C-E Power Systems
Combustion Engineering, Inc.
Route 21-A
Hematite, Missouri 63047

INSPECTION AND ENFORCEMENT

Tel. 314/937-4691
314/296-5640

70-36

RECEIVED

NIS/78/525

POWER SYSTEMS

1978 MAY 1 PM 3 44

U.S. NUCLEAR REG. COMMISSION
NMSS MAIL SECTION

April 27, 1978

Mr. L. C. Rouse
Chief, Fuel Processing & Fabrication Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

License No. SNM-33
Docket No. 70-36

Dear Mr. Rouse:

Enclosed is a copy of C-E Hematite's Emergency Plan, containing the elements required by 10 CFR 50, Appendix E. An additional nine copies are being mailed under separate cover.

Very truly yours,

COMBUSTION ENGINEERING, INC.

H. E. Eskridge

H. E. Eskridge
Supervisor, Nuclear Licensing,
Safety and Accountability

/wg
Enclosure

DOCKETED USNRC
SEP 1 1978
NMSS MAIL SECTION DOCKET CLERK

FEE EXEMPT
MH 8/31/78 memo

OCT 1 0 1978

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 6
FOIA-2004-0234

02237

N-1

EMERGENCY PLAN

COMBUSTION ENGINEERING, INC.
Hematite, Missouri

09237

License No. SNM-33
Docket No. 70-36

April 1978

EMERGENCY PLAN

TABLE OF CONTENTS

Section No.		Page No.
1	INTRODUCTION	1-1
2	DEFINITIONS	2-1
3	SCOPE AND APPLICABILITY	3-1
4	EMERGENCY CONDITIONS	4-1
	4.1 Personnel Emergency	4-2
	4.2 Emergency Alert	4-3
	4.3 Plant Emergency	4-4
	4.4 Site Emergency	4-6
	4.5 General Emergency	4-7
5	ORGANIZATIONAL CONTROL OF EMERGENCIES	5-1
	5.1 Normal Plant Operations	5-1
	5.2 Onsite Emergency Organization	5-2
	5.3 Augumentation of Onsite Emergency Organization	5-7
	5.4 Coordination with Participating Government Agencies	5-9
6	EMERGENCY MEASURES	6-1
	6.1 Personnel Emergency	6-1
	6.2 Emergency Alert	6-2
	6.3 Plant Emergency	6-3
	6.4 Site Emergency	6-5
7	EMERGENCY FACILITIES AND EQUIPMENT	7-1
	7.1 Emergency Control Center	7-1
	7.2 Communications Systems	7-1
	7.3 Assessment Facilities	7-1
	7.4 Protective Facilities and Equipment	7-4
	7.5 First Aid and Medical Facilities	7-5
	7.6 Damage Control Equipment and Supplies	7-5

TABLE OF CONTENTS

Section No.		Page No.
8	MAINTAINING EMERGENCY PREPAREDNESS	8-1
	8.1 Organizational Preparedness	8-1
	8.2 Review and Updating of the Plan and Procedures	8-3
	8.3 Emergency Equipment and Supplies	8-4
9	RECOVERY	9-1
	APPENDIX A	
	APPENDIX B	
	APPENDIX C	
	APPENDIX D	
	APPENDIX E	

1. INTRODUCTION

Although all known possibilities of a serious accident have been eliminated or reduced to an acceptably low level, it is prudent to plan and prepare in detail for coping effectively with all emergency conditions which may arise, however unlikely their occurrence may appear.

It is essential that emergency plans identify:

- Potential sources for a serious radiation accident,
- Capabilities available from within the Company for coping with accidents,
- Capabilities readily available from nearby support and service organizations.

Human error and process failures, among other circumstances, can lead to spills of radioactive material, fire, or criticality--all of which can potentially lead to or result in human radiation exposure.

The purpose of the Emergency Plan is to provide a basis for procedures for a coordinated effort to cope with: nuclear criticality, fire, radiological accidents, explosions, potential major hazards, civil disorders, major accidents and severe weather conditions which seriously affect the Hematite site, adjacent property or which require total plant capability.

Saving human lives, and preventing or lessening personal injury are the major considerations during any emergency situation. It is also important, subsequently, to minimize property damage and to determine the cause and effect of an emergency.

1. INTRODUCTION (continued)

Proper action quickly and correctly taken during an emergency situation:

- Can minimize confusion, personnel exposures or injury, and property damage associated with a serious accident
- Will aid in an earlier return to normal working conditions
- Can prevent a relatively minor incident from escalating into a serious accident
- Will enhance the effectiveness of mitigatory action that may be taken as a result of an intake of radioactive material.

2. DEFINITIONS

Assessment actions - those actions taken during or after an accident to obtain and process information that is necessary to make decisions to implement specific emergency measures.

Corrective actions - those emergency measures taken to ameliorate or terminate an emergency situation at or near the source of the problem in order to prevent an uncontrolled release of radioactive material or to reduce the magnitude of a release, e.g., shutting down equipment, firefighting, repair and damage control.

Drills - a strictly supervised repetitive instruction period aimed at perfecting facility and skill in a particular operation. A drill is often a component of an exercise.

Emergency - any (potential or actual) situation which could result in a major disruption of normal operations at the Hematite site. It includes fires, nuclear accidents, severe weather conditions, structural collapses, mechanical and electrical failure and other similar type incidents involving injury of personnel and/or loss of property.

Emergency action levels - radiological dose rates; specific contamination levels of airborne, waterborne, or surface deposited concentrations of radioactive materials; or specific instrument indications (including their rates of change) that may be used as thresholds for initiating such specific emergency measures as designating a particular class of emergency, initiating a notification procedure, or initiating a particular protective action.

2. DEFINITIONS (continued)

Exercise - an event that tests a major portion of the basic elements within an Emergency Prepardness Plan/Organization. This event should demonstrate the capability of the emergency preparedness organization to cope with a radiological emergency that could result in offsite consequences.

Population at risk - those persons for whom protective actions are being or would be taken.

Protective Action Guides (PAGs)- projected radiological doses or dose commitment values to individuals in the general population that warrant protective action following a release of radioactive material. Protective actions would be warranted provided the reduction in individual dose expected to be achieved by carrying out the protective action is not offset by excessive risks to individual safety in taking the protective action. The PAG does not include the dose that has already occurred prior to the assessment.

Protective actions - those emergency measures taken after an uncontrolled release of radioactive material has occurred for the purpose of preventing or minimizing radiological exposures to persons that would be likely to develop if the actions were not taken.

Recovery actions - those actions taken after the emergency to restore the plant or facility as nearly as possible to its preemergency condition.

3. SCOPE AND APPLICABILITY

This emergency plan applies to Combustion Engineering, Inc.'s low enriched oxide conversion plant and related facilities at Hematite, Missouri.

While most accidents are of minimal consequence, a few can be expected to be serious. Routine, established programs, such as those conducted by Nuclear and Industrial Safety, will normally be able to cope with the minor incidents following standard operating procedures. For the other extreme, detailed emergency plans will be needed to cope with the serious accident.

Therefore, the following plan has been established in accordance with the elements listed in Section IV of Appendix E to 10 CFR Part 50, to provide the functions necessary to cope with any emergency that may occur at C-E Hematite.

4. EMERGENCY CONDITIONS

Section 6 of C-E Hematite's Environment Impact Information and the Environmental Impact Appraisal by the NRC evaluates the consequences of all credible accidents. In all cases examined, the probability of a major accident was found to be extremely low. This low probability is derived from the fact that: 1) all process equipment is designed to incorporate permanently engineered safeguards; 2) strict administrative control of production processes is maintained; 3) adherence to the double contingency principle in the preparation of safety evaluations; and 4) the inclusion of generous safety factors in all facility limits.

A classification system has been employed, however, which covers the entire spectrum of possible emergency situations, regardless of the probability of occurrence.

This section of the emergency plan describes how the spectrum of postulated accidents are encompassed within the emergency characterization classes. Each class defined is associated with a particular set of immediate actions to be taken to cope with the situation. These actions are described in Section 6.

It should be noted that various classes of accidents require a graded scale of responses, which form the basis for the classification system. Also a small problem, such as a fire, may increase in severity and therefore move up from one class of accident to another.

4.1 Personnel Emergency

This class involves accidents and occurrences on-site in which emergency treatment of one or more individuals is required. It includes those situations that have no potential for escalation to more severe emergency conditions. There may be no effect on the facility, and immediate operator action to alter facility status is not necessarily required. A Personnel Emergency does not activate the entire emergency organization but may activate teams such as the first aid team. It may also require special local services such as ambulance and medical. Emergencies in this class can reasonably be expected to occur during the life of the plant.

Implementing procedures for handling this class of emergency are incorporated into the facility's nuclear and industrial safety procedures.

Recognition of this class of emergency is primarily a judgment matter for facility supervisory or management personnel. Its importance as part of the classification scheme rests to some extent on its "negative" information content, via, that the incident giving rise to the emergency is restricted in its scope of involvement.

Examples of personnel emergencies are:

- Injuries requiring first aid treatment by trained plant personnel only.
- Injuries requiring transportation to offsite medical facilities for treatment.
- Actual or possible internal exposure to radioactive materials requiring health physics evaluation and follow-up.
- External contamination requiring decontamination and assessment by Nuclear and Industrial Safety.

4.2 Emergency Alert

This class involves specific situations that can be recognized as creating a hazard potential that was previously nonexistent or latent. The situation may not yet have caused damage to the facility or harm to personnel and does not necessarily require an immediate change in facility operating status. Inherently, however, this is a situation in which time is available to take precautionary and constructive steps to prevent an accident and to mitigate the consequences should it occur. An Emergency Alert situation may be the result of either man-made or natural phenomena and can reasonably be expected to occur during the life of the plant.

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

Example of situations which fall in the emergency alert classification are:

- Bomb threats
- Civil disturbances
- Tornado warning or sighting
- Earthquake tremor or warning of seismic activity
- Forest fire
- Release of toxic or noxious gas nearby which could affect the site

4.3 Plant Emergency

This class includes accidents within the plant requiring staff emergency organization response. The initial assessment of situations in this class should indicate that it is unlikely that an offsite hazard will be created. However, substantial modification of plant operating status is a highly probable corrective action if it has not already taken place by automatic protective systems. This class is normally associated with a judgment that the emergency situation can be corrected and controlled by the facility staff.

Protective evacuations or isolation of certain plant areas may be necessary. This class of emergency can also reasonably be expected to occur during the life of the plant.

Accidents which fall into this class are those accidents analyzed in the Environmental Impact Information as events that are predicted to have insufficient consequences outside the plant to warrant taking protective measures.

Criteria for declaring Plant Emergencies should be based on (1) the recognition of an immediate need to implement in-plant emergency measures to protect or provide aid to affected persons in the facility or to mitigate the consequences of damage to plant equipment; (2) a positive observation that radiation monitors do not indicate the possibility of a criticality; (3) the recognition by personnel in the area involved that the situation is beyond their capability to resolve.

4.3 Plant Emergency (continued)

Examples of plant emergencies are:

Major process leak or spill (toxic or radioactive)

Fire (not controllable by personnel in the immediate vicinity)

Explosion contained within building

4.4 Site Emergency

Emergency situations more severe than plant emergencies are not expected to occur during the life of a plant because of design features and other measures taken to guard against their occurrence.

Nevertheless, it is necessary and prudent to make provisions for a class that involves an uncontrolled release of radioactive materials or chemicals into the site environs, outside the fenced manufacturing area. Notification of offsite emergency organizations may be necessary. Protective actions include evacuation of all facility areas other than the emergency control center. Associated assessment actions may include provisions for monitoring the environment.

A site emergency is declared by (1) automatic sounding of the nuclear (criticality) alarm or (2) sounding of the non-nuclear alarm, initiation by any person cognizant of the situation.

Examples of site emergencies are:

- Criticality accident
- Major UF_6 release
- Major fire or explosion
- Major anhydrous ammonia release

4.5 General Emergency

Accidents that have the potential for serious radiological consequences to the public health and safety have been analyzed previously and were found not to be credible for the C-E Hematite facility (NRC Environmental Impact Appraisal, March 1977).

5. ORGANIZATIONAL CONTROL OF EMERGENCIES

The formal organization of C-E Hematite contains support groups which, in addition to normal functions during routine operations, can provide support to any or all facilities at Hematite during an emergency.

5.1 Normal Plant Operations

Each operation at C-E Hematite is staffed with experienced operating personnel. These personnel are well qualified to recognize conditions that may result in an accident and are capable of instituting remedial procedures. If these remedial actions would be insufficient to deal with a situation, the employees have been trained to make emergency notifications and to perform those emergency functions that provide the maximum immediate control over most situations. These staffs are also trained to evacuate the facility involved, if necessary.

The Production Superintendent has overall responsibility for the facility in the event of an emergency. He has delegated this responsibility to the shift foremen on the evening and night shifts.

5.2 Onsite Emergency Organization

At such time as the Site Emergency Plan is put into effect, all aspects of the emergency situation will be coordinated within the scope of the site emergency organization (see Figure 5-1).

Responsibilities of each position or group are shown below:

5.2.1 Emergency Director

a. Activate Emergency Control Center in the tile barn emergency room, or establish an alternate control point from which activities can be directed.

b. Determine status and necessity for shutdown of plant systems.

c. Direct, coordinate, and evaluate actions to be taken by functioning emergency teams.

5.2.2 Fact Finding Committee

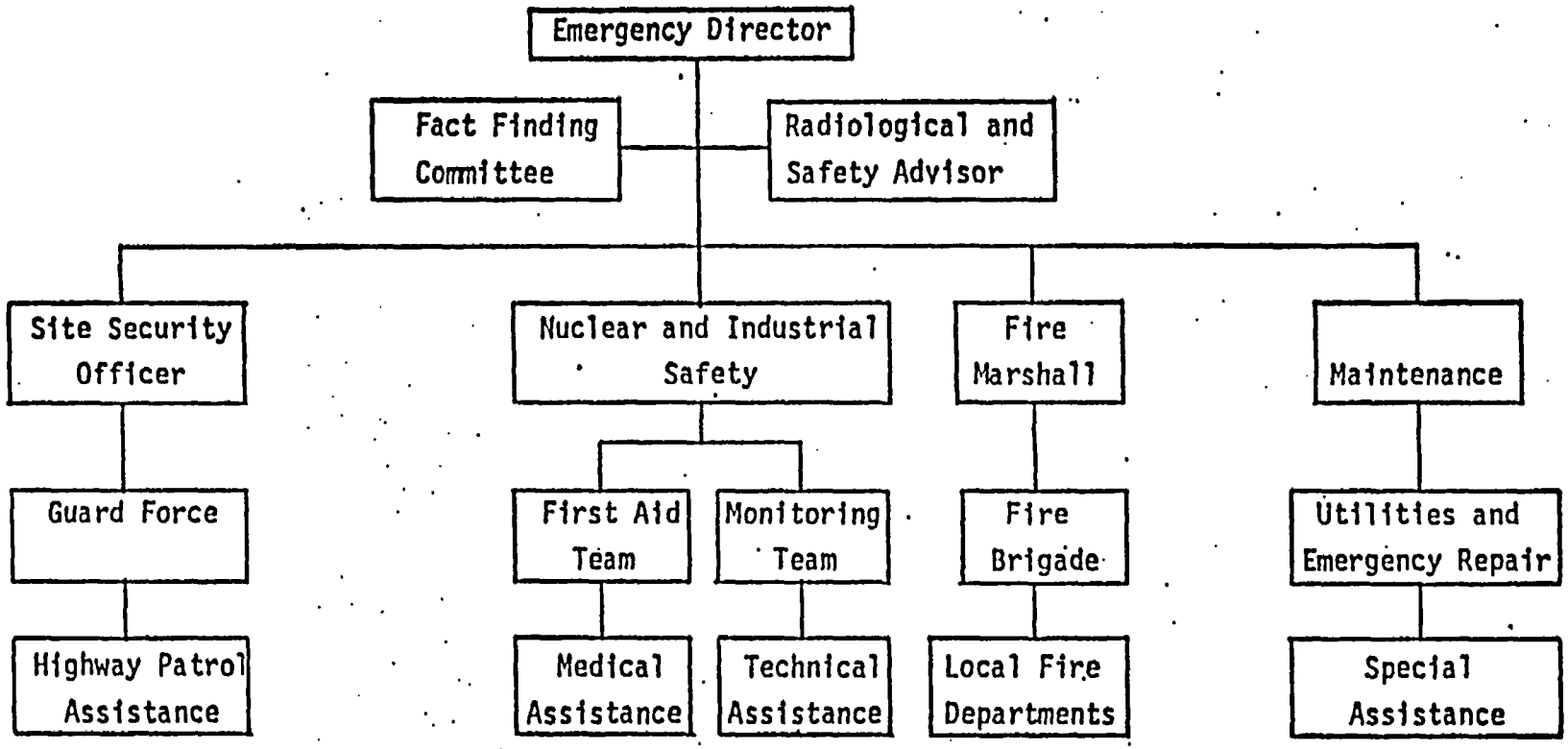
Members to serve on this committee will be selected by the Director depending on the nature of the emergency. The Chairman of the committee shall be an individual who is not a member of the immediate response teams.

a. Communicate with the Emergency Director and others to obtain facts for determining the cause and effect of the emergency.

b. Interview personnel who witnessed the incident or those who can contribute information leading to cause and effect.

c. Review and examine all evidences (photographs, recoverable materials, etc.) that may be considered pertinent and informative for evaluation purposes.

d. Keep records and prepare a written report for the Plant Manager.



EMERGENCY ORGANIZATION CHART

Figure 5-1

5.2 Onsite Emergency Organization (continued)

5.2.3 Radiological and Safety Advisor

a. Accumulate and evaluate known data to determine the extent of the emergency.

b. Establish a liaison between the Director and a direct source of available information.

c. Establish policies regarding the emergency plan of action for controlling the incident.

d. Shall be responsible for collecting and disseminating information pertaining to the emergency to outside agencies.

e. Normally be the sole contact with news media.

f. Maintain a close liaison with the Plant Manager regarding emergency activity progress.

g. Inform and consult with the Fact Finding Committee.

h. Review and obtain approvals for public releases and notices.

5.2.4 Supervisors

a. Each supervisor is responsible for proper implementation of the Site Emergency Plan.

b. Shall assure himself that personnel under his supervision are familiar with the location and use of emergency equipment.

c. Shall assure personnel familiarization with the Emergency Plan and procedures.

d. Shall account for their personnel during an emergency.

5.2 Onsite Emergency Organization (continued)

5.2.5 Nuclear and Industrial Safety

a. Shall assess and delineate an emergency radiation or toxic fume, vapor or mist condition, including radiological survey monitoring.

b. Provide personnel monitoring, decontamination, recovery accident dosimetry for analysis and collect health physics or industrial hygiene samples for analysis.

c. Conduct environmental monitoring.

d. Assist with first aid and emergency rescue.

e. Procure, store and issue protective clothing and equipment for recovery operations.

f. Prepare necessary records and reports.

5.2.6 Site Security Officer

a. Direct and coordinate Security Guard activities.

b. Restrict access to the site to authorized personnel and outside supporting services.

c. Coordinate activities with state and local police.

5.2.7 Fire Marshal

a. Coordinate the fire-fighting activities of site fire brigades with local fire departments.

b. Organize site fire brigades.

c. Assure that personnel have been trained in fire-fighting techniques.

5.2 Onsite Emergency Organization (continued)

5.2.8 Security Guards

a. Provide traffic control and communication with outside supporting services.

b. Be familiar with Special Guard Orders for all emergency occurrences, which includes maintaining plant security and access control.

5.2.9 Maintenance

a. Maintain or discontinue as necessary utility services during the emergency.

b. Provide, fabricate or modify equipment needed for recovery operations.

c. Provide equipment and personnel for recovery and salvage operations.

d. Obtain special assistance as necessary.

5.3 Augumentation of Onsite Emergency Organization

5.3.1 Windsor Support

Technical support and consultation in the areas of nuclear criticality safety, radiological safety and industrial hygiene is provided by the Nuclear Licensing and Safety Supervisor, Windsor, upon request.

5.3.2 Local Services Support

Agreements have been reached with various private and civil organizations to provide assistance as required.

5.3.2.1 Barnes Hospital

Barnes Hospital has agreed to accept victims of accidents having injuries possibly complicated by radioactive contamination. Barnes Hospital has a procedure for handling patients who are contaminated with radioactive materials.

5.3.2.2 Joachim-Plattin Ambulance District

Joachim-Plattin Ambulance District has agreed to transport victims of accidents having injuries possibly complicated by radioactive contamination to Barnes Hospital.

5.3.2.3 Jefferson County Sheriff Department

The Jefferson County Sheriff Department has agreed to provide assistance to C-E Hematite in an emergency. This assistance includes coordination with other civil authorities as necessary, traffic control, and control of civil disturbances.

5.3 Augumentation of Onsite Emergency Organization (continued)

5.3.2.4 Hematite and Festus Fire Departments

The Hematite and Festus fire departments respond to emergency calls at C-E Hematite. If the response is for a fire involving radioactive material, Nuclear and Industrial Safety technicians provide monitoring as necessary to protect fire department personnel.

5.4 Coordination with Participating Government Agencies

As previously stated, analysis of the postulated C-E Hematite accident spectrum shows that there is no credible accident with significant offsite consequences.

A list of cognizant government agencies and current telephone numbers is maintained, however, and they will be contacted should an emergency arise involving a consideration within their jurisdiction. The contact would be in the form of notification, rather than a request for emergency assistance. These agencies include:

U.S. Nuclear Regulatory Commission, Region III - Glen Ellyn, Illinois

Missouri Department of Public Safety, Disaster Planning and Operations Office - Jefferson City

Missouri Division of Health, Bureau of Radiological Health - Jefferson City

Missouri Department of Natural Resources - Jefferson City, St. Louis

U.S. Environmental Protection Agency, Region 7 - Kansas City

Missouri Highway Patrol - Creve Coeur

U.S. Federal Bureau of Investigation - St. Louis

6. EMERGENCY MEASURES

6.1 Personnel Emergency

This class of emergency is declared by the affected individual or nearby personnel. (It does not involve sounding of an alarm). An assessment of the situation is made by a representative of the Nuclear and Industrial Safety group to determine whether medical treatment and/or personnel decontamination is necessary. When applicable corrective actions will be promptly taken to preclude further injury to the individual involved or nearby personnel. These correction actions may include:

Shutting off electrical power to faulty equipment.
Isolation and containment of minor process leaks.
Restricting personnel access to areas of possible high concentrations of airborne radioactive material.
Any other action necessary to correct or mitigate the situation at or near the source of the problem.

Normally protective action, other than the possible use of respiratory protection in the immediate area, is not required for a personnel emergency.

Use of respiratory protection is determined by a trained member of the Nuclear and Industrial Safety group. Personnel decontamination will be performed by or under the supervision of a trained NIS representative. Notification of and transportation to offsite medical facilities, if necessary, is also made by the Nuclear and Industrial Safety group. An NIS representative will accompany the victim to any offsite treatment facility.

6.2 Emergency Alert

The responsibility for declaring an emergency alert rests with the Emergency Director. The general criteria for declaring an emergency alert are as follows:

1. Bomb threats
2. Actual or warning of impending civil disturbance
3. Tornado warning or sighting
4. Earthquake tremor or warning of seismic activity
5. Forest fire warning or sighting
6. Sighting or report of release of toxic or noxious gas nearby which could affect the site

The Emergency Director then assesses the situation and makes a decision as to whether to evacuate to the designated assembly area by manually activating the non-nuclear alarm, or to instruct personnel to remain inside plant buildings by normal communications channels. At this time the plant will be secured, processes and equipment shut down and utilities shut off as deemed necessary by the Emergency Director.

The emergency alert is terminated when the threatening situation has passed.

6.3 Plant Emergency

A plant emergency is declared by manual activation of the non-nuclear alarm by any personnel cognizant of the emergency situation. The criteria for declaring a plant emergency are described in Section 4. Plant emergency situations include:

Major process leak in UF_6 to UO_2 conversion line
Fire not easily extinguishable by personnel in the immediate vicinity
Break in combustible gas line
Explosion contained within building
Any other situation which results in immediate danger to plant personnel

Upon sounding of the alarm, personnel other than production area monitors immediately evacuate to the designated non-nuclear emergency assembly area. Production area monitors monitor or shut down process equipment and evauate their area when secured or otherwise instructed. The following onsite emergency teams are then activated as deemed necessary by the Emergency Director.

First Aid Team
Fire Brigade
Radiological Survey Monitoring
Guard Force
Utilities and Emergency Repair

The Emergency Director then issues directions for care of any injured personnel, combating the specific problem and preventing unauthorized entry to the affected area. He then determines the need for additional assistance and initiates call-in (e.g. fire department).

6.3 Plant Emergency (continued)

Use of respiratory protection is determined by a trained member of the Nuclear and Industrial Safety group. Personnel decontamination will be performed by or under the supervision of a trained NIS representative. Notification of and transportation to offsite medical facilities, if necessary, is also made by the Nuclear and Industrial Safety group. An NIS representative will accompany the victim to any offsite treatment facility.

The non-nuclear emergency procedure will contain instructions for the specific emergency teams action during the emergency. When the emergency has been controlled, NIS will survey the affected area and release for clean-up or return to normal operations.

6.4 Site Emergency

The Site Emergency can be implemented in several ways:

- Sounding of the nuclear alarm (intermittent horn).
- Sounding of the non-nuclear alarm (loud, continuously ringing bell).
- By any personnel cognizant of an actual or impending emergency which affects the C-E Hematite Site.

Examples of site emergencies are:

- Criticality accident
- Major UF_6 release
- Major fire or explosion
- Major anhydrous ammonia release

The non-nuclear alarm is usually sounded to designate a plant emergency. At the discretion of the Emergency Director, a site emergency may be declared in accordance with the criteria discussed in Section 4.4. At this time personnel are instructed to further evacuate to either the parking lot or the Emergency Assembly Area in the tile barn. The emergency actions are then directed and any necessary offsite notifications made from the Emergency Control Center.

In the case of the sounding of the nuclear alarm, all personnel evacuate immediately to the Emergency Assembly Area in the tile barn. Upon assembly at the barn, supervisors determine that all personnel under their cognizance have been evacuated and are accounted for, including their visitors and outside contractors.

Those present in the assembly area are questioned to determine if any unusual occurrences were observed and a survey team, consisting of at least two persons knowledgeable in the use of instruments, are instructed to prepare for re-entry.

6.4 Site Emergency (continued)

First aid is provided for any individuals injured during the evacuation and all identification badges are checked for indium foil activation.

When the report of the re-entry team is received, the incident is considered confirmed if radiation levels in excess of 5 mr/hr are encountered.

At this point, a NIS representative is dispatched to the site boundary downwind of the plant to monitor the exposure rate. The maximum offsite thyroid dose is estimated from these readings as specified in the detailed procedures.

The Emergency Director assures that the following actions are initiated:

- Arrange for treatment of injured or exposed personnel.
- Arrange for decontamination of personnel.
- Determine radiation level in assembly area. Decide need to relocate.
- Collect film badges and record indium foil readings.
- Instruct health physics to initiate sampling of airborne contamination.
- Start action to obtain assitance:
  - Ambulance
  - Hillsboro Sheriff
  - Barnes Hospital (radiation exposure)
  - C-E Management list. Request first individual contacted to inform the NRC and other persons on management notification list.
- Direct survey team to establish 100 mr/hr boundary line.

6.4 Site Emergency (continued)

Based on information from survey team, initiate action to shut down the plant.

Obtain other assistance and make notifications of other offsite agencies as required.

Exposures during subsequent re-entry operations will be limited.

Allowed exposure for any person shall not exceed 12.5 rems. Under unusual circumstances, exposures may be permitted to a maximum of 25 rems.

Time-of-stay during re-entry shall be limited. Such time-of-stay will commence upon penetrating beyond the 100 mr/hr boundary and terminate upon recrossing it while exiting.

No personnel are allowed to reenter the affected plant areas unless authorized by the Emergency Director.

7. EMERGENCY FACILITIES AND EQUIPMENT

This section identifies, describes briefly, and gives locations of items to be maintained for emergency use at C-E Hematite.

7.1 Emergency Control Center

The emergency control center is located within the tile barn west of the fenced manufacturing area. This direction is normally upwind from the manufacturing area. Therefore, an alternate offsite location is not considered necessary.

7.2 Communications Systems

Communications during an emergency may be by the following methods:

- Normal plant telephone system
- Separate emergency telephone line
- 2-way radios
- Voice and hand signals (effective in many cases due to small size of plant)

7.3 Assessment Facilities

The following monitoring systems are used to initiate emergency measures as well as those used for continuing assessment:

7.3.1 Onsite Systems and Equipment

Windspeed and direction - remote readout is in NIS office, but estimate may be obtained visually from emergency control center.

7.3 Assessment Facilities (continued)

7.3.1 Onsite Systems and Equipment

Radiation monitors and alarms - Radiation monitors are installed in various areas of plant manufacturing and storage areas so that all Special Nuclear Material located in or about the facility is observed by a detector.

The radiation intensity is shown on a meter mounted on the front panel of the monitor. There is an alarm which serves as a local and general audible radiation evacuation alarm. A visual alarm for each of the above units is also located near the NIS office and at the guard station.

An externally mounted light and control panel buzzer serve as a power failure indicator.

Loss of power indicators are also provided at the readout location for each detector. These monitors are connected to the emergency power system.

Portable monitors - several portable air samplers, radiation survey instrumentation, and radiation dosimeters - located in NIS office and/or Emergency Control Center.

Process monitors - normal chemical process control monitors are not related to emergency conditions or situations.

7.3.2 Facilities and Equipment for Offsite Monitoring

Portable battery-operated air samplers
Fixed air samplers outside of fenced manufacturing area
Portable radiation survey instruments
Containers, etc. for sampling soil, water and vegetation
Mobile proportional counter for alpha and beta analyses of samples - located in NIS Laboratory

7.4 Protective Facilities and Equipment

The emergency assembly area in the tile barn, located west of the fenced manufacturing area, is of adequate size to accommodate the entire plant staff. It is not in the prevailing wind direction and its distance and construction provide sufficient shielding in the event of a criticality accident.

Located in the emergency control and assembly area are emergency equipment and supplies, including

- Radiation survey instruments
- Respirators
- Protective Clothing
- Personnel dosimeters
- First Aid Supplies
- 2-way Radios
- Decontamination supplies
- Environmental Sampling Supplies

For plant emergencies of a localized nature, there are three other emergency supply stations strategically located in the manufacturing areas. The supplies located in the tile barn would be relied upon in the event of a site emergency.

7.5 First Aid and Medical Facilities

Standard first aid supplies are available in 3 locations at the C-E Hematite site:

1) Health Physics Office
2) Shift Foreman's Office
3) Tile Barn (Emergency Control Center)

7.6 Damage Control Equipment and Supplies

Fire extinguishers are located throughout the plant manufacturing and office areas.

A CO_2 cylinder is maintained at the UF_6 vaporization area for freezing UF_6 leaks.

8. MAINTAINING EMERGENCY PREPAREDNESS

This section of the plan describes the means which are employed to ensure that the emergency plan will continue to be effective throughout the lifetime of the C-E Hematite facility.

8.1 Organizational Preparedness

8.1.1 Training

The purpose of the training program is to inform and instruct all employees in the policy and programs of the company as they relate to nuclear criticality safety, health physics and industrial safety, emergency procedures, and proper and safe performance of their assignments.

The indoctrination of new employees in the safety aspects of the facility is conducted by, or under the supervision of specialists in the various topics. The indoctrination topics include but are not limited to:

a. Fundamentals of nuclear criticality safety and controls.
b. Fundamentals of the health physics program and controls.
c. Emergency alarms and actions required.
d. A review of the facility operations.
e. On the job training, under direct line supervision and/or by experienced personnel.

After determining by testing that a new employee has attained sufficient knowledge in the above topics, adequate performance is monitored by the Foreman and NIS prior to permitting work without close supervision.

8.1 Organizational Preparedness (continued)

The training and personnel safety program is continued with on the job training supplemented by regularly scheduled meetings conducted by line supervision and specialists in the subjects covered. Personnel protective equipment, industrial safety and accident prevention emergency procedures and other safety topics are included. Foremen receive a formal course in radiation safety, criticality control emergency plans and procedures. Sufficient knowledge to enable them to carry out their training functions is determined by testing. All operating personnel receive a re-training course in criticality control, radiation safety and emergency procedures on an annual basis.

8.1.2 Drills and Exercises

Semi-annual site emergency evacuation drills are conducted to test promptness of response, adequacy of procedures, emergency equipment and the overall effectiveness of the emergency plan. At least one of the drills will involve participation by offsite agencies to test as a minimum the communications links and notification procedures.

All drills are documented and critiqued by the NIS group to evaluate the effectiveness of the plan and to correct weak areas through feedback with emphasis on practical training.

8.1.3 Emergency Planning Coordinator

The NLS&A Supervisor serves as the Emergency Planning Coordinator. His responsibility includes the coordination of offsite and onsite emergency planning efforts.

8.2 Review and Updating of the Plan and Procedures

An annual review of the emergency plan is performed by the Emergency Planning Coordinator for the purpose of updating and improving procedures. Results of training and drills as well as changes on site or in the environs are incorporated into this review.

All written agreements are reviewed and updated if necessary at least every two years.

8.3 Emergency Equipment and Supplies

Both the nuclear and non-nuclear alarm systems are tested weekly to insure their proper operation.

Nuclear and Industrial Safety is responsible for routine inspection of all equipment and supplies at all emergency stations and other reserve equipment, and for maintenance and servicing, or obtaining servicing, for all emergency equipment. NIS also procures or initiates procurement, of all supplies of emergency equipment and other miscellaneous supplies necessary to cope with foreseeable emergency situations.

9. RECOVERY

The Emergency Director will assign such personnel as necessary to restore or have restored all equipment and/or services to operating condition upon termination of the emergency.

APPENDIX A

NORMAN P. KNOWLTON, JR., M.D.
QUEENY TOWER BUILDING, SUITE 3102
4989 BARNES HOSPITAL PLAZA
ST. LOUIS, MISSOURI 63110

PHONE
361-7660

April 17, 1978

Mr. H. E. Eskridge
% Combustion Engineering, Inc.
Route 29-A
Hematite, Missouri 63047

Dear Mr. Eskridge:

The arrangement to handle emergency radiation injuries at Barnes Hospital, St. Louis, Missouri which was revised in 1976 is still in force and will continue to be.

Yours very sincerely,

Norman P. Knowlton, Jr., M.D.

NPK:ksb

HEMATITE FIRE PROTECTION DISTRICT
P.O. Box 67
Hematite, Missouri 63047

April 25, 1978

Combustion Engineering, Inc.
Highway 21-A
Hematite, Missouri 63047

Gentlemen:

This is to document that the Hematite Fire Protection District will respond to a fire call at your plant.

Very truly yours,

Delbert Shoults
Chief

PHONE 314/937-4694

City of FESTUS

222B NORTH MILL STREET
FESTUS, MISSOURI 63028

Festus Fire Dept.
April, 18, 1978.

Combustion Engineering Inc.
Hematite, Mo.

Dear Sir.

As requested as to the Festus Fire Department in assisting the Hematite Fire Department in combating a fire at your plant.

We will assist the Hematite Fire Department in any way we can as we have a mutual aid agreement with them as well as all departments in Jefferson county.

Sincerely Yours

F. Terrell Bagley

Chief, Festus Fire Dept.

JOACHIM-PLATTIN TOWNSHIPS AMBULANCE DISTRICT

Jefferson County, Missouri

Office: 937-2224
Emergency: 937-3666

Post Office Box 124
FESTUS, MISSOURI 63028

April 17,1979

THOMAS ROBART
Chairman

LLOYD THUESEN
Vice Chairman

KATHERINE E. DERQUE
Secretary

WILLIAM WALKER
Treasurer

PHILLIP ROKICKI
Member

P. KENNETH WILKEY
Member

DAVID McFARLAND
Administrator

Service Address
301 North Mill Street
Festus, Missouri 63028

Mr. Harold Eskridge
Combustion Engineering
Hematite, Mo. 63407

Dear Mr. Eskridge:

Please let this serve as formal notice of our availability in case of any type of assistance that you need, or also if we are needed in a stand-by capicity.

Respectfully yours,

David McFarland

David Mc Farland
Administrator
Joachim-Plattin Townships
Ambulance District

OFFICE PHONES:
789-3346
948-3222
296-0411

THOMAS E. MIRGAIN, CHIEF DEPUTY

WALTER "BUCK" BUERGER
SHERIFF OF JEFFERSON COUNTY
HILLSBORO, MO. 63050

APRIL 17, 1978

COMBUSTION ENGINEERING
RT. 21A
HEMATITE, MISSOURI 63047

IN REFERENCE TO COMBUSTION ENGINEERING:

THIS LETTER WILL SERVE NOTICE THAT THE JEFFERSON COUNTY SHERIFF'S DEPARTMENT WILL ASSIST COMBUSTION ENGINEERING IN ANY EMERGENCY THAT SHALL ARISE.

Walter "Buck" Buerger

WALTER "BUCK" BUERGER
SHERIFF OF JEFFERSON COUNTY
HILLSBORO, MISSOURI 63050

APPENDIX B

PROCEDURE FOR HANDLING PATIENTS WHO ARE CONTAMINATED WITH RADIOACTIVE MATERIALS

BARNES HOSPITAL

I. Source of Patients

1. Combustion Engineering Inc. (formerly United Nuclear Corp.), Hematite, Mo. Jefferson County near Festus, Mo., approximately 40 miles south of St. Louis. Telephone 296-5640 or 314-937-4691.

2. Mallinckrodt Nuclear - 2703 Wagner Pl, Maryland Hts., Mo. Telephone 291-5575.

3. Washington University Medical Center and Affiliated Hospitals.

4. Washington University (Hilltop Campus).

5. Other sources could include other hospitals, Lambert Airport, State Highway Patrol.

II. Method and Details of Notification of Barnes Hospital Emergency Room:

1. Direct telephone call to the Emergency Room (ER) from the company or laboratory detailing the following:

   A. The number and names of the individuals involved.
   B. Description of the mechanical injuries of each person.
   C. An estimate of the radioactive contamination of each individual and the suspected isotope with which they became contaminated.
   D. A preliminary estimate of the dosage of gamma, beta and/or neutron exposure to each individual.

2. This information will be recorded by the ER Personnel in order to brief the individuals who are to be notified of the incident. ER Personnel should request the above information if the caller does not volunteer it.

III. Individuals to be IMMEDIATELY NOTIFIED:

1. Physicians:

   A. Norman P. Knowlton, Jr., M.D. - Primary Physician to be called
   Office 361-7660
   Barnes 454-3078
   Home [redacted] Ex. 6
   Exchange 533-5858

   B. James F. Nickel, M.D.
   Office 367-4509
   Home [redacted] Ex. 6
   Exchange 533-5858.

C. Herbert C. Wiegand, M.D.
Office 361-7660
Home [redacted] Ex. 6
Exchange 533-5858

D. Virgil Loeb, Jr., M.D.
Office 361-7660
Home [redacted] Ex. 6
Exchange 533-5858

2. Surgeons: (If there are mechanical injuries)

A. Heinz Haffner, M.D.
Office 727-2011 or 367-4425
Home [redacted] Ex. 6
Exchange 533-5858

B. Lawrence O'Neal, M.D.
Office 727-2011 or 367-4425
Home [redacted]
Exchange 533-5858 Ex. 6

3. Radiation Safety Division:

A. John Eichling, Ph.D., Radiation Safety Officer
Office 454-2281
Home [redacted] Ex. 6

B. Richard Brown, Deputy Radiation Safety Officer
Office 454-2282
Home [redacted] (Primary person to be called) Ex. 6

C. Mary Feldhaus, Health Physics Technologist
Office 454-2282
Home [redacted] Ex. 6

4. Radiation Science Division of Radiology

A. Michel Ter-Pogossian, Ph.D.
Office 454-3595
Home [redacted] Ex. 6

5. Hospital Administration (Entirely responsible for release of information to the public and news media)

A. Robert Frank, Administrator
Office 454-2600
Home [redacted] Ex. 6

B. Tom Behnen, Evening Administrator
Home [redacted] Ex. 6
Office 454-2800

C. Administrator on Call:
Call Barnes Hospital Operator

IV. Preparation of the Emergency Room BEFORE arrival of patients:

1. Call the Radiation Safety Facility and request that the emergency radiation cart be brought to the E.R. (NOTE: if after normal hours refer to the list of Radiation Safety personnel listed on page 2).

2. Place plastic sheets on the floor of the E.R. as outlined on the attached addendum using red masking tape to outline the areas that may become contaminated by the patients. SPECIFICALLY the following floor area (designated as the "Red Area").

   A. A four foot path from near the curb of the E.R. driveway through the E.R. door on the north side of doorway. (The south side of the doorway should be reserved for other emergencies).

   B. The area just inside the North E.R. Door.

   C. A six foot path extending from the E.R. Door, past the desks, and up to the door of examination room #4.

   The floor area between this path (above) and into, and including examination rooms #2 and 3.

3. If the E.R. has been notified that there are to be individuals who are UNINJURED but have had possible high exposure to radiation and are to be observed and checked for possible radiation illness in the E.R., then place an adequate number of chairs along the north side of the corridor just inside the E.R. Door.

4. Place plastic on stretchers, examination tables, and chairs which may be used by the patients.

5. Place the large plastic bags and their radiation tags in a readily accessible area for the deposition of contaminated materials.

6. Obtain a dozen assorted sizes of scrub suits, disposable gloves, surgeons gowns, caps, masks, and booties from the Barnes Hospital Operating Room Area. (These do not have to be sterile as they will be used to gown E.R. personnel to protect them from contaminating themselves with radioactive materials while attending the patients).

7. Control of Air Flow in the E.R. before patients enter the area:

   A. Call Barnes Maintenance at extension 3545 to obtain their services in operating the necessary air flow controls which are located on the roof of the E.R. (small superstructure housing motors, switches, etc. for the E.R.).

B. Turn OFF the Air Conditioning Switch. This prevents the cold air return moving air throughout the system.

C. Ascertain that the Exhaust Switch is ON. This switch is normally in the ON position but should be checked. Air from the E.R. will then will discharged through the exhaust duct on the roof.

8. Each person assigned to care for patients in the "Red Area" will be issued a radiation dosimeter (film badge) by the Radiation Safety Representative.

V. Care of the Patients Upon Arrival:

1. Monitor the individuals for radioactive contamination (Note: Monitor the personnel who accompanied patients before allowing them to enter the Hospital). The Radiation Safety Representative will assist the Health Physicists who are accompanying the patients from the site of the accident. They will monitor the individuals for radioactive contamination. This should be done in the vehicles transporting the patients before they are brought into the Hospital. Individuals found NOT contaminated will enter through the Wohl Clinic Entrance north of the E.R. entrance and those found to be contaminated will enter through the E.R. entrance. The contaminated individuals will then be directed to an appropriate place in the "Red Area". Injured individuals will be placed in Examination Room #2,3, or 4. Once contaminated individuals enter the "Red Area", ALL hospital personnel entering this area will wear the protective clothing (from Barnes O.R.). This protective apparel will be removed upon leaving the "Red Area" and deposited in the plastic bags for disposal by Radiation Safety. The number of personnel entering the "Red Area" shall be kept at an absolute minimum. ALL personnel shall be monitored by the Radiation Safety Representative as they exit from the "Red Area".

2. Authorization has been received (Dr. Lacy) to utilize the Autopsy Room located on the first floor of the West Bldg. to decontaminate and care for extremely contaminated individuals. A Radiation Safety Representative MUST accompany anyone transferred to that facility. Extreme care SHALL be taken so as not to spread any contamination enroute.

3. Decontamination of Individuals: It is anticipated that the patients arriving in the E.R. will have been fairly well de-contaminated at the site of the accident. If significant contamination remains then further de-contamination should be carried out. The following procedure is recommended:

A. Contaminated Clothing: Remove clothing and place in a plastic bag. Affix a radiation tag which shall include the nature of the contamination, date and time, patients name. This container will then be handled only by the Radiation Safety Representative. NOTE: Valuables should be inventoried by two persons, placed in a plastic bag and sealed.

B. Skin Contamination: If skin surfaces are round to be contaminated scrub these areas with gauze sponges soaked in RADCON or Phisohex for two or three minutes and then remove with a damp clean sponge. (Contaminated sponges shall be placed in plastic bags for later disposal). Re-monitor the contaminated area and if still significantly contaminated, scrub with a Soft brush using RADCON or Phisohex. AVOID ABRASION of the skin. Re-monitor and repeat if necessary. The area between the fingers, under the fingernails, and in skin folds are the most difficult to decontaminate. If it is possible to hold the contaminated part of the body over the large sinks during decontamination this is much more preferable as large quantities of water is very helpful. AVOID use of any organic solvents on skin or wounds as they often increase the permeability of the skin.

C. Open Wounds: If the wound is found to be contaminated with radioactive material the following procedure is recommended; First, rinse the wound with running tap water for several minutes and then use the procedures in paragraph B for decontaminating the surrounding skin. Necrotic tissue should be surgically removed. If the wound still contains significant contamination then a block resection may be the procedure of choice. Any tissue removed should be saved for analysis.

D. Contamination of the Eyes, Nose and Mouth: These areas should be irrigated with copious amounts of normal saline using a bulb syringe or standard I.V. bottle and tubing.

E. Contamination of the Hair: Hair should be shampooed with Phisohex and rinsed with large amounts of water. If, after repeated shampooing, it is still contaminated it may be necessary to remove the hair with a clipper. (The clipper will then be contaminated).

VI. Further E.R. Examination and Care:

1. Blood Tests:

A. WBC, RBC, Differential, Hemoglobin, Hematocrit, Platelet Count, and Reticulocyte Count.

B. 20 cc of oxylated or heparnized blood for Sodium-24 activitation analysis.

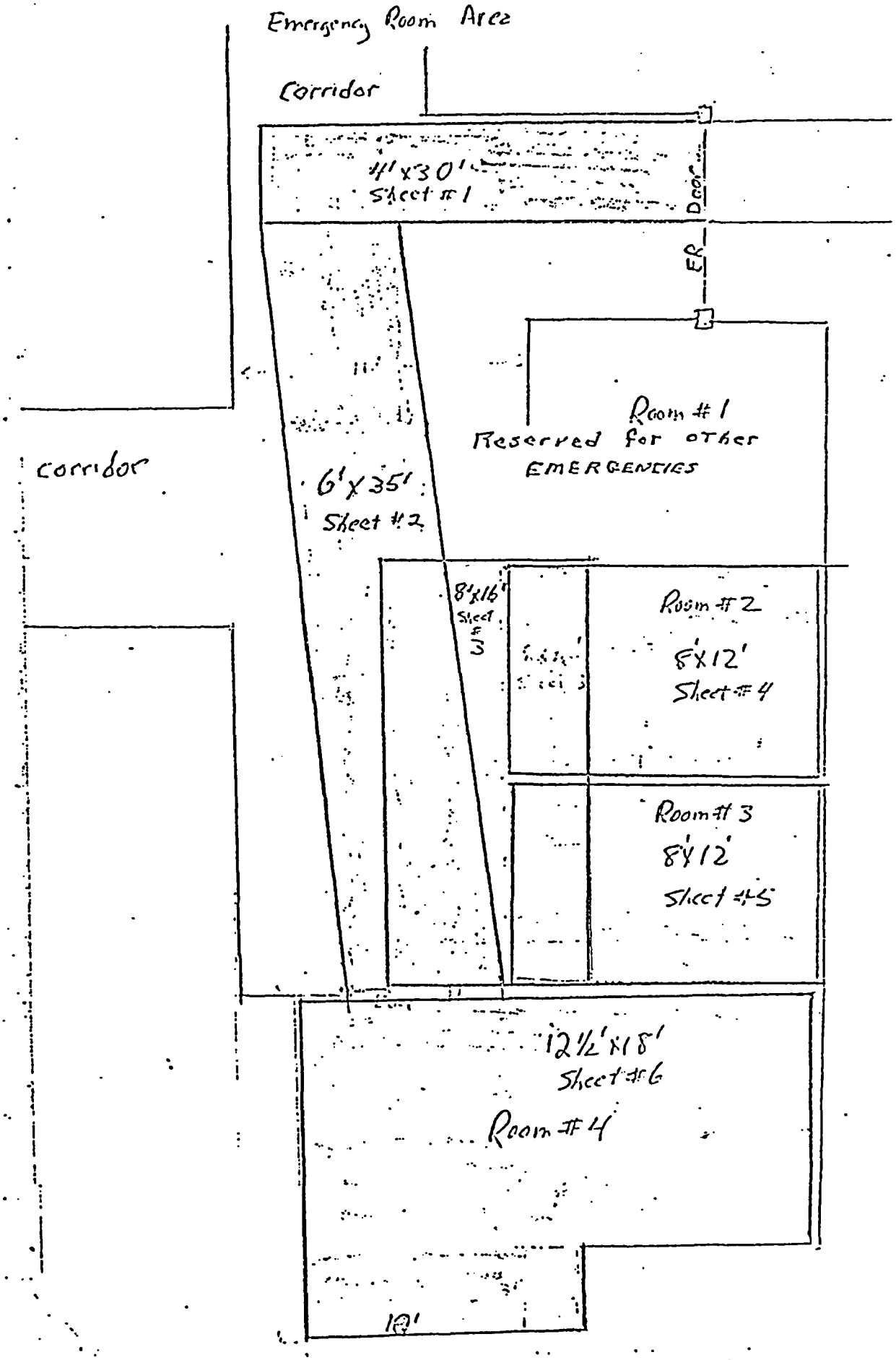
C. SMA 6 and SMA 12

2. Urine:

A. Routine urinalysis

B. Hold all urine for analysis (refrigerate)

3. Feces, Vomitus: - Save and refrigerate for isotopic analysis.


Emergency Room Area
Corridor
41'x30'
Sheet #1
Door
ER
Room #1
Reserved for other
EMERGENCIES
corridor
6'x35'
Sheet #2
8'x16'
Sheet #3
Room #2
8'x12'
Sheet #4
Room #3
8'x12'
Sheet #5
12½'x18'
Sheet #6
Room #4
10'

APPENDIX C

ESTIMATING OFFSITE EXPOSURES

The magnitude of the offsite release of radioactive materials, if any, from a criticality incident will be estimated as follows:

(1) Determine approximate wind speed and direction by observing the meterological sensors on the roof of Building 240.

(2) A Health Physics representative will be dispatched to the site boundary downwind of the plant with a portable survey meter and a two-way radio.

(3) Monitor the exposure rate until a reading above background is obtained. Continue to monitor the exposure rate until it drops to background levels. Note the time when the exposure rate first rises above background levels, the time that the maximum reading was obtained, and the time that the exposure rate returns to background level.

(4) The Health Physics representative shall estimate the maximum offsite adult thyroid dose expected from Figure 1, Appendix C, and communicate this information and the information in paragraph (3) above to the Radiological and Safety Advisor.

(5) The Radiological and Safety Advisor will communicate the information listed below to the appropriate offsite agencies:

(a) Time and magnitude of peak exposure rate at site boundary and type of instrument used.

(b) Approximate point on site boundary where exposure rate was measured and height above ground at which the measurement was taken.

(c) Wind speed and direction.

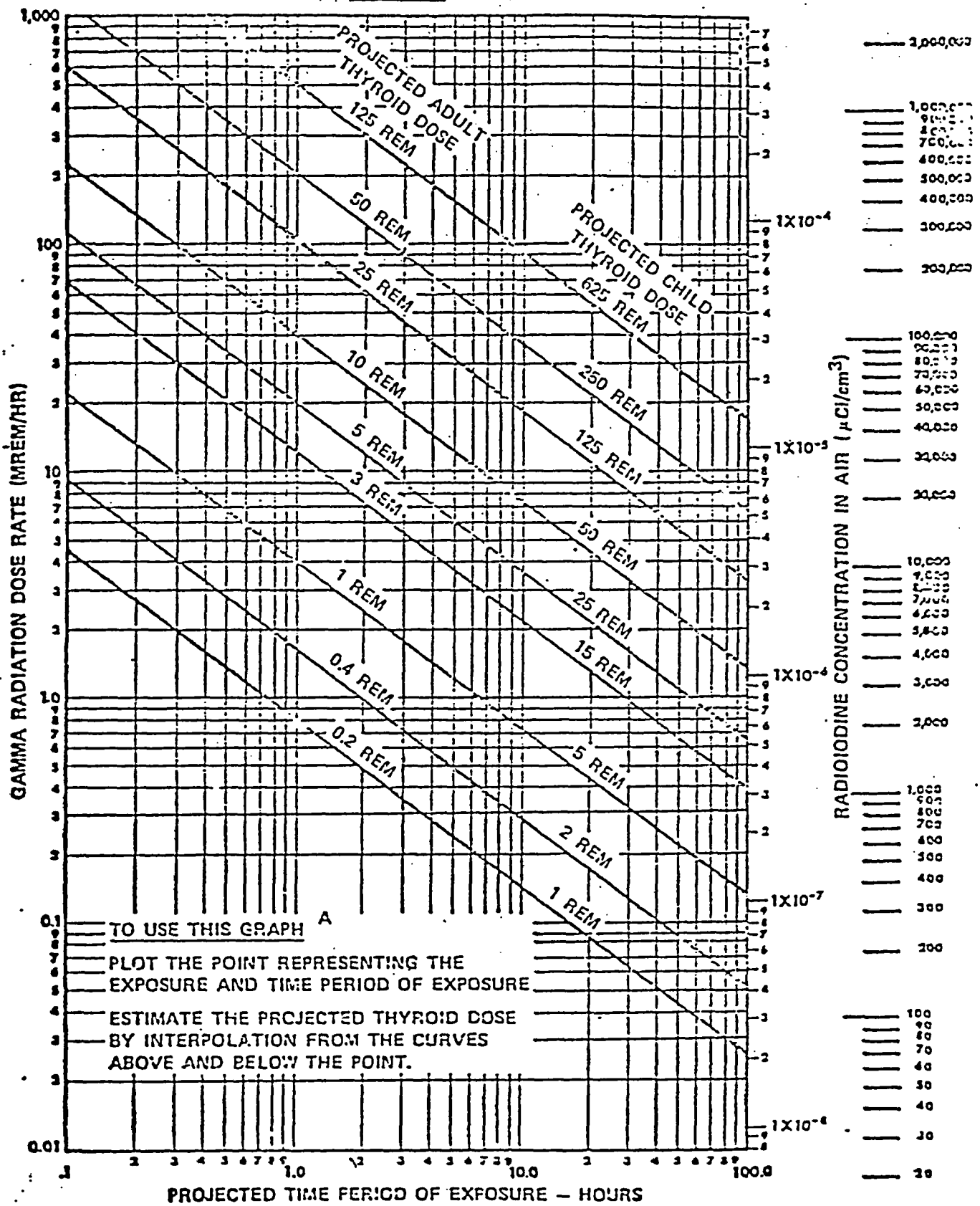
(d) Time interval between alarm trip and peak exposure rate at site boundary.

(e) Maximum offsite adult thyroid dose expected.

(f) Any other information which may assist these agencies in making decisions regarding protection of the public and the environment.

APPENDIX C

Figure 1



PROJECTED THYROID DOSE AS A FUNCTION OF GAMMA RADIATION EXPOSURE RATE AND PROJECTED TIME PERIOD OF EXPOSURE

A. USE OF THIS FIGURE ASSUMES THAT THE RADIOIODINE/NOBLE GAS ACTIVITY RATIO IS 0.3. IF IT IS KNOWN THAT THE RATIO HAS A LOWER VALUE, THE CORRECTION FACTOR GIVEN IN FIGURE 5.3 SHOULD BE USED.

APPENDIX D

EMERGENCY PROCEDURES

Following is a listing of written emergency procedures that implement the Site Emergency Plan:

1. ORGANIZATION AND RESPONSIBILITIES
   - Purpose
   - Introduction
   - Responsibilities
2. EMERGENCY CALL-IN LIST
   - Plant Personnel
   - Emergency Support
   - Notifications
3. NUCLEAR ALARM PROCEDURE
   - General Instructions - All Personnel
   - Emergency Director Instructions
   - Guard Force Instructions
   - Plant Survey Team
   - Emergency Rescue or Equipment Shutdown
   - First-Aid Crew
4. NON-NUCLEAR EMERGENCY PROCEDURE
   - General Instructions
   - Special Instructions
   - Emergency Director Instructions
   - Guard Force Instructions
   - Plant Re-Entry
   - First-Aid Crew
   - NIS Personnel
   - Movement and Storage of Special Nuclear Materials

5. BOMB THREAT PROCEDURE
   - Scope
   - Search Procedure
   - Evacuation
   - Location of Questionable Object
   - Return to Work

6. CIVIL DISOBEDIENCE AND DISORDER
   - Facility Preparation
   - Plant Security
   - Employee Conduct and Plant Operations
   - Resumption of Normal Activity

7. EMERGENCY PREPAREDNESS
   - Emergency Equipment Lists
   - Emergency Equipment Locations
   - Equipment Maintenance Responsibility

APPENDIX E

EMERGENCY EQUIPMENT

Following is a typical listing of emergency equipment in the various plant areas and the Emergency Control Center, and a facility layout map designating the locations of the emergency equipment stations.

Station #1 (Pellet Plant)

Scott Air Pack
Fire Extinguishers
Stretcher
All Service Gas Mask
Emergency Medical Oxygen Bottles
First Aid Kit

Station #2 (Building 240 Hallway)

Scott Air Pack
Fire Extinguishers
Inflatable Splints
All Service Gas Mask
Emergency Medical Oxygen Bottles
First Aid Kit

Station #3 (Pellet Plant Break Area)

Resuscitator

Station #4 (Well House)

Scott Air Pack

Station #5 (Oxide Control Room)

Scott Air Pack
Emergency Repair Kit for 30-B (UF_6/Chlorine) Cylinders

Station #6 (Warehouse)

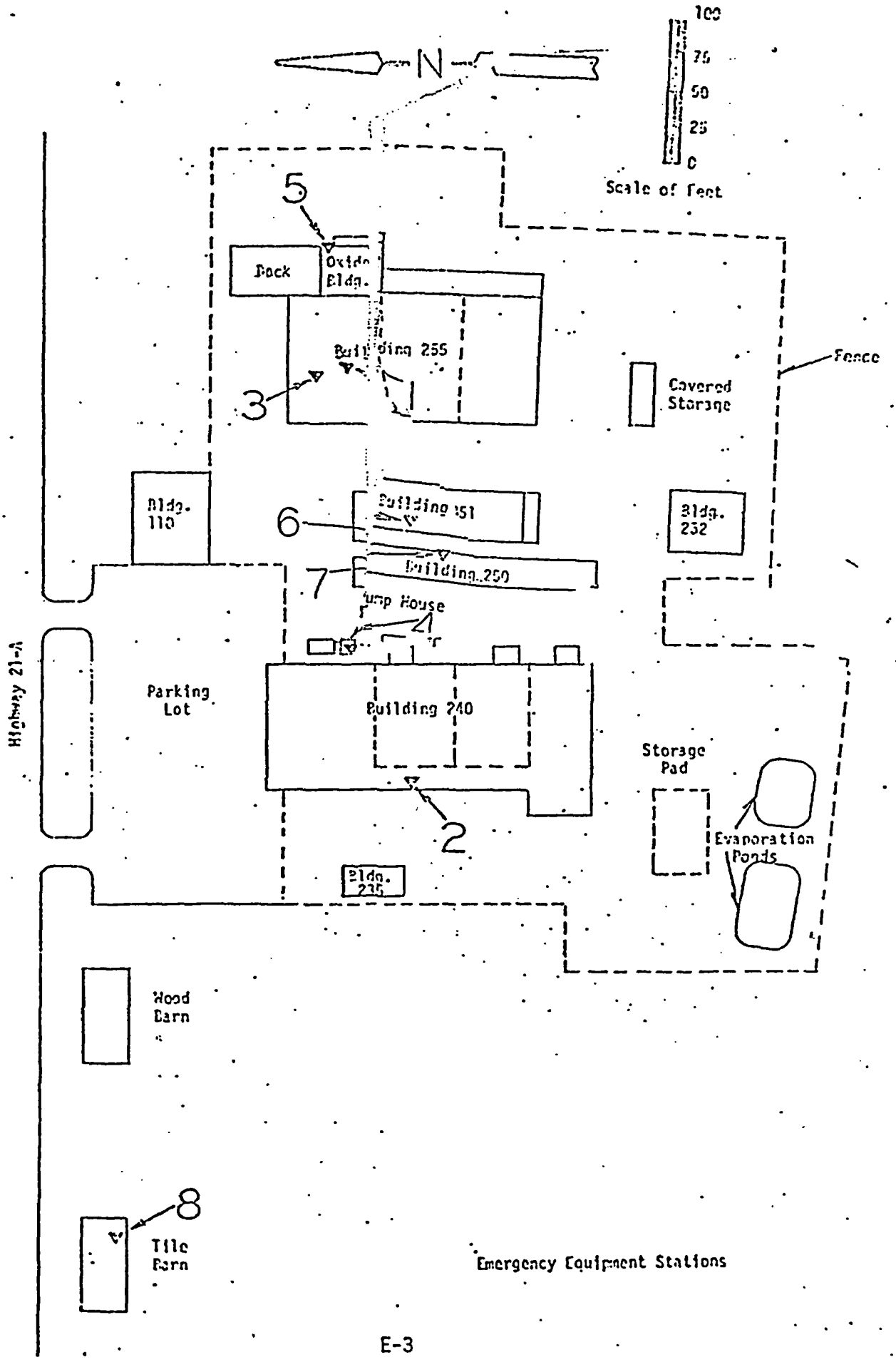
Fire Extinguisher - 125 lb. Wheeled Unit

Station #7 (Outside Old Boiler Room)

Respirators
Acid Suits w/hoods
Rubber Suit w/hood
Harness w/Life-Line
Face Shield
Vinyl Rain Coat
Emergency Procedures Manual

Station #8 (Assembly Area, Tile Barn)

Radiation Survey Instruments
Dosimeters
Film Badges w/Film
Lab Coats
Urine Sample Bottles
Respirators
Chemox Breathing Apparatus
Flares
First Aid Kit
Disposable Litters
Disposable Splints
Blankets
Sheets
Surgical Caps
Surgical Gloves
Emergency Procedures Manual
Check Sources
Portable Radio Transceivers
Misc. Environmental Sample Containers
Misc. Forms and Instructions


N
100
75
50
25
0
Scale of Feet
5
Dock
Oxide Bldg.
Building 255
3
Fence
Covered Storage
Bldg. 110
6
Building 251
Bldg. 232
7
Building 250
Pump House
Highway 21-A
Parking Lot
Building 240
Storage Pad
2
Evaporation Ponds
Bldg. 235
Wood Barn
8
Tile Barn
Emergency Equipment Stations