UNIVERSITY OF TEXAS AT AUSTIN
NUCLEAR ENGINEERING TEACHING LABORATORY
TRIGA RESEARCH REACTOR
LICENSE NO. R-129
DOCKET NO. 50-602

EMERGENY PLAN REVISION NO. 4
APRIL 25, 2019

REDACTED VERSION*

SECURITY-RELATED INFORMATION REMOVED

*REDACTED TEXT AND FIGURES BLACKED OUR OR DENOTED BY BRACKETS

ATT 1: SUMMARY OF CHANGES TO THE EMERGENCY PLAN UNDER REVISION 4

Summary

Revision 4 the Emergency Plan consists of 23 changes. The first change removes designated classification of the document from OFFICAL USE ONLY to unclassified. The second change is to the table of contents, which indicated a different header than the paragraph. The third change is editorial, organizing the paragraph to provide information from main campus, then PRC and reference applicable figures. The fourth change removes a figure of response organization structure which was not correct, replacing it with the structure required under the National Incident Management System model. The fifth change reorganizes a paragraph, indicates where letters of agreement are used, updates referenced figures, and credits the use of cell phones instead of landline in the reactor bay. The sixth, tenth, and eleventh through nineteenth, twenty-first and -second changes are editorial (mostly grammatical corrections). The seventh through ninth changes incorporate recent UT organizational changes. The tenth change reflects a merger of medical centers and accompanying hospital name change. The nineteenth change designates Emergency Support Center as a proper name.

Details

ITEM 1:

The Emergency Response Plan was transmitted under the classification, "OFFICAL USE ONLY." After reviewing criteria in USNRC Regulatory Issue Summary 2015-071, it was determined that there is no information that should be withheld from the public in the Plan. Therefore, the document was declassified, and the markings removed.

This change concerns only administrative control of the Plan. Since the Plan does not provide specific information related to hostile-action based events that could be used in attempting to reduce the effectiveness of the Plan, the change does not decrease the effectiveness of the Plan.

ITEM 2:

Table of Contents, "4.1 Emergency Support Center" changed to "4.1 Assembly Area & Emergency Support Center"

The indicated section addresses both Assembly Area and Emergency Support Center. This change does not decrease the effectiveness of the Plan.

ITEM 3:

EP 1.0, the lead sentence was revised to flow information from the main campus to the PRC, and figure references refenced from EP 1.0, paragraphs 4 embedded when the items occur in the text.

This editing the arrangement of information and does not change the effectiveness of the plan.

ITEM 4:

EP, Section 2, 1st paragraph, first sentence:

> The emergency organization for The University of Texas TRIGA reactor facility consists of three functional groups. A block diagram presentation of the organization is in Figure 4 of the Appendix.

The referenced diagram did not reflect current practice, which follows the National Incident Management System, and was revised to:

> The normal operating organization is structured as provided in Fig. 4-1. The emergency organization for The University of Texas TRIGA reactor facility follows the National Incident Management System (NIMS) model. NIMS is design to flexible so that it may be implemented as needed. A block diagram presentation of the normal and emergency organization is provided in Fig. 4-3, with a sample implementation in Fig. 4-4. A relatively small incident at NETL may consist of the NETL emergency director as the only person in Unified Command with NETL staff acting as operations personnel and no other sections being staffed. A larger incident involving outside responders would likely result in representatives from various responding agencies in Unified Command with the NETL emergency director and multiple divisions of the operations section. The Public Information Officer and Safety Officer positions would likely be staffed as well. Other sections may or may not be staffed depending on complexity and duration of the incident.

This change reflects the NIMS structural organization for emergency response and does not decrease the effectiveness of the plan.

ITEM 5:

EP, Section 2, 2nd paragraph,

1. The paragraph was broken into separate paragraphs for reactor facility personnel other university organizations, and non-university organizations. The 'third group' lead sentence was revised to indicate letters of agreement are used for those who do not have statutory responsibilities.

2. the sentence "Both intercom and telephone line communications between the reactor room, control room, and adjacent laboratory facilities normally will be available"

3. The referenced figures were updated.

The University is transitioning to voice over internet protocol and traditional analog telephone lines are being phased out. Since cell phones are ubiquitous, cell phone communication is adequate to provide necessary communication to support emergency response. Therefore, the paragraph was revised to:

> One group is the reactor facility personnel, including staff, faculty and researchers. Responsibilities of facility personnel are to maintain emergency awareness, classify emergency conditions, initiate emergency responses, manage response actions and provide for recovery operations.
>
> A second group of personnel from other university departments supplement the laboratory facility emergency response organization. Responsibilities of some university support groups include security services for area control and supplemental communications, and safety services for consultation and supplemental equipment.
>
> The third group of emergency response personnel comprise non-university organizations, with letters of agreement in the absence of non-statutory responsibilities. Typical/sample letters of agreement with the major external response groups are in Figs. 5, 6, and 7. Responsibilities of these groups are to provide specialty functions such as medical services, fire control, or additional law enforcement activities. The recovery organization will consist of reactor facility personnel and other university personnel such as environmental health and safety personnel. Communications within the reactor facility are possible on a verbal basis because of the facility size. Both intercom and telephone communications between the reactor room, control room, and adjacent laboratory facilities normally will be available. Communications with other personnel of the research center site depend on a University telephone system as does communication with personnel on the University main campus. Several programmable two-way radios are also maintained which allow communication with university support groups and local emergency response personnel. Initial notification of offsite organizations shall typically be by telephone, but emergency radio communications may also be used to contact University safety or security personnel.

Since (1) the scope for letters of agreement is clarified (although in practice unchanged), and (2) cell phone service is available in the reactor bay and cell phones are generally available, this change does not decrease the effectiveness of the Plan.

ITEM 6:

EP, Section 2, 2nd paragraph, sentence reading:

> Several programmable two way radios are also maintained which allow communication with university support groups and local emergency response personnel.

Grammatically the term 'two way' should be hyphenated, therefore revised to 'two-way.' Therefore the sentence was revised to:

> Several programmable two-way radios are also maintained which allow communication with university support groups and local emergency response personnel.

This change is strictly editorial and does not decrease the effectiveness of the Plan.

ITEM 7:

2.0, 4th paragraph: "Information available to the public will be made available through the University Office of Public Affairs."

The University Office of Public Affairs has been removed from the organization. The new office responsible for distributing information during emergencies is the Director of Communications. Therefore, the sentence is revised to:

> Information available to the public will be made available through the University Director of Communications, acting as a Public Information Officer. The Emergency Director or a representative of the laboratory management will inform the University of data for a news release.

Since the responsibility for distribution of information to the public is explicitly specified, this change does not decrease the effectiveness of the plan.

ITEM 8:

2.2.2, University Campus Safety and Security, sentence reading:

> "Personnel in the University under the direction of the Associate Vice President for Campus Safety and Security are responsible to have in place programs and plans to insure emergency preparedness, law enforcement and security, parking enforcement, fire prevention, and environmental health and safety for all members of the university community and the general public on the University Campus.'

Responsibilities within the management of UT have been realigned. Therefore, the sentence was revised to:

Personnel in the University Financial and Administrative Services organization under the Senior Vice President and Chief Financial Officer are responsible to have in place programs and plans to insure emergency preparedness, law enforcement and security, parking enforcement, fire prevention, and environmental health and safety for all members of the university community and the general public on the University Campus.

Since the specified components are assigned under the Vice President and Chief Financial Officer, the responsibility, authority, and resources are available as required to support emergency planning and response. Therefore, this change does not decrease the effectiveness of the Plan.

ITEM 9:

2.2.4, "The University Facility Services and specialty organizations such as the Office of Public Affairs will provide normal and problem service functions. Facility Services personnel are available to assist with services such as utility shutdowns or startups and maintenance or temporary repairs. The Office of Public Affairs will handle official information releases concerning emergency situations at The University of Texas TRIGA reactor facility.

The office of Public Affairs no longer exists. Distribution of information to the public is now accomplished under the Director of Communications. Therefore, paragraph is revised to:

The University Facility Services and specialty organizations such as the University Director of Communications will provide normal and problem service functions. Facility Services personnel are available to assist with services such as utility shutdowns or startups and maintenance or temporary repairs. The University Director of Communications will handle official information releases concerning emergency situations at The University of Texas TRIGA reactor facility.

Since the responsibilities have been reassigned to the Director of Communications this change does not decrease the effectiveness of the Plan.

ITEM 10:

2.3.2 Emergency Medical Services, sentence reading "The ambulance personnel, emergency medical technicians and emergency service supervisors will furnish emergency aide and transport to local medical facilities for laboratory personnel requiring medical attention."

The word 'aide' is not the correct term and is intended to be aid. Therefore, the sentence was revised to:

> The ambulance personnel, emergency medical technicians and emergency service supervisors will furnish emergency aid and transport to local medical facilities for laboratory personnel requiring medical attention.

This Change is strictly editorial and does not decrease the effectiveness of the Plan

ITEM 11:

Section 2.3.3, "One of the main hospitals in this group is Brackenridge Hospital, the only Level I Trauma Facility serving Austin and the Central Texas region. Brackenridge Hospital is located in the heart of downtown Austin, about 8 miles from NETL. Brackenridge Hospital is also the home base for the Austin area shock/trauma air rescue helicopters."

Brackenridge Hospital has been renamed Dell Seton Medical Center at the University of Texas.

Therefore, the sentences are revised to:

> One of the main hospitals in this group is the Dell Seton Medical Center at the University of Texas, the only Level I Trauma Facility serving Austin and the Central Texas region. The hospital is located in the heart of downtown Austin, about 8 miles from NETL. This facility is also the base for one of the Austin area shock/trauma air rescue helicopters.

This change does not decrease the effectiveness of the Plan.

ITEM 12:

Section 3.0 Emergency Response, sentence "As necessary for the emergency conditions, other onsite notifications will be made by telephone, two way radio, or messenger."

As noted, term 'two way radio' should include hyphenation. Therefore, the sentence was revised to:

> As necessary for the emergency conditions, other onsite notifications will be made by telephone, two-way radio, or messenger.

This Change is strictly editorial and does not decrease the effectiveness of the Plan

ITEM 13, 14, and 15:

Section 3.0 Emergency Response, sentences "The University Police provide 24 hour campus surveillance. Reactor facility personnel and EHS personnel are on call on a 24 hour basis."

Grammatically, the term '24 hour' should be hyphenated. Therefore, the sentence was revised to:

A brief list posted near the facility main entrance and in the control room lists the staff emergency response personnel. The University Police provide 24-hour campus surveillance. Reactor facility personnel and EHS personnel are on call on a 24-hour basis. List checks are made annually to update appropriate ITEMs

This Change is strictly editorial and does not decrease the effectiveness of the Plan

ITEM 16:

Section 3.0, list item d: "Types of radioactive release expected and duration time expected (for example: airborne, waterborne, surface contamination or no release; instantaneous, continual, or limited release),"

Grammatically incorrect. Therefore, the sentence was revised to:

Expected type(s) and duration of radioactive release (for example: airborne, waterborne, surface contamination or no release; instantaneous, continual, or limited release),

This Change is strictly editorial and does not decrease the effectiveness of the Plan

ITEM 17:

3.0, "Emergency Response" ends with "The agency notified shall be asked to acknowledge receipt of the initial message and that it is authentic."

Grammatically incorrect; it appears that a word was left out. Therefore, the sentence was revised to:

The agency notified shall be asked to acknowledge receipt of the initial message and provided with contact information (such as a call-back number) to verify that it is authentic.

This change better defines the intent of the statement, and does not decrease the effectiveness of the Plan.

ITEM 18:

3.1.3, last paragraph, "In each case, the Emergency Director or his alternate shall assure the evacuation of all personnel from the area, and verify that each of the remaining individuals is aware of the current emergency situation and has a responsibility that requires that person to remain in the area."

Three specific actions are required in this sentence, resulting in unnecessary complexity. Therefore, the sentence was revised to:

> When evacuation is required, the Emergency Director or his alternate shall assure:
> 1. Only individuals who have responsibilities for emergency response in the affected area remain in the area,
> 2. Individuals remaining in the area are aware of the current emergency situation, and
> 3. All other personnel evacuate the area.

This Change is strictly editorial and does not decrease the effectiveness of the Plan

ITEM 19:

4.2, paragraph 1, the sentence "Both instruments are typical of civil defense type equipment, and are sensitive to beta and gamma radiation"

We have no "civil defense type equipment" and the sentence is therefore deleted. The change does not decrease the effectiveness of the Plan.

ITEM 20:

4.1, paragraphs 2, 3, 4 and 5 the term "emergency support center" was capitalized and once in paragraphs 2-4 and twice in paragraph 5 "support center" was changed to "Emergency Support Center."

ITEM 21:

4.2 paragraph 2, sentences: "Assessment of personnel dose and radionuclide identification depends on the routine use of issued dosimeters (self reading, OSL, thermoluminescent, or electronic), portable survey instruments, and additional laboratory equipment. Personnel pocket dosimeters available are ionization chambers and thermoluminescent detectors. Self reading pocket dosimeter ranges are typically 0 to 200 mR. Thermoluminescent dosimeter ranges are 1 mR to 100 R.'

The term 'self reading'should be hyphenated. Therefore, the sentences were revised to:

> Assessment of personnel dose and radionuclide identification depends on the routine use of issued dosimeters (self-reading, OSL, thermoluminescent, or electronic), portable survey instruments, and additional laboratory equipment. Personnel pocket dosimeters available are ionization chambers and electronic dosimeters. Self-reading pocket dosimeter ranges are typically 0 to 200 mR. Electronic dosimeter ranges are 0.1 mR to 1000 R.

This Change is strictly editorial and does not decrease the effectiveness of the Plan

ITEM 22:

5.0, paragraph 2, "The Reactor Supervisor shall assure compliance with applicable parts with 10CFR20, 10CFR50, license Technical Specifications and the requirements for all written reports."

The 'requirements for all written reports' is redundant; reporting requirements are in the Technical Specifications. Therefore, the sentence was revised to:

> The Reactor Supervisor shall assure compliance with applicable sections of 10CFR and license Technical Specifications.

This change does not decrease the effectiveness of the Plan

ITEM 23:

6.2, second paragraph, sentence "If non expiring agreements are in place, letters acknowledging existence and continuation of the in place agreements will be sufficient."

Grammatical correction, non expiring should be hyphenated. Therefore, the sentence was revised to:

> If non-expiring agreements are in place, letters acknowledging existence and continuation of the in place agreements will be sufficient.

This Change is strictly editorial and does not decrease the effectiveness of the Plan

Conclusion

These changes do not decrease the effectiveness of the Emergency Response Plan.

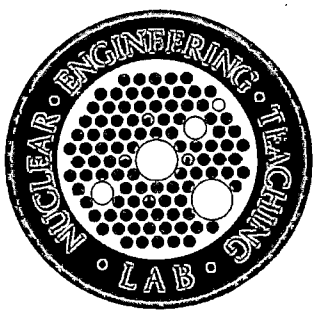
Attachment 2:

Emergency Response Plan

The University of Texas at Austin

Docket 50-602

License R-129



Emergency Response Plan

The University of Texas at Austin
Nuclear Engineering Teaching Laboratory
TRIGA Mark II Nuclear Research Reactor

Docket 50-602
License R-129
Rev 4
(04/2019)

The University of Texas at Austin
Nuclear Engineering Teaching Laboratory
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Emergency Response Plan

Table of Contents

Preface

Emergency Plan

UT TRIGA MARK II

This document describes the Emergency Plan applied to The University of Texas TRIGA Mark II reactor. The plan includes a classification system of potential emergency conditions. The purpose of this plan is to identify emergency organizations and responsibilities, establish communication and notification requirements, define accident assessment and protective actions, specify emergency facilities and equipment, and maintain emergency preparedness. The plan consists of six sections and an appendix. The appendix contains site location, organizational structure, procedures and agreements that implement the plan.

Descriptions and details of the plan should not require modification for each change to facility operation or equipment. In general, modifications should not alter substantially the intent of the plan. Revisions to the plan will be made, as appropriate, to include significant changes.

EMERGENCY PLAN

1.0 Introduction

The Austin J.J. Pickle Research Campus (PRC) is approximately seven miles toward the center of the City of Austin is The University of Texas at Austin main campus (Fig. 1). The nuclear research reactor of the TRIGA type is one of the facilities of PRC.

The TRIGA reactor facility and other radiation producing equipment are a part of the Nuclear Engineering Teaching Laboratory Program. Reactor power levels of 1100 kW steady state and pulse insertions of 2.2% ΔK/K are limiting operational values. The fuel is standard TRIGA fuel of zirconium hydride (H/Zr ratio of 1.6) with 8.5% by weight uranium of less than 20% enrichment. An above ground reactor shield structure and pool provide access to reactor neutrons via in-pool facilities or beam tubes through the shield structure. Operation schedules vary but plan for a normal 40-hour, single shift, work week. An estimate of the annual average energy production is 20 Megawatt days.

Other major equipment within the laboratory includes a cobalt-60 irradiator in the pool (design limit of [redacted], allowed in the possession license but not currently present), [redacted] U_3Si_2-Al fresh fuel elements previously operated as the Manhattan College Zero Power Reactor (MCZPR) containing [redacted] grams of ^{235}U with an enrichment of 19.75% (currently in storage), a subcritical assembly and reflectors with [redacted] grams of uranium-235, isotopic neutron sources of plutonium beryllium and californium-252, and a 14 MeV neutron producing accelerator. Additional radioactive materials and equipment provide calibration, detection, and measurement of nuclear radiations for education and research applications that are available at the laboratory.

Functions of the laboratory consist of three major activities. Education activities of the laboratory supplement the educational experience of engineers by demonstration and measurement of reactor characteristics, extend the technical experience of engineering and science students with nuclear technology applications and provide assistance to other education activities. Research activities of the laboratory support nuclear analysis methods such as neutron activation and neutron radiography as evaluation tools available to other university research programs. Service activities of the laboratory provide a source for production of radioisotopes or analytical measurements with laboratory equipment.

The reactor facility is a building containing basic laboratories, support areas, offices, and the reactor bay with the reactor pool and shield structure (Fig. 3). Location of the building is on the J.J. Pickle Research Campus in north Travis County near the intersection of Braker Lane and Burnet Road. The reactor facility and research campus site are bounded by Braker Lane on the north, Burnet Road on the east, and the Missouri Pacific Railroad on the west.

1.1 Definitions

1.1.1 General Definitions

Action levels. Action levels are specific readings, or observations; radiological dose or dose rates; or specific contamination levels of airborne, waterborne, or surface-deposited radioactive materials used as thresholds for establishing emergency classes and initiating appropriate emergency measures.

Annual limit on intake (ALI). The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of 5 rems (0.05 Sv) or a committed dose equivalent of 50 rems (0.5 Sv) to any individual organ or tissue. (ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Table 1, Columns 1 and 2, of Appendix B to 10CFR 20).

Derived air concentration (DAC). The concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work (inhalation rate 1.2 cubic meters of air per hour), results in an intake of one ALI. DAC values are given in Table 1, Column 3, of Appendix B to 10CFR 20.

Effluent Concentration (EC). The concentration values given in Columns 1 and 2 of Table 2 in Appendix B to 10CFR 20, equivalent to: 1)The radionuclide concentrations, other than noble gases, which, if inhaled or ingested continuously over the course of a year by the general public, would produce a total effective dose equivalent of 50 millirem (*mrem*) (0.5 millisievert (*mSv*)),or 2)The radionuclide concentrations of noble gases where the submersion external dose to the general public over a year would produce a total effective dose equivalent of 100 mrem (1 mSv).

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 an accident.

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

Emergency planning zone. An emergency planning zone 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 emergency planning zone shall be the reactor operations boundary.

Gray (*Gy*). Gray is the SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 Joule/kilogram (100 rads).

Immediate Evacuation Zone. The area surrounding a potential criticality accident location that must be evacuated without hesitation if a criticality accident alarm is activated.

Protective action guides (PAG). Protective action guides are projected radiological doses 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 unavoidably occurred prior to the assessment.

Rad. Rad is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

Rem. Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem=0.01 sievert).

Sievert (Sv). Sievert is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv=100 rems).

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.

1.1.2 Specific Definitions

Facility. The facility is the University of Texas engineering building that contains the TRIGA reactor named the Nuclear Engineering Teaching Laboratory.

Operations Area Boundary. The operations area is the area that encloses the reactor room, the control room, the hallway accessing the control room, and rooms accessed via the control room access hallway.

Confinement Area. The confinement area is the area within the facility that encloses the reactor room. Ventilation to the confinement area is via a separate ventilation system with isolation dampers.

Site Area Boundary. The site area is the area encompassed by the University of Texas at Austin J.J. Pickle Research Campus east tract.

Offsite. Offsite is the geographical area beyond the research campus grounds.

Onsite. Onsite is the geographical area within the research campus grounds.

Research Campus. The research campus is the east and west tracts of The University of Texas at Austin J.J. Pickle Research Campus.

Research Reactor. The TRIGA reactor that operates as a utilization facility for research and development activities.

1.2 Emergency Classification System

Potential emergency situations consist of two classes. One class, non-reactor specific events, is for non-reactor specific conditions of either an individual nature or awareness of conditions that may represent an impending peril to the reactor or its systems. The other class, notification of unusual events, consists of events that could lead to or create radiation hazards or radioactive releases from the reactor room. This class of accident is an emergency category consistent with the Federal Emergency Management Administration terminology and requires the notification of licensing authorities. Credible accident conditions are not possible that would cause an emergency classification more severe than a notification of unusual events.

1.2.1 Non-reactor specific events

Non-reactor specific events are of two types, both of which rely on visual observation and subjective judgment to classify the emergency condition. Events of this class are either events that affect individual personnel or conditions that should cause an awareness of the potential for occurrence of the alternate emergency class. Classification of a non-reactor specific emergency is separate from reactor operation and does not necessarily require a change in reactor status. The reactor may be shutdown to reallocate personnel or because of injury to key personnel. Advisories to university police or safety officials may be necessary and conditions may require medical services. Radiological consequences of this class should not affect areas beyond the operations or facility boundary.

1.2.2 Non-reactor specific action levels

Emergency action levels for non-reactor specific events are the following:

a. An individual with serious physical or mental injury.
b. Radioactive contamination of personnel or local radioactive spill in a laboratory area.
c. Activation of the criticality alarm in a material storage area.
d. Fire in the reactor room lasting fewer than 15 minutes or fire in other parts of the building.
e. Report of severe natural phenomenon that is affecting the areas adjacent to the reactor site, such as earthquake, flooding or tornadic winds.

1.2.3 Notification of unusual events

Notification of unusual events are visual observations or specific facility parameters that classify events likely to alter the safety of reactor operations. Reactor operations shall change to mitigate the impact of the emergency and allow the reallocation of reactor operations staff to the procedures of emergency response. Notifications to appropriate onsite and offsite emergency response organizations shall be made as necessary for the type of event. Events of this class may have a radiological impact beyond the operations or facility boundary. Radiological impact beyond the site boundary should be less than the protective action guides and emergency action levels.

1.2.4 Notification of unusual events emergency action levels

Emergency action levels for notification of unusual events are the following:

a. Severe natural events being experienced that are causing observable damage to reactor systems.
b. Sustained fire in the facility that might affect reactor safety systems or radioactive material storage areas.
c. Bomb threats or civil disturbances directed toward the reactor facility, or threats to or breaches of physical security.
d. Damage to reactor cooling system allowing uncontrolled leakage of water exceeding allowable release limits outside the facility boundary.
e. Abnormal loss of core coolant at a rate that exceeds the makeup capacity.
f. Single fuel element damage that releases radionuclides to the confinement area at concentrations of greater or equal to 100 DAC.
g. Multiple fuel element damage that releases radionuclides to the confinement area at concentrations of greater or equal to 100 DAC.
h. Actual or projected radiological effluents at the site boundary resulting in the following exposures in 24 hours or less:
   (1) A deep dose equivalent of 15 mrem (0.15 mSv) or
   (2) A committed effective dose equivalent of 15 mrem (0.15 mSv) based on the following considerations:
      (i) 2400 EC-hours per 15 mrem for radionuclides other than noble gases.
      (ii) 1200 EC-hours per 15 mrem for noble gases.
i. Dose rate measurements, at or near the operations boundary, of 20 millirem per hour from an unknown source.
j. Measured particulate activities, within the operation boundary, of greater or equal 2.0 x 10^{-9} μCi/cc from a fixed filter air sample with a two-hour particulate accumulation.

2.0 Organization, Responsibilities and Communication

The normal operating organization is structured as provided in Fig. 4-1. The emergency organization for The University of Texas TRIGA reactor facility follows the National Incident Management System (NIMS) model. NIMS is design to be flexible so that it may be implemented as needed. A block diagram presentation of the normal and emergency organization is provided in Fig. 4-2, with a sample implementation in Fig. 4-3. A relatively small incident at NETL may consist of the NETL emergency director as the only person in Unified Command with NETL staff acting as operations personnel and no other sections being staffed. A larger incident involving outside responders would likely result in representatives from various responding agencies in Unified Command with the NETL emergency director and multiple divisions of the operations section. The Public Information Officer and Safety Officer positions would likely be staffed as well. Other sections may or may not be staffed depending on complexity and duration of the incident.

One part of the operating organization consists of the reactor facility personnel, including staff, faculty and researchers. Responsibilities of facility personnel are to maintain emergency awareness, classify emergency conditions, initiate emergency responses, manage response actions and provide for recovery operations.

A second group of personnel from other university departments supplement the laboratory facility emergency response organization. Responsibilities of some university support groups include security services for area control and supplemental communications, and safety services for consultation and supplemental equipment.

The third group of emergency response personnel comprise non-university organizations, with letters of agreement in the absence of non-statutory responsibilities. Typical/sample letters of agreement with the major external response groups are in Figs. 5, 6, and 7. Responsibilities of these groups are to provide specialty functions such as medical services, fire control, or additional law enforcement activities. The recovery organization will consist of reactor facility personnel and other university personnel such as environmental health and safety personnel. Communications within the reactor facility are possible on a verbal basis because of the facility size. Both intercom and telephone communications between the reactor room, control room, and adjacent laboratory facilities normally will be available. Communications with other personnel of the research center site depend on a University telephone system as does communication with personnel on the University main campus. Several programmable two-way radios are also maintained which allow communication with university support groups and local emergency response personnel. Initial notification of offsite organizations shall typically be by telephone, but emergency radio communications may also be used to contact University safety or security personnel.

Reports to regulatory agencies shall be by telephone or mail according to regulatory reporting requirements and the severity of the emergency. The Reactor Supervisor or his alternate is responsible for notifying regulatory agencies.

Information available to the public will be made available through the University Director of Communications, acting as a Public Information Officer. The Emergency Director or a representative of the laboratory management will inform the University of data for a news release.

2.1 Facility Personnel

2.1.1 Emergency Director

The Reactor Supervisor or a supervisory senior reactor operator will be the Emergency Director. The emergency director shall be responsible for assuring the facility is placed in a safe shutdown condition, terminating or minimizing the release of radioactive materials, protecting facility personnel and visitors, and assessing the onsite and offsite health and radiological conditions of an emergency event. In the event that the Reactor Supervisor is not available the Senior Reactor Operator on duty will be the Emergency Director. Should none of the above personnel be able to respond to an emergency, a reactor operator, or if the reactor is not operating, the health physicist may assume the role of emergency director and immediately request assistance from the University Radiation Safety Officer. When senior personnel arrive at the scene an exchange of emergency director responsibilities shall occur only after personal communication and briefing of the emergency status.

The Reactor Supervisor, in addition to having the responsibility of Emergency Director, shall be responsible for maintaining emergency preparedness by training personnel, reviewing the emergency plan's function, establishing procedures for recovery operations after an emergency, and providing notifications to appropriate regulatory agencies.

Prior to termination of an emergency, the Emergency Director shall conclude that there exists no foreseeable subsequent events that could cause damage to the reactor or render its operation unsafe. The Emergency Director shall verify that areas open to personnel or the general public meet regulatory requirements. The Emergency Director shall also confirm appropriate posting of areas restricted to entry or controlled access. Precautions for reentry and authorization to reenter the reactor room after an evacuation shall also be the responsibility of the emergency director.

Authorization for radiation exposure to personnel during an emergency response function that are in excess of normal occupational doses shall be the responsibility of the Emergency Director with the concurrence of the Radiation Safety Officer.

2.1.2 Reactor Operator

The Reactor Operator is the current person responsible for the controls of reactor operation. This person may not be available under certain situations where the reactor is already secure, or he may be the same person as the Emergency Director when a senior operator is assuming control of reactor operation. The Reactor Operator is responsible for safe shutdown and securing of the reactor in emergency situations. An operator shall observe the status of emergency action levels and take immediate action in case of possible reactor damage or a release of radioactive material.

2.1.3 Other Facility Personnel

Faculty, staff, and researchers with routine access to the reactor facility shall have instruction in basic radiation safety and emergency procedures. Facility personnel assignment of responsibilities during the course of an emergency event will be commensurate with that individual's training or experience. All activities of facility personnel shall be under the direction of the Emergency Director or a Senior Reactor Operator.

2.2 University Personnel

2.2.1 Radiation Safety Officer

The Radiation Safety Officer is the person responsible for daily operation of radiological safety programs. This person is a part of the University Environmental Health Safety (EHS) staff and manages the radiological safety of the agreement state radioactive material broad license.

2.2.2 University Campus Safety and Security

Personnel in the University Financial and Administrative Services organization under the Senior Vice President and Chief Financial Officer are responsible to have in place programs and plans to insure emergency preparedness, law enforcement and security, parking enforcement, fire prevention, and environmental health and safety for all members of the university community and the general public on the University Campus. The responsibility of these personnel in an emergency is to provide consultation to reactor facility staff and assistance especially during emergencies that threaten areas outside the reactor operation's boundary.

2.2.3 University Police Department

Personnel with the University of Texas Police Department (UTPD) are to provide security assistance, escort for emergency vehicles, emergency communications, traffic control and crowd control outside areas of the operations boundary.

2.2.4 Other University Personnel

The University Facility Services and specialty organizations such as the University Director of Communications will provide normal and problem service functions. Facility Services personnel are available to assist with services such as utility shutdowns or startups and maintenance or temporary repairs. The University Director of Communications will handle official information releases concerning emergency situations at The University of Texas TRIGA reactor facility.

2.3 Offsite Response Group

2.3.1 Austin Fire Department

The City of Austin Fire Department provides fire fighter services and several other emergency response functions. Fire department personnel will provide the functions of first response, extraction and rescue, as well as the capabilities of fire control and handling of hazardous materials.

2.3.2 Emergency Medical Services

The City of Austin in cooperation with Travis County provide Emergency Medical Services (EMS) including medical transport and emergency medical assistance. The ambulance personnel, emergency medical technicians and emergency service supervisors will furnish emergency aid and transport to local medical facilities for laboratory personnel requiring medical attention. Treatment and transport of victims that may have radioactive contamination typically requires the assistance of emergency medical supervisors and laboratory staff.

2.3.3 Local Hospitals

Austin's expanding health care system now rivals that of any major metropolitan area, including more than 10 major hospitals and one children's hospital. One of the main hospitals in this group is the Dell Seton Medical Center at the University of Texas, the only Level I Trauma Facility serving Austin and the Central Texas region. The hospital is located in the heart of downtown Austin, about 8 miles from NETL. This facility is also the base for one of the Austin area shock/trauma air rescue helicopters. Two more hospitals with emergency departments are located within about 2 miles of the NETL facility. The destination hospital for patients from NETL will typically be chosen by EMS personnel based on patient needs and transport times. Care of individuals suffering from acute radiation exposure, injuries with radioactive contamination, and other medical injury trauma or illness will be a function of the hospital and its staff.

2.3.4 Non-university Law Enforcement Agencies

The City of Austin Police Department, Travis County Sheriff's Office, and Texas Department of Public Safety will provide backup and assistance to the UTPD if requested. Levels of assistance range from SWAT teams or law enforcement helicopter support to traffic and crowd control within their jurisdiction. Requests for assistance and coordination with these agencies will be through The University of Texas Police Department.

2.4 Coordination and Notification of Government Agencies

The analysis of credible accidents that could occur from operation of The University of Texas TRIGA reactor facility do not project a radiological hazard exceeding the allowable limits for radioactive material releases. As a consequence, no accident or significant offsite release of radioactive material affecting the public health and safety is likely. Those emergency events that do occur should not require the direct involvement of local, state or federal agencies. An exception to this involvement would be the possible participation of various agencies in the recovery process following an emergency event.

2.4.1 United States Nuclear Regulatory Commission

Notification of an incident to the U.S. Nuclear Regulatory Commission will be in accordance with the requirements of 10CFR20. Additional requirements for information are set by the license conditions of 10CFR50 and the Technical Specifications of docket 50-602.

2.4.2 Texas Department of State Health Services Radiation Control Program

Notification of an incident to the Texas Department of State Health Services, Radiation Control Program, will be in accordance with the regulations for the University's state radioactive material license. Texas, as an Agreement State, issues broad licenses such as that held by the University for possession and use of radioactive materials.

2.4.3 Local Government Agencies

The City of Austin and Travis County will require notification if a release or projections of an incident occur that may cause or threatens to cause a release of radioactive materials that result in substantial offsite doses. Accident conditions and dose projections do not indicate that levels significant enough to require notification will occur.

3.0 Emergency Response

An emergency response initiates by action of reactor operations staff when one or more conditions of the emergency action levels exist. The response shall follow the general requirements set forth in the Emergency Response Plan, and the more detailed instructions in facility implementing procedures PLAN-O and PLAN-E. The action level will determine the emergency classification and the Emergency Director shall assume responsibility for the emergency. Immediate notification of facility personnel will occur by oral communication or intercom network. As necessary for the emergency conditions, other onsite notifications will be made by telephone, two-way radio, or messenger. Requests for offsite response support will be by telephone or radio as conditions allow. Emergency call lists with personnel titles, locations and telephone numbers shall be available at the facility entrance and at the reactor control console. Checks of the list shall be made annually by the Reactor Supervisor to assure appropriate changes have been made.

Detection of an emergency by onsite personnel during periods when the reactor facility is not operational or when a person that acts as an Emergency Director is not present shall require immediate notification of reactor facility and EHS personnel. Emergency call lists that include persons that may act as an Emergency Director will be part of the University Police Department procedures. A brief list posted near the facility main entrance and in the control room lists the staff emergency response personnel. The University Police provide 24-hour campus surveillance. Reactor facility personnel and EHS personnel are on call on a 24-hour basis. List checks are made annually to update appropriate items.

Reporting of an emergency to onsite, offsite or regulatory agencies shall be a message containing the following information:

a. Name, title and telephone number of reporting person,
b. Location, classification and description of event,
c. Date and time event commenced,
d. Types of radioactive release expected, and duration time expected (for example: airborne, waterborne, surface contamination or no release; instantaneous, continual, or limited release),
e. The quantity and identity of radionuclides expected to be released, and
f. Projected or measured doses outside the operations boundary.

The agency notified shall be asked to acknowledge receipt of the initial message and provided with contact information (such as a call-back number) to verify that it is authentic.

3.1 Emergency Response for Non-Reactor Specific Events

Activation of the complete emergency organization is not necessary for this emergency class. The Emergency Director will activate those portions of the onsite and offsite emergency organizations necessary to respond to the specific emergency event. Notification of the facility management will be done as soon as time permits.

3.1.1 Assessment Actions for Non-Reactor Specific Events

For personal injury, the Emergency Director will assess, by observing and consulting the victim, the extent of the injury. A determination of the possibility or extent of radiation exposure from an unexpected criticality or radioactive contamination of the victim shall consider knowledge of the victim's activities and/or monitoring with portable radiation survey equipment. The assessment shall determine the nature of the injury, whether significant exposure or contamination is possible, the type of first aid requirements, and the need for emergency medical service. If the event involved a criticality the assessment should also determine if the reaction has terminated or is still ongoing.

Fires, or other chemical related events (such as explosions, toxic agents or caustic agents) shall require assessment by visual observation of the magnitude of the event and the potential for certain escalation versus prompt control of the event. Portable radiation survey equipment, area radiation monitors, and knowledge of radioactive material storage areas and current laboratory activities will allow assessment of the involvement of radioactive materials.

Reports of severe natural phenomenon rely on personal observation and reports broadcast by news service or provided by other organizations that monitor these conditions. Assessment of the state of natural phenomena shall consider any reliable source of information.

3.1.2 Corrective Actions for Non-Reactor Specific Events

In the case of personal injury, the Emergency Director will ascertain that medical assistance is available in the form of first aid and/or a request for emergency medical support. If the injury involves significant radiation exposure or radioactive contamination, decontamination will be done only if the procedure will not aggravate the injury. The transportation of an individual with contamination will use control and isolation methods. Notification will be made to facility management.

In the event of a criticality involving stored material the immediate actions will include implementation of actions to limit additional exposure and terminate or prevent another criticality.

For fires or other similar hazardous chemical events that do not affect the reactor or its control systems, control measures shall be taken immediately, including removal of non-essential persons from the vicinity. Use of fire extinguishers or other devices that control the event will be done to alleviate the emergency conditions. Other actions will attempt to mitigate the conditions of the emergency such as relocation or removal of hazardous materials if the action does not involve substantial risk to personnel. A request for assistance will be made as soon as actions determine the safety or condition of each person in the facility and the scope of the emergency is known. Actions will be taken to confine radioactive releases to areas within the operations or facility boundary. Notification will be made to facility management.

After a report of the threat of natural phenomena to the reactor facility, corrective actions shall be taken to lessen the potential consequences of the impending emergency. Primarily these actions include securing experiments or radioactive materials, identifying facility structures that

are at risk, and shutting down the reactor as soon as is necessary to take actions to minimize hazardous conditions that may occur during the emergency.

3.1.3 Protective Action for Non-Reactor Specific Events

Protective actions for personal injury consist of removing the conditions that were the cause of the injury or controlling access to the area to prevent additional injury. For the case of a criticality or radioactive contamination, the immediate area will require access control by ropes and signs or other appropriate means.

Protective actions for fire and other hazardous events of a chemical nature will require removal of all non-essential personnel from the immediate area. In the case that radioactive materials are present, a survey by portable monitors will determine that there is no contamination of persons leaving the facility areas.

Protective actions for events that result from a cause of natural phenomena are indistinguishable from corrective actions. These actions may include evacuation of visitors, experimenters, and staff in accordance with the anticipation or occurrence of the emergency.

When evacuation is required, the Emergency Director or his alternate shall assure:

1. Only individuals who have responsibilities for emergency response in the affected area remain in the area,
2. Individuals remaining in the area are aware of the current emergency situation, and
3. All other personnel evacuate the area.

3.2 Emergency Response for Notification of Unusual Events

The Emergency Director will activate the emergency response and delegate duties to affect evacuation, control access and summon emergency support. Procedures shall identify evacuation radiation levels, routes and assembly areas. Several groups of the onsite and offsite organization may respond to this class emergency. Notification will be made to the facility management and regulatory agencies.

3.2.1 Assessment Actions for Notification of Unusual Events

Indication of fuel damage, experiment failure or any event causing unusual radiation or radioactivity levels within the reactor area or at the operations boundary shall require assessment immediately by the Emergency Director. The assessment of radiological conditions will depend on measurements by area radiation monitors, an air particulate monitor, portable survey equipment, pocket dosimeters, and swipe samples. Observation will determine the extent of facility damage, damage to reactor core, control or cooling systems, shield, and breaches of physical security. The Emergency Director will assess threats to physical security by evaluation of the available information and possible consequences of an event. Assessment of radiological situations that cause the evacuation of the reactor room will require supplemental measurements of the radiation and contamination levels and review of the data by the Radiation Safety Officer.

Assessment to evacuate the facility will depend on the observation of radiation levels, observation of physical damage, and knowledge of potential conditions.

3.2.2 Corrective Actions for Notification of Unusual Events

Non-essential personnel shall vacate the reactor room. Remaining facility personnel will take immediate corrective actions. Normal reactor operations will terminate. The Emergency Director shall account for all personnel.

In the event that radiological measurements are the cause of the evacuation, personnel will assemble at the emergency assembly area. If possible, portable survey monitors will be taken from the reactor room to the emergency assembly area. Measurements of the radiation dose rates at the operation boundary shall be made with portable equipment. A visual examination of the integrity of the operation boundary to prevent radioactive releases will be made, and ventilation equipment in the reactor room will be shutdown. Measurements with portable survey instruments will determine the extent of personnel contamination and requirements for decontamination of persons, clothing or shoes.

Corrective actions for threats against reactor room physical security will depend on the nature of the threat. Personnel will vacate the reactor room and a rapid visual inspection will determine the accessibility of key materials or equipment. A material inventory may be necessary as conditions warrant.

3.2.3 Protective Actions for Notification of Unusual Events

The Emergency Director shall establish control of access areas to the reactor room by facility personnel or other onsite personnel. Removal of personnel to an alternate assembly area and evacuation of other adjacent areas onsite will proceed according to the assessment of radiological measurements. Contamination of individuals will require decontamination control at the emergency assembly area. Portable thin window Geiger detectors will monitor personnel contamination. Swipes will measure the extent of surface contamination. Personnel dosimetry for persons entering radiation areas will use pocket ionization type dosimeters or portable electronic integrating dosimeters. Optically stimulated luminescence (OSL)dosimeters and/or thermoluminescent dosimeters typically worn by NETL staff may provide supplemental after event dose assessment confirmation. Notification of the Radiation Safety Officer will provide assistance and consultation regarding subsequent radiological measurements and actions of emergency personnel. The Emergency Director will assign a person to record the radiological data at the site. A report by messenger or other means of supplemental measurement and analysis of data done by EH&S personnel will be the responsibility of the Radiation Safety Officer.

Since almost all events of this emergency class are capable of leading to a radiological release, the extent of protective actions beyond evacuation and access control at the operation boundary shall depend on the projection of potential emergency conditions or actual results of radiological data.

3.3 Protective Action Values

Every attempt will be made to maintain radiation exposures to emergency personnel within the limits of 10CFR20 and/or the Protective Action Guide of 1 Rem whole body or 5 Rem thyroid. However, the Emergency Director with the concurrence of the Radiation Safety Officer,

may authorize exposure in excess of these values to facilitate rescue of personnel with injuries or take corrective actions to mitigate consequences of an emergency event. The whole body exposure limit for life-saving is 100 Rem and 25 Rem for corrective actions. In either case, these exposures will be on a voluntary basis and are to be a once in a lifetime exposure.

Levels of removable beta-gamma contamination outside the operations boundary applicable to assessment, corrective and protective actions shall be 2000 dpm/100 cm^2. Immediate actions to isolate the area or decontaminate personnel shall be done if contamination exceeds these levels. Remedial action for levels between 200-2000 dpm/100 cm^2 shall be applicable to control contamination. No action will be necessary for levels below 200 dpm/100 cm^2.

4.0 Equipment and Facilities

4.1 Emergency Assembly Area & Support Center

For emergency events that require evacuation of a room or area of the building, the initial emergency assembly area shall be the Health Physics Laboratory on the entrance level of the facility. For emergency events that do not affect the general building this assembly area has a central location. Portable radiation survey instruments and emergency supplies will be available in the vicinity of the emergency assembly area.

After communicating and assessing the emergency conditions at the emergency assembly area, coordination and direction of emergency activities should move to the Emergency Support Center. The and Emergency Support Center will be the office area of the facility receptionist, associate director, and program director. These office areas adjacent to the facility entrance are easily accessible. The Emergency Support Center will maintain communication by telephone or radio with other emergency support organizations.

In the event that hazards, a toxic environment, physical damage, or radiation levels render the emergency support or assembly area within NETL hazardous, then the emergency center shall be setup in an alternate location such as the NETL Annex or an outdoor area. Since emergency conditions may also exist close to the building in the area of the NETL Annex, the assembly area and Emergency Support Center. also be setup outside in a parking lot or access roadway. The location shall consider prevailing wind conditions and the approach route of emergency response vehicles.

After emergency responders arrive, the Emergency Support Center should initiate coordination with the Incident Command Post set up by the emergency responder commanders. The Incident Command Post will typically be setup near a designated emergency responder command vehicle. Commanders from each of the emergency responding organizations gather, determine the nature of the emergency including specific hazards, and plan their method of response at the Incident Command Post. The NETL Emergency Director or an appointed Supervisory Senior Reactor Operator shall represent NETL at the Incident Command Post, providing emergency responder commanders with the current conditions at the facility and coordinating the NETL staff actions with the emergency responders.

Two alternate locations that may serve key roles during a major emergency and subsequent recovery are J.J. Pickle Research Campus Building Nineteen and the EHS office. Building Nineteen on the research center site contains the site security dispatch office that may serve as an alternate and Emergency Support Center or information center. The University EHS office on the main campus shall function as part of the alternate and Emergency Support Center to provide supplies and communications. The University EHS office has equipment for response to minor fire, chemical and radiation emergencies.

4.2 Assessment Facilities

The TRIGA reactor instrumentation allows rapid assessment of reactor parameters such as power, temperature, and coolant system conditions. Alarms monitor the status of pool water level, purification water conditions, heat exchanger differential pressure and bulk coolant temperature. Area radiological conditions are monitored by multiple types of equipment. Typical equipment (and typical sensitivities) include fixed GM monitors (~0.1 to 1000 mR/hr), a continuous air particulate monitor (~10-100,000 cpm), and a stack air gaseous monitor (~1 to 10,000,000 cpm) . Portable survey instruments are available in the reactor control room or in the health physics laboratory for routine and emergency use. Survey instruments available for routine operation (and typical sensitivities) include pancake type GM tubes for use as beta contamination friskers (scale ranges ~0 to 100,000 cpm), cylindrical type GM tubes for use as gamma area monitors (scale ranges ~0 to 100 mR/hr), and ionization chambers (scale ranges ~0 to 5 R/hr). Several special instruments may assist the evaluation of specific radiation areas. These include dose measurements with a tissue equivalent scintillator, and detection of alpha and neutron particles with scintillators or gas type detectors. A GM tube device which can be used for both contamination and dose rate monitoring is typically part of the emergency response kit. The scale ranges of this instrument is 0 to 300,000 cpm and 0.001 to 100 mR/hr.

Assessment of personnel dose and radionuclide identification depends on the routine use of issued dosimeters (self-reading, OSL, thermoluminescent, or electronic), portable survey instruments, and additional laboratory equipment. Personnel pocket dosimeters available are ionization chambers and electronic dosimeters. Self-reading pocket dosimeter ranges are typically 0 to 200 mR. Electronic dosimeters with varying ranges are also typically available. Several types of radiation counting systems are generally available in NETL laboratory areas to assess radionuclide samples. A gamma ray spectroscopy system, and an alpha-beta proportional counter provide radionuclide identification and analysis of contamination swipes. Other radiation counting systems may be available for particular conditions from standard nuclear electronic components. Laboratory radiation counting equipment locations within NETL are near or adjacent to the emergency assembly area.

Equipment such as emergency lighting, fire extinguishers (both dry chemical and carbon dioxide), and a first aid kit are within the operations boundary and provide for initial emergency response. Other emergency equipment in the emergency assembly area includes protective clothing, radiation contamination control items, several pocket dosimeters, and two radiation monitors.

The University Environmental Health and Safety division maintains equipment and supplies. Available equipment includes portable survey instruments, gas flow proportional counters, a multiple sample liquid scintillation counter, and supplies to respond to fire, chemical, radiation and personal injury emergencies.

4.3 First Aid and Medical Facilities

At least one First Aid Kit is within the operations boundary and others are available at other facility locations for initial treatment of minor injuries. A safety shower will aid in the decontamination of personnel. Other supplies that help in the control of contamination will also be available such as absorbent paper, plastic bags, tape, coveralls, shoe covers, and gloves. Persons with major injuries with or without radioactive contamination will be taken to an appropriate local hospital by the responding Emergency Medical Services staff. Fire Department personnel will assist victims if the conditions require extrication. Transport and treatment of persons with injuries and contamination shall be at the discretion of emergency responders who may consult with available staff of the facility or EHS that are trained in the use of radioactive materials. Removal and control of contamination will depend on a judgment of the victim's injuries. A localized area for contamination control shall be created as necessary to provide for contamination removal by rinse, wipe, wash and/or clothing replacement. Medical treatment typically takes precedence over decontamination of a patient and should not be delayed. Contamination control can be practiced where practical while treating the patient.

4.4 Communications

Routine communications within the laboratory facility utilize both intercom and telephone. Outside the facility area numerous university telephone lines are available in adjacent buildings because of the proximity of other university activities. In the event of building evacuation, portable telephone and portable radio equipment is also available for communication between the Emergency Director, NETL responders, and emergency responders.

5.0 Recovery

The Emergency Director shall terminate an emergency and initiate recovery actions when the conditions that cause the designation of an emergency class no longer exist or stabilize such that recovery operations may proceed safely. The Emergency Director will consult with the Radiation Safety Officer regarding personnel dosimetry and decontamination procedures. Other requirements for procedures require consultation with the appropriate personnel, such as the University Fire Marshall for an event that involves fire. The individuals assessing recovery requirements shall consider the severity of the incident and review which reactor safety systems or health physics systems may exhibit adverse effects as a result.

Procedures shall be written for recovery operations if the operations require significant facility repairs or the actions of more than several persons. The Emergency Director will determine the need for written procedures and approval of such procedures. The Reactor Supervisor shall assure compliance with applicable sections of the Technical Specifications and applicable paragraphs of 10CFR.

6.0 Emergency Preparedness

6.1 Training

Persons with authority to operate the TRIGA reactor will be knowledgeable of emergency procedures. Training for other personnel with authority to access the laboratory provides instruction about the location and application of radiation survey equipment, location of the emergency assembly area, and general conditions for facility evacuation. Instruction on emergency procedures will be part of the operator requalification program

Onsite personnel that respond to emergency conditions that extend beyond the reactor operations boundary should have an annual orientation to the facility. Discussions are made of potential hazards, emergency procedures and response requirements. An onsite drill shall occur each year with response of facility personnel to exercise knowledge of emergency action levels, evacuation requirements, and the location and function of emergency equipment. Both the Reactor Supervisor and the Radiation Safety Officer should participate in the drill in the roles of participant, advisor and observer. Every two years the drill shall include a call simulation to one or more offsite responders to test communication and response procedures. Local response to a criticality alarm should annually be exercised in addition to the routine drills, however this exercise may periodically qualify and be used as one of the required annual drills.

Observations of the Radiation Safety Officer and Reactor Supervisor and discussions with drill participants will provide guidance to improve future drills. Fundamental problems found by the drill should identify and provide necessary changes to the plan or procedures.

6.2 Plan Review and Update

Each two years a review of the plan shall be made in conjunction with the observations of past drill results and other facility changes. A report of the critiques of emergency drills and, changes and updates to the plan shall be made to the Reactor Oversight Committee and Radiation Safety Committee. Revisions to procedures will be made with approval by the Reactor Oversight Committee.

Letters of agreement with non-university emergency services by emergency response groups will be subject to renewal every two years. If non-expiring agreements are in place, letters acknowledging existence and continuation of the in place agreements will be sufficient.

6.3 Emergency Equipment Maintenance

University Facility Services or safety personnel perform periodic checks of equipment such as emergency lighting and fire extinguishers. Reactor instrumentation, coolant system alarms, area radiation monitors, and portable survey instruments are subject to calibration and functional checks at procedurally specified intervals. Inventory of emergency supplies and first aid kit shall occur at least once each two years. A check of emergency call lists will be made annually for updates of information.

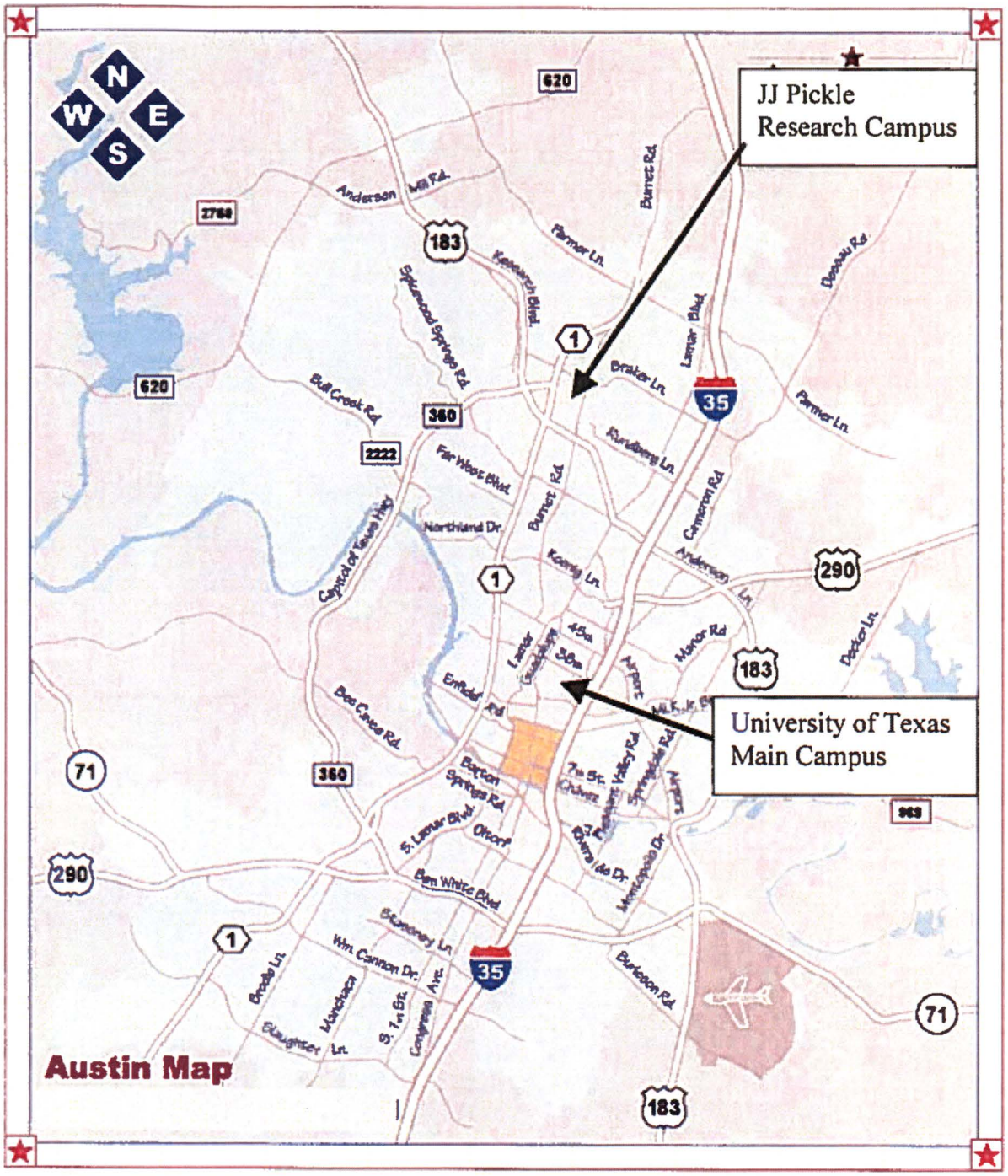
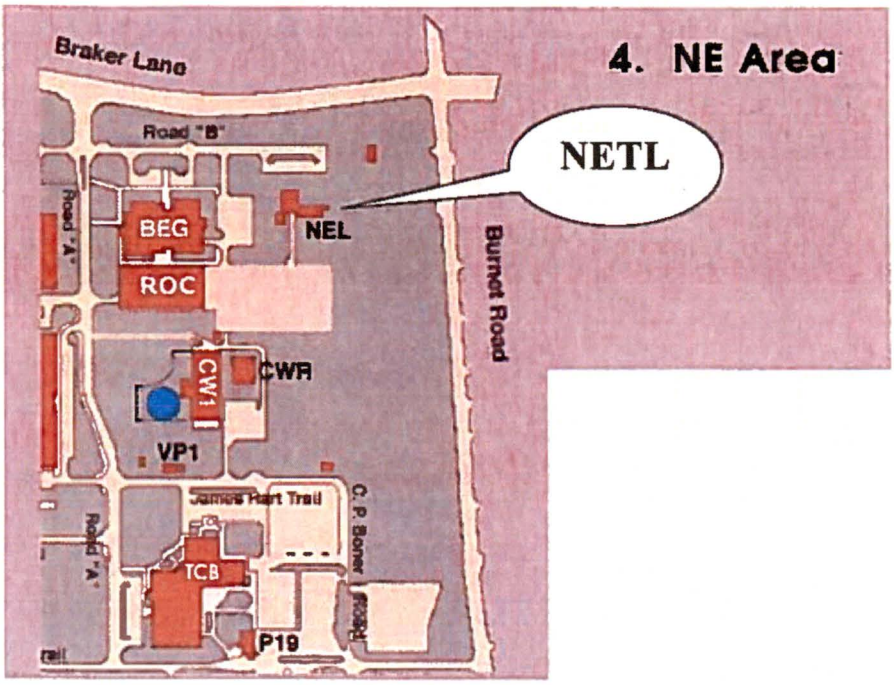


Figure 1 JJ Pickle Research Campus
The University of Texas
Austin, Texas



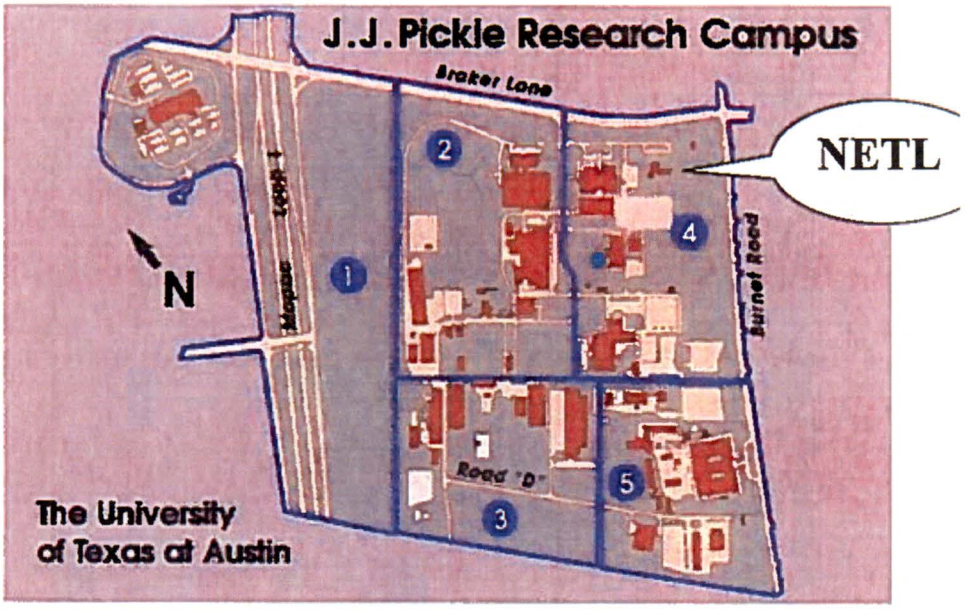


Figure 2 Nuclear Engineering Teaching Laboratory
JJ Pickle Research Campus

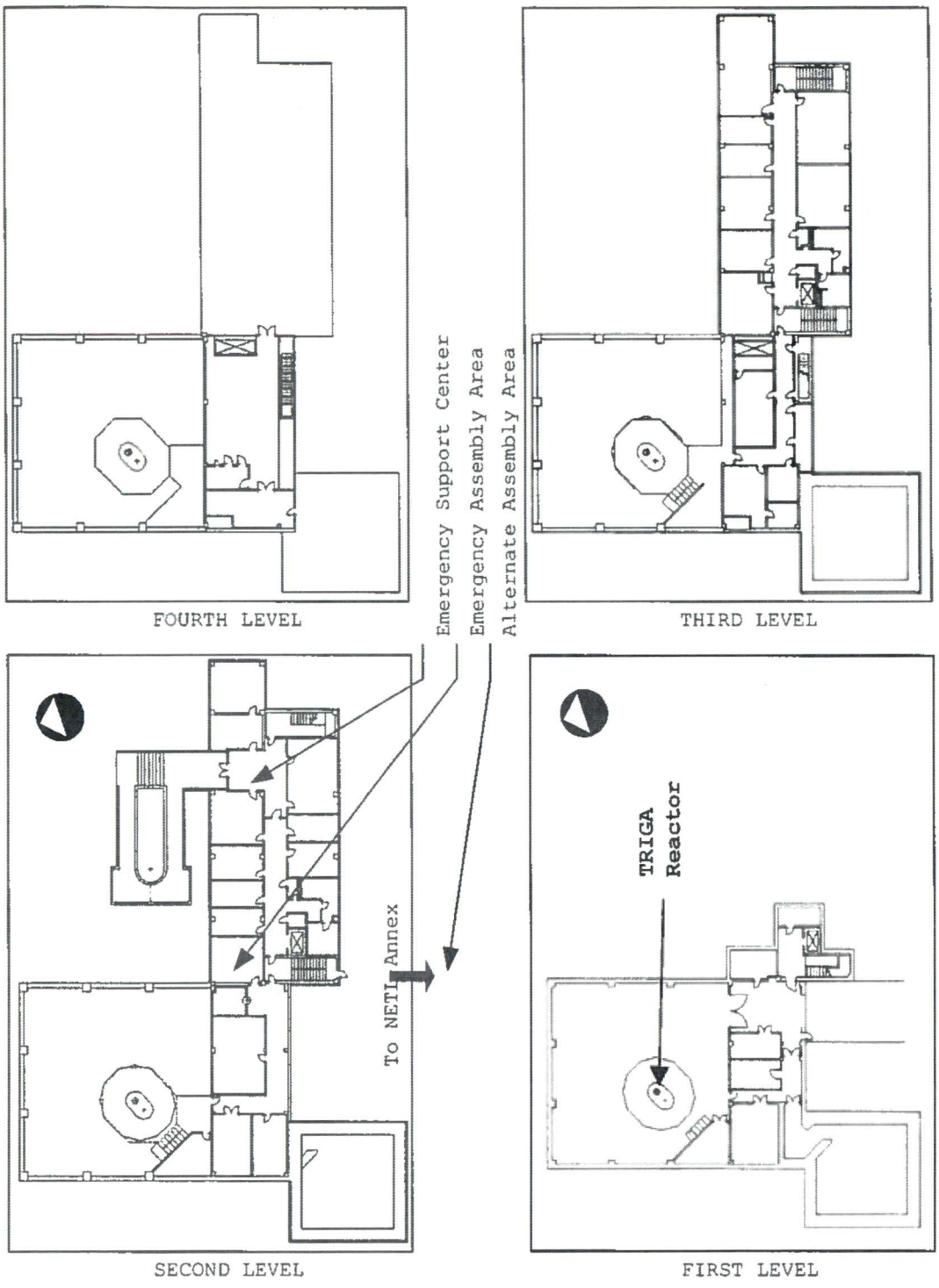


Figure 3 TRIGA Reactor Facility, NETL

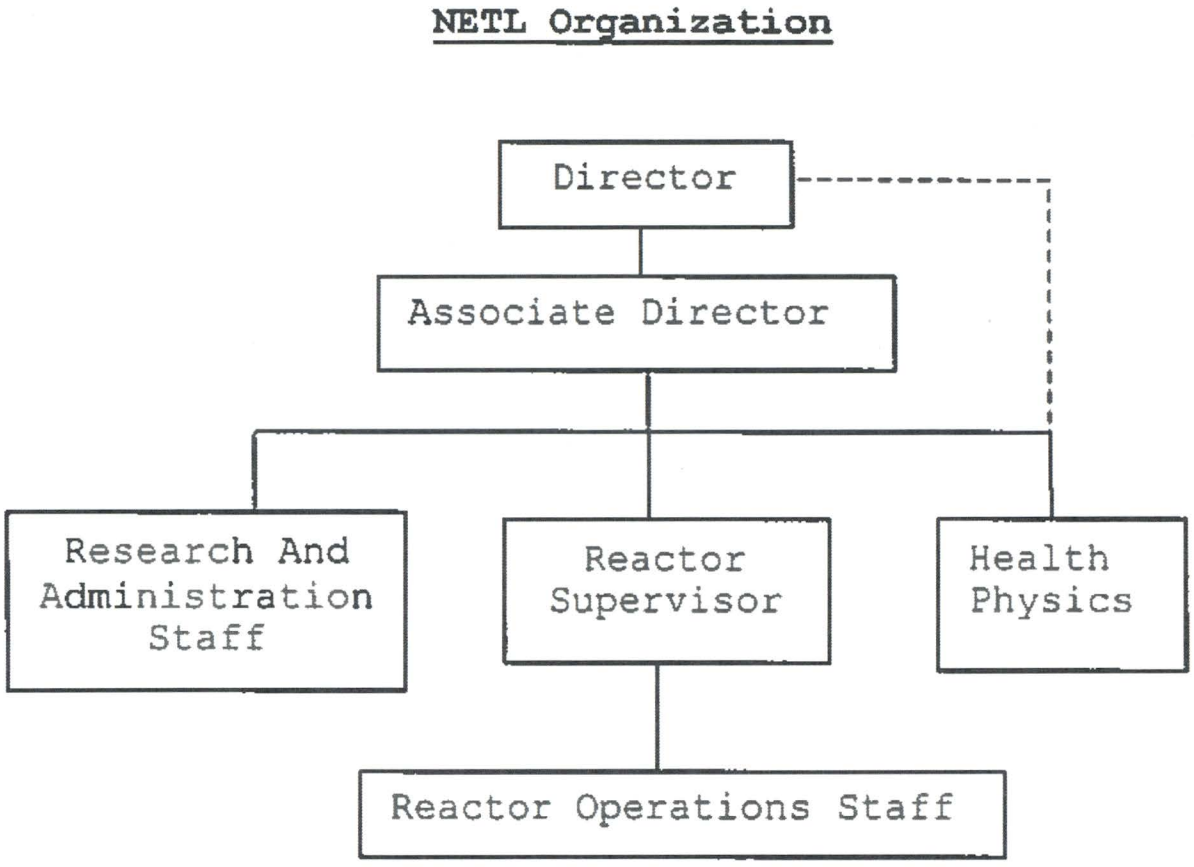


Figure 4-1, NETL Operating Organization

Emergency Response Organization

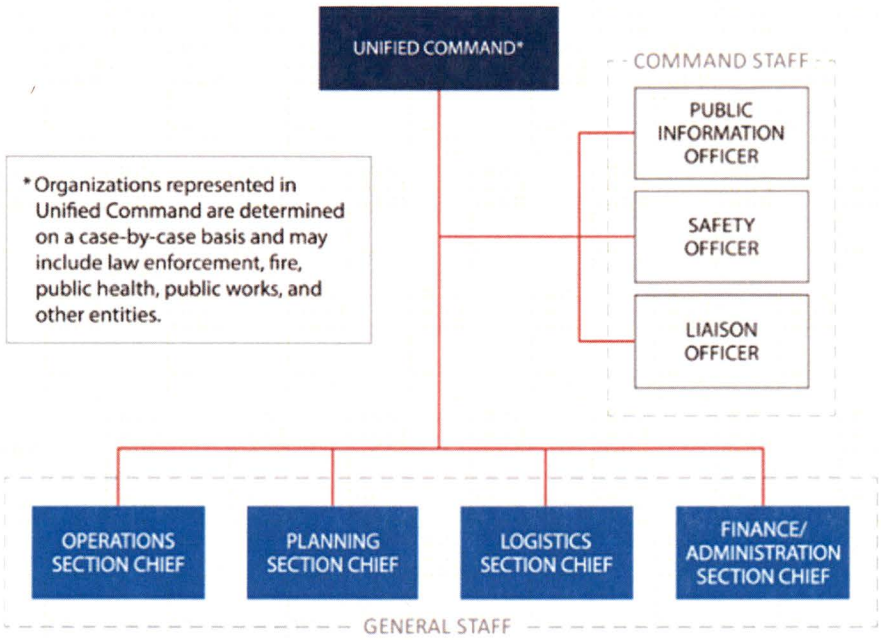


Figure 4-2, NIMS Emergency Response Organization Model

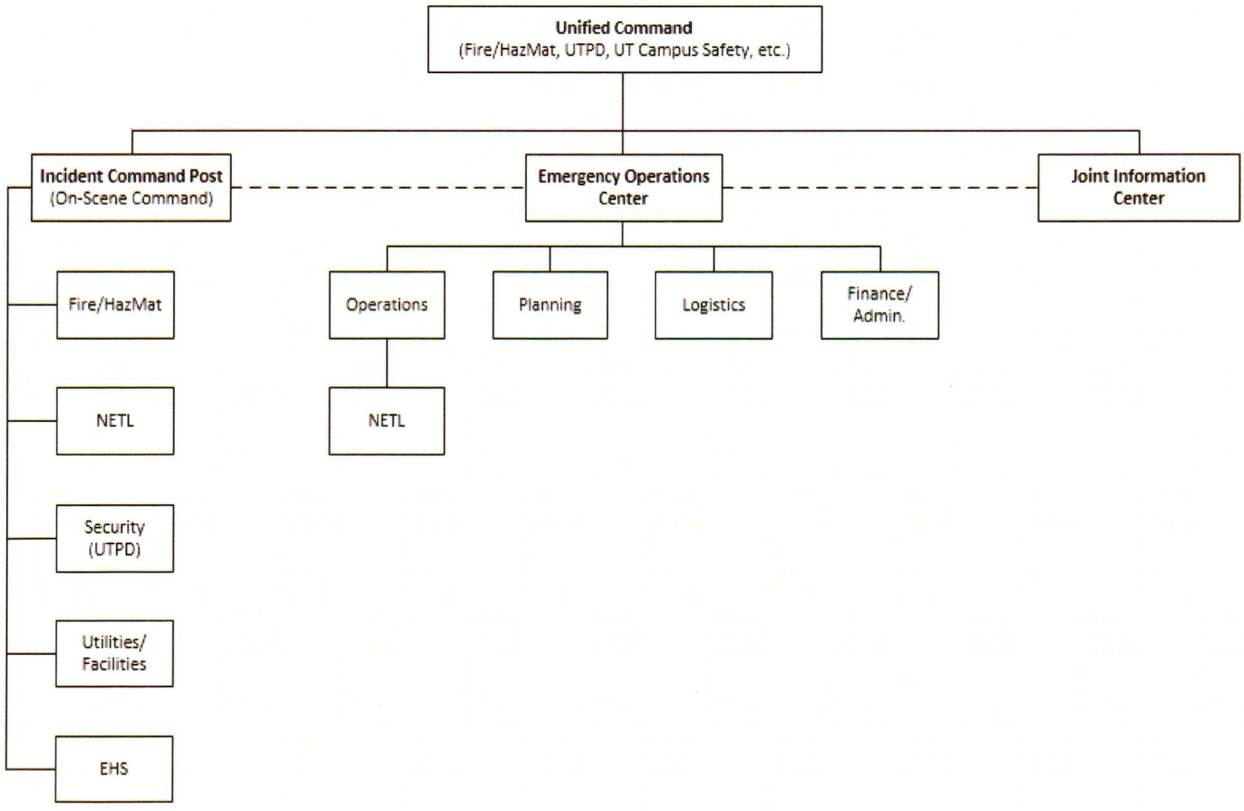


Figure 4-3, Example NETL Implementation of NIMS Incident Command Structure

City of Austin Fire Department

P.O. Box 1088, Austin, TX 78767-1088
www.CityofAustin.org/fire

November 5, 2004

Michael G. Krause P.E.
Reactor Supervisor/Emergency Director
J.J. Pickle Research Center, Building 159
Austin, TX 78712

Dear Mr. Krause:

This correspondence will serve as a letter of agreement between the University of Texas Nuclear Engineering Teaching Laboratory and the Austin Fire Department. Our department will respond to any incident at the NETL facility.

Response will be contingent on the type of emergency and the information we receive from the caller. Personnel responding to NETL will be familiar with the facility and with the necessary operating procedures.

Response to incidents involving hazardous materials will consist of the closest fire engine, the closest two (2) Hazardous/Materials/Rescue units and their companion engines, the closet ladder truck, the Hazardous Materials Command post, and the Special Operations Chief. An engineering staff member will also respond to provide assistance.

The Austin Fire Department has monitoring equipment and personnel trained in this use. We use self-contained breathing apparatus and appropriate protective clothing. Any response will be handled in a prudent and cautious manner. We do request that someone from NETL be present at all times at our command post. This person should be knowledgeable of the facilities, the hazards, and have the ability to assist in coordinating necessary activities.

For additional information, please contact Battalion Chief Harry Evans at 974-0130.

Sincerely,

Gary Warren
Fire Chief
Austin Fire Department

GW/jlp

Office of the Chief
Headquarters
(512) 974-0130
Support Services
(512) 974-4100

Communications
(512) 974-0402
Emergency Prevention
(512) 974-0160
Investigations
(512) 974-0240

Maintenance
(512) 974-1730
Medical Operations
(512) 974-0200
Professional Standards
(512) 974-0139

Public Education
(512) 974-0290
Public Information
(512) 974-0150
Recruiting
(512) 974-0100
(800) 832-5264

Safety
(512) 974-4170
Special Operations
(512) 974-4160
Training
(512) 974-0300

Figure 5-1 Typical Documents - Fire Department

City of Austin

October 3, 2006

Mr. Michael G. Krause P.E.
Reactor Supervisor/Emergency Director
University of Texas, Nuclear Engineering Teaching Laboratory
10100 Burnet Road
JJ Pickle Research Campus, Bldg. 159
Austin, Texas 78712

Dear Mr. Krause:

The University of Texas Nuclear Engineering Teaching Laboratory territory is within the area served by Austin – Travis County Emergency Medical Services (A/TCEMS).

A/TCEMS ambulances will transport patients from within the geographical area served by the University of Texas Nuclear Engineering Teaching Laboratory to hospital emergency facilities. Patients will be transported to facilities as requested by patients or as directed by Medical Control. Patient care and transport shall be done while following A/TCEMS Protocol and A/TCEMS Standard Operating Procedures.

In the event invasive therapy is established before EMS arrival the personnel initiating invasive therapy will accompany the patient to the receiving facility. A/TCEMS personnel shall be in charge of patient care after complete patient information has been received. The A/TCEMS personnel will not be responsible for the return of the University of Texas Nuclear Engineering Teaching Laboratory personnel to the scene. In some cases it may be possible to arrange for their transportation.

The University of Texas Nuclear Engineering Teaching Laboratory personnel will be responsible for completion of the appropriate patient care related reports as required by the Texas Department of Health immediately following patient transport. A/TCEMS shall be provided a copy of all documentation relating to patient care rendered by the University of Texas Nuclear Engineering Teaching Laboratory within five days of the date of the incident.

A/TCEMS will not be responsible for supplying, maintaining, retrieving or replacing the University of Texas Nuclear Engineering Teaching Laboratory equipment or supplies. The University of Texas Nuclear Engineering Teaching Laboratory assumes any and all associated liability related to patient care rendered by the University of Texas Nuclear Engineering Teaching Laboratory personnel. A/TCEMS shall not be responsible for care rendered,

The City of Austin is committed to compliance with the Americans with Disabilities Act. Reasonable modifications and equal access to communications will be provided upon request.

Figure 6-1 Typical Documents - Emergency Medical Services

October 3, 2006
Letter of Agreement
University of Texas, Nuclear Engineering Teaching Laboratory
Page 2 of 2

training, accidents, injuries, exposures or any liability involving the University of Texas Nuclear Engineering Teaching Laboratory, University of Texas Nuclear Engineering Teaching Laboratory personnel, equipment, supplies or vehicles.

In the event any discrepancies arise between A/TCEMS and the University of Texas Nuclear Engineering Teaching Laboratory personnel relating to patient care or transport the respective Department Heads shall be advised. A meeting will be arranged for all personnel involved. This will be done to prevent any problems from creating animosity between Departments, thus adversely affecting patient care.

Either party may cancel this agreement at any time through written notice.

By: _____ Date: 10-3-2006
Richard Herrington, Executive Director
Austin – Travis County Emergency Medical Services

By: _____ Date: 10/11/06
Michael G. Krause, P.E., Reactor Supervisor
University of Texas at Austin
Nuclear Engineering Teaching Laboratory

cc: Chris Callsen, ATCEMS, Assistant Director - Operations

M:\OTD\Staff\Agreement of Service\UTNuclear Eng 2006.doc (vh)

Figure 6-2 Typical Documents - Emergency Medical Services

BRACKENRIDGE HOSPITAL
A member of the Seton Healthcare Network

601 EAST 15TH STREET
AUSTIN, TEXAS 78701-1096
(512) 324-7000
FAX (512) 324-7051
www.seton.net

October 3, 2006

Michael G. Krause P.E.
Reactor Supervisor, Manager of Operations
University of Texas
Nuclear Engineering Teaching Laboratory
JJPRC Building 159
Austin, TX 78712

Dear Dr. Krause:

This is in response to our conversations regarding the status of our agreement to provide care and treatment to individuals who are injured at your facility.

SETON acknowledges knowledge of the original AGREEMENT TO PROVIDE TREATMENT entered into and effective beginning January, 1997, and AMENDMENT NO. 1 TO AGREEMENT TO PROVIDE TREATMENT, effective October 1, 2002. SETON confirms that this Agreement has not been terminated and is still in full force and effect as of the current date.

The scope of this agreement includes the following Austin-based acute care hospital facilities: Brackenridge Hospital, Seton Medical Center, and Seton Northwest Hospital.

Please contact me should you need anything else.

Sincerely,

Mark Wilson RN MSN FNP
Director, Emergency Services
Brackenridge Hospital

Cc: Suzanne Shepherd, SETON Legal Services

ASCENSION HEALTH

Figure 7-1 Typical Documents - Hospital

AGREEMENT TO PROVIDE TREATMENT

This Agreement ("Agreement") is made effective as of the 1st day of January, 1997, ("Effective Date") by and between the Daughters of Charity Health Services of Austin d/b/a Brackenridge Hospital (the "Hospital"), located in Austin, Texas, and the University of Texas Nuclear Engineering Teaching Laboratory facility, J.J. Pickle Research Campus, Austin, Texas (the "Facility").

WITNESETH:

WHEREAS, Hospital is a provider of acute care hospital services; and

WHEREAS, Facility is a nuclear engineering teaching laboratory; and

WHEREAS, the parties of this Agreement desire to ensure availability of care and treatment appropriate to the needs of individuals at Facility who are injured through radioactive contamination or radiation exposure, in accordance with the terms and conditions of this Agreement;

NOW, THEREFORE, for and in consideration of the mutual covenants set forth herein, the parties hereto agree as follows:

1. TRANSPORT OF PATIENTS FROM FACILITY TO HOSPITAL

a. Availability of Hospital Services and Facilities. Hospital shall make available, on a timely basis, its services and facilities to Individuals at Facility injured through radioactive contamination or radiation exposure for whom Hospital's services and facilities are necessary or appropriate, provided however, that such services and facilities are available at Hospital. Hospital will, to the extent possible, grant Individuals at Facility a priority for bed availability especially in cases involving an emergency medical condition.

b. Transport Procedures of Radioactively Contaminated Individuals.

In the event of a radioactive contamination of an individual at Facility, Facility shall:

1. Ensure that the patient is transported to Hospital in accordance with the agreement among the University of Texas, Emergency Medical Services, and the Austin Fire Department;
2. Provide a person knowledgeable in measurement of nuclear contamination along with the equipment necessary for such monitoring;
3. Immediately notify the Hospital Emergency Department Charge Nurse at 324-7033 of the transport; and
4. Immediately fax any written information pertaining to the incident and the materials involved to 324-7029.

Figure 7-2 Typical Documents - Hospital

Hospital's procedures for treating radioactively contaminated patients shall include setting up a treatment area outside its Emergency Department, with decontamination by staff of the Austin Fire Department Haz-Mat Team.

2. TERM AND TERMINATION

a. Term. This Agreement shall become effective as of the Effective Date and shall remain in effect until terminated as set forth in this Agreement.

b. Termination. This Agreement may be terminated on the occurrence of any of the following:

i. Termination by Agreement. In the event Hospital and Facility shall mutually agree in writing, this Agreement may be terminated with or without cause on the terms and dates stipulated therein.

ii. Unilateral Termination. In the event either party, with or without cause, at any time gives to the other at least sixty (60) days advance written notice, this Agreement will terminate on the future date specified in that notice.

iii. Termination for Loss of License or Certification. In the event either party shall have its license to operate revoked or suspended, or its governmental certification status suspended or revoked, this Agreement shall immediately terminate. If either party shall have its license to operate revoked or suspended, notice shall be given to the other party, in writing, within ten (10) days of the date of suspension or revocation.

iv. Termination on Notice of Default. In the event either party shall give notice to the other that such other party has substantially defaulted in the performance of any material obligation under this Agreement, and such default shall not have been cured within ten (10) days following the giving of such notice, the party giving such notice shall have the right to immediately terminate this Agreement.

c. Effects of Termination. Upon Termination of this Agreement, as hereinabove provided, neither party shall have any further obligations hereunder except for (1) obligations accruing prior to the date of termination, and (2) obligations, promises, or covenants contained herein that extend beyond the term of this Agreement, including, without limitation, confidentiality of patient information.

3. MISCELLANEOUS

a. No Discrimination. Hospital and Facility shall comply with all applicable federal and state anti-discrimination statutes, rules, and regulations. Hospital shall not exclude a person from patient care on the basis of arbitrary, capricious, or unreasonable discrimination because of race, religion, national origin, age, sex, physical condition, economic status, or existence or non-existence of Advance Directives.

b. Ability to Pay. The transport or receipt of Individuals in need of emergency care shall not be based on the Individual's inability to pay for the services rendered by the Hospital.

2

Figure 7-3 Typical Documents - Hospital

c. Freedom of Choice. Under no circumstances shall this Agreement constitute a direct or an indirect referral arrangement between the parties. Hospital and Facility expressly recognize that all Individuals transported or proposed to be transported pursuant to this Agreement have the right to request transfer into the care of a physician and healthcare facility of the Individual's choosing for medical care and treatment.

d. Mandated Providers. Hospital shall comply with the requirements of the Indigent Health Care and Treatment Act relating to the transfer of Individuals to mandated providers.

e. Entire Agreement. This Agreement constitutes the sole and only agreement of the parties hereto and supersedes and cancels any prior understanding or written or oral agreements between the parties respecting the subject matter herein.

f. Governing Law; Venue. The terms of this Agreement shall be construed and governed by the laws and regulations of the State of Texas and the United States of America. The parties agree that venue of all disputes, claims and lawsuits arising hereunder shall lie in Travis County, Texas.

g. Amendment and Assignment. Neither party may assign this Agreement without the prior written consent of the other. This Agreement may be amended only by mutual agreement reduced to writing and signed by both parties.

h. Notices. Notices under this Agreement shall be hand-delivered or mailed by certified mail to the addresses set forth below.

IN WITNESS WHEREOF, the parties have executed this Agreement in multiple originals as of the Effective Date.

University of Texas Nuclear Engineering Teaching Laboratory facility, J.J. Pickle Research Campus
By: _____
Name: Stephen Monti
Title: Executive VP & Provost

Address: UT Austin
Austin, TX 78712

Attn: _____

DAUGHTERS OF CHARITY HEALTH SERVICES OF AUSTIN, d/b/a Brackenridge Hospital
By: _____
Name: JOHN C. BRINDLEY
Title: PRESIDENT/CEO AUSTIN HOSPITALS

Address: 1201 W. 38th St.
Austin, Texas 78705
Attn: Chief Operating Officer

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Figure 7-4 Typical Documents - Hospital

AMENDMENT NO. 1 TO AGREEMENT TO PROVIDE TREATMENT

THIS AMENDMENT NO. 1 ("Amendment") is made effective October 1, 2002 ("Effective Date") by and between the Daughters of Charity Health Services of Austin d/b/a Seton Healthcare Network ("Seton") located in Austin, Texas, and the University of Texas Nuclear Engineering Teaching Laboratory Facility, J.J. Pickle Research Campus, Austin, Texas (the "Facility").

Whereas, the parties entered into an Agreement to Provide Treatment ("Agreement"), dated January 1, 1997; and

Whereas, the parties desire to reconfirm the effectiveness of the Agreement, and to expand the definition of "Hospital" under the Agreement;

NOW THEREFORE, for and in consideration of the mutual covenants set forth herein, the parties hereto agree as follows:

1. **Confirmation of Effectiveness.** The parties acknowledge that Section 2(a) of the Agreement states that the Agreement remains in effective until terminated. Each party confirms that the Agreement has not been terminated and is still effective as of the Effective Date of this Amendment.

2. **Expansion of Scope.** The parties agree that scope of the term "Hospital," as used in the Agreement, shall be expanded to include the following Austin-based Seton acute care hospital facilities: Brackenridge Hospital, Seton Medical Center & Seton Northwest Hospital.

3. **Other Terms.** All other terms of the Agreement not amended herein shall remain in full force and effect.

IN WITNESS WHEREOF, the parties have executed this Amendment No. 1 as of the Effective Date.

University of Texas Nuclear Engineering Teaching Laboratory Facility, J.J. Pickle Research Campus

By: _____
Name: Stephen A. Monti
Title: Executive Vice Provost

Daughters of Charity Health Services of Austin d/b/a Seton Healthcare Network

_____
Patricia Hayes, Interim President & CEO

Figure 7-5 Typical Documents - Hospital