EMERGENCY PLAN

UNIVERSITY OF FLORIDA TRAINING REACTOR

FACILITY LICENSE NO.: R-56
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College of Engineering

University of Florida

Gainesville, Florida

UFTR EMERGENCY PLAN

-Contents

1.0. INTRODUCTION

1.1. Scope of the UFTR Emergency Plan

The University of Florida Training Reactor (UFTR) Emergency Plan is designed to cope with credible emergencies which may impact or result from the UFTR. Where possible, it adopts the standard campus procedures that are widely practiced and understood by campus emergency response teams. However, the plan deals primarily with emergency responses that are required by the unique nature of the research reactor facility and the credible accidents that might arise within the facility.

Details that are provided in other UFTR design and licensing basis documents such as the FSAR and security procedures, details that can reasonably be expected to change from time to time, and step-by-step procedures or checklists that may be altered as a result of experience or test exercises, are not incorporated into this Emergency Plan. Where necessary, these details are included in an appendix to this plan or in the implementing procedures as appropriate. The UFTR design and licensing basis documents and non-safeguarded implementing procedures are available at the facility for inspection and review.

1.2. Basis for the UFTR Emergency Plan

The emergency planning requirements for research reactors are specified in 10 CFR, Part 50, Appendix E. Applicable guidance in emergency planning is set forth in Revision 1 to Regulatory Guide 2.6, "Emergency Planning for Research and Test Reactors" (March 1983) and in ANSI/ANS-15.16-2008, "Emergency Planning for Research Reactors." These documents were used as the basis for development of the UFTR Emergency Plan.

1.3. Characteristics of the UFTR Facility

1.3.1. Reactor Characteristics

The requirements for safe and flexible operation of the reactor as a student training aid and for research have been met by use of the inherently safe Argonaut-UTR design which incorporates a low power level with large negative temperature and void coefficients. The reactor is licensed to operate at a maximum steady-state power level of 100 kW thermal.

The reactor core is heterogeneous in design using low enriched uranium silicide-aluminum fuel contained in aluminum cladding. The MTR-type fuel plates are assembled in bundles in the fuel boxes. Water in the fuel boxes acts as a moderator and a coolant. Reactor grade graphite blocks surrounding the fuel boxes act as a moderator and a reflector.

The reactor power is controlled with four control blades constructed with cadmium neutron absorbing tips. The blades are housed within a magnesium shroud positioned between the fuel boxes. A drive mechanism located outside the biological shield is attached to each blade to allow remote manipulation by a licensed operator.

The biological shield consists of a shield test tank and cast-in-place concrete and removable concrete blocks. Access to the reactor core is provided by removal of concrete blocks cast to fit openings and to prevent radiation streaming.

1.3.2. UFTR Building Structural Design

The UFTR is located in a two-story building reinforced with concrete. The reactor building is divided into two distinct parts based upon differences in utilization and structure. The reactor cell area is located at the north end of the building. The south end of the building is used for research laboratories and offices.

1.3.3. Experimental Facilities

The UFTR is equipped with a variety of experimental facilities including vertical foil slots, a variety of vertical ports, removable vertical and horizontal graphite stringers, a thermal column, a shield test tank, a horizontal through-port, and several horizontal openings on the center plane of the reactor. The horizontal through-port is used in conjunction with a pneumatic rapid sample transfer (rabbit) system which moves small samples to and from the core remotely from the radiochemistry lab within a shielded glove box.

1.4. UFTR Facility Location

The UFTR building is located on the campus of the University of Florida at Gainesville, in Alachua County. Alachua County, with Gainesville at its center, is located in the north central portion of the Florida peninsula. The University of Florida campus is in the southwestern quadrant of the greater Gainesville area approximately one mile from the historic center of the city.

The Nuclear Sciences Building (Building 634) is connected to the Reactor Building (Building 557). Detailed UF campus maps showing all major arteries along with building locations, landmarks and boundaries are readily available from the internet. Emergency vehicular approach to the reactor building is via one of three service drives: the reactor service drive leading from Gale Lemerand Drive to an area west of the reactor building, the Nuclear Sciences Building service drive leading from Gale Lemerand Drive to an area south of the reactor building, and the Journalism lot service drive leading from Stadium Road to an area east of the reactor building.

1.5. Limiting Credible Accident

Accident scenarios for the UFTR are discussed in the FSAR. The FSAR concludes that no credible nuclear excursion could lead to fission product release since no excursion can lead to fuel or clad melting.

The core-crushing accident was analyzed as the Maximum Hypothetical Accident (MHA) for the UFTR. Such a scenario is not credible, however, and was intended only to illustrate the analysis of events and consequences for a hypothetical event that bounds all credible accident scenarios.

The consequences of a fueled experiment failure is limited by ensuring that the generation of certain fission products in fueled experiments are bounded by the concentration present in the fuel bundle analyzed in the Fuel-Handling Accident (FHA) scenario.

The FSAR concludes that the most limiting credible accident is the FHA and therefore it is used as the accident basis for Emergency Planning purposes. The analysis results show that in the event of a FHA event the appropriate accident control strategy is to evacuate and secure the entire reactor building. The FHA analysis also shows that the need for evacuation of larger areas is unnecessary since there are no credible accident scenarios that lead to exposures exceeding the normal 10 CFR 20 TEDE limit of 0.1 rem/year for any individual beyond the operations boundary.

2.0. DEFINITIONS

Actions: Measures taken for some purpose in response to an emergency; four types of actions are important in emergency planning:

(1) Assessment Actions – actions taken during or after an accident to obtain and process information that is necessary to make decisions to implement specific emergency measures.

(2) Corrective Actions – actions taken to ameliorate or terminate an emergency situation at or near the source of the problem in order to prevent an uncontrolled release of radioactive material or to reduce the magnitude of a release.

(3) Protective Actions – actions taken in anticipation of or after an uncontrolled release of radioactive material has occurred for the purpose of preventing or minimizing radiological exposures to persons that would be likely to occur if the actions were not taken.

(4) Recovery Actions – actions taken after the emergency is terminated to restore the facility to a safe status.

Acting Emergency Director: The acting emergency director is the most senior able-bodied UFTR staff member within the UFTR facility until relieved by a more senior staff member.

Campus Emergency Staff: Any UF personnel involved in providing assistance in emergencies.

Decontamination Room: The decontamination room (also called Decon Room or Room 108 in the Nuclear Sciences Building (NSB)) is the first level Emergency Support Center for the UFTR facility.

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

Emergency Action Levels: Specific instrument readings, or observations; radiological dose or dose rates; or specific contamination levels of airborne, waterborne, or surface-deposited radioactive materials that may be used as thresholds for establishing emergency classes and initiating appropriate emergency measures.

Emergency Classes: Classes of accidents grouped by severity level for which predetermined emergency measures should be taken or considered.

Emergency Coordinator: The emergency coordinator is normally the reactor manager.

Emergency Director: The emergency director is normally the facility director.

Emergency Plan: An emergency plan is a document that provides the basis for actions to cope with an emergency. It outlines the objectives to be met by the emergency procedures and defines the authority and responsibilities to achieve such objectives.

Emergency Planning Zone: An emergency planning zone (EPZ) is an area for which offsite emergency planning is performed to assure that prompt and effective actions can be taken to protect the public in the event of an accident. The EPZ size depends on the distance beyond the site boundary at which the Protective Action Guides (PAG) could be exceeded.

Emergency Procedures: Emergency procedures are documented instructions that detail the implementation actions and methods required to achieve the objectives of the emergency plan.

Emergency Support Center (ESC): The defined area from which emergency control directions will be given. The first level ESC for the UFTR is also known as Decontamination Room and Room 108 in the Nuclear Sciences Building (NSB).

Facility Director: The UFTR Facility Director shall refer to the individual having this title or a designate and is the chief administrative officer of the UFTR facility; this individual is responsible for reactor facility management.

Offsite: The geographical area that is beyond the main University of Florida campus boundary.

Onsite: The geographical area that is within the main University of Florida campus boundary.

Operations Boundary: The operations boundary is the reactor building and annex (designated UF Bldg. #557), including the west fenced lot as necessary.

Protective Action Guides: Protective Action Guides (PAG) are projected radiological dose or dose commitment values to individuals 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 taking the protective action. The projected dose does not include the dose that has occurred prior to the assessment.

Reactor Facility Staff Member: Technical personnel employed specifically to work in areas related to the UFTR facility.

Reactor Manager: The Reactor Manager shall refer to the individual having this title or his designate; this individual is responsible for reactor operations and supervision of day-to-day facility activities.

Reactor Cell: Two-story room containing the reactor at the north end of the UFTR building isolated from offices and laboratories by a controlled access buffer area.

Reactor Safety Review Subcommittee (RSRS): The RSRS is a subcommittee of the Radiation Control Committee (RCC). The RSRS is responsible for the review of safety-related issues pertaining to the UFTR with the purpose of ensuring the safe operation of the reactor through the discharge of its review and audit function. See UFTR Technical Specifications.

Research Reactor: A research reactor, such as the UFTR, is a device designed to support a self-sustaining neutron chain reaction for research, developmental, educational, training, and experimental purposes.

Shall, Should and May: The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may" to denote permission, neither a requirement nor a recommendation.

Site Boundary: The site boundary is that boundary, not necessarily having restrictive barriers, surrounding the operations boundary wherein the reactor administrator may initiate emergency activities. The area within the site boundary may be frequented by people unacquainted with the reactor operations. The site boundary for the UFTR is the line about the main UF campus.

Radiation Control Committee (RCC): Committee appointed by the Director of Environmental Health and Safety (EH&S) Division of the University of Florida and consisting of personnel from many departments, and including the Radiation Control Officer, who are familiar with radiation and its effects. The RCC is responsible for advising the Director of EH&S on all matters related to radiation safety.

3.0. ORGANIZATION AND RESPONSIBILITIES

3.1. UFTR Administrative Structure

The UFTR is operated by the College of Engineering of the University of Florida for the academic purposes of instruction and research. The Dean of the College of Engineering, the Facility Director and the Reactor Manager all have line responsibility for the administrative control of the reactor facility, for safeguarding the general public and facility personnel, and adhering to all requirements of the Facility License and the Technical Specifications.

3.2. UFTR Operating Organization

3.2.1. Facility Director and Reactor Manager

The Facility Director and the Reactor Manager are in charge of the reactor facility. They are responsible for the safe operation of the reactor, the physical protection of the facility, the scheduling and supervision of experiments using the reactor, the control of the reactor fuel, the keeping of logs and records, and the maintenance of the facility. They are also responsible for liaison with the NRC and other regulatory bodies, and for coordinating the teaching and research programs within the facility. The Facility Director (or his duly authorized representative) has overall responsibility for the handling of emergency situations, including coordination with Law Enforcement, Emergency Preparedness, Local and State Health Agencies and the Nuclear Regulatory Commission.

3.2.2. Reactor Safety Review Subcommittee (RSRS)

The RSRS is a part of and answers to the RCC. The basic purpose of the RSRS is to review and audit UFTR operations for conformance of operations with good radiological safety practices. The RSRS reports directly to the Chairman of the RCC and provides its recommendations to the Director of EH&S. The Facility Director and/or the Reactor Manager report safety-related issues concerning the reactor to the UFTR RSRS for review.

3.2.3. Radiation Safety Organization

The radiation safety organization at the University of Florida is directed and overseen by the Radiation Control Committee (RCC). The Committee is appointed by the Director of EH&S and is responsible for advising the President on all matters related to radiation safety.

The radiation control office (headed by the Radiation Control Officer) within the EH&S is the organization responsible for surveillance of health physics for reactor operations. This office trains designated UFTR staff members in health physics areas and supplies health physicists or other health physics technical personnel on an as needed basis to oversee operations and to assure the health physics function is properly implemented in all reactor-related operations.

The Radiation Control Officer assists the Facility Director and/or the Reactor Manager in all matters that concern the health and safety of the public during any emergency.

3.3. Interaction with Governmental Organizations

There are no credible UFTR operations related events that will require direct interaction with offsite governmental agencies. The University of Florida is a quasi-governmental agency and, as such, EH&S is engaged in emergency planning. EH&S, through the Radiation Control Office, is involved in assuring the safe operation of the UFTR. Provisions are made to interact with the Alachua County Emergency Management office which is tied to the Florida Department of Community Affairs, Division of Emergency Management. In addition, the State of Florida Department of Health, Bureau of Radiation Control is notified of all radiological emergencies through the Department of Community Affairs, Division of Emergency Management State Warning Point to assure proper communications are maintained with the State Bureau of Radiation Control to afford this office the opportunity for offsite monitoring and assessment and to assure availability and access to resources through this office should they be deemed appropriate. This response, however, is not considered essential for the UFTR Emergency Response Plan to be effective.

3.4. Coordination with Onsite and Offsite Authorities

The five (5) key emergency support organizations for the UFTR are: University Police Department (UPD), Gainesville Fire Department, Shands Hospital and Clinics, the Alachua County Emergency Planning Office, and the State of Florida Department of Health and Rehabilitative Services (HRS) Office of Radiation Control.

3.4.1. University Police Department

The UPD provides basic law enforcement support, including access control, communications with different agencies, coordination with other law enforcement agencies, evacuation of affected areas and support of the emergency action. All emergency communications begin with notification of the UPD Dispatch Center which serves as the Campus Communications Center for onsite and offsite notifications in response to radiological emergencies.

3.4.2. Gainesville Fire Department (GFD)

GFD provides basic firefighting, lifesaving, and support actions. GFD is equipped and trained to work within the confines of a radiological accident and can support many of the required actions, in coordination with the ESC (see Section 8.1) from which actions to evaluate and respond to radiological emergencies are directed.

3.4.3. Shands Hospital and Clinics

Shands Hospital and Clinics, Inc., has overall responsibility for treating any injured persons who may be contaminated, irradiated, or physically injured.

3.4.4. Alachua County Emergency Planning Office

The Alachua County Emergency Planning Office has overall responsibility in handling situations that could or have resulted in a significant release of radioactivity to the environs. The Alachua County Emergency Planning Office is responsible through the Florida Department of Community Affairs, Division of Emergency Planning, for all offsite communications and coordination of support. Although not expected to be necessary for credible UFTR accident conditions, this organization will serve as a communications and information resource in the event of a radiological emergency.

3.4.5. State of Florida Bureau of Radiation Control

The State of Florida Department of Health, Bureau of Radiation Control is notified of radiological emergencies through the Department of Community Affairs, Division of Emergency Management State Warning Point. This Office is informed of all radiological emergencies and will normally be informed of emergency drills as well. The Office of Radiation Control maintains a full spectrum of response capabilities for offsite monitoring and dose assessment and can be expected to respond to any significant radiological emergencies associated with the UFTR to assure documentation of offsite monitoring and assessment activities and to provide backup radiation protection and control services if deemed appropriate. This response is not considered essential for the UFTR Emergency Plan to be effective.

3.5. Reactor Emergency Response Organization

The UFTR Emergency organization is shown in Figure 3.1. Lines of responsibility are shown by solid lines and lines of communication are shown by dashed lines. Figure 3.1 shows extensions to other organizations and groups that will augment and extend the capability of the facility emergency staff. The Facility Director or his duly authorized representative has overall responsibility for reactor-related emergencies; the Radiation Control Officer or his duly authorized representative has overall responsibility for radiation control actions (specifically Protective Action Guides). The University of Florida Police Department has overall law enforcement and communications responsibility through its dispatch center which serves as the campus emergency operations center. The Alachua County Emergency Planning Office has offsite responsibility. The State of Florida Bureau of Radiation Control is notified by the State Warning Point of all radiological emergencies to provide the opportunity for offsite monitoring and assessment and to provide a communications link for such technical support as may be deemed appropriate for radiation protection and control. Again this response is not considered essential for implementation of the UFTR Emergency Plan.

A flexible internal emergency organization is needed due to the small size of the reactor operating staff. However, credible emergencies that have radiological release implications would arise from failure of an experiment-in-progress or fuel handling. In these situations, there would be a designated Senior Reactor Operator and one or more Reactor Operators available. To provide reasonable assurance that an emergency management organization will exist to meet emergencies, the following succession is specified as depicted in Figure 3.1:

Emergency Director (normally the Facility Director)
- Reactor Manager
- Onsite Senior Reactor Operator
- The most technically experienced onsite UFTR staff member
- The Radiation Control Officer or designated alternate

Emergency Coordinator (normally the Reactor Manager)
- Onsite Senior Reactor Operator
- Others as above

The Emergency Director and the Emergency Coordinator may be the same individual.

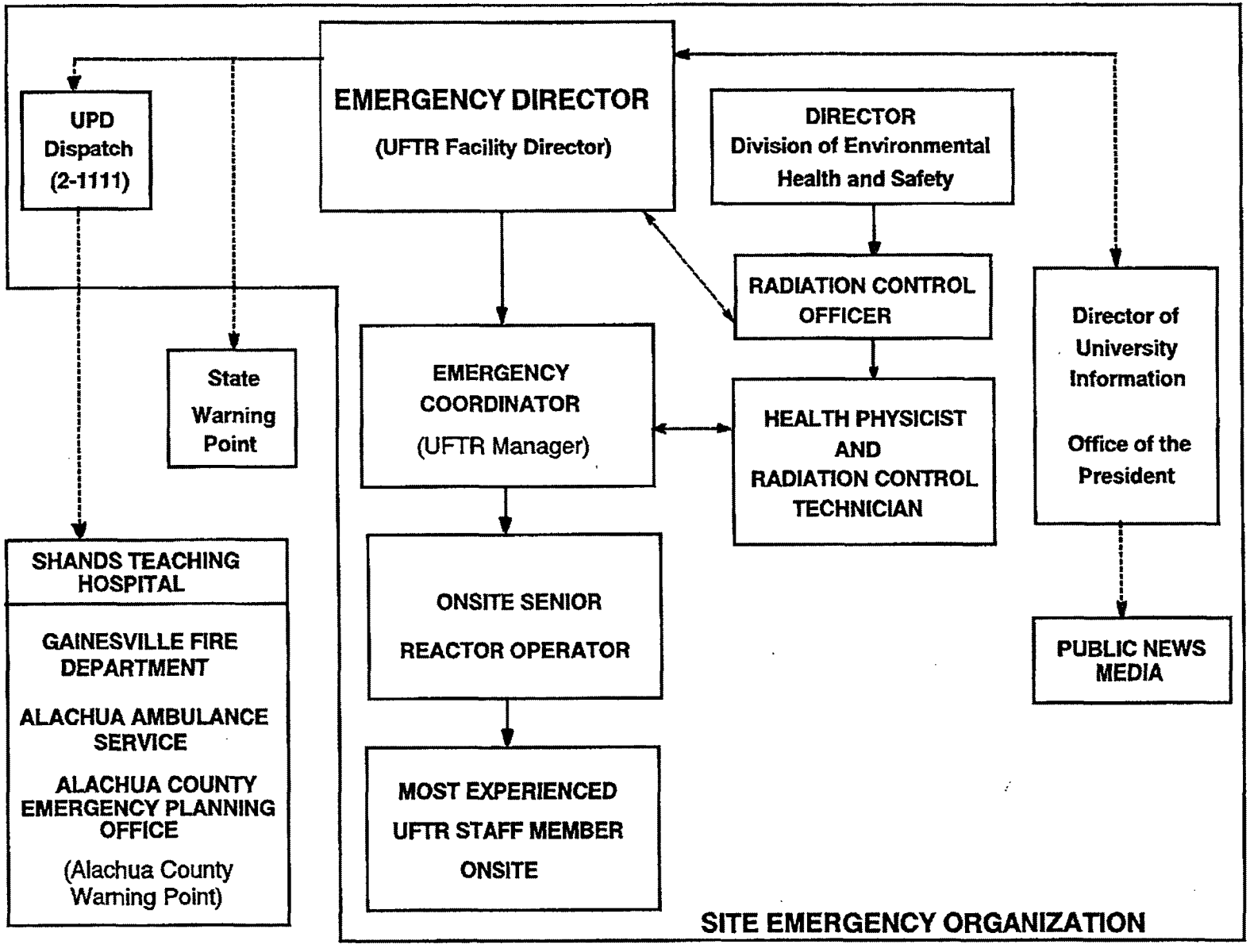

Figure 3.1 – UFTR Emergency Organization

If an event occurs during non-working hours, or if a catastrophic accident (fire or explosion) causes disablement of the organization, UPD Dispatch will notify EH&S and will attempt to locate and advise at least one staff member each from the UFTR and the Radiation Control Office. The UPD Dispatch is provided with a UFTR emergency call list for radiation control personnel as well as UFTR staff members. The call list is also available at Room 108 NSB. The center will dispatch police and, if necessary, fire fighting forces to the emergency location according to standard campus-wide procedures.

An emergency event from external factors would activate the campus plan, and responding emergency forces will rely upon the Radiation Control Office for advice and assistance if the entire UFTR staff is unavailable because of absence or disability.

Figure 3.1 shows the relationship between the internal UFTR organization delineated in Section 3.1 and the support and support-related organizations that can be called upon in credible emergencies.

The interface with the emergency field units occurs by dialing the UPD Dispatch number. Police service is directly available. Ambulance service and fire department service may be requested by UPD Dispatch. Medical admission procedures at the Shands Hospital Emergency Room depend upon the type and severity of injury, but the emergency center also arranges admission for cases that require ambulance delivery, and will summon paramedic assistance when required.

The interface with the news media and the general public will be through the University of Florida Director of University Information in the Office of the President as depicted in the UFTR Emergency Organization block diagram in Figure 3.1. As appropriate, this office will release UFTR emergency-related information to public news media based upon information supplied from the UFTR facility emergency organization through the Emergency Director.

3.6. Prolonged Emergencies and Management Endurance

In the event of prolonged emergency, the UFTR staff can be augmented by the Nuclear Engineering Program and Radiation Control Office personnel to provide two persons per shift to monitor, advise, and assist external support forces. The campus police, City of Gainesville Fire/Rescue Department, and Alachua County emergency services are staffed continuously.

3.7. Emergency Director

The Emergency Director has the responsibility and authority for assembling personnel, directing actions, and for discharging the duties of Sections 3.9 through 3.12 of this chapter. The line of succession is described in Section 3.5.

3.8. Emergency Coordinator

The UFTR Reactor Manager is responsible locally for the coordination of emergency preparedness. This individual has the responsibility and authority for representing the UFTR facility in the broader campus planning for emergencies.

3.9. Radiological Assessment

Radiological assessment shall be performed by the Reactor Manager with the assistance of the Radiation Control Officer. The UFTR line of succession shall follow Figure 3.1. Supporting personnel from the Radiation Control Office are to be determined by that Office. There are no credible accidents requiring offsite dose assessments or protective actions. However, the State of Florida Bureau of Radiation Control will be notified of all significant radiological emergencies to assure a timely opportunity to provide documentation of any offsite monitoring and assessment and to assure communications channels are established for such technical support as may be deemed appropriate.

3.10. Recovery Operations

Recovery operations shall be directed by the Emergency Director. This individual shall be assisted by:

a. The Emergency Coordinator (for personnel, supplies and equipment); and

b. The Radiation Control Officer with radiation control qualified personnel as backup to provide general health physics support.

3.11. Termination of Emergency and Recovery

Decisions regarding termination of emergency, initiation of recovery and completion of recovery shall be made by the Emergency Coordinator or Emergency Director in consultation with the Radiation Control Officer and supporting personnel. Planned organizational changes or actions are to be approved by the Emergency Coordinator who shall inform impacted agencies and coordinate those changes.

3.12. Authorization of Deviations to License Conditions or Technical Specifications

The Emergency Director, with the consent of the Radiation Control Officer, may authorize a deviation from the actions described in this plan for unusual or unanticipated emergency conditions in accordance with 10 CFR 50.54(x).

4.0. EMERGENCY CLASSIFICATION SYSTEM

This section describes the classification system for emergency situations. To assure adequate communications between the UFTR staff, UF Emergency Organization, federal, state and local agencies and organizations, the credible accidents for the UFTR facility are standardized into three classes of emergency conditions which essentially group the accidents according to the potential radiological consequences.

The Emergency Plan addresses only those standard classes appropriate for dealing with accident and emergency consequences that have been determined to be credible for the UFTR facility. The emergency situations which may occur include those that have less severe off-site consequences than the least severe standard class (Class 0) as well as the first two standard emergency classes designated in ANSI 15.16: Notification of Unusual Events (Class I) and Alert (Class II). Each class defined and described below is associated with a set of immediate actions detailed in the Emergency Procedures.

4.1. Events Less Severe Than the Lowest Category (Class 0)

Events in this category are typically peripheral to reactor operations and do not necessarily indicate changing the reactor status. There may be no effect on the reactor, and immediate operator action to alter reactor status is not necessarily required, although there may be a need to shut down the reactor to reallocate personnel and resources. This level of emergency would not be expected to activate an entire emergency organization but may require special local services such as ambulance service and medical assistance. Advisories to campus police may be warranted. Emergencies in this class may be expected to occur during the life of a research reactor.

This category includes:

a. Medical emergency that may be complicated by contamination or radiation exposures to personnel in the reactor cell.

b. Fire within the reactor cell that is extinguished within 15 minutes.

Emergency action levels used to initiate emergency measures associated with this emergency class are listed in Table 5.1 of Chapter 5.

4.2. Notification of Unusual Event (Class I)

The conditions associated with Class I Emergencies (Notification of Unusual Event) may arise as a result of either man-made events or natural phenomena and lead to a specific situation that can be recognized as creating a significant hazard potential that was previously nonexistent or latent. The situation has not yet caused damage to the fuel or harm to personnel but may warrant an immediate shutdown of the reactor if it is in an operating mode. This is a situation in which time is available to take precautionary and corrective or constructive measures to prevent the escalation of the event and/or to mitigate the possible consequences should escalation occur. The event will often warrant termination or alteration of normal routines and may be expected to

occur during the life of a research reactor.

Unusual event conditions imply a rapid transition to a state of readiness by the reactor personnel and possibly by some off-site emergency support organizations, the possible cessation of certain routine functions or activities that are not immediately essential and possible precautionary actions that a specific situation may require.

Conditions that may lead to an Unusual Event include:

a. Threats to facility security, such as civil disturbances or bomb threats directed toward the reactor;

b. Fire or explosion in the reactor cell that is not extinguished within 15 minutes;

c. Severe natural phenomena in the reactor facility environment such as flood, hurricane or tornado;

d. Radiological events such as a radioactive spill in the reactor cell which results in a high radiation or airborne radioactivity area;

Situations that might fall into this class are those accidents that are predicted to have insufficient radiological consequences outside the operations boundary to warrant taking protective measures and no releases of radioactive material requiring off-site responses. 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 fuel, it may warrant an immediate shutdown of the reactor or interruption of nonessential routine functions.

Emergency Action Levels used to initiate emergency measures associated with this emergency class are listed in Table 5.1 of Chapter 5.

4.3. Alert (Class II)

Class II (Alert) includes physical occurrences within the facility of such significance as to require notification of the emergency organization and response as appropriate for the specific emergency situation. An alert condition may exist when events have occurred that require emergency response to control or limit a serious radiological or security hazard. Suspension of the normal reactor operating status is highly likely and the evacuation of the UFTR building may be necessary.

The initial assessment leading to this class should indicate that it is unlikely that an off-site hazard will be created. However, substantial modification of reactor operating status is a highly probable corrective action. Although this class is associated with a judgment that the emergency situation can be corrected and controlled by the on-site staff, notification through normal reporting mechanisms of an appropriate off-site agency to alert it as to the nature and possible extent of the incident should be a measure associated with this class. Protective evacuations or isolations of certain areas of the facility may be necessary.

Situations that might fall into this class are those accidents that may have significant radiological consequences to staff but are predicted to have insufficient radiological consequences off-site to warrant taking protective measures.

Activation levels for declaring an emergency Alert should be based on the recognition of an immediate need to implement in-house emergency measures to protect or provide aid to affected persons or to mitigate the consequences of a security breach, coupled with a positive observation that radiological monitors do not indicate the possibility of a more serious emergency. Situations which might lead to this class of emergency condition include:

a. Severe fuel cladding damage with significant release of fission products;

b. Failure of a fueled experiment with significant releases of radioactivity;

c. Security breach of the facility security area;

Emergency Action Levels used to initiate emergency measures associated with this emergency class are listed in Table 5.1 of Chapter 5.

The Class II Alert emergency class is the most severe situation to be considered in the UFTR Emergency Plan. Emergency situations more severe than an Alert Class II situation are not credible during the life of the UFTR. Nevertheless, it is considered prudent that facilities make provisions for a class that involves an uncontrolled release of radioactive materials to an extent that the initial assessment indicates protective actions off-site should be considered. Alerting principal off-site emergency organizations is a recommended associated measure for the Alert condition and assessment actions should include provisions for monitoring the environment.

4.4. Site Area Emergency (Class III)

No credible events attributable to the reactor or its operation are postulated which can cause emergency conditions beyond the reactor operations boundary; therefore, this emergency class is not addressed in the UFTR Emergency Plan.

4.5. General Emergency (Class IV)

No credible events attributable to the reactor or its operation are postulated which can cause emergency conditions beyond the campus (site) boundary; therefore, this emergency class is not addressed in the UFTR Emergency Plan.

5.0. EMERGENCY ACTION LEVELS (EALs)

There are no credible accident scenarios that lead to exposures exceeding the 10 CFR 20 TEDE limit of 0.1 rem/year for any individual beyond the operations boundary. Protective action guides for the general public and onsite personnel beyond the operations boundary are therefore unnecessary. Somewhat similar concepts are employed internally for assessment of emergency status, as shown in Table 5.1. Emergency Action Levels specified in Table 5.1 and described in subsections 7.2.1, 7.3.1 and 7.4.1 of Section 7.0 are considered to be EALs for activating the emergency organization and the initiation of protective actions at the level appropriate for addressing the emergency event in question.

Table 5.1

UFTR Emergency Classification Guide

Action Level	Purpose
Class 0 – Less Severe than the Lowest Event	
Medical emergency in the reactor cell. Fire within the reactor cell that is extinguished within 15 minutes.	Alert staff to a possible escalation. Initiate assessment. Provide treatment if needed.
Class 1 – Notification of Unusual Event	
Receipt of a bomb threat affecting the reactor facility. Credible security threat affecting the reactor facility. Fire or explosion in the reactor cell which is not extinguished within 15 minutes. Report or observation of severe natural phenomena affecting the reactor facility. Two area monitors in reactor cell above 100 mR/hr. Valid APD alarm indicating high airborne contamination in the reactor cell.	Ensure that the first step in any response later found out to be necessary has been carried out. Bring the staff to a state of readiness. Provide systematic handling of unusual events information and decision making. Assure that emergency personnel are ready to respond if situation escalates. Perform confirmatory radiation monitoring if required.
Class 2 – Alert	
Major visible damage to fuel bundle or other visible failure indicating a major breach of one or more fuel plates with significant release of fission products. Fueled experiment failure resulting in significant release of fission products. Security breach affecting the reactor security area. Two area monitors in reactor cell above 500 mR/hr. [a]Actual or projected radiation levels at the operations boundary in excess of 20 mrem/hour deep dose equivalent for 1 hour.	Assure that response centers are manned. Assure that monitoring teams are dispatched. [a]Assure that personnel required for evacuation of onsite areas are at duty stations. Provide consultations with off-site authorities. Provide information to the public through the UF Public Information Office.

[a]No credible events attributable to the reactor or its operation are postulated which can cause emergency conditions beyond the reactor operations boundary.

6.0. EMERGENCY PLANNING ZONE (EPZ)

Emergency planning zones for the UFTR are unnecessary as there are no credible accidents which lead to exposures exceeding the 10 CFR 20 TEDE limit of 0.1 rem/year beyond the operations boundary. However, simply for planning purposes, the operations boundary is established as an EPZ to conform with Table 2 of ANSI/ANS-15.16 which represents an alternate method for determining the size of the EPZ. As indicated in the standard, this EPZ is selected based upon the postulated releases from credible accidents. In addition it should be noted that the UFTR authorized power level of 100 kW is well below the 2 MW threshold in Table 2 for which the acceptable EPZ size is the operation boundary. The size of the area within the operations boundary is large enough to provide a response base that would support actions outside this area should this ever be needed. The predetermined protective actions for the EPZ are described in Sections 7.2.4 and 7.3.4.

7.0. EMERGENCY RESPONSE

This chapter identifies emergency response measures for each emergency class. These response measures are based upon the emergency class and action levels that specify what measures are to be implemented. In particular, this chapter describes the specific actions to notify and activate the emergency organization and the applicable support organizations for each class of credible emergency.

7.1. Generic Emergency Response

Before delineating emergency responses for specific emergency classes, certain generic assessment responsibilities and protective actions are applicable for all levels of radiological emergencies in the facility.

7.1.1. Assessment Responsibilities

Reactor facility staff are responsible for the safety of the reactor and measures to prevent or mitigate hazards to the reactor, reactor personnel, and the general public. The implementation details of the staff emergency functions are incorporated in emergency and security procedures.

Radiation Control Office personnel are responsible for onsite radiological safety. The details of the radiological assessment function are incorporated in radiation control procedures. The procedures include a description of the methodologies and techniques to be used to an extent sufficient to demonstrate, in a timely manner, that there is reasonable assurance (1) that the magnitudes of releases of radioactive materials can be determined, (2) that the magnitude of any resulting radioactive contamination can be determined, (3) that projected exposures to persons within or beyond the facility boundaries can be estimated, and (4) that emergency action levels specified can be determined.

The Alachua County Emergency Planning Office is responsible for offsite radiological safety. The State of Florida (an Agreement State) and the Department of Health and Department of Community Affairs hold joint and primary responsibility for protection of public health and safety in matters relating to radiological incidents.

7.1.2. Protective Actions

A series of generic protective actions are delineated in this section as applied to all levels of UFTR emergencies.

7.1.2.1. Evacuation from Operations Boundary

For radiological emergencies originating in the reactor cell, all people in Building 557 and the Annex are evacuated by activation of the evacuation siren (automatic or manual). Evacuation of the building may not be advised or necessary for emergency events that are not radiological in nature. The backup means for notifying building occupants of the need to evacuate is by telephone and word-of-mouth. Personnel may exit the operations boundary from

designated exits as directed by signs posted throughout the building. Personnel evacuated to the ESC stay in the room until discharged, if conditions permit. Personnel evacuated to any other area remain at the point until released or redirected by radiation control personnel. The reactor personnel and senior experimenters present in the cell are responsible for the accounting of personnel that are in the cell and their disposition during an emergency.

If the emergency renders Room 108 NSB unusable or unsafe, the ESC will then be established at the elevator or in the service drive area behind the Nuclear Sciences Building.

1. Evacuation of Other On-site Areas

Although not expected to be necessary, the UFTR Emergency Plan includes provisions for immediate evacuation of the Nuclear Sciences Building and surrounding buildings. The UPD has primary responsibility for evacuation. After being notified that an evacuation is warranted, the UPD shall proceed to evacuate the areas indicated, using the existing fire alarm system to expedite the removal of personnel. The UPD will be given instructions regarding the disposition of evacuees.

2. Use of Protective Equipment and Supplies

The use of respiratory protection equipment and protective clothing shall be considered whenever airborne or surface contamination is measured or suspected during handling of the emergency. The UFTR maintains basic emergency supplies; the City of Gainesville Fire/Rescue Department can provide additional self-contained breathing apparatus and other respiratory equipment as needed.

3. Contamination Control Measures

The facility is provided with rooms that are easily isolated from each other, assisting in the isolation of potentially contaminated areas. Personnel are trained in establishing contamination control boundaries, controlling access into contaminated areas, and techniques for mitigating and minimizing the potential spreading of contamination. The contamination level criterion for permitting return to normal use shall be in accordance with approved radiation control procedures.

7.1.2.5 Aid to Affected Personnel

The UFTR has an agreement with the Shands Hospital and Clinics, Inc., for the treatment of injured and/or contaminated/irradiated personnel. Shands Hospital maintains a trained crew of medical personnel to handle radiological emergencies for nuclear reactors in the State of Florida. Immediate assistance is available at the ESC. If required, the ambulance service is notified through the UPD Dispatch.

7.2. Events Less Severe Than the Lowest Category (Class 0)

7.2.1. Activation of the Emergency Organization

For medical emergency or minor fire, the Emergency Director and/or Emergency Coordinator will be notified along with the Radiation Control Officer and Environmental Health and Safety Division if appropriate. Only the needed support services will be notified via the UPD Dispatch. For a minor fire in the reactor cell, the reactor will be secured and UPD notified. For contaminated injured personnel, Shands will be notified using the appropriate forms and calling sequence, and the individual will be accompanied by a qualified radiation control technician to assure proper control.

7.2.2. Assessment Actions

For injury involving radiation exposure or contamination, the reactor cell area monitors shall be used to determine if a more severe class of emergency exists. Airborne contamination will be indicated by the airborne particulate detector. Assessments will include a determination of injury, the degree of radiation exposure or contamination, the appropriate first aid, and the need for ambulance transport. Assessment should also include assuring that there is no danger of fire or radiological escalation to a higher level emergency classification.

7.2.3. Corrective Actions

In the absence of radioactive contamination, unusual radiation levels, or fire, campus procedures for first aid and transport will be followed. For a minor fire in the reactor cell, the reactor will be secured and UPD notified. If unusual radiation levels or if airborne contamination is detected or suspected, the HVAC system and the reactor (if operating) may be shut down. If a victim is contaminated, local decontamination will be attempted if judged to be non-aggravative of the injury and the situation. For more complicated cases, the injured person will be transported to the ESC. At this point, decontamination will be effected as practicable and the individual transported to the Shands Emergency Facility.

7.2.4. Protective Actions

For Class 0, protective actions are generally either non-existent or indistinguishable from corrective actions. In the special case of contamination, radiation control measures shall be taken to avoid the spread of contamination.

7.3. Notification of Unusual Event (Class I)

7.3.1. Activation of the Emergency Organization

In the event that a situation exists that presents a potentially serious hazard to the reactor and its staff, the Emergency Director will activate the emergency organization and where appropriate will request support via UPD Dispatch. The reactor staff shall use the specific UFTR-SOP for the type of emergency involved in the reactor cell, specific threat to the

facility, or radiological emergency. Required communications are listed in the procedures.

7.3.2. Assessment Actions

Credible security or bomb threats directed toward the reactor shall be assessed by the Emergency Director for validity and specificity using the campus police experience and the information source.

For fire or explosion, the Emergency Director shall assess the magnitude of the event, the likelihood of escalation versus prompt control, whether the fire has impacted the reactor core, fuel, and/or its required systems, and the need for supporting forces.

Any event may be categorized as Class I if one or more of the following is observed:

a. Two reactor cell area radiation monitors reading above 100 mR/hour, indicating a high radiation area in the reactor cell.

b. Valid reactor cell air particulate detector alarm indicating high airborne contamination in the reactor cell.

7.3.3. Corrective Actions

The Emergency Director will assign staff members to assist and guide police officers in bomb search or such other actions as the police officers and security considerations indicate. The reactor will be secured.

For major fires or explosions, the Emergency Director shall initiate evacuation of the reactor cell, check cell radiation and stack levels, activate the building fire alarm system, and dispatch teams to check for injured personnel if needed. The Emergency Director shall summon aid through the campus police dispatch and advise responding units of the situation.

In the event that a Class I Emergency is dictated by assessment of the radiation levels, the reactor cell will be evacuated pending an evaluation of the problem, identification of the probable source, and the appropriate control measures. The radiation levels associated with radiological events in this emergency class will ordinarily require evacuation of the facility via manual or automatic trip of the evacuation siren as per SOP-B.1.

7.3.4. Protective Actions

For a Class I or higher emergency defined by radiation or radioactivity levels, the reactor cell will be evacuated by the evacuation alarm (automatic or manual) following written procedures. Personnel accountability shall be by observation of the reactor cell during evacuation and personnel accounting in the ESC. All evacuees shall be surveyed for contamination, and measures taken to limit the spreading of contamination. The Emergency Director shall dispatch personnel to survey all operations boundary exit doors

as well as evacuees from these doors.

For emergencies of this or higher class, access to the reactor cell shall be under the control of the Emergency Director and shall be limited to rescue and emergency response operations until the situation has been evaluated and recovery operations are in process.

The area and APD monitors identified in Table 5.1 will be used for the initial determination of the radiological emergency class. Additional support and confirmatory instrumentation are available at the ESC including self-reading high and low range pocket dosimeters as well as high range and low range survey instruments.

Collected filter material and swipe samples can be counted in a laboratory adjacent to the ESC or in the radiation control laboratories elsewhere in the NSB.

TLDs are routinely placed in locations peripheral to the reactor cell and the operations boundary; these devices may be used to provide integrated dose information for post-accident assessment.

7.4. Emergency Alert (Class II)

7.4.1. Activation of the Emergency Organization

In the event that a situation exists that presents a serious hazard to the reactor and its staff, the Emergency Director will activate the emergency organization and where appropriate, will request support external to the UFTR facility via the campus emergency system through UPD Dispatch. The reactor staff shall use the specific UFTR-SOP for the type of emergency involved in the reactor cell, specific threat to the facility, or radiological emergency. Required communications are listed in the procedures.

7.4.2. Assessment Actions

Alert should be based on the recognition of an immediate need to implement in-house emergency measures to protect or provide aid to affected persons, or to mitigate the consequences of a security breach, coupled with a positive observation that radiological monitors do not indicate the possibility of a more serious emergency.

Assessment observations which define this class of emergency condition are:

a. Severe fuel cladding damage with significant release of fission products;

b. Failure of a fueled experiment with significant releases of radioactivity;

c. Security breach of the facility security area

This class of emergency will also be defined by either of the following radiation observations:

a. Two reactor cell area radiation monitors reading above 500 mR/hour.

b. Actual or projected background radiation levels at the operations boundary in excess of 20 mrem/hour deep dose equivalent for 1 hour.

The quantitative measures will be augmented by visual observation and/or portable radiation monitoring devices to identify and localize the source and extent of the problem. Personnel injuries shall be assessed as in Section 7.2.2. Additional assessment facilities are described in Section 8.2.

7.4.3. Corrective Actions

Corrective actions for Class II Emergency Alert situations are essentially the same as those for the Class I Emergency (Notification of Unusual Event) as delineated in Section 7.3.3. The applicable actions of Sections 7.2.3 and 7.3.3 shall be implemented here if not already accomplished. Additionally, the Emergency Director shall order the reactor secured if not already accomplished.

7.4.4. Protective Actions

The protective actions of 7.3.4 shall be taken. In addition, the Emergency Director shall dispatch teams to survey the operations boundary.

8.0. EMERGENCY FACILITIES AND EQUIPMENT

This section briefly describes the emergency facilities, types of equipment and their location that are available in the event of an emergency.

8.1. Emergency Support Center (ESC)

Emergency support is to be given from a location designated as the ESC which can be moved to successively larger distances from the reactor building if conditions warrant. Since the onset of an emergency condition may necessitate evacuation of the entire Reactor Building, the ESC is to be established in the Nuclear Sciences Building directly adjacent to the south of but separate from the Reactor Building. The ESC is to be established initially in the Decontamination Room, Room 108 NSB located just outside the Reactor Building. If warranted by emergency conditions, the ESC functions can be relocated at the elevator area in the Nuclear Sciences Building followed by the service drive located at the southwest entrance to the Nuclear Sciences Building.

8.2. Assessment Facilities

Equipment available at Room 108 NSB to be used to determine the need to initiate further emergency measures as well as that to be used for continuing assessment include a high level wide-range survey meter as well as a low level meter as well as two or more high level and low level dosimeters. The Radiation Control Office in the Nuclear Sciences Building can provide additional portable survey meters and is equipped with low level counting equipment for assessment of swipes. The Radiation Control Office will provide a high-volume air sampler for evaluating airborne particulate activity and a pancake detector to check for surface contamination as well as personnel contamination. A list of equipment typically available for radiation dose and level assessment is presented in Table 8.1. The table is not all-inclusive; it is representative of the range of instruments typically available.

Table 8.1

Equipment Available from Radiation Control Office for Emergency Dose and Radiation Level Assessment

DETECTOR	RADIATION TYPE MEASURED	RANGE	MAIN USE	ADVANTAGES	REMARKS
Ionization chambers	Beta particles, X rays, gamma rays	0.2-20 R/hr	Exposure survey	Almost energy independent	Slow Response
Gas Proportional counters	Alpha particles	0-100,000 cpm	Alpha and beta contamination survey	Efficient	Very delicate Must be used close to ground
Geiger-Mueller counters	Beta particles, X rays, gamma rays	0-100,000 cpm	Radiation field measurements Beta and gamma contamination	Rapid response High sensitivity	Highly energy dependent May saturate RF sensitive
Scintillation counters	Alpha and beta particles, X rays, gamma rays	0-5 mR/hr or 50-250,000 cpm	Low-energy contaminants	Rapid response High sensitivity Energy discrimination	Fragile (windowed versions)
Pocket dosimeters	X rays, gamma rays	0-200 mrem 0-5 rem	Personal monitoring	Inexpensive, portable Some "self-reading"	Provides only integrated dose Some shock sensitive
TLD or badge dosimeters	Neutrons, beta particles, X rays, gamma rays	1 mrem and up	Personal monitoring	Inexpensive, portable Luxel provides permanent record	Can be read only in a processing laboratory

8.3. First Aid and Medical Facilities

The Shands Hospital and Clinics, Inc. is a designated radiation accident emergency center. It has made a commitment to cope with irradiated and/or contaminated patients originating on the University of Florida Campus. The Shands Hospital and Clinics provides continuing training, including the handling of radiation exposure patients and contaminated victims. A copy of the agreement letter is included in the Appendix to the Emergency Plan.

8.3.1. Decontamination Facilities

A decontamination shower and sink is located in Room 108 NSB and may be utilized for limited emergency decontamination purposes since both are plugged to hold up contaminated water. Protective clothing and decontamination supplies are available in Room 108 NSB and on the Emergency Equipment Cart. Additional supplies are available through the Radiation Control Office. If the victim cannot be decontaminated on site, the victim will be transported to the designated decontamination site at the Shands Hospital.

8.3.2. First Aid

First aid is available through UFTR personnel who are trained in first aid, or from the UPD or GFD personnel who are certified in CPR and advanced Red Cross first aid. In addition, Alachua County Emergency Medical Services (EMS) personnel are not only qualified in first aid but can provide paramedical assistance. First aid kits are available in the UFTR control room and Room 108 NSB. Stretchers and splints are also available in Room 108 NSB.

8.3.3. Ambulance Service

Ambulance service is typically provided through the Alachua County EMS. For a contaminated victim, a designated radiation control qualified technician will accompany the victim in the ambulance to advise on proper handling, to minimize personnel dose rates and the spread of contamination during transport, and to convey dose estimate and contamination information. A copy of the Alachua County Emergency Management agreement letter is included in the Appendix to this Emergency Plan.

8.3.4. Shands Hospital and Clinics

The Shands Emergency Room handles all emergency cases and is also a designated radiation accident emergency facility with the capability of handling radiation exposed and contaminated victims. It has made a commitment to cope with irradiated and/or contaminated patients originating on the University of Florida Campus. The agreement letter is included in the Appendix to this Emergency Plan.

8.4. Communication Equipment

Room 108 NSB is equipped with a telephone for primary communications to outside the facility. Cellular phones may also be used. UPD will be the primary communication center and can provide communications assistance via portable, handheld radio equipment as well. If Civil Defense actions are warranted, then they become the primary control center and direction/communications originate from this office. Telephones also connect the other various areas of the UFTR Building to the control room and the outside. Face-to-face is the typical primary means for internal communications.

9.0. RECOVERY

This section of the Emergency Plan describes the generic criteria for restoring the reactor facility to a safe status including reentry into the reactor cell or other portions of the facility. Since the operations to recover from most accidents will be complex in specifics and depend on the actual conditions at the facility, only generic criteria are described or referenced in this section. It is not practical to plan detailed recovery actions for all conceivable situations.

First, the assessment levels of Sections 7.2.2, 7.3.2, and 7.4.2 are applicable for the downward classification of emergency situations. Decontamination shall conform to the provisions of 10 CFR 20 and the more stringent State and University of Florida requirements where applicable. In all cases, the ALARA criterion will be followed.

Second, emergency situations will be reevaluated following completion of the initial protective actions which typically include evacuation to the ESC. Only if prompt remedial action so requires will efforts be made to reenter the building prior to full evaluation and consideration of ALARA. Examples of the need for prompt reentry would be a fire endangering the fuel inventory or injured personnel unable to evacuate from a high radiation area. Time should be used to evaluate the emergency situation carefully and take advantage of decay of radioactive materials as from a dropped fuel plate or a ruptured experiment tube. When it is determined advisable for the building and cell to be reentered, it should be done in stages. Careful measurements of radiation field, radioactive contamination, and airborne particulate radioactivity concentrations should be taken to indicate the amount and rate of reentry as well as aid in the downward classification of the emergency.

Always, the key concern will be for the health and safety of all concerned.

10.0. MAINTAINING EMERGENCY PREPAREDNESS

This section describes how the effectiveness of the Emergency Plan is maintained. This includes: personnel training; review and update of the plan and its associated implementing procedures; maintenance of equipment; and inventory of equipment and supplies used in emergencies.

10.1. Training and Drills

10.1.1. On-Site Personnel Training and Retraining

Licensed reactor operators and senior reactor operators are required to attend a biennial cycle of requalification lectures and training exercises and demonstrate proficiency in the subject areas covered. Nuclear Engineering program personnel and Radiation Control personnel are invited to attend the sessions involving emergency preparedness and the implementing procedures along with other unlicensed UFTR facility personnel in order to keep them updated. University Police Department personnel attend an orientation lecture and familiarization tour of the UFTR facility on an annual basis while personnel representing other law enforcement and emergency response agencies and GFD personnel attend a similar orientation and familiarization tour of the UFTR facility on a biennial basis. Emphasis in these orientations is on emergency response actions. Training of emergency medical personnel is left to the proper medical organizations.

10.1.2. Emergency Drills

At least once every year, emergency evacuation drills are conducted to ensure that all reactor facility personnel are familiar with applicable portions of the Emergency Plan. These drills ensure that all personnel with assignments in the reactor building are familiar with evacuation routes and immediate response to the evacuation siren.

At least once every two years, one large-scale emergency evacuation drill shall be conducted in which an emergency scenario is simulated to test the emergency preparedness of the UFTR facility staff and, to the extent appropriate, the response of the Campus Emergency Staff. The scenario shall be planned in consultation with the Radiation Control Office and that office shall provide one or more observers and/or participants in the drill. The GFD shall be included as necessary in the drill with a minimum requirement of testing the communication links and notification procedures at intervals not to exceed two years.

10.1.3. Evaluation of Drills

A critique shall be held by the participating UFTR facility staff, participants and observers from the Radiation Control Office, and other supporting participants. Outstanding drill critique recommendations are periodically evaluated and updated. Improvements in evacuation procedures, equipment, personnel response, and equipment use are implemented and evaluated for effectiveness in subsequent drills.

10.2. Emergency Plan Review and Update

The Emergency Plan shall be revised and updated as required. In accordance with 10 CFR 50.54(q), the licensee may make changes to its emergency plan without NRC approval only if the licensee performs and retains an analysis demonstrating that the changes do not reduce the effectiveness of the plan.

The responsibility for the periodic review of all agreements with offsite emergency agencies is assigned to the RSRS. The plan shall also be audited by the RSRS as delineated in the UFTR Technical Specifications.

10.3. Equipment Maintenance

Maintenance and calibration of Technical Specification required radiation monitoring systems are performed as delineated in the Technical Specifications. Portable detectors and counting equipment is maintained and calibrated in accordance with radiation control policy.

Emergency supplies are verified to be operational and complete on a weekly basis by an assigned UFTR staff member. Specific items of emergency equipment inventoried and minimum quantities are listed in Table 10.1. For most items, the quantity on hand far exceeds the requirements of Table 10.1 with additional quantities of all items available through the Radiation Control Office.

Table 10.1
Decontamination Room
Emergency Equipment Inventory

The following listing details the minimum emergency equipment available in the Emergency Support Center (Room 108 NSB).

Item	Quantity Required
Self-Contained Breathing Apparatus	2
Pair Full-Cover Shoes	2
Anti-C Hoods	2
Anti-C Coveralls	2
Pair Waterproof Coveralls	2
Wide Roll (~20 inches) Absorbent Paper	1
Pair Scissors	1
2-Inch Roll Masking Tape	1
Pair Cotton Gloves	2
Pair Rubber Gloves	2
High Level Dosimeters	2
Low Level Dosimeters	2
Dosimeter Charger	1
High Level Survey Meter	1
Low Level Survey Meter	1
D-Cell Batteries	4
Walkie-Talkie Radios (Recommended Only)	2

11.0. REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix E, Emergency Facilities and Equipment.

2. U.S. N.R.C. Regulatory Guide 2.6, Emergency Planning for Research and Test Reactors, March, 1983.

3. ANSI/ANS-15, 16-2008, Emergency Planning for Research Reactors,

4. Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation.

APPENDIX

Alachua County
Fire Rescue
Edwin C. Bailey, Chief

August 14, 2013

Dr. Kelly Jordan
Associate Professor
Facilities Director
University of Florida Training Reactor
202 Nuclear Sciences Center
University of Florida
Gainesville, FL 32611-8300

RE: University of Florida Training Reactor (UFTR)

Dear Dr. Jordan,

This is to advise that Alachua County Emergency Management is prepared to assist the University of Florida Training Reactor (UFTR) in the event emergency services are required. All requests for fire, emergency medical services (EMS) or law enforcement should be reported through 911. For non-emergencies, Emergency Management staff can be contacted during normal business hours (Monday – Thursday, 7 AM to 5:30 PM) at 352-264-6500.

Additionally, our office can be contacted through the Combined Communications Center (CCC) at 352-955-1818. The CCC is operational 24-hours a day, seven days a week and has the ability to contact emergency management staff during non-business hours. The CCC also maintains a direct link to the State Warning Point through the State's Emergency Manager's Network (EMnet).

Alachua County Emergency Management is available to assist the University of Florida in the event of an emergency or for drills involving the UFTR. Since the UFTR's emergency plan is on file at our office, please continue to provide any updates or changes.

If you have any questions, please contact me at 352.264.6500.

Thank you.

Sincerely,

David A. Donnelly, CEM® FPEM, CPM
Emergency Management Director

Cc: file

P.O. Box 5038 ■ Gainesville, Florida 32627 ■ Tel. (352) 384-3101 ■ Fax (352) 334-0832
Suncom *651-3101* ■ Home Page: *http://www.alachuacounty.us*

UF | UNIVERSITY of FLORIDA

College of Medicine
Department of Emergency Medicine

PO Box 100186
Gainesville, Florida 32610-0186
Tele: (352) 265-5911
Fax: (352)265-5606

June 6, 2011

Dr. David E. Hintenlang
Associate Professor
Interim Facilities Director
University of Florida Training Reactor
202 Nuclear Sciences Center
University of Florida
Gainesville, FL 32611-8300

Dear Dr. Hintenlang,

This is to advise that you that the University of Florida College of Medicine and Shands Teaching Hospital are appropriately staffed, equipped and prepared to provide to the University of Florida Training Reactor (UFTR) emergency medical care and treatment in the event of radiation injury and/or personnel contamination.

We are pleased to make this commitment to the Colelge of Engineering and look forward to a continued positive relationship between your facility, the College of Medicine, and Shands.

Sincerely,

Joseph Adrian Tyndall, MD. MPH, FACEP
Chairman, Department of Emergency Medicine
Chief of Emergency Services
Shands at the University of Florida

APPENDIX I

UNIVERSITY OF FLORIDA

Program for Maintaining Occupational Radiation Exposure for Non-Medical Licensed Activities at the University of Florida, As Low As Reasonably Achievable (ALARA)

I. Management Commitment

A. The University of Florida is committed to the program described in this document for keeping radiation exposures (individual and collective) as low as reasonably achievable (ALARA). In accordance with this commitment, we hereby establish an administrative organization for radiation safety and will develop the necessary written policies, procedures, and instructions to foster the ALARA concept within our institution. The organization includes a Radiation Control Committee (RCC) and a Radiation Control Officer (RCO).

B. The RCO will perform a review to determine methods by which exposures might be lowered. This review shall include reviews of operating procedures and past exposure records, inspections and consultations with the radiation control staff. A brief summary of the audit will be prepared covering the scope of the review and the conclusions reached, and lessons learned, if any.

C. A representative of administration shall be an active member of the RCC. The University of Florida will consider any modifications or changes as recommended by the Committee including those resulting from the annual review of the radiation safety program performed by the RCO.

D. Modifications to operating and maintenance procedures and to equipment and facilities will be made when they will reduce exposures at reasonable costs. We will be able to demonstrate that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonably achievable. Where modifications have been considered but not implemented, we will be prepared to describe the reasons for not implementing them.

E. In addition to maintaining doses to individuals as far below the limits as reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level.

II. Radiation Control Committee

A. Review of Proposed Users and Uses

1. The RCC will review the qualifications of each potential Principal Investigator (PI) and approved user of radioactive material and radiation producing devices with respect to the types and quantities of materials and uses for which he/she has applied to assure that the user will be able to take appropriate measures to maintain exposure ALARA.

2. When considering a new use of radioactive material, the RCC will review the efforts of the PI to maintain exposure ALARA. The user shall have systematic procedures to ensure ALARA and must consider the use of special radiation safety equipment, such as rubber or disposable gloves, fume hoods, remote handling tools, and appropriate shielding in his/her proposed use, when appropriate.

B. Delegation of Authority

1. The RCC will delegate authority to the RCO for enforcement of the ALARA policy.

2. The RCC will support the RCO in those instances where it is necessary for the RCO to assert his authority. Where the RCO has been overruled by the RCC, the RCC will record the basis for its action.

C. Review of the ALARA Program

1. In association with the RCO, the RCC will perform an annual review of all current radiation safety procedures and the development of new procedures as appropriate to implement the ALARA concept.

2. The RCC will review all instances of deviations from the ALARA philosophy. Information in support of the review will be supplied by the RCO.

3. The RCC will evaluate the institution's overall effort for maintaining exposures ALARA. This annual review will include the efforts of the RCO, approved users and workers as well as those of Administration.

4. The RCC will perform a periodic review of occupational radiation exposure with particular attention to instances in which the Investigational Levels in Section VI are exceeded. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded.

III. <u>Radiation Control Officer (RCO)</u>

A. Annual and Quarterly Review

1. The RCO will perform an annual review of the radiation control program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis.

2. The RCO will review, at least quarterly, the external radiation exposures of approved users and workers to determine that their exposures are ALARA in accordance with the provisions of Section VI of this program.

3. The RCO will review, at least quarterly, the records of radiation level surveys in unrestricted and restricted areas to determine that radiation levels were ALARA during the previous quarter.

B. Education Responsibilities for ALARA Program

1. The RCO will inform PIs, approved users, workers, and ancillary personnel of ALARA program efforts.

2. The RCO will ensure that PIs, approved users, workers and ancillary personnel who may be exposed to radiation will be instructed in the ALARA philosophy and informed that the administration, the RCC, and the RCO are committed to implementing the ALARA concept.

C. Cooperative Efforts for Development of ALARA Procedures

PIs, approved users, workers and ancillary personnel will be given opportunities to participate in formulation of the procedures that they will be required to follow.

1. The RCO will be in close contact with all users and workers in order to develop ALARA procedures for using radioactive materials and radiation producing devices.

2. The RCO will establish procedures for receiving and evaluating suggestions for improving ALARA procedures and will encourage the use of these procedures.

D. Reviewing Instances of Deviation from Good ALARA Practices

The RCO will investigate all known instances of deviation from good ALARA practices and will determine the causes. The RCO may require changes in working procedures to maintain exposures ALARA.

IV. Principal Investigators

A. New Procedures Involving Potential Radiation Exposures

1. The PI will consult with and receive the advance approval of the RCO during the planning stage before using radioactive material for a new procedure.

2. The PI will evaluate all procedures before using radioactive material to ensure that exposure will be kept ALARA. This may be implemented through the application of trial runs.

B. Responsibility of Principal Investigator to Persons Under His/Her Supervision

1. The PI will explain the ALARA concept and his/her commitment to maintain exposures ALARA to all persons under his/her supervision.

2. The PI will ensure that persons under his/her supervision who are subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

V. Persons Who Receive Occupational Radiation Exposure

A. The worker will be instructed in the ALARA concept and its relationship to working procedures and work conditions.

B. The worker will also be informed of recourses that are available if he/she feels that ALARA is not being promoted on the job.

VI. Establishment of Investigational Levels in Order to Monitor Individual Occupational External Radiation Exposures

The University hereby establishes Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or investigation by the RCO with subsequent review by the RCC. The Investigational Levels are listed in the table below. These levels apply to the exposure of individual workers. In cases where it is necessary for a worker's or a group of workers' doses to exceed these Investigational Levels; the RCC retains the right to establish new Investigational Levels on the basis that is consistent with good ALARA practices for that individual or group. Justification for new Investigational Levels will be documented.

A. The following actions will be taken at the Investigational Levels as stated in the table below.

1. Monthly exposure of individuals to less than Investigational Level I

Except when deemed appropriate by the RCO, no further action will be taken in those cases where an individual's exposure is less than values for the Investigational Level I.

2. Personnel exposures equal to or greater than Investigational Level I, but less than Investigational Level II.

The RCO will investigate the exposure of each individual whose monthly exposures equal or exceed Investigational Level I and will report the results of the investigation at the first RCC meeting following the quarter when the exposure was recorded. If the exposure does not equal or exceed Investigational Level II, no further action related specifically to the exposure is required unless deemed appropriate by the RCC. The RCC will, however, consider each such exposure in comparison with those of others performing similar tasks as an index of ALARA program quality and will record the review in the RCC minutes.

C. Personnel exposures equal to or greater than Investigational Level II

The RCO will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II and, if warranted, will take action. A report of the investigation and actions taken, if any will be presented to the RCC at the first meeting following completion of the investigation. The details of these reports will be recorded in the meeting minutes. A report of the investigation will also be made available to the Department of Health, Bureau of Radiation Control.

Investigation Levels
for Radiation Exposure

		Level I mrem per month	Level II mrem per quarter
Research Laboratories,	TEDE	40	375
	DDE+CDE	400	3750
	LDE	125	1125
	SDE	400	3750
Veterinary Medicine Radiology	TEDE	300	1250
	DDE+CDE	3300	12500
	LDE	1000	3750
	SDE	3300	12500

TEDE = Total Effective Dose Equivalent = DDE + CEDE = deep dose equivalent and the committed effective dose equivalent

DDE+CDE = Sum of the deep dose equivalent (DDE) and the committed dose equivalent (CDE) to any organ or tissue other than the lens of the eye

LDE = Lens of the eye (eye dose equivalent)

SDE = Skin (shallow dose equivalent) or to any extremity

NOTE: Bimonthly Investigation Levels are 2x monthly Investigation Levels

When annual doses exceed the levels specified in 64E-5.304 (1) (a) and (b), a report of the investigation will also be made available to the Department of Health, Bureau of Radiation Control.

VII. Signature of Certifying Official

I hereby certify that this institution has implemented the ALARA program set forth above.

By: _____ Date: _____

Ed Poppell
Vice President of Finance and Administration
University of Florida