PRELIMINARY

EMERGENCY PREPAREDNESS EVALUATION REPORT

BY THE

DIVISION OF EMERGENCY PREPAREDNESS

AND ENGINEERING RESPONSE

OFFICE OF INSPECTION AND ENFORCEMENT

U.S. NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF

THE UNIVERSITY OF MICHIGAN

MICHIGAN MEMORIAL-PHOENIX PROJECT

FORD NUCLEAR REACTOR

LICENSE NO. R-28

DOCKET NO. 50-002

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INTRODUCTION

The University of Michigan filed with the Nuclear Regulatory Commission, by letter dated July 29, 1982, its "Emergency Plan for the Ford Nuclear Reactor (FNR)," dated September 1975, and amended February 6, 1981.

The plan was reviewed against the requirements of 10 CFR Part 50, Appendix E. In addition, the staff review extended to ascertaining the degree of conformance with the guidance criteria set forth in proposed Revision 1 to Regulatory Guide 2.6, "Emergency Planning for Research and Test Reactors," March 1982, which endorses American National Standard ANSI/ANS-15.16-1982, "Emergency Planning for Research Reactors."[1] This standard was developed as a parallel effort by the American Nuclear Society Subcommittee ANS-15 and the NRC staff to provide guidance for research and test reactor licensees and applicants to use in developing radiological emergency plans and upgrading emergency preparedness at their facilities.

This evaluation report follows the format of Section 3 of ANSI/ANS-15.16-1982 in that each of the planning standards is quoted and followed by (1) an evaluation of the applicable portions of the plan and (2) the findings that relate to that specific planning standard.[2]

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[1]American National Standard for Emergency Planning for Research Reactors, ANSI/ANS-15.16-1982, American Nuclear Society, La Grange Park, ILL.

[2]The planning standards are extracted from American National Standard ANSI/ANS 15.16-1982, with permission of the publisher, the American Nuclear Society.

EVALUATION OF CONTENT OF EMERGENCY PLAN

1.0 Introduction

PLANNING STANDARD

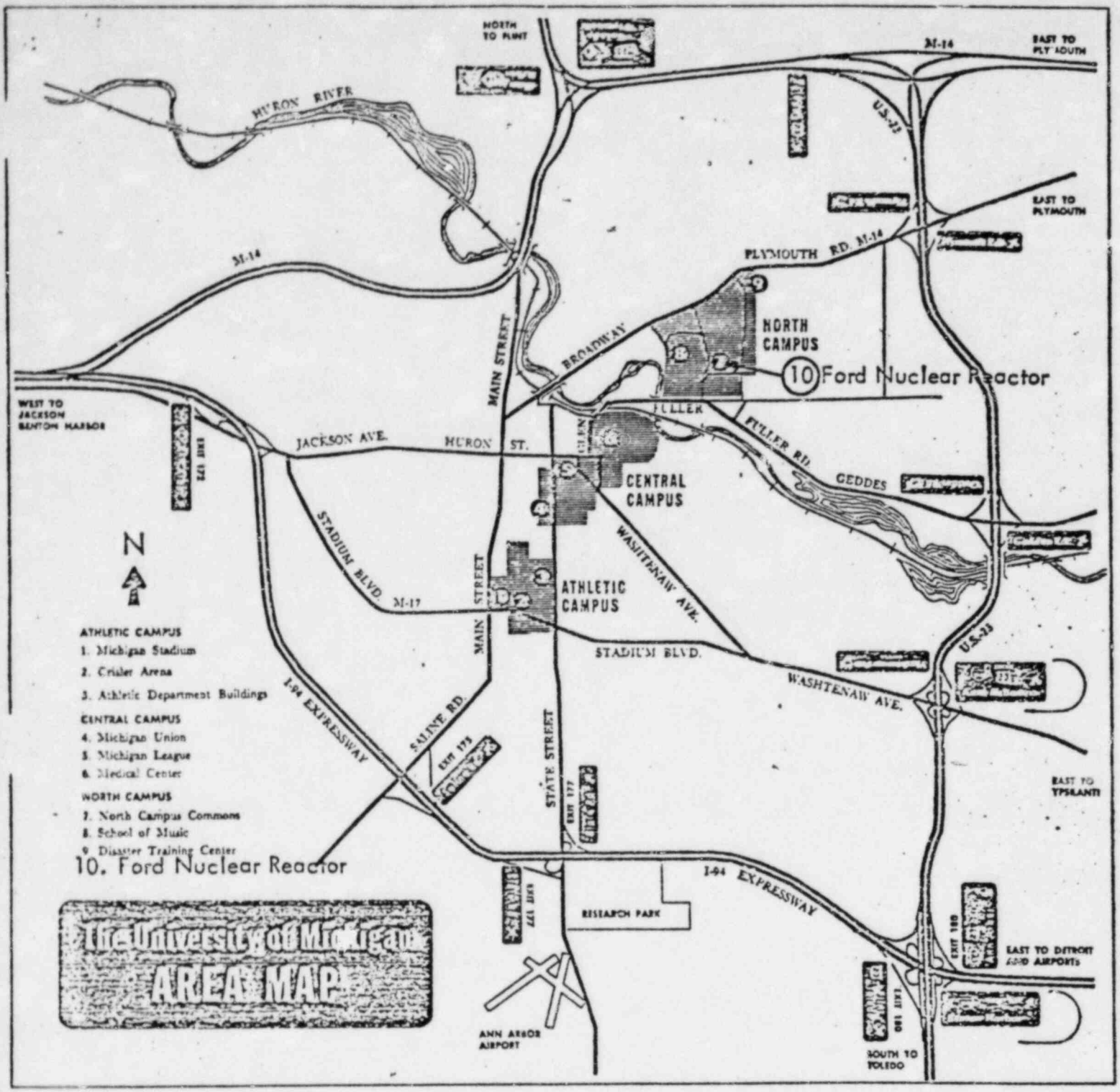
The plan shall briefly introduce the type of reactor, the reactor's purpose, where it is located, and the purposes of the emergency plan.

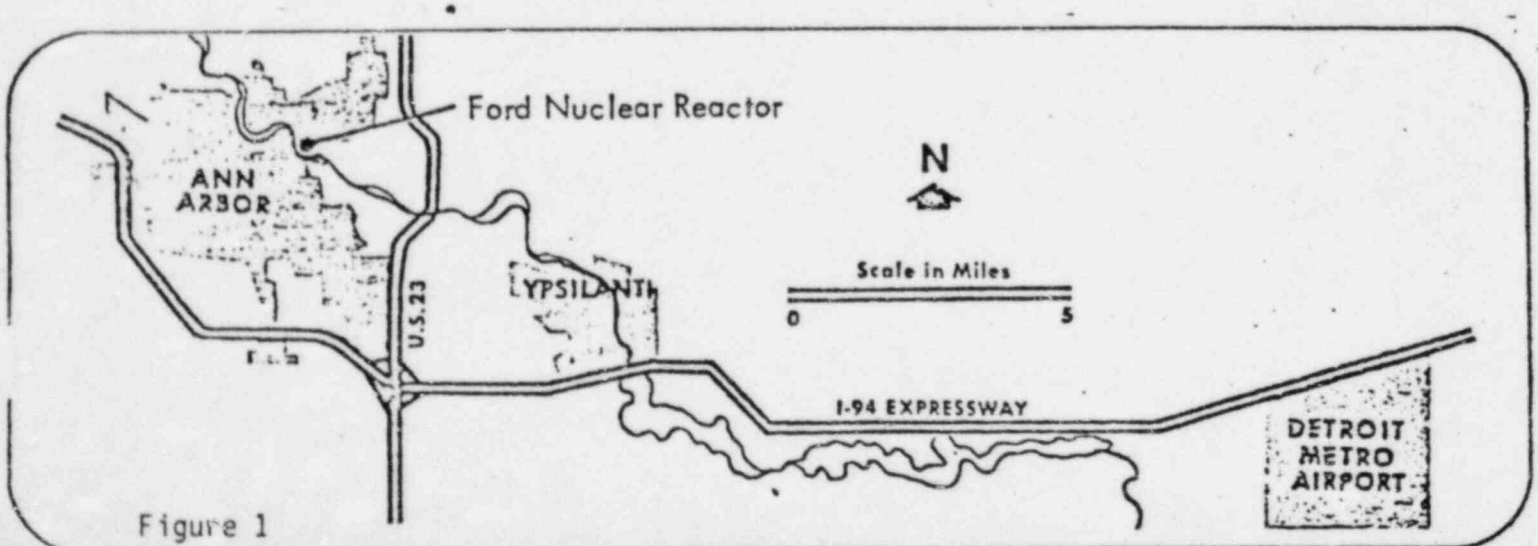
The purpose of the introduction is to provide a general orientation and common understanding about the reactor and the objective of the plan for those members of the reactor organization, the public, and local and federal agencies that will read and study the plan.

EVALUATION

The purposes of the emergency plan are described in section 1 "scope" of the plan. The plan is established to provide guidance for the emergency director in handling emergencies and establish procedures for coping with emergencies that require evacuation of the reactor building. The plan states in section 1.2 "Emergency Plan Basis" that a description of the facility is contained in a report, (MM-PP 75-1), dated November 27, 1953, to the Atomic Energy Commission.

Appendix 1 to the plan contains drawings that provide information on facility location, access routes, and floor plans for the Phoenix Memorial Laboratory (PML) and the Ford Nuclear Reactor (FNR) buildings. These drawings are included in this report as Figures 1, 2, and 3.


NORTH TO FLINT
M-14
EAST TO PLYMOUTH
HURON RIVER
U.S.-23
EAST TO PLYMOUTH
PLYMOUTH RD. M-14
M-14
MAIN STREET
BROADWAY
NORTH CAMPUS
10 Ford Nuclear Reactor
WEST TO JACKSON BENTON HARBOR
FULLER
FULLER RD.
JACKSON AVE.
HURON ST.
CENTRAL CAMPUS
GEDDES
STADIUM BLVD.
M-17
WASHTENAW AVE.
ATHLETIC CAMPUS
MAIN STREET
STADIUM BLVD.
U.S.-23
WASHTENAW AVE.
I-94 EXPRESSWAY
SALINE RD.
STATE STREET
EAST TO YPSILANTI
I-94 EXPRESSWAY
RESEARCH PARK
EAST TO DETROIT AIRPORTS
ANN ARBOR AIRPORT
SOUTH TO TOLEDO
N
ATHLETIC CAMPUS
1. Michigan Stadium
2. Crisler Arena
3. Athletic Department Buildings
CENTRAL CAMPUS
4. Michigan Union
5. Michigan League
6. Medical Center
NORTH CAMPUS
7. North Campus Commons
8. School of Music
9. Disaster Training Center
10. Ford Nuclear Reactor
The University of Michigan
AREA MAP


Ford Nuclear Reactor
ANN ARBOR
YPSILANTI
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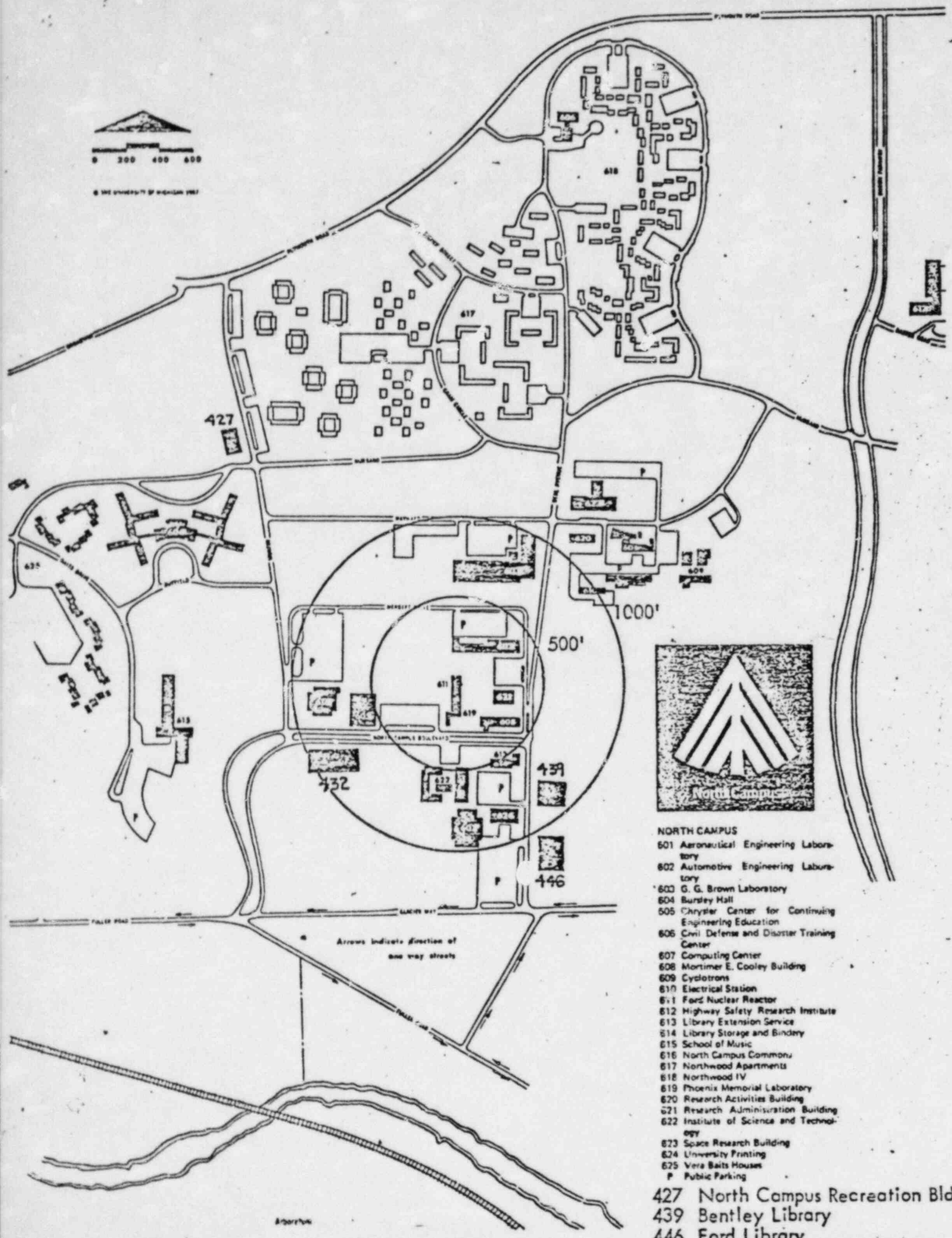
Scale in Miles
0
5
I-94 EXPRESSWAY
DETROIT METRO AIRPORT

Figure 1

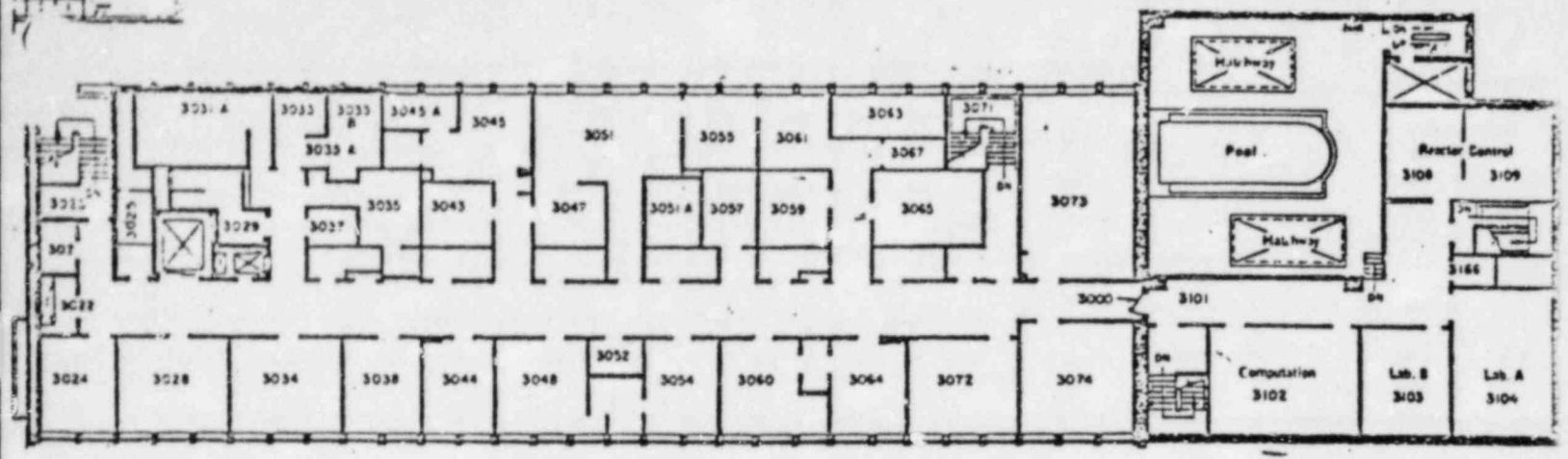


NORTH CAMPUS

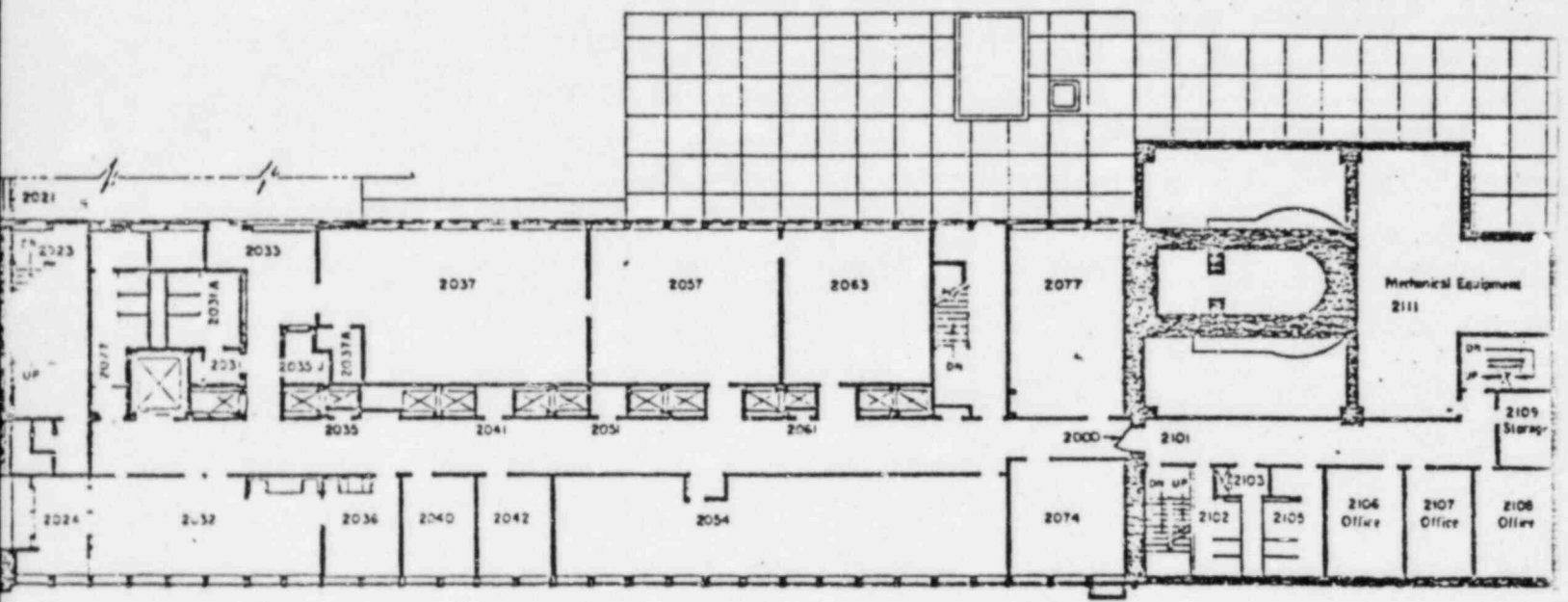
601 Aeronautical Engineering Laboratory
602 Automotive Engineering Laboratory
603 G. G. Brown Laboratory
604 Bursley Hall
605 Chrysler Center for Continuing Engineering Education
606 Civil Defense and Disaster Training Center
607 Computing Center
608 Mortimer E. Cooley Building
609 Cyclotrons
610 Electrical Station
611 Ford Nuclear Reactor
612 Highway Safety Research Institute
613 Library Extension Service
614 Library Storage and Bindery
615 School of Music
616 North Campus Commons
617 Northwood Apartments
618 Northwood IV
619 Phoenix Memorial Laboratory
620 Research Activities Building
621 Research Administration Building
622 Institute of Science and Technology
623 Space Research Building
624 University Printing
625 Vera Baits Houses
P Public Parking

427 North Campus Recreation Bldg.
439 Bentley Library
446 Ford Library
432 Art and Architecture Building

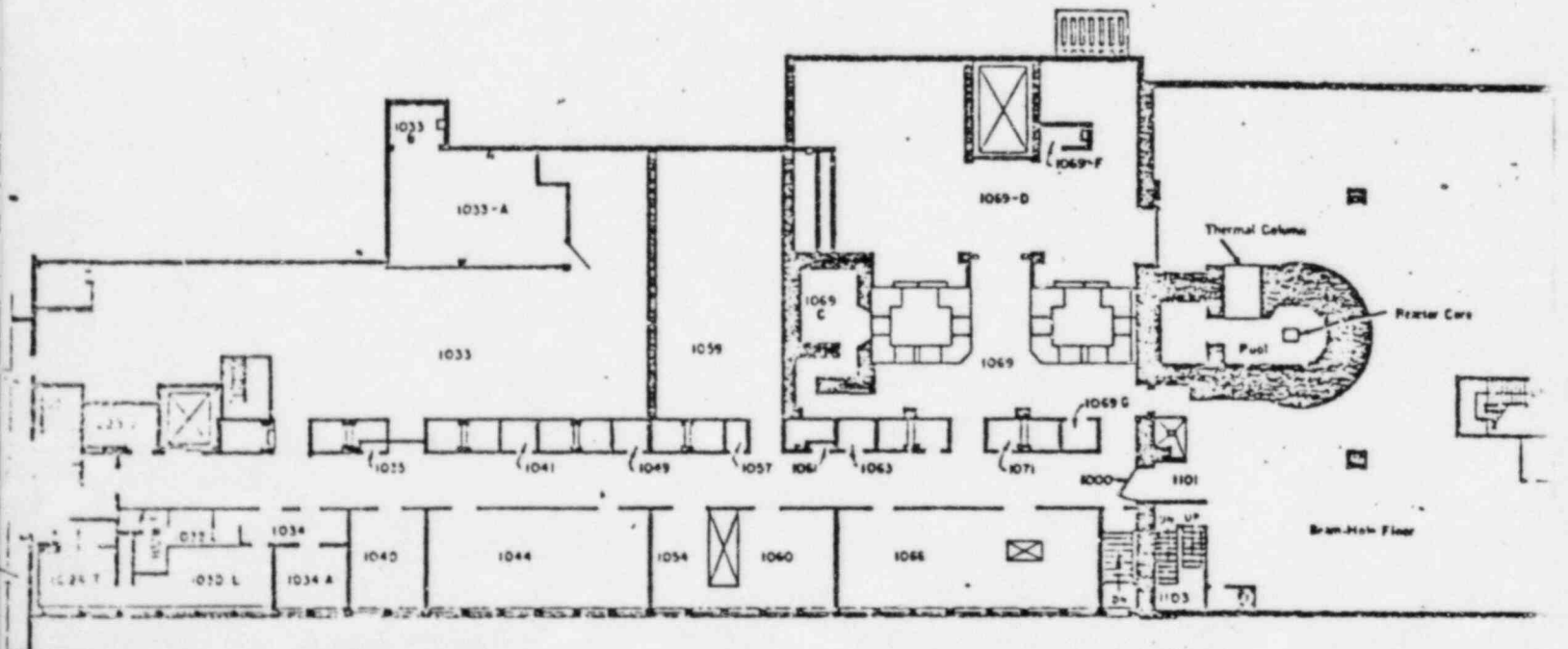
Figure 2



Third-Floor Plan



Second-Floor Plan



First-Floor Plan

Figure 3

FINDINGS

This portion of the plan fails to meet the intent or satisfy the planning standard for the following reasons:

1. The plan does not contain an introduction to the plan.

2. The plan fails to provide a description of the reactor and associated facilities, e.g., fuel type, authorized power level, etc..

3. The reactor's major purpose, e.g., functions and utilization are not described in the plan.

This portion of the plan should include an introduction with sufficient information to provide a general orientation and common understanding about the reactor and associated facilities and the objective of the plan. Additional information and more specificity is needed in the above defined areas to meet the planning standard and a finding of acceptability.

2.0 Definitions

PLANNING STANDARD

Terms unique to the reactor facility or that have a special meaning when used in the plan shall be defined in the plan.

EVALUATION

The plan does not address this planning standard. A definition of words or phrases specific or unique to the plan or the reactor and associated facilities is not included in the plan.

FINDINGS

The licensee should address the planning standard or justify its omission. This portion of the plan needs additional information. This portion of the plan is not adequate.

3.0 Organization and Responsibilities

PLANNING STANDARD

The plan shall describe the emergency organization that would be activated to cope with radiological emergencies. This includes the onsite emergency organization and any augmentation from offsite groups. Persons or groups that will fill positions in the emergency organization should be identified by their normal everyday title. This organizational description shall include as appropriate:

a) The authority and responsibility of each governmental agency (local, county, state, or all three) having radiological emergency responsibilities for emergency preparedness planning, and for emergency response. Agreements with these agencies shall be confirmed in writing where appropriate or governmental agencies' radiological emergency response plans may be referenced to the extent that they apply to the facility.

(2) The reactor's emergency organization, including augmentation of the reactor staff to provide assistance for coping with the emergency situation, recovery from the emergency, and maintaining emergency preparedness.

(3) The arrangements and agreements, confirmed in writing with local support organizations to augment and extend the capability of the facility's emergency organization.

(4) A block diagram that illustrates the interrelationship of the facility emergency organization to the total emergency response effort. Interfaces between reactor and other onsite emergency organization groups and offsite local support organizations and agencies shall be specified.

(5) The capability of the emergency organization to function around-the-clock for a protracted period of time following the initiation of emergencies that have or could have radiological consequence requiring around-the-clock emergency response.

(6) The identification by title of the person in charge of directing emergency operations, the line of succession, his responsibilities and authorities, and specifying those responsibilities which cannot be delegated, such as notification and protective action decisions.

(7) The identification by title of the person in charge of coordinating emergency preparedness, including responsibility and authority for emergency preparedness planning, updating emergency plans and procedures, and coordinating plans with other applicable organizations.

(8) The identification by title of the individual, with a line of succession, responsible for relating information about the emergency situation to the news media and the public.

(9) The identification by title of the individual, with a line of succession, in charge of radiological assessments including his responsibilities and authority for onsite and offsite dose assessments and recommended protective actions.

(10) The identification by title of the individual authorized to terminate an emergency and initiate recovery actions and be responsible for informing the emergency organization of planned organizational actions or changes.

(11) The identification by title of the individual in charge of recovery operations, and the structure of the recovery organization.

(12) The identification of the positions in the emergency organization and the associated responsibilities and authorities to authorize volunteer emergency workers to incur radiation exposures in excess of normal occupational limits.

EVALUATION

The plan identifies several support organizations that will augment the emergency organization. The assistance and support services provided by these organizations include fire fighting and rescue, medical aid for injured personnel, and police protection to include traffic control and evacuation of buildings in the vicinity of the reactor if requested by the emergency director. The individual who will assume the position of emergency director is identified from a listing in section 3.1 of the plan.

The emergency director is responsible for providing information to the office of the Governor of the State of Michigan and the Michigan Department of Public Health. The Governor's Office is responsible for issuing news releases for class A and B emergencies. News releases for class C emergencies will be made by the Michigan Department of Public Health. These emergency classes are discussed in section 4.0 of the report. The emergency director will supervise emergency actions and will delegate duties and responsibilities in carrying out the provisions of the emergency plan. Staff emergency assignments are briefly described in section 3.2 of the plan. The staff is described as the reactor operator on duty, director of radiation control services, FNR health physicist, FNR-PML staff and members of the radiation control services. The plan in section 3.1 states the FNR-PML employees will assist the emergency director as directed.

FINDINGS

This portion of the plan does not fully satisfy the planning standard for the following reasons:

1. The identification by title of the person in charge of directing emergency operations is not described in the plan. The plan states only that the uppermost person identified in section 3.1 of the plan will be the emergency director. The plan fails to identify a line of succession for the emergency director. Although the listing in section 3.1 could be constructed as a line of succession, the listing is not identified for this purpose. The authorities of the emergency director are not described. The plan fails to specify those responsibilities which cannot be delegated.

2. The identification by title of the person in charge of coordinating emergency preparedness, including responsibility and authority for emergency planning, updating the emergency plan and procedures, and coordinating plans with support groups or organizations that will augment the facility's emergency organization is not described.

3. The plan does not contain a block diagram that illustrates the interrelationship of the facility emergency organization to the total emergency response effort. The block diagram should specify the interfaces between the facility emergency organization and other onsite emergency organization groups and offsite support agencies.

4. The plan does not identify by title the individual authorized to terminate an emergency and initiate recovery actions. Section 10.1 of the plan states that facility reentry and recovery procedures will be planned by the emergency director, director of radiation control services, FNR-PML staff members, and NRC and state advisors on the scene. Facility reentry must be approved by the Michigan Department of Public Health. The plan fails to state who will be in charge of the operations or provide a line of succession in his absence.

5. The plan does not identify by title the individual, with a line of sucession, in charge of radiological assessments including his responsibilities and authority for onsite and offsite dose assessments and recommended protective actions. It does appear that these actions are the responsibility of health physics; however, they are not clearly or specifically addressed in the plan.

Additional information and more specificity is needed in the above defined areas to meet the planning standard and a finding of acceptability. This portion of the plan is not adequate.

4.0 Emergency Classification System

Planning Standard

The emergency plan shall describe several classes of emergency situations covering the spectrum of emergency conditions that involve the alerting or activating of progressively larger segments of the emergency organization. To provide for improved communications between the licensee, federal, state, and local agencies and organizations, the most severe accidents are standardized in four classes of emergency conditions which group the accidents according to the severity of offsite radiological consequences. Each emergency plan shall include only those standard classes appropriate for dealing with accident consequences determined to be credible for the specific facility. Most research reactors have potential emergency situations which may occur (e.g., personnel injury with contamination, fire, etc.) that have less severe offsite consequences than the least severe standard class, notification of unusual events. For some research reactors, no credible accidents are postulated which result in consequences matching the least severe class. However, planning for onsite emergencies is important. Preparedness for these onsite emergencies should be accomplished by identifying them and including in the plan those elements of this standard commensurate with the postulated emergency situations.

Each class of emergency shall be associated with particular emergency action levels and with particular immediate actions to provide appropriate graded response. In order of increasing severity, the four standard emergency classes are: notification of unusual events, alert, site area emergency, and general emergency.

EVALUATION

The plan contains "EMERGENCY PROCEDURES" in section 4 of the plan and states that the actions required by these procedures follow actions taken by the reactor operations staff in accordance with Operating Procedures 101, "Reactor Building Emergency." These procedures, among other things, directs the user to evaluate the magnitude of the radiation emergency utilizing the guidelines of "EVALUATION" in section 5 of the plan and take appropriate action. Section 5 includes a Table for classifying the emergency as an A, B or C incident. Section 6 of

the plan "Notification" states that in the event of a reactor emergency, notification of individuals and organizations is performed by the University's department of safety and the emergency director or his designated representative. The department of safety is notified by telephone (123) or by an automatic radiation, fire, and intrusion alarm system. The notification responsibilities assigned to the department of safety are described in Appendix 2 to the plan. The notification format is provided in section 6.2 of the plan.

Findings

The plan does not contain or describe an emergency classification system that is consistent with the planning standard.

The licensee should describe an emergency classification system that includes, as appropriate, the standard classes described in section 3.4 and subsections thereof, of ANSI/ANS-15.16-1982. In addition, the licensee should identify and plan for emergency situations which may occur that are less severe than the least severe standard class. Each emergency class should be associated with emergency action levels which will be used as thresholds for determining the emergency class and initiating emergency actions.

This portion of the plan is not acceptable.

5.0 Emergency Action Levels

PLANNING STANDARD

Because of the wide diversity in research reactor (power level, engineered safety features, site environment, etc.), those conditions which might initiate or signal a radiological incident having particular offsite consequences will vary widely among facilities. Action levels may be specified for effluent monitors or other plant parameters for which the dose rates and radiological effluent releases at the site boundary can be projected.

To establish effluent action levels, facilities that have meteorological information available may base the action levels on actual meteorological conditions; otherwise the criteria to be used for downwind concentration should be taken from Section 4, "Criteria for Downwind Concentration" of American National Standard for Research Reactor Site Evaluation, ANSI/ANS-15.7-1977.[3] Each emergency plan should establish emergency action levels appropriate for the specific facility and consistent with Table 1.

The emergency plan shall include emergency action levels to initiate protective actions for members of the general public onsite. The protective action guide shall be 1 rem whole body or 5 rem thyroid.

EVALUATION

The plan contains an "Evaluation" procedure in section 5. The procedure describes radiation levels and readings from the PML stack 2 airborne particulate monitor (MAPP) that will be used to initiate emergency measures. The procedure includes a Table (Rev/76) for classifying the emergency as an A, B or C incident and specificies that the 1000 feet perimeter around the reactor is the site boundary for incident classification and evaluation.

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[3]American National Standard for Research Reactor Site Evaluation, ANSI/ANS 15.7-1977. American Nuclear Society, La Grange Park, ILL.

FINDINGS

The plan does not contain or describe Emergency Action Levels (EALs) that are consistent with the planning standard and Table I of ANSI/ANS-15.16-1982. EALs should be specified for each emergency class that will be used to signal a radiological incident or other emergency situations and initiate emergency response actions. The minimum projected public radiation dose or the dose rates specified in the evaluation table in section 5 of the plan are not consistent with the Protective Action Guides (PAGs) of 1 rem whole body or 5 rem thyroid (see section 3.5 of ANSI/ANS-15.16-1982). The licensee should be more specific when referencing readings from instruments that will be used to initiate emergency response actions. Action levels should be specified for effluent monitors or other plant parameters for which the dose rates and radiological effluent releases at the site boundary can be projected.

This portion of the plan needs additional information for clarification. The plan should describe specific instrument readings and observations or other plant parameters that will be used as thresholds for establishing emergency classes and initiating emergency measures. This portion of the plan is not adequate.

6.0 Emergency Planning Zones

PLANNING STANDARD

As part of emergency planning, the reactor owner/operator of a facility that identifies radiological emergencies which result in offsite plume exposures exceeding 1 rem whole-body or 5 rem thyroid shall identify an emergency planning zone (EPZ).

The postulated radioactive releases from credible accidents provide the basis for determining the need for an EPZ. The size of the EPZ should be established such that the dose to individuals beyond the EPZ is not projected to exceed the PAG. As an alternative to performing such calculations, the EPZ sizes in Table 2 of ANSI/ANS-15.16-1982 may be adopted according to the power level.

EVALUATION

The plan does not specifically address or describe an Emergency Planning Zone (EPZ) for the FNR facility. The plan, in section 5.3 does establish a 1000 feet perimeter around the FNR facility (see Figue 2) as the site boundary for incident classification and evacuation.

FINDINGS

This portion of the plan needs additional information for clarification and a finding of acceptability. This portion of the plan is not adequate.

7.0 Emergency Response

PLANNING STANDARD

Emergency response measures shall be identified for each emergency. These response measures should be related to the emergency class and action levels that specify what measures are to be implemented.

EVALUATION

The plan briefly describes items and areas that are related to emergency response. These items and areas are generally distributed throughout the plan and cover (1) provisions for the maintenance of exposure records for onsite and offsite personnel who enter the facility, (2) emergency notification rosters for notifying emergency personnel and support agencies, (3) emergency exposure levels for life saving activities and taking protective actions, (4) emergency supplies, i.e., protective clothing, respiratory equipment, and dosimeters for emergency workers, and (5) monitoring for contamination and radiation dose rates.

FINDINGS

This portion of the plan needs additional information. The plan does not specifically address the planning standard. Emergency response measures related to action levels that specify the response measures to be implemented for each emergency class are not described in the plan. The plan should include emergency response measures for each emergency class. These response measures should address (1) activation of the emergency organization, (2) assessment action, (3) corrective actions and (4) protective actions.

The licensee should refer to section 3.7 and subsections thereof, of ANSI/ANS-15.16-1982 for definitive guidance in addressing the above defined emergency response measures. This portion of the plan is not adequate.

8.0 Emergency Facilities and Equipment

PLANNING STANDARD

The emergency plan shall briefly describe the emergency facilities, types of equipment and their location.

EVALUATION

The plan identifies medical facilities, ambulance services, emergency supplies, portable survey instruments and dosimeters, and facilities for personnel decontamination. The plan establishes a command post in the lobby of the PML and references a drawer in the watchman's desk for the FNR emergency plan, emergency logbook, and the key to the film badge drawer.

The University Hospital is identified as the hospital that will provide medical facilities and care for injured personnel with or without radiological complications. The hospital's "Medical Emergency Plan for Radioactive Contamination Accidents" is included as Appendix 4 to the plan.

The plan states in section 7.3 that transportation of injured and contaminated injured personnel can be provided by the Fontana-Taylor Ambulance Service (994-4111).

The general contents of the emergency closet defined as room 2051 in section 9 of the plan, are listed in Appendix 5 to the plan.

FINDINGS

This portion of the plan does not fully satisfy the planning standard for the following reasons:

1. Although the emergency procedures in section 4 of the plan establishes a commond post in the lobby of the PML, the plan does not clearly designate this location as the Emergency Support Center (ESC) from which emergency control directions will be given.

2. The monitoring systems and laboratory facilities that are to be used for accident assessment are not adequately described in the plan. Non-radiological monitors, e.g., fire detector, or other process monitors that provide pertinent facility system information are not described or discussed in the plan.

3. Although the plan states that the Fontana-Taylor Ambulance Service can provide transportation of injured or contaminated injured personnel, there is no agreement in the plan that these services will be provided and are available at all times .

4. The plan does not adequately describe the communications system that would be used for emergency communications. The plan does not describe the means or methods used to notify onsite personnel of an emergency.

This portion of the plan needs additional information that addresse the planning standard in section 3.8 and subsections thereof, of ANIS/ANS-15.16-1982. This portion of the plan is not adequate.

9.0 Recovery

PLANNING STANDARD

This element of the emergency plan shall describe the criteria for restoring the reactor facility to a safe status including reentry into the reactor building or portions of the facility that may have been evacuated because of the accident. The operations to recover from the most severe accidents will be complex and depend on the actual conditions at the facility. It is not practicable to plan detailed recovery actions for all conceivable situations.

EVALUATION

The reentry and recovery operations are discussed in section 10 of the plan. Facility reentry and recovery procedures will be planned by the emergency director, director radiation control services, FNR-PML staff members, and NRC and state advisors on the scene. Facility reentry must be approved by the Michigan Department of Public Health.

The plan describes the reentry requirements for personnel protection and establishes guidelines for exposures to radfation for live-saving-actions and less urgent actions, e.g., isolation of equipment and radiation sources and controlling fires or flooding. The exposure guidelines are 100 rem whole body for life saving and 25 rem for corrective actions. Individuals performing these planned actions will be volunteers that are familiar with the consequences of the projected radiation exposures.

The plan describes the criteria for determining when the emergency phase is over and states that any additional entrances into hazardous areas must be approved by the emergency director.

FINDINGS

The plan satisfies the planning standard except as noted. It is not clear if the emergency director has the authority to authorize reentry for rescue of injured personnel or taking corrective actions to mitigate the consequences of the accident without prior approval of the Michigan Department of Public Health. This portion of the plan needs additional information for clarification of the authorities and responsibilities of the individual in charge of recovery operations.

10.0 Maintaining Emergency Preparedness

PLANNING STANDARD

The emergency plan shall describe the elements necessary for maintaining an acceptable state of emergency preparedness. A description shall be provided of how the effectiveness of the emergency plan will be maintained, including training, review and update of the emergency plan and associated implementing procedures, and maintenance and inventory of equipment and supplies that would be used in emergencies.

EVALUATION

The plan discusses the training programs and provisions for review and update of the emergency plan and procedures. The FNR-PML staff receive annual requalification training in emergency and abnormal procedures including reactor building emergencies. Provisions have been made for an annual review of the emergency plan and revisions will be approved by the manager of the FNR, FNR safety service committee, and the Michigan Department of Public Health. The plan provides for the forwarding of applicable portions of the plan and agreements to authorized agencies and support organizations. Site specific training programs have been established for police, security, firefighting and ambulance personnel. Medical and communication drills for medical personnel are described in section XVII of the "Medical Emergency Plan" for the University of Michigan's hospital. The hospital's emergency plan is included as Appendix 4 to the plan.

FINDINGS

The plan satifies the planning standard except as noted. The plan should describe the provisions to ensure the operational readiness of emergency equipment and supplies including required maintenance and calibrations, testing and inventory. The licensee should refer to section 3.10 and subsections thereof, of ANSI/ANS-15.16-1982 for definitive guidance in addressing the planning standard. This portion of the plan needs additional information for clarification and a finding of acceptability.