the discretion of the Emergency Director.

4.3 Notification of Unusual Event

A Notification of Unusual Event includes man-made events and natural phenomena creating a significant hazard potential that was previously non-existent. There is usually time available to take precautionary and corrective steps to prevent the escalation of the accident or to mitigate the consequences should it occur. No releases of radioactive or hazardous materials requiring offsite responses are expected.

Elements of the ERO will be activated or notified to increase the state of readiness as warranted by the circumstances.

Although the situation may not have caused damage to the facility, it may warrant preventive or mitigative actions or interruption of nonessential routine functions. Protective evacuations or isolation of certain areas of the facility may be necessary.

4.4 Alert

An Alert means events may occur, are in progress, or have occurred, that could lead to a release of radioactive material or hazardous chemicals incident to the processing of licensed materials; however, the release is not expected to require a response by an offsite response organization to protect persons offsite. Substantial modification of facility operating status is a highly probable corrective action. Protective evacuations or isolation of certain areas within the operations boundary or within the site boundary may be necessary.

4.5 Site Area Emergency

A Site Area Emergency means events may occur, are in progress, or have occurred that could lead to a significant release of radioactive material or hazardous chemicals incident to the processing of license material and that could require a response by offsite emergency response organizations to protect persons offsite.

A Site Area Emergency may be initiated when events such as major damage of primary boundaries containing radioactive or hazardous materials incident to the process of licensed material have occurred and actual or imminent failure of other physical barriers preventing releases have occurred and projected offsite radiological consequences exceed the action levels. Monitoring at the site boundary should be conducted to assess the need for offsite protective actions. Protective measures on site may be necessary.

5 EMERGENCY ACTION LEVELS

Emergency action levels (EALs) for the events described in the above emergency classes are found in Appendix 4.

These EALs have been established in terms of effluent monitors and other facility parameters from which the dose rates and radiological effluent releases at the site boundary can be projected.

EALs are used as criteria for determining the need for notification and participation of local agencies and the Commission. This emergency plan includes EALs that are used for determining when and what type of protective actions for the facility staff onsite to protect health and safety. The protective action guidelines are one rem whole body or five rem thyroid.

The SHINE safety analysis did not identify any events that could lead to a release of hazardous chemicals incident to the processing of license material that would require activation of the SHINE emergency response organization to protect persons onsite, or that would require a response by an offsite response organization to protect persons offsite. For this reason there are no EALs related to releases of hazardous chemicals incident to the processing of license material.

6 EMERGENCY PLANNING ZONES

There are no identified radiological emergencies at the SHINE facility that result in offsite plume exposure exceeding one rem whole body or five rem thyroid. Therefore, SHINE has identified an Emergency Planning Zone (EPZ) in accordance with the alternate method described in NUREG-0849 and ANSI/ANS-15.16-2015. The combined licensed power for all eight IU cells is less than 2 MW. Accordingly, the EPZ for the SHINE facility is the operations boundary.

7 ACTIVATION OF THE ERO AND NOTIFICATION

The activation of the Emergency Response Organization will be staged with the immediate activation of all or portions of the facility emergency organization, followed by the activation of emergency support organizations as required.

7.1 Activation and Notification of the Facility Emergency Organization

The shift supervisor or another individual authorized to assume the Emergency Director position shall implement the "Activation of the Emergency Response Organization" EPIP, when it is determined that conditions exist exceeding the EALs or if conditions warrant activation of the facility emergency organization in the opinion of the shift supervisor. Notifications of the emergency declaration will be made to onsite personnel and on and offsite ERO members in accordance with the EPIP addressing Activation of the Emergency Response Organization.

Emergency notification rosters are maintained in the control room and ESC, and in all controlled copies of the Emergency Plan Implementing Procedures Manual.

At the Notification of Unusual Event classification, select ERO personnel are notified and requested to either report to the facility or to remain available to respond, as the situation dictates.

At an Alert classification or higher, ERO personnel are notified for activation of the ESC.

7.2 Activation of the Emergency Support Organizations

The Emergency Director shall initiate the activation of the emergency support organizations upon the classification of a Site Area Emergency. The Emergency Director may activate all or part of the emergency support organizations for lower classes of emergencies in accordance with the EIPs when offsite support is needed for the particular event, at the discretion of the Emergency Director.

The emergency support organizations are activated by calling the Rock County 911 Communications Center, in accordance with the EPIP addressing Activation of the Emergency Response Organization. This EPIP contains instructions for message authentication and to ensure the message was received.

7.3 Notification of Offsite Organizations

The Emergency Director ensures notifications are promptly made to offsite emergency response organizations as follows:

1) Local Agencies

A notification shall be made to the Rock County 911 Communications Center within 15 minutes of the emergency classification.

2) Nuclear Regulatory Commission (NRC)

An event will be reported to the NRC Operations Center immediately after notification of the appropriate local agencies, but not later than one hour after declaration of an emergency.

Follow-up notifications shall be made promptly whenever event conditions change significantly (e.g., event classification escalation, projected dose estimate changes), at the discretion of the Emergency Director, or at the request of an offsite organization.

Notifications are made in accordance with the EPIP addressing Notification and Communication, using concise, preformatted messages and standard reporting checklists to facility timely notification. The EPIP contains instructions for message authentication and to ensure the message was received.

Initial and follow-up notifications to offsite emergency response organizations including the NRC will contain the following information, to the extent known:

- Name, title, and telephone number of the caller;
- Location of the incident;
- Emergency class;
- Description of the emergency event;
- Date and time of incident initiation;
- Type and quantity of radionuclides or hazardous material released or expected to be released; and
- Impact of releases and recommended offsite emergency actions.

Rock County Emergency Management, contacted via the Rock County 911 Communication Center, has processes in place for prompt notification of the public if required, which include a backup method. The responsibility for activating public alert and notification systems remain with the appropriate governmental authorities.

The Emergency Communicator remains in periodic contact with offsite organizations via commercial telephone or other mutually agreeable mechanism to coordinate the emergency response and transmit updated dose projections, dose rates, contamination levels, or the results of field monitoring as necessary.

7.4 Activation of the Emergency Support Center

The ESC is activated at an Alert classification or higher. Activation for other events is optional, at the discretion of the Emergency Director. Activation of the ESC is described in the "Activation of the Emergency Response Organization" EPIP.

8 EMERGENCY RESPONSE

8.1 Responses Applicable to All Emergencies

8.1.1 Protective Action Guidelines

The Protective Actions for all classifications are based upon a guideline of one rem dose equivalent for whole body and five rem dose equivalent thyroid. Credible accidents at the SHINE facility do not result in offsite doses in excess of these guidelines.

8.1.2 Offsite Organization Responses

- Medical assistance shall be provided to injured personnel requiring more than first aid.
- Offsite fire support shall be requested to respond to all fires that progress beyond the incipient stage.
- Law enforcement shall be requested to respond to credible security events.

8.1.3 Voluntary Emergency Worker Exposures

The Emergency Director may authorize volunteer emergency workers to incur radiation exposure in excess of 10 CFR 20 limits, according to the following guidelines:

- Up to 10 rem TEDE for saving vital equipment
- Up to 25 rem TEDE for life-saving actions
- >25 rem TEDE for life-saving actions only for people fully aware of the risks involved

Individuals volunteering to receive doses in excess of 25 rem shall be briefed on 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.

8.1.4 Provisions for Emergency Responders

- Use of Respirators: SHINE personnel use respiratory protection in any environment involving exposure to high level gaseous activity or oxygen deficient atmosphere, or where air quality is in doubt. In the presence of airborne particulates, emergency response personnel may be directed by the Radiation Safety Coordinator or radiation protection personnel to use full-face filter type respirators. The criteria for issuance of respiratory protection are described in 1100-09-03, Respiratory Protection Program.
- Use of Protective Clothing: Anti-contamination clothing, located in the facility dress out area and in the ESC is available for use by onsite personnel. The criteria for issuance of protective clothing are described in 1100-09-02, Radiation Protection Program.

8.1.5 Evacuation, Access Control, and Radiological Controls

Evacuation is the primary protective action anticipated for onsite personnel. Additional information related to evacuation is found in Section 8.6.

The Emergency Director may direct isolation and access control of facility areas to minimize exposures to radiation and the spread of radioactive contamination. Access control is implemented by site Security. Additional information on contamination control is found in Section 9.5.

8.1.6 Concurrent Emergencies

The ERO may implement more than one EPIP at any given time in order to respond to concurrent emergencies (e.g., fire, personnel injury or security incidents). The Emergency Director has the authority to prioritize emergency responses as necessary.

8.2 Emergencies Less Severe Than Notification of Unusual Events

8.2.1 Activation and Notification Actions

- The shift supervisor may activate the ERO, or portions of the ERO, if he or she feels conditions warrant activation.
- Offsite emergency response organizations may be contacted for assistance if required.

8.2.2 Additional Actions

Assessment, Corrective and Protective actions may be implemented in accordance with EIPs, as required for the situation, at the discretion of the Emergency Director.

No radiological monitoring is anticipated to be required for this type of emergency, with the exception of transportation incidents. Personnel with portable survey equipment may be dispatched to assess the impact of transportation accidents involving licensed materials.

8.3 Notification of Unusual Event

8.3.1 Activation and Notification Actions

- The Emergency Director shall notify offsite organizations as described in Section 7.3.
- Facility emergency organization personnel are notified as described in Section 7.1. Personnel are requested to either report to the facility or to remain available to respond, at the discretion of the Emergency Director.

8.3.2 Assessment Actions

During emergencies involving airborne radioactivity, facility and surrounding area airborne radioactivity levels shall be determined by the stack release monitor and carbon delay bed effluent monitor, installed area radiation monitors and continuous air monitors, and portable monitoring equipment used by members of the ERO and communicated to the Emergency Director.

Assessment Team personnel may be dispatched to visually assess collateral damage to the facility caused by the event, or to monitor for potential releases inside or outside the facility.

The Emergency Director shall use this information and Appendix 4 to determine that the emergency is appropriately classified, and to determine release rates and contamination magnitudes, and to estimate projected exposures to onsite personnel.

8.3.3 Corrective Actions

Shutdown and/or isolation of affected or at-risk equipment or suspension of related activities should be considered by the Emergency Director. Physical barriers to contain radioactivity shall be maintained or implemented where necessary.

Specific corrective actions are provided in the EPIP addressing Emergency Classification and Initial Accident Assessment and the applicable Emergency Response EPIP.

8.3.4 Protective Actions

Protective actions may include instructing personnel to take shelter from severe natural phenomena, or evacuation of a room or small area of the SHINE facility.

8.4 Alert

8.4.1 Activation and Notification Actions

- The Emergency Director shall notify offsite organizations as described in Section 7.3.
- ERO personnel are notified and the facility emergency organization is activated as described in Section 7.1.
 - The criticality safety engineer shall report to the facility for situations involving or suspected of involving a criticality hazard.
- The ESC is activated as described in Section 7.4.

8.4.2 Assessment Actions

During emergencies involving airborne radioactivity, facility airborne radioactivity levels shall be determined by the stack release monitor and carbon delay bed effluent monitor, installed area radiation and continuous air monitors, and portable monitoring equipment used by members of the ERO and communicated to the Emergency Director.

During emergencies involving criticality hazards, criticality accident alarm system (CAAS) instrumentation shall be monitored for event escalation criteria.

Assessment Team personnel may be dispatched to visually assess collateral damage to the facility caused by the event, or to monitor for potential releases inside or outside the facility.

The Emergency Director shall use this information and Appendix 4 to determine that the emergency is appropriately classified, and to determine release rates and contamination magnitudes, and to estimate projected exposures to onsite and offsite personnel.

8.4.3 Corrective Actions

Shutdown and/or isolation of affected equipment and suspension of related activities shall be considered by the Emergency Director. Physical barriers to contain radioactivity shall be maintained or implemented where necessary.

Specific corrective actions are provided in the EPIP addressing Emergency Classification and Initial Accident Assessment and the applicable Emergency Response EPIP.

8.4.4 Protective Actions

Protective actions may include evacuation of specific areas.

For emergencies involving criticality hazards, the Emergency Director shall order a precautionary evacuation of the affected area immediate evacuation zone for non-essential personnel.

Personnel shall be instructed to evacuate or take shelter from severe natural phenomena, security events, or other severe incidents, as appropriate.

The Emergency Director should consider evacuation of all non-essential personnel to outside the operations boundary.

8.5 Site Area Emergency

8.5.1 Activation and Notification Actions

- The Emergency Director shall notify offsite organizations as described in Section 7.3.
- ERO personnel are notified and the facility emergency organization is activated as described in Section 7.1.
 - The Criticality Safety Engineer shall report to the facility for situations involving or suspected of involving imminent or actual uncontrolled criticalities.
 - Assessment Teams shall report to the facility for Site Area Emergencies.
- Emergency support organizations are activated as described in Section 7.2.
- Emergency support organizations will consider precautionary notification of the public near the site, in accordance with their internal processes.
- The ESC is activated as described in Section 7.4.
- Assembly and Accountability for the site is initiated, as described in Sections 8.6.2 and 8.6.3, unless doing so would adversely affect site personnel (e.g., severe weather or security threats).

8.5.2 Assessment Actions

Facility and site boundary airborne radioactivity levels shall be determined by the stack release monitor and carbon delay bed effluent monitor, installed area radiation monitors and continuous air monitors, and portable monitoring equipment used by members of the ERO and communicated to the Emergency Director.

During emergencies involving criticality events, CAAS instrumentation shall be monitored for event status, and the criticality safety engineer shall evaluate the consequences of the criticality accident, including those from radioactive and nonradioactive hazardous materials that might be released as a result of the accident.

Assessment Team personnel may be dispatched to visually assess collateral damage to the facility caused by the event, and should be dispatched to monitor for potential releases outside the facility and at the site boundary.

The Emergency Director shall use this information and Appendix 4 to determine release rates and contamination magnitudes and to estimate projected exposures to onsite and offsite personnel.

8.5.3 Corrective Actions

Shutdown and/or isolation of all irradiation units and suspension of all activities involving target solution and or other radioactive material shall be directed by the Emergency Director. Physical barriers to contain or mitigate radioactivity releases shall be maintained or implemented where possible.

Emergency support organizations mobilize to the site and/or set up an incident command center to respond to the emergency.

Specific corrective actions are provided in the EPIP addressing Emergency Classification and Initial Accident Assessment and the applicable Emergency Response EPIP .

8.5.4 Protective Actions

Protective actions may include evacuation of specific areas of the SHINE facility.

For emergencies involving criticality events, the Emergency Director shall order an evacuation of the affected area immediate evacuation zone.

Personnel shall be instructed to evacuate or take shelter from severe natural phenomena, security events, or other severe incidents, as appropriate.

Non-essential personnel shall be evacuated offsite unless doing so would adversely affect personnel leaving the site (e.g., severe weather or security threats).

8.6 Evacuation, Assembly and Accountability

8.6.1 Evacuation

Various classes of emergency events may require evacuation of personnel. Evacuation is the primary protective action anticipated for onsite personnel. When an evacuation is initiated, all personnel within the immediate evacuation zone shall evacuate without hesitation by planned evacuation routes to established assembly stations.

All areas within the operations boundary have established immediate evacuation zones and evacuation routes. Sufficient exits from the immediate evacuation zones exist to enable rapid and unobstructed evacuation of personnel. Immediate evacuation for personnel protection shall take precedence over contamination control or security considerations. Evacuation routes are planned to minimize the total risk considering all potential hazards, including chemical, industrial, and radiation.

The public address system, and/or audible alarms and flashing lights are used to initiate area or facility evacuations. In the event of an evacuation, visitors are the responsibility of the facility employee being visited. A register of visitors is kept by Security and is available to the Emergency Director.

Evacuation is followed by Assembly and Accountability (see Section 8.6.2 and 8.6.3).

Radiation levels shall be monitored in occupied areas adjacent to the immediate evacuation zone and periodically at the assembly station after initiation of the emergency response. Collected information shall be provided to the Radiation Safety Coordinator. If this monitoring indicates that the dose rate exceeds 100 mrem/hour in areas that continue to be occupied, non-essential personnel shall be evacuated from those areas.

Evacuation zones, planned evacuation routes, and other detailed information are provided in the EPIP addressing Evacuation, Assembly, and Accountability.

8.6.2 Assembly

Assembly stations are those areas to where personnel shall report if an evacuation of any area of the facility has been called, or if a Site Area Emergency has been declared. Personnel are trained to report to their primary assembly area, and to listen for instructions provided by the ERO. If it is determined that the primary assembly area(s) is unfit for personnel, the Emergency Director may designate alternate assembly area(s) and direct personnel using appropriate communication systems. Assembly stations are clearly

identified in the EPIP addressing Evacuation, Assembly, and Accountability and posted in the area.

Assembly stations consist of:

- Control room – primary assembly area for on-duty control room and Operations personnel
- Main production facility breakroom (primary ESC) – primary assembly area for ERO personnel
- Main production facility conference room – primary onsite assembly area for non-essential personnel
- Resource building office area (back-up ESC) – alternate onsite assembly area
- SHINE Building One – contingency alternate offsite assembly area

Security personnel shall individually report their location(s) to the ERO, and then perform their Accountability duties as described in the EPIP addressing Evacuation, Assembly, and Accountability.

Personnel evacuating the facility will be monitored for contamination by the portal monitors as they exit the radiologically controlled area (RCA), or with portable friskers at assembly areas. Potentially contaminated personnel arriving at assembly areas will be segregated from non-contaminated individuals until they have been monitored. Additional decontamination information is described in Section 9.5.

SHINE has the capability of identifying quickly individuals who have received doses of 10 rads or more due to a criticality accident via reading of electronic dosimeters worn by personnel in the RCA.

The Radiation Safety Coordinator is responsible for identifying exposed personnel and determining their radiation dose, in order to ensure appropriate medical assistance is provided.

8.6.3 Accountability

The purpose of Accountability is to determine the locations of all personnel at the site and to muster emergency personnel at prearranged locations in the event of a Site Area Emergency. Accountability is also performed after Evacuation and Assembly, to ensure personnel are no longer located within evacuation zone(s). When Accountability of onsite personnel is determined to be necessary by the Emergency Director, all personnel onsite shall be accounted for and the names of missing individuals (if any) are determined and reported to the Emergency Director. Accountability is performed in accordance with the EPIP addressing Evacuation, Assembly, and Accountability.

As part of Assembly and Accountability, the Emergency Director may also direct isolation and access control of facility areas to minimize exposures to radiation and the spread of radioactive contamination.

8.7 Assessment Action Information

This section contains additional details on the Assessment Actions described in Sections 8.2, 8.3, 8.4 and 8.5.

8.7.1 Projections of Offsite Impacts

Facility emergency organization personnel make projections of offsite radiation dose based on field monitoring data or installed facility instrumentation, coupled with the results of previously performed calculations. For all credible accidents, the worst-case projected accident consequences for offsite individuals are below 500 mrem for radiological releases and below protective action guidelines for hazardous chemicals incident to the processing of licensed materials. Therefore, dose projections using real-time meteorological information or specifically-designed computer codes are not required for the SHINE facility.

Instructions for completing offsite exposure estimates are found in the EPIP addressing Emergency Radiation Exposure Control.

Offsite dose projections will be made available to offsite emergency support organizations and NRC personnel following initial determination and following any significant changes to the predictions as described in Section 7.3.

8.7.2 Source Terms

Estimated radiological and chemical source term data are available in the EPIP addressing Emergency Radiation Exposure Control for use by the ERO.

Information from facility instrumentation readings, operations logs, and technical staff may be used to augment or update the source term data. If requested, source term information related to the emergency will be made available to appropriate offsite emergency response organizations and the NRC through the established communication lines.

8.7.3 Onsite and Offsite Surveying

As part of the assessment process, Assessment Teams may be dispatched to collect samples, perform area radiation readings, and observe conditions throughout the facility and around the site boundary, in order to gather information about radiation dose rates and contamination levels. Assessment Teams report information to the Emergency Director or designee using hand-held radios, mobile phones, or directly by returning to the control room or ESC.

Radiation doses are measured by portable Geiger counters and handheld survey equipment.

Contamination levels are measured by portable air samplers via collecting samples for subsequent analysis in the onsite laboratory.

Hazardous chemicals incident to the processing of licensed materials, i.e., uranium particulate, are measured by portable alpha-emitter detection equipment. Other hazardous chemicals are detected by Geiger counters or air samplers due to their expected coincident with gamma radiation.

Instrumentation and equipment used for assessment is described in more detail in Section 9.4.

Monitoring outside the facility and at the site boundary shall be implemented within four hours of declaring a Site Area Emergency involving a potential or actual release. Monitoring should be continued periodically as necessary to monitor the progress of the event. Monitoring outside the facility may be implemented at the discretion of the Emergency Director for less severe emergency classifications.

Monitoring inside the facility is normally accomplished by installed equipment. Assessment teams may be dispatched to augment data obtained from installed equipment at the discretion of the ERO.

Although postulated accidents at the SHINE facility do not require offsite monitoring or protective actions, the capability for offsite monitoring using Assessment Teams and equipment is available, if required.

Field monitoring and assessments are performed in accordance with the EIPs addressing Emergency Radiation Exposure Control and Damage Assessments.

8.8 Criticality Event Responses

8.8.1 Notification

The criticality safety engineer reports to the facility as part of the activation of the ERO for Alerts involving the discovery of a critical-mass quantity of special nuclear material in an unsafe geometry container or other condition that creates a criticality hazard; for Site Area Emergencies involving imminent or actual occurrences of an uncontrolled criticality; or whenever his or her assistance is deemed necessary at the discretion of the Emergency Director.

8.8.2 Reentry

All activities associated with reentry and rescue shall be coordinated and authorized by the Emergency Director.

Reentry shall be planned to minimize risks to personnel. The possibility of a continuing or recurring criticality accident shall be considered. Reentry during the emergency shall only be made by personnel trained in emergency response and reentry.

Reentry should be made only if a preliminary radiological survey indicates that the radiation levels are acceptable for reentry. Existing instrumentation or temporary sensors with remote readout may be used. All reentries shall be made with continuous radiation monitoring. Both neutron and gamma instruments should be used.

Personnel who reenter the immediate evacuation zone during the emergency shall be informed of the potential hazards and shall choose to accept the associated risk. Reentry should be performed by more than one person, as part of a Reentry and Damage Control Team. If personnel need to be rescued, the rescue shall be planned so as not to expose rescuers to life threatening radiation doses. The requirements for voluntary emergency worker exposures described in Section 8.1.3 apply to all reentries during the emergency.

8.8.3 Stabilization

All activities associated with stabilization of a criticality event shall be coordinated and authorized by the Emergency Director. The Emergency Director may delegate authority to the criticality safety engineer, Technical Support Coordinator, or Radiation Safety Coordinator.

If the system remains critical and is possibly causing excessive damage or significant releases of radioactive material, an early reentry effort to disable the system may be permitted. The method for disabling the system shall be carefully planned and implemented to minimize risks to the Reentry and Damage Control Team.

The Criticality Safety Engineer shall determine if the system is subcritical and shall advise the ERO of methods to ensure stabilization of affected equipment and safe conditions for

personnel. This might include placing the fissile material in a favorable geometry, diluting the fissile solution below a critical concentration, or using neutron absorbers to maintain subcriticality.

Neutron absorbers are available for use in shutting down or stabilizing a criticality event. Neutron absorbers are stored in the resource building. Prior to being selected for use, the effect of the neutron absorbers under accident conditions shall be evaluated by the criticality safety engineer. Consideration shall be given to material compatibility and to cases under which addition of the neutron absorber can increase system neutron multiplication.

9 EMERGENCY FACILITIES AND EQUIPMENT

Emergency facilities and equipment are available for emergency assessment, communications, first aid and medical care, and performing corrective and recovery actions.

9.1 Control Room

The control room is the centralized onsite location from which the facility is operated, and from which effective direction can be given and effective control can be exercised during an emergency. The control room is located within the safety-related area of the main production facility. It is equipped with instrumentation to supply information on the facility status and is continuously staffed with qualified licensed operators while the facility is operating. Available control room indications are further described in Sections 9.4.1, 9.4.4, and 9.4.5.

The control room is provided with communications equipment to communicate within and outside the facility, including commercial telephones, sound powered phones, base station radios, and the ability to broadcast on the public address system. Communications equipment is further described in Section 9.8. The control room contains a controlled copy of the EPIP Manual and current notification rosters.

Emergency response activities are coordinated from the control room until the ESC is activated.

9.2 Emergency Support Center (ESC)

9.2.1 Primary and Back-up Locations

The ESC is an onsite facility from which effective direction can be given and effective control can be exercised during an emergency. The ESC is located to oversee operations in the control room and the facility, but it is separated from actual activities.

- The primary location of the ESC is the main production facility breakroom.
- The back-up location of the ESC is the resource building office area.

Both locations for the ESC are equipped with communications equipment, including commercial telephones, a sound powered phone, a base station radio, and the ability to broadcast on the public address system. Communications systems are further described in Section 9.8.

Both locations for the ESC are adequately sized to seat at least six people, and contain the following supplies and equipment:

- A controlled copy of the EPIP Manual and current notification rosters;
- First Aid equipment;

- Handheld lights;
- Electronic dosimeters for use by emergency personnel; and
- A supply of anti-contamination clothing.

9.2.2 Contingency Location

If both ESC locations are unsuitable for use, the ESC may be relocated to SHINE Building One, located at 4027 South US Highway 51, Janesville, 53546.

9.3 Offsite Response and Coordination Facilities

The Rock County Emergency Operations Center, located 3530 County Road F, Janesville WI 53545, is the facility used by Rock County Emergency Management. Rock County Emergency Management may use this facility at its discretion for coordinating responses to emergencies involving the SHINE site.

In the unlikely event that the emergency renders SHINE emergency facilities and equipment unusable, alternate facilities and equipment may be supplied by Rock County Emergency Management. Written letters of agreement pertaining to alternate facilities and equipment are found in Appendix 3.

9.4 Assessment Facilities and Equipment

This section describes the instrumentation, facility and equipment used to assess emergency events.

9.4.1 Installed Facility Radiological Instrumentation

This section describes installed instrumentation that provides information on radiological conditions. Unless specified otherwise, all indications are available inside the control room. Once the ESC is activated, information will be relayed to ESC staff via the communications systems described in Section 9.8.

- Criticality Accident Alarm System

The criticality accident alarm system (CAAS) provides information on the occurrence of an actual criticality within the facility. The CAAS detectors are located in the RPF and are arranged so that each area within the RPF generally receives coverage from at least three detectors. The CAAS is powered by the facility redundant, safety-related uninterruptible power supply system (UPSS), which is expected to be available during any credible emergency event. The CAAS is described in FSAR Section 6b.3.2.

- Area Radiation Monitoring

Detectors for monitoring direct radiation in occupied areas comprise the radiation area monitoring system (RAMS). RAMS detectors are located in the general areas of the IF and RPF. The RAMS is described in FSAR Section 7.7.3.

- Process Radiation Monitoring

Safety-related detectors for monitoring radiation in the facility HVAC are located in the exhaust of each hot cell of the supercell, in comprise the radiation monitors of the engineered safety feature actuation system (ESFAS). These monitors are described in FSAR Section 7.7.1.

- Process Tritium Monitoring

Detectors for monitoring tritium levels within facility processes are provided in the tritium purification system (TPS). These safety-related tritium monitors provide signals to the safety-related facility control systems, and are described in FSAR Section 7.7.1.

- Airborne Contamination Monitoring

Continuous air monitoring system (CAMS) detectors provide information on airborne alpha-beta and tritium contamination levels within the facility. CAMS detectors are located in the general areas of the IF and RPF. The CAMS is described in FSAR Section 7.7.4.

- Effluent Monitoring

The stack release monitor (SRM) measures radiation levels in the main facility stack, and the carbon delay bed effluent monitor (CDBEM) monitors for noble gases at the exhaust of the process vessel vent system (PVVS) carbon delay beds to provide information on radiation levels in that flow path. The effluent monitors are described in FSAR Section 7.7.5.

- Criticality Accident Dosimeters

Criticality dosimeters or instruments are located within the facility which, when recovered and evaluated, provide spectrum information and assist in reconstruction of a criticality incident. Information from criticality dosimeters is not available in the control room or in real time.

- Environmental Monitoring

Information from installed environmental monitoring equipment is not available in the control room or in real time. Samples must be collected and analyzed in a laboratory.

Four continuous air samplers are installed around the SHINE site boundary. Assessment Teams may collect samples from these locations for analysis at the onsite laboratory.

Sixteen direct radiation monitors (i.e., TLDs or equivalent) are also installed around the SHINE site boundary. These monitors may be collected and analyzed at an offsite laboratory if required.

9.4.2 Portable Instrumentation and Equipment

Portable radiological monitoring equipment is primarily stored in the health physics office inside the main production facility. Supplies and equipment are also stored in the resource building.

Inventory lists, calibration schedules, and other detailed information for portable radiological monitoring equipment are contained in the EPIP addressing Emergency Equipment and Supplies. Equipment available for emergency use includes the following:

- Sampling kits
- Handheld lights
- Portable battery-powered radiation protection instruments (e.g., portable alpha-beta and alpha-beta-gamma probes and meters)

9.4.3 Laboratories

The SHINE facility contains two laboratories. Both laboratories are located inside the main production facility, within the radiologically controlled area. The laboratories include

instrumentation for specific radionuclide identification and analysis. The laboratories have the following capabilities:

- Alpha-beta meters and counters
- Gamma spectrometer with high purity germanium (HPGe) detector
- Alpha spectrometer
- ICP-OES (elemental identification)
- ICP-MS (isotopic identification)
- Liquid scintillation counter (LSC)
- High-performance liquid chromatograph (HPLC))

9.4.4 Non-Radiological Monitors and Instrumentation

This section describes installed instrumentation that provides information on non-radiological conditions. Unless specified otherwise, all indications are available inside the control room. Once the ESC is activated, information will be relayed to ESC staff via the communications systems described in Section 9.8.

- Fire Detection

Fire detection and alarm systems are located throughout the main production facility and support buildings. The systems are designed, installed, located, inspected, tested, and maintained in accordance with NFPA 72, National Fire Alarm Code.

Fire detection consists of early warning air sampling smoke detection and gas monitoring system in general areas of the RCA, and smoke detection systems in other normally occupiable areas of the facility, in accordance with the facility Fire Hazards Analysis.

- Seismic Monitoring

The seismic monitoring system includes instrumentation, control cabinets and a dedicated computer for monitoring seismic activity in the safety-related portion of the facility. The seismic monitoring system provides event recording time histories for seismic events and provides indication of a seismic event to the process integrated control system for alarm in the facility control room. Data may be retrieved from the seismic monitoring system by either the dedicated computer or via the operator workstation in the facility control room.

- Weather Monitoring

The control room contains a weather band radio to assess potential meteorological threats to the facility.

9.4.5 Irradiation and Radioisotope Production Facility Process Monitoring and Instrumentation

The facility control room allows for monitoring and controlling the production facility processes. Indications described are available in the control room. Once the ESC is activated, information will be relayed to ESC staff via the communications systems described in Section 9.8. The following indications are important for assessing the status of emergencies and determining appropriate event classification in accordance with EALs:

Variables associated with a breach of the primary system boundary:

- Target solution vessel (TSV) level
- TSV dump tank level
- TSV headspace temperature
- TSV off gas system blower outlet pressure

Variables used in determining and assessing the magnitude of radioactive material release external to the facility:

- Stack release monitor
- Carbon delay bed effluent monitor
- RVZ1 RCA exhaust radiation detectors
- RVZ2 RCA exhaust radiation detectors

Variables used in determining and assessing the magnitude of radioactive material release inside the facility:

- Radiation area monitors (RAMS)
- Continuous air monitors (CAMS)

9.5 Decontamination Facilities, Supplies, and Controls

This section contains information on decontamination and contamination control during emergencies.

Personnel are considered contaminated if they are found by direct frisk or use of a portal monitor to have contamination above background. Equipment is considered contaminated if a survey of accessible surfaces results in contamination more than 20 CPM above background.

9.5.1 Normal Controls and Facilities

During emergency conditions, normal facility contamination control practices, as discussed in radiation protection implementing procedures, will be adhered to as much as possible.

A decontamination room is located inside the main production facility at the main exit from the RCA. The decontamination room is used to decontaminate personnel for their own protection as well as to prevent spreading contamination to other areas. The decontamination room contains a sink, a shower, and a supply cabinet.

9.5.2 Emergency Controls and Supplies

Temporary decontamination areas can also be set up at various locations if necessary. Decontamination supplies (e.g., buckets, hoses, soap, brushes, etc.) for use in temporary decontamination areas are stored in the health physics office. Specific inventory lists are available in the EPIP addressing Emergency Equipment and Supplies.

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 in blankets. The Emergency Director will ensure that the

emergency support organizations providing transportation and treatment are alerted if injured personnel are contaminated.

Potentially contaminated emergency vehicles will be surveyed before they are allowed to leave the site. SHINE is responsible for decontaminating contaminated vehicles. Offsite decontamination, if necessary, of equipment, facilities and personnel for the emergency support organizations will be accomplished by those organizations. Decontamination process details are found in the EPIP addressing Emergency Radiation Exposure Control.

9.6 Personnel Monitoring Equipment

SHINE employees responding to a radiological emergency will use their normally assigned dosimetry (i.e., thermoluminescent dosimeter (TLD) badges or equivalent) to monitor beta and gamma exposure, plus any added high range or specialized dosimetry deemed necessary by the Emergency Director or Radiation Safety Coordinator.

Personnel entering areas with a potential for neutron radiation are verified to have or are supplied neutron dosimeters (e.g., thermoluminescent albedo dosimeters, electrochemically etched plastics (CR-39), or equivalent) prior to entering the area.

Personnel entering areas with a potential for a criticality accident are supplied personal criticality accident dosimeters (i.e., as specified in ANSI N13.3-1969 (R1981), "Dosimetry for Criticality Accidents") prior to entering the area.

All personnel responding to the radiological emergency are given electronic dosimeters. Equipment for prompt onsite readout of electronic dosimeters is maintained in the health physics office.

Emergency support organization personnel are given dosimetry (gamma, beta, neutron, and/or criticality accident monitoring, and electronic dosimeters) prior to entering the affected area. A supply of emergency dosimetry is maintained in the health physics office and is readily available to emergency personnel. Details related to personnel dosimetry use during emergencies are found in the EPIP addressing Emergency Radiation Exposure Control.

Bioassay sample collection is used for assessing internal exposure, in accordance with the facility radiation protection procedures.

Exposure records are maintained in accordance with the normal facility radiation protection and records processes.

9.7 First Aid and Medical

9.7.1 Onsite First Aid Assistance, Equipment and Supplies

First aid equipment is strategically located in the following areas, at minimum:

- Control room
- Main production facility breakroom (primary ESC)
- Resource building office (back-up ESC)
- Main production facility shipping/receiving dock

First Aid supply inventory information is found in the EPIP addressing Emergency Equipment and Supplies.

Facility emergency organization personnel are trained in basic first aid. Personnel who require care beyond first aid will be treated by emergency support organization personnel and transported to offsite medical facilities as necessary.

9.7.2 Offsite Medical Arrangements and Facilities

SHINE has made arrangements with the City of Janesville Fire Department and local hospitals to transport and treat personnel injured or exposed to radiation, including those who may be contaminated. Provisions for handling contaminated personnel are described in Section 9.5.

- The City of Janesville Fire Department has personnel who can provide emergency onsite first aid and transportation of affected individuals to offsite facilities for treatment.
- SSM Health St. Mary's Hospital - 3400 East Racine Street - Janesville WI

Additional details about arrangements and communications with offsite organizations are provided in Section 3.4 and in the EPIP addressing Notification and Communication.

9.8 Communications

This section describes the communications systems available for use by the ERO. Communications plans are contained in the EPIP addressing Notification and Communication, containing titles and alternates for those in charge at both ends of the communication links and the primary and backup means of communication.

9.8.1 Normal Commercial Telephones

The facility uses a commercial telephone communication system that provides for onsite two-way communication, paging and public address, and party-line-type voice communications. Stations for this system are located throughout the main production facility and outbuildings. These phones provide two-way normal communication between personnel within the SHINE campus and between the SHINE campus and offsite persons. Normal commercial telephones are the primary onsite and offsite communication system. The normal telephone communication system contains redundant servers and a battery backup.

9.8.2 Public Address

The public address (PA) system uses the telephone communication system to initiate public address announcements. The system also includes dedicated base transmitting units, which are designed to continue to function in the event of a failure of the phone system. Announcements can be made site-wide or to specific predefined zones. The public address system is audible in the following areas:

- Occupiable areas of the main production facility RCA
- Normally occupied areas of the main production facility and support buildings
- Hallways and corridors of the main production facility and support buildings
- Outdoor areas on the SHINE campus within the controlled access area fence

The PA system is a primary onsite communications system.

9.8.3 Sound Powered Phones

Sound-powered phones supplement the telephone system for onsite communications. The system uses portable sound-power telephones that can plug into local terminal jacks. The sound powered telephones are located in areas where critical operations and response activities are anticipated to occur. The sound powered telephones utilize the user's voice to create the necessary power for reliable and uninterrupted communications in the event of an emergency. The phones operate independent of any power source and are not affected by loss of power to the facility.

- Control room
- Main production facility breakroom (primary ESC)
- IF general area
- RPF general area

9.8.4 Radio

Handheld portable radios are available for use by facility emergency organization personnel as an additional onsite backup communication device. Handheld radios are powered by replaceable, rechargeable battery packs that maintain the ability to be independent of the facility power once charged. Base units are placed throughout the SHINE campus and communicate with the portable radios. Base stations are located at the following locations, at minimum:

- Control room
- Main production facility breakroom (primary ESC)
- Resource building office area (back-up ESC)

The radio system also contains radios, antenna, battery backups, and amplifiers capable of communicating with the Janesville Wisconsin fire and police departments (emergency support organizations). Radios are a back-up onsite communications system.

9.8.5 Mobile Telephones

An emergency mobile telephone is stored in the control room. Personal mobile telephones normally carried by SHINE personnel and emergency support organization personnel are also expected to be present in the facility. Mobile telephones serve as a back-up onsite and offsite communications system.

9.9 Equipment Required to Maintain Safe Shutdown

The following facility equipment is relied upon to maintain a safe shutdown state:

- Target solution vessel off-gas system (TOGS)

The TOGS is required to circulate gas within an irradiation unit to recombine hydrogen and oxygen generated from radiolysis. The TOGS is required to continue operating for five minutes after an irradiation unit has been shut down. The TOGS is described in FSAR Sections 4a2.1 and 4a2.8.

- Uninterruptible power supply system (UPSS)

The UPSS provides power to the TOGS in the event normal power sources are lost. The UPSS also provides power to instrumentation and control systems and other systems used for monitoring facility status. The UPSS is described in FSAR Section 8a2.2.

- Nitrogen purge system (N2PS)

The N2PS is required to prevent the accumulation of elevated levels of hydrogen in the irradiation units and in process tanks and vessels containing irradiated target solution. The N2PS is described in FSAR Sections 6b.2.3 and 9b.6.2.

10 RECOVERY

Recovery consists of those actions required to restore the facility and its impact on public health and safety to a safe status.

The Emergency Director determines when the emergency condition no longer exists, and Recovery can begin. The Emergency Director may secure from the emergency when conditions no longer meet an Emergency Action Level and it appears unlikely that conditions will deteriorate.

The Emergency Response Organization will also be the Recovery Organization. The Emergency Communicator will ensure that records of the event are compiled, evaluated, and retained.

10.1 Criteria

The criteria used to determine when reentry of the facility following an accident is appropriate are:

- Preliminary radiological survey indicates that the radiation levels are acceptable for reentry. Existing instrumentation or temporary sensors with remote readout may be used.
- Reentry personnel can perform the required activities within normal 10 CFR 20 exposure limits.
- Any fire, flood, earthquake, hazardous chemical release or similar emergency condition or threat to security no longer poses an immediate danger to reentry personnel or has been mitigated to an acceptably safe level.

The criteria used to determine when operation of the facility may be resumed following an emergency are:

- All applicable technical specifications and associated surveillance requirements are satisfied.
- Any fire, flood, earthquake, hazardous chemical release or similar emergency condition or threat to security no longer exists.
- Damage to affected facility structures, systems and components (SSC) designated for restart has been repaired, and post maintenance tests and inspections have been completed satisfactorily, in accordance with normal facility procedures.
- Any SSC that cannot or will not be repaired, or where the repair will be deferred until a later date, have been appropriately isolated or abandoned, as applicable, and a technical justification (e.g., design change, technical report, etc.) of the acceptability of the existing condition has been prepared and approved in accordance with normal facility procedures.

10.2 Recovery Actions and Procedures

Recovery plans and procedures will be written and approved as needed. These procedures include those used to determine the necessary actions to reduce any ongoing releases of radioactive material or hazardous chemicals incident to the processing of licensed material and to prevent further incidents.

The recovery plans and procedures will be prepared by the facility technical staff, with input from the emergency support organizations, as applicable. Recovery plans and procedures will be evaluated and approved by an individual authorized to assume the role of the Emergency Director. Recovery plans and procedures will include elements such as stabilization actions, repair methods, and decontamination methods, as needed. The recovery plans and procedures will be compiled, kept and retained in accordance with the normal SHINE document control and records management processes.

SHINE has made the following provisions for accomplishing required restoration and recovery actions:

- The Emergency Director is assigned the responsibility for assessing the damage to and status of the facility's capabilities to safely control radioactive material and hazardous chemicals incident to the processing of licensed materials.
- Recovery assessments will be performed by Assessment Teams, using guidance contained in the EPIP addressing Damage Assessment.
- Normal processes for controlling personnel exposure, facility maintenance, and configuration control are in place.

11 MAINTAINING EMERGENCY PREPAREDNESS

The Operations Manager is responsible for maintaining emergency preparedness, including administration of the Emergency Plan training program.

11.1 Facility Emergency Organization Training

SHINE personnel with roles and responsibilities within the facility emergency organization receive initial training prior to being assigned those responsibilities, and receive annual refresher training, on the following topics:

- Emergency plan overview;
- Emergency procedure usage;
- Facility layout;
- Characteristics of a criticality event;
- Radiation safety;
- First aid; and
- Use of protective equipment and monitoring devices.

Team training, i.e., training of individuals together in groups consistent with their normal shift or assigned ERO team, is not required due to the small size of the total facility staff.

Initial training on the above topics is expected to take eight hours. Annual refresher training is expected to take four hours.

Additionally, individuals with authority to assume the roles described in Section 11.1.1 through 11.1.7 receive additional initial and annual refresher training in the specified topics below. Details on training requirements, including the expected number of hours for initial and annual refresher training for each topic, are contained in the EPIP addressing Emergency Organization Training.

11.1.1 Emergency Director

Individuals who have authority to assume the role of the Emergency Director receive additional training on the following topics:

- Emergency action levels and accident assessment;
- Notifications and communication with offsite organizations

Initial training on the above topics is expected to take four hours. Annual refresher training is expected to take two hours.

11.1.2 Control Room Staff

Individuals assigned to the control room staff, i.e., licensed operators, receive additional training on the following topics:

- Emergency action levels and accident assessment;
- Notifications and communication with offsite organizations

Initial training on the above topics is expected to take four hours. Annual refresher training is expected to take two hours.

11.1.3 Emergency Communicator

Individuals who have the authority to assume the role of the Emergency Communicator receive additional training on the following topics:

- Notifications and communication with offsite organizations

Initial training on the above topics is expected to take two (2) hours. Annual refresher training is expected to take one (1) hour.

11.1.4 Assessment Teams

Individuals assigned to Assessment Teams receive additional training on one or more of the following topics, depending on their particular role:

- Radiological monitoring;
- Damage assessment;
- Respirator use
 - Respirator training is administered in accordance with the normal respiratory protection program

Initial training on the above topics is expected to take two to four hours, depending on the individual's assigned duties. Annual refresher training is expected to take one to two hours.

11.1.5 Reentry and Damage Control Teams

Individuals assigned to Reentry and Damage Control Teams receive additional training on one or more of the following topics, depending on their particular role:

- Damage control and repair;
- Response to criticality accidents, including reentry and stabilization;
- Respirator use
 - Respirator training is administered in accordance with the normal respiratory protection program

Initial training on the above topics is expected to take two to four hours, depending on the individual's assigned duties. Annual refresher training is expected to take one to two hours.

11.1.6 Criticality Safety Engineer

Criticality safety engineers are trained qualified as part of the facility normal criticality safety program. In addition, criticality safety engineers receive training on their duties and responsibilities described in this Emergency Plan in the event of a criticality accident.

11.1.7 Security Personnel

Security Personnel receive initial and annual refresher training on access control, Assembly, and Accountability during emergencies.

Initial training is expected to take two hours. Annual refresher training is expected to take one hour.

11.2 Offsite Organization Training and Orientation

This section describes training, briefings, and orientation for offsite organizations.

11.2.1 Emergency Support Organization Training

Training is offered annually to offsite emergency support organization personnel in accordance with the EPIP addressing Emergency Organization Training. SHINE personnel will meet with each offsite assistance group to accomplish training and review items of mutual interest including relevant changes to the program. This training may include:

- Facility tours;
- Reentry procedures;
- Facility hazards;
- Information concerning facility access control (normal and emergency);
- Permitted manual fire suppression techniques;
- Potential accident scenarios;
- EALs;
- Notification procedures;

- Exposure guidelines;
- Personnel monitoring devices;
- Communications;
- Contamination control; and
- The offsite assistance organization role in responding to an emergency at SHINE, as appropriate.

11.2.2 Community Orientation

Radiological and SHINE facility orientation opportunities are offered biannually to other local services personnel (e.g., local news media, local government officials, etc.). The orientation may include:

- Emergency Plan purpose and/or brief overview;
- Facility tours; and/or
- Radiation safety overview.

11.3 General Site Personnel

This section describes training, briefings, and orientation related to the emergency response that are provided to individuals who may be onsite, including non-emergency response personnel.

11.3.1 SHINE Personnel

SHINE employees and other individuals with unescorted access to the facility, including those who are not assigned duties as part of the ERO, receive initial orientation training on the following topics:

- Emergency plan introduction
- Facility layout, evacuation, assembly, and accountability; and
- Facility alarm recognition.

Orientation training is expected to take two hours. The training emphasizes that emergency actions, including evacuation, should be performed in a manner to reduce risk of injury.

Additionally, SHINE employees and other individuals with unescorted access to the facility receive additional training:

- Individuals who are permitted to enter the RCA receive radiation safety training in accordance with normal Radiation Protection processes.
- Individuals who manage, work in, or work near facilities where the potential exists for a criticality accident receive criticality safety training in accordance with normal Criticality Safety processes.

11.3.2 Visitors

Visitors to the site are briefed that they shall ensure a facility employee being visited is aware of their location at all times and shall follow SHINE personnel instructions in the event of an emergency.

11.4 Drills and Exercises

Periodic drills and exercises are conducted to test the adequacy of EIPs, to test emergency equipment and communications networks, and to ensure that ERO personnel are familiar with their duties. Drills are primarily onsite tests of specific emergency response functions with offsite support functions being simulated. An exercise is a type of drill that is a full-scale test of the ERO, and offsite organizations are invited to participate. Drills and exercises are conducted in accordance with the EIP addressing Drills and Exercises.

SHINE is committed to conducting exercises and drills in a manner that demonstrates the capability of the organization to plan and perform an effective response to an emergency.

11.4.1 Facility Emergency Organization Participation

Individuals who are assigned roles within the facility emergency organization are required to participate in at least one exercise or drill involving a combination of some of the principal functional areas of the ERO emergency response capabilities every two years to demonstrate task-related knowledge, and update and reinforce their previous response training.

Principal functional areas include the management and coordination of emergency response, accident assessment, event classification, notification of offsite authorities, assessment of the onsite and offsite impact of radiological releases, protective action recommendation development, protective action decision making, plant system repair and mitigative action implementation.

11.4.2 Planning and Controlling Drills and Exercises

Annual drills and exercises should be planned to demonstrate the following objectives:

- To test the capabilities of the emergency organizations and communication system and to reinforce emergency training.
- Resources are effectively used to control the site, mitigate further damage, control radiological releases, perform required onsite activities under simulated radiation or airborne and other emergency conditions, accurately assess the facility's status during an accident, and initiate recovery.
- Personnel protection measures, including controlling and minimizing hazards to individuals during fires, medical emergencies, mitigation activities, search and rescue, and other similar events, are implemented effectively and demonstrated via inclusion of these types of events in scenarios.
- Onsite communications effectively support emergency response activities.
- The Emergency Communicator disseminates accurate, reliable, timely, and understandable information.
- Exercise and drill scenarios, as appropriate, emphasize coordination among onsite and offsite responses.

Exercises and drills shall be developed as written scenarios, and should be planned and controlled by personnel who are not direct participants (players) in the exercise. The technical staff shall participate in the planning of drills and exercises. Exercises shall have

defined objectives that specify the aspects of emergency response selected for testing or reinforcing.

Offsite organizations or governments shall be allowed to participate in drills or exercises at their request.

Prior to the beginning of the exercise or drill, effective player, controller, evaluator, and observer pre-drill briefings are conducted. The pre-staging of equipment and personnel is minimized to realistically test the activation and staffing of emergency facilities.

During the exercise or drill, scenario data and messages provided by the controllers effectively maintain the timeline and do not interfere with the emergency organization's response to exercise scenario events, except when safety considerations are involved.

11.4.3 Drills

Drills are conducted annually, at minimum. The performance of an exercise fulfills this minimum requirement. The maximum interval between drills or between a drill and an exercise will not exceed 15 months. The maximum interval provides operational flexibility only and is not to be used to reduce frequency. The established frequency will be maintained over the long term.

The required annual drill shall test some combination of the principal functional areas of the ERO emergency response capabilities, and is conducted as an action drill. An action drill tests the integrated capability of the emergency plan, or a component thereof, and may include instruction periods to develop and maintain skills in a particular operation.

Drills may also be conducted to test a particular portion of the emergency plan, to consider accident management strategies or to instruct or train ERO personnel.

Additionally, evacuation drills shall be conducted at least annually. An evacuation may be included as part of the required annual drill or conducted separately. Evacuation drills should be scheduled to include all personnel who routinely work within the immediate evacuation zone. The drills shall be preannounced by written notice, posted signs, or public address announcement to minimize the possibility that accident or injury could result. A response to a false alarm can only be substituted for an evacuation drill if the required actions are observed or demonstrated.

11.4.4 Exercises

The onsite and offsite emergency plans shall be exercised every two years with full participation by each offsite authority having a role under the plans. The maximum interval between exercises will not exceed 30 months. The maximum interval provides operational flexibility only and is not to be used to reduce frequency. The established frequency will be maintained over the long term.

A criticality accident response exercise should be conducted at least every three years. Exercises should include a realistic scenario involving a simulated criticality accident.

Offsite emergency support organizations shall be invited to participate in the planning, conduct and execution of the full participation exercise. If any offsite organizations or governments refuse to participate, their participation is not required in accordance with 10 CFR 50.47(c)(1). In such cases, an exercise shall be held with the facility emergency organization and such governmental entities as elect to participate in the emergency planning process.

11.5 Operational Readiness

The following activities are conducted in order to maintain operational readiness of the ERO and emergency equipment and supplies.

11.5.1 Communications

Communication checks are conducted quarterly with offsite emergency support organizations to verify the functionality of initial notification points, including backup communications systems, in accordance with the EPIP addressing Notification and Communications.

Communication checks are conducted annually with the NRC in accordance with the EPIP addressing Notification and Communications.

Emergency telephone numbers contained in rosters and emergency response telephone directories are verified and updated as part of the communication checks.

11.5.2 Equipment and Supplies

Portable instrumentation and equipment described in Section 9.4.2 will be functionally tested quarterly, and inventoried, maintained and calibrated at least annually, in accordance with the EPIP addressing Equipment and Supplies.

First Aid supplies and equipment described in Section 9.7.1 will be inventoried annually, in accordance with the EPIP addressing Equipment and Supplies.

11.6 Critiques

Exercises, drills, and training that provide performance opportunities to develop, maintain, or demonstrate key skills must provide for formal critiques in order to identify weak or deficient areas that need correction. Any weaknesses or deficiencies that are identified in a critique of exercises, drills, or training must be corrected. Critiques for exercises and drills should involve observers, controllers and representative participants. Critiques are performed in accordance with the EPIP addressing Critiques and Performance Improvement. Deficiencies that are identified are entered into the Issue Management system, and corrective actions will be taken, as necessary. If updates to the emergency plan or EIPs are required as a result of the critiques, they will be processed in accordance with the EPIP addressing Revising the Emergency Plan and EIPs and the normal Document Control processes.

11.7 Emergency Plan and Procedure Use and Maintenance

SHINE maintains procedures for implementing the requirements of the emergency plan. A list of EIPs is found in Appendix 5. Controlled copies of the emergency plan and EIPs are retained in the normal electronic SHINE Document Control system and controlled hard copies of the EIP Manual are stored in the control room, primary ESC and back-up ESC.

SHINE maintains emergency procedures for each area in which licensed special nuclear material is handled, used, or stored to ensure that all personnel withdraw to an area of safety upon the sounding of a CAAS alarm. This information is found in the "Criticality Emergency Response" EIP.

Copies of current EIPs are retained in accordance with the normal Records Management process for the life of the facility, and copies of and revised or superseded EIPs are retained for at least three years.

The emergency plan and EIPs are annually reviewed for accuracy by the Operations Manager, or designated member of the facility emergency organization. The emergency plan, EIPs and agreement letters are reviewed by those responsible every two years. Emergency action levels (Appendix 4) are reviewed with local governmental authorities on an annual basis.

The emergency plan and EIPs are reviewed, revised, updated, approved and distributed in accordance with the EIP addressing Revising the Emergency Plan and EIPs and the normal SHINE Document Control process. This EIP implements the requirements of 10 CFR 50.54(q) and Appendix E to Part 50, Section IV.B.2.

12 REFERENCES

- 12.1** 1100-09-02, Radiation Protection Program
- 12.2** 1100-09-03, Respiratory Protection Program
- 12.3** American National Standards Institute/American Nuclear Society, ANSI/ANS-15.16-2015, "Emergency Planning for Research Reactors," ANS, LaGrange Park, IL
- 12.4** American National Standards Institute/American Nuclear Society, ANSI/ANS-8.23-2007, "Nuclear Criticality Accident Emergency Planning and Response," ANS, LaGrange Park, IL
- 12.5** American National Standard Institute/American Nuclear Society, ANSI/ANS-8.21-1995, "Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors," ANS, LaGrange Park, IL
- 12.6** American National Standard Institute/American Nuclear Society, ANSI/ANS-8.20-1991, "Nuclear Criticality Safety Training," ANS, LaGrange Park, IL
- 12.7** U.S. Nuclear Regulatory Commission, "Emergency Planning for Research and Test Reactors," Regulatory Guide 2.6, Revision 2
- 12.8** U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors," NUREG-0849, October 1983 (ML062190191)
- 12.9** U.S. Nuclear Regulatory Commission, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," NUREG-1537, Part 1, February 1996 (ML042430055)
- 12.10** U.S. Nuclear Regulatory Commission, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," NUREG-1537, Part 2, February 1996 (ML042430048)
- 12.11** U.S. Nuclear Regulatory Commission, "FINAL Interim Staff Guidance Augmenting NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," for Licensing Radioisotope Production Facilities and Aqueous Homogeneous Reactors," October 17, 2012 (ML12156A069)
- 12.12** U.S. Nuclear Regulatory Commission, "FINAL Interim Staff Guidance Augmenting NUREG-1537, Part 2, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Standard Review Plan and Acceptance Criteria," for Licensing Radioisotope Production Facilities and Aqueous Homogeneous Reactors," October 17, 2012 (ML12156A075)
- 12.13** Los Alamos National Laboratory; "A Review of Criticality Accidents," LA-13638, May 2000

Appendix 1 FIGURES

Figure 1 – SHINE Facility Site Layout

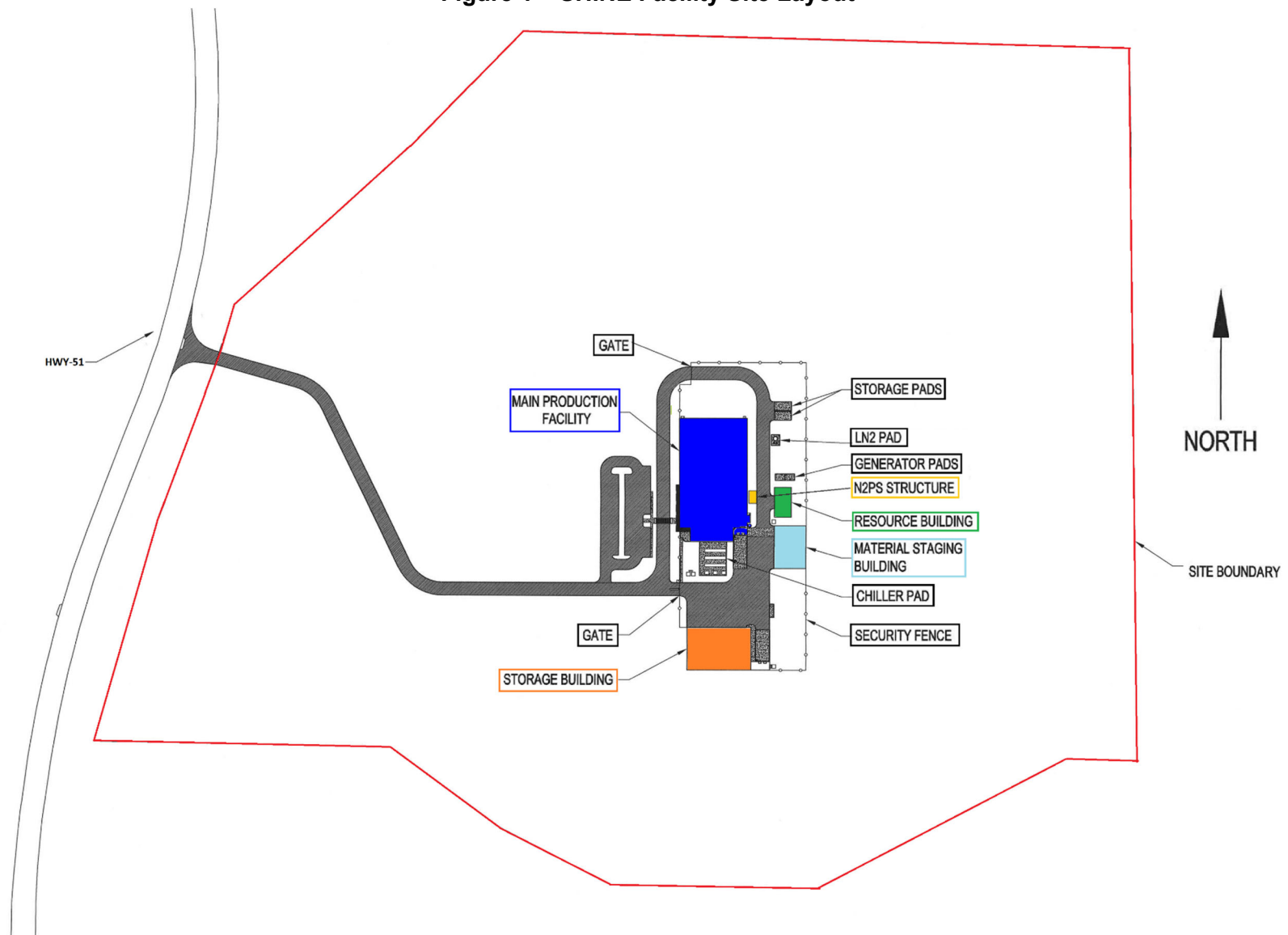


Figure 2 – SHINE Main Production Facility General Arrangement (Sheet 1 of 3)

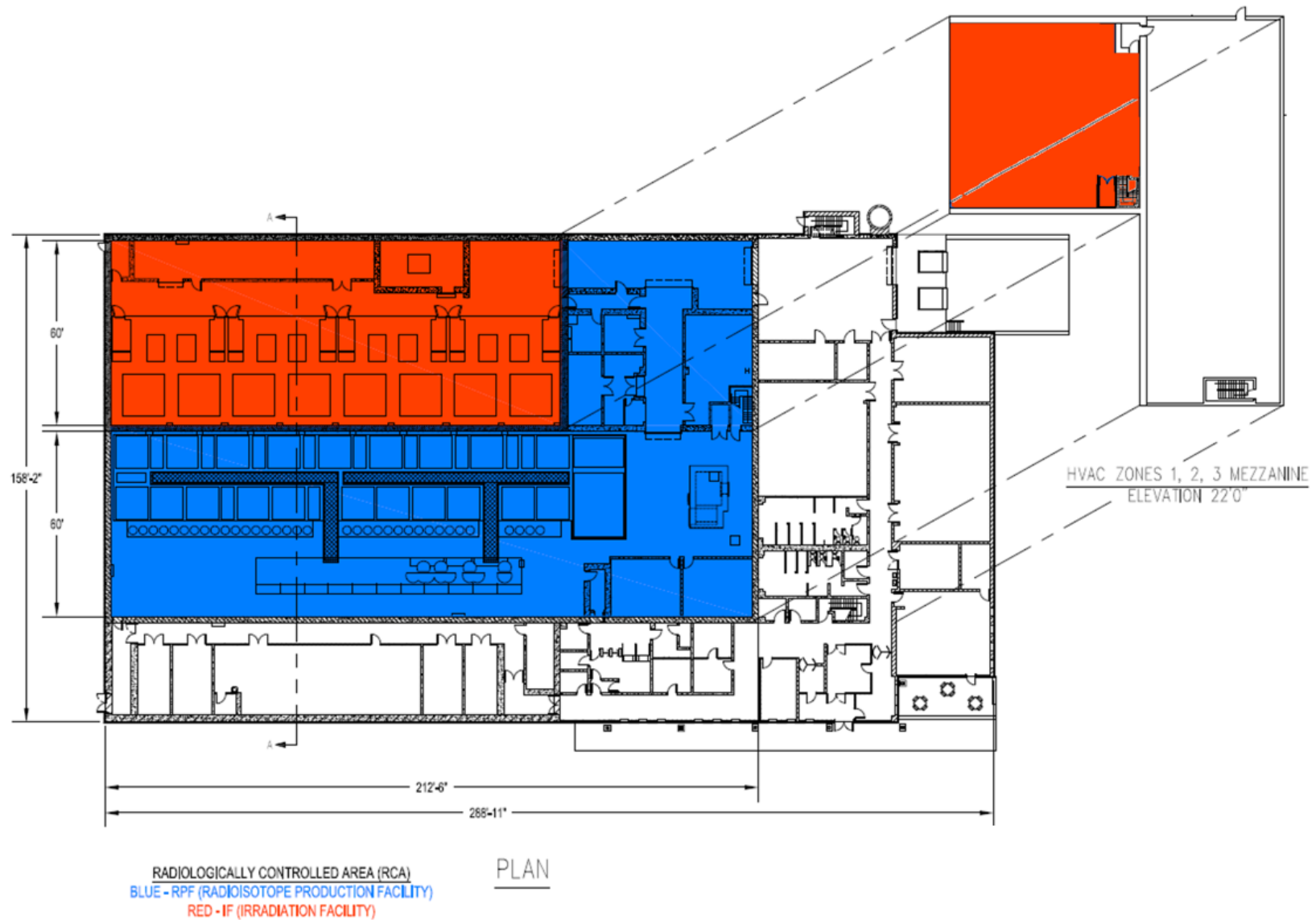


Figure 2 – SHINE Main Production Facility General Arrangement (Sheet 2 of 3)

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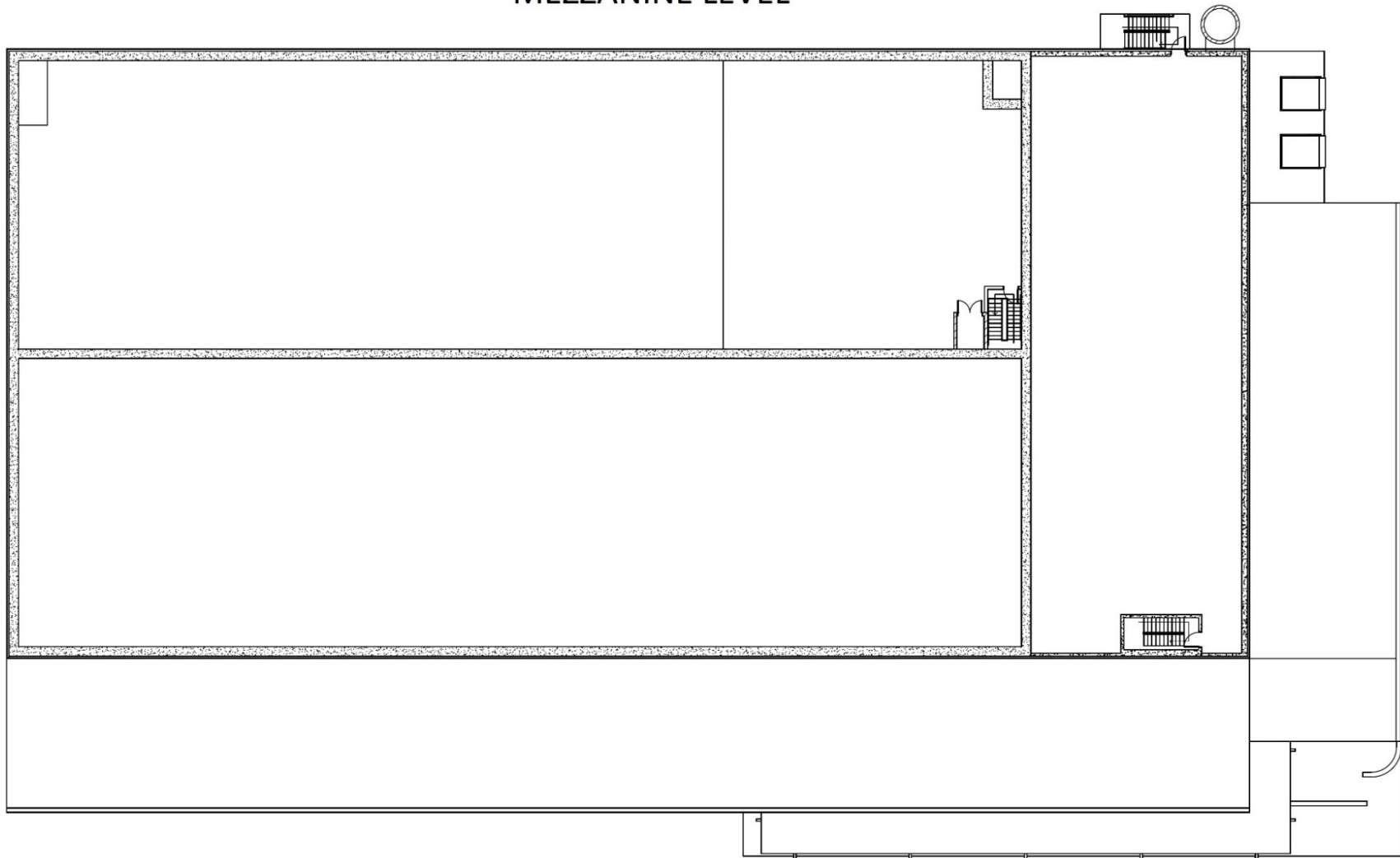
Figure 2 – SHINE Main Production Facility General Arrangement (Sheet 3 of 3)**MEZZANINE LEVEL**

Figure 3 – SHINE Site Buildings and Surrounding Area

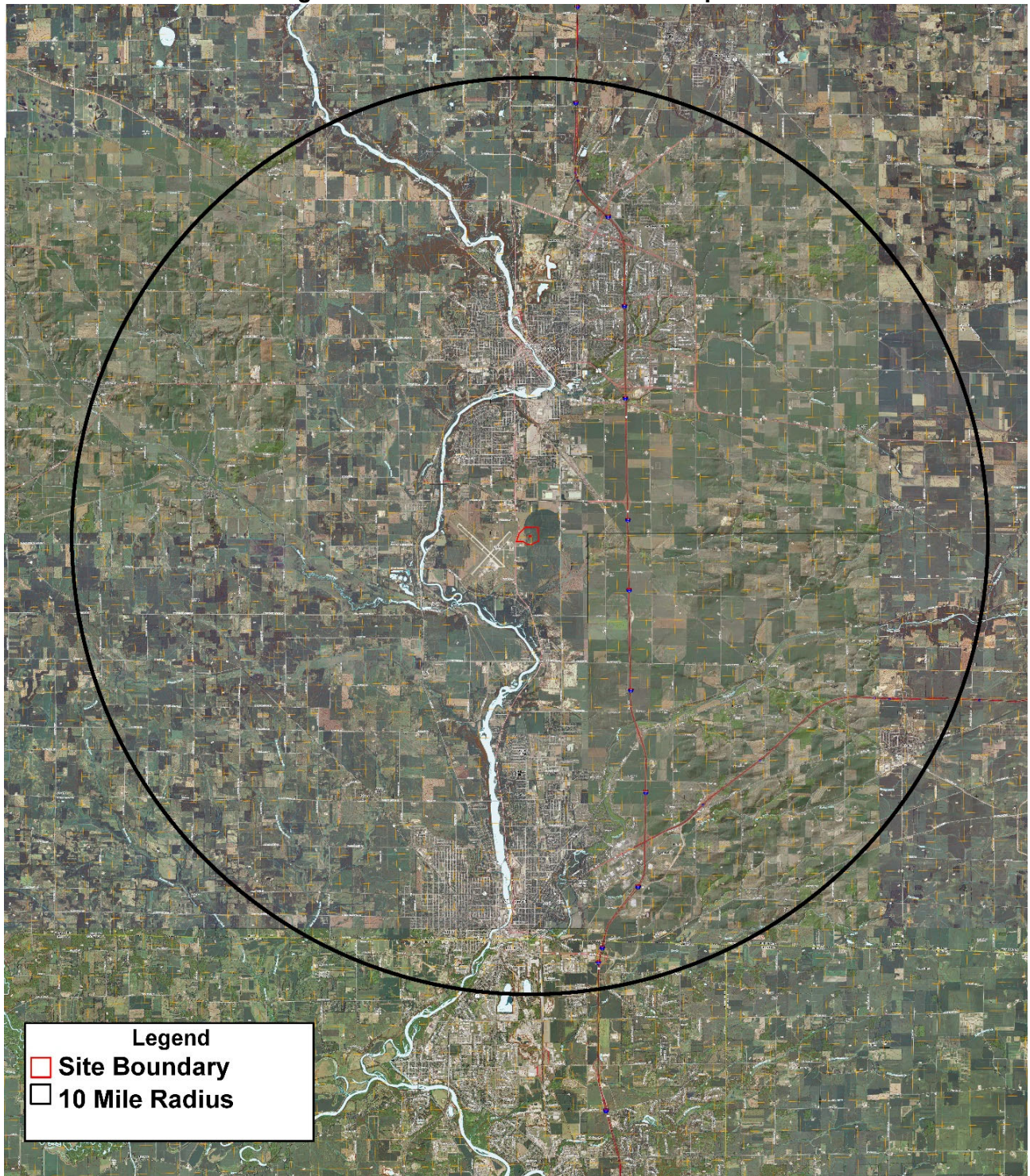
Figure 4 – SHINE Site General Area Map

Figure 5 – U.S. Geological Survey Janesville West Quadrangle

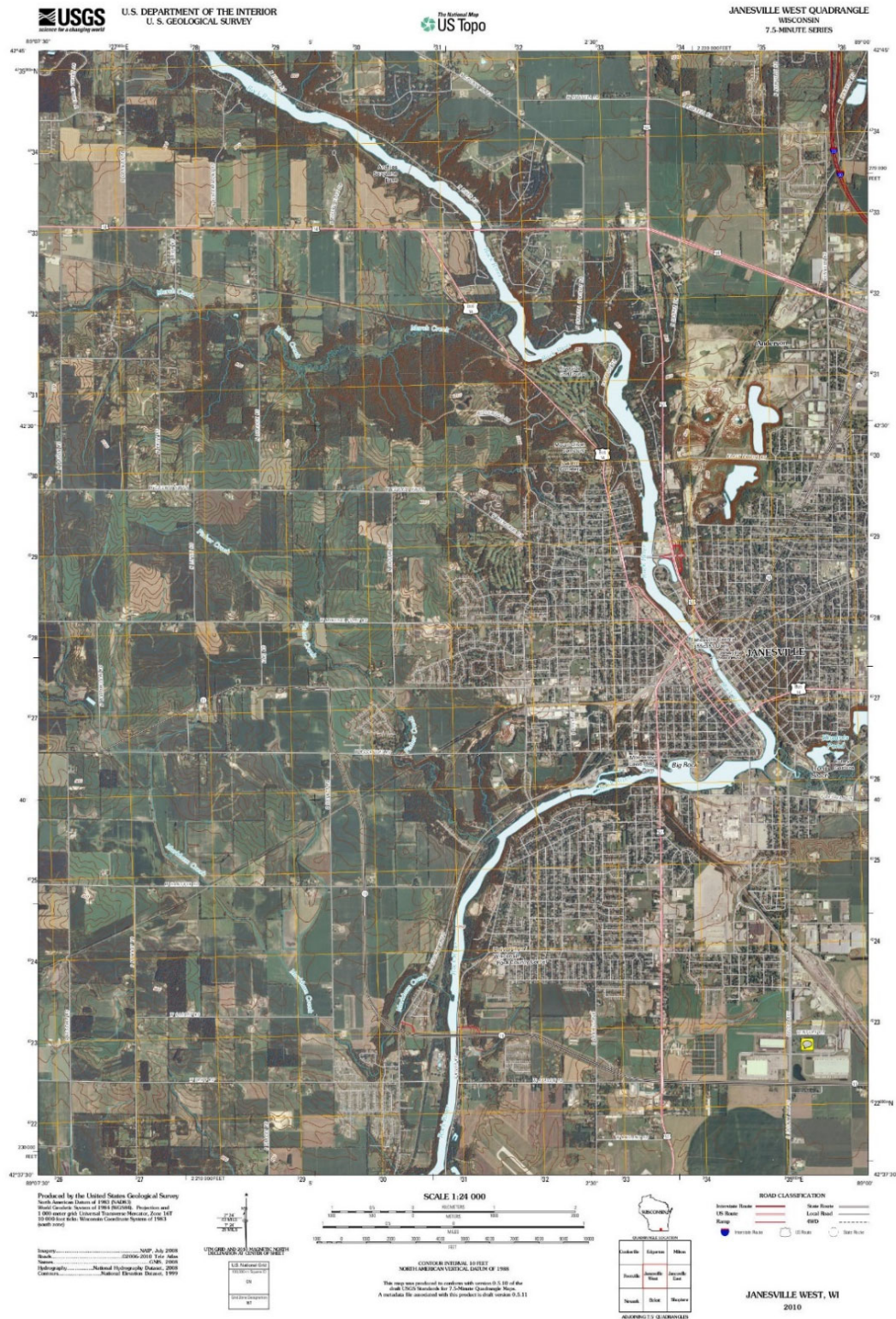


Figure 6 – U.S. Geological Survey Beloit Quadrangle



Figure 7 – U.S. Geological Survey Janesville East Quadrangle

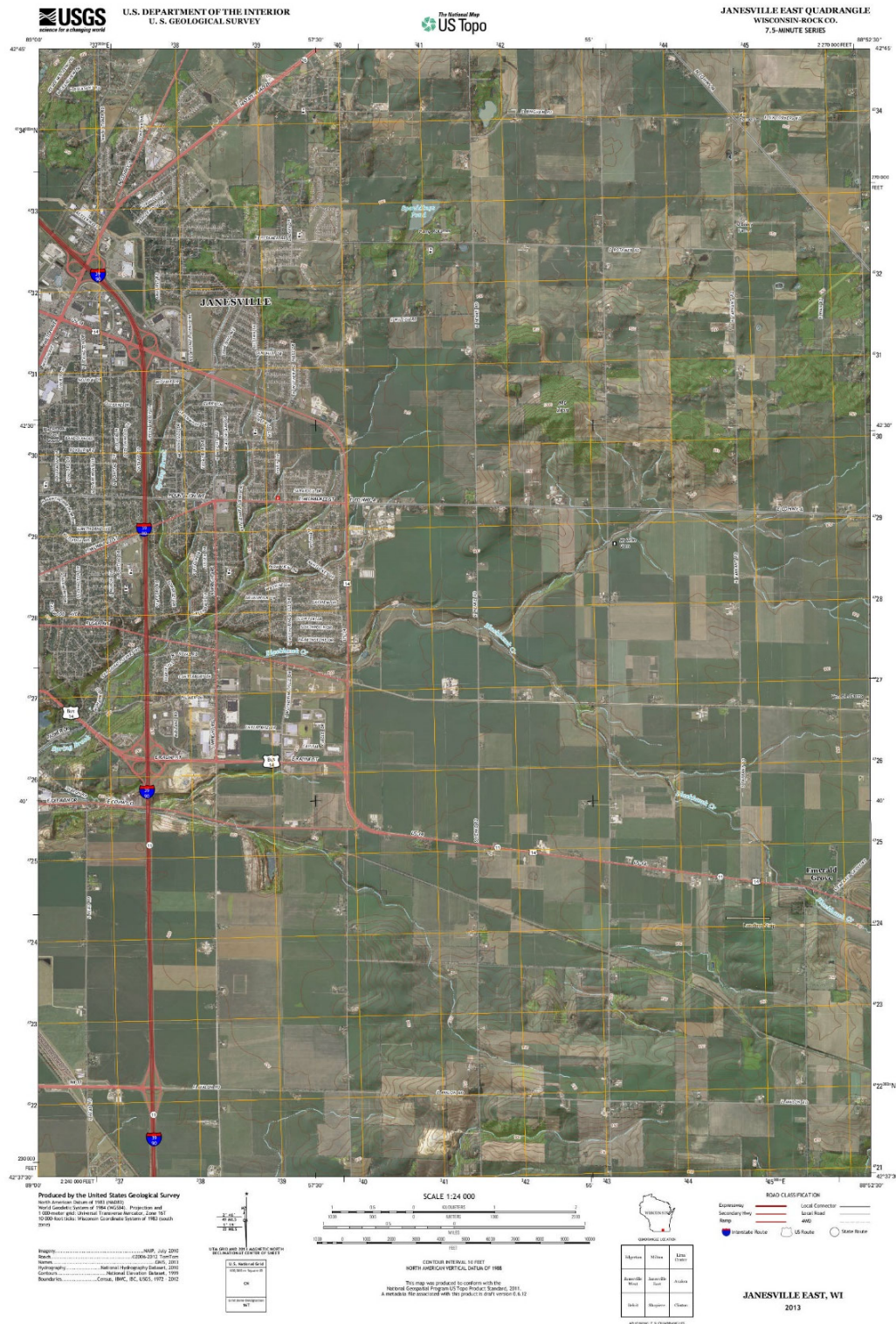


Figure 8 – U.S. Geological Survey Shopiere Quadrangle

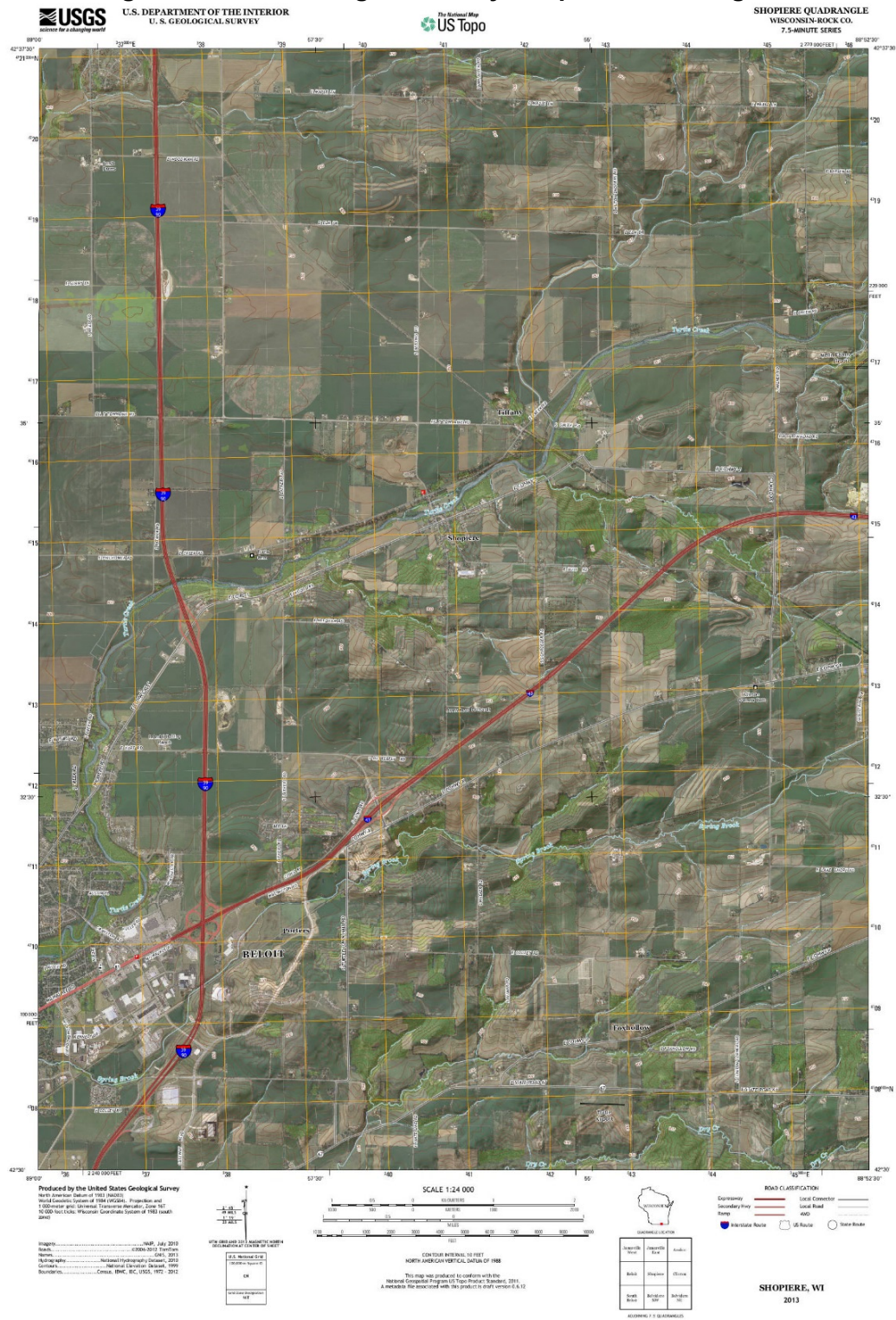


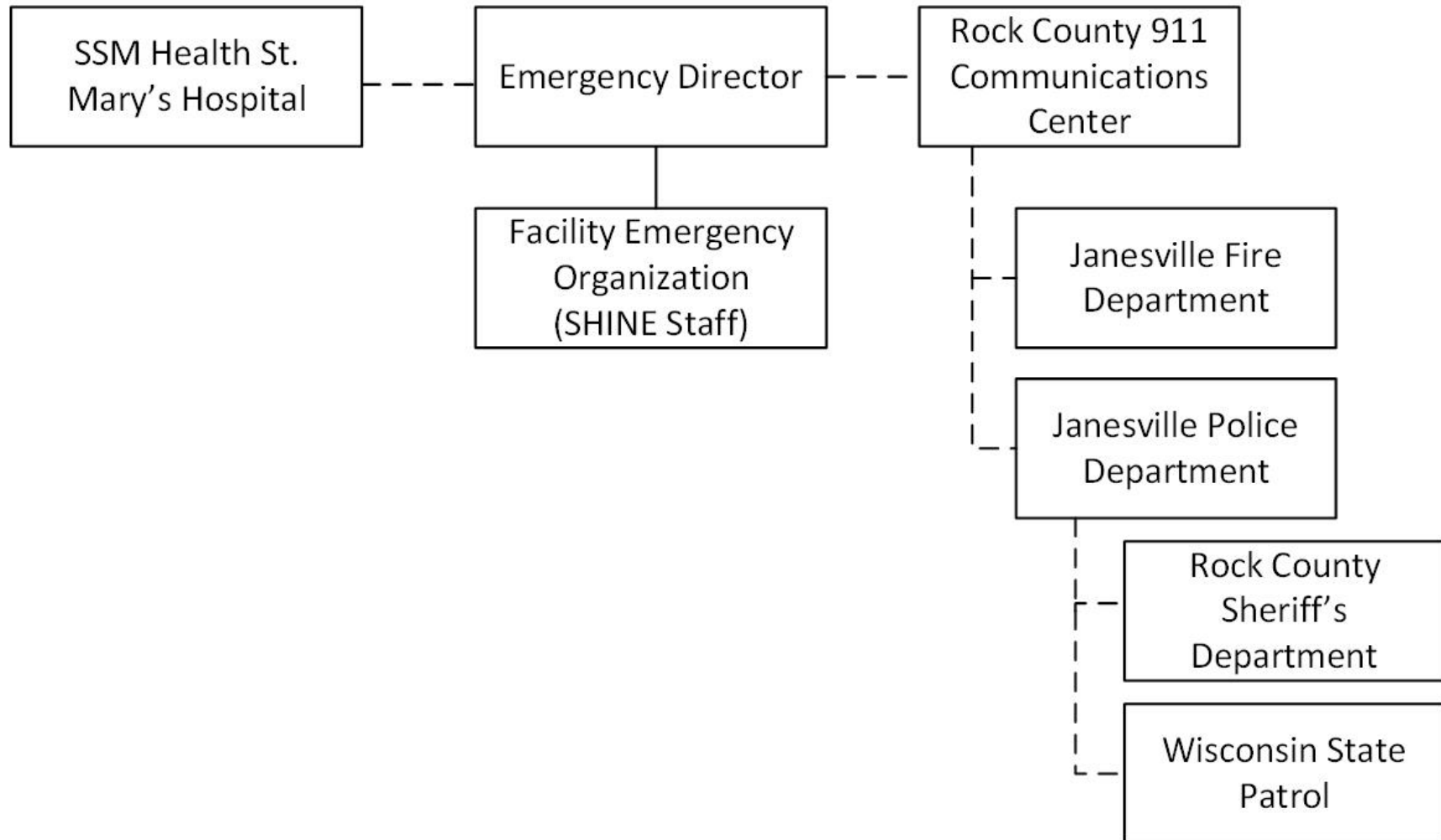
Figure 9 – Emergency Organization Interrelationships

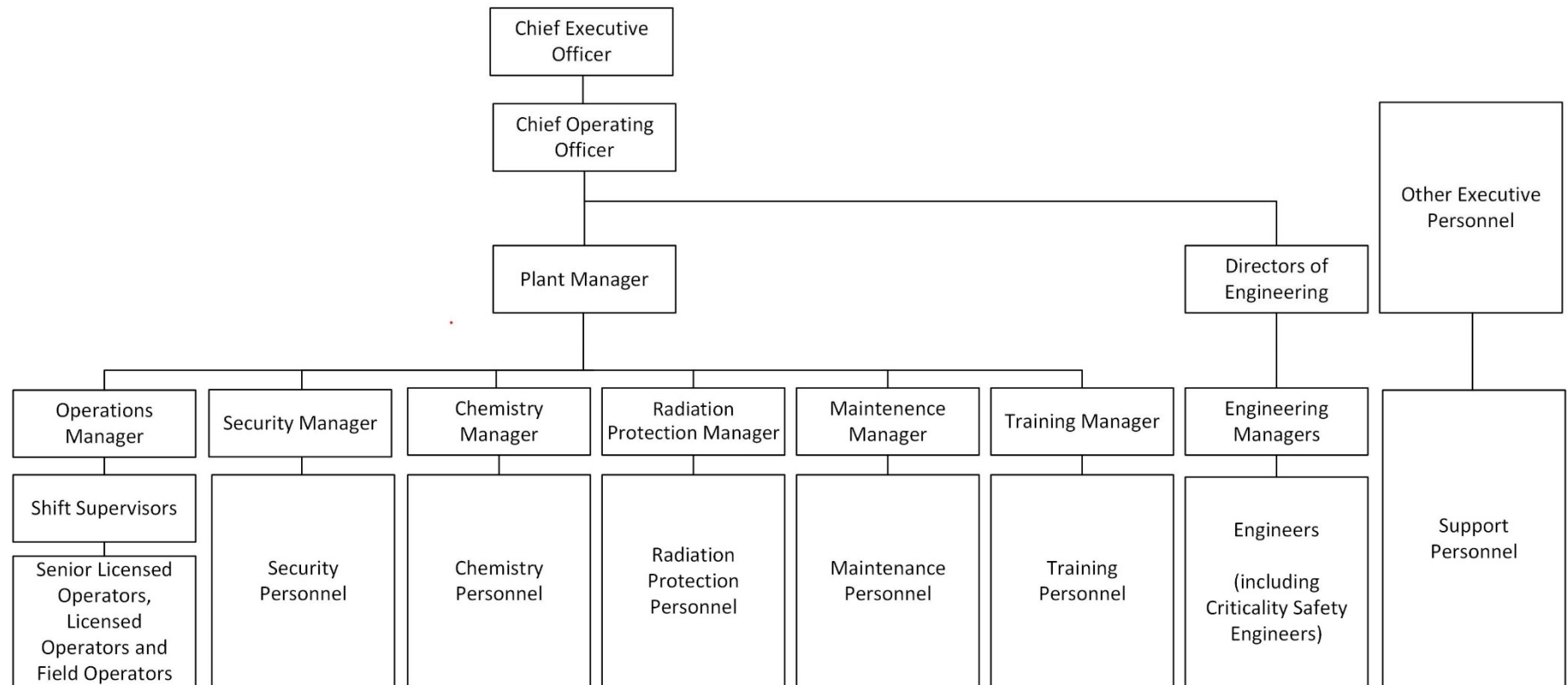
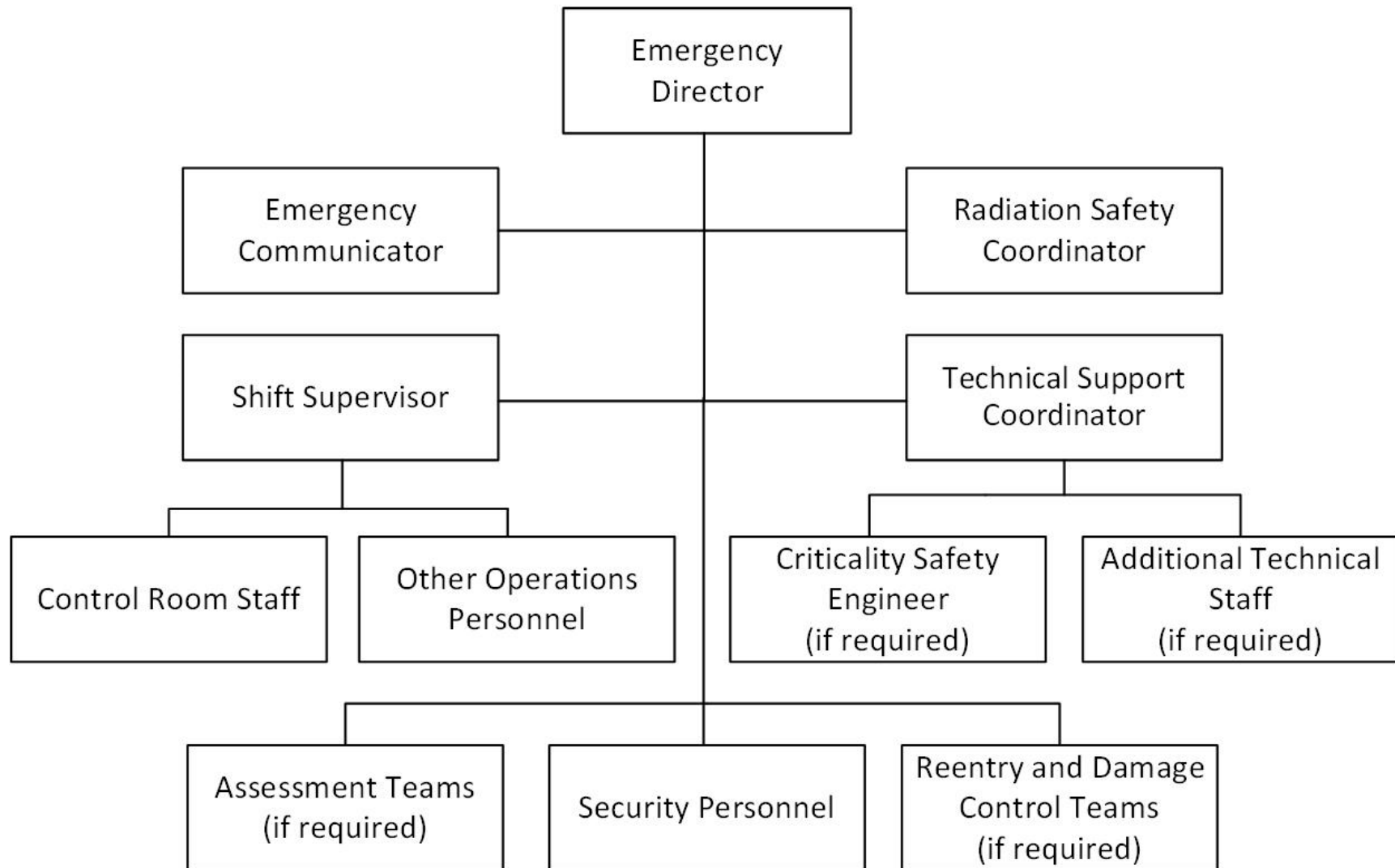
Figure 10 – SHINE Normal Facility Operation Organization Chart

Figure 11 – SHINE Facility Emergency Organization

Appendix 2 RADIOACTIVE AND HAZARDOUS MATERIALS

Chemical Name	Hazard	Location	Approximate Maximum Site Inventory	Storage State
Alpha-benzoin oxime	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	2 kg	Liquid
		Chemical storage	1 kg	Solid Powder (two 250 g containers)
Ammonia (28 wt% in storage)	Radiological / Chemical	Liquid waste	21 kg	Liquid, In Process
	Chemical	Chemical storage	499 kg	Liquid (two 1000 L IBC)
[] ^{PROP/ECI}	Chemical	In process	5 kg	Liquid, In Process
		Liquid waste	2 kg	Liquid
		Chemical storage	10 kg	Solid (two 5 kg containers)
Hydrochloric Acid	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	1 kg	Liquid
		Chemical storage	4 kg	Liquid (two one-gallon containers)
Hydrogen Peroxide	Chemical	Facility chemical reagent system (FCRS)	178 kg	Liquid, In Process
		Chemical storage	668 kg	Liquid (two 1000 L IBC)
Mineral Oil	Chemical	In pumps	172 kg	Liquid, In Process
		Chemical storage	360 kg	Liquid (two 55-gallon drums)

Chemical Name	Hazard	Location	Approximate Maximum Site Inventory	Storage State
Molybdenum trioxide	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	1 kg	Liquid
		Chemical storage	1 kg	Liquid (two one-gallon containers)
Nitric Acid (70 wt% in chemical storage)	Radiological / Chemical	Liquid Waste	126 kg	Liquid, In Process
	Chemical	FCRS	102 kg	Liquid, In Process
		Chemical storage	1979 kg	Liquid (two 1000 L IBC)
Potassium hexachlororuthenate	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	1 kg	Liquid
		Chemical storage	1 kg	Solid powder (two 250 g containers)
Potassium permanganate	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	3 kg	Liquid
		Chemical storage	1 kg	Solid powder (two 250 g containers)
Rhodium chloride	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	1 kg	Liquid
		Chemical storage	1 kg	Solid powder (two 250 g containers)
Silver Nitrate	Chemical	FCRS	1 kg	Liquid, In Process
		Chemical storage	1 kg	Crystal Powder (two 250 g bottles)

Chemical Name	Hazard	Location	Approximate Maximum Site Inventory	Storage State
Sodium Iodide	Chemical	In process	1 kg	Liquid, In Process
		Chemical storage	1 kg	Solid (two 250 g bottles)
Sodium Hydroxide	Chemical	FCRS	60 kg	Liquid, In Process
		Chemical storage	1541 kg	Liquid (two 1000 L IBC)
Sodium Sulfite	Chemical	In process	1 kg	Liquid, In Process
		Liquid waste	3 kg	Liquid
		Chemical storage	2 kg	Solid (two 250 g bottles)
Sulfuric Acid	Radiological / Chemical	In Process	61 kg	Liquid, In Process
		Liquid waste	579 kg	Liquid
	Chemical	FCRS	95 kg	Liquid, In Process
		Chemical storage	3599 kg	Liquid (two 1000 L IBC)
Sulfur Hexafluoride	Asphyxiant / Chemical	IU Cells	1440 kg	Gas, In Process
		Storage	360 kg	Compressed Gas (Two 180 kg containers)
Nitrogen (Liquid)	Asphyxiant / Chemical	Storage	18,000 gal	Liquid, Outdoors, Bulk Storage Tank
Nitrogen (Compressed Gas)	Asphyxiant / Chemical	Storage	500 ft ³ at 3000 psig	Gas, N2PS Structure, Storage Tubes

Chemical Name	Hazard	Location	Approximate Maximum Site Inventory	Storage State
Uranium Metal	Chemical	Uranium storage	620 kg	Solid Pieces ~20% enrich. (Maximum storage container size 7.8 kg)
	Radiological	In process	[] ^{PROP/ECI}	Neutron multipliers natural enrich. (8 IU)
Uranium Oxide	Chemical / Radiological	Uranium storage	732 kg	Solid Powder (Maximum storage container size 5.04 kg)
Uranyl Peroxide	Chemical	In process	43 kg	Solid, In Process (intermediate compound)
Uranyl Sulfate	Radiological	In process	1058 kg	Liquid, In Process (Maximum in a single target solution prep tank is [] ^{PROP/ECI})
	Radiological	Waste	254 kg	Liquid, In Process
Tritium	Radiological	In Process	30 g	Gas, In Process
Hydrogen	Flammable	In Process	60 g	Gas, In Process

Appendix 3 AGREEMENT LETTERS

This appendix contains letters of agreement that SHINE has obtained with offsite organizations for support of the Emergency Plan.

ROBERT D. SPODEN
ROCK COUNTY SHERIFF
BARBARA J. TILLMAN
CHIEF DEPUTY

May 18, 2018

Catherine Kolb, P.E.
Project Integration Manager
SHINE Medical Technologies, Inc.
4021 South US Highway 51, Janesville WI 53546

RE: Letter of Support

To whom it may concern:

This is to advise that the Rock County Sheriff's Office - Emergency Management Bureau is prepared to assist the above-mentioned facility in the event emergency services are required. All requests for fire, emergency medical services (EMS) or law enforcement should be reported through 911. For non-emergencies, County Emergency Management staff can be contacted during normal business hours (Monday - Friday, 7:30 AM to 4:00 PM) at 608-758-8440.

Additionally, our office can be contacted through the 911 Communications Center at 608-757-2244. The 911 Communications Center is operational 24-hours a day, seven days a week and has the ability to contact Emergency Management staff during non-business hours.

The Rock County Sheriff's Office - Emergency Management Bureau is available to assist in the event of an emergency or for drills, trainings and exercises. Since your emergency plan is on file at our office, please continue to provide any updates or changes.

If you have any questions, please contact me at [REDACTED]

Thank you.

Sincerely,

 [REDACTED]

Sergeant Shena Kohler, [REDACTED]
County Director of Emergency Management

200 EAST U. S. HIGHWAY 14
JANESVILLE, WISCONSIN 53545-9601
PHONE: (608)757-8000 FAX: (608)757-7997



July 25, 2018

Catherine Kolb, PE
Project Integration Manager
SHINE Medical Technologies, Inc.
4021 South US Highway 51, Janesville WI. 53546

Letter of support

To whom it may concern:

This is to advise that SSM Health-St Mary's Hospital Janesville, located at 3400 East Racine Street, Janesville WI., is prepared to assist SHINE Medical Technologies Inc. in accordance with section 3.4.3 and section 9.7.2 of the current Emergency Plan revision in our files.

SSM Health St. Mary's Hospital Janesville may be contacted at the following phone numbers:

Emergency Preparedness Administrator.	608-373-8129
Emergency Department	608-373-8101
Switchboard	608-373-8000

If there are any questions, please contact me at [REDACTED]

Thank you

Robert Swenarski CHEC, WCEM
Emergency Preparedness Administrator
EMS Liaison/EOC Safety Officer

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Appendix 4 EMERGENCY ACTION LEVELS

Classification	Category	Event	Emergency Action Levels
Notification of Unusual Event	Security	Threat to Security	Credible report from facility personnel or local authorities of a bomb threat, civil disturbance, or other security threat directed toward the facility.
Alert	Security	Security Event	Ongoing security event, including the threat of an imminent hostile action, that <ul style="list-style-type: none"> a) Threatens or compromises site security; b) Risks the safety of site personnel; OR c) Potentially degrades the level of safety of the facility.
Site Area Emergency	Security	Hostile Action	1) Hostile action at the facility, OR 2) Imminent or actual loss of physical control of the facility.
Alert	Criticality	Criticality Hazard	Discovery of a critical-mass quantity of special nuclear material in an unsafe geometry container or other condition that creates a criticality hazard.
Site Area Emergency	Criticality	Uncontrolled Criticality	Imminent or actual occurrence of an uncontrolled criticality, indicated by <ul style="list-style-type: none"> a) Valid actuation of the criticality accident alarm system (CAAS); OR b) Credible report from facility personnel.

Classification	Category	Event	Emergency Action Levels
Notification of Unusual Event	Fire	Prolonged Fire	Fire in the main production facility or the material staging building not extinguished within 15 minutes of control room notification of the fire or receipt of a control room fire alarm.
Alert	Fire	Fire Potentially Affecting Radioactive Material or Safety-Related SSCs	<ol style="list-style-type: none"> 1) Fire in a carbon delay bed, indicated by a carbon monoxide level of 20 ppm in the affected bed. <i>Results in up to 36 mrem TEDE in 1 hour, 36 mrem TEDE in 24 hours, and 36 mrem CDE thyroid in 24 hours at site boundary</i> 2) Explosion or fire within the safety-related area of the main production facility or within the material staging building, with the potential to affect radioactive material OR cause damage to safety-related SSCs that provide a barrier to the release of radioactive materials.
Site Area Emergency	Fire	Fire Compromising Radioactive Material or Safety-Related SSCs	<ol style="list-style-type: none"> 1) Fire in a carbon guard bed, indicated by a temperature of 150°C in the affected bed <i>Results in up to 81 mrem TEDE in 1 hour, 81 mrem TEDE in 24 hours, and 831 mrem CDE thyroid in 24 hours at site boundary</i> 2) Fire within the safety-related area of the main production facility or within the material staging building <ol style="list-style-type: none"> a) Involving radioactive material; b) Causing visible damage to safety-related SSCs that provide a barrier to the release of radioactive materials; OR c) Causing loss of the safety function of a safety-related SSC that provides a barrier to the release of radioactive materials.

Classification	Category	Event	Emergency Action Levels
Notification of Unusual Event	External	Severe Natural Phenomena or External Event	<ol style="list-style-type: none"> 1) Tornado confirmed by direct observation by facility personnel or credible report from local authorities of a tornado in the immediate vicinity of the facility. 2) Seismic event, confirmed by at least two of the following: <ol style="list-style-type: none"> a) Seismic event alarm in control room b) Earthquake felt in the facility c) A “response event” for the SHINE site location, reported by the U.S. Geological Survey National Earthquake Information Center 3) Uncontrolled flooding inside the main production facility or the material staging building. 4) Aircraft crash onsite. 5) Other severe external event or natural phenomena onsite that creates a significant hazard potential, as determined by the Emergency Director.

Classification	Category	Event	Emergency Action Levels
Alert	External	External Event Potentially Affecting Radioactive Material or Safety-Related SSCs	<p>Credible report or observation by facility personnel of any of the following events jeopardizing the function of safety-related SSCs that provide a barrier to the release of radioactive materials, OR having the potential to affect radioactive material, such as:</p> <ol style="list-style-type: none"> 1) Tornado strike 2) Seismic event, meeting the criteria of an NOUE seismic event 3) Aircraft crash into the main production facility or the material staging building 4) Uncontrolled flooding within the main production facility or the material staging building 5) Other severe external event or natural phenomena affecting the facility, as determined by the Emergency Director.
Site Area Emergency	External	External Event Compromising Radioactive Material or Safety-Related SSCs	<p>Credible report or observation by facility personnel of any of the Alert-Level External Events</p> <ol style="list-style-type: none"> a) Actually compromising the integrity of radioactive material; b) Causing visible damage to safety-related SSCs that provide a barrier to the release of radioactive materials; OR c) Causing loss of the safety function of a safety-related SSC that provides a barrier to the release of radioactive materials.

Classification	Category	Event	Emergency Action Levels
Notification of Unusual Event	Radiological Release	Equipment Malfunction	<p>1) Release of entire NDAS tritium inventory for seven or eight IU cells, indicated by loss of vacuum (7.7 psia - high pressure) in the affected ATIS mixed gas return lines during tritium delivery.</p> <p><i>Results in up to 9 mrem TEDE in 1 hour, 18 mrem TEDE in 24 hours, and 18 mrem CDE thyroid in 24 hours at site boundary</i></p> <p>2) Failure of primary system boundary and release of target solution into the IU cell in Modes 2, 3 or 4, indicated by</p> <ul style="list-style-type: none"> a. Evidence of PSB failure (IU Cell Safety Actuation signals OR RVZ1e radiation monitoring > 5x background), AND b. Elevated radiation levels or airborne contamination levels in the IF (factor of 10 over normal levels), as indicated by facility RAMS, CAMS, or portable instruments. <p><i>Results in up to 0 mrem TEDE in 1 hour, 21 mrem TEDE in 24 hours, and 21 mrem CDE thyroid in 24 hours at site boundary</i></p>
Alert	Radiological Release	Equipment Failure or Release within the Facility	<p>1) Release of tritium into the TPS glovebox, indicated by 150 Ci/m³ tritium on TPS glovebox tritium monitor, with GBSS not operating.</p> <p><i>Results in up to 0 mrem TEDE in 1 hour, 6 mrem TEDE in 24 hours, 6 mrem CDE thyroid in 24 hours, and 326 mrem TEDE in 10 days at site boundary</i></p> <p>2) Elevated radiation levels or airborne contamination levels WITHIN a site building that indicate severe loss of control (factor of 100 over normal levels), as indicated by facility RAMS, CAMS or portable instruments.</p>

Classification	Category	Event	Emergency Action Levels
Site Area Emergency	Radiological Release	Severe Equipment Accident or Release to Environment	<p>1) TOGS pressure boundary failure during Mode 2, 3 or 4 with pressurized release (N2PS actuation), indicated by</p> <ul style="list-style-type: none"> a) Evidence of TOGS failure (N2PS actuation signals OR RVZ1e radiation monitoring > 5x background), AND b) Elevated radiation levels or airborne contamination levels in the IF (factor of 100 over normal levels), as indicated by facility RAMS, CAMS, or portable instruments. <p><i>Results in up to 2 mrem TEDE in 1 hour, 122 mrem TEDE in 24 hours, and 955 mrem CDE thyroid in 24 hours at site boundary</i></p> <p>2) Release of molybdenum eluate into the supercell, indicated by</p> <ul style="list-style-type: none"> a) High radiation in an extraction cell (RVZ1 radiation monitoring > 5x background), AND b) Elevated radiation levels or airborne contamination levels in the IF (factor of 100 over normal levels), as indicated by facility RAMS, CAMS, or portable instruments. <p><i>Results in up to 71 mrem TEDE in 1 hour, 72 mrem TEDE in 24 hours, and 536 mrem CDE thyroid in 24 hours at site boundary</i></p> <p>3) Elevated radiation levels or airborne contamination levels OUTSIDE the main production facility that indicate a significant release to the environment (factor of 100 over normal levels), as indicated by portable instruments.</p>

Classification	Category	Event	Emergency Action Levels
Notification of Unusual Event	Other	Other Unusual Events	Other conditions exist that warrant precautionary activation of the ERO, at the discretion of the Emergency Director.
Alert	Other	Other Alerts	Other conditions that warrant activation of the ERO, at the discretion of the Emergency Director.
Site Area Emergency	Other	Other Site Area Emergencies	Other conditions that warrant activation of offsite emergency response organizations or precautionary notification of the public near the site, at the discretion of the Emergency Director.

Appendix 5 EMERGENCY PLAN IMPLEMENTING PROCEDURE (EPIP) LIST

The following is a topical list of Emergency Plan Implementing Procedures (EPIPs).

- Emergency Response Organization Responsibilities
- Emergency Classification and Initial Accident Assessment, addressing
 - Notification of Unusual Event
 - Alert
 - Site Area Emergency
- Activation of the Emergency Response Organization
- Notification and Communication
- Emergency Radiation Exposure Control, including
 - Exposure Projections
 - Radiological Monitoring
 - Emergency Dosimetry
 - Emergency Exposure Authorization
 - Emergency Contamination Control
- Evacuation, Assembly, and Accountability
- Emergency Equipment and Supplies
- Damage Assessments
- Emergency Organization Training
- Exercises and Drills
- Critiques and Performance Improvement
- Revising the Emergency Plan and EPIPs
- Emergency Response, including
 - Security Event Response
 - Severe Natural Phenomena and External Event Response
 - Fire Response
 - Criticality Emergency Response
 - Radiological Release Response
 - Hazardous or Toxic Chemical Spill or Release Response
 - Equipment Malfunction, Failure or Severe Accident Response