OREGON STATE UNIVERSITY
TRIGA REACTOR
LICENSE NO. R-106
DOCKET NO. 50-243

EMERGENCY RESPONSE PLAN
REVISION 10
SEPTEMBER 2019

REDACTED VERSION*

SECURITY-RELATED INFORMATION REMOVED

*REDACTED TEXT AND FIGURES BLACKED OUT OR DENOTED BY BRACKETS

Oregon State University
License R-106
October 14, 2019

ENCLOSURE 1

Oregon State University TRIGA Reactor (OSTR)
License No. R-106, Docket No. 50-243

Summary of Changes to the OSTR ERP Which Were
Determined Not to Create a Reduction in Effectiveness in the Plan

1. Change: In section 3.3.2, under "Historian" replace "Radiation Center Accountant" with "Senior Reactor Operator" and remove "Use the available tape recorder as needed."

   Basis: The Radiation Center no longer has a dedicated accountant, thus this position needed to be revised. A Senior Reactor Operator is almost always present during working hours and would be available as the second backup. The likelihood of the Receptionist and Administrative Assistant both being absent is very low. The tape recorder was removed in a previous revision of the plan and this section did not get updated to reflect the change. These edits do not reduce the effectiveness of the emergency response plan.

2. Change: Throughout Section 7, revise all mentions of OSTROP 1 from "Emergency Operating Procedures" to "Annunciator Response Procedures".

   Basis: The OSTROP was renamed and thus the title should be renamed in the emergency response plan.

3. Change: Removed 8.2.5.b: "The reactor also has one instrumented fuel element which permits the measurement of the fuel temperature in that element."

   Basis: The instrumented fuel element was recently removed from the reactor as part of a license amendment, thus this section no longer belongs in the emergency response plan.

4. Change: Removed 8.4.v: "A battery-operated portable PA device (bullhorn) for addressing personnel at the assembly area or for other similar uses."

   Basis: The bullhorn was removed during a previous revision of the plan, thus this section no longer belongs in the emergency response plan.

Oregon State University
License R-106
October 14, 2019

ENCLOSURE 2

Oregon State University TRIGA Reactor (OSTR)
License No. R-106, Docket No. 50-243

OSTR Emergency Response Plan

Oregon State University

Radiation Center

and

Oregon State TRIGA Reactor (OSTR)

Emergency Response Plan

Approved by the

Nuclear Regulatory Commission

May 17, 1984

Last Revised September 2019

Revision Number 10

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OREGON STATE UNIVERSITY
RADIATION CENTER AND TRIGA REACTOR
EMERGENCY RESPONSE PLAN

Table of Contents

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OREGON STATE UNIVERSITY
RADIATION CENTER AND TRIGA REACTOR
EMERGENCY RESPONSE PLAN

1.0 INTRODUCTION

The Oregon State University (OSU) Radiation Center complex is an over 50,000 square foot facility located at the northeast corner of 35th Street and Jefferson Way in Corvallis, Oregon. The complex is comprised of three buildings. The TRIGA Reactor is located in a four-story building, which is called the Reactor Building, on the north side of the Radiation Center. The Reactor Building is attached to the single story Radiation Center building on the south side of the site. The Advanced Thermal Hydraulics Research Laboratory (ATHRL/ANSEL) is a high bay facility attached to the east side of the Reactor Building; however, there is no access between these two buildings.

The Reactor Building contains primarily the main Reactor Bay, the Reactor Control Room, space for reactor mechanical equipment, two research laboratories, office space for the Reactor Operations Staff, and a small conference room. The Radiation Center building houses classrooms, offices, a wide variety of radioisotope laboratories, a cobalt-60 irradiation facility, a large inventory of nuclear instrumentation useful for research applications as well as for radiation protection, and a number of supporting facilities. The ATHRL/ANSEL houses experimental test loops.

The Oregon State TRIGA Reactor (OSTR) is a light-water-cooled, graphite-reflected reactor using Uranium-zirconium hydride ZRH-U TRIGA fuel elements. These fuel elements are placed in a circular grid with 16 feet of water over the top of the core. The reactor has an authorized maximum steady state thermal power of 1,100 kW and may be pulsed to a peak power of over 2,000 MW.

The OSTR is owned and operated by Oregon State University under U.S. Nuclear Regulatory Commission (NRC) License Number R-106 (Docket Number 50- 243). It is used for teaching, research, public service, and radionuclide production. Nuclear Engineering students perform a number of tests and experiments using the reactor in order to reinforce their class work on reactor theory. Researchers use the beam ports, the rotating rack, the pneumatic transfer system, the cadmium-lined irradiation tube, the in-core irradiation tube, and the thermal column for experiments involving neutron activation analysis and geochronology. Radionuclides are produced for both research and class applications, particularly classes in nuclear reactor chemistry, radiotracer techniques, and other phases of radiochemistry. Public service is provided through a large number of channels. Although outside agencies and institutions are regularly accommodated, a large percentage of the reactor's users come from OSU and other schools within the Oregon University System.

The reactor is normally operated between 4 and 7 hours a day every week day, with the most usual power level being 1,000 kW. The average energy output per year is approximately ~60 MWd.

The objective of this Emergency Response Plan is to provide a plan of action for coping with radiological and other emergencies, and to minimize the consequences of such emergencies at the OSTR. The plan specifies emergency action levels for applicable classes of emergencies, in response to which relevant portions of this plan will be activated.

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2.0 DEFINITIONS

Action Drill

A drill which 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.

Annual

Every 12 months, with an interval not exceeding 15 months.

Assessment Actions

Those actions taken during or after an accident to obtain and process information that is necessary when deciding whether to implement specific emergency measures.

Biennial

Every 24 months, with an interval not exceeding 30 months.

Corrective Actions

Those measures taken to ameliorate or terminate an emergency situation at or near the source of the problem.

Emergency

An emergency is a condition which calls for immediate action, beyond the scope of normal operating procedures, to avoid an accident or to mitigate the consequences of one.

Emergency Action Levels

Radiological dose rates, specific concentrations of airborne, waterborne or surface-deposited radioactive materials, specific observations, or specific instrument readings that may be used as thresholds for initiating specific emergency measures (e.g., designating a particular class of emergency, initiating a notification procedure, or initiating a particular protective action).

Emergency Planning Zone (EPZ)

The EPZ for the OSTR is limited to the operations boundary and includes no offsite areas.

Emergency Support Center (ESC)

The room(s) from which effective emergency control directions will be given.

ERIP

Emergency Response Implementing Procedure.

Federal Radiological Monitoring Assessment Plan (FRMAP)

A federally sponsored plan to provide expeditious and effective radiological assistance to those requesting it in the event of a radiological incident.

Monthly

Every four weeks, with an interval not to exceed six weeks.

Operations Boundary

The area within the site boundary where the Radiation Center Director has direct authority over all the activities, and for which there are prearranged evacuation procedures known to the personnel frequenting the area. For the OSTR, the operations boundary is the Reactor Building.

OSTR

Oregon State TRIGA Reactor.

OSTROP

Oregon State TRIGA Reactor Operating Procedure.

Population At Risk

Those persons for whom protective actions are being or would be taken.

Protective Actions

Those measures taken in anticipation of an uncontrolled release of radioactive material, or after an uncontrolled release of radioactive material has occurred, for the purpose of preventing or minimizing personnel radiation doses or dose commitments that would otherwise be likely to occur if the actions were not taken.

Protective Action Guides (PAGS)

Projected radiation doses or dose commitments to individuals in the general population that warrant protective action following a release of radioactive material. Protective actions would be warranted provided the reduction in individual dose expected to be achieved by carrying out the protective action is not offset by excessive risks to individual safety in the process of taking the protective action. The projected dose does not include the dose that has unavoidably occurred prior to the assessment.

Quarterly

Every three months, with an interval not exceeding four months.

Radiation Center Building

The southern building in the Radiation Center Complex.

Radiation Center Complex

The buildings situated at the northeast corner of 35th and Jefferson Way in Corvallis, Oregon, consisting of the Radiation Center Building, the Reactor Building, and the ATHRL/ANSEL facilities.

Radiological Assessment Team

The team of persons who will perform radiation dose rate, contamination, and environmental surveys to assess the radiological conditions existing within the site boundaries at the Radiation Center Complex.

Reactor Building

The northern building in the Radiation Center Complex which houses the OSTR.

Recovery Actions

Those actions taken after an emergency to restore the facility to a safe status.

Semi-Annual

Every six months, with an interval not exceeding seven and one-half months.

Site Boundary

The site boundary is that boundary, not necessarily having restrictive barriers, surrounding the operations boundary wherein the Radiation Center Director may directly initiate emergency activities. The area within the site boundary may be frequented by people unacquainted with the reactor operations. For the OSTR the site boundary consists of the rectangular area bounded by Jefferson Way on the south, 35th Street on the west, the Reactor Building fence on the north, and the east edge of the Radiation Center Complex parking lot on the east.

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3.0 ORGANIZATION AND RESPONSIBILITIES

3.1 Authorities And Responsibilities Of Governmental Agencies

This section describes the authorities, responsibilities, and support functions of federal, state, county and local governmental agencies in an emergency situation. The information presented here pertains to any class of emergency.

Specific responsibilities and emergency response actions of these agencies are described in greater detail in Chapter 7.0.

In addition to the governmental agencies mentioned in this section, arrangements have also been made with specific Oregon State University organizations with regard to augmentation of the OSTR staff during emergencies. These nongovernment agencies are described in Section 3.2.

To ensure a clear understanding of the emergency support responsibilities of key support organizations, written support agreements have been obtained from the City of Corvallis Police and Fire Departments, and the Good Samaritan Regional Medical Center.

3.1.1 Federal Agencies

U.S. Nuclear Regulatory Commission (USNRC)

Title 10, Code of Federal Regulations, Part 20.2202, "Notification of Incidents," and the OSTR Technical Specifications, as amended, outline requirements for the reporting of emergencies to the U.S. Nuclear Regulatory Commission. Notification procedures (e.g., telephone and written reports, etc.) will be implemented as required in these documents. The NRC will assess the situation and determine if any further response is required of them.

3.1.2 State Agencies

Oregon Department of Energy (ODOE)

Oregon Department of Energy Rules 345-030-0005 and 345-030-0010, Parts 2 and 3, establish notification requirements to this agency in the event of an emergency at the OSTR. Notification procedures (e.g., telephone and written reports, etc.) will be implemented as required by the Department of Energy Rules.

Once the ODOE has been notified they will:

a) Assess the situation.

b) Notify and coordinate with any other state or federal agencies, as deemed necessary.

c) Call Radiation Protective Services of the Oregon State Health Division, who in turn may call for Federal Radiological Monitoring Assessment Plan (FRMAP) assistance.

d) Notify the Governor's office and the Energy Facility Siting Council.

Other organizations which could be called by the ODOE are:

a) The Oregon Department of Emergency Services.

b) The Oregon National Guard.

c) The Oregon State Police.

3.1.3 County Agencies

Benton County Sheriff's Department

The Benton County Sheriff's Department will assist in law enforcement activities as requested by Corvallis law enforcement agencies. Notification of incidents to the Sheriff's Department will be initiated by the City of Corvallis Police Department, as deemed necessary.

Benton County Emergency Services

The Benton County Emergency Services will assist by providing emergency support mainly in the form of transportation, communications, and equipment, when such assistance is sought by local emergency support agencies. Notification of incidents will be conducted by Corvallis City Fire or Police personnel or by the Benton County Sheriff's Department.

3.1.4 Local Agencies

City of Corvallis Fire Department

The Corvallis Fire Department will provide assistance during emergencies involving actual or potential fire, explosions or injuries.

The Corvallis Fire Department operates the area's only formal ambulance service and will provide transportation for injured and/or contaminated personnel to the Good Samaritan Regional Medical Center in Corvallis. The decision as to the need to transport injured and/or contaminated personnel to the Good Samaritan Regional Medical Center will be made by attending medical personnel with advice from the Senior Health Physicist.

City of Corvallis Police Department

The City of Corvallis Police Department could be involved in an emergency if it involves an OSTR physical security situation or hostile crowds assembling outside the building. They may also assist the Oregon State Police and the OSU Department of Public Safety (OSU DPS) force with monitoring and maintaining the security of the Radiation Center Complex during and after an emergency evacuation, as well as assisting with crowd and traffic control around the Radiation Center Complex.

Notification of incidents to the City of Corvallis Police Department will be made by Oregon State Police and the OSU DPS dispatcher.

3.2 *Authorities and Responsibilities Of Nongovernmental Agencies*

This section describes the authorities, responsibilities and support functions of nongovernmental agencies.

3.2.1 Non-OSU Support Agencies

American Nuclear Insurers (ANI)

ANI is the insurer of the OSTR facility and will be notified of any emergency of Class I or greater. They may, at their discretion, send a representative to advise and deal with any legal or liability matters.

Good Samaritan Regional Medical Center, Corvallis

Arrangements have been made for injured personnel who may also be contaminated to be received and treated at the Good Samaritan Regional Medical Center in Corvallis.

3.2.2 OSU Campus Support Agencies

OSU Radiation Safety

Safety considerations for the utilization of radiation and radioactive materials at OSU falls within the jurisdiction of OSU Radiation Safety. This is headed by the OSU Radiation Safety Officer (RSO), and in the event of a radiological emergency the RSO will be notified and, as needed, will respond to the ESC. The RSO's responsibilities will be:

a) Coordinate the resources of OSU Radiation Safety in support of the emergency response effort, if needed.

b) Mobilize the Assistant RSO (s) from OSU Radiation Safety, who will assist as a member of the Emergency Radiological Assessment Team, if needed.

c) Provide backup support to and serve as the Senior Health Physicist, if required.

d) Serve on the Radiological Assessment Team, if required.

Oregon State Police and OSU Department of Public Safety

The responsibilities of the Oregon State Police and OSU DPS during an emergency are to:

a) Respond in any emergency arising from a bomb threat or a threatened or actual breach in physical security. The Standard Operating Procedure (SOP) detailed in the OSTR Physical Security Plan will be followed in these situations. This SOP contains "Safeguards information-modified handling," exempt from public disclosure, and is therefore not included in this plan.

b) Monitor and maintain the security of the Radiation Center Complex after any emergency evacuation.

c) Assist in crowd control around the Radiation Center Complex at all times.

d) Make announcements to assembled personnel over the loudspeaker systems installed on their vehicles.

e) Coordinate with other law enforcement agencies.

OSU News and Communication Services

Arrangements have been made with OSU's News and Communication Services to assist with the coordination of all public relations aspects of an emergency, such as interfacing with the university faculty, staff and student body, the public, press, television and other news media.

OSU Office of Environmental Health and Safety

Arrangements have been made with the OSU Office of Environmental Health and Safety to provide assistance as needed regarding non-radiological hazardous materials.

*3.3 Facility Emergency Organization*Error! Bookmark not defined.

3.3.1 Normal Facility Organization

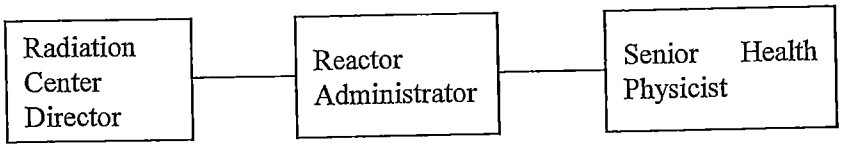
The organizational chart for the normal administration and operation of the OSTR and Radiation Center is given in Fig. 3.1. This chart will aid in understanding the emergency assignments of these personnel, which will be described in greater detail in subsection 3.3.2.

3.3.2 Authorities And Responsibilities Of Facility Emergency Personnel

Emergency Director

In the event of an emergency, the Radiation Center Director will be the Emergency Director. The line of succession and responsibilities of the Emergency Director are as follows:

a) Line of Succession



b) Responsibilities

i) Direct emergency operation and ensure proper implementation of the emergency response plan.

ii) Ensure that any necessary NRC and ODOE notifications are made.

iii) Authorize emergency workers to incur radiation exposures in excess of normal occupational limits, with the concurrence of the campus Radiation Safety Officer, if available. This function cannot be delegated.

iv) Terminate an emergency and initiate recovery operations based on advice from the Emergency Coordinator.

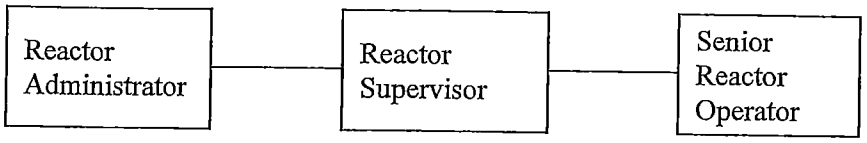
v) Notify and coordinate with the OSU Administration.

vi) Notify the Public Information Officer and keep him/her informed regarding the emergency situation.

Emergency Coordinator

In the event of an emergency, the Reactor Administrator will be the Emergency Coordinator. The line of succession and responsibilities of the Emergency Coordinator are as follows:

a) Line of succession



b) Responsibilities

i) Fulfill any necessary requirements for notifying the NRC and ODOE, and keep the Emergency Director advised of all such notifications.

ii) Take charge of the Emergency Support Center (ESC) and emergency control measures, and keep the Emergency Director informed regarding the emergency situation.

iii) Ensure proper evacuation of the reactor facility (or portion thereof) that requires evacuation during the emergency.

iv) Determine the course of further action with the assistance of the Emergency Director, the Reactor Supervisor, the Senior Health Physicist, and the Chair of the Reactor Operations Committee.

v) Authorize reentry into the reactor facility (or portion thereof) that required evacuation during the emergency.

vi) Coordinate emergency response actions with the offsite emergency support services.

vii) Advise the Emergency Director on the possibility of terminating the emergency and initiating recovery operations.

viii) Ensure the implementation of an emergency preparedness program for facility equipment and personnel.

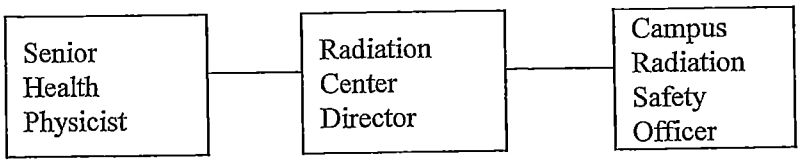
ix) Ensure up-to-date status of emergency plans and procedures.

x) Coordinate emergency plans with other affected support organizations and obtain written agreements confirming assistance from such organizations.

Senior Health Physicist

In the event of an emergency, the Senior Health Physicist will be responsible for the radiological health physics aspects of the emergency. The line of succession and responsibilities of the Senior Health Physicist are as follows:

a) Line of Succession



b) Responsibilities

i) Direct and oversee all actions of the Radiological Assessment Team.

ii) Evaluate personnel doses received during the incident.

iii) Assess subsequent potential doses and recommend protective actions as appropriate.

iv) Supervise the establishment of a release process for persons leaving the assembly point.

v) For fire emergencies, meet Fire Department upon their arrival onsite and coordinate their response into the emergency actions underway.

vi) Assist the Emergency Director, and help determine the course of further action.

Radiological Assessment Team

a) Personnel

The Radiological Assessment Team will consist of OSU personnel who have been trained in radiological assessment techniques and do not have an assigned responsibility already specified in this section. This may include the following personnel as available during an emergency:

OSU Radiation Safety Officer (RSO)
Health Physicist(s)
Assistant RSO(s)
Reactor Operator(s)
Reactor Supervisor
Development Engineer(s)
Senior Reactor Operator(s)

b) Responsibilities

i) Bring extra portable survey instruments to the assembly point during any evacuation.

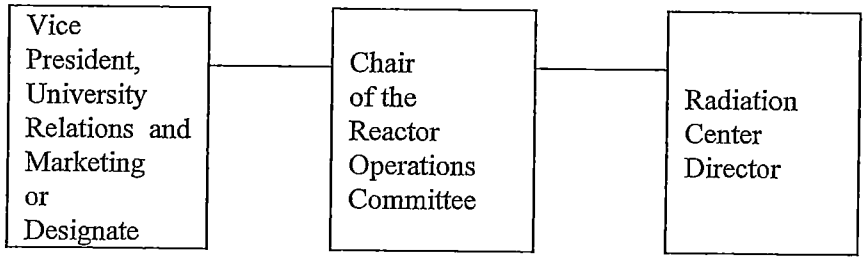
ii) Survey personnel at the assembly point after any evacuation, beginning with the emergency organization personnel.

iii) Perform radiological assessment action as directed by the Senior Health Physicist.

Public Information Officer

In the event of an emergency, the Vice President, University Relations and Marketing or a staff member acting specifically on their behalf will be the Public Information Officer, assisted as necessary by other personnel from OSU's News and Communication Services. The line of succession and responsibilities of the Public Information Officer are as follows:

a) Line of Succession



b) Responsibilities

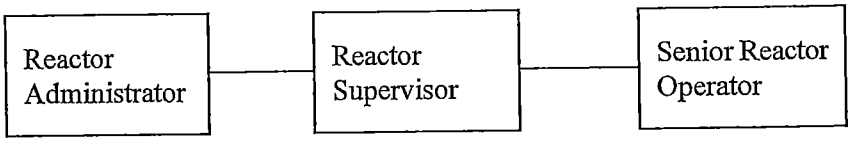
i) Coordinate all public relations aspects of the emergency, interfacing with the OSU faculty, staff and student body, the public, press, television, and other media.

ii) Coordinate with the Emergency Director to obtain current and accurate information regarding the emergency situation and recovery operations.

Recovery Operations Coordinator

After an emergency has been terminated and recovery operations initiated, the Reactor Administrator will act as the Recovery Operations Coordinator. This position will replace that of the Emergency Coordinator. The line of succession and responsibilities of the Recovery Operations Coordinator are as follows:

a) Line of Succession



b) Responsibilities

i) Assess conditions in the reactor facility after termination of the emergency to determine the proper course of further recovery actions.

ii) Authorize reentry into the reactor facility (or portion thereof) that required evacuation during the emergency.

iii) Establish and coordinate recovery/reentry efforts with the assistance of the Emergency Director, the Reactor Supervisor, the Senior Health Physicist, and the Chair of the Reactor Operations Committee.

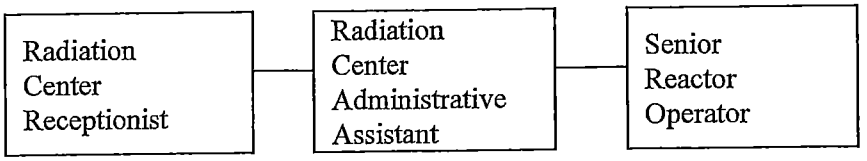
iv) Keep the Emergency Director informed regarding recovery operations.

v) Evaluate the causes of the emergency and recommend corrective actions before returning the facility to a normal operating status.

Historian

The Radiation Center Receptionist will be the Historian for the emergency.

a) Line of Succession



b) Responsibilities

i) Log the sequence of events, with the time, as they occur in the ESC. Log as much pertinent information as possible.

Chair of the Reactor Operations Committee (ROC)

a) Line of Succession

Chair, Reactor Operations Committee	—	Any available member of the Reactor Operation Committee not specifically involved in Emergency Response

b) Responsibilities

i) Help determine the correct course of action at the ESC.

ii) Ensure all necessary written reports of the incident to the regulatory agencies are completed and submitted on time.

3.3.3 Interfaces Between The Facility Emergency Organization, Offsite Local Support Organizations, And State And Federal Agencies

A block diagram showing the interfaces between the facility emergency organization, offsite local support organizations, and state and federal agencies is given in Fig. 3.2.

Figure 3.1
Normal Facility Organization

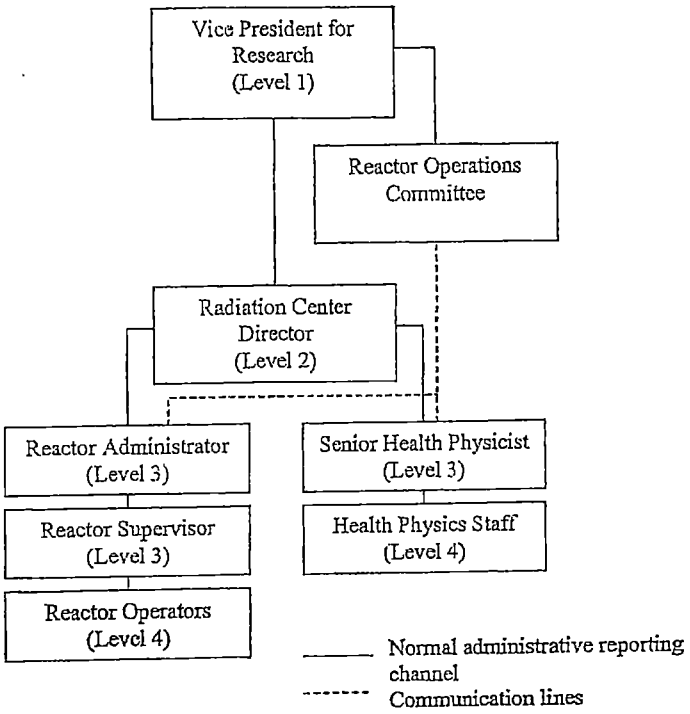
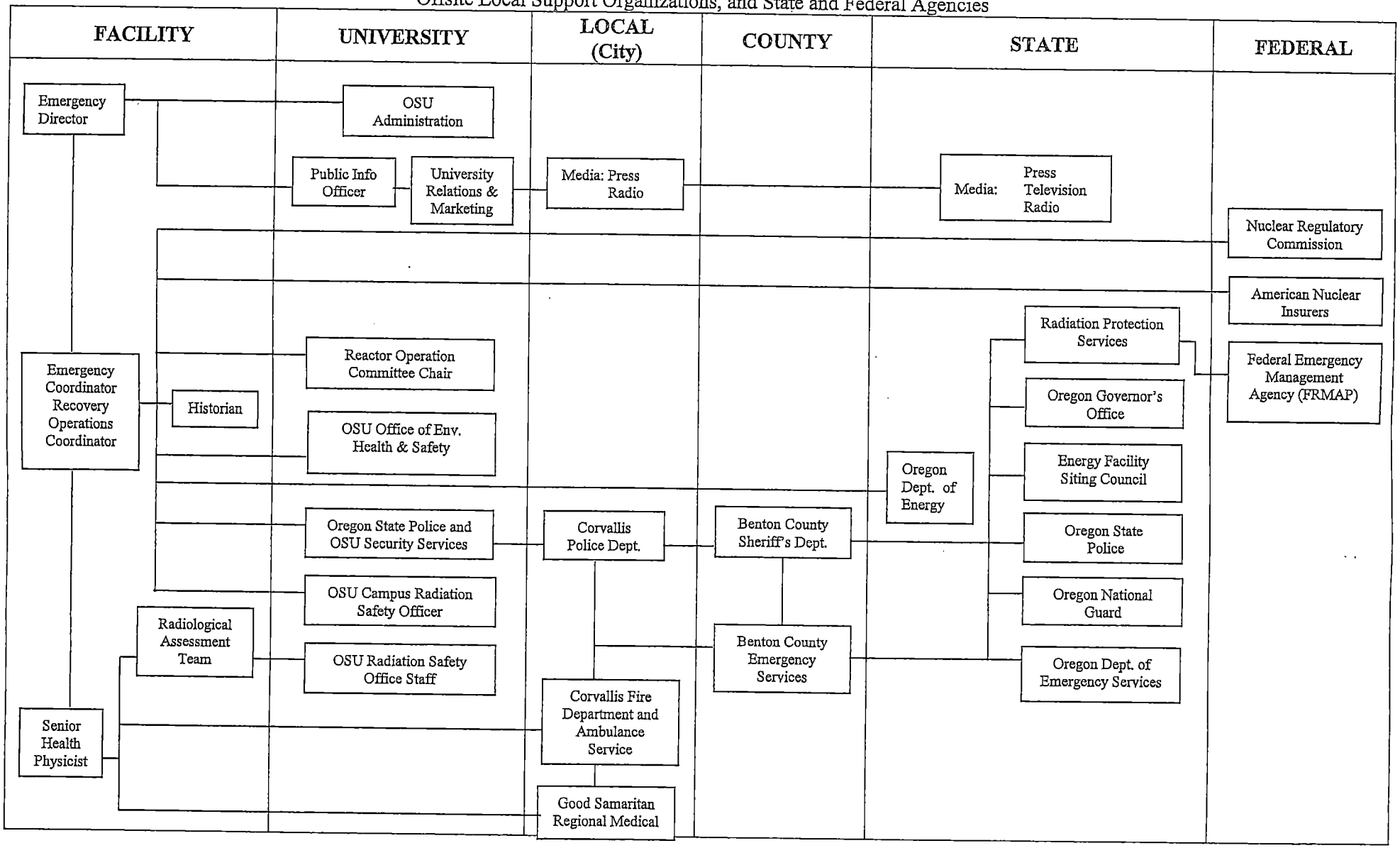


Figure 3.2
Interfaces Between The Facility Emergency Organization,
Offsite Local Support Organizations, and State and Federal Agencies



4.0 EMERGENCY CLASSIFICATION SYSTEM

The purpose of this emergency classification system is to provide for improved communications between facility personnel, local offsite emergency support personnel, and state and federal organizations. The emergency classes addressed for the OSTR are based upon accidents associated with reactor operations (many of which are very remotely possible), and upon other lesser emergency situations that are nonreactor-related. In addition, however, the Radiation Center asserts that one or more of the emergency action levels included under a Class I and Class II emergency are not deemed to be credible occurrences for the OSTR.

The emergency action levels for each of the three classes of emergencies addressed for the OSTR are intended to provide specific trigger points for the activation of the emergency organization, or applicable portions thereof, and the initiation of protective actions appropriate for the emergency event. The action levels listed below are not all inclusive. Situations or occurrences not listed under a specific emergency class, but having similar postulated consequences as those in one of the three classes of emergencies, will also be used to trigger emergency response actions applicable to that particular class of emergency. Identification of such occurrences is left to the judgment of the reactor staff on duty.

Emergency Response Implementing Procedures for the OSTR are listed in Appendix C.

4.1 Class O Emergency -- Personnel And Operational Events

Class O emergencies are events less severe than Class I emergencies, which still require a response by at least part of the emergency organization. There usually will be no effect on the reactor and immediate operator action to alter reactor status is not normally required.

The following emergency action levels (EALs) will be used to initiate emergency measures associated with this emergency class:

a) A major personnel injury such as a severe cut, wound, or burn.

b) A person experiencing a heart attack, stroke, or other severe physical ailment of rapid onset.

c) Any person receiving an estimated radiation dose equivalent greater than any occupational dose limit from sources external to the body, including doses caused by skin contamination.

d) Any person becoming internally contaminated with radioactive material sufficient to give a dose equivalent in excess of any applicable occupational dose limit.

e) Radiation levels in the reactor building sufficient to trip the alarm on any single area radiation monitor, when such levels are from unknown sources, or sources known to represent a potential emergency situation.

f) Airborne radioactivity levels in the reactor building sufficient to alarm the reactor top continuous air monitor or the stack monitor, when such levels are from unknown sources or sources known to represent a potential emergency situation.

g) Uncontrolled surface contamination greater than 2.2×10^6 dpm per 100 cm^2 over 50% of the accessible reactor bay area.

h) An event which causes significant damage to the Radiation Center complex.

4.2 Class I Emergency -- Notification Of Unusual Events

Notification of Unusual Events (Class I Emergencies) may be initiated by either man-made events or natural phenomena that can be recognized as creating a hazard potential that was previously nonexistent. 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.

In a Class I Emergency, one or more elements of the emergency organization are likely to 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 reactor, it may warrant an immediate shutdown of the reactor or interruption of non-essential routine functions.

The following emergency action levels will be used to initiate emergency measures associated with this emergency class:

a) Receipt of information threatening, or confirming, a breach in physical security (e.g., bomb threat or signs of a hostile crowd assembling outside the building).

b) Receipt of information that a severe natural phenomenon such as a flood, volcano, tornado, or earthquake, is likely to affect the Corvallis area.

c) An explosion, or a fire in the Radiation Center Complex lasting more than 10 minutes.

d) Actual or projected radiological effluents with concentrations resulting in an unrestricted area total effective dose equivalent of 15 mrem accumulated in 24 hours.

Note: The stack monitor will have alarmed, shut off the ventilation system and closed the isolation dampers long before this concentration level is reached. However, the stack monitor will continue to function and would be used to project radiological effluent releases and detect radiation levels in the unrestricted area. Direct measurements with portable survey meters would also be used to evaluate radiation levels in the unrestricted area.

4.3 Class II Emergency -- Alert

Events leading to an Alert would be sufficient to require response by the emergency organization. Modification of reactor operating status is a probable corrective action. Protective evacuations or isolation of certain areas within the operations boundary could be necessary.

The following emergency action levels will be used to initiate emergency measures associated with this emergency class:

a) Loss of greater than 80% of the reactor tank water.

b) Actual or projected whole body radiation levels at the site boundary of 20 mrem h^{-1} for one hour, or a 100 mrem thyroid dose.

c) Actual or projected radiological effluents with concentrations resulting in an unrestricted area total effective dose equivalent of 75 mrem accumulated in 24 hours.

Note: Determination of airborne effluent concentrations will follow the same process as described for a Class I Emergency. Unrestricted area radiation levels will be determined by direct radiation measurements with portable survey meters.

4.4 Class III Emergency -- Site Area Emergency

This class and higher classes of emergencies are not credible for the OSTR based on the Safety Analysis Report (SAR). The design Basis Accident for the OSTR is defined as the loss of integrity of fuel cladding for one uncooled fuel element and the simultaneous loss of all pool water, resulting in fission product release. The results of these calculations are well below the criteria established in NRC Information Notice 97-34, Deficiencies in Licensee Submittals Regarding Terminology for Radiological Emergency Action Levels in Accordance with New Part 20. ANST/ANS standard 15.16, Emergency Planning for Research Reactors states, "Each emergency plan shall include only those standard classes appropriate for dealing with accident consequences determined to be credible for the specific facility." Therefore, this entire class of emergency is not included in the OSTR emergency plan.

4.5 Class IV Emergency -- General Emergency

A general emergency may be initiated by accidents which result in an uncontrolled release of radioactive material into the air, water, or ground to the extent that protective actions offsite may be necessary. In line with reasons discussed in section 4.4, this class of emergency also is not credible for the Oregon State TRIGA Reactor based on the Safety Analysis Report, and it is therefore omitted from this plan.

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5.0 EMERGENCY ACTION LEVELS (EAL)

The emergency action levels for each OSTR emergency class are included under the appropriate class in Table 5.1 of this section. The action levels specified in Table 5.1, "Emergency Classes and Action Levels," are EALs for activating the emergency organization and initiating protective actions appropriate for the emergency event.

Table 5.1

Emergency Classes and Action Levels

Emergency Class	Emergency Action Levels
Class O -- Personnel and Operational Events	a) A major personnel injury, such as a severe cut, wound, or burn. b) A person experiencing a heart attack, stroke, or other severe physical ailment of rapid onset. c) Any person receiving an estimated radiation dose equivalent greater than any occupational dose limit from sources external to the body, including doses caused by skin contamination. d) Any person becoming internally contaminated with radioactive material sufficient to give a dose equivalent in excess of any applicable occupational dose limit. e) Radiation levels in the reactor building sufficient to trip the alarm on any single area radiation monitor, when such levels are from unknown sources, or sources known to represent a potential emergency situation. f) Airborne radioactivity levels in the reactor building sufficient to alarm the reactor top continuous air monitor or the stack monitor, when such levels are from unknown sources or sources known to represent a potential emergency situation. g) Uncontrolled surface contamination greater than 2.2 x 10^6 dpm/100 cm^2 over 50% of the accessible reactor bay area. h) An event which causes significant damage to the Radiation Center complex.

Emergency Class	Emergency Action Levels
Class I -- Notification of Unusual Events	a) Receipt of information threatening, or confirming a breach in physical security (e.g., bomb threat or signs of a hostile crowd assembling outside the building). b) Receipt of information that a severe natural phenomenon such as a flood, volcano, tornado, or earthquake, is likely to affect the Corvallis area. c) An explosion in the operations boundary, or a fire in the Radiation Center Complex lasting more than 10 minutes. d) Actual or projected radiological effluents with concentrations resulting in an unrestricted area total effective dose equivalent of 15 mrem accumulated in 24 hours. NOTE: The stack monitor will have alarmed, shut off the ventilation system and closed the isolation dampers long before this concentration level is reached. However, the stack monitor will continue to function and would be used to project radiological effluent releases and direct radiation levels in the unrestricted area. Direct measurements with portable survey meters would also be used to evaluate radiation levels in the unrestricted area.

Emergency Class	Emergency Action Levels
Class II – Alert	a) Loss of greater than 80% of the reactor tank water. b) Actual or projected whole body radiation levels at the site boundary of 20 mrem h^{-1} for one hour, or a 100 mrem thyroid dose. c) Actual or projected radiological effluents with concentrations resulting in an unrestricted area total effective dose equivalent of 75 mrem accumulated in 24 hours. NOTE: Determination of airborne effluent concentrations will follow the same process as described for a Class I Emergency. Unrestricted area radiation levels will be determined by direct radiation measurements with portable survey meters.

6.0 EMERGENCY PLANNING ZONE

The emergency planning zone (EPZ) for the Oregon State TRIGA Reactor used for all classes of emergencies covered in this Emergency Response Plan is the area within the operations boundary. The operations boundary is indicated in Appendix A and consists of the walls of the Reactor Building.

The area within the operations boundary (the EPZ) is large enough to support emergency actions should this ever be needed. The predetermined protective actions for the EPZ for each class of emergency are described in Section 7.0.

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7.0 EMERGENCY RESPONSE

7.1 Class O Emergency -- Personnel And Operational Events

7.1.1 Activation of Emergency Organization for Personnel and Operational Events

a) The individual who initially confirms an emergency situation will immediately contact the Emergency Coordinator and briefly describe the emergency.

b) The Emergency Coordinator will then mobilize that part of the facility organization appropriate for the emergency.

c) The 24-hour-per-day emergency call list for emergency response personnel is posted throughout the Radiation Center Complex, including the Emergency Support Center (Room A100).

d) Required offsite support agencies will then be mobilized (normally by telephone) by the Emergency Coordinator. Agencies which may be notified for this class of emergency include:

Corvallis Fire Department
Good Samaritan Regional Medical Center

e) The NRC and the Oregon Department of Energy will be notified of this class of emergency by the Emergency Coordinator when required by applicable licenses and regulations.

7.1.2 Assessment Actions for Personnel and Operational Events

1) Personnel Injury or Ailment

The nature and extent of any personnel injuries or physical ailment will be assessed by an OSU person trained in first aid and by other responding medical personnel.

2) Personnel Radiation Exposure (in Excess of Applicable Limits)

a) Initial assessment of personnel radiation dose will be made by the Senior Health Physicist based on:

i) Any direct-reading dosimeters worn.

ii) Measured dose rate and exposure time, or estimates of these.

iii) Calculation from available known data such as source strength, distance, etc.

b) As soon as possible, other dosimeters will be collected and returned to the supplier of the dosimetry service for emergency processing.

3) Personnel Contamination with Radioactive Materials

Personnel contamination on external surfaces and/or ingestion of radioactive materials will be assessed by:

a) Direct radiation surveys with appropriate instruments.

b) Smears and swabs of affected areas.

c) Applicable bioassay techniques available at OSU (e.g., urinalysis).

4) Area Radiation Monitor Alarm

a) Radiation dose rates in the reactor bay initially will be assessed by the area radiation monitors (ARMs). There are several area radiation monitors in various positions throughout the Reactor Building. These have detection ranges for gamma radiation between 0.1 mR h^{-1} and 10,000 mR h^{-1}. A channel check is performed on the ARMs daily. Alarm set points for these ARMs are checked quarterly and are typically set between 10 mR h^{-1} and 1000 mR h^{-1}. All of these ARMs may be read in the reactor control room and most of them may also be read near the remote detector location. In addition, the ARM outside the control room can be read in A100.

b) Portable dose rate monitoring instruments will be used by the Radiological Assessment Team to further assess and characterize the radiation field in the reactor bay. Instruments are available which cover a wide range of dose rates, radiation types, and energies.

5) Continuous Air Monitor or Stack Monitor Alarm

a) Airborne radioactivity in the reactor bay initially will be assessed by the installed air monitors. A reactor top continuous air monitor (CAM) analyzes the air for particulate radioactivity. It is capable of detecting radioactive material concentrations above normal background starting at about 10^{-10} μCi cm^{-3}. The alarm set point for the particulate channel is typically set at a small percentage of the applicable DAC for radionuclides normally expected.

b) In addition to the reactor top CAM, all ventilation air in the reactor bay is monitored as it exhausts through the reactor stack. The reactor stack monitor is capable of detecting radioactive material concentrations beginning at about 3×10^{-11} μCi cm^{-3} for particulate and 3×10^{-7} μCi cm^{-3} for gaseous activity. The stack monitor alarm set points are also typically set at a small percentage of the applicable DAC for radionuclides normally expected.

c) Both high and low volume portable air samplers are also available to take grab samples to further monitor any particulate or halogen airborne radioactivity, if necessary.

6) Uncontrolled Surface Contamination

a) If background radiation levels permit, direct surface contamination levels will be monitored using a portable thin window G.M. detector. The lower limit of detection for this type of survey is consistently well below the emergency action level for contamination.

b) Gross smear surveys using smear pads and thin window pancake G.M. detectors will also be used to determine the extent of the surface contamination, especially in the presence of higher background levels. The lower limit of detection for this survey technique is also consistently well below the emergency action level specified.

c) Analytical smear surveys will be taken using filter papers smeared over a known area and counted on appropriate instrumentation such as a laboratory gas flow proportional counter.

7) Radiation Center Complex

An assessment will be made by the Emergency Coordinator to determine if either of the following criteria are met.

a) If a large loss of water from the ATHRL/ANSEL facility has occurred which causes flooding in adjacent rooms or hallways.

b) An event has occurred which causes significant damage to the Radiation Center Complex facility.

7.1.3 Corrective Actions For Personnel And Operational Events

1) Personnel Injury or Ailment

a) First aid by qualified individual.

b) Transfer to appropriate medical treatment facility.

2) Personnel Exposure

Corrective actions for personnel exposure depend on the specific situation, but may include:

a) Shutting off equipment.

b) Moving or shielding sources.

c) Moving the individual out of the radiation field.

3) Personnel Contamination or Uncontrolled Surface Contamination

Corrective actions will normally include initiating spill and contamination control procedures, along with decontamination procedures. Emergency procedures for laboratories and areas where radioactive materials are used are posted in numerous locations around the Radiation Center laboratories and the reactor bay. These procedures describe the correct actions for both minor and major spills, including:

a) Notifying other persons in the area that a spill or contamination has occurred.

b) Preventing the spread of radioactive material.

c) Shielding any large sources.

d) Closing and locking the doors to the area.

e) Calling for assistance.

f) Decontaminating personnel and the affected area.

4) Area Radiation Monitor Alarms

a) The cause of the alarm will be determined, and if it is identified as indicating no potential problem it will be reset.

b) If the alarm is for an unknown reason or a cause known to present an emergency situation, the reactor will be shut down and secured in accordance with OSTROP 1, *Annunciator Response Procedures*.

5) Continuous Air Monitor or Stack monitor Alarm

a) The cause of the alarm will be determined, and if it is identified as indicating no potential problem it will be reset.

b) If the alarm is for an unknown reason or a cause known to present an emergency situation, the reactor will be shut down and secured in accordance with OSTROP 1, *Annunciator Response Procedures*.

c) As part of a stack monitor alarm, the reactor ventilation system will be shut down automatically, resulting in the fans being turned off and the reactor bay isolation dampers being closed. If the ventilation system does not shut down automatically, it will be shut down manually.

6) Radiation Center Complex

Corrective actions will be initiated by the Radiation Center staff with the objective of minimizing damage to the Radiation Center complex.

7.1.4 Protective Actions For Personnel And Operational Events

a) Protective actions at this level of emergency are often not distinguishable from corrective actions. Usually it will not be necessary to evacuate the Reactor Building for this class of emergency; however, it may be desirable to keep nonessential personnel away from any problem area.

b) Some protective actions which may be applicable to this class of emergency are:

i) Performing first aid.

ii) Moving personnel away from high radiation fields.

iii) Dressing contaminated personnel in protective clothing prior to movement to contain the contamination.

iv) Moving personnel away from contaminated areas.

v) Establishing restricted areas.

7.2 Class I Emergency -- Notification Of Unusual Events

7.2.1 Activation Of Emergency Organization For Notification Of Unusual Events

a) The individual who initially confirms an emergency situation will immediately contact the Emergency Coordinator and briefly describe the emergency.

b) The Emergency Coordinator will then mobilize that part of the facility emergency organization appropriate for the emergency.

c) The 24-hour-per-day emergency call list for emergency response personnel is posted throughout the Radiation Center Complex, including the Emergency Support Center (Room A100).

d) Required offsite support agencies will then be mobilized (normally by telephone) by the Emergency Coordinator. Some of the offsite support agencies will receive automatic alarms for certain emergencies in this class. For example, OSU DPS will receive physical security and fire alarms directly.

e) The NRC, the Oregon Department of Energy, and the American Nuclear Insurers will be notified by the Emergency Coordinator. A system will be used to ensure that these offsite agencies have received the initial message and that they can verify its authenticity.

f) Contents of initial and follow-up emergency messages to the NRC, the Oregon Department of Energy, and other appropriate offsite authorities will include the following, to the extent known and applicable:

i) Name, title and telephone number of caller, location of emergency, and license or docket number.

ii) Description of emergency event and emergency class.

iii) Date and time of emergency initiation.

iv) Type and quantity of radionuclides released or expected to be released.

v) Instructions to implement the callback verification procedure.

7.2.2 Assessment Actions For Notification Of Unusual Events

Physical Security Threats or Breaches, Severe Natural Phenomena and Explosions or Fires

The assessment actions for physical security threats, or breaches in physical security, severe natural phenomena, explosions, and fires will consist of gathering data by direct visual observation or from personnel involved in the situation. This data will then be evaluated in an expedient and timely manner by the Emergency Director, the Emergency Coordinator, the Senior Health Physicist, and the Chair of the Reactor Operations Committee, if available.

Elevated Radiological Effluent Discharge to the Unrestricted Area

a. Airborne radioactivity in the reactor bay initially will be assessed by the installed air monitors. A reactor top continuous air monitor (CAM) analyzes the air for particulate radioactivity. It is capable of detecting radioactive material concentrations above normal background beginning at about 10^{-10} $\mu Ci\ cm^{-3}$ for the particulates. The alarm set point for the particulate channel is typically set at a small percentage of the applicable DAC for radionuclides normally expected.

b. In addition, all ventilation air in the reactor bay is sampled as it exhausts through the reactor stack. The reactor stack monitor is capable of detecting particulate radioactive material concentrations beginning at about 3×10^{-11} $\mu Ci\ cm^{-3}$, and will detect gaseous concentrations starting at about 3×10^{-7} $\mu Ci\ cm^{-3}$. The stack monitor alarm set points are typically set at a small percentage of the applicable DAC for radionuclides expected.

c. Both high and low volume portable air samplers are available for sampling in the unrestricted area. The sampling would likely be performed by the Radiological Assessment Team.

7.2.3 Corrective Actions For Notification Of Unusual Events

1) Physical Security Threats or Breaches

a) The reactor shall be shut down and secured.

b) In all emergencies involving physical security, the next corrective action is to contact OSU DPS who will respond to the OSTR. Further law enforcement support will be coordinated by OSU DPS. Procedures for these actions are contained in the OSTR's NRC-approved Physical Security Plan, which is "safeguards information-modified handling," exempted from public disclosure, and thus not reproduced here.

2) Severe Natural Phenomena

On receipt of information that a severe natural phenomenon is likely to affect the Corvallis area, the Emergency Director, the Emergency Coordinator, the Senior Health Physicist, and the Chair of the Reactor Operations Committee, if available, will immediately convene to determine an appropriate course of action. Actions which may be considered are:

a) Shutting down and securing the reactor.

b) Removing spare fuel elements and any other radioactive material from the fuel storage pits if a flood is imminent, and;

c) Sampling and discharging the Radiation Center's liquid holdup tank.

3) Explosions or Fires

a) The reactor shall be shut down and secured.

b) Personnel initially discovering an explosion or fire will use individual judgment regarding the use of a fire extinguisher.

c) If the fire alarm has not been activated automatically, it will be activated manually. Fire alarm boxes and fire extinguishers are located throughout the facility.

d) Doors not already closed should be shut to help prevent the spread of any fire or the spread of any radioactive contamination which may arise as a result of an explosion or fire.

4) Elevated Radiological Effluent Discharge to the Unrestricted Area

a) The reactor will be shut down and secured.

b) If the ventilation system has not shut down automatically, it will be turned off manually so that the fans will be off and the isolating

dampers closed in accordance with OSTROP 1, *Annunciator Response Procedures*.

c) Doors to the reactor bay may be sealed with duct tape to minimize the leakage of airborne radioactive material.

7.2.4 Protective Actions For Notification Of Unusual Events

a. For most Class I emergencies (and Class II emergencies), the main protective action will be to evacuate the Reactor Building and/or the Radiation Center (or portion thereof).

b. Due to the nature of most Class I emergencies, an evacuation may be initiated by any member of the staff.

c. There are three methods to evacuate the reactor bay or the Radiation Center:

i) Fire alarm system.

ii) Automated Public Address System evacuation announcement.

iii) Public Address system for the entire Radiation Center Complex.

d. Evacuation procedures are posted throughout the Radiation Center Complex. All personnel in areas where any evacuation alarm sounds will immediately evacuate the building by the shortest reasonable route. Personnel will reassemble outside the main entrance to the Radiation Center Building (the south side of the building) unless ordered to another assembly point as part of the evacuation.

e. During any evacuation of the Reactor Building, the OSTR intrusion alarm system will be activated by the reactor operations staff.

f. In the assembly area, personnel who suspect that they are contaminated will assemble separately from other personnel.

g. Other appropriate protective actions may be communicated to individuals within the operations boundary by means of the public address system for the Radiation Center Complex or by a separate system for the reactor bay which originates in the reactor control room.

h. A battery-operated public address device (bullhorn) is available in the emergency equipment locker in B134 to communicate protective actions and other information to personnel at the assembly area.

i. Personnel accountability within the operations boundary and/or the Radiation Center Complex is accomplished by two methods:

i) All personnel entering the reactor bay are required to check with the control room on entry and exit so that the identity and number of people in the reactor bay are known at all times.

ii) During an evacuation, Radiation Center staff members have pre-assigned areas of the Radiation Center Complex to check on their way out of the building to ensure that everyone has evacuated.

j. Personnel evacuated from the Radiation Center Complex will remain in the assembly area until all the necessary information has been obtained, needed dosimeters have been collected for evaluation of doses, and personnel surveys have been completed. Nonessential personnel will then be released.

7.3 Class II Emergency -- Alert

7.3.1 Activation Of Emergency Organization For Alert

a. The individual who initially confirms an emergency situation will immediately contact the Emergency Coordinator and briefly describe the emergency.

b. The Emergency Coordinator will then mobilize that part of the facility emergency organization appropriate for the emergency.

c. The 24-hour-per-day emergency call list for emergency response personnel is posted throughout the Radiation Center Complex, including the Emergency Support Center (Room A100).

d. Required offsite support agencies will then be mobilized (normally by telephone) by the Emergency Coordinator. In the unlikely event that this class of emergency occurs during off-duty hours, OSU DPS will have already been notified through an automatic system.

e. The NRC, the Oregon Department of Energy, and the American Nuclear Insurers will be notified by the Emergency Coordinator. A system will be used to ensure that these offsite agencies have received the initial message and that they can verify its authenticity.

f. Contents of initial and follow-up emergency messages to the NRC, the Oregon Department of Energy, and other appropriate offsite authorities will include the following, to the extent known and applicable:

i) Name, title and telephone number of caller, location of emergency, and license or docket number.

ii) Description of emergency event and emergency class.

iii) Date and time of emergency initiation.

iv) Type and quantity of radionuclides released or expected to be released.

v) Instructions to implement the callback verification procedure.

7.3.2 Assessment Actions For Alert

1) Loss of Reactor Tank Water

a. A loss of reactor tank water will be indicated initially by the reactor low water alarm. This will be annunciated in the control room during working hours and will alarm at the OSU DPS any other time. Assessment of the situation based on this alarm will be by visual observation.

b. In the event of a failure of this system, the reactor top ARM will alarm when the loss of shielding water over the core results in the radiation level from the core exceeding the alarm point on the ARM (normally 1 R h^{-1}). Assessment of water loss following alarms from the ARM will be by observation of ARM radiation levels and the water level in the liquid holdup tank for the Radiation Center Complex.

c. Because water on the reactor bay floor drains to the liquid holdup tank, a standard water analysis will also be performed on the liquid in the tank to determine if the radionuclide concentrations are such that the holdup tank contents can be drained to the sewer in order to provide additional liquid storage capacity. The combined volumes of the holdup tank and the reactor bay floor are sufficient to retain the entire volume of liquid in the reactor tank on site.

d. Further assessment of the loss of reactor water will be made by visual observation of the reactor tank water level and the rate of increase of radiation levels as measured by the reactor top and other ARMs.

2) High Radiation Levels at the Site Boundary

a) High radiation dose rates initially will be assessed by the installed area radiation monitors (ARMs). There are several ARMs in various positions throughout the Reactor Building. These have detection ranges for gamma radiation between 0.1 mR h^{-1} and 10,000 mR h^{-1}. A channel check is performed on the ARMs daily. Alarm set points for these ARMs are checked quarterly and are typically set between 10 mR h^{-1} and 1000 mR h^{-1}. These ARMs may be read in the reactor control room and most of them may also be read near the remote detector location. In addition, the ARM outside the control room can be read in A100.

b) Portable dose rate instruments will be used by the Radiological Assessment Team to further assess and characterize the radiation field at the site boundary. Instruments are available which cover a wide range of dose rates, radiation types, and energies.

3) Elevated Radiological Effluent Discharge to the Unrestricted Area

a) Airborne radioactivity in the reactor bay initially will be assessed by the installed air monitors. A reactor top continuous air monitor (CAM) analyzes the air for particulate radioactivity. It is capable of detecting radioactive material concentrations above normal background beginning at about 10^{-10} μCi cm^{-3} for the particulates. The alarm set point for the particulate channel is typically set at a small percentage of the applicable DAC for radionuclides normally expected.

b) In addition, all ventilation air in the reactor bay is sampled as it exhausts through the reactor stack. The reactor stack monitor is capable of detecting particulate radioactive material concentrations starting at about 3×10^{-11} μCi cm^{-3}, and concentrations of gaseous activity beginning at about 3×10^{-7} μCi cm^{-3}. The stack monitor alarm set points are typically set at a small percentage of the applicable DAC for radionuclides normally expected.

c) Both high and low volume portable air samplers are available for sampling in the unrestricted area. The sampling would likely be performed by the Radiological Assessment Team.

7.3.3 Corrective Actions For Alert

1) Loss of Reactor Tank Water

a) If the reactor is operating the following will occur in accordance with OSTROP 1, *Annunciator Response Procedures*:

i) Shut down and secure the reactor.

ii) Shut off the primary circulating and demineralizing pumps.

iii) Attempt to isolate and stop the leak.

b) In addition, the following may occur:

i) Add make-up water in an attempt to maintain an adequate water level.

ii) Pump liquid waste holdup tank to sewer, if possible, based on the radioactivity concentrations in the water.

2) High Radiation Levels at the Site Boundary

a) The reactor will be shut down and secured in accordance with OSTROP 1, *Annunciator Response Procedures*

b) The source of high radiation levels shall be sought and shielded.

c) Personnel shall be sent to the site boundary, out of the radiation field, to minimize access to the general area.

3) Elevated Radiological Effluent Discharge to the Unrestricted Area

a) The reactor will be shut down and secured.

b) If the ventilation system has not shut down automatically, it will be turned off manually so that the fans will be off and the isolating damper closed in accordance with the OSTROP 1, *Annunciator Response Procedures.*

c) Doors to the reactor bay may be sealed with duct tape to minimize the leakage of airborne radioactive material.

7.3.4 Protective Actions For Alert

Protective actions for this class of emergency will be in accordance with Section 7.2.4.

7.4 Emergency Exposure Levels

7.4.1 Lifesaving Activities

For lifesaving situations, a total effective dose equivalent of up to 25 rem is permissible, due to the urgency of the situation. Authorization for this limit shall be obtained from the Emergency Director, with the concurrence of the OSU Radiation Safety Officer if available. The individual performing this action shall be an informed volunteer.

7.4.2 Corrective Actions

For non-lifesaving corrective actions, the maximum total effective dose equivalent which will be authorized is 10 rem. Authorization for this limit shall be obtained from the Emergency Director, with the concurrence of the OSU Radiation Safety Officer, if available.

7.4.3 Other Emergency Actions

Emergency personnel who will be providing routine first aid, decontamination, or medical treatment services to injured persons will be subject to the normally applicable occupational dose limits.

7.5 Access Control And Restricted Areas

a) Following the assessment of radiation and contamination conditions in and around the entire Radiation Center Complex, in order to minimize exposures to radiation

and the spread of radioactive contamination, the Senior Health Physicist will post appropriate warning signs, and restrict access to areas where permissible contamination or radiation limits are exceeded.

b) No area will be returned to normal use until radiation and contamination levels have been reduced to the approximate background levels existing in the area prior to the incident. Such levels will be determined by conventional radiation surveys. In all applicable situations levels will be equal to or below the limits specified in current regulatory guidance for unrestricted use and access.

7.6 Personnel Dosimetry

a) Determination of the onsite radiation doses to personnel during an emergency will be made using existing dosimeters regularly supplied to personnel.

b) Members of the reactor facility staff routinely wear, or have available, the following dosimeters:

i) Pocket ion chamber (0-200 mR).

ii) TLD badges.

iii) Neutron dosimeter.

iv) TLD finger rings.

c) Many other personnel at the Radiation Center Complex also have TLD badges, TLD rings and pocket ion chambers.

d) There are a large number of additional pocket ion chambers and electronic dosimeters available for issue in the event of an emergency. These would be used as necessary for assessing personnel doses.

e) The issuance, use and recording of self-reading dosimeter doses during an emergency is under the direction of the Senior Health Physicist.

7.7 Protection Action Guides (PAGS) For Whole Body And Thyroid Dose Equivalent For Members Of The General Public Within The EPZ (The Operations Boundary)

Although it is extremely unlikely that any member of the general public will remain inside the EPZ during an emergency involving radioactive materials, PAGs for radiation exposure of these individuals have been set at 1 rem to the whole body and 5 rem to the thyroid tissue.

8.0 EMERGENCY EQUIPMENT AND FACILITIES

8.1 Emergency Support Center (ESC)

a) The primary emergency support center will be Room A100 in the Radiation Center. Adjacent offices may be used as necessary. This room also has all the annunciators for the facility fire alarm and some physical security annunciators. In addition, the general evacuation alarms for the entire Radiation Center Complex may be initiated and turned off in this room, and the dose rate measured by the ARM outside of the control room can be read there.

b) The ESC will be the central point for receipt and evaluation of radiological data and the point from which emergency control directions will be given. Room A100 is normally occupied by the Radiation Center receptionist and hence has the main telephone communications control. It also has microphones for the building public address (PA) system and an intercom to strategic laboratories and offices in the Radiation Center Complex.

c) A further advantage of this room is that it is at the front (south) entrance to the Radiation Center, which is adjacent to the assembly area used in the event of an evacuation. This means that it can be activated and staffed very rapidly after an evacuation.

d) For many of the more minor emergencies, the ESC may be moved up to the reactor control room (D302), depending on the exact nature of the emergency. The reactor control room has similar communications facilities as Room A100, including two independent telephones and a microphone for the Radiation Center Complex public address system. In addition, the control room has the same intercom system as Room A100, as well as the same capability to turn the automated PA evacuation announcement on and off.

e) The control room has the added advantage that it has the instrumentation readouts for all of the reactor's radiological and nonradiological monitoring systems. A small quantity of emergency equipment is stored in the control room, and it also has an independent intercom system for the reactor bay.

8.2 Assessment Facilities and Equipment

A listing of the current locations for emergency equipment cabinets and other emergency equipment storage areas, plus representative equipment inventories for these storage locations are given in Appendix B.

8.2.1 Portable and Fixed Radiological Monitors

a. Many portable radiation monitoring instruments are available for use during an emergency. Some of these are kept in the emergency equipment cabinets and others are routinely used for normal operations. A representative listing of these instruments includes:

i) High-range gamma ion chamber survey meters.

ii) Medium-range beta-gamma ion chamber survey meters.

iii) Beta-gamma G.M. survey meters.

iv) Neutron survey meters.

v) Alpha survey meters.

vi) High-range remote ion chamber suitable for use in air or underwater.

b. A number of fixed radiological monitors are also available, and as described in Chapter 7, these include:

i) A continuous air monitor located on the reactor top.

ii) A stack monitor for the OSTR ventilation discharge stack (particulate and gaseous) located in Room D400B.

iii) The multi-channel area radiation monitoring system (ARMs) located around the Reactor Building.

8.2.2 Sampling Equipment

a) There are a number of portable air samplers available for use in an emergency. A representative listing of this equipment includes:

i) Continuous particulate air monitors (on carts).

ii) High-volume particulate air samplers (AC operated).

iii) Medium-volume particulate and halogen air sampler (AC operated).

iv) Medium-volume battery-operated particulate and halogen air sampler.

v) Low-volume battery-operated (lapel) particulate air samplers.

b) There are ample supplies kept in the Health Physics Laboratory for various other forms of sampling, including water and surface smear sampling. The emergency cabinets also contain a selection of necessary sampling materials.

8.2.3 Instrumentation For Specific Radionuclide Identification And Analysis

a. A wide variety of laboratory analytical instrumentation is available in the Radiation Center. The following three systems are representative of available equipment and are also the most likely to be used in an emergency:

i) The multichannel analyzer (MCA) with a Germanium detector for automated computer analysis of gamma spectra, normally in Room B125 of the Radiation Center Complex.

ii) A liquid scintillation counter normally in Room B136 of the Radiation Center Complex.

iii) A gas flow proportional counter, normally in the Health Physics Laboratory, A138.

8.2.4 Personnel Monitoring Equipment

Typical personnel monitoring equipment is described in section 7.6 under "Personnel Dosimetry."

8.2.5 Nonradiological Monitoring Equipment

1) Reactor Instrumentation

All of the nonradiological reactor system monitors which may provide pertinent information have their displays in the reactor control room.

a) There are five reactor power indicators operating off of three separate detectors. These are listed below:

Detector	Monitor
Fission Chamber	Linear Power Recorder Log Power Recorder Log Power Meter
Uncompensated Ion Chamber	% Power Meter
Uncompensated Ion Chamber	Safety Power Meter

b) There are seven thermocouples which measure the reactor water system temperatures. Each of these has a digital readout on the reactor console. The seven thermocouples provide surveillance of:

Reactor tank water North
Reactor tank water South
Heat exchanger inlet, primary water
Heat exchanger outlet, primary water
Demineralizer inlet
Heat exchanger inlet, secondary water
Heat exchanger outlet, secondary water

c) A level sensor is used to annunciate a low reactor tank water level. This is activated when the water level drops about two inches below normal. The same sensor also activates a high water alarm when the reactor tank water level rises about one inch above normal.

2) **Fire Detectors**

a) The Radiation Center has fire detection devices in essentially all rooms and corridors. Most of these respond to temperature-rate-of-rise; however, there are also a few smoke detectors.

b) If one of the fire sensors detects a fire, an alarm will be automatically activated, not only in the building, but also at OSU DPS dispatch. The OSU dispatcher will then call the Corvallis City Dispatcher who will alert the nearest available fire engine crew. This will normally be from substation #2 which is approximately one quarter of a mile from the Radiation Center.

c) An annunciator will also be lit in A100, the receptionist's room (also the ESC) to indicate the origin of the fire alarm. A map in that office indicates the possible radiation hazards, if any, for each area of the Radiation Center Complex.

8.3 First Aid, Decontamination, and Medical Facilities

8.3.1 First Aid Training

One or more members of the emergency organization will have obtained a current first aid qualification. Training, such as the American National Red Cross Standard Multimedia Course (refresher course every three years) or equivalent, will be provide to selected members of the facility emergency organization.

8.3.2 Contamination Control And Personnel Decontamination

The Health Physicist will coordinate any necessary personnel decontamination under the direction of the Senior Health Physicist.

a) If there are a number of people involved in an emergency where there is a possibility for contamination, injured personnel will be monitored first.

b) All contaminated personnel should assemble in a separated area to avoid the spread of contamination.

c) Injured personnel will normally be decontaminated and then dispatched to the Good Samaritan Regional Medical Center.

d) Monitoring and decontamination may occur enroute or after arrival, depending on the nature of the injury.

e) After all injured persons are cared for, uninjured personnel will be checked for contamination and necessary action taken to remove whatever contamination is detected.

8.3.3 Decontamination Facilities And Equipment

a) There are a number of personnel decontamination kits available throughout the Radiation Center Complex. The typical contents of the small and large decontamination kits are given in Appendix B.

b) There is a shower in room D206 which can be used for personnel decontamination. The water from this shower drains into the Radiation Center's liquid waste holdup tank.

c) In the event that this shower is not accessible or available, there are further personnel decontamination facilities at the Good Samaritan Regional Medical Center.

8.3.4 Medical Transportation

a) The attending medical staff will decide where injured persons are taken, based on:

i) The nature and severity of their injuries.

ii) The level of radioactive contamination.

b) During transportation care will be taken to contain any contamination by dressing the person with protective clothing, by covering the individual with blankets or plastic, or by other appropriate means.

c) Personnel with obviously serious injuries, with or without contamination, will be transported by ambulance directly to the emergency room of the Good Samaritan Regional Medical Center. Both the ambulance crews and the hospital emergency room staff have been trained to handle radiological emergencies.

8.3.5 Medical Treatment

a) The Good Samaritan Regional Medical Center in Corvallis has a Standard Operating Procedure for dealing with radiological emergencies, including contaminated patients.

b) The OSU Radiation Center will maintain a written agreement with the Good Samaritan Regional Medical Center which assures that medical services are available, and that the staff are prepared to handle radiological emergencies.

8.4 Communications Equipment

a) Communications equipment or systems available for use during an emergency are:

i) Telephones: The Radiation Center Complex has approximately fifty telephones, each with its own independent line. The main reception area (and hence ESC) telephones can handle four simultaneous calls, and includes displays which provide information about the calls. The telephones will continue to function in the event of a power loss to the Radiation Center.

ii) A public address (PA) system: This system serves the entire Radiation Center Complex and is operable from the ESC (A100) and the reactor control room. This system has backup emergency power.

iii) Portable radios.

iv) A separate building intercom system between the ESC, the reactor control room, and other locations throughout the Radiation Center Complex.

v) Cell phones.

b) In addition, the Oregon State Police and OSU DPS have the capability of radio communication with other local law enforcement agencies, and of using the loudspeaker system on their vehicles as an external public address system, if necessary.

9.0 RECOVERY

a) Recovery criteria for restoring the facility to a safe status will be strongly dependent upon the incident and will be determined by a task group consisting of:

i) The Emergency Director.

ii) The Recovery Coordinator.

iii) The Senior Health Physicist.

iv) The Reactor Supervisor.

v) The Chair of the Reactor Operations Committee.

vi) The Campus Radiation Safety Officer.

b) As needed, recovery procedures will be written and approved by the ROC for each operation prior to initiation. The recovery operations and any needed procedures will include consideration of the radiation and contamination levels.

c) After the emergency, a comprehensive written report of the events and subsequent actions shall be prepared by the reactor operations staff and filed with the Reactor Operations Committee as soon as possible.

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10.0 MAINTAINING EMERGENCY PREPAREDNESS

This chapter describes the elements necessary for maintaining an acceptable state of emergency preparedness. Provisions have been made for maintaining the effectiveness of the Emergency Response Plan, including training, review and update of the Emergency Response Plan and associated implementing procedures, and maintenance and inventory of equipment and supplies that would be used in emergencies.

10.1 Initial Training And Periodic Retraining Program

a) An initial training and periodic retraining program will be conducted to maintain the ability of emergency response personnel to perform their assigned functions.

b) The personnel involved in the training program will be:

i) Facility personnel responsible for decision making and transmitting emergency information and instruction.

ii) Facility personnel responsible for accident assessment.

iii) Facility radiological monitoring and assessment team members.

iv) Medical support personnel at Good Samaritan Regional Medical Center. (1)

v) Oregon State Police and OSU Department of Public Safety personnel. (1)

vi) Police, ambulance and fire-fighting personnel. (1)

c) The content of the training program will include the overall Emergency Response Plan and the particular implementing procedures relevant to each group of personnel listed above.

10.2 Emergency Drills

a) Annual onsite emergency drills will be conducted as action drills with each required emergency measure being executed as realistically as is reasonably possible, including the use of appropriate emergency equipment.

b) Annual action drills will employ the use of written scenarios to more effectively fulfill their function.

c) Biennially, these drills will contain provisions for coordination with offsite emergency personnel and will test, as a minimum, the communication links and notification procedures with these offsite agencies and support organizations.

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(1) These personnel will receive regular training at fixed intervals, but initial training for all new employees is not considered feasible.

d) After each drill there will be a debriefing, during which time observers will present their critiques of the exercise. These will then be evaluated by the facility emergency response personnel. Any deficiencies identified in the emergency plan, the implementing procedures, or their actual use during a drill will be corrected within six months of the exercise. Corrections will be approved by the OSTR Reactor Operation Committee prior to implementation.

10.3 Emergency Plan Review And Update

a) The Emergency Response Plan will be reviewed and updated annually, and will include modifications necessitated by changes in the facility and/or environs. The review committee will consist of the Radiation Center Director, the Reactor Administrator, the Senior Health Physicist, and the Reactor Supervisor. The updated plan will then be approved by the OSTR Reactor Operations Committee.

b) Revised or updated copies of the Emergency Response Plan, support agreements and applicable implementing procedures will be distributed within 30 days of approval to all affected individuals and federal, state, county, and local organizations.

c) Changes to the Emergency Response Plan will be made in accordance with 10 CFR 50.54(q). Three copies of changes made without NRC approval which do not decrease the effectiveness of the plan, and proposed changes which may decrease the effectiveness of the plan, will be submitted to the NRC within 30 days after they are made or proposed. The signed original and one copy should be sent to the USNRC Document Control Desk, Washington, D. C. and one copy should be sent to the USNRC Project Manager.

10.4 Equipment Maintenance And Inventory

The operational readiness of all emergency communications and emergency health physics equipment is assured by a routine maintenance program. Part of this is performed under the existing OSTR surveillance and maintenance program (S&Ms) covered by OSTROPs 14.0 and 16.0, and the rest is performed as part of the routine health physics program.

A check of the emergency equipment security seals shall be performed quarterly. If this seal is broken, an inspection and inventory shall be immediately performed using the checklist for the given cabinet or room as appropriate. If the seal is not broken, the status of the seal shall be recorded in the checklist. However, all emergency equipment shall be inventoried and inspected annually regardless of the status of the security seals. The inventory and inspection checklists are given in Appendix B.

10.4.1 Required Maintenance and Minimum Calibration Frequency

a) Communications equipment is repaired as necessary.

b) All portable survey instruments are repaired as necessary and calibrated annually.

c) The OSTR fixed radiological monitors are repaired as necessary and calibrated annually.

d) Self-reading dosimeters are calibrated annually.

e) Air sampler flow rates are calibrated annually.

f) The automated evacuation announcement system and building PA system shall be tested annually and repaired as necessary.

10.4.2 Functional Testing

a) Most communications equipment (i.e., cell phones, land-line phones and two-way radios) are in daily, weekly or monthly use and hence is undergoing continual functional testing. .

b) All portable survey instruments at the Radiation Center Complex are checked prior to operation, except those in the emergency cabinets which are checked at least annually. A number of survey instruments are in routine use and are functionally checked on a daily basis.

c) The instruments at the Good Samaritan Regional Medical Center emergency cabinet are calibrated on an annual basis. Batteries are normally replaced annually.

d) The OSTR fixed radiological monitors are in routine use and functionally tested daily during the normal work week as part of the reactor startup checklist.

10.4.3 Equipment Inventory

a) The equipment in the emergency cabinets at the Radiation Center Complex is inventoried on an annual basis.

b) Emergency equipment located in a cabinet at the Good Samaritan Regional Medical Center is inspected and inventoried annually.

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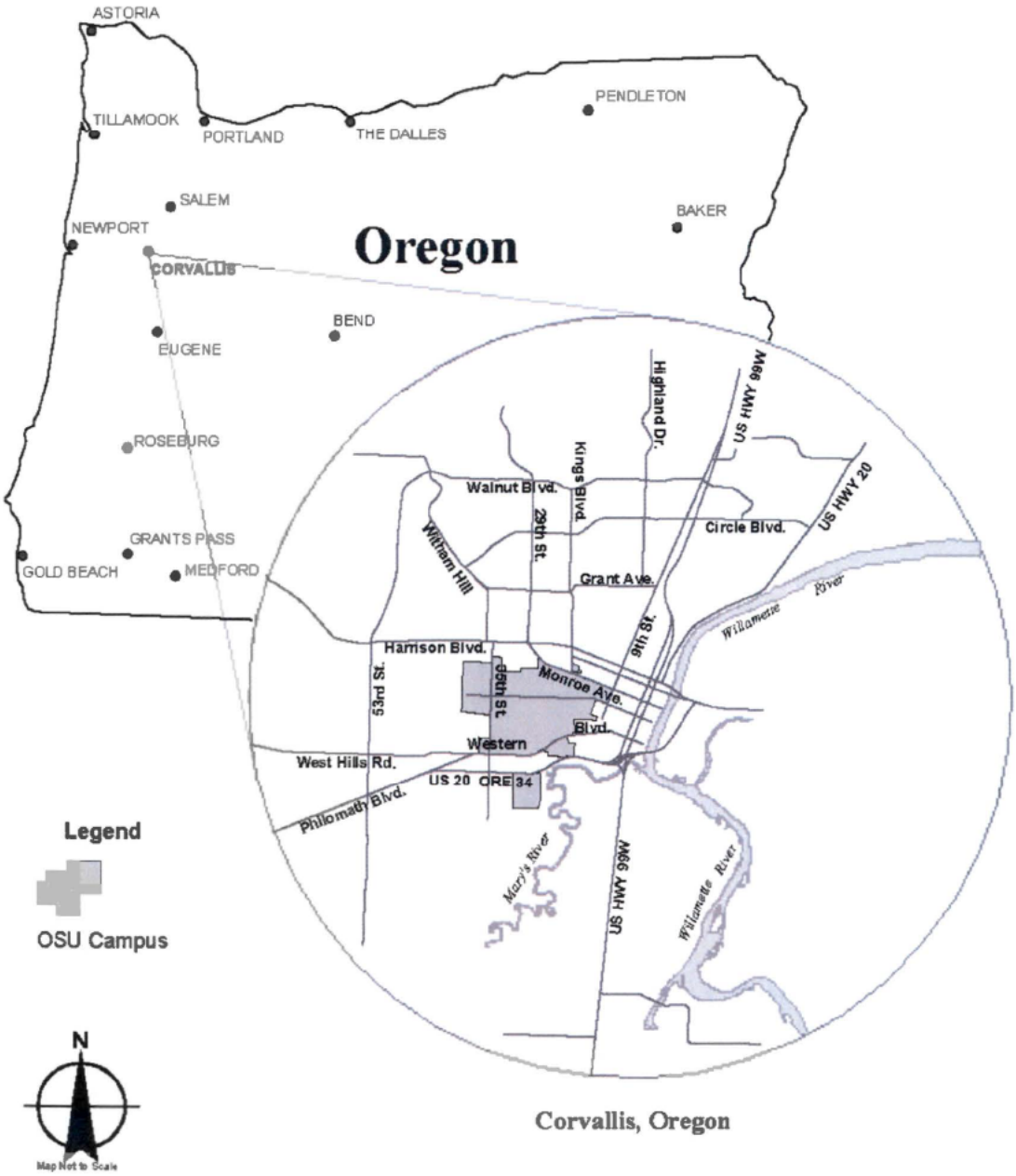
Appendix A

Area Maps and Radiation Center Complex Floor Plan

Figure A.1

Access Routes and General Location of the
Radiation Center Complex in the Corvallis Area



Corvallis, Oregon

Figure A.2

Site Diagram for the Radiation Center Complex

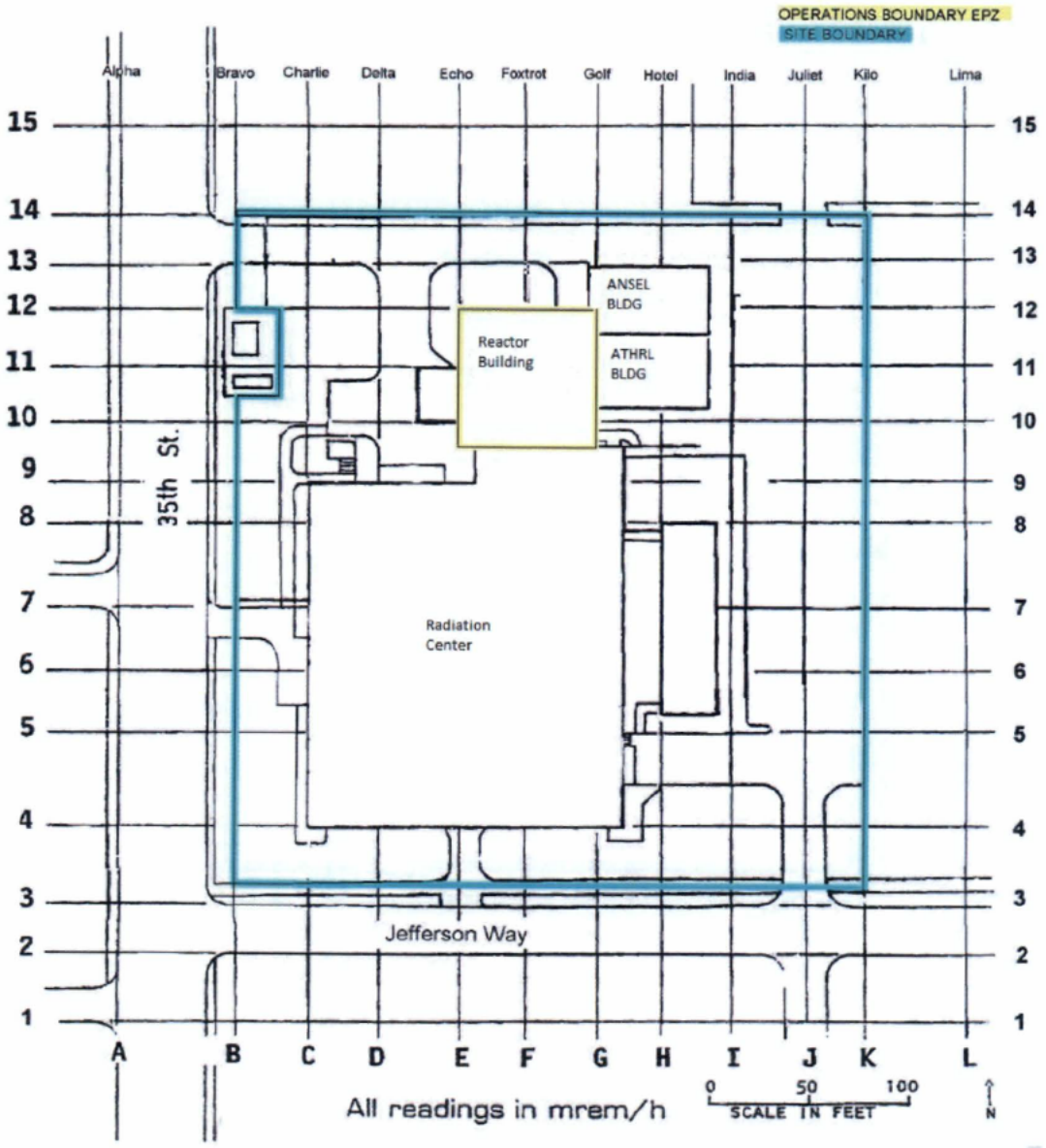


Figure A.3

OSU Radiation Center

Appendix B

OREGON STATE UNIVERSITY RADIATION CENTER QUARTERLY SECURITY SEAL INSPECTION OR ANNUAL EQUIPMENT INVENTORY CHECKLIST	Date:
	By:
	Signature:

G Quarterly Security Seal Inspection for _____ Quarter of _____.

G Annual Equipment Inventory for _____.

Seal Status	Location
☐ ok ☐ Broken/Inventory Performed	Good Samaritan Regional Medical Center Emergency Department Cabinet
☐ ok ☐ Broken/Inventory Performed	A138, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	B108, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	B114, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	B122, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	B124, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	B134, Large Emergency Equipment Cabinet
☐ ok ☐ Broken/Inventory Performed	B134, Small Emergency Equipment Cabinet
☐ ok ☐ Broken/Inventory Performed	B134 #1, Large Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	B134 #2, Large Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	C118 #1, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	C118 #2, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	D100, Emergency Cabinet
☐ ok ☐ Broken/Inventory Performed	D100, Large Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	D102, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	D104, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	D204, Health Physics Office
☐ ok ☐ Broken/Inventory Performed	D204, Small Decontamination Kit
☐ ok ☐ Broken/Inventory Performed	D302, Reactor Control Room Emergency Cabinet
☐ ok ☐ Broken/Inventory Performed	D302, Small Decontamination Kit

B134 LARGE EMERGENCY EQUIPMENT CABINET

- ☐ 1. Current copy of Emergency and Safety Equipment Inventory List.
- ☐ 2. 4 flashlights (Exchange batteries and check for proper operation).
- ☐ 3. 4 packages of disposable plastic booties.
- ☐ 4. 100 moist towelettes. Replace if dried out.
- ☐ 5. 60 smear pads.
- ☐ 6. 4 boxes disposable vinyl gloves.
- ☐ 7. 4 packages of disposable towels.
- ☐ 8. 1 roll of large plastic bags.
- ☐ 9. Zip-lock bags.
- ☐ 10. 2 boxes of twist tie Baggies.
- ☐ 11. 4.25 cm smears, bags, tweezers.
- ☐ 12. 3 lengths of nylon warning rope.
- ☐ 13. 1 roll nylon warning rope.
- ☐ 14. Radiation Center/neighborhood grids.
- ☐ 15. Various radiation warning signs.
- ☐ 16. 25 prestrung CRAM tags.
- ☐ 17. Emergency position signs.
- ☐ 18. 2 orange hard hats.
- ☐ 19. 2 plastic buckets.
- ☐ 20. 1 plastic bag containing a towel, face cloth, soap, nail brush.
- ☐ 21. Thick polyethylene sheeting.
- ☐ 22. Blanket.
- ☐ 23. 2 standard large personnel decontamination kits (attach checklist).
- ☐ 24. 10 packages of personal protective clothing.
    - ☐ a. Cloth hood.
    - ☐ b. Cloth coveralls.
    - ☐ c. Plastic coveralls.
    - ☐ d. Pair cotton liner gloves.
    - ☐ e. Pair rubber gauntlet gloves.
    - ☐ f. Pair rubber shoe covers.
    - ☐ g. Pair plastic shoe covers.
    - ☐ h. Pair vinyl gloves.

B134 SMALL EMERGENCY EQUIPMENT CABINET

- ☐ 1. Current copy of Emergency and Safety Equipment Inventory List.
- ☐ 2. 5 Dose/Exposure rate survey instruments.
- ☐ 3. 2 Contamination survey instruments.
- ☐ 4. 2 high volume air samplers with filter paper:
  - ☐ a. AC only operated.
  - ☐ b. RADECO (Exchange batteries annually and check for proper operation).
- ☐ 5. 1 extension cord for air sampler.
- ☐ 6. 1 dosimeter charger (Exchange batteries annually and check for proper operation).
- ☐ 7. 3 First Aid kits.
- ☐ 8. 2 writing pads.
- ☐ 9. 5 pens (replace annually).
- ☐ 10. 4 rolls of masking tape (replace if discolored, dry, or brittle).
- ☐ 11. 12 pocket dosimeters. (Room A100 also contains a number of pocket dosimeters.)

B134 ADDITIONAL EQUIPMENT

- ☐ 1. Two mops.
- ☐ 2. One stretcher.
- ☐ 3. One metal swab bucket.

GOOD SAMARITAN REGIONAL MEDICAL CENTER

(Emergency Room)

- ☐ 1. Check that the hospital has a current copy of the Emergency Response Plan.
- ☐ 2. Radiation warning signs and labels. (One packet)
- ☐ 3. Heavy polyethylene sheathing (one).
- ☐ 4. Disposable protective clothing, including:
  - ☐ a. Caps
  - ☐ b. Shoe covers
  - ☐ c. Gloves
  - ☐ d. Cover-alls
- ☐ 5. Several plastic bags of various sizes.
- ☐ 6. Radiological smearing materials.
- ☐ 7. 3-4 rolls of 12" masking tape. Replace if discolored, dry, or brittle.
- ☐ 8. Five 200 mR pocket dosimeters and one charger.
  - ☐ a. Rezero pocket dosimeters.
  - ☐ b. Replace charger battery (one D-cell).
- ☐ 9. One large personnel decontamination kit (attach checklist).
- ☐ 10. Radiation survey meters (instruments calibrated and returned to the kit):
  - ☐ a. 2 Contamination Survey instruments.
  - ☐ b. 1 dose/exposure rate survey meter.

REACTOR CONTROL ROOM, D-302, EMERGENCY CABINET

- ☐ 1. Current copy of the Emergency and Safety Equipment Inventory List.
- ☐ 2. 2 flashlights (Exchange batteries annually and check for proper operation).
- ☐ 3. 2 rolls of masking tape. (Replace if discolored, dry or brittle)
- ☐ 4. Various radiation warning signs.
- ☐ 5. 2 lengths of nylon warning rope.
- ☐ 6. 1 pair of cloth coveralls.
- ☐ 7. 1 cloth hood.
- ☐ 8. 1 pair of heavy duty rubber gloves.
- ☐ 9. 4 packages of disposable plastic gloves.
- ☐ 10. 1 pair of rubber shoe covers.
- ☐ 11. 1 pair of cloth shoe covers.
- ☐ 12. 2 packages of disposable plastic shoe covers.
- ☐ 13. 1 box Telfa sterile pads.
- ☐ 14. 1 box cotton balls.
- ☐ 15. 1 can cleanser.
- ☐ 16. 1 bottle of Isoclean.
- ☐ 17. 1 bottle Phisohex.
- ☐ 18. 4 packages of absorbent towels.
- ☐ 19. 1 package of Q-Tips.
- ☐ 20. 2 boxes of plastic baggies.
- ☐ 21. 6 large plastic waste bags.
- ☐ 22. 1 plastic bucket.
- ☐ 23. 3 dozen smear pads.
- ☐ 24. 1 roll of "Caution Radioactive Material" tape.
- ☐ 25. 15 pair paper disposable coveralls.
- ☐ 26. 1 standard small decontamination kit (attach checklist).

Also located in the reactor control room D-302 or Reactor Bay D-104 are the following:

- ☐ 27. 1 Contamination survey instrument.
- ☐ 28. 1 dose/exposure rate survey meter.
- ☐ 29. 5, 2-way citizens band radio transceivers. (check for proper operation)

ROOM D-100 EMERGENCY CABINET

- ☐ 1. Current copy of the Emergency and Safety Equipment Inventory List.
- ☐ 2. 1 contamination survey instrument.
- ☐ 3. 1 dose/exposure rate survey meter.
- ☐ 4. 1 first aid kit.
- ☐ 5. 2 flashlights. (Exchange batteries annually and check for proper operation)
- ☐ 6. 2 cloth caps.
- ☐ 7. 3 cloth hoods.
- ☐ 8. 4 plastic disposable hoods.
- ☐ 9. 4 pair of coveralls.
- ☐ 10. 1 pair of small rubber gloves.
- ☐ 11. 1 pair of large rubber gloves.
- ☐ 12. 2 pair heavy duty rubber gloves.
- ☐ 13. 2 boxes of disposable gloves.
- ☐ 14. 2 packages of disposable plastic booties.
- ☐ 15. 2 pair of rubber shoe covers.
- ☐ 16. Paper towels.
- ☐ 17. 6 big plastic waste bags.
- ☐ 18. 1 plastic wash tub.
- ☐ 19. 14 smear pads.
- ☐ 20. 1 length of nylon warning rope.
- ☐ 21. Various radiation warning signs.
- ☐ 22. 3 rolls of masking tape. (Replace if discolored, dry or brittle)
- ☐ 23. 1 standard large decontamination kit (attach checklist).

HEALTH PHYSICS OFFICE, D-204

- ☐ 1. Various types of instruments.
- ☐ 2. 1 portable high volume air sampler.

OREGON STATE UNIVERSITY
RADIATION CENTER

SMALL DECONTAMINATION KIT INSPECTION

Verify the quantity and quality of the following small kit items: (Refill or replace as necessary to meet the minimum quantity indicated for each item or if items are unusable.)

		Minimum Quantity	Actual Quantity										
			A138	B108	B114	B122	B124	C118 #1	C118 #2	D102	D104	D204	D302
a.	250 ml bottle of ISOCLEAN/Radiacwash	1											
b.	Sterile Pads	5											
c.	Package of Cotton Balls	1											
d.	Paper Cups	4											
e.	Plastic Scrub Brush	1											
f.	Package of Q-Tips	1											
g.	Writing Pad and Pencils	1											
h.	Roll of 12" Masking Tape	1											
i.	Roll of RAM Warning Tape	1											
j.	Can of Abrasive Cleanser	1											
k.	Band-Aids	6											
l.	Radiacwash Towelettes	10											
m.	Surgeon's Gloves (latex or plastic)	6 pr.											

OREGON STATE UNIVERSITY
RADIATION CENTER

LARGE DECONTAMINATION KIT INSPECTION

Verify the quantity and quality of the following large decon items: (Refill or replace as necessary to meet the minimum quantity indicated for each item or if items are usable.)

	Large Decon Kit Item	Minimum Quantity	Actual Quantity		
			B134#1	B134#2	D100
a.	Quart Bottle of ISOCLEAN/Radiacwash	1			
b.	500 ml Bottle of Distilled Water	1			
c.	Bottle of Liquid Soap	1			
d.	Box of Sterile Pads	1			
e.	Box of Cotton Balls	1			
f.	Paper Cups	15			
g.	5 lb. Box of Borax	1			
h.	Bar of Lava Soap	1			
i.	Bar of Facial Soap	1			
j.	Plastic Scrub Brushes for Hands & Fingernails	2			
k.	Box of Disposable Gloves	1			
l.	Box of Plastic Baggies	1			
m.	Box of Q-Tips	1			
n.	Writing Pad & Pencils	1			
o.	Pair of Scissors	1			
p.	Roll of Masking Tape (12")	1			
q.	Can of Abrasive Cleanser	1			
r.	Roll of RAM Warning Tape	1			
s.	Coarse Rasp	1			
t.	Fine Tip Permanent Marker (blue or black)	1			
u.	Red Permanent Marker	1			
v.	Surgeon's Gloves (latex or plastic)	6 pr			
w.	Radiacwash Towelettes	20			