Proc No EI-4.1
Revision 4
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: TECHNICAL SUPPORT CENTER

1. Prepared

[signature] 5/18/83
Originator Date
for RA DeLong

2. QA Concurrence

NA
Date

3. Recommend Approval/Q-List (Yes) No

[signature] 5/18/83
Department Head Date

4. PRC Reviewed

RH Kucik 5/19/83
PRC 83-40 Date

5. Approved

James Ray for 5/20/83
Plant Manager Date

6. ATMS Incorporated

5/23/83
Date

7. Biennial Review

Date

TITLE: TECHNICAL SUPPORT CENTER

Table of Contents

TITLE: TECHNICAL SUPPORT CENTER

1.0 PERSONNEL RESPONSIBILITY

The Site Emergency Director (SED) shall implement this procedure.

2.0 PURPOSE

To provide a Technical Support Center (TSC) that will provide the following functions:

a. Provide Plant management and technical support to Plant Operations personnel during emergency conditions.

b. Relieve the Reactor Operators of peripheral duties and communications not directly related to reactor systems manipulations.

c. Prevent congestion in the Control Room.

d. Perform EOF functions for the Alert class and for Site Area Emergency and General Emergency class until the General Office Control Center/Emergency Operations Facility is functional.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

The TSC shall be activated at the Alert or higher emergency classification. The TSC may be activated before this time at the option of the SED.

4.0 PROCEDURE

4.1 FACILITY DESCRIPTION

The TSC consists of the area directly outside the Control Room, including the viewing gallery and Shift Supervisor office.

Attachment 1 provides a floor plan of the TSC.

4.2 ACTIVATION

Upon sounding the emergency siren, or at the direction of the SED, personnel assigned to the TSC shall proceed to that assembly area and report to the Assembly Area Leader. Personnel accountability shall be performed per EI-12.

4.3 ORGANIZATION

TSC organization and interfaces are detailed in Attachment 2.

4.3.1 Site Emergency Director (SED)

In addition to the duties listed in EI-1 and EI-2.1, the SED shall direct the TSC, with all TSC support groups listed below and reporting to him.

4.3.2 Technical Support Group

a. The senior member of the Technical Department available in the TSC shall function as the Technical Support Group Leader, reporting to the SED.

b. The Technical Support Group shall provide technical assistance to the Plant emergency organization.

c. The Engineering Support Center (ESC, located outside the TSC) shall report to the Technical Group Leader and assist the Technical Support Group in performing the above mentioned functions.

d. The General Office Engineering Support Team shall provide support per GOCC/EOF Emergency Implementing Procedures.

4.3.3 Maintenance Support Group

a. The senior member of the Maintenance Department available in the TSC shall function as the Maintenance Support Group Leader, reporting to the SED.

b. The Maintenance Support Group shall provide maintenance support to the Plant emergency organization.

c. The Maintenance Support Center, (MSC, located outside the TSC), shall report to the Maintenance Support Group Leader and assist the Maintenance Support Group in performing the above mentioned functions.

4.3.4 Communications Support Group

a. The Plant Technical Engineer shall function as the Communications Support Group Leader, reporting to the SED. In the absence of the Technical Engineer, the SED shall assign this task to available TSC personnel.

b. The Communications Support Group shall coordinate communications in the TSC including all notifications/updates as required per EI-2.1 and EI-3.

c. The Communications Support Group shall update TSC status boards as information becomes available.

d. Communications methods, are detailed on Attachment 3.

e. The General Office Communications Support Team shall provide support per GOCC/EOF Emergency Implementing Procedures.

Routine notifications/updates should be transferred to the GOCC/EOF as soon as practicable.

4.3.5 Administrative Support Group

a. The senior member of the Administrative Department available in the TSC shall function as the Administrative Support Group Leader, reporting to the SED.

b. The Administrative Support Group Leader shall function as the TSC Public Affairs liaison in the absence of the Plant Public Affairs Director. The TSC Public Affairs liaison shall gather information for the GOCC Public Affairs Department.

c. The Administrative Support Group Leader shall ensure TSC status boards are updated with information obtained from other TSC support groups. The Administrative Support Group Leader shall also ensure that an Emergency Notification Form (EI-3, Attachment 1) is completed at approximately 15 minute intervals or sooner if conditions warrant. This form shall be forwarded to the Communications Support Group after the information has been verified by the Administrative Support Group Leader.

d. The Administrative Support Group shall provide logistic support to the Plant emergency organization including, but not limited to:

1. Copying, typing.

2. Supplying food and drink.

3. Providing office supplies.

4. Obtaining Plant documents.

e. The Administrative Support Center, (ASC, located outside the TSC) shall report to the Administrative Group Leader and assist the Administrative Group in performing the above mentioned functions.

f. The General Office Logistics Support Team shall provide support per GOCC/EOF Emergency Implementing Procedures.

4.3.6 Chemistry/Health Physics Support Group

a. The senior member of the Chemistry/Health Physics Department available in the TSC shall function as the Chemistry/Health Physics Support Group Leader, reporting to the SED.

b. The Chemistry/Health Physics Support Group shall perform the following functions:

1. Calculate offsite dose and provide recommendations for offsite protective actions to the SED (Reference EI-6.0).

2. Ensure habitability is monitored in onsite assembly areas (References EI-8 and EI-12).

3. Ensure onsite and offsite monitoring is performed (Reference EI-8 and EI-9).

4. Provide Technical Support to the Plant emergency organization.

5. Ensure contaminated personnel are segregated in the Security Building during Accountability and at the evacuation monitoring point during an evacuation. Ensure decontamination is performed as necessary (References EI-14 and HP 2.18).

6. Ensure Radiation Safety support for Operations, Maintenance and Chemistry emergency activities.

c. The Operational Support Center, (OSC, located outside the TSC), shall report to the Chemistry/Health Physics Support Group Leader and assist the Chemistry/Health Physics Support Group in performing the above mentioned functions (Reference EI-4.2).

d. The General Office Health Physics Support Team shall provide support per GOCC/EOF Emergency Implementing Procedure.

4.3.7 Operations Support Group

a. The senior member of the Operations Department available in the TSC shall function as the Operational Support Group Leader.

b. The Operations Support Group shall have administrative control of and provide technical support for the Control Room staff.

c. In the event close support is needed for the Control Room staff, members of the Operations Support Group may function in the Shift Supervisor's office or Control Room.

NOTE: Access to the Control Room shall be limited to essential personnel to prevent overcrowding, confusion and high noise levels.

4.4 EQUIPMENT

TSC Emergency Equipment shall be as described in EI-16.1.

4.5 EVACUATION

a. If airborne contamination levels warrant (greater than 20% MPC) or radiation levels exceed 100 mRem/hr, the SED shall consider evacuation, relocation or use of protective measure (including respiratory protection or thyroid blocking agent).

b. Relocation or evacuation should be initiated only if adequate support for the Control Room can be maintained (eg, by the General Office Control Center/Emergency Operational Facility), or personnel are likely to exceed CPCo administrative dose limits.

Reference HP 1.0, "Health Physics Policy" for normal dose limits or EI-14, "Radiological Medical Care For Emergency Dose Limits"

c. Evacuation/relocation shall require the concurrence of the SED. The evacuation/relocation should be announced over the Public Address System.

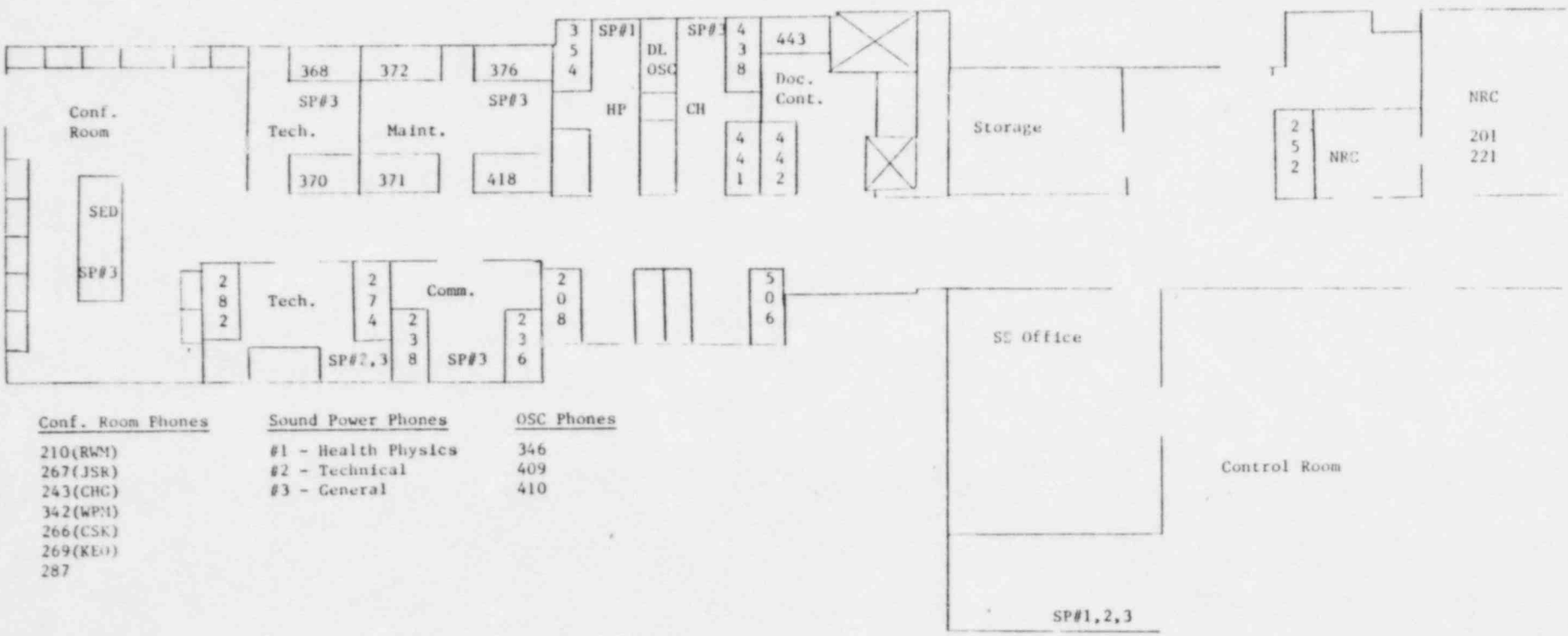
5.0 ATTACHMENTS

5.1 Attachment 1, "Technical Support Center Floor Plan"

5.2 Attachment 2, "Technical Support Center Organization and Interfaces"

5.3 Attachment 3, "Communications Matrix"

Technical Support Center Layout and Phone Locations



Conf. Room Phones	Sound Power Phones	OSC Phones
210(RWM)	#1 - Health Physics	346
267(JSR)	#2 - Technical	409
243(CHG)	#3 - General	410
342(WPM)		
266(CSK)		
269(KEO)		
287		

TECHNICAL SUPPORT CENTER ORGANIZATION AND INTERFACES

Site Emergency Director
(SED)

Operations Support Group	Technical Support Group	Maintenance Support Group	Chemistry/Health Physics Support Group	Communications Support Group	Administrative Support Group

Control Room	Engineering Support Center (ESC)	Maintenance Support Center (MSC)	Operational Support Center (OSC)		Administrative Support Center (ASC)	Plant Support Groups
	Conf Rm #3&4	Main Locker Rm Lunchroom	Lunchroom		Doc Control	

ONSITE

OFFSITE

Engineering Support Team	Health Physics Support Team	Communications Support Team	Logistics Support Team	Public Affairs	

General Office Central Center/
Emergency Operations Facility

Communications Matrix

	Control Room	Technical Support Center	Operational Support Center	General Office Control Center	Emergency Operations Facility	Power Controller	NRC Offsite	Michigan State Police	Van Buren Cty EOC	Offsite Monitoring Teams
Offsite Monitoring Teams	D	D	B,D*	---	B,D*	---	---	---	---	D
Van Buren Cty EOC	A*,B	A*,B	B	B	A,B	B	B	B	---	
Michigan State Police	A*,B	A*,B	B	B	A*,B	B	B	---		
NRC Offsite	A*,B	A*,B	B	B	A*,B	B	---			
Power Controller	A*,B	A*,B	B	B	B	---				
Emergency Operations Facility	A*,B, C,D	A*,B, C,D	B,C, D*	A*,B	E,F,H*					
General Office Control Center	A*,B	A*,B	B	E						
Operational Support Center	B,C*, D	A*,B, C,D,F	E							
Technical Support Center	B,C*, E,F,G	E,G*								
Control Room	E									

A = Dedicated telephones
B = Commercial telephones
C = Intraplant telephones
D = Radio
E = Face-to-face
F = Intercom
G = Sound powered telephones
H = PA System

* = Preferred method

ei0780-0007d-93

Proc No EI-3
Revision 5
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: COMMUNICATIONS AND NOTIFICATIONS

1. Prepared

[signature] 5/18/83
Originator Date
FOR EP DELONG

2. QA Concurrence

NA
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3. Recommend Approval/Q-List Yes No

[signature] 5/18/83
Department Head Date

4. PRC Reviewed

R.M. Kuch 5/18/83
PRC 83-010 Date

5. Approved

James Rang for 5/20/83
Plant Manager Date

6. ATMS Incorporated

5/20/83
Date

7. Biennial Review

Date

TITLE: COMMUNICATIONS AND NOTIFICATIONS
Table of Contents

TITLE: COMMUNICATIONS AND NOTIFICATIONS

1.0 PERSONNEL RESPONSIBILITY

a. The Site Emergency Director (SED) shall assure offsite notifications are performed per EI-2.1 and onsite notifications are performed per this procedure.

b. Upon activation of the Technical Support Center (TSC), the Communicator (described in EI-4.1) shall perform the notifications requiring regular updates, including Power Controller/General Office Control Center/Emergency Operations Facility, State, County and Nuclear Regulatory Commission. Prior to activation of the TSC, the SED shall delegate this function.

2.0 PURPOSE

To provide for emergency communications to onsite personnel and offsite agencies.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. Initial notification shall be made at Unusual Event. Followup notification shall be made as conditions warrant or the emergency escalates.

b. Alert and above followup notifications shall be made at approximately 15 minute intervals.

4.0 COMMUNICATIONS AND NOTIFICATIONS

4.1 ONSITE NOTIFICATIONS

a. The emergency siren shall be sounded at the Alert, Site Area Emergency or General Emergency.

b. The emergency siren shall be a continuous two minute blast.

c. The Plant Public Address System shall be used to notify Plant personnel of the location and nature of the emergency.

d. Additional information shall be provided to Plant personnel over the Public Address System as conditions warrant or the emergency escalates.

4.2 OFFSITE NOTIFICATIONS

4.2.1 Power Controller/General Office Control Center/Emergency Operations Facility, State, County and NRC

a. The Communicator shall use Attachment 1 to provide notification to above listed agencies as required in Initial Conditions and/or Requirements.

b. Information to complete Attachment 1 may be obtained from TSC Status Boards.

c. Notifications to the State, County and NRC should be turned over to the General Office Control Center or Emergency Operations Facility as soon as possible.

d. A final call should be made to all agencies before notification turn over is completed to clearly establish the new point of contact.

4.2.2 Hospital Notification

Notification of hospitals receiving contaminated injured victims should be performed using Attachment 2, "Hospital Notification Form".

4.2.3 Message Authentication

a. In the event commercial telephones are used to send or receive emergency notifications, the following method may be used to ensure the authenticity of a message.

b. Message authentication should be performed in the following cases:

1. The validity of the message is in doubt.

2. The identity of the caller is in doubt.

3. The message requires extreme or unusual action (for example, public evacuation).

4. At the option of the SED, Communicator, or offsite contact.

c. Message authentication by the Palisades Staff shall be performed by informing the offsite caller that you will return the call. Return the call using the telephone number listed in EI-2.1 or EI-3. Re-establish contact with the original caller.

d. Message authentication by offsite organizations shall be performed at their request. Request that the organization return the call using the Palisades Plant telephone number listed in their emergency plan, procedure or call list. After contact is re-established, re-transmit the message.

5.0 ATTACHMENTS

a. Attachment 1, "Emergency Notification Form"

b. Attachment 2, "Hospital Notification Form"

c. Attachment 3, "Communications Matrix"

d. Attachment 4, "Emergency Call List"

EMERGENCY NOTIFICATION FORM

_____ 1. NAME/TITLE/TELEPHONE # PLANT COMMUNICATOR: _____

_____

_____ 2. LOCATION - PALISADES PLANT

A. Message # _____ Date: _____ Time: _____
B. Control Room _____ C. Technical Support Center _____

_____ 3. THIS IS _____ IS NOT _____ A DRILL OR EXERCISE (CHECK ONE)

_____ 4. CLASS OF EMERGENCY (check one)

A. Time declared _____ D. Site Area _____
B. Unusual Event _____ E. General _____
C. Alert _____

_____ 5. DESCRIPTION OF EVENT; CHANGE OF STATUS: _____

_____

_____

_____

_____

_____ 6. PROGNOSIS (CHECK ONE)

A. Stable _____ C. De-Escalating _____
B. Escalating _____ D. Terminating _____

_____ 7. PLANT EMERGENCY RESPONSE ACTIONS UNDERWAY (CHECK)

A. Offsite assistance previously requested: Yes___ No___

B. Fire _____ D. Ambulance _____
C. Police _____ E. Hospital _____
F. Other _____

G. Site Evacuation: Yes ___ No ___ Limited ___

_____

H. Onsite Monitoring Teams Dispatched: Yes_____ No_____
I. Offsite Monitoring Teams Dispatched: Yes_____ No_____

EMERGENCY NOTIFICATION FORM

_____ 8. RADIOLOGICAL RELEASE DATA

A. Potential for release: Yes_____ No_____
B. Actual Release: Yes_____ No_____
C. Time of Release _____
D. Airborne _____
E. Waterborne _____
F. Surface Spill _____
G. Potential Release Duration, hours (estimated) _____

_____ 9. METEOROLOGICAL DATA

A. Stability Class _____
Based on ΔT° (°C) _____ ΔZ(m)
or _____ Sigma Theta (degrees)
B. Wind Speed, mph _____
C. Wind Direction, degrees (from) _____
D. Downwind Sector: _____ _____

_____ 10. OFFSITE DOSE RADIOLOGICAL RELEASE DATA

A. Estimated _____ Measured _____ (check one)
B. Effluent Point: _____
C. Noble Gas Release Rate, Ci/Sec: _____
D. Average Energergy per Disintegration, E, MeV: _____
E. Equivalent I-131 Release Rate, Ci/sec: _____
F. Potential Release Duration, hours: _____

_____ 11. CALCULATED OFFSITE DOSE

	Site Boundary			
A. Distance, miles	.5	2	5	10
B. Whole Body Gamma Dose Rate, rem/hr	____	____	____	____
C. Whole Body Gamma Dose, rem	____	____	____	____
D. Child Thyroid Dose Rate, rem/hr	____	____	____	____
E. Child Thyroid Dose, rem	____	____	____	____

F. Additional Data: _____

_____

EMERGENCY NOTIFICATION FORM

____ 12. PROTECTIVE ACTION RECOMMENDATIONS

	Sector(s)	Miles
A. None		
B. Sheltering		
C. Precautionary Evacuation		
D. Evacuation		
E. Contamination Control		
F. Food		
G. Water		
H. Milk		
I. Other _____		

____ 13. REMARKS/ADDITIONAL INFORMATION: _____

_____

_____

____ 14. THIS IS ____ IS NOT ____ A DRILL/EXERCISE (CHECK ONE)

HOSPITAL NOTIFICATION FORM

1. Communicator

   A. Name: _____

   B. Title: _____

   C. Telephone Number: _____

2. Location: Palisades Plant

3. Number of victims: _____

4. Method of transport: _____

   Estimated time of arrival: _____

5. Extent of injuries: _____

   _____

   _____

   _____

6. First aid and/or decontamination procedures initiated: _____

   _____

   _____

   _____

7. Contamination levels: _____

   _____

   _____

   _____

Communications Matrix

	Control Room	Technical Support Center	Operational Support Center	General Office Control Center	Emergency Operations Facility	Power Controller	NRC Offsite	Michigan State Police	Van Buren Cty EOC	Offsite Monitoring Teams
Offsite Monitoring Teams	D	D	B,D*	---	B,D*	---	---	---	---	D
Van Buren Cty EOC	A*,B	A*,B	B	B	A,B	B	B	B	---	
Michigan State Police	A*,B	A*,B	B	B	A*,B	B	B	---		
NRC Offsite	A*,B	A*,B	B	B	A*,B	B	---			
Power Controller	A*,B	A*,B	B	B	B	---				
Emergency Operations Facility	A*,B, C,D	A*,B, C,D	B,C, D*	A*,B	E,F,H*					
General Office Control Center	A*,B	A*,B	B	E						
Operational Support Center	B,C*, D	A*,B, C,D,F	E							
Technical Support Center	B,C*, E,F,G	E,G*								
Control Room	E									

A = Dedicated telephones
B = Commercial telephones
C = Intraplant telephones
D = Radio
E = Face-to-face
F = Intercom
G = Sound powered telephones
H = PA System

* = Preferred method

ei1180-0007d-93

EMERGENCY CALL LIST

Medical

Memorial Hospital, St Joseph
Mercy Hospital, Benton Harbor
South Haven Community Hospital

Dale K Morgan, MD, South Haven
David B Witte, MD, South Haven

Local Response

City of South Haven
Board of Public Utilities

State Response

Michigan State Police
Emergency Services Division, Lansing

Michigan State Water
Resources Commission

Indiana Civil Defense
Indiana State Police

Federal Response

Department of Energy
Radiological Assistance Program

Insurers

American Nuclear Insurers

Nuclear Mutual Limited
Insurers

Technical Support

Institute of Nuclear
Power Operations

REMS

Radiation Emergency Management
Services - Medical Consultant

Proc No EI-5
Revision 1
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: REENTRY/RECOVERY

1. Prepared

R a D [illegible] 5-19-83
Originator Date

2. QA Concurrence

Not Required _____
Date

3. Recommend Approval/Q-List (Yes) No

J R Lewis for LW Pan 5-19-83
Department Head Date

4. PRC Reviewed

P Hijeck 5/19/83
PRC 83-010 Date

5. Approved

James Rang for 5/20/83
Plant Manager Date

6. ATMS Incorporated

5/23/83
Date

7. Biennial Review

_____ _____
Date

TITLE: REENTRY/RECOVERY

Table of Contents

TITLE: REENTRY/RECOVERY

1.0 PURPOSE

To provide guidelines for reentry/recovery of the plant following implementation of Site Emergency Plan. Specific actions are dependent on circumstances.

2.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

2.1 Specific reentry/recovery procedures are prepared by Technical Support Center staff at the direction of the Site Emergency Director or by the EOF staff at the direction of the Ekmergency Officer.

2.2 All reentry/recovery actions will be deliberate and preplanned using personnel whose experience and expertise are best suited to the required actions.

2.3 Radiation exposure of personnel involved in reentry/recovery shall be as low as reasonably achievable. Limits imposed may be dependent upon specific circumstances and risk versus benefit. In any case, radiation exposure should be controlled within the limits of Administrative Procedure 7.04.

2.4 A log should be maintained of important actions and persons performing the actions, using Attachments 1 and 2 to this procedure.

2.5 Personnel responsible:

2.5.1 Site Emergency Director or Emergency Officer is responsible for escalating, downgrading or terminating the emergency.

2.5.2 Technical Support Center staff or EOF staff is responsible for providing reentry/recovery procedures.

3.0 PROCEDURE

3.1 GUIDELINES FOR INITIATING REENTRY PHASE

3.1.1 When initiating the reentry phase, the plant should be in a stable condition assessed by the Site Emergency Director.

3.1.2 Prior to authorizing reentry, determine the following:

a. Plant areas potentially affected by radiation/contamination from radiation surveillance data.

b. That adequate radiation survey instrumentation is available.

c. Radiation exposures of personnel expected to participate in reentry

3.1.3 Preplan survey team activities to include:

a. Areas to be surveyed

b. Anticipated radiation and contamination levels

c. Radiation survey equipment

d. Shielding availability

e. Protective clothing and equipment required

f. Access control procedures

g. Exposure limits and dosimetry requirements

h. Decontamination requirements

i. Communications required

3.1.4 Designate a reentry team consisting of the following as required:

a. Operations personnel (1)

b. Chemistry/Health Physics personnel (1)

c. Maintenance personnel (1)

d. Engineering/Supervisory personnel (1)

3.1.5 Reentry into areas should encompass the following goals (in order of priority):

a. Determination of initial required recovery operations.

b. Visual observations of hazards or potential hazards associated with recovery operations.

c. Conduct radiation survey of plant areas and define radiological problem areas.

d. Isolate and post plant radiation areas, high radiation areas and contaminated areas.

3.1.6 After reentry team procedures are complete, assess the data, determine the extent of recovery operation required and initiate Section 3.2 - Recovery.

3.2 RECOVERY

Recovery will occur in three phases.

3.2.1 When recovery is to commence, the Site Emergency Director or Emergency Officer is responsible for notification of offsite organizations (ie, NRC, Consumers Power Company, Van Buren and Berrien Counties, State of Michigan, etc).

3.2.2 Phase 1 recovery operations:

a. Designate applicable recovery teams to perform the following:

1. Assessment of equipment damage

2. Installation of shielding

3. Posting of controlled areas

4. Application of clearance tags

5. Decontamination and cleanup necessary to place plant in an acceptable long-term condition.

b. Evaluate all results from Phase 1 recovery operations and determine areas affected by the emergency. Do not initiate

Phase 2 recovery operations until Phase 1 has been completed and has clearly defined affected areas of the plant.

3.2.3 Phase 2 recovery operations:

a. Designate applicable recovery teams to perform the following:

1. Detailed investigation into the accident causes and consequences to the plant and the environment.

2. Evaluate work required to repair/modify plant equipment or operating procedures.

3. Make necessary repairs/modifications as authorized.

4. Develop and institute testing procedures to determine fitness of plant components and systems for return to service.

b. Phase 3 may be initiated at the completion of Phase 2 operations or upon termination of the emergency, whichever occurs sooner.

3.2.4 Phase 3 recovery operations:

Develop a report to be forwarded to Consumers Power Company management to inform them of the extent of recovery operations which will be required following termination of the emergency. Management will form a long-term recovery organization in accordance with Section 3.3 of this procedure.

3.3 LONG-TERM RECOVERY ORGANIZATION GUIDELINES

3.3.1 Upon termination of the emergency, at the discretion of management and the Site Emergency Director, a long-term recovery organization will be set and may consist of at least the following:

a. Recovery Operations Manager

b. Technical Working Group

c. Task Management/Scheduling Group

d. Technical Support Group

e. Plant Operations/Maintenance Group

f. Waste Management Group

g. Plant Modifications Group

h. Industrial Advisory Group

i. Public/Government Affairs Group

j. Administration and Logistics Group

k. Chemistry/Health Physics Support Group

The structure of the long-term recovery organization is dependent on the nature of the accident and the situation after the accident.

3.3.2 The Recovery Operations Manager may be the Plant Manager and will be responsible for recovery activities including technical decisions

about courses of action. He will coordinate the functional activities of the various groups.

3.3.3 The Technical Working Group will propose and evaluate course of action and address other major technical aspects of the recovery operations. It will include the heads of the various Palisades technical groups in the recovery organization as well as outside vendors, Architect-Engineers, NRC experts and others as appropriate.

3.3.4 The Task Management/Scheduling Group will consist of persons designated by the Recovery Operations Manager and will identify and plan tasks and monitor and coordinate tasks in progress.

3.3.5 The Technical Support Group will provide engineering analysis support, procedures development, data analysis, technical support to the Control Room and other technical tasks as required.

3.3.6 The Plant Operations/Maintenance Group will be responsible for plant operations and maintenance and all other routine activities in and around the plant.

3.3.7 The Waste Management Group is responsible for proper management of waste processing and disposal, including onsite decontamination of facilities contaminated during the emergency.

3.3.8 The Plant Modifications Group is responsible for providing engineering, design, materials and construction necessary for any required modifications to plant systems, components or structures.

3.3.9 The Industry Advisory Group will be staffed by experts from outside Consumers Power Company to augment the technical abilities of the long-term recovery organization and provide independent technical assessment based on experience rather than engineering analysis.

3.3.10 The Public/Government Affairs Group will coordinate the exchange of information with public and government agencies regarding recovery operations. Legal council will also be part of this organization.

3.3.11 The Administration and Logistics Group will provide general services such as manpower, communications, transportation and temporary office space as required.

3.3.12 The Chemistry/Health Physics Group will provide chemical analysis services and health physics support such as dose assessment, isotope identification, job coverage and ALARA planning as required.

4.0 ATTACHMENTS

4.1 Attachment 1, Record of Major Actions Performed

4.2 Attachment 2, Record of Major Actions Performed, Continuation Page

RECORD OF MAJOR ACTIONS PERFORMED

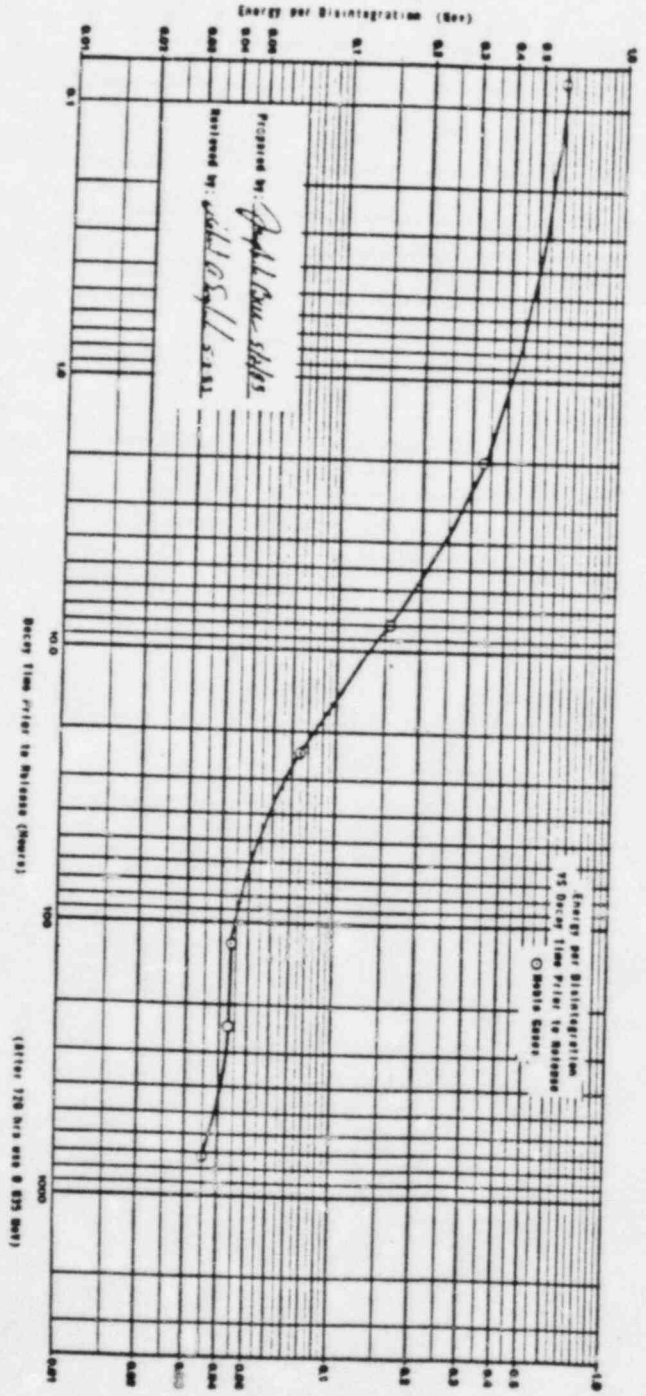
Date/Time of Emergency: _____

Date/Time	Recovery Action	Accomplished By	Reviewed By

RECORD OF MAJOR ACTIONS PERFORMED
(Continuation Page)

Date/Time	Recovery Action	Accomplished By	Reviewed By

ENERGY PER DISINTEGRATION
vs
DECAY TIME PRIOR TO RELEASE FOR NOBLE GAS



Proc No EI 4.3
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Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
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EMERGENCY OPERATIONS FACILITY ACTIVATION

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[signature] 5/18/83
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FOR RA DELOCKS

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N/A
Date

3. Recommend Approval/Q-List (Yes) No

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Department Head Date

4. PRC Reviewed

[signature] 5/19/83
PRC 83-010 Date

5. Approved

[signature] 5/20/83
Plant Manager Date

6. ATMS Incorporated

5-23-83
Date

7. Biennial Review

Date

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

Table of Contents

Attachments

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

1.0 PERSONNEL RESPONSIBILITIES

The Site Emergency Director (SED) shall implement this procedure.

2.0 PURPOSE

To provide a means of activating the Emergency Operations Facility (EOF) in preparation for staffing by General Office personnel. Also, to provide interface capabilities with the General Office Control Center.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. The EOF shall be activated at the Site Area Emergency classification or above. The EOF may be activated before this time at the option of the SED, or at the request of the General Office Control Center Director.

b. The General Office Control Center shall function as the EOF until such time the EOF is adequately manned.

4.0 ACTIVATION OF THE EMERGENCY OPERATIONS FACILITY

4.1 FACILITY DESCRIPTION

a. The EOF consists of the South Haven Conference Center with headquarters located in the conference building. Refer to Attachment 1 for a floor plan.

b. Additional buildings are available to support lodging and food services.

c. The EOF location is detailed on Attachment 3.

4.2 ACTIVATION

a. The SED shall dispatch plant personnel generally Chemistry/Health Physics personnel from the Operational Support Center) to the EOF.

b. Plant personnel should perform habitability monitoring during activation of the EOF until this function can be transfered to GO personnel.

c. Plant personnel should arrange the facility in accordance with Attachment 1.

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

4.3 ORGANIZATION

The EOF organization shall be as described in the GOCC/EOF Emergency Implementation Procedures.

4.4 COMMUNICATION

Communications methods and alternates are identified on Attachment 2.

4.5 EQUIPMENT

EOF equipment shall be as described in EI-16.1.

4.6 EVACUATION

a. If airborne contamination levels warrant (>20% MPC) or radiation levels exceed 100 mrem/hr the EOF Director shall consider evacuation/relocation, or use of protective measures (including respiratory protection of thyroid blocking agent).

b. Before full staffing the plant personnel should perform habitability monitoring to ensure these levels are not exceeded.

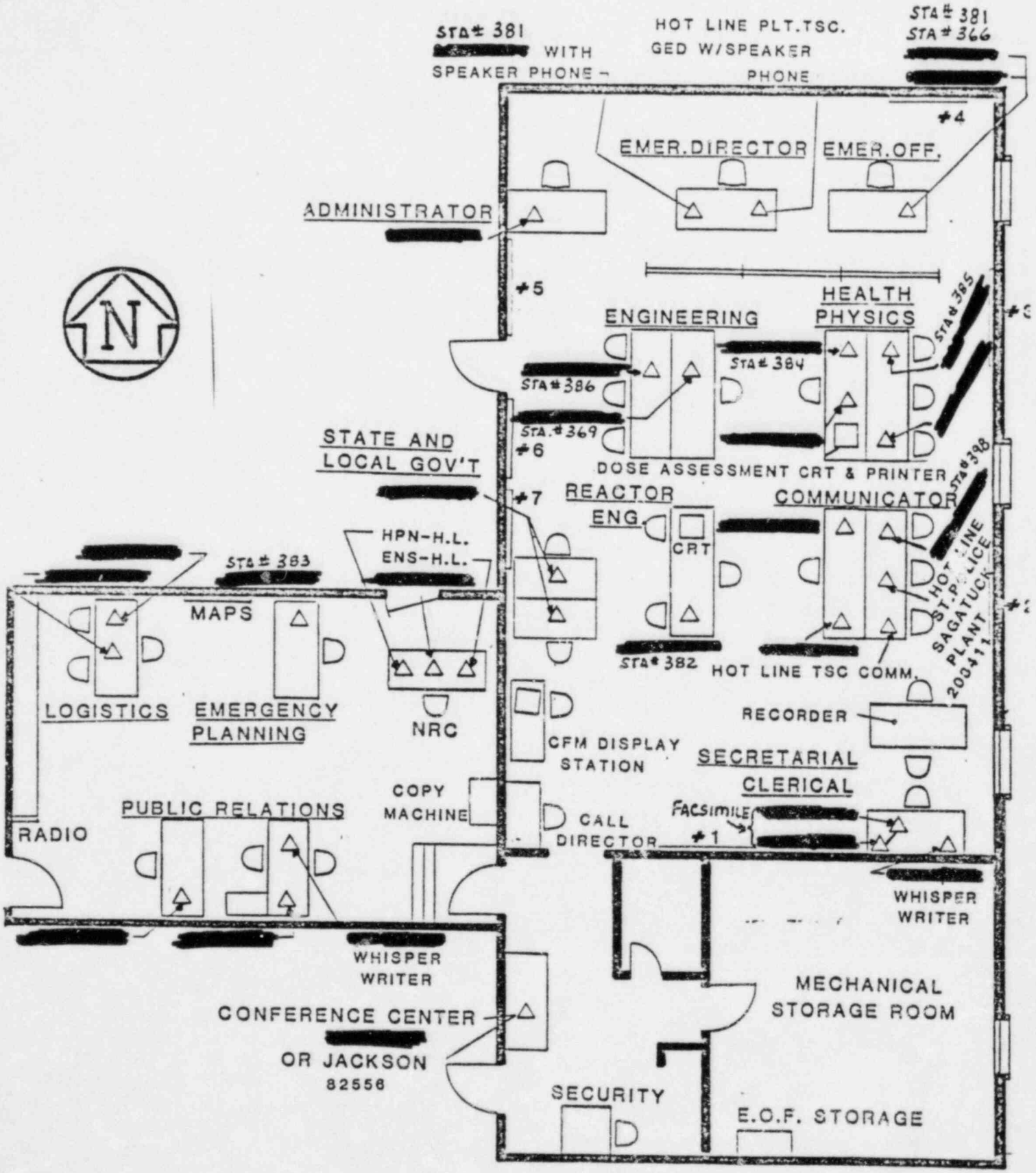
5.0 ATTACHMENTS

5.1 Attachment 1, "Emergency Operations Facility Floor Plan"

7.2 Attachment 2, "Communications Matrix"

7.3 Attachment 3, "Palisades Nuclear Plant/Emergency Operating Facility Location Map"

EMERGENCY OPERATIONS FACILITY FLOOR PLAN



ei0583-0011b-93-154

EXHIBIT F-2

4-27-83

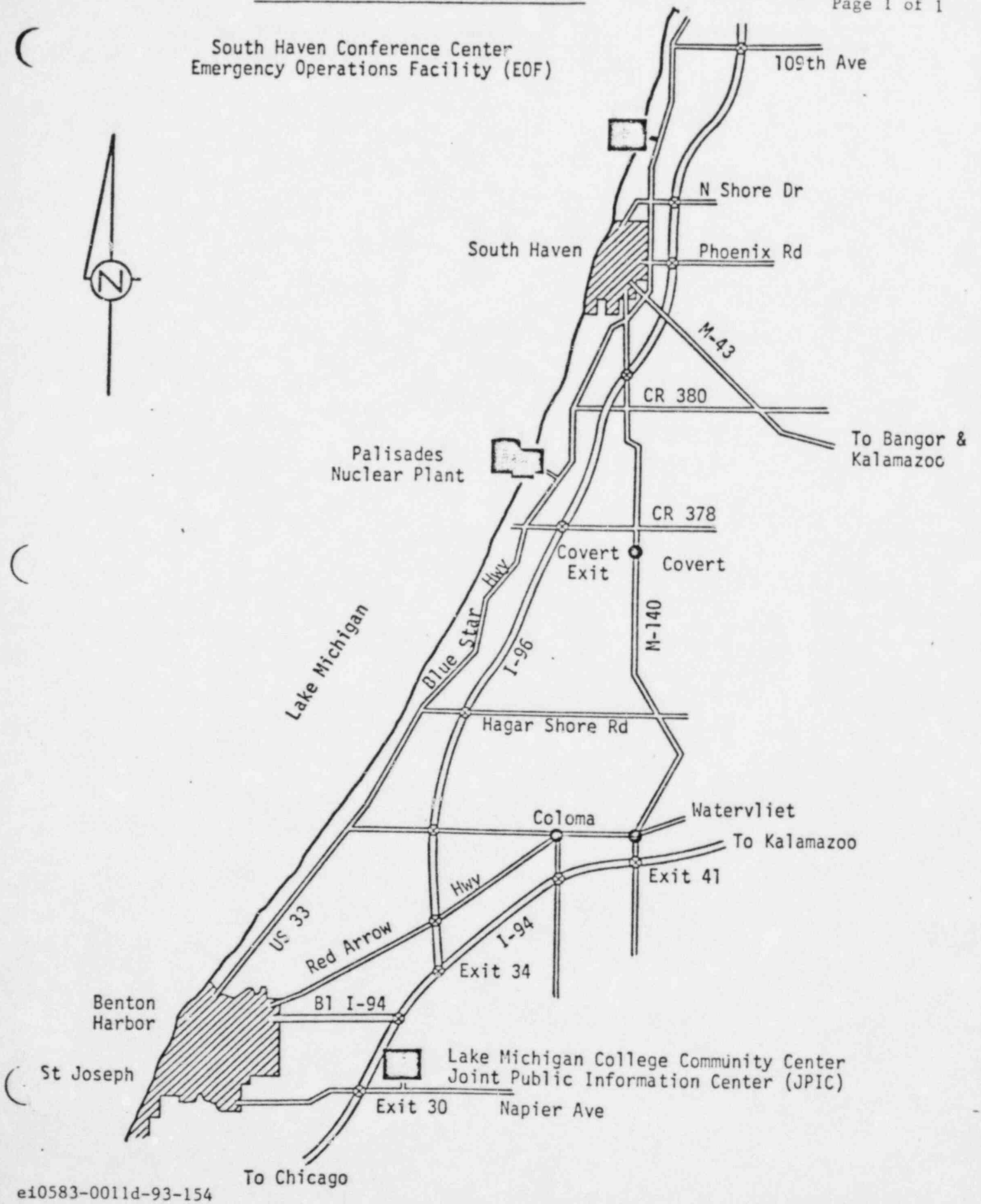
Communications Matrix

	Control Room	Technical Support Center	Operational Support Center	General Office Control Center	Emergency Operations Facility	Power Controller	NRC Offsite	Michigan State Police	Van Buren Cty EOC	Offsite Monitoring Teams
Offsite Monitoring Teams	D	D	B,D*	---	B,D*	---	---	---	---	D
Van Buren Cty EOC	A*,B	A*,B	B	B	A,B	B	B	B	---	
Michigan State Police	A*,B	A*,B	B	B	A*,B	B	B	---		
NRC Offsite	A*,B	A*,B	B	B	A*,B	B	---			
Power Controller	A*,B	A*,B	B	B	B	---				
Emergency Operations Facility	A*,B, C,D	A*,B, C,D	B,C, D*	A*,B	E,F,H*					
General Office Control Center	A*,B	A*,B	B	E						
Operational Support Center	B,C*, D	A*,B, C,D,F	E							
Technical Support Center	B,C*, E,F,G	E,G*								
Control Room	E									

A = Dedicated telephones
B = Commercial telephones
C = Intraplant telephones
D = Radio
E = Face-to-face
F = Intercom
G = Sound powered telephones
H = PA System

* = Preferred method

PALISADES NUCLEAR PLANT/EMERGENCY OPERATIONS FACILITY LOCATION MAP



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Proc No EI 4.3
Revision 4
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

1. Prepared

Originator FOR RA DELOOS — 5/18/83 Date

2. QA Concurrence

N/A — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — 5/18/83 Date

4. PRC Reviewed

R H Block per PRC 83-010 — 5/19/83 Date

5. Approved

James Rang — Plant Manager — 5/20/83 Date

6. ATMS Incorporated

5-23-83 Date

7. Biennial Review

_____ Date

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

Table of Contents

Attachments

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

1.0 PERSONNEL RESPONSIBILITIES

The Site Emergency Director (SED) shall implement this procedure.

2.0 PURPOSE

To provide a means of activating the Emergency Operations Facility (EOF) in preparation for staffing by General Office personnel. Also, to provide interface capabilities with the General Office Control Center.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. The EOF shall be activated at the Site Area Emergency classification or above. The EOF may be activated before this time at the option of the SED, or at the request of the General Office Control Center Director.

b. The General Office Control Center shall function as the EOF until such time the EOF is adequately manned.

4.0 ACTIVATION OF THE EMERGENCY OPERATIONS FACILITY

4.1 FACILITY DESCRIPTION

a. The EOF consists of the South Haven Conference Center with headquarters located in the conference building. Refer to Attachment 1 for a floor plan.

b. Additional buildings are available to support lodging and food services.

c. The EOF location is detailed on Attachment 3.

4.2 ACTIVATION

a. The SED shall dispatch plant personnel generally Chemistry/Health Physics personnel from the Operational Support Center) to the EOF.

b. Plant personnel should perform habitability monitoring during activation of the EOF until this function can be transfered to GO personnel.

c. Plant personnel should arrange the facility in accordance with Attachment 1.

TITLE: GENERAL OFFICE CONTROL CENTER/
EMERGENCY OPERATIONS FACILITY ACTIVATION

4.3 ORGANIZATION

The EOF organization shall be as described in the GOCC/EOF Emergency Implementation Procedures.

4.4 COMMUNICATION

Communications methods and alternates are identified on Attachment 2.

4.5 EQUIPMENT

EOF equipment shall be as described in EI-16.1.

4.6 EVACUATION

a. If airborne contamination levels warrant (>20% MPC) or radiation levels exceed 100 mrem/hr the EOF Director shall consider evacuation/relocation, or use of protective measures (including respiratory protection of thyroid blocking agent).

b. Before full staffing the plant personnel should perform habitability monitoring to ensure these levels are not exceeded.

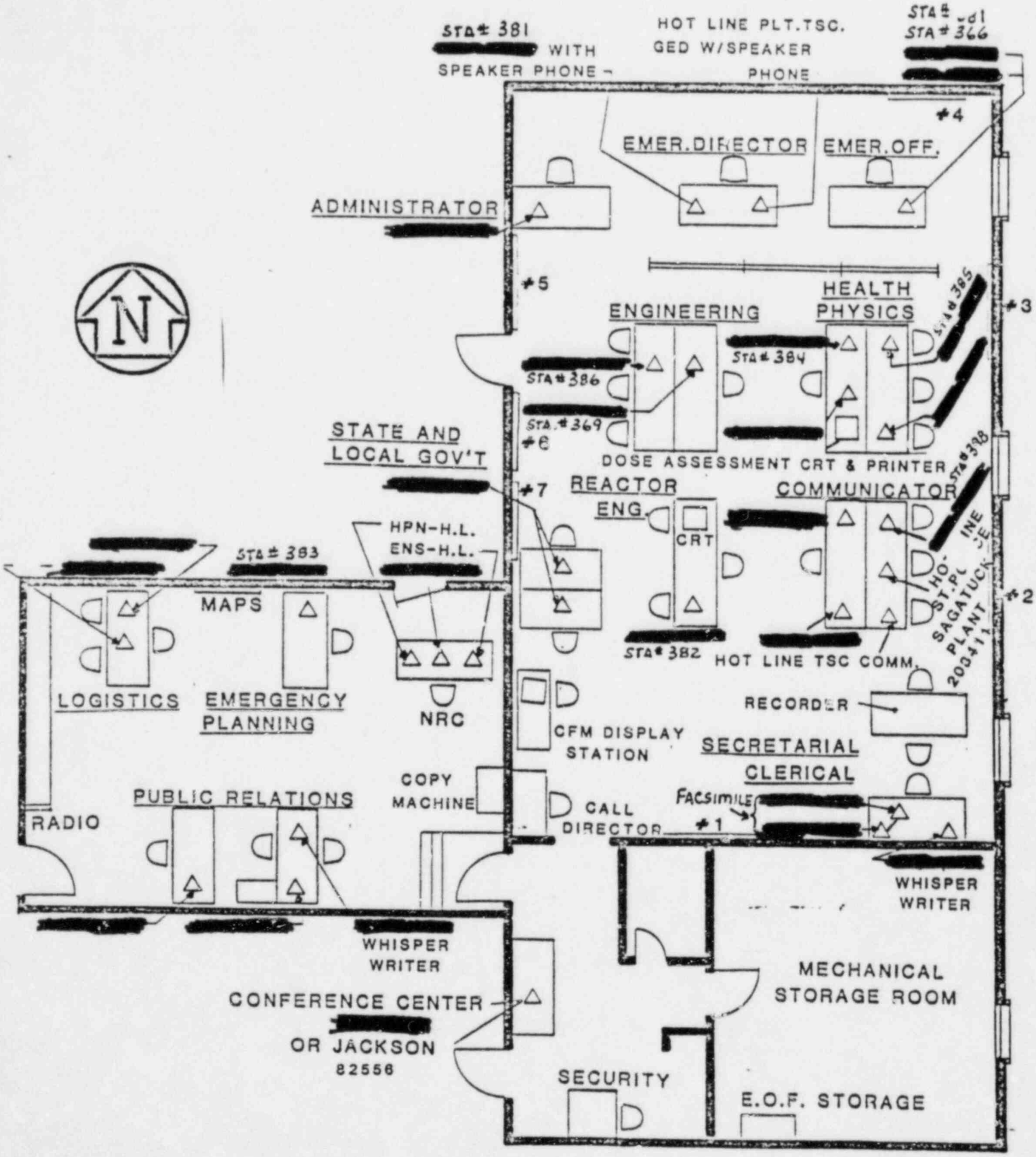
5.0 ATTACHMENTS

5.1 Attachment 1, "Emergency Operations Facility Floor Plan"

7.2 Attachment 2, "Communications Matrix"

7.3 Attachment 3, "Palisades Nuclear Plant/Emergency Operating Facility Location Map"

EMERGENCY OPERATIONS FACILITY FLOOR PLAN



ei0583-0011b-93-154

EXHIBIT F-2

4-27-83

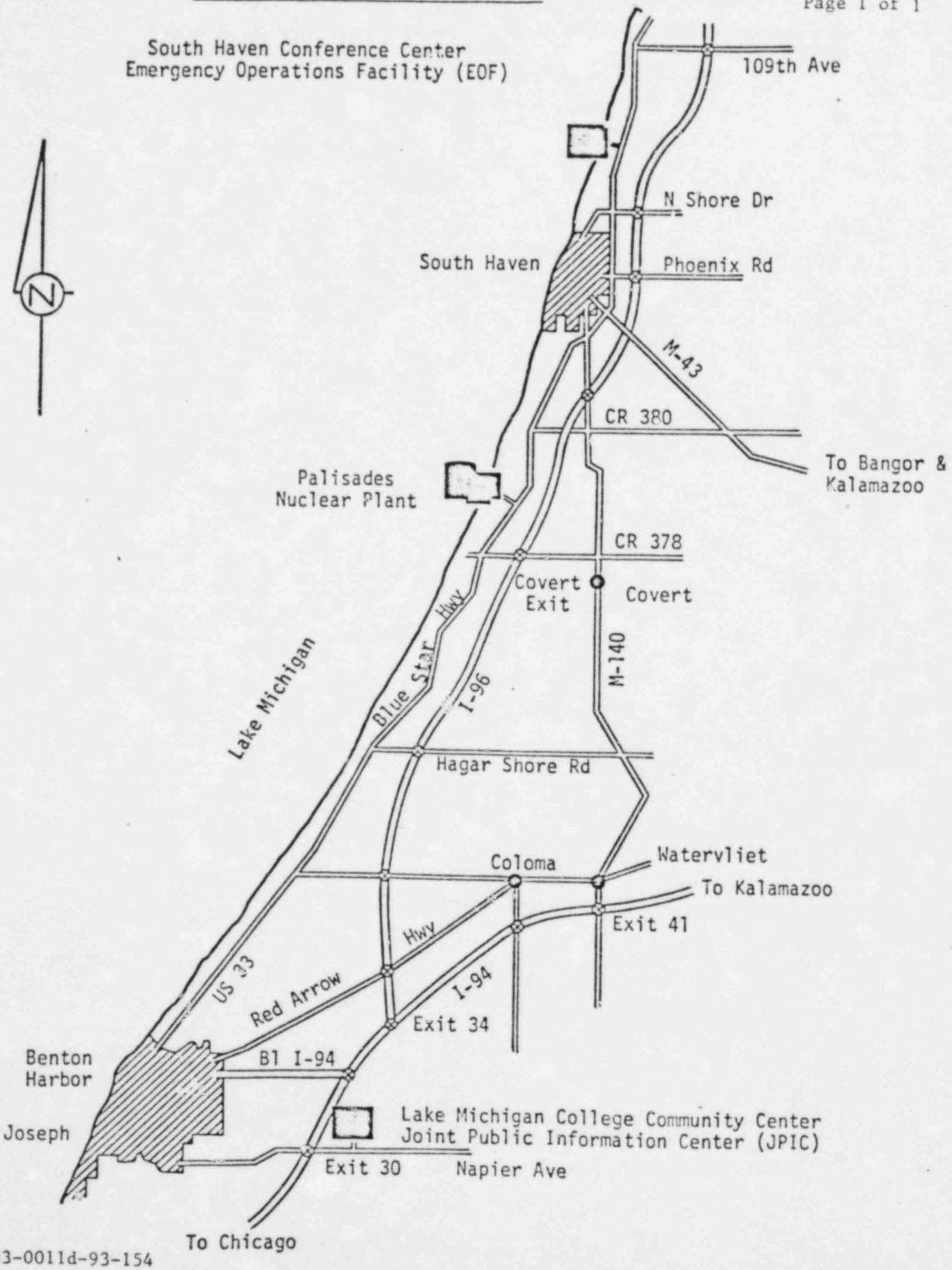
Communications Matrix

	Control Room	Technical Support Center	Operational Support Center	General Office Control Center	Emergency Operations Facility	Power Controller	NRC Offsite	Michigan State Police	Van Buren Cty EOC	Offsite Monitoring Teams
Offsite Monitoring Teams	D	D	B,D*	---	B,D*	---	---	---	---	D
Van Buren Cty EOC	A*,B	A*,B	B	B	A,B	B	B	B	---	
Michigan State Police	A*,B	A*,B	B	B	A*,B	B	B	---		
NRC Offsite	A*,B	A*,B	B	B	A*,B	B	---			
Power Controller	A*,B	A*,B	B	B	B	---				
Emergency Operations Facility	A*,B, C,D	A*,E, C,D	B,C, D*	A*,B	E,F,H*					
General Office Control Center	A*,B	A*,B	B	E						
Operational Support Center	B,C*, D	A*,B, C,D,F	E							
Technical Support Center	B,C*, E,F,G	E,G*								
Control Room	E									

A = Dedicated telephones
B = Commercial telephones
C = Intraplant telephones
D = Radio
E = Face-to-face
F = Intercom
G = Sound powered telephones
H = PA System

* = Preferred method

PALISADES NUCLEAR PLANT/EMERGENCY OPERATIONS FACILITY LOCATION MAP



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Proc No EI-2.1
Revision 9
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: EMERGENCY ACTIONS/NOTIFICATIONS/RESPONSIBILITIES

1. Prepared

Originator FOR RA DELONG — Date 5/18/83

2. QA Concurrence

NA — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — Date 5/18/83

4. PRC Reviewed

R H Kinch PRC 83 010 — Date 5/19/83

5. Approved

James Pinkton — Plant Manager — Date 5/20/83

6. ATMS Incorporated

Date 5-23-83

7. Biennial Review

Date

TITLE: EMERGENCY ACTIONS/NOTIFICATIONS/RESPONSIBILITIES

Table of Contents

Attachments

TITLE: EMERGENCY ACTIONS/NOTIFICATIONS/RESPONSIBILITIES

1.0 PERSONAL RESPONSIBILITIES

The Site Emergency Director (SED) shall implement this procedure.

2.0 PURPOSE

2.1 To provide the SED with a prepared course of action for each emergency identified in EI-1, Activation of the Site Emergency Plan/Emergency Classification.

2.2 To define the SEDs responsibilities in an emergency.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

This procedure shall be implemented after completion of EI-1.

4.0 EMERGENCY ACTIONS/NOTIFICATIONS/RESPONSIBILITIES

4.1 EMERGENCY ACTIONS/NOTIFICATIONS

a. The SED shall delegate the Actions/Notifications identified in EI-1 and marked on Attachment 1. Normally assigned personnel/groups are identified in fourth column.

b. The assignee should note the category of action as marked in column 1.

1. Mandatory Actions (M) - Actions that should be performed within one hour.

2. Subsequent Actions (S) - Actions that should be performed in an expeditious manner as conditions, time and personnel permit.

3. If Needed Actions (I) - Actions that are not required in every case, but may be needed.

c. The assignee shall note the frequency the action should be performed in Column 5.

d. Appropriate actions/notifications should be turned over upon activation of the General Office Control Center or Emergency Operations Facility. Note the time of turnover on Attachment 1 and notify the SED.

NOTE: A line through the box for time of turnover indicates this action/notification may not be appropriate for turned over to the GOCC/EOF.

TITLE: EMERGENCY ACTIONS/NOTIFICATIONS/RESPONSIBILITIES

4.2 SITE EMERGENCY DIRECTOR RESPONSIBILITIES

a. In addition to the responsibilities listed in Attachment 1, the SED shall also perform or delegate those actions and responsibilities listed below.

1. Command and control of the Technical Support Center and Operational Support Center. Refer to EI-4.1 and EI-4.2.

*2. Approve recommendations to state and local agencies regarding protective actions for the public. Refer to EI-6.

*3. Approve decisions regarding Site evacuation. Refer to EI-13.

4. Maintain a log of events and actions during the emergency and subsequent recovery.

5. Request Federal assistance as necessary.

6. Have PA announcements regarding emergency conditions made at regular intervals or when significant changes occur.

7. Limit personnel access to the site.

8. Ensure on site first aid is performed and accident victims are transported to hospitals as necessary. Refer to EI-14.

*9. Authorization to exceed the 10CFR20 dose limits for emergency workers. The following guidelines should be used to establish emergency dose limits:

TITLE: EMERGENCY ACTIONS/NOTIFICATIONS/RESPONSIBILITIES

Projected Dose (Rem) to Emergency Team Workers	Category	Comments
Whole Body 25 Thyroid 125	Control exposure of emergency team members to these levels except for lifesaving missions. (Appropriate controls for emergency workers, include time limitations, respirators, and stable iodine.)	Although respirators and stable iodine should be used where effective to control dose to emergency team workers, thyroid dose may not be a limiting factor for lifesaving missions.
Whole body 75 Thyroid (**)	Control exposure of emergency team members performing lifesaving missions to this level. (Control of time of exposure will be most effective.)	

These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take into consideration the impact of existing constraints.

**No specific upper limit is given for thyroid exposure since complete loss might be an acceptable penalty for a life saved.

5.0 ATTACHMENTS

Attachment 1, Emergency Actions/Notifications

*Indicates a responsibility that shall not be delegated.

EMERGENCY/ACTIONS/NOTIFICATIONS

Action Type M, S, or I (From EI-1)	Action/Notification	Reference/Telephone No	Normally Assigned To	Frequency	Turnover to GOCC/EOF (Time)
	1. Notification of Duty and Call Superintendent	Duty Call List	SED/Comm	Initially at Unusual Event	------
	2. Perform Emergency Staff Augmentation	Contact Property Protection Supervisor or Security Shift Leader - EI-2.2	SED/Comm	Initially at Unusual Event	------
	3. General Office Notification Power Controller upon activation transfer notification to GOCC Upon activation transfer notification to Technical Support Center	Dedicated phone or 517-788-0990 Dedicated phone or 82-87001 Dedicated phone or _____	SED/Comm	Initially at Unusual Event Every 15 min above Unusual Event	------
	4. NRC Notification	1. Dedicated phone or 2. 202-951-0550 Bethseda Op Ctr or 3. 301-427-4056 Silver Springs or 4. Health Physics Network *22 (touch tone) 22 (dial phone) or 5. 301-492-7000 Bethseda Central Office	SED/Comm	Initially at Unusual Event Every 15 min above Unusual Event	

EMERGENCY/ACTIONS/NOTIFICATIONS

Action Type M, S, or I (From EI-1)	Action/Notification	Reference/Telephone No	Normally Assigned To	Frequency	Turnover to GOCC/EOF (Time)
	5. State Notification South Haven State Police Post	Dedicated Phone or 616-637-2125 or Security Radio	SED/Comm	Initially at Unusual Event Every 15 min above Unusual Event	
	6. Local Notification Van Buren County Sheriff	Dedicated Phone or 616-657-3101	SED/Comm,	Initially at Unusual Event Every 15 min above Unusual Event	
	7. Initiate Fire Protection Plan	Fire Protection Implementing Procedures	SED/SS	Initially	------
	8. Covert Fire Dept and Ambulance Service	616-764-1313	SED	As Needed	------
	9. Backup Ambulance Service MEDIC 1 (St Joseph) South Haven Ambulance	 925-2141 637-3305	SED	As Needed	------

EMERGENCY/ACTIONS/NOTIFICATIONS

Action Type M, S, or I (From EI-1)	Action/Notification	Reference/Telephone No	Normally Assigned To	Frequency	Turnover to GOCC/EOF (Time)
	10. Hospitals: Benton Harbor Mercy South Haven Community	616-927-5241 or 616-927-5242 616-637-5271	SED	As Needed	
	11. Property Protection Supervisor	Day: Call List Night: At Site Area Emergency Only 616-468-6370	SED	Initially	------
	12. Initiate Onsite Monitoring	EI-8	Chem/HP	Contin-uously	------
	13. Initiate Offsite Monitoring	EI-9	Chem/HP	Contin-uously	------
	14. Perform Offsite Dose Estimates, Obtain Meteorological Data	EI-6.0	Chem/HP	Per EI-6.0	
	15. Perform Post-Accident Sampling	EI-7	Chem/HP	As Needed	------
	16. Perform Environmental Assessment	EI-10	Chem/HP	As Needed	
	17. Activate the Technical Support Center (TSC)	EI-4.1	SED	Initially at Alert	------

EMERGENCY/ACTIONS/NOTIFICATIONS

Action Type M, S, or I (From EI-1)	Action/Notification	Reference/Telephone No	Normally Assigned To	Frequency	Turnover to GOCC/EOF (Time)
	18. Activate the Operational Support Center (OSC)	EI-4.2	SED	Initially at Alert	------
	19. Activate the Emergency Operations Facility (EOF)	EI-4.3	SED	Initially at Site Area Emerg	------
	20. Activate the Joint Public Information Center (JPIC)	Nuclear Plant Emergency Public Information Policies and Procedures	Plant Public Affairs Director	Initially	------
	21. Dispatch liasons to local Emergency Operations Centers		SED	Initially at Site Area Emerg	------
	22. Perform Personnel Accountability	EI-12	SED/ Security	Initially at Alert	------
	23. Evacuate non-essential personnel	EI-13	SED/ Chem/HP/ Security	Initially at Site Area Emerg	------
	24. Notify Plant Public Affairs Director	Call List: (Days) 637-8769 or (night) 82-80333 or 517-788-0333	SED	Initially at Unusual Event	------

EMERGENCY/ACTIONS/NOTIFICATIONS

Action Type M, S, or I (From EI-1)	Action/Notification	Reference/Telephone No	Normally Assigned To	Frequency	Turnover to GOCC/EOF (Time)
	25. Perform Estimate Core Damage	EI-11	Tech	As Needed	
	26. Backup Local Notification Berrien County AND Allegan County	616-983-7141 616-673-5441	SED/Comm	As Needed	
	27. Michigan Dept of Public Health	517-373-1578 (Days) 517-373-0800 (Night)	Chem/HP	As Needed	
	28. US Coast Guard Notification St Joseph Muskegon	616-983-1371 616-759-0951	SED/Comm	As Needed	
	29. South Haven Water Dept Notification	616-637-5211 (Days) 616-637-5151 (Nights)	SED/Comm	As Needed	
	30. Palisades Park Manager Notification	616-764-8272	SED/Comm	As Needed	
	31. Van Buren State Park Manager Notification	616-637-2788	SED/Comm	As Needed	
	32. Federal Aviation Administration South Bend, IN	616-637-8075	SED/Comm	If light fails on Met Tower	
	33. Initiate reentry/recovery	EI-5	SED	-----	------

EMERGENCY/ACTIONS/NOTIFICATIONS

Action Type M, S, or I (From EI-1)	Action/Notification	Reference/Telephone No	Normally Assigned To	Frequency	Turnover to GOCC/EOF (Time)
	34. Initiate Event Report	Admin Procedures No 3.04	SED	Within 24 hrs at Unusual Event within 8 hrs above Unusual Event	------

Proc No EI-6.6
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: GAMMA $\bar{E}$ DETERMINATION

1. Prepared

[signature] 5/19/83
Originator Date
FOR RA DELONG

2. QA Concurrence

NA
Date

3. Recommend Approval/Q-List (Yes) No

[signature] 5/19/83
Department Head Date

4. PRC Reviewed

R Mikesell 5/19/83
PRC 83-510 Date

5. Approved

James Ray for 5/20/83
Plant Manager Date

6. ATMS Incorporated

5-23-83
Date

7. Biennial Review

Date

ei0383-0043d154

TITLE: GAMMA $\bar{E}$ DETERMINATION

Table of Contents

TITIE: GAMMA $\bar{E}$ DETERMINATION

1.0 PERSONNEL RESPONSBILITY

The Chemistry/Health Physics Support Group Leader shall implement this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

This procedure provides a gamma $\bar{E}$ (average gamma energy per disintegration) for input into offsite dose calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per El-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 to EI-6.0, in Section II.1.

c. $\bar{E}$ is dependent on the source of the radionuclide release, the type of accident/release and the time of decay (or time after reactor shutdown. Those parameters should be known prior to performing this procedure. In the event these parameters cannot be determined, the default case for $\bar{E}$ of 0.7 MeV should be used.

4.0 $\bar{E}$ DETERMINATION

a. Determine the source of the release.

b. Determine the decay time in hours and record on worksheet, item (A).

c. Determine $\bar{E}$ from the appropriate section below:

1. Fuel Melt of Fuel Failure - using the time after reactor shutdown as the decay time prior to release, determine $\bar{E}$ using Attachment 1. Fuel melt accidents predominate when determining $\bar{E}$.

NOTE: Fuel failure may be determined using EI-11.

2. Mainsteam and Offgas (Air Ejector) Releases - If the release is coming from a primary to secondary leak and fuel failure or fuel melt is involved, determine $\bar{E}$ from Attachment 1 and use time after shutdown as decay time prior to release. For all other cases use an $\bar{E}$ of 0.134 MeV.

3. Surge Tank, Volume Control Tank, and Degasifier Releases - Use the $\bar{E}$ that corresponds to the six hour time in Attachment 1 (0.180 MeV). This corresponds to a release from the Primary Coolant System (excluding mainsteam releases) without fuel

damage. This value may be used for any release that involves fresh primary coolant.

4. Waste Gas Decay Tank - If the decay time for activity in a Waste Gas Decay Tank is known, then $\bar{E}$ should be determined using Attachment 1 by using six hours as the starting point.

   For example, if the tank contains activity that has decayed for two days, then the $\bar{E}$ from attachment is equal to that for the 48 + 6 = 54 hour time period.

5. Fuel Handling, Sipping and Cask Drop Releases - if the release is coming from a fresh spent fuel bundle (directly out of the reactor core and less than 30 days old), then determine $\bar{E}$ using time after reactor shutdown and Attachment 1. If the release is coming from an old fuel bundle, then use an $\bar{E}$ of 0.035 MeV.

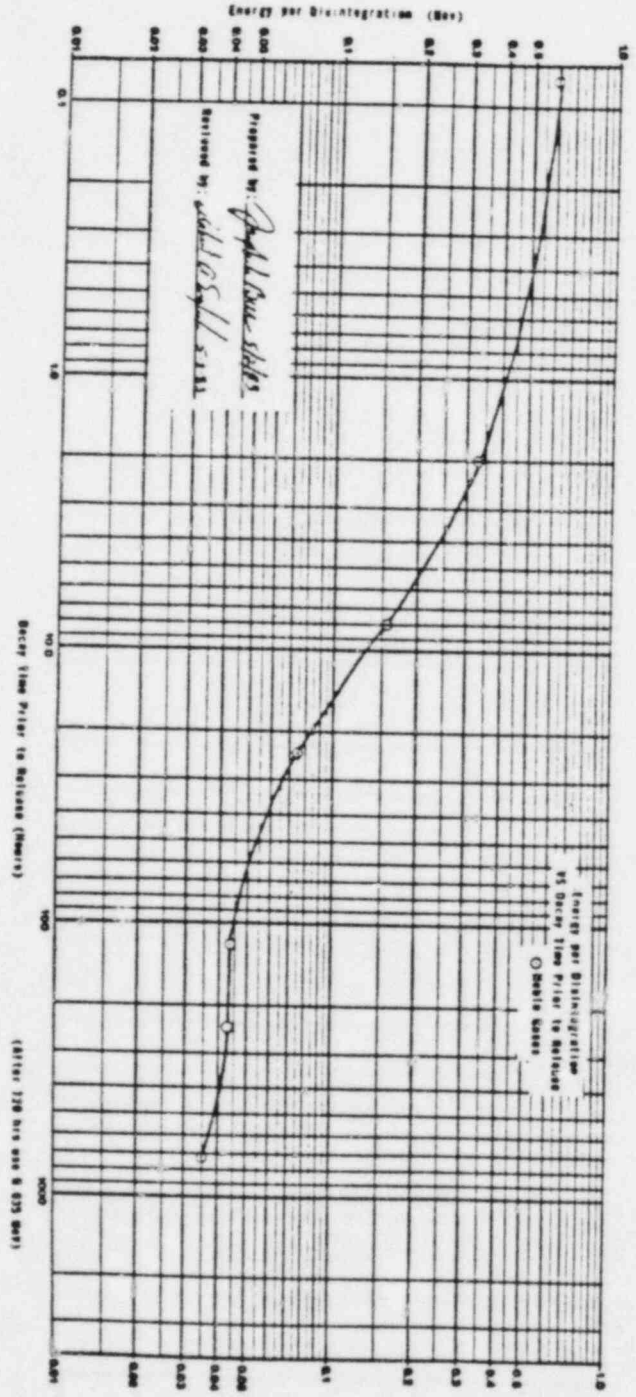
Mark release type and record $\bar{E}$ on worksheet, items (B) and (C) respectively.

d. Proceed to next procedure as required, per EI-6.0.

5.0 ATTACHMENTS

Attachment 1, "Energy Per Disintegration vs Decay Time Prior to Release for Noble Gas"

ENERGY PER DISINTEGRATION
vs
DECAY TIME PRIOR TO RELEASE FOR NOBLE GAS



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Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: PROTECTIVE ACTION RECOMMENDATIONS
FOR OFFSITE POPULATION

1. Prepared

Originator — Date 5/19/83

FOR RA DELONG

2. QA Concurrence

NA

Date

3. Recommend Approval/Q-List (Yes) No

Department Head — Date 5/19/83

4. PRC Reviewed

PRC 53-010 — Date 5/19/83

5. Approved

James Ruy for 5/24/83
Plant Manager — Date

6. ATMS Incorporated

5-23-83
Date

7. Biennial Review

Date

ei0383-0049c154

TITLE: PROTECTIVE ACTION RECOMMENDATIONS
FOR OFFSITE POPULATION

Table of Contents

TITLE: PROTECTIVE ACTION RECOMMENDATIONS
FOR OFFSITE POPULATION

1.0 PERSONNEL RESPONSIBILITY

a. The Site Emergency Director (SED) shall make recommendations for protective actions to offsite agencies. This responsibility shall not be delegated.

b. The Chemistry/Health Physics Group Leader shall implement this procedure and make recommendations to the SED with respect to protective actions. In the absence of a Chemistry/Health Physics Group Leader, the SED shall delegate this responsbility.

2.0 PURPOSE

This procedure provides a basis for making recommendations for offsite protective actions based on offsite dose calculations and offsite monitoring results.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required in EI-6.0.

b. Data and results from this section should be recorded on the Offsite Dose Worksheet, Attachment 1 of EI-6.0, Section VI.

c. Input to this section is obtained from previously completed sections of the Offsite Dose Worksheet. Pertinent data is enclosed in boxes for rapid identification.

4.0 PROTECTIVE ACTION RECOMMENDATIONS

4.1 DEVELOPING PROTECTIVE ACTION

a. Compare the integrated doses calculated in EI-6.9, EI-6.10 or EI-6.11 (Worksheet, Section IV), to the recommended protective actions listed below.

TITLE: PROTECTIVE ACTION RECOMMENDATIONS
FOR OFFSITE POPULATION

TABLE 1

RECOMMENDED PROTECTIVE ACTIONS TO REDUCE WHOLEBODY AND THYROID DOSE TO OFFSITE POPULATION FROM EXPOSURE TO A GASEOUS PLUME

Projected Dose (Rem) to the Population	Recommended Actions (a)	Comments
Wholebody < 0.5 Thyroid < 5	No required protective actions (b) State may issue an advisory to seek shelter and await further instructions. Monitor environmental radiation levels.	Previously recommended protective actions may be reconsidered or terminated.
Wholebody 0.5 to < 5 Thyroid 5 to < 25	Seek shelter as a minimum. Consider evacuation. Evacuate unless constraints make it impractical. Monitor environmental radiation levels. Control access.	If constraints exist, special consideration should be given for evacuation of children and pregnant women.
Wholebody 5 and above Thyroid 25 and above	Conduct mandatory evacuation. Monitor environmental radiation levels and adjust area for mandatory evacuation based on these levels. Control access.	Seeking shelter would be an alternative if evacuation where not immediately possible.

(a) These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take existing conditions into consideration.

(b) At the time of the incident, state officials may implement low-impact protective actions in keeping with the principle of maintaining radiation exposures as low as reasonably achievable.

b. Check the appropriate recommendations in Worksheet, Section VI, item (A). If no protective actions are required, write "NONE" in item (A) and go to Step 4.1.e.

c. Affected downwind sectors should be determined on Table 2, using wind direction as determined in EI-6.7 or EI-6.8. (Worksheet, Section III)

TITLE: PROTECTIVE ACTION RECOMMENDATIONS
FOR OFFSITE POPULATION

TABLE 2

Wind Direction		Affected Sectors	
Degrees From	Degrees To	Centerline Sector	Adjacent Sectors
168.76 - 191.25	348.75 - 11.25	N	NNW NNE
191.26 - 213.75	11.26 - 33.75	NNE	N NE
213.76 - 236.25	33.76 - 56.25	NE	NNE ENE
236.26 - 258.75	56.26 - 78.75	ENE	NE E
258.76 - 281.25	78.76 - 101.25	E	ENE ESE
281.26 - 303.75	101.26 - 123.75	ESE	E SE
303.76 - 326.25	123.76 - 146.25	SE	ESE SSE
326.26 - 348.74	146.26 - 168.75	SSE	SE S
348.75 - 11.25	168.76 - 191.25	S	SSE SSW
11.26 - 33.75	191.26 - 213.75	SSW	S SW
33.76 - 56.25	213.76 - 236.25	SW	SSW WSW
56.26 - 78.75	236.26 - 258.75	WSW	SW W
78.76 - 101.25	258.76 - 281.25	W	WSW WNW
101.26 - 123.75	281.26 - 303.75	WNW	W NW
123.76 - 146.25	303.76 - 326.25	NW	WNW NNW
146.26 - 168.75	326.26 - 348.74	NNW	NW N

Record affected sectors on Worksheet, item (B).

For example: A wind direction from 85° would indicate affected sectors of W, WSW, and WNW. Include the area within two miles of the plant (all sectors) in any recommended actions.

d. Record the basis for the recommended action, (eg, Whole body dose or Thyroid dose), on Worksheet, Section VI, item (C).

e. Record on Worksheet, Section VI, item (D) whether doses are based on actual or potential release (per Worksheet, Section IV).

f. Sign the Worksheet, include date and time and give worksheet to the Chemistry/Health Physics Group Leader. If the Chemistry/Health Physics Group Leader is not available, give the worksheet to the SED.

4.2 REVIEW OF RECOMMENDATIONS

a. The Chemistry/Health Physics Group Leader should review the results of Section 4.1 before making recommendations to the Site Emergency Director (SED).

b. As time permits and conditions warrant, include a review of offsite monitoring data per EI-6.12.

c. Sign the worksheet, include date and time. Provide a recommendation and the worksheet to the SED based on the review of Worksheet, Section VI.

4.3 RECOMMENDATIONS TO THE STATE

a. The SED shall make the decision to make protective action recommendations to the state through the Michigan State Police. This decision shall not be delegated.

The recommendations should include:

1. Recommended Protective Action.

2. Affected Sectors including a two mile radial area.

3. Projected Doses (thyroid and/or whole body).

4. Whether doses are actual or projected.

5.0 ATTACHMENTS

None

Proc No EI 7.2
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTING PROCEDURE
Revision and Approval Summary

TITLE: POST ACCIDENT ANALYSIS

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B Embrey — Originator — 5/17/83 — Date

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6. ATMS Incorporated

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7. Biennial Review

_____ — Date

TITLE: POST ACCIDENT ANALYSIS

Table of Contents

Attachments

Attachment 1, "Post Accident Analytical Data"

TITLE: POST ACCIDENT ANALYSIS

1.0 PURPOSE

To describe the sequential method of analyzing the Primary Coolant System samples obtained from the post accident sample panel during a post accident condition.

2.0 REFERENCES

2.1 Emergency Implementation Procedure EI-7.1

2.2 Emergency Implementation Procedure, EI-7.3

2.3 Emergency Implementation Procedure, EI-7.4

2.4 Emergency Implementation Procedure, EI-7.5

2.5 Emergency Implementation Procedure, EI-7.6

3.0 PREREQUISITES

3.1 DOSIMETRY REQUIREMENTS

Each individual that may handle a post accident sample shall as a minimum wear beta/gamma TLDs on their chest and on the inside of both wrists. Additionally, a ring TLD shall be worn on both index fingers with the TLD face inward.

3.2 ANTI-C CLOTHING REQUIREMENTS

Minimum clothing shall consist of full Anti-Cs, wetsuit with all seams taped, and an SCBA Breathing unit. A lapel air sampler should be worn by the sampling technician. Any persons who will handle samples shall wear lineman's gloves in addition to their other clothing.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Hand handling of samples should be minimized. When samples must be handled, a Beta radiation dose rate deduction of 90% can be assumed for lineman's gloves. Dose to the extremities shall be limited to 7.5R as measured by the ring TLD pending a dose determination based on the beta/gamma TLDs.

4.2 When not being handled, samples shall be stored in a shielded or removed location. All unsealed samples shall be handled in vent hoods.

TITLE: POST ACCIDENT ANALYSIS

5.0 PROCEDURE

5.1 PRE-ANALYSIS PREPARATION

5.1.1 Baseline Gas Chromatograph

a. Disconnect Gas Chromatograph

1. Turn detector off (inside GC Cabinet)

CAUTION:

Do not shut off carrier gas flow with detector turned on.

2. Close all calibration isolation valves.

3. Place GC in manual and clear.

4. Enter "13", "14", "23" then "24" at 1 second intervals to bleed off calibration gas pressure.

5. Repeat Step 4 until all calibration gases are bled off.

6. Close eductor and valve op supply valve.

7. Enter "23", wait 5 seconds then "24" to bleed eductor supply.

8. Turn Gas Chromatograph off (back of instrument)

9. Close Carrier Gas Isolation Valve

10. Disconnect the carrier gas, all calibration gases and the Eductor and Valve Op connections at the supply end.

11. Unplug the recorder and place it on top of the Gas Chromatograph. Unplug Gas Chromatograph, place sample block on top of Gas Chromatograph.

12. Carefully lift the Gas Chromatograph and place on cart.

b. Connect Gas Chromatograph to Cart

1. Connect the gas lines to the proper connections are marked.

2. Plug in Gas Chromatograph and Recorder to cart.

3. Back off all regulators (CCW)

TITLE: POST ACCIDENT ANALYSIS

4. Open carrier and calibration gas bottle valves.

5. Adjust regulators for pressure as follows:

   1. Eductor and Valve Op - 80 psig

   2. Carrier Gas - 30 psig

   3. Calibration Gases - 2-3 psig

6. Place recorder in proper location on cart.

7. Place sample block in shield.

8. Turn recorder, Gas Chromatograph and detector switches on.

NOTE: There should not be any power available at cart as of yet.

c. Move cart to use location and plug cart into 110 Vac.

d. With GC in "manual", clear and enter "45" when trace flattens out, GC is ready for use; enter "00".

e. Place GC in "enter" and "clear" enter 08, 03, 31, 13. Exit the "enter" mode and "clear" (read mode). Verify program by entering step numbers (01, 02, ...50). Program sequence as listed in E 7.3, Appendix I.

f. Verify recorder settings

Upper pen Pressure

MV/V 50 mv
Ø set at Left Margin with pen in standby

Lower pen TCD Output

MV/V 0.100 Volts
Ø set at right "10" with pen in standby

Speed 5 cm/min

5.1.2 pH Analysis

a. Remove the pH lead shield brick from the emergency kit and put it in the hood.

b. Take a 15 cc wide mouth vial from the emergency kit and place it in the pH lead shield brick. Remove the cap and label the cap with "pH" and the time/date. Set the cap aside.

TITLE: POST ACCIDENT ANALYSIS

c. Shield the vial with at least more than 4" of lead brick.

d. Remove a pH probe from the emergency kit and place it inside the hood in a beaker of demineralized water to soak. The probe must soak 30 minutes before use.

e. Place a pH meter inside the hood and hook-up the pH probe.

5.1.3 Boron Analysis

a. Set up the automatic titrator in the hood.

b. Place a 100 ml beaker in the automatic titrator. Add 30 ml of demineralized water to the beaker.

c. Pipet a 1 ml aliquot of 1000 ppm boron reference standard from the emergency kit into the 100 ml beaker.

d. Turn on the magnetic stirrer and adjust for moderate speed. Place the pH probe in the 100 ml beaker.

e. Adjust the temperature control for the sample and press the start button to adjust the pH to 7.00. If the meter needle swings to the left, add 1 ml of 0.01N HNO_3 and press the start button again until a small amount of titrant is used. This will bring the initial pH to 7.

f. Adjust the dosimat to 0 by pushing the down arrow.

g. Add 3 ml of 5M Mannitol solution to the 100 ml beaker.

h. Adjust the titrator for sample temperature and push the start button to start titration.

i. At the end of the titration, add an additional 3 ml of Mannitol solution and continue the titration to the pH = 7.0 endpoint.

j. Calculate the volumetric factor, N_f, using the following equation:

N_f (ppm boron/ml NaOH) = 1000 ppm Boron ÷ ml NaOH titrant used

Record the volumetric factor, N_f, on Attachment 1.

k. Remove the pH probe from the 100 ml beaker, rinse it with demineralized water, and put it back into the demineralized water to soak.

TITLE: POST ACCIDENT ANALYSIS

5.2 SAMPLE ANALYSIS

5.2.1 Primary Coolant Hydrogen Gas Analysis

a. Place recorder chart switch in the cm/min position.

b. Place the sample vial end of the sample tong transported from the PASM panel into the shielded tong holder on the Gas Chromatograph cart. Rotate the sample tong to lock in place.

c. Conduct hydrogen analysis using Procedure EI 7.3.

d. Dispose of the sample vial by holding the sample tong over the disposal cask. Rotate the sample tong handle until the sample vial drops into the cask.

5.2.2 PCS Offgas Radioactivity Analysis

a. Transport the 15 cc vial to the counting facility for gamma spectral analysis using Procedure EI-7.4. Wrap the sample vial in poly sheeting before placing the sample vial on the detector.

b. Upon completion of EI-7.4, dispose of the vial in the disposal cask.

5.2.3 PCS Liquid pH

a. Using the shielded syringe from the Emergency Kit, insert the syringe needle into the sample cask top until it cannot be inserted any further.

b. Slowly withdraw the syringe plunger to the preset stop.

c. Withdraw the syringe needle from the sample cask and insert the needle into the shielded 15 ml Tritium vial.

d. Depress the syringe plunger to the mechanical stop to transfer the PCS liquid sample to the analytical beaker.

e. Rinse the shielded syringe using demineralized water in the laboratory sink or the disposal cask.

f. Place the pH probe in the shielded sample. When the pH meter has stabilized, record the PCS pH on Attachment 1.

g. Remove the pH probe from the shielded 15 ml Tritium vial and place it in the 30 ml of water in the automatic titrator.

TITLE: POST ACCIDENT ANALYSIS

5.2.4 PCS Boron Analysis

a. Pipette a 1 ml aliquot of the sample into the 100 ml beaker containing 30 ml of water using a 1 ml Eppendorph Pipette.

b. Conduct Boron titration on the sample using Procedure EI 7.5.

c. Using lab tongs, dispose of the Boron sample solution in the Laboratory hood drain. Rinse the 100 ml beaker thoroughly using demineralized water.

d. Using lab tongs, place the cap on the 15 ml PCS pH sample vial. Move the sample vial and the lead shield to a shielded storage location. The sample shall be retained for chloride analysis within 4 days.

5.2.5 PCS Liquid Radioactivity Analysis

WARNING

Wear lineman's gloves while conducting Steps a and b.

a. Using a 2.5 cc syringe, collect 1.0 cc of the diluted PCS liquid sample in the 15 cc Tritium sample vial.

b. Inject the 1.0 cc diluted PCS sample into an evacuated 15 cc gas vial. Dispose of the Tritium sample vial containing the PCS sample from the PASM in the disposal cask. Fill the 15 cc gas vial containing the 1.0 cc sample by injecting 14 cc of demineralized water into the vial.

c. Transport the 15 cc sample gas vial in a sample tong to the counting facility for gamma spectral analysis using Procedure EI-7.4. Wrap the sample vial in poly sheeting before placing the sample vial on the detector.

d. Upon completion of EI-7.4 dispose of the contents of the vial in a lab hood and dispose of the vial in the disposal cask.

5.2.6 Forward the completed data sheet to the Technical Support Center for review by the Chemical Engineer. The data sheet shall remain in the TSC until required for further analysis.

5.2.7 PCS Chloride Analysis

Conduct PCS Chloride Analysis using Procedure EI 7.6 within 4 days of the sample time. Use the sample stored in Step 3.2.3.d.

TITLE: POST ACCIDENT ANALYSIS

5.2.8 PCS Dissolved Oxygen Analysis

Dissolved Oxygen analysis shall be conducted using the Modified Winkler method CH-4.5A until a polargraphic probe method can be developed.

4.0 ATTACHMENTS

Attachment 1, Post Accident Analytical Data

POST ACCIDENT ANALYTICAL DATA

Sample Time _____ / _____
Date Time

	PCS HYDROGEN ANALYSIS		PROCEDURE/STEP EI 7.1/3.3.1.e
1.	H_2 pressure initial (PI-1903)	_____ psia	EI 7.1/3.41
2.	H_2 pressure final (PI-1903)	_____ psia	EI 7.1/3.4p
3.	H_2 Concentration ppm	_____ cc/kg	EI 7.3/3.4
4.	PCS H_2 Concentration (Item 2 x Item 3 x 2.2E-4)	_____ cc/kg	
	PCS OFFGAS RADIOACTIVITY ANALYSIS		
5.	PCS Gas Activity	_____ µCi/gm	EI 7.4/5.4.a
	PCS pH ANALYSIS		
6.	PCS pH	_____	EI 7.2/5.2.3f
	PCS BORON ANALYSIS		
7.	Volumetric factor, N_f	_____ ppm Boron/ml NaOH	EI 7.2/5.1.3j
8.	Titrant Volume	_____ ml	EI 7.5/5.7
9.	Boron Concentration (Item 7 x Item 8)	_____ ppm	EI 7.5/5.8
	PCS LIQUID RADIOACTIVITY ANALYSIS		
10.	PCS liquid radioactivity	_____ µCi/gm	EI 7.4/5.4.b
	PCS CHLORIDE ANALYSIS		
11.	PCS Chloride Concentration	_____ ppm	EI 7.6/5.5
	PCS DISSOLVED OXYGEN ANALYSIS		
	PCS DO Concentration	_____ ppm	EI 7.8/
	CONTAINMENT AIR HYDROGEN AND ACTIVITY ANALYSIS		
	Containment Air H_2 Concentration	_____ %	EI 7.3/
	Containment Gas Activity Concentration	_____ µCi/cc	EI 7.4/

Technician _____

Supervisor _____

Proc No EI-7.3
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: HYDROGEN ANALYSIS OF POST ACCIDENT SAMPLES

1. Prepared

J Embrey — Originator — 5/17/83 — Date

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[signature] — Department Head — 5/17/83 — Date

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R M Brueck — PRC 83-010 — 5/17/83 — Date

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James Ray by [signature] — Plant Manager — 5/20/83 — Date

6. ATMS Incorporated

5-23-83 — Date

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TITLE: HYDROGEN ANALYSIS OF POST ACCIDENT SAMPLES

Table of Contents

TITLE: HYDROGEN ANALYSIS OF POST ACCIDENT SAMPLES

1.0 PURPOSE

This document describes the procedural steps necessary to determine the Hydrogen concentrations from a gas sample collected at the PASM panel.

2.0 INITIAL CONDITIONS

2.1 The instrument shall be set up in accordance with EI-7.2.

2.2 The program sequencer shall be set up in accordance with Appendix 1 to this procedure.

2.3 Attentuate and multiplier shall both be set to "5" and "X10" respectively.

2.4 Six port valve shall be in position "Cal 1". Manually enter 13, 14; as necessary to advance to "Cal 1".

3.0 PROCEDURE

3.1 With GC in "Auto" mode, push and release "clear".

3.2 After 25 minutes, turn recorder chart switch to "OFF" and remove chart trace to low background area.

3.3 Calculate ppm Hydrogen in accordance with the following equation:

$$H_2 \text{ ppm} = 9000 \times \frac{\text{Hydrogen Net Peak height in chart units}}{\text{Pressure transmitter chart units}}$$

3.4 Record ppm H_2 on Attachment 1 of Procedure EI-7.2.

3.5 Chart trace shall be identified with Date/Time, standards used, sample location and Technician performing analysis and shall be placed in Ziploc Bag and retained as directed by the Plant Chemical Engineer.

4.0 ATTACHMENTS

Attachment 1, Appendix 1 - "Program Sequence"

BASELINE GAS CHROMATOGRAPH PROGRAM

Step	Time	Code	Comment
01	00:01	23	Eductor on
02	00:03	24	Eductor off
03	00:05	03	Inject
04	00:06	25	Detector on
05	00:50	04	Precut to vent
06	01:08	01	Recorder on (and Ø)
07	03:45	00	Recorder off
08	03:46	13	Advance 6 Port Valve
09	03:47	14	PASM reset 6 port
10	03:48	23	Repeat for Cal #2
11	03:50	24	
12	03:52	03	
13	03:53	25	
14	04:37	04	
15	04:55	01	
16	07:32	00	
17	07:33	13	
18	07:34	14	
19	07:35	23	Repeat for Cal #3
20	07:37	24	
21	07:39	03	
22	07:40	25	
23	08:24	04	
24	08:42	01	
25	11:19	00	
26	11:20	13	
27	11:21	14	Evaluate Collection Vial
28	11:22	23	
29	11:24	24	PASM Sample
30	11:30	13	
31	11:31	14	
32	11:35	03	
33	11:36	25	
34	12:20	04	
35	12:38	01	
36	15:15	00	Exhaust sample vial to hood
37	15:16	23	
38	15:20	24	
39	15:21	13	
40	15:22	14	Cal #4 or Argon
41	15:23	23	
42	15:25	24	
43	15:27	03	
44	15:28	25	

BASELINE GAS CHROMATOGRAPH PROGRAM

Step	Time	Code	Comment
45	16:12	04	
46	16:30	01	
47	19:07	00	
48	19:08	13	
49	19:09	14	
50	19:10	00	
51	19:11	99	
99	(00:00)	00	Recycle (time in hours:minutes)

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PALISADES NUCLEAR PLANT
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Date

TITLE: PLANT SITE METEOROLOGICAL SYSTEM

Table of Contents

TITLE: PLANT SITE METEOROLOGICAL SYSTEM

1.0 PERSONNEL RESPONSIBILITY

The Chemistry/Health Physics Support Group Leader is responsible for the implementation of this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

To provide a procedure to access the Plant site meteorological system for meteorological data required in the Offsite Dose Calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 of EI-6.0 in Section III.1.

c. A TI silent 700 Terminal is required for remote access (Section 4.2).

4.0 PROCEDURE

4.1 USING CONTROL ROOM METEOROLOGICAL DISPLAY

4.1.1 This is the preferred method; if the meteorological data display is not available in the Control Room, go to Part 4.2.

4.1.2 The meteorological display in the Control Room is updated every 15 minutes automatically. The printout should be in the form of the following example:

SITE	PALI	PALI	PALI	PALI	PALI	PALI	PALI	PALI
HEIGHT	10-M	6010	10-M	10-M	10-M	60-M	60-M	60-M
PARAMETER	TEMP	DELT	WS	WD	SGMH	WS	WD	SGMH
UNITS	C	C	MPH	DEG	DEG	MPH	DEG	DEG
AVG ENDINGS-EST								
03/27/83 22:00	3.4	-0.38	7.45	54.	11.8	11.85	60.	6.0
STATUS 00*	0**	0	0	0	0	0	0	0
03/27/83 22:15	3.2	-0.40	7.42	52.	11.6	11.56	58.	6.3
STATUS 00	0	0	0	0	0	0	0	0
03/27/83 22:30	3.1	-0.40	7.40	51.	13.8	11.52	53.	6.2
STATUS 00	0	0	0	0	0	0	0	0
03/27/83 22:45	3.0	-0.40	8.35	35.	12.0	11.66	44.	8.0
STATUS 00	0	0	0	0	0	0	0	0
03/27/83 23:00	2.6	-0.40	8.00	10.	10.8	12.23	20.	5.6
STATUS 00	0	0	0	0	0	0	0	
03/27/83 23:15	2.2	-0.41	9.21	3.	13.3	12.84	13.	7.1
STATUS 00	0	0	0	0	0	0	0	0

* = System Status
** = Parameter Status

Where:
TEMP = Air temperature °C
DWPT = Dew Point °C
DELT = Temperature difference between 60 meters and 10 meters
WS = Wind speed in miles per hour
WD = Wind direction from which the wind is blowing (degrees)
SGMA = Sigma theta (horizontal wind direction standard deviation in degrees)

NOTE: The above display is repeated after six 15 minute periods have been printed. Status information is described in Attachment 1.

4.1.3 Verify the parameter status to be less than 100 for the "10-M WS" and "10-M WD" columns (10-meter wind speed (mph) and 10-meter wind direction from which wind is coming from, respectively). Record readings on worksheet, items (A) and (B) respectively. Mark 10 meters on worksheet.

NOTE: If parameter status is not less than 100 for the 10-meter wind data, check the status for "60-M WS" and "60-M WD" column. If status is less than 100, multiply WS by .77 and record data on worksheet, items (A) and (B) respectively. Mark 60 meters on worksheet. If it is not less than 100, go to Procedure EI-6.8 to obtain meteorological data.

4.1.4 Verify the parameter status to be less than 100 for the "6010 DELT" column (60-10 meter temperature differential) and record value on worksheet, item (C).

NOTE: If status is not less than 100, go to Step 4.1.6.

4.1.5 Use Table 4.1 of this procedure in conjunction with Parameter DELT to determine stability class.

TABLE 4.1

Stability Class	DELT Parameter
A	<-0.95
B	-.95 to -0.85
C	-.84 to -0.75
D	-.74 to -0.25
E	-.24 to +0.75
F	+.76 to +2.0
G	>+2.0

Record the stability class on worksheet, item (D). All required meteorological data has now been recorded; continue with next procedure as required per EI-6.0.

******** Steps 4.1.6-4.1.7 are needed only if temperature differential data are not available. ********

4.1.6 Verify the parameter status to be less than 100 for the "10-M SGMA" column (10-meter sigma theta) and record the value on worksheet, item (C).

NOTE: If the parameter status for the 10-meter sigma theta is not less than 100, verify the parameter status for "60-M SGMA" to be less than 100 and record on worksheet, item (C). If it is not less than 100, go to Procedure EI-6.8 to get meteorological data.

4.1.7 Use Table 4.2 and the parameter SGMA to determine stability class.

TABLE 4.2

Stability Class	SGMA
A	>22.5
B	17.6 to 22.5
C	12.5 to 17.5
D	7.5 to 12.4
E	3.8 to 7.4
F	2.1 to 3.7
G	< 2.1

Record stability class worksheet, item (D). All required meteorological data has now been recorded; continue with next procedure as required per EI-6.0.

4.2 USING REMOTE ACCESS METEOROLOGICAL DISPLAY

To be used when the Control Room meteorological display is not available or to obtain a Plant site meteorological display outside of the Control Room.

4.2.1 Power Up the Terminal

Connect the power supply cord to the terminal and plug the cord into a power socket.

NOTE: To use the Control Room meteorological terminal to obtain meteorological data remotely, the terminal must be unplugged from the modem (black line) and the black plug inserted in its place.

4.2.2 Move the toggle switch located on the rear right-hand side of the terminal to the "on" position. You should be able to hear the terminal fan motor start up.

4.2.3 There are three rocker switches located on the front right-hand side of the terminal. They are labeled low speed, half dup, and on line.

a. Depress the right side of the one labeled low speed.

b. Depress the left side of the one labeled half dup.

c. Depress the left side of the one labeled on line.

4.2.4 There is one rocker switch located on the front left-hand side of the terminal labeled "NUM". Depress the right-hand side of this switch.

NOTE: The above display is repeated after six 15 minute periods have been printed. Status information is described in Attachment 1.

4.1.3 Verify the parameter status to be less than 100 for the "10-M WS" and "10-M WD" columns (10-meter wind speed (mph) and 10-meter wind direction from which wind is coming from, respectively). Record readings on worksheet, items (A) and (B) respectively. Mark 10 meters on worksheet.

NOTE: If parameter status is not less than 100 for the 10-meter wind data, check the status for "60-M WS" and "60-M WD" column. If status is less than 100, multiply WS by .77 and record data on worksheet, items (A) and (B) respectively. Mark 60 meters on worksheet. If it is not less than 100, go to Procedure EI-6.8 to obtain meteorological data.

4.1.4 Verify the parameter status to be less than 100 for the "6010 DELT" column (60-10 meter temperature differential) and record value on worksheet, item (C).

NOTE: If status is not less than 100, go to Step 4.1.6.

4.1.5 Use Table 4.1 of this procedure in conjunction with Parameter DELT to determine stability class.

TABLE 4.1

Stability Class	DELT Parameter
A	<-0.95
B	-.95 to -0.85
C	-.84 to -0.75
D	-.74 to -0.25
E	-.24 to +0.75
F	+.76 to +2.0
G	>+2.0

Record the stability class on worksheet, item (D). All required meteorological data has now been recorded; continue with next procedure as required per EI-6.0.

******** Steps 4.1.6-4.1.7 are needed only if temperature differential data are not available. ********

4.1.6 Verify the parameter status to be less than 100 for the "10-M SGMA" column (10-meter sigma theta) and record the value on worksheet, item (C).

NOTE: If the parameter status for the 10-meter sigma theta is not less than 100, verify the parameter status for "60-M SGMA" to be less than 100 and record on worksheet, item (C). If it is not less than 100, go to Procedure EI-6.8 to get meteorological data.

4.1.7 Use Table 4.2 and the parameter SGMA to determine stability class.

TABLE 4.2

Stability Class	SGMA
A	>22.5
B	17.6 to 22.5
C	12.5 to 17.5
D	7.5 to 12.4
E	3.8 to 7.4
F	2.1 to 3.7
G	< 2.1

Record stability class worksheet, item (D). All required meteorological data has now been recorded; continue with next procedure as required per EI-6.0.

4.2 USING REMOTE ACCESS METEOROLOGICAL DISPLAY

To be used when the Control Room meteorological display is not available or to obtain a Plant site meteorological display outside of the Control Room.

4.2.1 Power Up the Terminal

Connect the power supply cord to the terminal and plug the cord into a power socket.

NOTE: To use the Control Room meteorological terminal to obtain meteorological data remotely, the terminal must be unplugged from the modem (black line) and the black plug inserted in its place.

4.2.2 Move the toggle switch located on the rear right-hand side of the terminal to the "on" position. You should be able to hear the terminal fan motor start up.

4.2.3 There are three rocker switches located on the front right-hand side of the terminal. They are labeled low speed, half dup, and on line.

a. Depress the right side of the one labeled low speed.

b. Depress the left side of the one labeled half dup.

c. Depress the left side of the one labeled on line.

4.2.4 There is one rocker switch located on the front left-hand side of the terminal labeled "NUM". Depress the right-hand side of this switch.

4.2.5 Dialing In

Dial:

764-8287 or 764-8288

(or portion needed for call) and wait for a tone. Place the telephone receiver in cradle cups with cord on the left side.

4.2.6 Logging In

The green light next to the shift key should light.

4.2.7 Press the orange "RETURN" key. (The computer will ask for "PW?".)

4.2.8 Type "CO" RETURN.

4.2.9 The computer will print a "?" when it is ready to accept command.

Display Meteorological Data

NOTE: Occasionally, a poor telephone connection may cause some data to be incorrectly transmitted. If the computer does not "understand" a command which was apparently typed correctly or if computer output is garbled, simply re-enter the command.

4.2.10 To receive the last averaging period's data, type "AV" and RETURN. Parameter status is also given during the "AV" command. This status is in the form of a number. 0 is perfect. A value between 1 and 99 indicates one or more scans were invalidated. Between 100 and 999 indicates there was not enough valid data to calculate an average. The last two digits of the status indicate the problem. Invalid data is displayed with all 9s. (Status comments are explained in Attachment 1.)

For example:

?AV

SITE	PALI	PALI	PALI	PALI	PALI	PALI	PALI	PALI	PALI
HEIGHT	10-M	10-M	6010	10-M	10-M	10-M	60-M	60-M	60-M
PARAMETER	TEMP	DWPT	DELT	WS	WD	SGMA	WS	WD	SGMA
UNITS	C	C	C	MPH	DEG	DEG	MPH	DEG	DEG
AVG ENDING-EST									
01/14/83 13:00	2.0	-1.1	-0.51	20.24	271.	13.0	28.88	266.	7.3
STATUS 00*	0**		0	0	0	0	0	0	0

* = System status
** = Parameter status

TITLE: PLANT SITE METEOROLOGICAL SYSTEM

SITE	PALI	PALI	PALI	PALI	PALI	PALI	PALI
HEIGHT	SHED	10-M	10-M	10-M	10-M	10-M	10-M
PARAMETER	TEMP	WS-A	WD-A	WG-A	WS-B	WD-B	SG-B
UNITS	C	MPH	DEG	DEG	MPH	DEG	DEG
AVE ENDING-EST							
01/14/83 13:00	22.0	20.24	271.	13.0	19.34	266.	12.2
STATUS 00	0	0	0	0	0	0	0

Where:
TEMP = Air temperature °C
DWPT = Dew point °C
DELT = Temperature difference between 60 meters and 10 meters
WS = Wind speed in miles per hour
WD = Wind direction from which the wind is blowing (degrees)
SGMA = Sigma theta (horizontal wind direction standard deviation in degrees)

NOTE: The second row of data beginning with the paramter "SHED TEMP" is provided for information purposes only and is to be ignored. When data for several averaging periods are printed out, all of the "first row" averages are printed first, followed by all of the "second row" averages.

4.2.11 Verify the parameter status to be less than 100 for the "10-M WS" and "10-M WD" columns (10-meter wind speed (mph) and 10-meter wind direction respectively). Record readings on worksheet, items (A) and (B) respectively. Mark 10 meters on worksheet.

NOTE: If the parameter status is not less than 100 for the 10-meter wind data, check the status for "60-M WS" and "60-M WD" column. If parameter status is less than 100, multiply WS by .77 and record data on worksheet, items (A) and (B) respectively. Mark 60 meters on worksheet. If it is not less than 100, go to Procedure 6.8 to obtain meteorological data.

4.2.12 Verify the parameter status to be less than 100 for the "6010 DELT" column (60-10 meter temperature differential) and record value on worksheet, item (C).

NOTE: If parameter status is not less than 100, go to Step 4.2.14.

4.2.13 Use Table 4.1 of this procedure in conjunction with Parameter DELT to determine stability class.

TABLE 4.1

Stability Class	DELT Parameter
A	<-0.95
B	-.95 to -0.85
C	-.84 to -0.75
D	-.74 to -0.25
E	-.24 to +0.75
F	+.76 to +2.0
G	>+2.0

Record the stability class on worksheet, item (D). All required meteorological data has now been recorded; continue to next procedure as required per EI-6.0.

******** Steps 4.2.14 through 4.2.15 are needed only if temperature differential data is not available. ********

4.2.14 Verify the parameter status to be less than 100 for the "10-M SGMA" column (10-meter sigma theta) and record the value on worksheet, item (C).

NOTE: If the parameter status for the 10-meter sigma theta is not less than 100, verify the status for "60-M SGMA" to be less than 100 and record on worksheet, item (C). If it is not less than 100, go to Procedure EI-6.8 to obtain meteorological data.

4.2.15 Use Table 4.2 and the parameter SGMA to determine stability class.

TABLE 4.2

Stability Class	SGMA
A	>22.5
B	17.6 to 22.5
C	12.5 to 17.5
D	7.5 to 12.4
E	3.8 to 7.4
F	2.1 to 3.7
G	< 2.1

Record stability class on worksheet, item (D). All required meteorological data has now been recorded; continue to next procedure as required per EI-6.0.

4.2.16 To terminate a session, type "BB" and return. The program may be restarted by typing the orange "RETURN" key.

When done, hang up the phone.

******* Steps 4.2.17-4.2.19 are used only if meteorological data for *******
******* prior periods or for specified time intervals are needed. *******

4.2.17 To receive the last n averaging period's data, type "AV,T=-n" where n is an integer typed from the keyboard.

NOTE: Caution should be used in printing a large number of past averages. Once the command is entered and the computer starts printing the averages, there is no way to stop the printing until all requested averages have been printed. If the phone is hung up and then re-dialed, the computer will continue to print the rest of the averages as soon as the telephone connection has been re-established.

4.2.18 To receive the average for a period ending at ddhhmm, where dd is a day of the month, hh is the time in hours and mm is the time in minutes, type "AV,T=ddhhmm" and RETURN. If dd is not submitted, the default is the current day. Minutes must be entered in quarter hour increments, ie, 00, 15, 30 and 45.

4.2.19 To receive the average for periods between two times, type "AV,T=ddhhmm$_1$-ddhhmm$_2$." Again the default for dd is the current date.

4.3 Continue with next procedure as required, per EI-6.0.

5.0 ATTACHMENTS

Attachment 1, "Palisades Meteorological System Parameter Status Codes and System Status Codes"

PALISADES METEOROLOGICAL SYSTEM
PARAMETER STATUS CODES AND SYSTEM STATUS CODES

Parameter status codes indicate any abnormal or non-ambient condition present for a specific parameter. Parameter statuses listed with the "AV" command reflect the "worst" (highest numbered) status for the entire averaging period.

PARAMETER STATUS CODES

Code	Meaning
0	Normal
1	Wind Direction or Sigma Theta Cannot Be Calculated
10	Data Acquisition Disabled Via "AC" Command
30	Analyzer in Span Recovery Period
31	Analyzer in Zero Mode
32	Analyzer in Span Mode
40	Input Voltage Cannot Be Converted
41	Instantaneous Value Too Low
42	Instantaneous Value Too High
50	Transmission Time-Out on Status Request
51	Transmission Time-Out on Data Request
52	Transmission Error on Status Request
53	Transmission Error on Data Request
60	Analyzer Flame Out
70	Instrument Out of Service
71	Aspirator Failure

A value of 100 is added to the above codes for an invalid average.

SYSTEM STATUS CODES

System status codes indicate any abnormal condition which may have occurred during a given averaging period. The status is reset to 0 at the beginning of each averaging period.

Code	Meaning
0	Normal
1	Time Correction
2	Storage Reallocated
3	Power Failure
4	System Start-Up or Restart
5	Instrument Shelter Temperature Low
6	Instrument Shelter Temperature High

Proc No EI-6.4
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: RELEASE/POTENTIAL RELEASE DETERMINATION FROM CONTAINMENT HIGH RANGE MONITORS

1. Prepared

Originator 5/19/83 Date

EVE RADELONS

2. QA Concurrence

NA

Date

3. Recommend Approval/Q-List (Yes) No

Department Head 5/19/83 Date

4. PRC Reviewed

PRC 83-40 5-19-83 Date

5. Approved

James Ray for 5/20/83
Plant Manager Date

6. ATMS Incorporated

5-23 83
Date

7. Biennial Review

Date

ei0383-0042d154

TITLE: RELEASE/POTENTIAL RELEASE DETERMINATION FROM CONTAINMENT HIGH RANGE MONITORS

Table of Contents

TITLE: RELEASE/POTENTIAL RELEASE DETERMINATION FROM CONTAINMENT HIGH RANGE MONITORS

1.0 PERSONNEL RESPONSBILITY

The Chemistry/Health Physics Support Group Leader shall implement this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

This procedure provides a release rate/potential release rate from radioactive material released into containment. This data is used as input to offsite dose calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. This procedure assumes a release from the Primary Coolant System into the Containment atmosphere.

c. If there is a breach in containment, the leak rate should be determined by the best method available.

4.0 RELEASE RATE

4.1 HIGH RANGE EFFLUENT MONITOR READING

a. Determine if there has been or is a release from the Primary Coolant System to the containment atmosphere.

b. Determine the time past shutdown (hours) and record on worksheet, item (A).

c. Mark the monitor from which the reading is taken on worksheet, item (B), RIA-2321 or RIA-2322.

d. Record the monitor reading on worksheet, item (C), in R/hr above background. The readout for both monitors is on Control Room Panel C-11A or the Critical Functions Monitor.

e. Obtain from Attachment 1 the $\frac{\mu Ci/cc}{R/hr}$ conversion factors for the specified time past shutdown for noble gas. Record on worksheet, item (D).

f. Determine the containment leak rate in cc/sec. If no breach of containment has occurred, then the design leak rate should be used (0.1%/day = 537.0 cc/sec). If there is a breach in containment, then the leak rate must be determined by the best available method. Record on worksheet, item (E).

TITLE: RELEASE/POTENTIAL RELEASE DETERMINATION FROM CONTAINMENT HIGH RANGE MONITORS

g. Calculate noble gas release rate (QN) as follows:

$$QN = \left[\text{Monitor reading R/hr (C)}\right] \times \left[\text{Noble gas conversion factor } \frac{\mu Ci/cc}{R/hr} \text{ (D)}\right] \times$$

$$\left[\text{leak rate cc/sec (E)}\right] \times \left[1 \times 10^{-6} \text{ Ci/}\mu Ci\right]$$

Record on worksheet, item (F)

h. Calculate the I-131 dose equivalent release rate (QI) as follows:

QN (F) x 1.0E-3

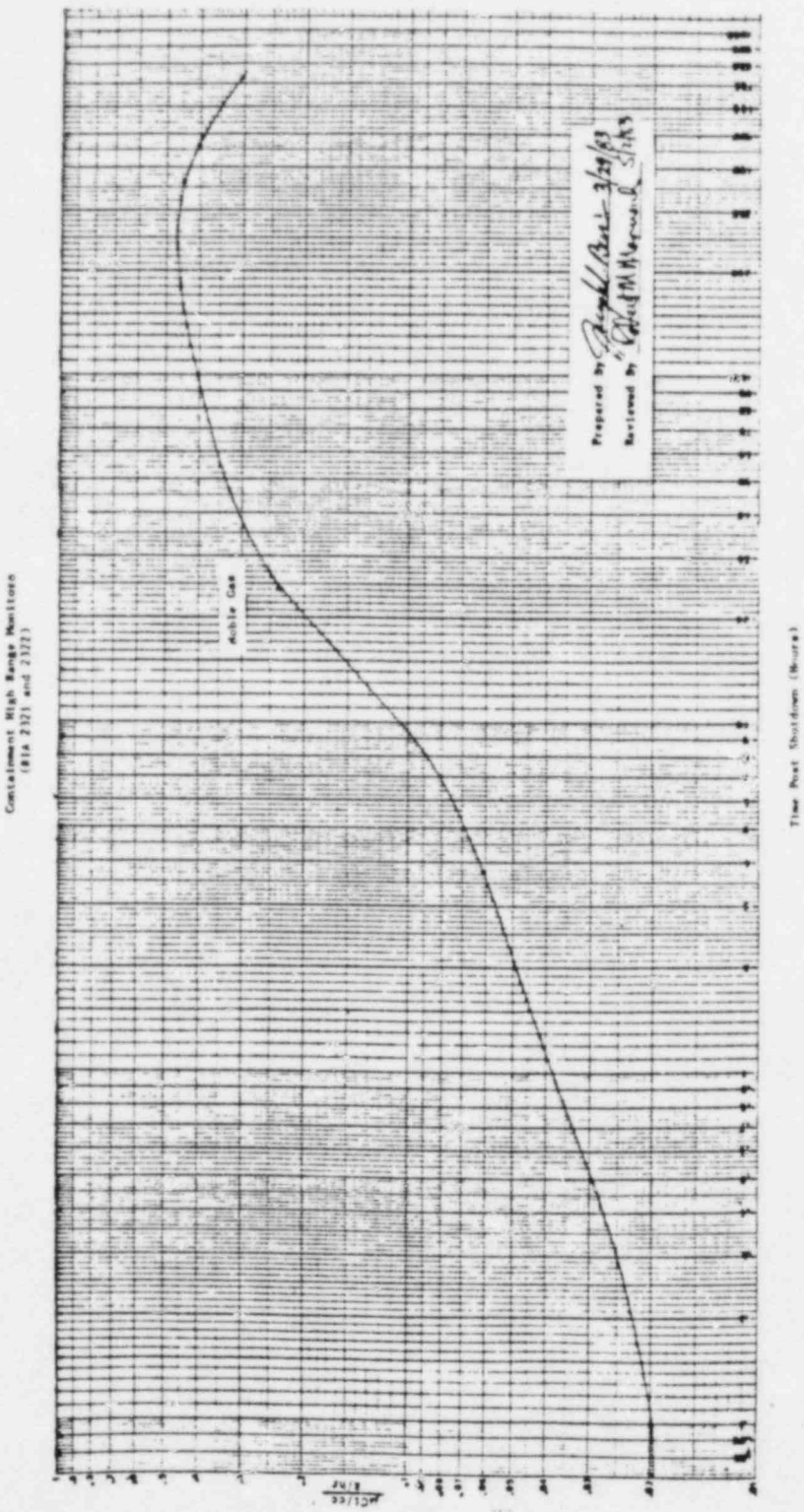
Record on worksheet, item (G)

4.1.1 Proceed to next procedure as required, per EI-6.0.

5.0 ATTACHMENTS

Attachment 1, "Containment High Range Monitor Conversion Factors"

CONTAINMENT HIGH RANGE MONITOR CONVERSION FACTORS



Proc No EI-6.3
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: RELEASE RATE DETERMINATION FROM HIGH RANGE EFFLUENT MONITORS

1. Prepared

Originator FOR MA DELONG — 5/19/83 Date

2. QA Concurrence

NA — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — 5/19/83 Date

4. PRC Reviewed

R.F. Gilleck per telecon — 5/19/83 Date

5. Approved

James Ring for — 5/20/83 Date
Plant Manager

6. ATMS Incorporated

5-23-83 Date

7. Biennial Review

Date

ei0383-0041g154

TITLE: RELEASE RATE DETERMINATION FROM HIGH RANGE EFFLUENT MONITORS

Table of Contents

TITLE: RELEASE RATE DETERMINATION FROM HIGH RANGE EFFLUENT MONITORS

1.0 PERSONNEL RESPONSBILITY

The Chemistry/Health Physics Support Group Leader shall implement this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

This procedure provides a release rate for radioactive effluents from the Plant stack or steam dumps. This data is used as input to offsite dose calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 to EI-6.0, in Section I.3.

c. High activity levels in the Penetration Fan Room filter box, (629' level), may cause unusually high readings on these instruments, which would indicate a higher release rate than is actually occurring.

4.0 RELEASE RATE DETERMINATION

4.1 HIGH RANGE EFFLUENT MONITOR READING

a. Monitor readouts are installed in the northeast corner of the viewing gallery.

b. An operational check should be performed on the monitors per HP 9.14 with one exception. Due to the remote location of the detector, the detector should not be exposed to a radiation field during the check. Other checks including battery test and two minute warm-up should be performed.

c. Obtain a reading from the affected monitor. Record monitor reading on worksheet, item (A). Note affected monitor on worksheet.

d. Convert monitor reading from mR/hr to R/hr by multiplying original reading by 1.0 E-3. Record on worksheet, item (B).

4.2 MONITOR RESPONSE FACTOR

a. Obtain Response Factor as marked on appropriate monitor. Record on worksheet, item (C).

TITLE: RELEASE RATE DETERMINATION FROM HIGH RANGE EFFLUENT MONITORS

b. Multiply monitor reading (R/hr), Item (B) by Response Factor, Item (C) to obtain a corrected reading. Record on worksheet, item (D).

4.3 RELEASE RATE

a. Determine elapsed time between reactor shutdown and monitor reading. If elapsed time is ≤ 24 hours, record elapsed time on worksheet, item (E) in hours. If elapsed time is > 24 hours, record elapsed time on worksheet, item (E) in days. Circle appropriate units on the worksheet.

b. Use the table below to determine which attachment to use to obtain the conversion factor, R/hr to Ci/sec.

	ELAPSED TIME	
	≤ 24 hours	> 24 hours
Stack Monitor	Attachment 1	Attachment 2
Steam Dump Monitor	Attachment 3	Attachment 4

Record conversion factor on worksheet, item (F) and mark attachment used.

c. Divide corrected monitor reading (D) by conversion factor (F) to obtain noble gas release rate, QN. Record on worksheet, item (G).

d. Multiply noble gas release rate (G) by 1.0E-3 to obtain Iodine-131 dose equivalent release rate, QI. Record on worksheet, item (H).

4.4 Proceed to next procedure, per EI-6.0.

5.0 ATTACHMENTS

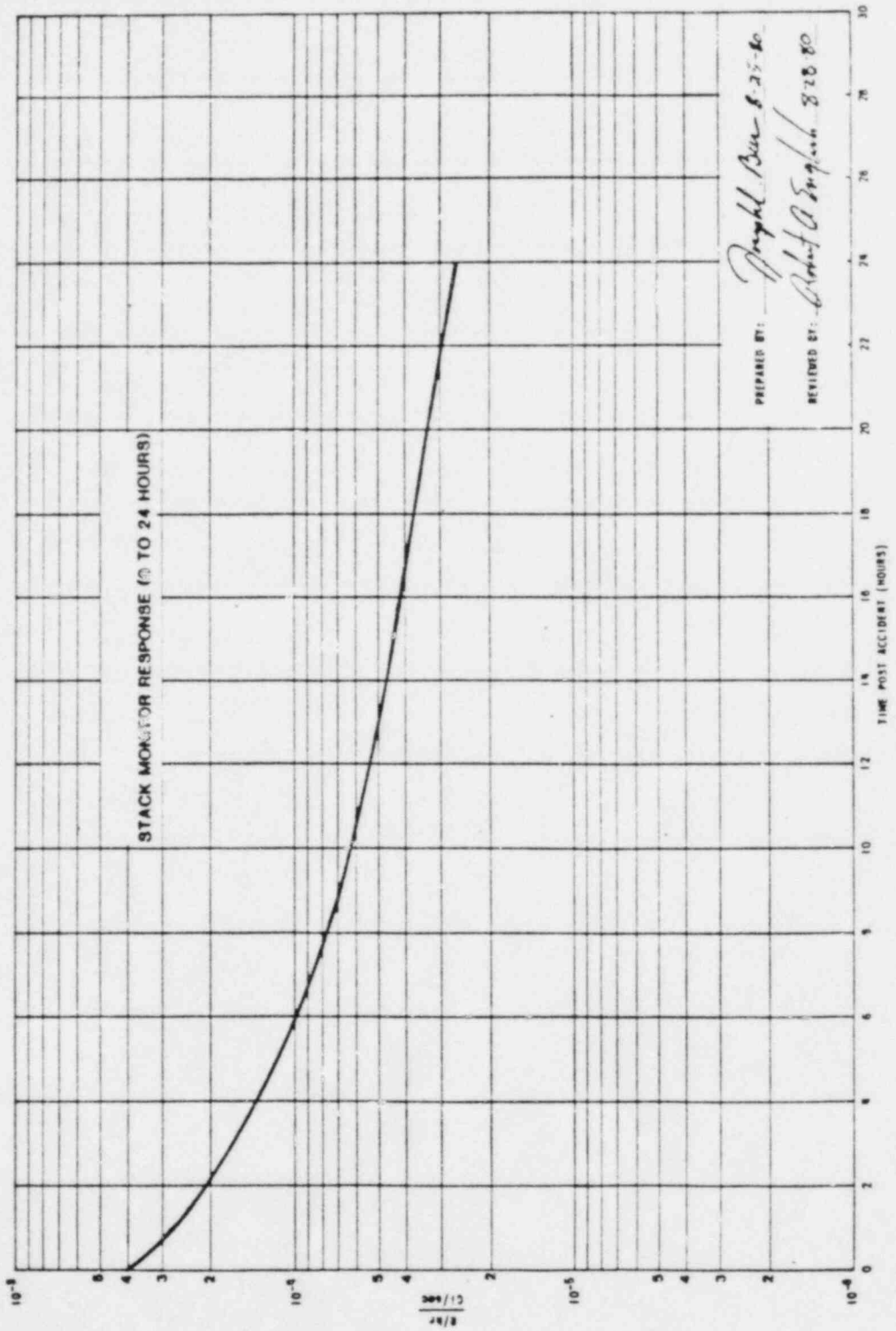
5.1 Attachment 1, "Stack Monitor Response (0 to 24 hours)"

5.2 Attachment 2, "Stack Monitor Response (0 to 30 days)"

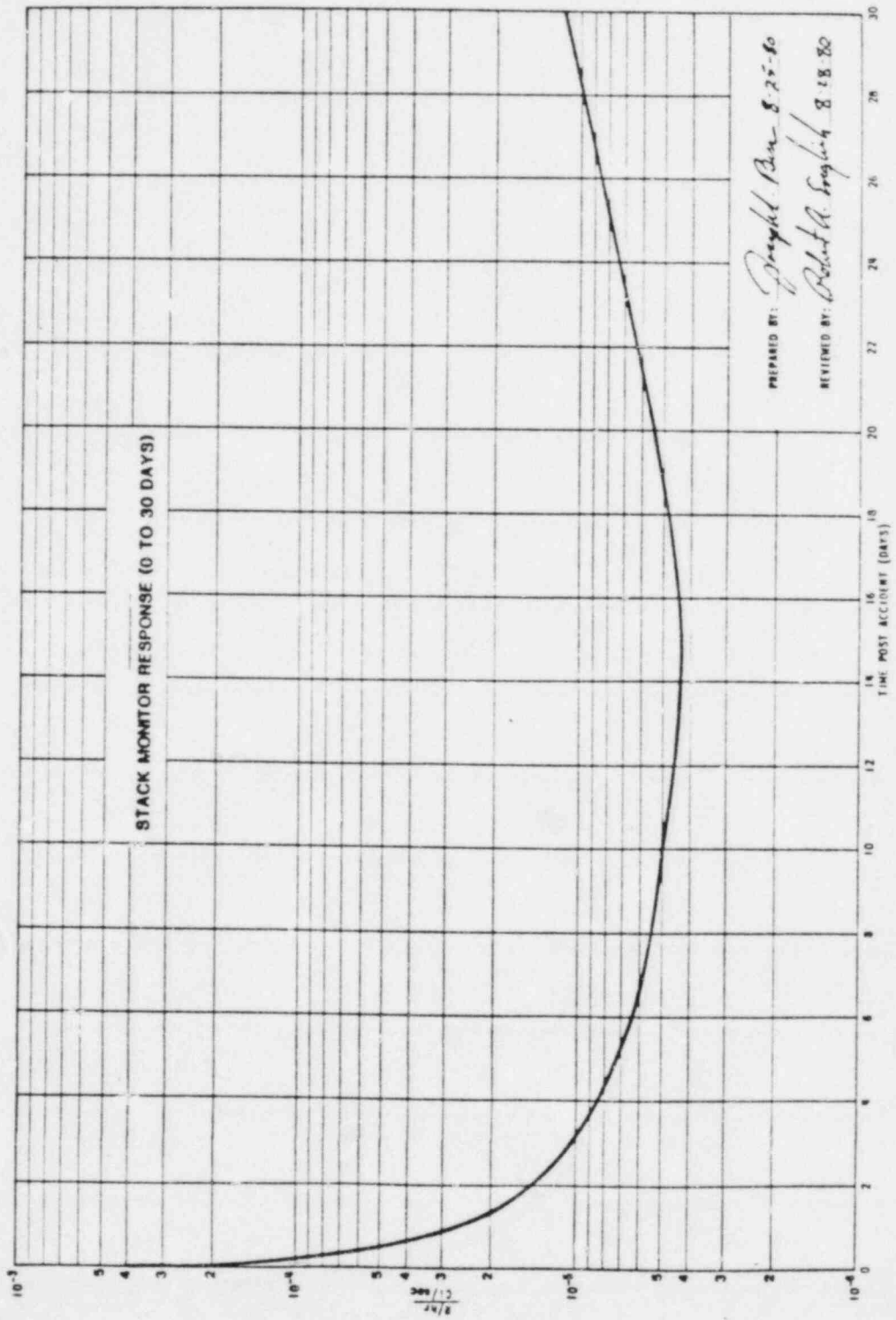
5.3 Attachment 3, "Steam Dump Monitor Response (0 to 24 hours)"

5.4 Attachment 4, "Steam Dump Monitor Response (0 to 30 days)"

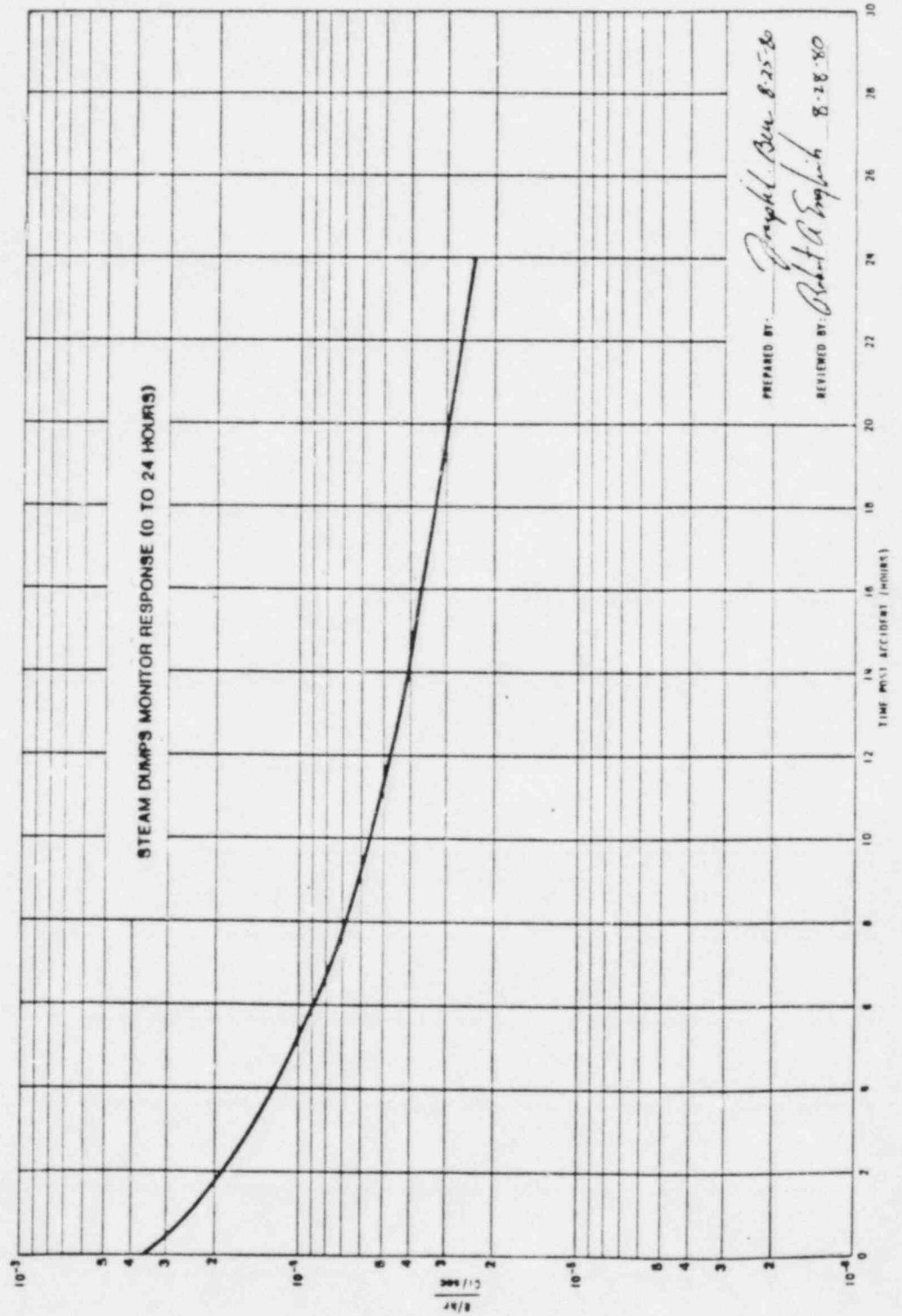
STACK MONITOR RESPONSE
(0 to 24 hours)



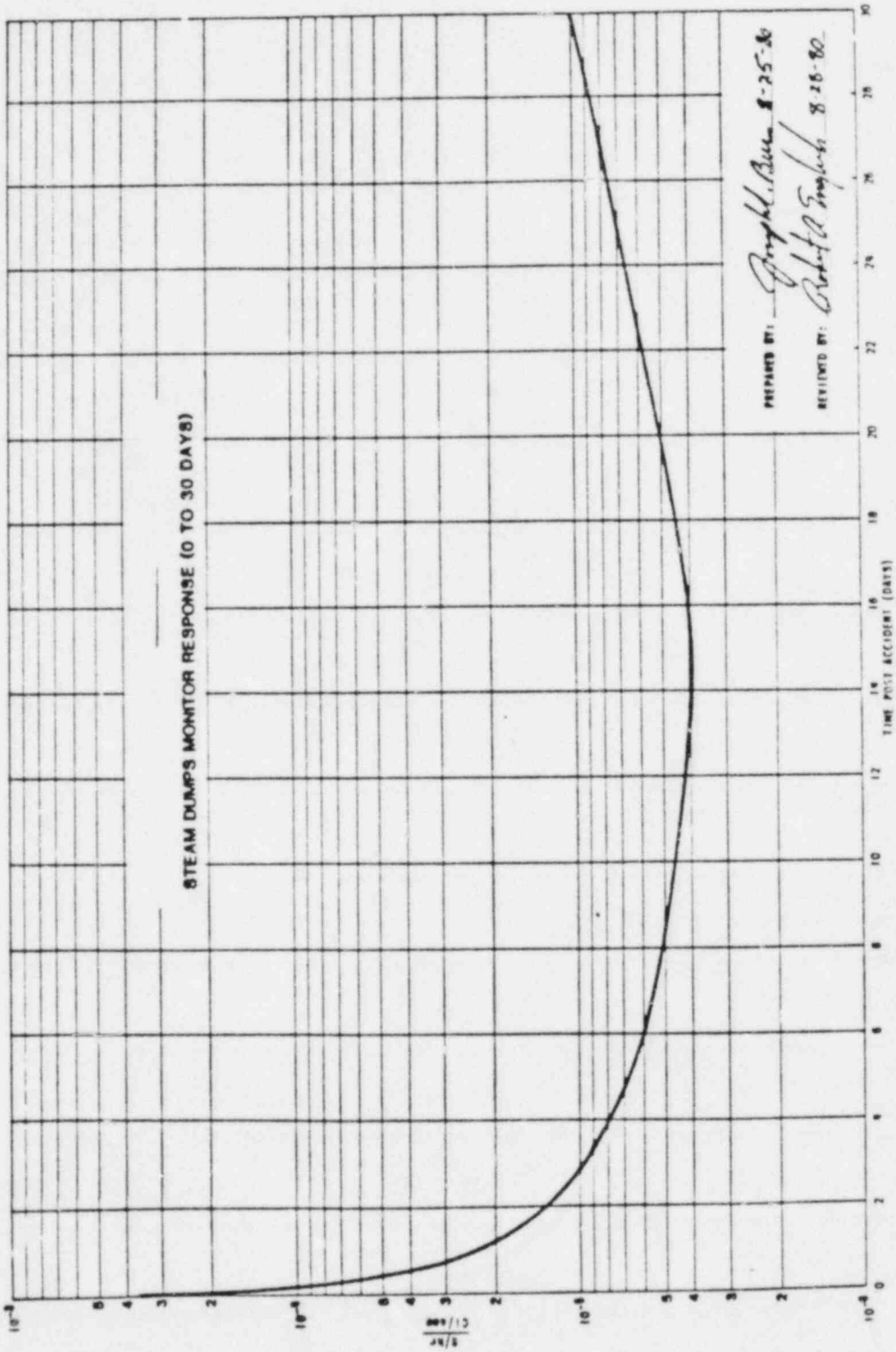
STACK MONITOR RESPONSE
(0 to 30 days)



STEAM DUMP MONITOR RESPONSE
(0 to 24 hours)



STEAM DUMP MONITOR RESPONSE
(0 to 30 days)



Proc No EI-6.9
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (CALCULATOR METHOD

1. Prepared

Originator — Date 5/19/83

EXD RD DEL005

2. QA Concurrence

N/A — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — Date 5/19/83

4. PRC Reviewed

R.H. Vurek — Date 5/19/83

PRC 83-010

5. Approved

James Ray for S. Tribble — Plant Manager — Date 5/20/83

6. ATMS Incorporated

5-23-83 — Date

7. Biennial Review

_____ — Date

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (CALCULATOR METHOD)

Table of Contents

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (CALCULATOR METHOD)

1.0 PERSONNEL RESPONSIBILITY

The Chemistry/Health Physics Support Group Leader is responsible for the implementation of this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

To provide a procedure to utilize the Hewlett Packard HP-41CV calculator to provide offsite dose assessment calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 to EI-6.0 in Section IV.1.

c. A pre-programmed Hewlett-Packard HP-41CV is required to perform this procedure. If this calculator is unavailable, go to EI-6.10 to calculate offsite dose.

d. Input to this section is obtained from previously completed sections of the Offsite Dose Worksheet. Pertinent data is enclosed in boxes for rapid identification.

4.0 PROCEDURE

4.1 ASSEMBLING CALCULATOR AND PRINTER

NOTE: The calculator and printer should both be "OFF" prior to interconnecting the units. Make sure that both the calculator and printer are connected to the charging unit(s).

Calculator may have card reader attached to top of calculator. If card reader is in place only one port is visible to connect printer. If card reader is not attached, use any port on bottom rear of calculator. A protective cover may have to be removed to gain access to a port. The printer plug in unit should be inserted so that the stepped side is at the bottom and the flat side on top.

4.2 INITIALIZATION OF CALCULATOR AND PRINTER

4.2.1 Turn printer "ON". Red "POWER" light should come on. Set the "Mode" switch to the "Norm" position and the "Intensity" switch to the middle position.

NOTE: If the red power light does not come on or the battery light does come on, proceed to the manual dose assessment procedure EI-6.10.

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (CALCULATOR METHOD)

4.2.2 Turn calculator "ON". If the word "USER" does not appear in the display, press the "USER" switch to activate the mode.

NOTE: If the calculator display does not light up, proceed to the manual dose assessment procedure EI-6.10.

4.3 RUNNING THE PROGRAM

4.3.1 Press the "SIN" button, (2nd Row, 3rd button from the left).

4.3.2 The first interrogation, "QN? CI/SEC", prompts for the noble gas release rate. Key in the proper number from the dose worksheet Section I and press the "R/S" key (lower right-hand corner).

NOTE: If an error is made while entering the data, the "←" key (middle right) can be pressed to erase the data prior to pressing the "R/S" key. If the "R/S" has been pressed, the program must be restarted by pressing the "SIN" button.

4.3.3 The next interrogation, "E-BAR N GAS MEV" prompts for the average energy per disintegration. Key in the proper number from the dose worksheet Section II and press the "R/S" key.

4.3.4 The next interrogation, "QI 131E CI/SEC", prompts for the dose equivalent Iodine-131 release rate. Key in the proper number from the dose worksheet Section I and press the "R/S" key.

4.3.5 The next interrogation, "REL HGT? METERS", prompts for the release height. Enter Ø (ground level) and press the "R/S" key.

4.3.6 The next interrogation, "U BAR? MI/HR", prompts for the wind speed. Key in the proper number from the dose worksheet Section III and press the "R/S" key.

4.3.7 The next interrogation, "START POINT", prompts for the distance in miles at which the dose assessments should start. Enter Ø and press the "R/S" key.

NOTE: When a Ø is entered, the program will print doses for .5, 1, 1.5, 2.0, 5.0 and 10 miles. If a distance other than Ø is entered, the program will start at that distance. The State of Michigan requires that dose assessment be done for .5, 2, 5 and 10 miles.

4.3.8 The final interrogation, "STABILITY?", prompts the user to select the Pasquill stability classification (A-G).

NOTE: Pressing the blue key starts the program running. Do NOT push the "R/S" key to start the program running. Once the program is running, the "R/S" key can be pressed to stop the program and pressed again to restart the program at the point it was stopped. Pressing the "SIN" key will restart the program from the beginning. The calculator "BEEP" function is activated by the program when the noble gas (whole

body) dose rate reaches 500 mrem/hr and/or when the child thyroid dose rate reaches 1000 mrem/hr which represent Protective Action Guidelines for consideration of evacuation.

4.4 READING THE PRINTOUT

Distance from release point	"DISTANCE MILE"
Iodine 131 dose equivalent concentration (Ci/m^3)	"CONCEN IODINE"
Child thyroid dose rate (mrem/hr)	"MREM/HR C-THY"
Noble gas concentration (Ci/m^3)	"CONCEN N GAS"
Finite cloud whole body dose rate (mrem/hr)	"MREM/HR W BODY"
Off axis whole body dose rate (distance units are the same as downwind distance units)	"MREM/HR DIS FROM X-AXIS"
Vertical distance to .1 mrem/hr whole body dose rate (distance units are the same as downwind distance units)	"ALT Ø .1 MR/HR"
Plume arrival time (minutes) at the specified downwind distance	"ARR TIME MIN"
Relative concentration (X/Q sec/m^3 value at the specified downwind distance	"CHI OVER Q"

4.5 RECORDING DATA

4.5.1 Record the child thyroid dose rate on the dose worksheet, Section IV.1, item (A) for .5, 2, 5 and 10 miles and for any other specific distance of interest.

4.5.2 Record the I-131 dose equivalent concentration on the dose worksheet, Section IV.1, item (B) for .5, 2, 5 and 10 miles and for any other specific distances of interest.

4.5.3 Record the finite cloud while body dose rate on the dose worksheet, Section IV.1, item (C) for .5, 2, 5 and 10 miles and for any other specific distance of interest.

4.5.4 Estimate duration of release. Use two hours as a default value. Record on worksheet, Section IV.1, item (D).

4.5.5 Multiply child thyroid dose rate (A) by estimated duration (D) to obtain child thyroid dose commitment. Record the child thyroid dose commitment on the dose worksheet, Section IV.1, item (E).

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (CALCULATOR METHOD)

4.5.6 Calculate the finite cloud whole body dose commitment by multiplying the whole body dose rate (C) by the estimated duration (D). Record on worksheet, Section IV.1, item (F).

4.5.7 Note on worksheet, Section IV.1, item (G) whether the doses are based on actual or potential releases.

4.5.8 Proceed to the next procedure as required per EI-6.0.

5.0 ATTACHMENTS

None

Proc No EI-6.8
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: BACKUP AND SUPPLEMENTAL METEOROLOGY

1. Prepared

[signature] 5/19/83
Originator Date
PER RCD REVIEWS

2. QA Concurrence

NA
Date

3. Recommend Approval/Q-List (Yes) No

[signature] 5/19/83
Department Head Date

4. PRC Reviewed

[signature] 5/19/83
PRC 83-010 Date

5. Approved

James Kay for 5/20/83
Plant Manager Date

6. ATMS Incorporated

5-23-83
Date

7. Biennial Review

Date

TITLE: BACKUP AND SUPPLEMENTAL METEOROLOGY

Table of Contents

TITLE: BACKUP AND SUPPLEMENTAL METEOROLOGY

1.0 PERSONNEL RESPONSIBILITY

The Chemistry/Health Physics Support Group Leader is responsible for the implementation of this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

To provide a backup procedure to access the Weather Services International (WSI) meteorological system and obtain meteorological data required in the offsite dose calculations when onsite meteorological data is not available and to provide a procedure to obtain supplemental regional meteorological data, site specific meteorological forecast and precipitation data as required.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Steps 4.1.1 through 4.1.15 of this procedure shall be implemented when there is a potential for or an actual release of radioactive material and onsite meteorological data is not available. Steps 4.2.1 through 4.2.7 of this procedure shall be implemented when there is a need for regional meteorological data, site-specific meteorological forecast and precipitation data.

c. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 of EI-6.0 in Section III.2.

d. A TI silent 700 Terminal is required to perform this procedure.

4.0 PROCEDURE

4.1 ACCESSING THE WSI WEATHER SYSTEM

Power Up the Terminal

4.1.1 Connect the power supply cord to the terminal and plug the cord into a power socket.

NOTE: To use the Control Room meteorological terminal to obtain meteorological data from the WSI system, the terminal must be unplugged from the modem (black line) and the black plug inserted in its place.

4.1.2 Move the toggle switch located on the rear right-hand side of the terminal to the "on" position. You should be able to hear the terminal fan motor start up.

4.1.3 There are three rocker switches located on the front right-hand side of the terminal. They are labeled low speed, half dup and on line.

a. Depress the right side of the one labeled low speed.

b. Depress the right side of the one labeled half dup.

c. Depress the left side of the one labeled on line.

4.1.4 There is one rocker switch located on the front left-hand side of the terminal labeled "NUM". Depress the right-hand side of this switch.

Dialing In

4.1.5 Using the telephone, obtain an outside line and dial [redacted]

Alternate Numbers - [redacted]

4.1.6 Place the telephone receiver into the acoustic coupler located on the back part of the terminal. The orientation of the telephone receiver in the acoustic coupler is pictured on the rear of the terminal by the acoustic coupler.

4.1.7 When the green light on the terminal comes on, hit the return button twice.

NOTE: If the green light does not come on within two minutes, return to Step 4.1.5.

NOTE: The system will give you a port identification number and ask you to identify your terminal by printing "TERMINAL=".

4.1.8 Type "TI45" and hit the return key once.

4.1.9 The system will respond with an "@" character. Type the letter "C" followed by a space, then the following number "617133" and hit the return key once.

The system will respond with one of the following connection messages:

a. "617 133 connected" (if this, go to 4.1.11)

b. "617 133 not reachable" (if this, go to 4.1.10)

c. "617 133 not operating" (if this, go to 4.1.10)

4.1.10 If the "not reachable" or "not operating" message is given, remove the telephone receiver from the acoustic coupler and hang up.

a. Using the telephone, obtain an outside line and then dial 1-617-275-3300.

b. Place the telephone receiver in the acoustic coupler.

c. When the green light on the terminal comes on, hit the return button twice.

NOTE: If the green light does not come on within one or two minutes, return to Step 4.1.10. If this connection cannot be established, go to Step 4.1.16.

d. The system will respond with the following message:

Please login
+
Proceed to Step 4.1.12

Logging In

4.1.11 To log in, hit the return key once.

NOTE: The system will respond with the following message:

Please login
+

4.1.12 Type in "LOGIN PAL"

NOTE: The system will respond with the word "PASSWORD;" followed by a field of overtyping.

4.1.13 Type the word "POWER" and hit the return key.

NOTE: The system will respond with an introduction message followed by a "+" sign. You have now logged in to the Weather Information System. The system will always type a plus sign "+" when it is ready to accept commands from the user. The user must always hit the return key after each command string. See Attachment 1 for further information if required.

Display Meterological Data

4.1.14 Type "USINFO" followed by a 3-letter-station-code followed by "WZQ," then hit the return key. This will print the data for the current hour at a selected weather station.

NOTE: The following are the 3-letter-station-codes. They are given in the order they shall be used, the first being the primary and the second to be used only if the first is not available.

1. Benton Harbor-BEH
2. Muskegon-MKG

For example, the following command would give the current hourly meteorological data at Benton Harbor:

USINFO BEH WZQ

The data would appear in the following format:

Observations for 8PM(01Z) 1-DEC-82

Station Name	Wind	PS
Benton Harbor, MI	2710	D

Where:

Wind = Wind direction first two digits in tens of degrees from which wind is blowing and wind speed to the nearest knot, ie, 2710 = 270 degrees at 10 knots

PS = Pasquill stability category (A-G)

Record the wind direction, the wind speed, and Pasquill stability class on the worksheet, items (A), (B) and (D) respectively. Convert wind speed to mph by multiplying wind speed (B) by 1.15 mph/knot. Record on worksheet, item (C).

All required meteorological data have now been recorded. Log out and proceed to the next procedure as required per EI-6.0.

4.1.15 Logging Out

When you are done with all your work on the system, you should log out. To log out, type: LOGOUT

NOTE: Step 4.1.16 is needed only if the connection to the WSI system can not be established.

4.1.16 Dial the Grand Rapids National Weather Service directly (616-949-0640). Identify yourself as a Palisades Plant representative and request the following data from the meteorologist on duty:

a. Wind direction, degrees from

b. Wind speed in mph.

Record on worksheet, items (A) and (C) respectively.

Stability class must be estimated as follows:

a. night time or cloudy = E

b. day time and clear = D

Record on worksheet, item (D).

Continue to the next procedure as required per EI-6.0.

******** STEPS 4.2.1-4.2.7 PROVIDE SUPPLEMENTAL METEOROLOGICAL INFORMATION ONLY ********
******** THESE STEPS ARE TO BE IMPLEMENTED ONLY IF TIME PERMITS. ********

4.2 DISPLAY SUPPLEMENTAL METEOROLOGICAL DATA AND FORECAST

4.2.1 To print the current data for more than one station, type each station code separated by a comma. For example, to print the current data for Benton Harbor and Muskegon, type:

USINFO BEH,MKG WZQ

NOTE: Data can also be printed from previous hours, or a set of hours. Data for most stations are stored for three days (72 hours). The command format is the same for the current hour except a time period is added after the "WZQ". The following codes are used to specify time periods:

A A.M.
B P.M.

The format for specifying the time periods is:

start time-end time

12 A represents midnight

12 P represents noon

4.2.2 To print the hourly Bentor Harbor data from 1 AM through 7 AM, type:

USINFO BEH WZQ 1A-7A

If you want the data from all the hours since a certain time, leave the end time blank. To print all the hours at Benton Harbor since 1 AM, type:

USINFO BEH WZQ 1A-

4.2.3 To print data for one particular hour (1 AM), type:

USINFO BEH WZQ 1A

NOTE: The same format is used for multiple stations. If the meteorological data for a station is missing for a particular hour, nothing will be displayed for that particular parameter.

Display Weather Forecast

The National Weather Service prepares a numerical weather forecast for select cities around the United States twice a day at 00Z (7:00 PM EST) and 12Z (7:00 AM EST). This forecast is called Model Output Statistics (MOS). The output from this forecast is used to obtain a site specific 48-hour forecast in 6-hour increments for the Palisades

Nuclear Plant. The Plant forecast parameters are wind direction (tens of degrees), wind speed (mph), cloud cover (tenths), cloud ceiling height (ft) and Pasquill stability category. The wind direction and wind speed values are printed to the nearest ten degrees and mph respectively. A value of 2710 would be interpreted as wind coming from 270° at 10 mph. The forecast is available through WSI at approximately 10 AM and 10 PM.

4.2.4 To obtain the forecast for the Palisades Plant, type:

-MOSPAL 00 or 12 depending on which forecast you want

The forecast will appear as:

DATE/GMT	27/18	28/00	28/06	28/12	28/18	29/00	29/06	29/12
DATE/EST	27/13	27/19	28/01	28/07	28/13	28/19	29/01	29/07
WIND-MP	0910	0711	0813	0811	0610	1511	2109	3303
CLDS-.1	10	10	10	10	10	10	8	2
HGT-FT	6100	6450	4750	3750	3150	5650	5500	5500
PAS	D	D	D	D	D	D	D	C

Where:
DATE = Day of the month
GMT = Greenwich Mean Time
EST = Eastern Standard Time
WIND-MP = Wind direction (tens of degrees) and wind speed (mph) value.
CLDS-.1 = Cloud cover in tenths
HGT-FT = Cloud height in feet
PAS = Pasquill stability category

Display Radar Maps (Precipitation)

4.2.5 To display the most recent radar map for the Palisades Plant area, type:

RADMAP MKG (Radar station located in Muskegon, Michigan)

NOTE: The map produced will be centered on the National Weather Service Radar Station. Digits indicating intensity of radar echoes will be superimposed on the map. Every hour, radar stations across the country take radar observations and determine the itensity of precipitation. The intensity at a particular location is reported as a single digit. The digits are defined as:

Digit	Precipitation Intensity
1	Light
2	Moderate
3	Heavy
4	Very Heavy
5	Intense
6	Extreme
8	Unknown, but probably light to moderate
9	Unknown, but probably heavy

** Indicates that a valid report has been received for the station at that location.

MM Indicates that the station at that location has been reported out of service.

If no report is received from a station, neither ** nor MM will be displayed. If an echo (levels 1-6, 8-9) is reported at the station, the echo will be typed, otherwise ** indicates the location of the station.

Display Regional Meteorological Data

4.2.6 To display a weather map of wind data for the State of Michigan, type:

MIC W

NOTE: The system will print "OK" to indicate that it is processing the command.

NOTE: Wind direction is reported in tens of degrees (first two digits of display) from which the wind is blowing and wind speed in nearest knot (last two digits of display).

4.2.7 To display a weather map of stability classes for the State of Michigan, type:

MIC ' (' = an apostrophe, uppercase 7 on keyboard)

NOTE: The system will print "OK" to indicate that it is processing the command.

5.0 ATTACHMENTS

Attachment 1, "Supplemental Information"

SUPPLEMENTAL INFORMATION

A. Correcting Typing Mistakes

If you make a mistake while typing a command, there are two methods to correct the mistake. One corrects the characters on the line, and one erases the entire line and lets you start again.

1. To correct mistakes on a line, you use the "Rubout" key. To correct an error, type the rubout key once for each character that you would like to erase. The system will indicate the use of this function by typing a black slash "/" followed by the characters that are being erased. (In some modes, the system will only type the characters that are being erased and not the black slash). Now type the correct characters. These characters can include spaces, letters and numbers. Once the return key has been typed, you cannot erase any characters from that line.

   If you were trying to type "USINFO" and mistakenly type "USDSRF", you could do the following:

   USDSFR/RFSD/INFO or

   USDSFRRFSDINFO

   The rubout key was typed four times, followed by the correct characters. If at any time you would like to see the corrected portion of the line before you hit the return key, hit the paper adv key and then hit the CTRL key while at the same time hitting the letter "R".

2. To erase an entire line, hit the CTRL key, at the same time hit the letter "U". The terminal will return to a new line. Even though the system does not type a "+", you may enter the command.

B. Stopping Programs and Output

If at any time you wish to cancel a command, stop a program execution, completely halt a printout, or stop anything else on the system, hit the CTRL key and the letter C simultaneously two times. Note that it might take a few seconds before the system recognizes the command. If after a few seconds, the system fails to halt execution, retype the above sequence.

C. Problem Assistance

If you encounter problems at any time, call the WSI Bedford Systems Consulting Group at 617-275-8860-172.

Proc No EI-6.0
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: OFFSITE DOSE CALCULATION AND RECOMMENDATIONS FOR PROTECTIVE ACTIONS

1. Prepared

Originator (FIRE PES OF DOSE) — Date 5/19/83

2. QA Concurrence

NA — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — Date 5/19/83

4. PRC Reviewed

[signature] — Date 5/23/83

5. Approved

James Ray for — Plant Manager — Date 5/20/83

6. ATMS Incorporated

Date 5/23/83

7. Biennial Review

Date

ei0383-0027e154

TITLE: OFFSITE DOSE CALCULATION AND RECOMMENDATIONS FOR PROTECTIVE ACTIONS

Table of Contents

TITLE: OFFSITE DOSE CALCULATION AND RECOMMENDATIONS FOR PROTECTIVE ACTIONS

1.0 PERSONNEL RESPONSIBILITY

The Chemistry/Health Physics Support Group Leader shall implement this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this function.

2.0 PURPOSE

To determine the appropriate steps required to calculate offsite dose and recommend offsite protective actions.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

This procedure shall be implemented when there is a potential for, or an actual significant release of radioactive materials from the Plant site, per EI-2.1.

4.0 PROCEDURE

4.1 OVERVIEW

a. All procedures in Emergency Implementation Procedures, Section EI-6 are for calculation of offsite dose and making recommendations for offsite protective actions. Not all procedures in this section are applicable to all release categories. The following paragraphs will direct the user to the appropriate procedures to complete this task.

b. Use Attachment 1 of this procedure, (Offsite Dose Worksheet), when completing this procedure. Mark the blank in the left margin of the worksheet to designate which procedures should be performed, per the following paragraphs.

4.2 RELEASE RATE

This section selects the appropriate procedure to determine a release rate (Ci/sec) for input into the Offsite Dose calculation.

4.2.1 If the release is occuring through the Plant stack, the release rate should be determined in EI-6.1. Mark Section I.1 on the worksheet if this paragraph applies to the release.

4.2.2 If the release is occuring through the steam dump, the release rate should be determined in EI-6.2. Mark Section I.2 on the worksheet if this paragraph applies to the release.

4.2.3 If the release is occuring through the stack or steam dump and the stack monitors or main steam line gamma monitors respectively, are not functional, the release rate should be determined in EI-6.3. Mark Section I.3 on the worksheet if this paragraph applies to the release.

4.2.4 If the radioactivity is confined to the containment building with a potential for release or an actual release taking place, the release rate should be calculated in EI-6.4, using the high range containment monitors. Mark Section I.4 on the worksheet if this paragraph applies to the (potential) release.

4.2.5 If the results from Post-Accident Sampling (EI-7) are available, confirmation of potential or actual release rates from the containment building or the Primary Coolant System may be determined in EI-6.5. This procedure may serve as a backup for EI-6.3 in the case of a containment building release, as time permits. Implementation of this procedure should not delay completion of Offsite Dose Calculations. Mark Section I.5 of the worksheet if the above conditions are met for the use of Post-Accident Sampling input.

4.3 AVERAGE GAMMA ENERGY ($\bar{E}$)

EI-6.6 shall be used to determine the average gamma energy per disintegration to be used for Offsite Dose calculations. Section II.1 is already marked on the worksheet.

4.4 METEOROLOGICAL DATA

This section selects the primary and backup methods of obtaining meteorological data, including wind speed, wind direction and stability class.

4.4.1 If the site meteorological station is functioning, current weather conditions should be determined in EI-6.7. Mark Section III.1 on the worksheet if onsite meteorological data is available.

4.4.2 Backup meteorological data and weather forecasts are obtained in EI-6.8. The backup system should be used when the onsite system is not available. Weather forecasts may be used to anticipate changing conditions. Forecasts should be made only if staffing and time permits. Mark Section III.2 on the worksheet if backup meteorology is used.

4.5 CALCULATIONAL METHODS

This section describes the method(s) which should be used to calculate offsite dose.

4.5.1 The straight-line Gaussian method described in EI-6.9 should be used to determine offsite dose. This method requires a pre-programmed Hewlett-Packard 41 CV calculator (normally stored with Technical Support Center emergency equipment). This method is in agreement with the state method and should be the primary used until the Technical Support Center is staffed. Mark Section IV.1 on the worksheets if the above conditions are met.

4.5.2 If a pre-programmed Hewlett-Packard 41 CV is not available, EI-6.10 should be used to determine offsite dose. The methodology and results are essentially identical to those in EI-6.9, but no calculator is required. Mark Section IV.2 on the worksheet if the backup method is used.

4.5.3 Segmented Gaussian Method, EI-6.11 - to be developed.

4.6 OFFSITE MONITORING

EI-6.12 compares offsite monitoring results (EI-9), to Offsite Dose calculations made in this section. This comparison should be made as data becomes available and time permits. Mark section V.1 on the worksheet if the above conditions are met.

4.7 OFFSITE PROTECTIVE ACTIONS

EI-6.13 shall be used to determine recommendations for offsite protective actions. Section VI.1 is already marked on the worksheet.

4.8 COMPLETION OF REQUIRED CALCULATIONS

Initiate the first procedure as identified on the worksheet. Proceed to the next procedure identified on the worksheet upon completion of the first. Omit unmarked sections of the worksheet.

5.0 ATTACHMENTS

Attachment 1, "Offsite Dose Worksheet"

OFFSITE DOSE WORKSHEET

I - Release Rate

( ) Section I.1, Reference EI-6.1, Release Rate Determination from Stack Gas Monitors

1. Current stack gas monitor reading = _____ cpm (A) **RIA-2318 ( ) **RIA-2319 ( )

2. Stack monitor background reading = _____ cpm (B)

3. Net stack monitor count rate = (A)-(B) = _____ cpm (C)

4. Stack gas flow rate = _____ ft^3/min (D)

5. Stack gas flow rate (D) ft^3/min x 4.72E-4 $\frac{m^3/sec}{ft^3/min}$ = _____ m^3/sec (E)

6. Conversion factor = _____ $\frac{Ci/m^3}{cpm}$ (F)

7. QN, Noble gas release rate = (C) x (E) x (F) = _____ Ci/sec (G)

8. QI, Iodine release rate = (G) x (1.0E-3) = _____ Ci/sec (H)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

( ) Section I.2, Reference EI-6.2, Release Rate Determination from Steam Line Monitors.

1. Steam Dump Start Date _____ (A)
   Time _____ (B)

2. Steam Line Monitor Reading
   A S/G, **RIA-2324 = _____ net cpm (C)

   Steam Line Monitor Reading
   B S/G, **RIA-2323 = _____ net cpm (D)

3. QN_A, noble gas release rate A S/G =
   (C) x (1.7 x 3E-2) = _____ Ci/sec (E)

   QN_B, noble gas release rate B S/G =
   (D) x (17.3E-2) = _____ Ci/sec (F)

4. QN, noble gas release rate =
   if release is from one S/G QN = (E) or (F) =
   if release is from both S/G
   $QN = \frac{(E) + (F)}{2}$ = _____ Ci/sec (G)

5. QI, I-131 dose equivalent release rate =
   (G) x (1.0E-3) = _____ Ci/sec (H)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

CONFIRMATION

( ) Section I.2, Reference EI-6.2, Release Rate Determination from Steam Line Monitors.

1. Date: _____ Time: _____
2. Steam Dump Start

   Date: _____ Time: _____
3. T_{avg} _____°F
4. PCP on? Yes: _____ No: _____
5. Secondary Pressure _____psia
6. Fully Open Dump Valve Saturated Steam Flow Rate _____cc/sec
7. T_{avg} error _____
8. Fraction Valve Open _____

   Actual Steam Flow Rate from one Dump Valve _____cc/sec
10. S/G A dumps open? Yes: _____ No: _____
11. **RIA-2324 reading _____cpm
12. S/G A Total Radionuclide Concentration _____µCi/cc
13. S/G A Radionuclide Release Rate _____µCi/sec
14. S/G A Noble Gas Release Rate _____µCi/sec

    S/G A Radioiodine Release Rate _____µCi/sec
15. S/G B dumps open? Yes: _____ No: _____
16. **RIA-2323 reading _____cpm
17. S/G B Total Radionuclide Concentration _____µCi/cc
18. S/G B Radionuclide Release Rate _____µCi/sec
19. S/G B Noble Gas Release Rate _____µCi/sec

    S/G B Radioiodine Release Rate _____µCi/sec
    . Bypass Valve Open? Yes: _____ No: _____

OFFSITE DOSE WORKSHEET

CONFIRMATION

21. S/G A MSIVs open? Yes: _____ No: _____

    S/G B MSIVs open? Yes: _____ No: _____

22. Bypass Valve Noble Gas Release Rate _____μCi/sec

23. QN = _____Ci/sec

    QI = _____Ci/sec

24. S/G A T_{cold} _____°F

    S/G B T_{cold} _____°F

25. S/G A Pressure _____psia

    S/G B Pressure _____psia

26. Fully Open Dump Valve Flow Rates:

    S/G A _____cc/sec

    S/G B _____cc/sec

27. T_{avg} error _____

28. Fraction Valve Open _____

29. S/G A Actual Steam Flow Rate _____cc/sec

    S/G B Actual Steam Flow Rate _____cc/sec

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

( ) I.3, Reference EI-6.3, Release Rate Determination From High Range Effluent Monitors.

1. High range effluent monitor reading _____ mR/hr (A)

   High range effluent monitor,
   ( ) stack
   ( ) steam dump

2. High range effluent monitor reading = (A) x (1.0E-3) = _____ R/hr (B)

3. Response factor
   _____ (C)

4. Corrected monitor reading = (B) x (C) = _____ R/hr (D)

5. Elapsed time from reactor shutdown to monitor reading = _____ hours,days (E) (circle one)

6. Conversion factor = _____ $\frac{R/hr}{Ci/sec}$ (F)

   from: Attachment 1 ( )
   Attachment 2 ( )
   Attachment 3 ( )
   Attachment 4 ( )

7. QN, noble gas release rate = (D) ÷ (F) = _____ Ci/sec (G)

8. QI, I-131 dose equivalent release rate = (G) x (1.0E-3) = _____ Ci/sec (H)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

( ) I.4, Reference EI-6.4, Release/Potential Release Determination From Containment High Range Monitors.

1. Time past shutdown = _____ hours (A)

2. Monitor number ( ) **RIA-2321 (B)
( ) **RIA-2322

3. Monitor reading = _____ R/hr (C)

4. Noble gas conversion factor = _____ $\frac{\mu Ci/cc}{R/hr}$ (D)

5. Leak rate = _____ cc/sec (E)

6. QN, noble gas release rate =
(C) x (D) x (E) x (1.0E-6) = _____ Ci/sec (F)

7. QI, I-131 dose equivalent release rate =
(F) x (1.0E-3) = _____ Ci/sec (G)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

REFERENCE EI-6.5

To Be Furnished Later

OFFSITE DOSE WORKSHEET

II Gamma $\bar{E}$ Determination

(x) II.1, Reference EI-6.6

1. Decay time _____ hours (A)

2. Source of release ( ) Fuel Melt or Fuel Failure (B)
( ) Main Steam or Offgas (Air Ejector) Releases
( ) Surge Tank, Volume Control Tank, and Degasifier Releases
( ) Waste Gas Decay Tank Releases
( ) Fuel Handling, Sipping and Cask Drop Releases

3. $\bar{E}$ = _____ MeV (C)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

III Meteorological Data

( ) III.1, Reference EI-6.7, Plant Site Meteorological System

1. WS, Wind Speed = _____ mph (A) ( ) 10 meters
( ) 60 meters, corrected

2. WD, Wind Direction = _____ ° from (B) ( ) 10 meters
( ) 60 meters

3. 6010 DELT = _____ (C) preferred

OR

( ) 10-M SGMA = _____ (C) alternate

( ) 60-M SGMA = _____

4. Stability Class = _____ (D)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

( ) III.2, Reference EI-6.8, Backup and Supplemental Meteorology.

1. Wind direction = _____ ° From (A)

2. Wind speed = _____ knots (B)

3. Wind speed = (B) x (1.15) mph/knot = _____ mph (C)

4. Pasquill Stability Class = _____ (D)
   default for stability class: night time or cloudy = E
   day time and clear = D

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

IV - OFFSITE DOSE CALCULATION

( ) IV.1, Reference EI-6.9 Calculation of Offsite Dose - Straight Line Gaussian (Calculator Method)

	Distance from Plant	Required Calculations: Site Boundary	.5 mi	2 mi	5 mi	10 mi	Optional Calculations: ____	____	
1.	Child thyroid dose rate, mrem/hr =	____	____	____	____	____	____	____	(A)
2.	I-131 Dose equivalent conc, Ci/m^3 =	____	____	____	____	____	____	____	(B)
3.	Finite cloud whole body dose rate, mrem/hr =	____	____	____	____	____	____	____	(C)

4. Estimated release duration = _____ hrs (D) Note: default is two hours.

5.	Child Thyroid dose, mrem = (A) x (D) =	____	____	____	____	____	____	____	(E)
6.	Finite Cloud Whole Body dose, mrem = (C) x (D) =	____	____	____	____	____	____	____	(F)

7. Above doses are based on actual/potential (circle one) releases. (G)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

( ) IV.2, Reference EI-6.10 Offsite Dose calculation - Straight Line Gaussian (Manual Method)

		Required Calculations: Site Boundary	.5 mi	2 mi	5 mi	10 mi	Optional Calculations		
							____	____	(A)
1.	$\chi\mu/Q$ $\frac{Ci\ (mph)}{m^3\ Ci/sec}$	=	____	____	____	____	____	____	(B)
2.	χ/Q (sec/m^3) = (B) ÷ wind speed (mph)	=	____	____	____	____	____	____	(C)
3.	Semi-infinite cloud whole dose rate (mrem/hr) = (C) x (QN) x ($\bar{E}$) x (9.0E+5)	=	____	____	____	____	____	____	(D)
4.	Finite cloud correction factor	=	____	____	____	____	____	____	(E)
5.	Finite cloud whole body dose rate (mrem/hr = (D) ÷ (E)	=	____	____	____	____	____	____	(F)
6.	Estimated release duration (hours)	____							(G)
7.	Finite Cloud Whole body dose commitment (mrem) = (F) x (G)	=	____	____	____	____	____	____	(H)
8.	I-131 dose equivalent concentration (Ci/m^3 = (QI) x (C)	=	____	____	____	____	____	____	(I)
9.	Child thyroid dose rate (mrem/hr) = (I) x (1.85E9)	=	____	____	____	____	____	____	(J)
10.	Child thyroid dose commitment (mrem) = (J) x (G)	=	____	____	____	____	____	____	(K)

Above doses based on actual/potential (circle one) releases. (L)

Date: _____ Time: _____ Completed By: _____

OFFSITE DOSE WORKSHEET

REFERENCE EI-6.11

(To be included later)

OFFSITE DOSE WORKSHEET

V Offsite Monitoring

( ) V.1, Reference EI-6.12 Comparison of Offsite Monitoring with Offsite Dose Calculations

Distance =	Site boundary .5 mi	2 mi	5 mi	10 mi	
1. Offsite Monitoring Data					
Whole Body dose rate (mrem/hr) =	_____	_____	_____	_____	(A)
I-131 dose equivalent conc (μCi/cc) =	_____	_____	_____	_____	(B)

2. Plume direction = _____ degrees to (C)

3. Offsite Dose Calculations

Finite Cloud Whole Body dose rate (mrem/hr) =	_____	_____	_____	_____	(D)
I-131 dose equivalent conc (μCi/cc) =	_____	_____	_____	_____	(E)

4. Wind direction = _____ degrees from (F)

Wind direction = _____ degrees to (G)

5. Data Comparison

(A) - (D) =	_____	_____	_____	_____	(H)
(B) - (E) =	_____	_____	_____	_____	(I)

If (H) or (I) > 0, circle in red.

(D) ÷ (A) =	_____	_____	_____	_____	(J)
(E) ÷ (B) =	_____	_____	_____	_____	(K)

If (J) or (K) > 2.0, circle in red.

[(C) - (G)] = _____ degrees (L)

If (L) > 10°, circle in red.

Date: _____ Time: _____ Completed By: _____ D

OFFSITE DOSE WORKSHEET

VI Protective Actions

(x) VI.1, Reference EI-6.13, Protective Action Recommendation for Offsite Population

1.

RECOMMENDED PROTECTIVE ACTIONS TO REDUCE WHOLE BODY AND THYROID DOSE TO OFFSITE POPULATION FROM EXPOSURE TO A GASEOUS PLUME

Recommended (A) Protective Action	Affected* Sectors (B)	Basis for (C) Protective Actions	Projected Dose (Rem) to the Population	Recommended Actions (a)	Comments
			Wholebody < 0.5	No required protective actions (b)	Previously recommended protective actions may be reconsidered or terminated.
			Thyroid < 5	State may issue an advisory to seek shelter and await further instructions. Monitor environmental radiation levels.	
			Wholebody 0.5 to < 5	Seek shelter as a minimum. Consider evacuation. Evacuate unless constraints make it impractical. Monitor environmental radiation levels. Control access.	If constraints exist, special consideration should be given for evacuation of children and pregnant women.
			Thyroid 5 to < 25		
			Wholebody 5 and above	Conduct mandatory evacuation. Monitor environmental radiation levels and adjust area for mandatory evacuation based on these levels. Control access.	Seeking shelter would be an alternative if evacuation were not immediately possible.
			Thyroid 25 and above		

(a)These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take existing conditions into consideration.

(b)At the time of the incident, state officials may implement low-impact protective actions in keeping with the principle of maintaining radiation exposures as low as reasonably achievable.

2. These dose rates are based on actual/potential (circle one) releases. (D)

NOTE: Include the area within two miles of the plant (all sectors) in any recommended actions.

		Date	Time
Completed By:			
Reviewed By:			
Site Emergency Director:			

Proc No EI-6.10
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (MANUAL METHOD

1. Prepared

Originator — 5/19/83 Date

FOR RA CLARK

2. QA Concurrence

NA — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — 5/19/83 Date

4. PRC Reviewed

PRC83-20 — 5/19/83 Date

5. Approved

Plant Manager — 5/20/83 Date

6. ATMS Incorporated

5-23-83 Date

7. Biennial Review

Date

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (MANUAL METHOD)

Table of Contents

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (MANUAL METHOD)

1.0 PURPOSE

The Chemistry/Health Physics Group Leader is responsible for the implementation of this procedure. In the absence of a Chemistry/Health Physics Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

To provide a hand calculation procedure to provide offsite dose assessment calculations whenever the automated dose assessment procedures EI-6.9 and/or EI-6.11 are not operable.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 to EI-6.0, in Section IV.2.

c. Input to this section is obtained from previously completed sections of the Offsite Dose Worksheet. Pertinent data is enclosed in boxes for rapid identification.

4.0 PROCEDURE

4.1 On the dose worksheet, item (A), record any special interest dose assessment distance(s) other than the mandatory .5, 2, 5 and 10 miles.

4.2 Select appropriate XU/Q figure from Attachment 1 based on the Pasquill stability category obtained in Section III of the dose worksheet.

4.3 Determine the appropriate XU/Q values from the selected figure for the mandatory downwind distance of .5, 2, 5 and 10 miles and for any special interest distance(s), record on the dose worksheet, item (B).

NOTE: The XU/Q $\frac{\text{Ci mph}}{\text{m}^3 \text{ Ci/sec}}$ value is read off the vertical axis (labeled XU/Q) directly across from the point on the curve which lies above the downwind distance of interest.

4.4 Determine X/Q (Sec/m^3) values by dividing the XU/Q values (B) by the wind speed (mph) obtained in Section III of the dose worksheet. Record the X/Q values on the dose worksheet, item (C).

4.5 Determine the semi-infinite cloud whole body dose rate (mrem/hr) by multiplying together X/Q(s), sec/m^3 (C), the noble gas release rate, QN Ci/sec, from Section I of dose worksheet, $\bar{E}$, MeV, from Section II of dose worksheet and the constant 9.0 E5 $\frac{\text{mRem} - \text{m}^3}{\text{hr - Ci - MeV}}$ for each distance.

Semi-infinite cloud whole body dose rate (mrem/hr) = $\underline{(X/Q)}$ x $\underline{(Q)}$ x $(\bar{E})$ x (9.0 E5)

Record on the dose worksheet, item (D).

4.6 Determine finite cloud correction factor from Attachment 2 at the downwind distance(s) recorded on the dose assessment worksheet and for the appropriate stability class determined in Section III of the dose worksheet.

NOTE: The finite cloud correction factor(s) is determined by (1) locating the downwind distance of interest on the horizontal axis and reading up to the appropriate stability curve and (2) reading the finite cloud correction factor off the vertical axis directly across from the intersection point on the curve.

Record on the dose worksheet, item (E).

4.7 Determine finite cloud whole body dose rate (mrem/hr) by dividing semi-infinite cloud whole body dose rates (D) by the finite cloud correction factor(s((E).

$$\text{finite cloud whole body dose rate (mrem/hr)} = \frac{\text{(semi-infinite cloud whole body dose rate)}}{\text{(finite cloud correction factor)}}$$

Record on the dose worksheet, item (F).

4.8 Estimate duration of release in hours and record on worksheet, item (G).

4.9 Determine finite cloud whole body dose commitment by multiplying the whole body dose rates (F) by the estimated release duration (G).

Record on the dose assessment worksheet, item (H).

4.10 Determine the I-131 dose equivalent concentration (Ci/m^3) by multiplying the I-131 dose equivalent release rate, QI from Section I of the worksheet by X/Q (C).

Record on worksheet, item I.

4.11 Determine the child thyroid dose rate by multiplying the I-131 dose equivalent concentration (I) by the constant 1.85 E9 $\frac{\text{mrem-m}^3}{\text{hr-Ci}}$.

Record on worksheet, item (J).

4.12 Determine the child thyroid dose commitment (mrem) by multiplying the child thyroid dose rates (I) by the estimated release duration (G).

Record on the dose assessment worksheet, item (J).

TITLE: OFFSITE DOSE CALCULATION - STRAIGHT LINE GAUSSIAN (MANUAL METHOD)

4.13 Note on the worksheet, item (K), whether the doses are based on actual or potential releases.

4.14 Continue to next procedure as required per EI-6.0.

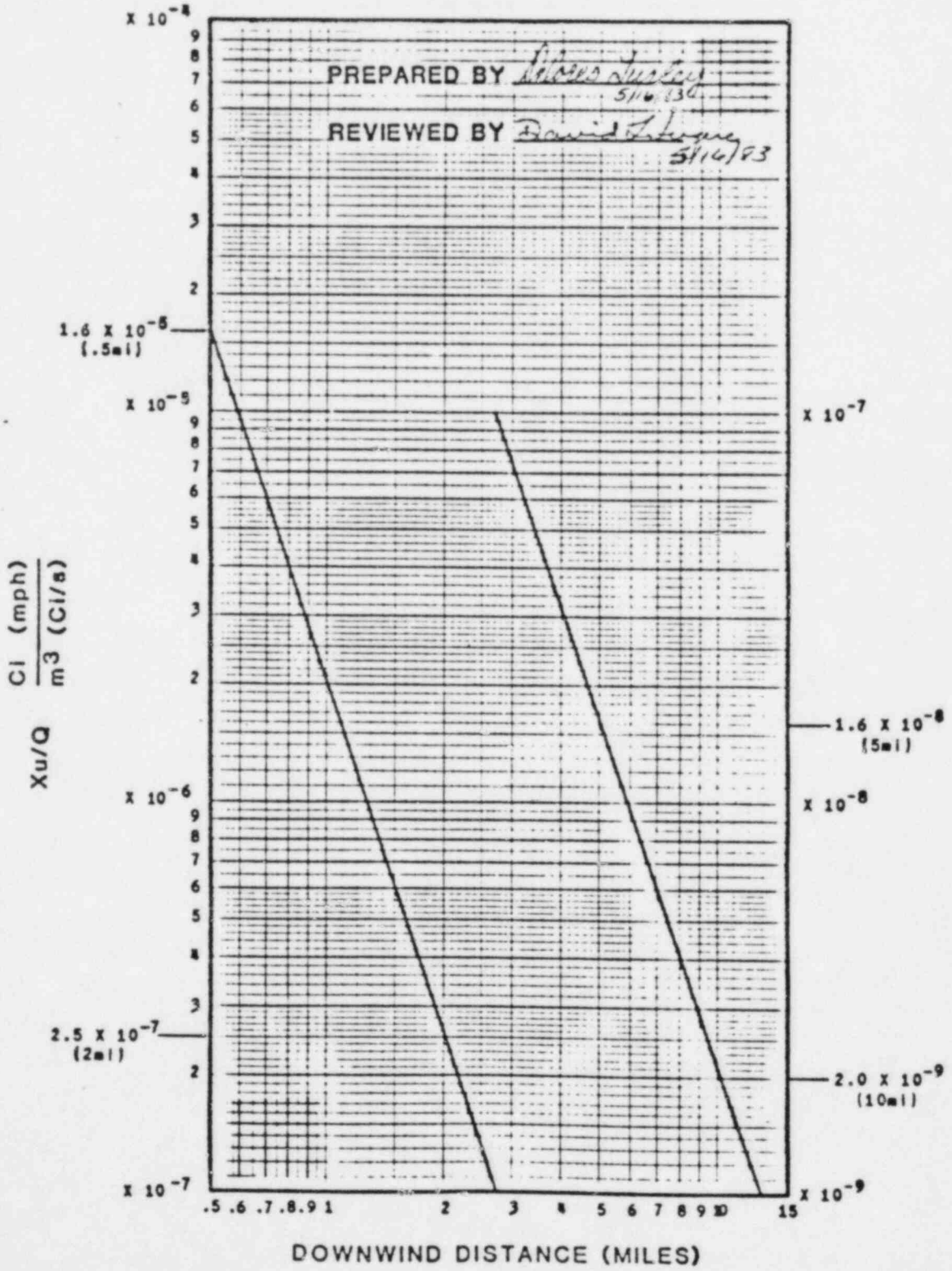
5.0 ATTACHMENTS

5.1 Attachment 1, "XU/Q Curves by Stability Category"

5.2 Attachment 2, "Finite Cloud Correction Factors"

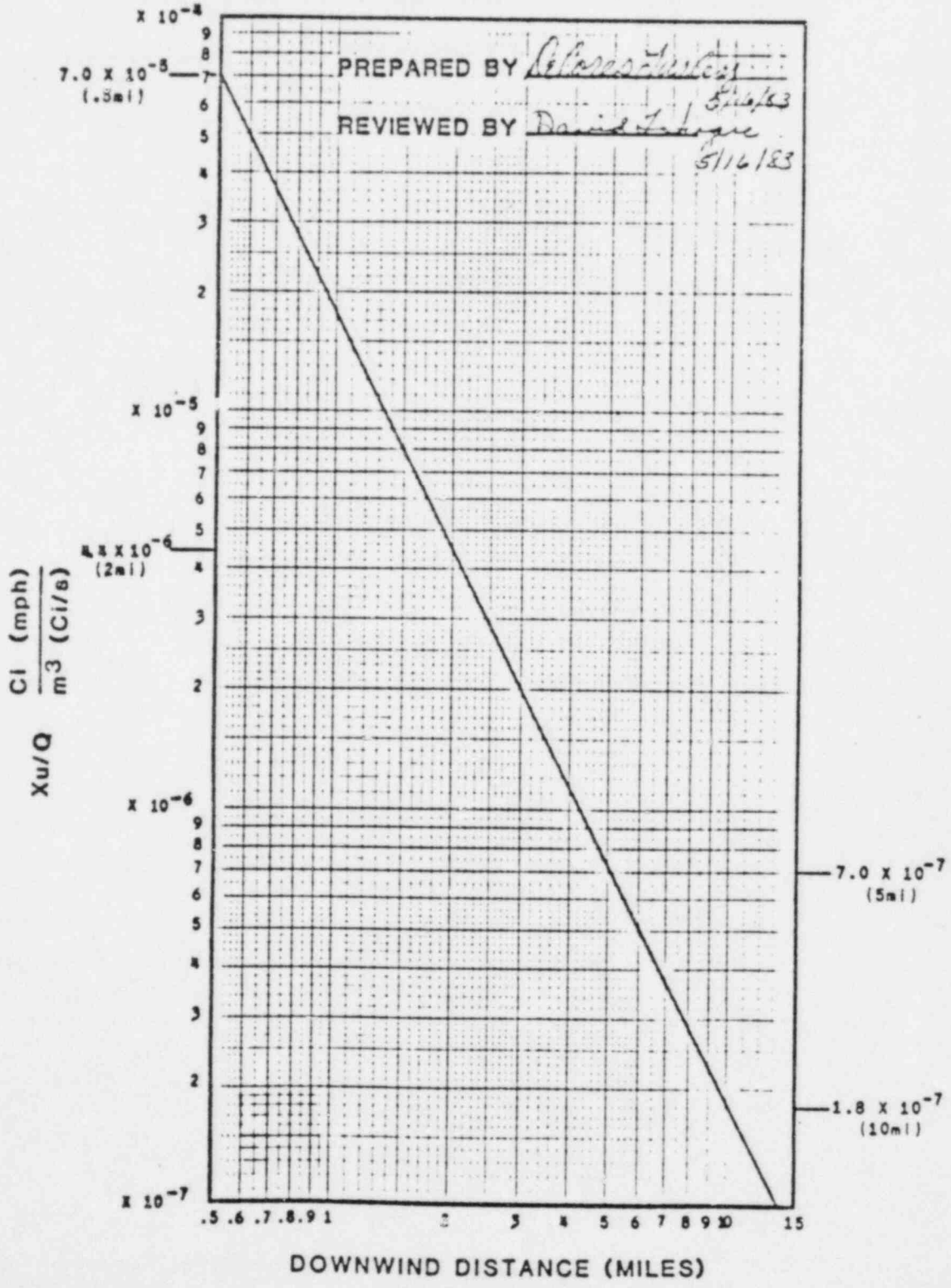
XU/Q CURVES BY STABILITY CATEGORY

"A" STABILITY WITH WAKE EFFECT



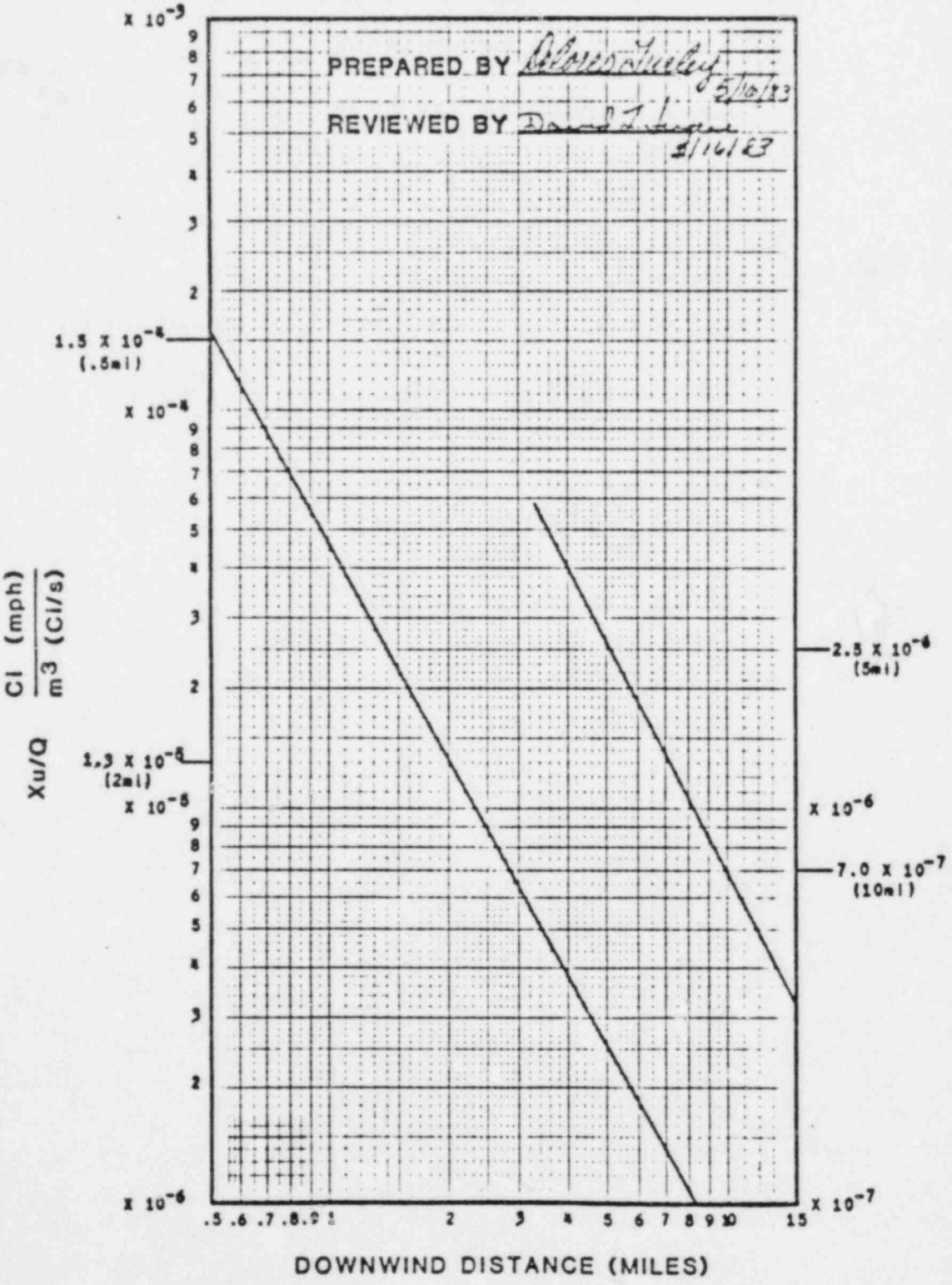
XU/Q CURVES BY STABILITY CATEGORY

"B" STABILITY WITH WAKE EFFECT



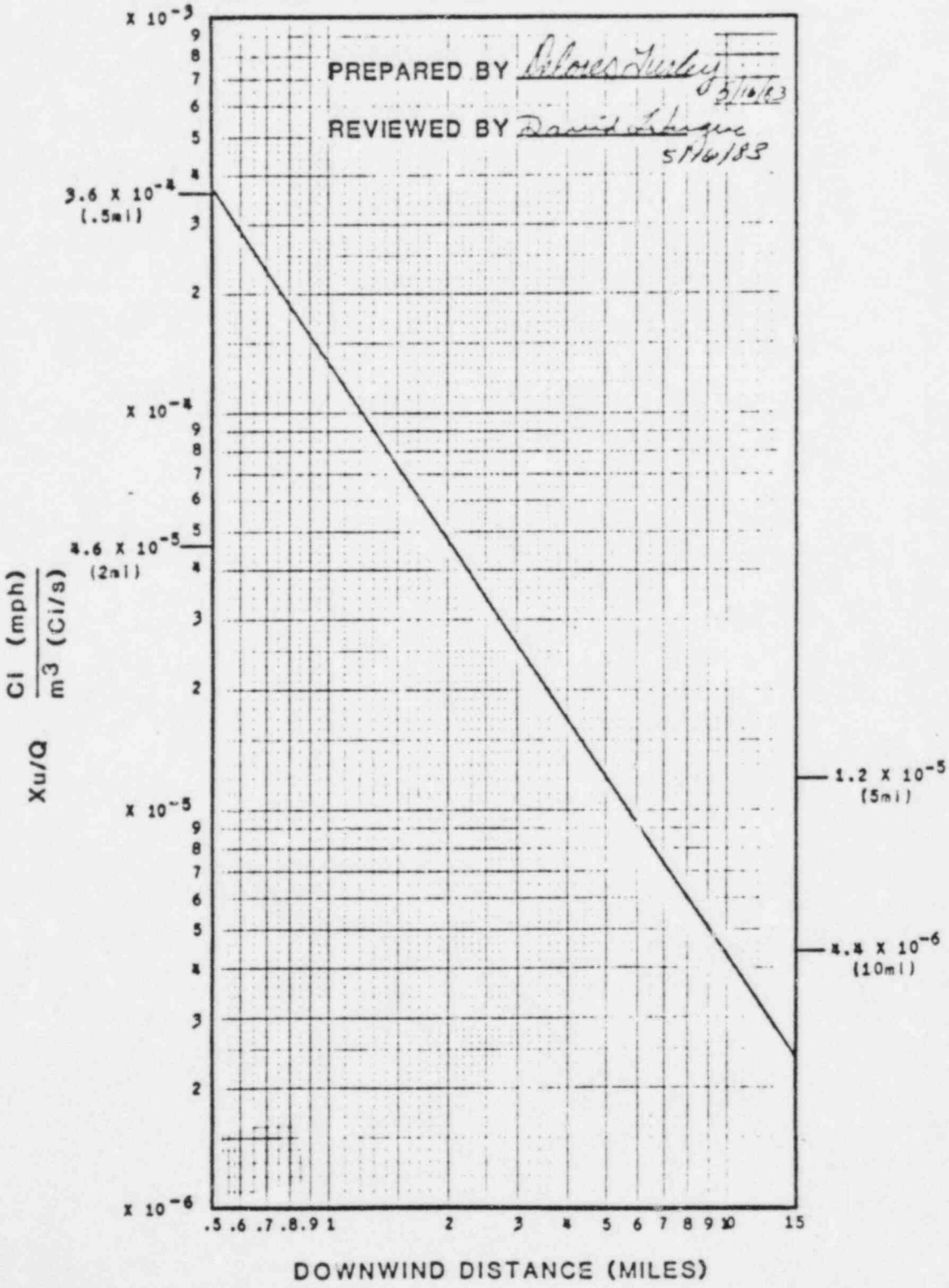
XU/Q CURVES BY STABILITY CATEGORY

"C" STABILITY WITH WAKE EFFECT



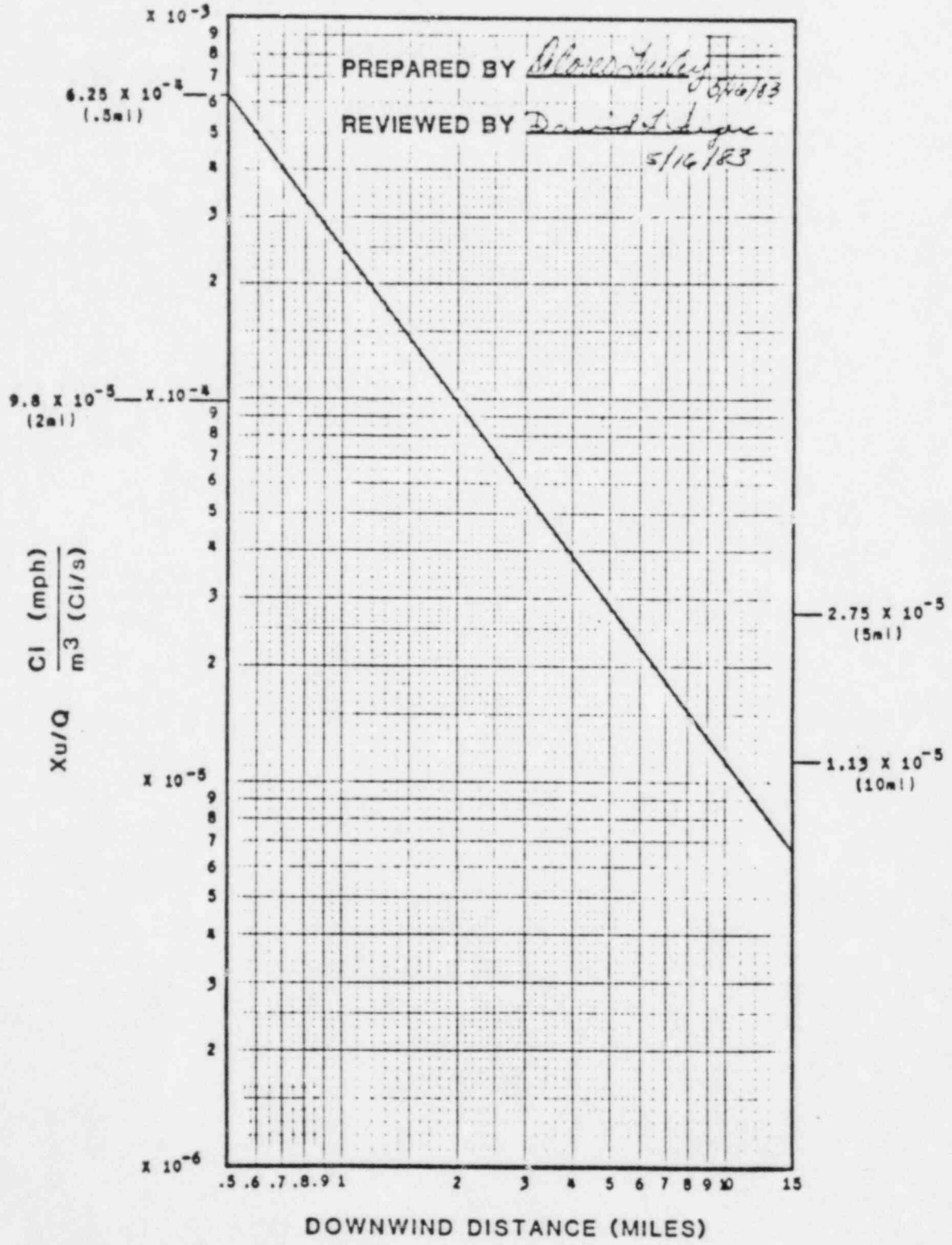
XU/Q CURVES BY STABILITY CATEGORY

"D" STABILITY WITH WAKE EFFECT



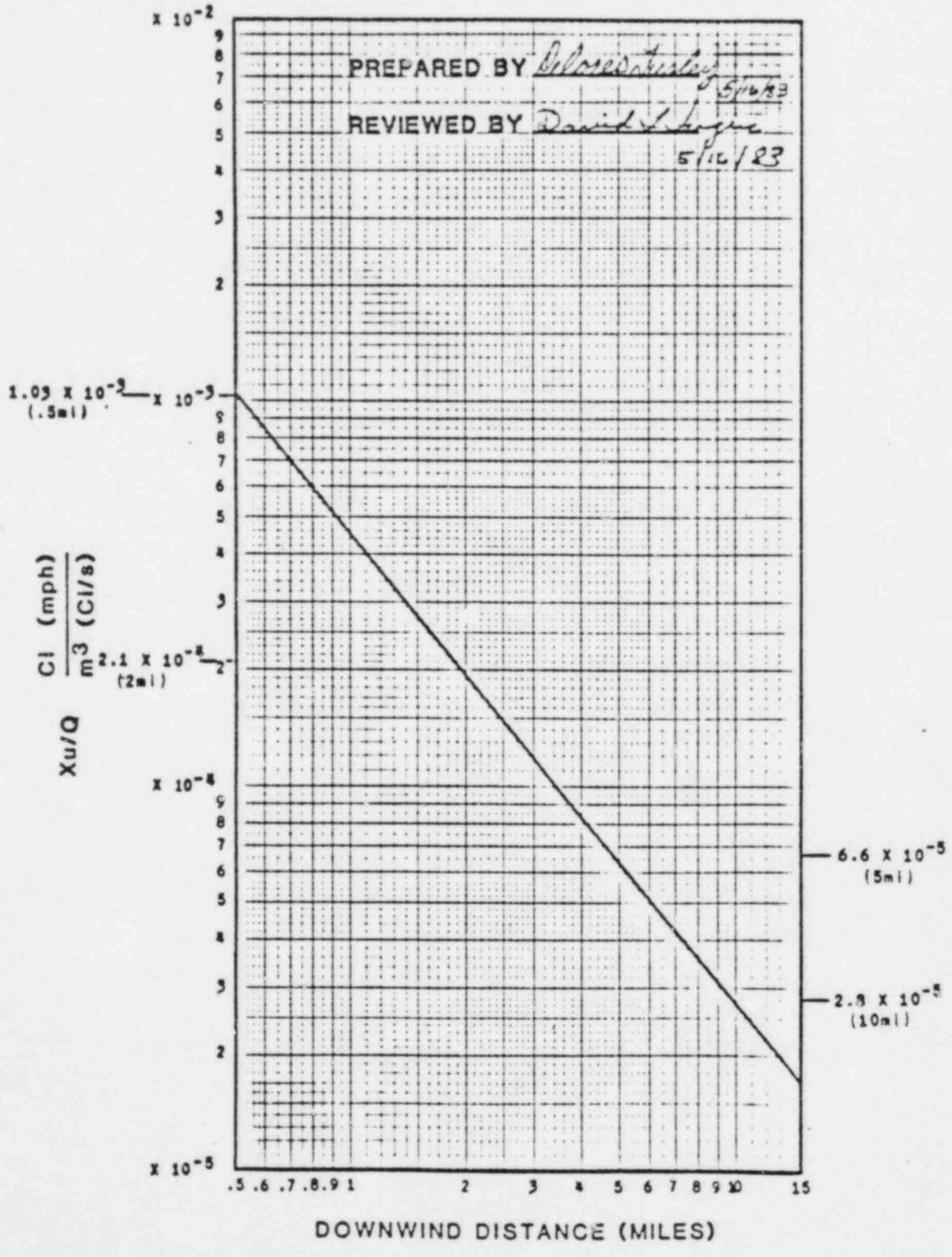
XU/Q CURVES BY STABILITY CATEGORY

"E" STABILITY WITH WAKE EFFECT



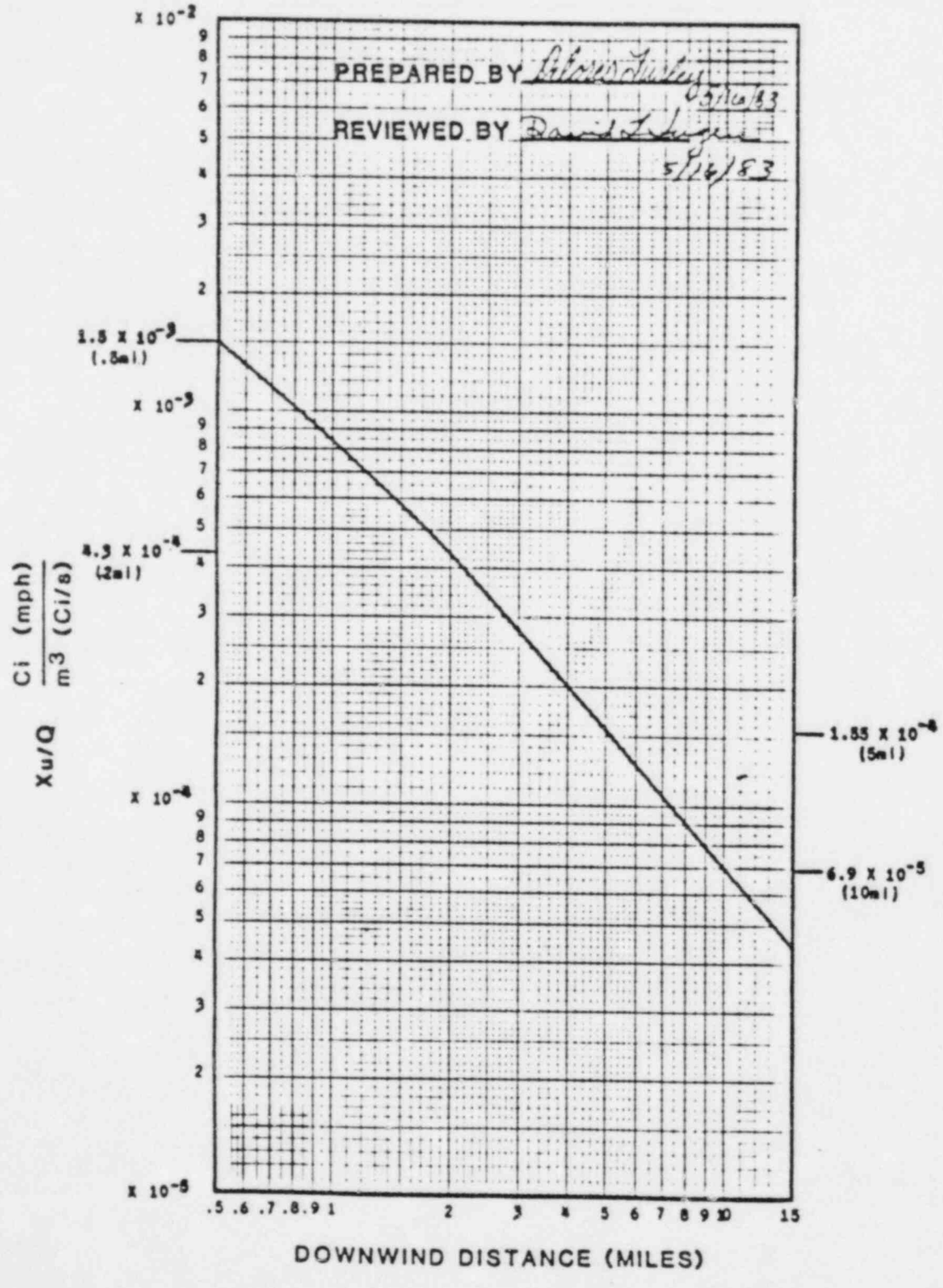
XU/Q CURVES BY STABILITY CATEGORY

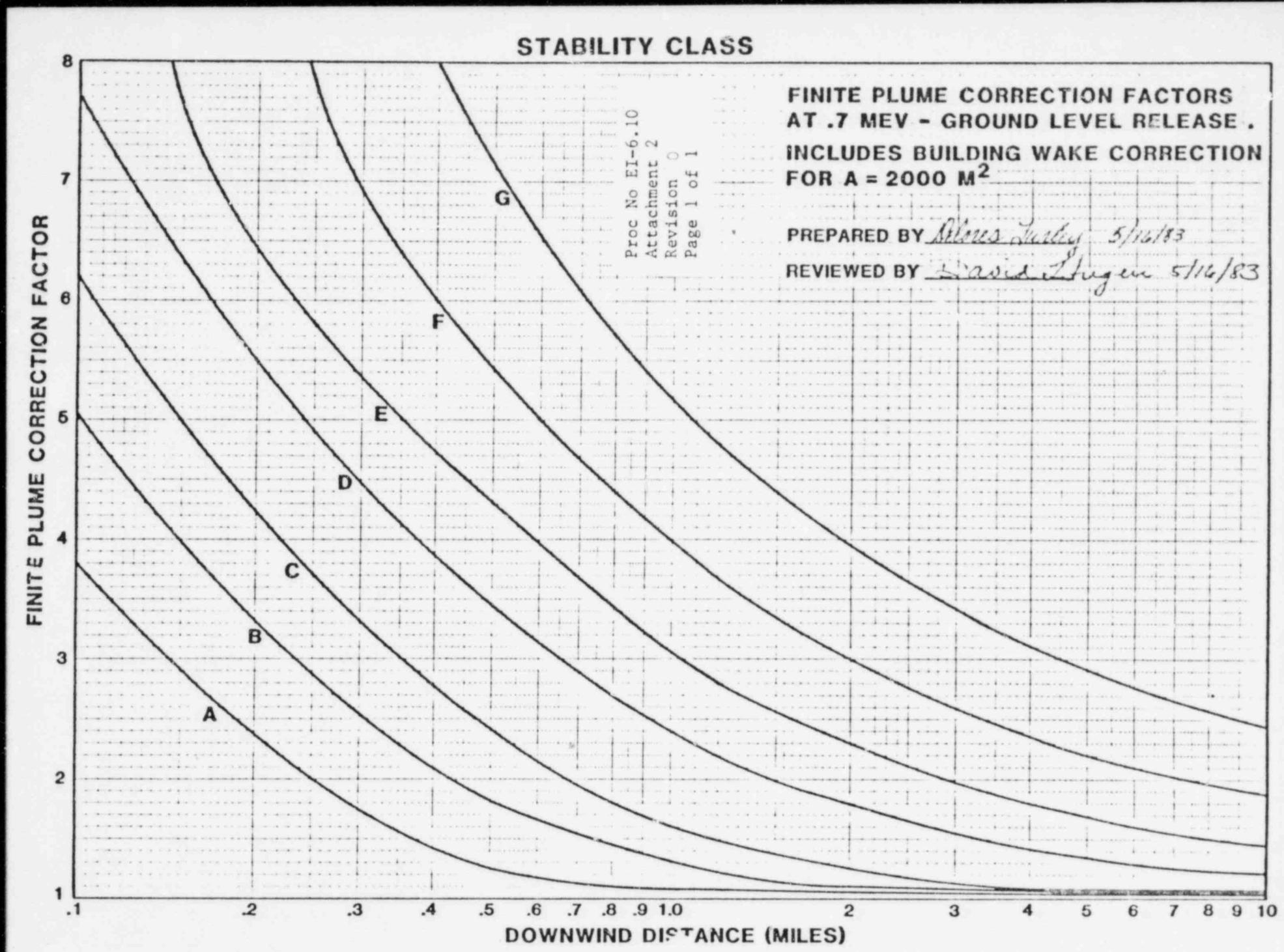
"F" STABILITY WITH WAKE EFFECT



XU/Q CURVES BY STABILITY CATEGORY

"G" STABILITY WITH WAKE EFFECT




STABILITY CLASS
FINITE PLUME CORRECTION FACTORS
AT .7 MEV - GROUND LEVEL RELEASE .
INCLUDES BUILDING WAKE CORRECTION
FOR A = 2000 M2
PREPARED BY Debores Lusby 5/16/83
REVIEWED BY David Thigen 5/16/83
Proc No EI-6.10
Attachment 2
Revision 0
Page 1 of 1
FINITE PLUME CORRECTION FACTOR
DOWNWIND DISTANCE (MILES)
A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
2
3
4
5
6
7
8
9
10

Proc No EI-6.1
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: RELEASE RATE DETERMINATION FROM STACK GAS MONITORS

1. Prepared

Originator FOR RA DELONG — Date 5/19/83

2. QA Concurrence

RAD — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — Date 5/19/83

4. PRC Reviewed

R A Buchi per PRC 5-20-83 — Date 5/19/83

5. Approved

James Rang Jr — Plant Manager — Date 5/21/83

6. ATMS Incorporated

Date 5/23/83

7. Biennial Review

Date

ei0383-0028d154

TITLE: RELEASE RATE DETERMINATION FROM STACK GAS MONITORS

Table of Contents

TITLE: RELEASE RATE DETERMINATION FROM STACK GAS MONITORS

1.0 PERSONNEL RESPONSIBILITY

The Chemistry/Health Physics Support Group Leader shall implement this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director (SED) shall delegate this responsibility.

2.0 PURPOSE

This procedure provides a release rate for radioactive effluents from the Plant stack. This data is used as input to offsite dose calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required in EI-6.0.

b. Data and results from this section should be recorded on the Dose Assessment Worksheet, Attachment 1 to EI-6.0, in Section I.1.

4.0 RELEASE RATE DETERMINATION

4.1 STACK GAS MONITOR READING

a. Obtain the stack gas monitor reading from chart recorder RR-2300 located behind the C-11 panel in the Control Room. RIA-2318 is the preferred monitor. RIA-2319 should be used as a backup. Record monitor reading on the worksheet, item (A). Mark which monitor was used to provide the data.

b. Obtain the background reading from the same monitor taken at a time prior to the release. The default values for background are 1000 cpm for RIA-2318 and 50 cpm for RIA-2319. Record background reading on worksheet Section (B).

c. Obtain a net count rate by subtracting stack monitor background (B) from current stack monitor reading (A).

Record on worksheet, item (C).

4.2 STACK FLOW RATE

a. Obtain stack gas flow rate from the C-11A panel, located in the Control Room on chart recorder FR-2318. Record on worksheet, item (D). If a reading is unavailable, use 82,000 ft^3/min as a default value.

b. Convert flow rate to m^3/sec by multiplying stack gas flow rate (D) by $4.72E^{-4}$ $\frac{m^3/sec}{ft^3/min}$

Record on worksheet, item (E).

4.3 RELEASE RATE

a. Obtain the conversion factor as follows:

1. For releases involving fuel melt or fuel failure, obtain the conversion factor from Attachment 1, using time after reactor shutdown as the time past accident.

2. For releases other than fuel melt or fuel failure use the following conversion factors:

$$\text{RIA-2318} = 6.1\text{E-}8 \ \frac{\text{Ci/m}^3}{\text{cpm}}$$

$$\text{RIA-2319} = 7.5\text{E-}7 \ \frac{\text{Ci/m}^3}{\text{cpm}}$$

Record conversion factor on worksheet, item (F).

b. Calculate the noble gas release rate (QN) as follows:

$$(\text{QN (Ci/sec)} = \text{Net stack gas monitor reading (cpm)} \times \text{stack gas flow rate} \left(\frac{\text{m}^3}{\text{sec}}\right) \times \text{conversion factor} \ \frac{\text{Ci/m}^3}{\text{cpm}}$$

Record results on worksheet, item (G).

c. Calculate the iodine release rate (QI) as follows:

$$\text{QI} = \text{QN} \times (1.0\text{E-}3)$$

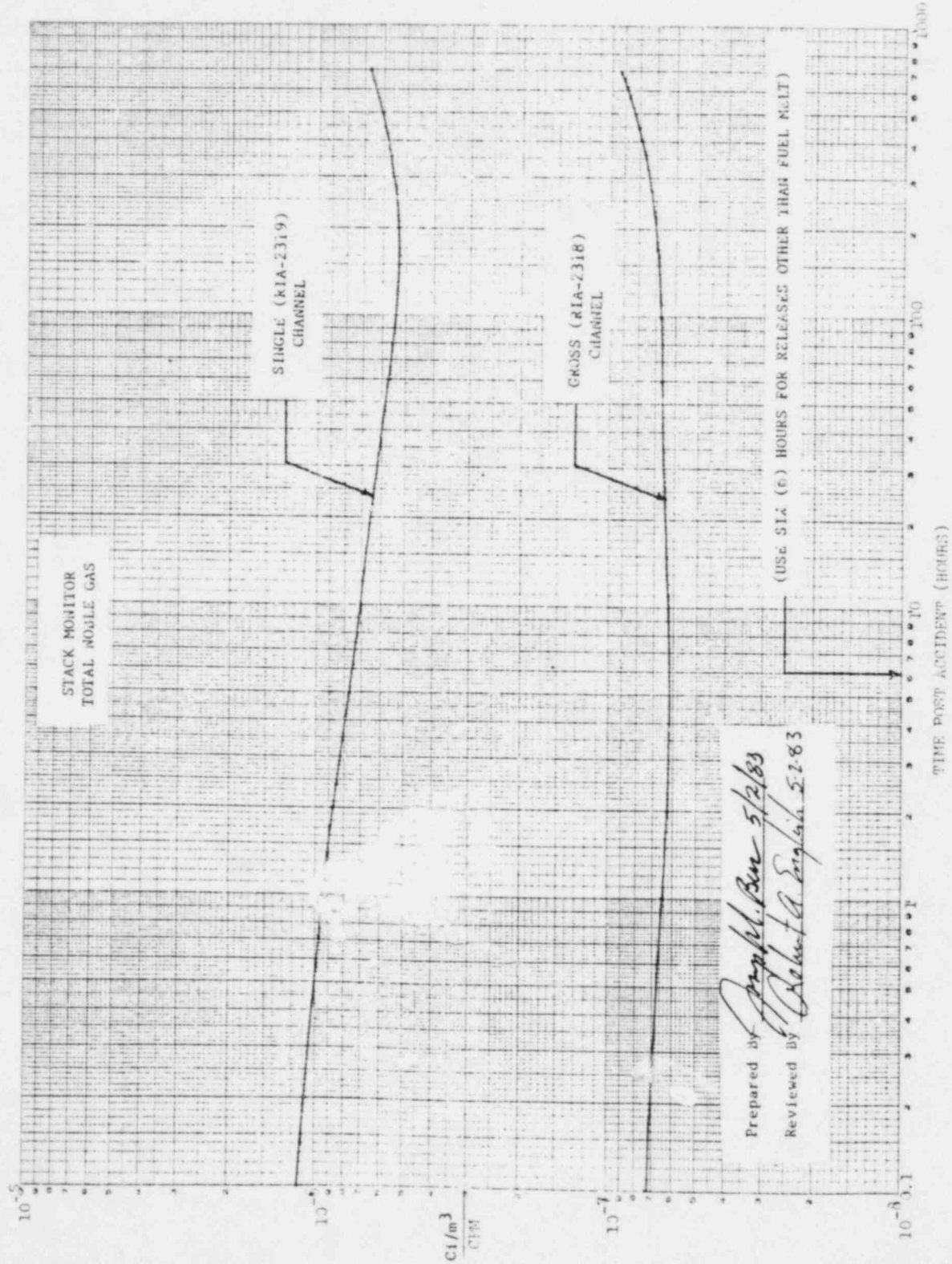
Record results on worksheet, item (H).

4.4 Continue with next procedure, per EI-6.0.

5.0 ATTACHMENTS

Attachment 1, "Stack Gas Monitor Conversion Factor"

STACK GAS MONITOR CONVERSION FACTOR



Proc No EI-6.12
Revision 0
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: COMPARISON OF OFFSITE MONITORING WITH OFFSITE DOSE CALCULATIONS

1. Prepared

Originator FOR QA DELVIG — 5/19/83 Date

2. QA Concurrence

N/A — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — 5/19/83 Date

4. PRC Reviewed

PRC 83-013 — 5/20/83 Date

5. Approved

James Peay for — 5/20/83 Date
Plant Manager

6. ATMS Incorporated

5-23-83 Date

7. Biennial Review

_____ Date

TITLE: COMPARISON OF OFFSITE MONITORING WITH OFFSITE DOSE CALCULATIONS

Table of Contents

TITLE: COMPARISON OF OFFSITE MONITORING WITH OFFSITE DOSE CALCULATIONS

1.0 PURPOSE

The Chemistry/Health Physics Group Leader is responsible for the implementation of this procedure. In the absence of a Chemistry/Health Physics Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

This procedure provides a method for comparison of offsite monitoring results with offsite dose calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 to EI-6.0, in Section V.1.

c. Offsite dose calculations and offsite monitoring results must be available prior to implementing this procedure.

4.0 PROCEDURE

4.1 OFFSITE MONITORING DATA

a. If available, obtain the most recent offsite monitoring data from the Operational Support Center (OSC) for the following locations: Site Boundary (.5 mi), 2 miles, 5 miles and 10 miles. Record the finite cloud whole body dose rate and I-131 dose equivalent concentration (μCi/cc). Record on worksheet, items (A) and (B), respectively.

b. Obtain the observed plume direction from the OSC in degrees and record on worksheet, item (C).

4.2 OFFSITE DOSE CALCULATION DATA

a. Obtain the most recent results from the Offsite Dose Calculation Procedure (worksheet, Section IV) for the following locations: Site boundary (.5 mi), 2 miles, 5 miles and 10 miles. Record the finite cloud whole body dose rates (mrem/hr) and I-131 dose equivalent concentrations (μCi/cc) on worksheet, items (D) and (E) respectively.

b. Obtain the wind direction from Section III of the worksheet. Record on worksheet, item (F).

c. If (F) is $\geq 0°$ and $< 180°$, then (G) = (F) + 180°
If (F) is $\geq 180°$ and $< 360°$, then (G) = (F) - 180°

Record (G) on worksheet in degrees.

TITLE: COMPARISON OF OFFSITE MONITORING WITH OFFSITE DOSE CALCULATIONS

4.3 DATA COMPARISON

a. Subtract calculated finite cloud whole body dose rates (D) from measured whole body dose rates (A) for each distance. Record results on worksheet, item (H). If (H) > 0, circle it in red.

b. Subtract calculated I-131 dose equivalent concentrations (E) from measured I-131 dose equivalent concentrations (B) for each distance. Record results on worksheet, item (I). If (I) > 0, circle it in red.

c. Divide the calculated finite cloud whole body dose rates (D) by measured whole body dose rates (A). Record on worksheet, item (J). If (J) > 2.0, circle it in red.

d. Divide the calculated I-131 dose equivalent concentrations (E) by the measured I-131 dose equivalent concentrations (B). Record results on worksheet, item (K). If (K) > 2.0, circle it in red.

e. Subtract the estimated plume direction (C) from the measured wind direction (G). Record on worksheet, item (L). If the absolute value of (L) > 10°, circle it in red.

4.4 REVIEW OF RESULTS

a. The Chemistry/Health Physics Support Group Leader should review the worksheet and note all data circled in red. The following specific areas should be considered:

1. Calculational errors.

2. Instrument malfunction.

3. Inaccurate monitoring team locating.

b. Offsite monitoring results that are significantly different than calculated results should be taken into consideration when making recommendations for offsite protective actions (Reference EI-6.13).

5.0 ATTACHMENTS

None

Proc No EI-1
Revision 7
Date 5/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: ACTIVATION OF THE SITE EMERGENCY PLAN/
EMERGENCY CLASSIFICATION

1. Prepared

Originator — 5/18/83 Date
FOR RA DeLONG

2. QA Concurrence

NA — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — 5/18/83 Date

4. PRC Reviewed

R H Kuch PRC 83-110 — 5/19/83 Date

5. Approved

James Ray for — 5/20/83 Date
Plant Manager

6. ATMS Incorporated

5-20-83 Date

7. Biennial Review

_____ — _____ Date

ei0780-0005e154

TITLE: ACTIVATION OF THE SITE EMERGENCY PLAN/
EMERGENCY CLASSIFICATION

Table of Contents

TITLE: ACTIVATION OF THE SITE EMERGENCY PLAN/
EMERGENCY CLASSIFICATION

1.0 PERSONNEL RESPONSIBILITIES

1.1 The Shift Supervisor shall implement this procedure and assume the title and responsibilities of the Site Emergency Director (SED) until relieved by Plant management identified below.

1.2 The line of succession for the SED is:

a. Plant Manager (days), Duty and Call Superintendent (nights)

b. Operations and Maintenance Superintendent (1st alternate)

c. Operations Superintendent (2nd alternate)

d. Technical Superintendent (3rd alternate)

e. Technical Engineer (4th alternate)

2.0 PURPOSE

To classify those emergency conditions that necessitate the activation of the Site Emergency Plan. To identify actions that should be taken to mitigate the consequences of an emergency.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

This procedure shall be implemented any time an event occurs or conditions exist which, in the opinion of the Shift Supervisor/SED, may require activation of the Site Emergency Plan (SEP).

OR

When events occur or conditions exist after the activation of the SEP that, in the opinion of the SED, may require reclassification, either upgrading or downgrading.

4.0 ACTIVATION OF THE SITE EMERGENCY PLAN/EMERGENCY CLASSIFICATION

4.1 CLASSIFICATION/RECLASSIFICATION

a. The Shift Supervisor/SED shall classify emergency conditions/events as follows:

TITLE: ACTIVATION OF THE SITE EMERGENCY PLAN/
EMERGENCY CLASSIFICATION

1. Determine the category that conditions/events best fit from the list of keywords below:

   Alarms/Annunciators

   Communication Loss

   Containment Integrity

   Engineered Safety Features

   Evacuation - Control Room

   Fire

   Fission Product Barriers/Fuel Damage

   Hazards - General

   Injury

   Meteorological Data Loss

   Miscellaneous

   Natural Phenomenon

   Plant Power - Electrical

   Primary Coolant System Integrity

   Primary Coolant System - Temperature or Pressure

   Radiation levels

   Releases

   Safety Injection System

   Secondary Side

   Security

2. Use the keyword identified above and Attachment 1, Site Emergency Plan Classification to classify the conditions/event.

NOTE: Attachment 2, Emergency Class Description is provided for background information and should not be used for classification.

4.2 DETERMINATION OF EMERGENCY ACTIONS/NOTIFICATIONS

a. The numbers in the righthand column of Attachment 1 (Actions/Notifications) identifies actions that should be performed for each emergency. These numbers relate to the Actions/Notifications listed in EI-2.1, Attachment 1.

b. The categories of actions are as follows:

1. Mandatory Actions - Actions that shall be performed within one hour.

2. Subsequent Actions - Action that should be performed in an expeditious manner as conditions, time, and personnel permit.

3. If Needed Actions - Actions that are not required, but may be needed.

c. After determination of the emergency actions/notifications mark the lefthand column of EI-2.1, Attachment 1 with an M, S or I for Mandatory, Subsequent or If Needed Action respectively, for each identified emergency action. Date EI-2.1, Attachment 1.

NOTE: Emergency actions identified in this section are in addition to the SED responsibilities identified in EI-2.1.

4.3 TURN OVER OF SED RESPONSIBILITIES

a. The Shift Supervisor shall turn over the responsibilities of SED to the personnel identified in Section 1.0 as soon as possible, above Unusual Event. Turn over may occur before this time at the option of the Shift Supervisor or potential SED.

b. Turn over should include verification of the emergency classification and pertinent information on Plant conditions.

c. The turn over should be announced in the Technical Support Center (TSC) and Operational Support Center (OSC), if activated, to ensure continuity of command and control.

d. Proceed to EI-2.1, "Emergency Actions/Notifications/Responsibilities"

5.0 ATTACHMENTS

5.1 Attachment 1, "Site Emergency Plan Classification"

5.2 Attachment 2, "Emergency Class Description"

ALARMS/ANNUNCIATORS

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Alert	Loss of most or all alarms (annunciators) in Control Room.	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 30
Site Area Emergency	Loss of most or all alarms (annunciators) for 15 minutes AND Shift Supervisors opinion that a Plant transient has occurred or is in progress.	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21 23, 24, 33, 34 If Needed: 19, 25, 26

COMMUNICATIONS LOSS

CLASSIFICATION	EMERGENCY ACTION LEVELS	METHOD OF DETECTION	ACTIONS
Unusual Event	Significant loss of offsite communication capability. (eg, loss of all commercial and dedicated phones)	Observation	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33

CONTAINMENT INTEGRITY

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Loss of Containment integrity requiring shutdown due to Technical Specifications .	Leak Rate Test Results OR Penetration Test Results OR Observation	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
NOTE:	For incidents involving loss of containment integrity AND loss of a second fission product barrier AND potential loss of the third fission product barrier, see FISSION PRODUCT BARRIER/FUEL DAMAGE.		

ENGINEERED SAFETY FEATURES

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Loss of engineered safety features requiring Plant shutdown due to Technical Specifications 3.2, 3.3, 3.4.	Observation	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
	Loss of fire protection system requiring Plant shutdown due to Technical Specifications.	Observation	
Alert	Failure of Reactor Protection system to initiate and complete a trip AND the reactor is not subcritical.	Nuclear instrumentation AND Rod position indicator	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 34 If Needed: 19, 25, 26
	Complete loss of any functions needed for Plant cold shutdown ie, Loss of Auxiliary Feed System and Shutdown Cooling Systems.		
Site Area Emergency	Complete loss of any function needed for hot shutdown	Annunciation OR Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26
	Transient requiring operation of shutdown systems with failure to trip (continued power generation, but no core damage immediately evident).	Nuclear instrumentation AND Rod position indicator	

EVACUATION, CONTROL ROOM

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Alert	Evacuation of Control Room anticipated or required with control of shutdown system established at local stations.	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26
Site Area Emergency	Evacuation of Control Room and control of shutdown systems not established at local stations within 15 minutes.	Observation	Mandatory: 1, 2, 3, 4, 5 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21 23, 24, 33, 34 If Needed: 15, 25, 26

FIRE

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Fire within the Plant lasting more than 10 minutes.	Observation OR Fire detection alarm confirmed by observation.	Mandatory: 1, 3, 4, 5, 6, 7, 11 Subsequent: 24, 34 If Needed: 2, 8, 26, 33
Alert	Fire potentially affects a safety systems.	Shift Supervisor's opinion	Mandatory: 1, 2, 3, 4, 5, 6, 7, 11, 12, 14, 17, 22 Subsequent: 24, 34 If Needed: 2, 8, 26, 33
Site Area Emergency	Fire compromising the function of safety systems.	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 7, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 8, 15, 25, 26

FISSION PRODUCT BARRIERS/FUEL DAMAGE

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Primary Coolant Iodine-131 dose concentration equivalent > 1.0μCi/gm for more than 72 hrs.	Failed Fuel Monitor (**RIA-0202) Alarm confirmed by sample analysis.	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
	> 0.1% increase in failed fuel within 30 minutes.	Observation **RIA-0202	
Alert	Primary Coolant Iodine-131 dose equivalent concentration > 300μCi/gm	Failed Fuel Monitor (**RIA-0202) off scale high confirmed by sample analysis.	Mandatory: 1, 2, 3, 4, 5 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26
	> 1% increase in failed fuel within 30 minutes.	Observation	
	> 5% total failed fuel.	Failed Fuel Monitor (**RIA-0202) off scale high confirmed by sample analysis OR Observation	
	Fuel damage accident with release of radioactivity to Containment or Fuel Handling Building.	Radiation monitor alarm confirmed after observation of accident OR Observation of accident confirmed by sample analysis OR Shift Supervisor/SED's opinion	

FISSION PRODUCT BARRIERS/FUEL DAMAGE

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Alert (cont'd)	Coolant pump seizure leading to fuel failure	Coolant pump trip AND Failed Fuel Monitor Alarm confirmed by sample analysis.	
Site Area Emergency	Major damage to spent fuel in Containment or Fuel Handling Building. (eg, large object damages fuel or water loss below fuel level)	Radiation monitor alarm confirmed after observation of accident OR Observation of accident confirmed by sample analysis OR Shift Supervisor/SED's opinion	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26
	Degraded core with possible loss of coolable geometry.	High core temperature OR Inadequate subcooling margin OR Core uncovered AND Temperature drop across the core increasing OR No temperature drop across the core OR Shift Supervisor/SED's opinion	
General Emergency	Loss of 2 of 3 fission product barriers with potential loss of third fission product barrier (eg, loss of Primary Coolant integrity, clad failure, and high potential for loss of Containment)	Detection dependent upon which barriers fail and to some extent, upon mechanism which causes failure.	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25 26

HAZARDS - GENERAL

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Aircraft crash onsite or unusual aircraft activity over facility which could affect Plant operation.	Observation of event AND Shift Supervisor/SED's opinion	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34
	Near or onsite train derailment which could affect Plant operation	Observation of event AND Shift Supervisor/SED's opinion	If Needed: 2, 26, 33
	Near or onsite explosion which could affect Plant operation.	Observation of event OR notification from offsite authorities AND Shift Supervisor/SED's opinion	
	Near or onsite toxic or flammable gas which could affect Plant operation.	Observation of event OR notification from offsite authorities AND Shift Supervisor's opinion.	
	Turbine rotating component failure causing Plant shutdown	Turbine trip AND observation of turbine malfunction of failure.	

HAZARDS - GENERAL

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Alert	Aircraft crash on facility	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22
	Missile impact from whatever source on facility.	Observation	Subsequent: 18, 24, 33, 34
	Know explosion damage to facility affecting Plant operation.	Observation	If Needed: 19, 25, 26
	Entry into facility environs of uncontrolled toxic or flammable gases	Observation OR warning from offsite authorities OR Detection with portable instrumentation.	
	Turbine failure causing casing penetration.	Observation AND Turbine trip.	

HAZARDS - GENERAL

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Site Area Emergency	Aircraft crash affecting vital structures by impact or fire AND Plant not in cold shutdown.	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26
	Severe damage to equipment required for safe shutdown from missile explosion - see ENGINEERED SAFETY FEATURES		
	Entry of uncontrolled flammable gas into vital areas OR Entry of uncontrolled toxic gas into vital areas that constitutes a safety problem AND Plant not in Cold Shutdown.	Observation OR Detection with portable instrumentation.	

INJURY

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Transportation of injured contaminated individual from site to offsite hospital.	Observation	Mandatory: 1, 3, 4, 5, 6, 8, 10 Subsequent: 24, 34 If Needed: 2, 9, 26 Notify county to which victim is taken.

METEOROLOGICAL DATA LOSS

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Loss of onsite meteorological data AND Loss of all backup meteorological data	Observation Observation	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26

MISCELLANEOUS

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Plant conditions exist that warrant increased awareness on the part of the Plant staff or State and/or local authorities OR require Plant shutdown under Technical Specifications requirements OR involve other than normal shutdown.	Shift Supervisor/SED's opinion	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
Alert	Plant conditions exist that warrant precautionary activation of Technical Support Center and placing Emergency Operations Facility and other emergency personnel on standby.	Shift Supervisor/SED's opinion	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26
Site Area Emergency	Plant conditions warrent the activation of emergency centers and monitoring teams or a precautionary notification to the public near the site.	Shift Supervisor/SED's opinion	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26
General Emergency	Conditions exist that make release of large amounts of radioactivity in a short time possible, (eg, any core melt situation)	Shift Supervisor/SED's opinion	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26

NATURAL PHENOMENON

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Any earthquake felt in-Plant	Observation	Mandatory: 1, 3, 4, 5, 6
	Abnormal water levels including flood or low water or seiche.	Observation	Subsequent: 24, 34
	Tornado onsite	Observation	If Needed: 2, 26, 30, 31, 33
Alert	Earthquake greater than OBE levels	"To Be Added Later"	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22
	Flood, low water, or seiche near design basis.	Observation	Subsequent: 18, 24, 33, 34
	Tornado striking facility	Observation	If Needed: 19, 25, 26, 30, 31
Site Area Emergency	Earthquake greater than SSE levels	"To Be Added Later"	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22
	Flood, low water, or seiche greater than design levels OR Failure of protection of vital equipment at lower levels.	Observation	Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26, 30 31
	Tornado in excess of design level	Observation	

PLANT POWER - ELECTRICAL

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Loss of offsite power	Annunciation switchyard non-critical alarms OR startup transformer trouble alarm OR Automatic start of Emergency Diesel Generator.	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 32, 33
	Loss of all onsite AC power	Observation: both Emergency Diesel Generators inoperable	
Alert	Loss of offsite power AND loss of all onsite AC power for less than 15 minutes.	Bus 1C & 1D low voltage alarms	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26, 32
	Loss of all onsite DC power for less than 15 minutes	DC Bus #1 and #2 low voltage alarms.	
Site Area Emergency	Loss of offsite power AND loss of onsite AC for more than 15 minutes.	Observation	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26, 32
	Loss of all vital onsite DC power for more than 15 minutes, AND Plant not in cold shutdown.	Observation	

PRIMARY COOLANT SYSTEM INTEGRITY

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Primary Coolant System leakage in excess of Technical Specifications but < 50 GPM	PCS leak rate determination (D/WO-1)	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
	Steam Generator secondary water activity > 0.1μCi/gm of dose equivalent I-131.	Chemical analysis	
	Primary to secondary leakage rate exceeds Technical Specifications limits of 0.3 GPM steady state or 0.6 GPM for transients, but < 50 GPM.	Offgas monitor (**RIA-0631) alarm confirmed by chemical analysis	
Alert	Rapid gross failure of one Steam Generator tube with loss of offsite power.	Offgas monitor (**RIA-0631) alarm confirmed by sample analysis AND Decreasing pressurizer level AND Observation of loss of offsite power	Mandatory: 1, 2, 3, 4, 5 6, 11, 12, 14, 17, 22
	Rapid failure of Steam Generator tubes resulting in primary to secondary leak rate of several hundred GPM.	Offgas monitor (**RIA-0631) alarm confirmed by sample analysis OR Rapidly decreasing pressurizer low level (**LI-0103A)	Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26
	Steam line break with > 10 GPM primary to secondary leak rate.	Increased containment pressure OR Increased Containment radiation levels; Decreasing pressurizer levels, OR Offgas Monitor (**RIA-0631) alarm confirmed by sample analysis	

PRIMARY COOLANT SYSTEM INTEGRITY

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
	Primary Coolant System leak > 50 GPM but less than charging pump capacity.	Containment sump high level alarms AND mismatch between charging flow and letdown flow	
Site Area Emergency	Loss of coolant accident greater than charging pump capacity.	Low-low pressurizer level (**LIC-0101A) OR Safety Injection actuation alarm OR Pressurizer low-pressure alarm OR Containment high pressure alarm	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26
	Rapid failure of Steam Generator tubes (several hundred GPM) with loss of offsite power.	Offgas monitor (**RIA-0631) alarm confirmed by sample analysis AND Pressurizer level decrease AND Observation of loss of offsite power.	
	Steam line break AND > 50 GPM primary to secondary leak rate AND indication of fuel damage.	Increased Containment pressure OR Increased Containment radiation levels OR decreasing pressurizer levels OR Steam Generator pressure instruments OR PCS leak rate determination (D/WO-1) AND Offgas Monitor (**RIA-0631) alarm confirmed by sample analysis AND Failed Fuel Monitor Alarm confirmed OR PCS sample analysis confirms fuel damage.	
NOTE:	For incidents involving loss of Primary Coolant System Integrity AND loss of a second fission product barrier AND potential loss of the third fission product barrier, see FISSION PRODUCT BARRIER/FUEL DAMAGE.		

PRIMARY COOLANT SYSTEM - TEMPERATURE OR PRESSURE

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Any challenge to over-pressure Protection System (OPPS).	Annunciation SV and/or PORV open	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
	Critical operation at PCS temperature < 525°F (except for physics tests).	Temperature recorder (**TR-0121 or **TR-0111)	
	Reactor high-pressure trip. (Initiating event)	Annunciator (RPS alarms) Event recorder	
	Pressurizer code safety operation.	Acoustical monitors (**RI-1039 **FI-1039, **FI-1041) Quench Tank high level (**LIA-0116) Quench Tank high pressure (**PIA-0116) Quench Tank high temperature (**TIA-0116) Discharge temperature alarms (**TIA-0107, **TIA-0108, **TIA-0109)	
Alert	PCS temperature < 50°F subcooled; sustained for more than 5 minutes or < 50°F subcooled, and subcooling margin decreasing. Not applicable when Plant is in cold shutdown or refueling shutdown condition.	Subcooling margin alarm	Mandatory: 1, 2, 3, 4, 5 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26

RADIATION LEVELS

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS	
Alert	Radiation levels or airborne contamination indicates a severe degradation in contol of radioactive materials.	Radiation monitors increase by a factor of 1000, confirmed OR Unexpected Plant area iodine or particulate airbone concentrations > 1000 MPC (per 10CFR20, Appendix B Table 1)	Mandatory: Subsequent: If Needed:	1,2,3,4,5 6,11,12,14, 17,22 18,24,33,34 13,19,25,26 27,28,39,30, 31

RELEASES

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Short term radiological effluent Technical Specifications exceeded.	Stack monitor (**RIA-2318) reaches high alarm setpoint for two or more hours. Confirmed by Lab sample analysis. Liquid waste discharge monitor (**RIA-1049) reaches alarm setpoint and automatic discharge trip function fails. Confirmed by Lab sample analysis.	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 12, 13, 26 33
	Significant solid or liquid waste spill outside restricted areas with threatened offsite release.	Observation confirmed by survey results.	
Alert	Radiological effluents > 10 times the Technical Specifications limits (an instantaneous rate which, if continued over two hours would result in a dose of approximately 1 mR at the site boundary under average meteorological conditions).	A valid stack monitor (**RIA-2318) reading of ≧ 4400 cpm above background for longer than 15 minutes. OR Liquid Waste Discharge Monitor (**RIA-1049) reaches 10 times alarm setpoint and automatic discharge trip function fills. Confirmed by Lab sample analysis.	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 13, 19, 25, 26, 27, 28, 39, 30, 31

RELEASES

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Site Area Emergency	Effluent monitors detect levels corresponding to > 50 mR/hr for ½ hour or > 500 mR/hr whole body for 2 minutes (or 5 times these levels to the child thyroid) at the site boundary for adverse meteorological conditions. These levels are projected based on other Plant parameters (eg, radiation level in containment with leak rate appropriate for existing containment pressure) or are measured in the environs. EPA Protective Action Guidelines (see EI-6.13) are projected to be exceeded outside the site boundary.	Any of the following valid radiation monitor readings for longer than 0.5 hour: Stack monitor (**RIA-2318); ≧ 3.75E+5 cpm above bkgd. Main Steam Monitors (**RIA-2323 or **RIA-2324) with a main steam release occurring; ≧ 850 cpm above bkgd and confirmation of dose from procedure EI-6.0 Containment high range monitors (**RIA-2321 or **RIA-2322) with no breach of containment; ≧ 2.4E+4 R/hr above bkgd. OR Any of the following valid radiation monitor readings for longer than 2 minutes: Stack Monitor (**RIA-2318) is offscale and the High Range Stack Monitor is ≧ 3.2E-3 R/hr above bkgd. Main Steam Monitors (**RIA-2323 or **RIA-2324) with a main steam release occurring; ≧ 8500 cpm above bkgd and confirmation of dose projection from procedure EI-6.0	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21 23, 24, 33, 34 If Needed: 15, 25, 26, 27, 28, 29, 30, 31

RELEASES

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Site Area Emergency (cont'd)		Containment High Range Monitors (**RIA-2321 or **RIA-2322) with no breach of containment; ≥ 2.4E+5 R/hr above bkgd. OR Radiation monitoring teams at the site boundary measure whole body dose rates > 50 mRem/hr for 0.5 hr or > 500 mRem/hr for 2 min or thyroid dose rates > 250 mRem/hr (1.95E-7 µCi/cc dose equivalent I-131) for 0.5 hr or 2500 mRem/hr (1.95E-6 µCi/cc dose equivalent I-131) for 2 minutes.	
General Emergency	Effluent monitors detect levels corresponding to 1 rem/hr whole body or 5 rem/hr thyroid at the site boundary under actual meteorological conditions. These levels are projected based on other Plant parameters (eg, radiation levels in containment with leak rate appropriate for existing containment pressure) or are measured in the environs.	Any of the following valid radiation monitor readings may indicate a General Emergency Classification: Stack monitor (**RIA-2318) is offscale and the high range stack monitor is: ≥ 6.3E-3 R/hr above bkgd; Main Steam Monitors (**RIA-2323 or **RIA-2324) with a main steam release occuring is: ≥ 17,000 cpm above bkgd.	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26, 27, 28, 29, 30, 31

RELEASES

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
General Emergency (cont'd)		Containment High Range Monitors (**RIA-2321 or **RIA-2322) with no leakage greater than design leakage limit; ≥ 4.8E+5 R/hr above bkgd.	
NOTE:	Consider evacuation only within about 2 miles of the site boundary unless these site boundary levels are exceeded by a factor of 10 or projected to continue for 10 hours or EPA Protective Action Guidelines exposure levels (see EI-6.13) are predicted to be exceeded at longer distances.	A General Emergency is indicated if the dose projection from procedure EI-6.0 is ≥ 1 Rem/hr whole body or ≥ 5 Rem/hr thyroid at the site boundary for the existing meteorological conditions. OR Radiation monitoring teams at the site boundary measure a whole body dose rate ≥ 1 Rem/hr or a thyroid dose rate ≥ 5 Rem/hr (3.9E-6 μCi/cc dose equivalent I-131)	

SAFETY INJECTION SYSTEM

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Safety Injection initiated and discharged to vessel	Annunciation flow verified (Ckt1, Ckt2)	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33

SECONDARY SIDE

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Failure of a safety or relief valve in a safety related system to close following reduction of applicable pressure.	Annunciation AND pressure indications, OR Observation	Mandatory: 1, 3, 4, 5, 6 Subsequent: 24, 34 If Needed: 2, 26, 33
	Rapid depressurization of secondary side	Low Steam Generator pressure alarm	
	For accidents involving primary to secondary leakage see "Primary Coolant System Integrity"		

SECURITY

CLASSIFICATION	EMERGENCY ACTION LEVEL	METHOD OF DETECTION	ACTIONS
Unusual Event	Security threat or Attempted entry or Attempted sabotage	Security alarms OR Observation AND Activation of Safeguards Contingency Procedures.	Mandatory: 1, 3, 4, 5, 6, Subsequent: 24, 34 If Needed: 2, 26, 33
Alert	Security threat exists that results in adversaries commandeering an area of the Plant, but not control over shutdown capability or of any vital areas	Security Alarms OR Observation AND Activation of Safeguards Contingency Procedures	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 14, 17, 22 Subsequent: 18, 24, 33, 34 If Needed: 19, 25, 26
Site Area Emergency	Physical attach on the Plant involving imminent occupancy of the Control Room, auxiliary shutdown panels, or other vital areas.	Security alarms OR Observation AND Activation of Safeguards Contingency Procedures	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26
General Emergency	Physical attack on the Plant has resulted in unauthorized personnel occupying the Control Room or any other vital areas.	Security alarms OR Observation AND Activation of Safeguards Contingency Procedures	Mandatory: 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17, 22 Subsequent: 16, 18, 19, 21, 23, 24, 33, 34 If Needed: 15, 25, 26

Proc No EI-6.2
Revision 0
Date 3/23/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: RELEASE RATE DETERMINATION FROM STEAM LINE MONITORS **RIA-2323 AND **RIA-2324 FOR STEAM RELEASES THROUGH ATMOSPHERIC DUMP VALVES

1. Prepared

Originator — Date 5/19/83

FOR RA DEVONS

2. QA Concurrence

N/A — Date

3. Recommend Approval/Q-List (Yes) No

Department Head — Date 5/19/83

4. PRC Reviewed

RM Krich per telecon — Date 5/19/83

5. Approved

James Ray for — Plant Manager — Date 5/20/83

6. ATMS Incorporated

Date 5/23/83

7. Biennial Review

Date

TITLE: RELEASE RATE DETERMINATION FROM STEAM LINE MONITORS
**RIA-2323 AND **RIA-2324 FOR STEAM RELEASES
THROUGH ATMOSPHERIC DUMP VALVES

Table of Contents

TITLE: RELEASE RATE DETERMINATION FROM STEAM LINE MONITORS **RIA-2323 AND **RIA-2324 FOR STEAM RELEASES THROUGH ATMOSPHERIC DUMP VALVES

1.0 PERSONNEL RESPONSIBILITY

The Chemistry/Health Physics Support Group Leader shall implement this procedure. In the absence of a Chemistry/Health Physics Support Group Leader, the Site Emergency Director shall delegate this responsibility.

2.0 PURPOSE

This procedure provides a release rate for radioactive effluents from the atmospheric dump valves. This data is used as input to offsite dose calculations.

3.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

a. This procedure shall be implemented as required per EI-6.0.

b. Data and results from this procedure should be recorded on the Offsite Dose Worksheet, Attachment 1 to EI-6.0 in Section I.2.

c. This procedure presupposes that a steam dump has occurred or is occurring.

d. For initial dose estimation, use release rate estimated in Section 4.0. As data becomes available and time permits, the release rate should be confirmed using Section 5.0.

4.0 RELEASE RATE ESTIMATION

4.1 Record date and time on worksheet.

4.2 Record date and time at which steam dump started on worksheet, items (A) and (B) respectively.

4.3 Obtain steam line monitor readings in net counts per minute from **RIA-2323 (Steam Generator "B") and **RIA-2324 (Steam Generator "A") or **RR-2324 from Control Room Panel **EC-11A. Record on worksheet, items (C) and (D) respectively.

4.4 Multiply net CPM for each monitor from Step 4.3 by 1.73×10^{-2} Ci/sec/cpm to obtain release rate, QN in Ci/sec. Record on worksheet, items (E) and (F) respectively.

$$QN_A = CPM_A \times (1.73 \times 10^{-2} \text{ Ci/sec/cpm})$$

$$QN_B = CPM_B \times (1.73 \times 10^{-2} \text{ Ci/sec/cpm})$$

4.5 If only one Steam Generator is dumping, use appropriate QN, dose estimation procedures. If both Steam Generators are dumping, use both release rates to determine an average value for QN. Record on worksheet, item (G).

4.6 Obtain Iodine-131 dose equivalent release rate by multiplying noble gas release rate QN, item (G), by 1.0E-3. Record on worksheet, item (H).

4.7 The above steps provide sufficient information to continue offsite dose calculations. Continue with next procedure, per EI-6.0. Return to Section 5.0 for confirmation of release rates as time permits and data becomes available.

5.0 CONFIRMATION OF RELEASE RATE ESTIMATE

5.1 Record date and time on worksheet.

5.2 Record date and time at which steam dump started on worksheet.

5.3 Obtain and record on worksheet rea or average temperature (T_{avg}) reading in °F from Control Room Panel **EC-2 (CO2), from recorders **TR-0111 and **TR-0121 or from the Critical Functions Monitor.

5.4 Are Primary Coolant Pumps on? Indicate on worksheet. If pumps are on, proceed to Step 5.5. If pumps are not on, proceed to Step 5.26.

5.5 Assume T_{avg} equals the steam temperature. Refer to Table 1, "Properties of Saturated Steam and Saturated Water (Temperature)". Enter the table in Column 1 with the value for T_{avg}. Record on worksheet the corresponding pressure in psia from Column 2. This is the secondary system steam pressure.

5.6 Enter Attachment 2 with the pressure determined in Step 5.5. Read the Fully Open Dump Valve Saturated Steam Flow Rate in cc/sec corresponding to this pressure. This is the flow rate for one valve in the fully open condition. Record on worksheet.

5.7 Determine and record on worksheet the primary coolant average temperature errors as defined by:

$$T_{avg} \text{ error} = T_{avg} - 532°F$$

T_{avg} was recorded in Step 5.3.

5.8 Use the T_{avg} error to determine the fraction the dump valves are open.

If T_{avg} error >25, then fraction = 1.0

If T_{avg} error <25, then fraction the valve is open is determined by:

Fraction valve open = (T_{avg} error x 0.04545) - 0.1346

Record on worksheet.

TITLE: RELEASE RATE DETERMINATION FROM STEAM LINE MONITORS **RIA-2323 AND **RIA-2324 FOR STEAM RELEASES THROUGH ATMOSPHERIC DUMP VALVES

5.9 Determine and record on worksheet the actual steam flow rate from one dump valve by multiplying together the results form Step 5.6 and Step 5.8

Step 5.6		Step 5.8	
Fully Open Flow Rate cc/sec	x	Fraction Valve is open	= Actual Steam Flow Rate in cc/sec

If and only if the necessary information is unavailable, use a steam flow rate default value determined by the peak secondary pressure of 922 psia which is reached upon turbine trip while operating at 2450 MW(t). From Attachment 2,

$$922 \text{ psia} = 4.60 \times 10^{6} \text{ cc/sec}$$

5.10 Are steam dumps from Steam Generator "A" open? Indicate on worksheet. If they are, proceed to Step 5.11. If they are not, proceed to Step 5.15.

5.11 Obtain reading from Main Steam Line Monitor **RIA-2324 from Control Room Panel **EC-11A. A record is available on Recorder **RR-2324. Indicate reading in counts per minute (cpm) on worksheet.

5.12 Using the Victoreen calibration of 531 cpm per µCi/cc, obtain total radionuclide concentration from Steam Generator "A" by dividing monitor reading from Step 5.11 by the calibration constant:

$$\frac{\text{**RIA-2324 cpm}}{531 \ \frac{\text{cpm}}{\mu\text{Ci/cc}}} = \text{Total Radionuclide Concentration from Steam Generator "A" in } \mu\text{Ci/cc}$$

Record on worksheet.

5.13 Determine the Steam Generator "A" radionuclide release rate in µCi/sec by multiplying together the concentration from Step 5.12, the actual steam flow rate from Step 9 and a factor of 2 to account for two dumps valves open. Record result on worksheet.

Step 5.12		Step 5.9

2 x (concentration µCi/cc) x (Steam Flow Rate cc/sec) = Steam Generator "A" Radionuclide Release Rate µCi/sec

5.14 Steam Generator "A" noble gas release rate in µCi/sec = Step 5.13.

Steam Generator "A" noble gas release rate in µCi/sec = 1.0E-3 x Step 5.13.

Compute and record on worksheet.

5.15 Are steam dumps from Steam Generator "B" open? Indicate on worksheet. If they are, proceed to Step 5.16. If they are not, proceed to Step 5.20.

5.16 Obtain reading from Main Steam Line Monitor **RIA-2323 from Control Room Panel **EC-11A. A record is available on Recorder **RR-2324. Indicate reading in cpm on worksheet.

5.17 Using the Victoreen calibration of 531 cpm per µCi/cc, obtain total radionuclide concentration from Steam Generator "B" by dividing monitor reading from Step 5.16 by the calibration constant:

$$\frac{\text{**RIA-2323 cpm}}{531\ \frac{\text{cpm}}{\mu\text{Ci/cc}}} = \text{Total Radionuclide Concentration from Steam Generator "B" in } \mu\text{Ci/cc}$$

Record on worksheet.

5.18 Determine the Steam Generator "B" radionuclide release rate in µCi/sec by multiplying together the concentration from Step 5.17 the actual steam flow rate from Step 5.9 and a factor of 2 to account for two dump valves open. Record result on worksheet.

Step 5.17 Step 5.9

2 x (concentration µCi/cc) x (Steam flow rate cc/sec)
= Steam Generator "B" Radionuclide Release Rate µCi/sec

5.19 Steam Generator "B" noble gas release rate in µCi/sec = Step 5.18.

Steam Generator "B" radionuclide release rate in µCi/sec = 1.0E-3 x Step 5.18.

Compute and record on worksheet.

5.20 Is Bypass Valve open? Indicate on worksheet. Bypass Valve will normally be open during a steam dump unless condenser vacuum has been lost. If Bypass Valve is not open, proceed to Step 5.24. If Bypass Valve is open, continue with Step 5.21.

5.21 Obtain Main Steam Isolation Valve position from Control Room Panel **EC-1 (CO1) or from Critical Functions Monitor. If both are open, proceed to Step 5.22. If either is closed, proceed to Step 5.23. If both MSIVs are closed, proceed to Step 5.24. Indicate condition of MSIVs on worksheet.

5.22 Since both MSIVs are open, steam flowing through Bypass Valve is a mix of steam from both Steam Generators. This steam enters condenser and noble gases will exit through condenser air ejector. Radioiodines will become entrained in hotwell and can be ignored. Noble gases release rate will be average of noble gas release rates determined in

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Steps 5.14 and 5.19 multiplied by 2/3 to account for the flow limits in the bypass valve and by a factor of 1/2 to account for only one valve being present.

$$\text{Bypass Valve Noble Gas Release Rate in } \mu\text{Ci/sec} = 2/3 \times 1/2 \times \frac{\underline{\text{Step 5.14}}\ \text{S/G A Noble Gas Release Rate} + \underline{\text{Step 5.19}}\ \text{S/G B Noble Gas Release Rate}}{2}$$

Record on worksheet.

5.23 If one MSIV is closed, steam flowing through bypass valve must originate in the Steam Generator not isolated. Noble gases release rate through the condenser air ejector can be determined by multiplying the noble gas release rate from the unisolated Steam Generator as determined in either Step 5.14 or 5.19 by a factor of 2/3 to account for the flow limiter in the bypass valve and by a factor of 1/2 to account for only one valve being present.

$$\text{Bypass Valve Noble Gas Release Rate in } \mu\text{Ci/sec} = 2/3 \times 1/2 \times \underline{\text{Step 5.14}}\ \text{S/G A Noble gas Release Rate}$$

if only S/G A MSIV is open, or

$$= 2/3 \times 1/2 \times \underline{\text{Step 5.19}}\ \text{S/G B Noble gas Release Rate}$$

if only S/G B MSIV is open.

Record appropriate result on worksheet as Item 22.

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5.24 Determine the total noble gas release rate by summing the rates calculated in Steps 5.14, 5.19 and 5.22.

QN = Total Noble Gas Release Rate in Ci/sec

	Step 5.14		Step 5.19		Step 5.22	
=	S/G A Noble Gas Release Rate	+	S/G B Noble Gas Release Rate	+	Bypass Valve Noble Gas Release Rate	$\times 10^{-6} \frac{Ci}{\mu Ci}$

Record on worksheet as Item 23.

Determine the total radioiodine release rate by summing those calculated in Steps 5.14 and 5.19.

QI = Total Radioiodine Release Rate in Ci/sec

	Step 5.14		Step 5.19	
=	S/G A Radio-iodine Release rate	+	S/G B Radio-iodine Release Rate	$\times 10\text{-}6 \frac{Ci}{\mu Ci}$

Record on worksheet as item 23.

5.25 Repeat Steps 5.1 through 5.24 with the data recorded during the steam dump at 15 second time intervals for the duration of the dump. This step provides a time-dependent record of the radionuclide release rates during the steam sump.

END OF RELEASE RATE DETERMINATION

5.26 If Primary Coolant Pumps are off, natural convection circulation has been established. Obtain the Cold Leg Temperatures, T_{cold} for both Steam Generators from Control Room Panel **EC-12 or from Critical Functions Monitor. Choose any of the four channels for each Steam Generator and record the readings on worksheet as item 26.

5.27 Assume T_{cold} equals the steam temperature. Refer to Table 1 "Properties of Saturated Steam and Saturated Water (Temperature)". For each T_{cold}, enter the table in Column 1 and record on Attachment 1 the corresponding pressure in psia from Column 2. These will be the Steam Generator pressures.

5.28 Enter Attachment 2 with the pressure determined in Step 5.27. Read the Fully Open Dump Valve Saturated Steam Flow Rate in cc/sec corresponding to these pressures. These are flow rates for one fully open valve. Record on worksheet.

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5.29 Determine and record on worksheet, the primary coolant average temperature error as defined by:

T_{avg} error = T_{avg} - 532°F

T_{avg} was recorded in Step 5.3.

5.30 Use T_{avg} error to determine the fraction the dump valves are open.

If T_{avg} >25 then fraction = 1.0

If T_{avg} <25 then fraction valve is open is determined by:

Fraction valve open = (T_{avg} error x 0.04545) - 0.1346

Record on worksheet.

5.31 Determine and record on worksheet, the actual steam flow rate from one dump valve by multiplying together the results from Step 5.28 and 5.30 for both Steam Generators.

Step 5.28		Step 5.30		
S/G A Fully Open Flow Rate cc/sec	x	Fraction valve is open	=	S/G A Actual Steam Flow Rate in cc/sec
S/G B Fully Open Flow Rate cc/sec	x	Fraction valve is open	=	S/G B Actual Steam Flow Rate in cc/sec

5.32 Return to Step 5.10.

NOTE: In Step 5.13, when "the steam flow rate from Step 5.9" is referred to, insert the Steam Generator "A" Actual Steam Flow Rate calculated in Step 5.31.

In Step 5.18, when "the steam flow rate from Step 5.9" is referred to, insert the Steam Generator "B" Actual Steam Flow Rate calculated in Step 5.31.

6.0 ATTACHMENTS

6.1 Attachment 1, "Properties of Saturated Steam and Saturated Water (Temperature)"

6.2 Attachment 2, "Steam Pressure vs Dump Valve Flow Rate Graph"

Properties of Saturated Steam and Saturated Water (Temperature)

Temp.	Press.	Volume, ft^3/lbm			Enthalpy, Btu/lbm			Entropy, Btu/lbm · R			Temp.
	psia	Water	Evap.	Steam	Water	Evap.	Steam	Water	Evap.	Steam	F
		v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g	
705.47	3208.2	0.05078	0.00000	0.05078	906.0	0.0	906.0	1.0612	0.0000	1.0612	705.47
705.0	3198.3	0.04427	0.01304	0.05730	873.0	61.4	934.4	1.0329	0.0527	1.0856	705.0
704.5	3187.8	0.04233	0.01822	0.06055	861.9	85.3	947.2	1.0234	0.0732	1.0967	704.5
704.0	3177.2	0.04108	0.02192	0.06300	854.2	102.0	956.2	1.0169	0.0876	1.1046	704.0
703.5	3166.8	0.04015	0.02489	0.06504	848.2	115.2	963.5	1.0118	0.0991	1.1109	703.5
703.0	3156.3	0.03940	0.02744	0.06684	843.2	126.4	969.6	1.0076	0.1087	1.1163	703.0
702.5	3145.9	0.03878	0.02969	0.06847	838.9	136.1	974.9	1.0039	0.1171	1.1210	702.5
702.0	3135.5	0.03824	0.03173	0.06997	835.0	144.7	979.7	1.0006	0.1246	1.1252	702.0
701.5	3125.2	0.03777	0.03361	0.07138	831.5	152.6	984.0	0.9977	0.1314	1.1291	701.5
701.0	3114.9	0.03735	0.03536	0.07271	828.2	159.8	988.0	0.9949	0.1377	1.1326	701.0
700.5	3104.6	0.03697	0.03701	0.07397	825.2	166.5	991.7	0.9924	0.1435	1.1359	700.5
700.0	3094.3	0.03662	0.03857	0.07519	822.4	172.7	995.2	0.9901	0.1490	1.1390	700.0
699.0	3073.9	0.03600	0.04149	0.07749	817.3	184.2	1001.5	0.9858	0.1590	1.1447	699.0
698.0	3053.6	0.03546	0.04420	0.07966	812.6	194.6	1007.2	0.9818	0.1681	1.1499	698.0
697.0	3033.5	0.03498	0.04674	0.08172	808.4	204.0	1012.4	0.9783	0.1764	1.1547	697.0
696.0	3013.4	0.03455	0.04916	0.08371	804.4	212.8	1017.2	0.9749	0.1841	1.1591	696.0
695.0	2993.5	0.03415	0.05147	0.08563	800.6	221.0	1021.7	0.9718	0.1914	1.1632	695.0
694.0	2973.7	0.03379	0.05370	0.08749	797.1	228.8	1025.9	0.9689	0.1982	1.1671	694.0
693.0	2954.0	0.03345	0.05587	0.08931	793.8	236.1	1029.9	0.9660	0.2048	1.1708	693.0
692.0	2934.5	0.03313	0.05797	0.09110	790.5	243.1	1033.6	0.9634	0.2110	1.1744	692.0
690.0	2895.7	0.03256	0.06203	0.09459	784.5	256.1	1040.6	0.9583	0.2227	1.1810	690.0
688.0	2857.4	0.03204	0.06595	0.09799	778.8	268.2	1047.0	0.9535	0.2337	1.1872	688.0
686.0	2819.5	0.03157	0.06976	0.10133	773.4	279.5	1052.9	0.9490	0.2439	1.1930	686.0
684.0	2782.1	0.03114	0.07349	0.10463	768.2	290.2	1058.4	0.9447	0.2537	1.1984	684.0
682.0	2745.1	0.03074	0.07716	0.10790	763.3	300.4	1063.6	0.9406	0.2631	1.2036	682.0
680.0	2708.6	0.03037	0.08080	0.11117	758.5	310.1	1068.5	0.9365	0.2720	1.2086	680.0
678.0	2672.5	0.03002	0.08440	0.11442	753.8	319.4	1073.2	0.9326	0.2807	1.2133	678.0
676.0	2636.8	0.02970	0.08799	0.11769	749.2	328.5	1077.6	0.9287	0.2892	1.2179	676.0
674.0	2601.5	0.02939	0.09156	0.12096	744.7	337.2	1081.9	0.9249	0.2974	1.2223	674.0
672.0	2566.6	0.02911	0.09514	0.12424	740.2	345.7	1085.9	0.9212	0.3054	1.2266	672.0
670.0	2532.2	0.02884	0.09871	0.12755	735.8	354.0	1089.8	0.9174	0.3133	1.2307	670.0
668.0	2498.1	0.02858	0.10229	0.13087	731.5	362.1	1093.5	0.9137	0.3210	1.2347	668.0
666.0	2464.4	0.02834	0.10588	0.13421	727.1	370.0	1097.1	0.9100	0.3286	1.2387	666.0
664.0	2431.1	0.02811	0.10947	0.13757	722.9	377.7	1100.6	0.9064	0.3361	1.2425	664.0
662.0	2398.2	0.02789	0.11306	0.14095	718.8	385.1	1103.9	0.9028	0.3434	1.2462	662.0
660.0	2365.7	0.02768	0.11663	0.14431	714.9	392.1	1107.0	0.8995	0.3502	1.2498	660.0
658.0	2333.5	0.02748	0.12023	0.14771	711.1	399.0	1110.1	0.8963	0.3570	1.2533	658.0
656.0	2301.7	0.02728	0.12387	0.15115	707.4	405.7	1113.1	0.8931	0.3637	1.2567	656.0
654.0	2270.3	0.02709	0.12754	0.15463	703.7	412.2	1115.9	0.8899	0.3702	1.2601	654.0
652.0	2239.2	0.02691	0.13124	0.15816	700.0	418.7	1118.7	0.8868	0.3767	1.2634	652.0
650.0	2208.4	0.02674	0.13499	0.16173	696.4	425.0	1121.4	0.8837	0.3830	1.2667	650.0
648.0	2178.1	0.02657	0.13876	0.16534	692.9	431.1	1124.0	0.8806	0.3893	1.2699	648.0
646.0	2148.0	0.02641	0.14258	0.16899	689.4	437.2	1126.6	0.8776	0.3954	1.2730	646.0
644.0	2118.3	0.02625	0.14644	0.17269	685.9	443.1	1129.0	0.8746	0.4015	1.2761	644.0
642.0	2088.9	0.02610	0.15033	0.17643	682.5	448.9	1131.4	0.8716	0.4075	1.2791	642.0
640.0	2059.9	0.02595	0.15427	0.18021	679.1	454.6	1133.7	0.8686	0.4134	1.2821	640.0
638.0	2031.2	0.02580	0.15824	0.18405	675.8	460.2	1136.0	0.8657	0.4193	1.2850	638.0
636.0	2002.8	0.02566	0.16226	0.18792	672.4	465.7	1138.1	0.8628	0.4251	1.2879	636.0
634.0	1974.7	0.02553	0.16633	0.19185	669.1	471.1	1140.2	0.8599	0.4307	1.2907	634.0
632.0	1947.0	0.02539	0.17044	0.19583	665.9	476.4	1142.2	0.8571	0.4364	1.2934	632.0
630.0	1919.5	0.02526	0.17459	0.19986	662.7	481.6	1144.2	0.8542	0.4419	1.2962	630.0
628.0	1892.4	0.02514	0.17880	0.20394	659.5	486.7	1146.1	0.8514	0.4474	1.2988	628.0
626.0	1865.6	0.02501	0.18306	0.20807	656.3	491.7	1148.0	0.8486	0.4529	1.3015	626.0
624.0	1839.0	0.02489	0.18737	0.21226	653.1	496.6	1149.8	0.8458	0.4583	1.3041	624.0
622.0	1812.8	0.02477	0.19173	0.21650	650.0	501.5	1151.5	0.8430	0.4636	1.3066	622.0
620.0	1786.9	0.02466	0.19615	0.22081	646.9	506.3	1153.2	0.8403	0.4689	1.3092	620.0
618.0	1761.2	0.02455	0.20063	0.22517	643.8	511.0	1154.8	0.8375	0.4742	1.3117	618.0
616.0	1735.9	0.02444	0.20516	0.22960	640.8	515.6	1156.4	0.8348	0.4794	1.3141	616.0
614.0	1710.8	0.02433	0.20976	0.23409	637.8	520.2	1158.0	0.8321	0.4845	1.3166	614.0
612.0	1686.1	0.02422	0.21442	0.23865	634.8	524.7	1159.5	0.8294	0.4896	1.3190	612.0
610.0	1661.6	0.02412	0.21915	0.24327	631.8	529.2	1160.9	0.8267	0.4947	1.3214	610.0
608.0	1637.3	0.02402	0.22394	0.24796	628.8	533.6	1162.4	0.8240	0.4997	1.3238	608.0
606.0	1613.4	0.02392	0.22881	0.25272	625.9	537.9	1163.8	0.8214	0.5048	1.3261	606.0
604.0	1589.7	0.02382	0.23374	0.25757	622.9	542.2	1165.1	0.8187	0.5097	1.3284	604.0
602.0	1566.3	0.02373	0.23875	0.26248	620.0	546.4	1166.4	0.8161	0.5147	1.3307	602.0
600.0	1543.2	0.02364	0.24384	0.26747	617.1	550.6	1167.7	0.8134	0.5196	1.3330	600.0
598.0	1520.4	0.02354	0.24900	0.27255	614.3	554.7	1169.0	0.8108	0.5245	1.3353	598.0
596.0	1497.8	0.02345	0.25425	0.27770	611.4	558.8	1170.2	0.8082	0.5293	1.3375	596.0
594.0	1475.4	0.02337	0.25958	0.28294	608.6	562.8	1171.4	0.8056	0.5342	1.3398	594.0
592.0	1453.3	0.02328	0.26499	0.28827	605.7	566.8	1172.6	0.8030	0.5390	1.3420	592.0
590.0	1431.5	0.02319	0.27049	0.29368	602.9	570.8	1173.7	0.8004	0.5437	1.3442	590.0
588.0	1410.0	0.02311	0.27608	0.29919	600.1	574.7	1174.8	0.7978	0.5485	1.3464	588.0
586.0	1388.6	0.02303	0.28176	0.30478	597.3	578.5	1175.9	0.7953	0.5532	1.3485	586.0
584.0	1367.6	0.02295	0.28753	0.31048	594.6	582.4	1176.9	0.7927	0.5580	1.3507	584.0
582.0	1346.7	0.02287	0.29340	0.31627	591.8	586.1	1178.0	0.7902	0.5627	1.3528	582.0
580.0	1326.2	0.02279	0.29937	0.32216	589.1	589.9	1179.0	0.7876	0.5673	1.3550	580.0

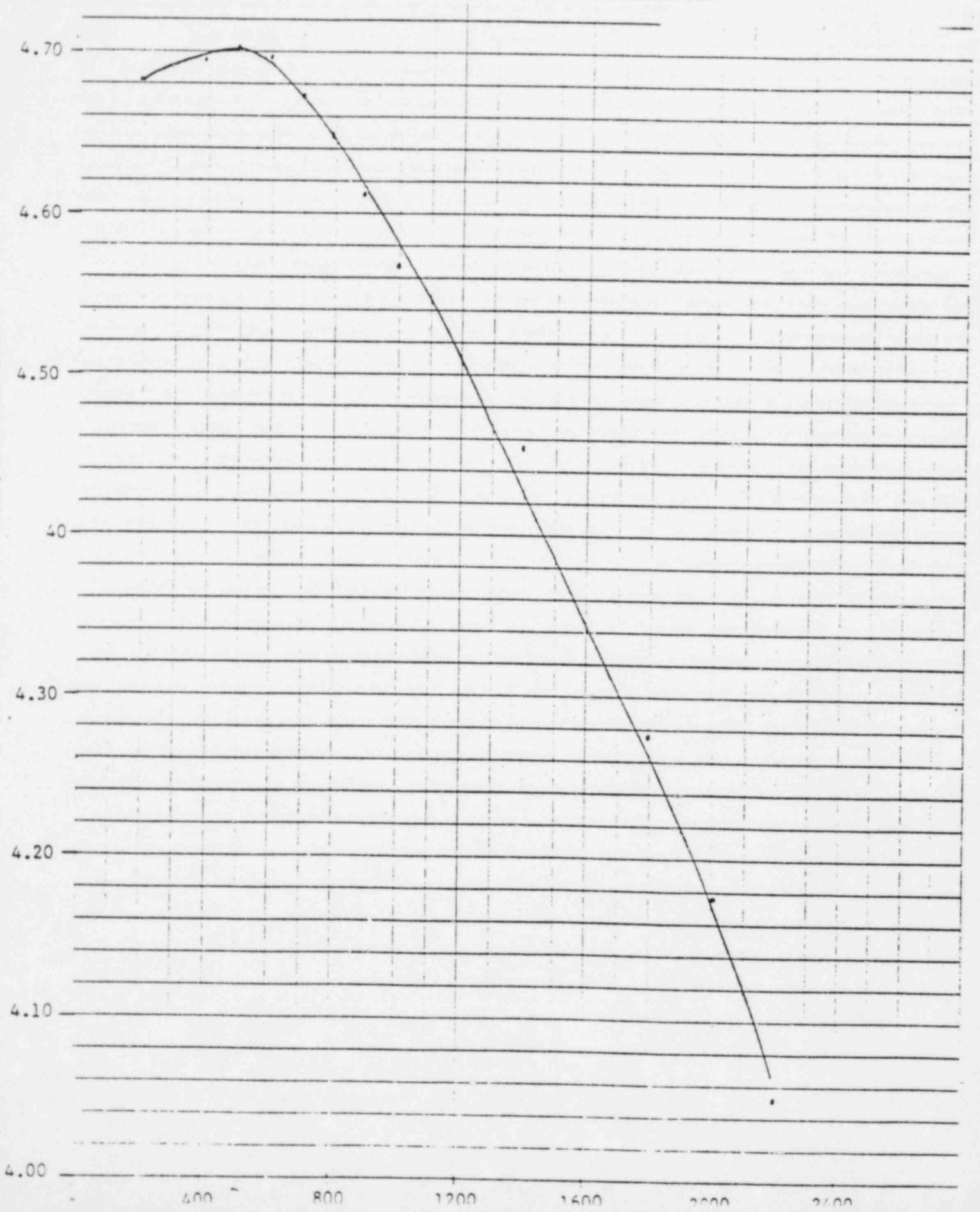
Properties of Saturated Steam and Saturated Water (Temperature)

Temp. F	Press. psia	Volume, ft³/lbm			Enthalpy, Btu/lbm			Entropy, Btu/lbm · R			Temp. F
		Water v_f	Evap. v_{fg}	Steam v_g	Water h_f	Evap. h_{fg}	Steam h_g	Water s_f	Evap. s_{fg}	Steam s_g	
580.0	1326.17	0.02279	0.29937	0.32216	589.1	589.9	1179.0	0.7876	0.5672	1.3550	580.0
578.0	1305.84	0.02271	0.30544	0.32816	586.4	593.6	1179.9	0.7851	0.5720	1.3571	578.0
576.0	1285.74	0.02264	0.31162	0.33426	583.7	597.2	1180.9	0.7825	0.5766	1.3592	576.0
574.0	1265.89	0.02256	0.31790	0.34046	581.0	600.9	1181.8	0.7800	0.5813	1.3613	574.0
572.0	1246.26	0.02249	0.32429	0.34678	578.3	604.5	1182.7	0.7775	0.5859	1.3634	572.0
570.0	1226.88	0.02242	0.33079	0.35321	575.6	608.0	1183.6	0.7750	0.5905	1.3654	570.0
568.0	1207.72	0.02235	0.33741	0.35975	572.9	611.5	1184.5	0.7725	0.5950	1.3675	568.0
566.0	1188.80	0.02228	0.34414	0.36642	570.3	615.0	1185.3	0.7699	0.5996	1.3696	566.0
564.0	1170.10	0.02221	0.35099	0.37320	567.6	618.5	1186.1	0.7674	0.6041	1.3716	564.0
562.0	1151.63	0.02214	0.35797	0.38011	565.0	621.9	1186.9	0.7650	0.6087	1.3736	562.0
560.0	1133.38	0.02207	0.36507	0.38714	562.4	625.3	1187.7	0.7625	0.6132	1.3757	560.0
558.0	1115.36	0.02201	0.37230	0.39431	559.8	628.6	1188.4	0.7600	0.6177	1.3777	558.0
556.0	1097.55	0.02194	0.37966	0.40160	557.2	632.0	1189.2	0.7575	0.6222	1.3797	556.0
554.0	1079.96	0.02188	0.38715	0.40903	554.6	635.3	1189.9	0.7550	0.6267	1.3817	554.0
552.0	1062.59	0.02182	0.39479	0.41660	552.0	638.5	1190.6	0.7525	0.6311	1.3837	552.0
550.0	1045.43	0.02176	0.40256	0.42432	549.5	641.8	1191.2	0.7501	0.6356	1.3856	550.0
548.0	1028.49	0.02169	0.41048	0.43217	546.9	645.0	1191.9	0.7476	0.6400	1.3876	548.0
546.0	1011.75	0.02163	0.41855	0.44018	544.4	648.1	1192.5	0.7451	0.6445	1.3896	546.0
544.0	995.22	0.02157	0.42677	0.44834	541.8	651.3	1193.1	0.7427	0.6489	1.3915	544.0
542.0	978.90	0.02151	0.43514	0.45665	539.3	654.4	1193.7	0.7402	0.6533	1.3935	542.0
540.0	962.79	0.02146	0.44367	0.46513	536.8	657.5	1194.3	0.7378	0.6577	1.3954	540.0
538.0	946.88	0.02140	0.45237	0.47377	534.2	660.6	1194.8	0.7353	0.6621	1.3974	538.0
536.0	931.17	0.02134	0.46123	0.48257	531.7	663.6	1195.4	0.7329	0.6665	1.3993	536.0
534.0	915.66	0.02129	0.47026	0.49155	529.2	666.6	1195.9	0.7304	0.6708	1.4012	534.0
532.0	900.34	0.02123	0.47947	0.50070	526.8	669.6	1196.4	0.7280	0.6752	1.4032	532.0
530.0	885.23	0.02118	0.48886	0.51004	524.3	672.6	1196.9	0.7255	0.6796	1.4051	530.0
528.0	870.31	0.02112	0.49843	0.51955	521.8	675.5	1197.3	0.7231	0.6839	1.4070	528.0
526.0	855.58	0.02107	0.50819	0.52926	519.3	678.4	1197.8	0.7206	0.6883	1.4089	526.0
524.0	841.04	0.02102	0.51814	0.53916	516.9	681.3	1198.2	0.7182	0.6926	1.4108	524.0
522.0	826.69	0.02097	0.52829	0.54926	514.4	684.2	1198.6	0.7158	0.6969	1.4127	522.0
520	812.53	0.02091	0.53864	0.55956	512.0	687.0	1199.0	0.7133	0.7013	1.4146	520.0
518	798.55	0.020[illegible]	0.54920	0.57006	509.6	689.9	1199.4	0.7109	0.7056	1.4165	518.0
516.0	784.76	0.020[illegible]1	0.55997	0.58079	507.1	692.7	1199.8	0.7085	0.7099	1.4183	516.0
514.0	771.15	0.020[illegible]6	0.57096	0.59173	504.7	695.4	1200.2	0.7060	0.7142	1.4202	514.0
512.0	757.72	0.020[illegible]2	0.58218	0.60289	502.3	698.2	1200.5	0.7036	0.7185	1.4221	512.0
510.0	744.47	0.02067	0.59362	0.61429	499.9	700.9	1200.8	0.7012	0.7228	1.4240	510.0
508.0	731.40	0.02062	0.60530	0.62592	497.5	703.7	1201.1	0.6987	0.7271	1.4258	508.0
506.0	718.50	0.02057	0.61722	0.63779	495.1	706.3	1201.4	0.6963	0.7314	1.4277	506.0
504.0	705.78	0.02053	0.62938	0.64991	492.7	709.0	1201.7	0.6939	0.7357	1.4296	504.0
502.0	693.23	0.02048	0.64180	0.66228	490.3	711.7	1202.0	0.6915	0.7400	1.4314	502.0
500.0	680.86	0.02043	0.65448	0.67492	487.9	714.3	1202.2	0.6890	0.7443	1.4333	500.0
498.0	668.65	0.02039	0.66743	0.68782	485.6	716.9	1202.5	0.6866	0.7486	1.4352	498.0
496.0	656.61	0.02034	0.68065	0.70100	483.2	719.5	1202.7	0.6842	0.7528	1.4370	496.0
494.0	644.73	0.02030	0.69415	0.71445	480.8	722.1	1202.9	0.6818	0.7571	1.4389	494.0
492.0	633.03	0.02026	0.70794	0.72820	478.5	724.6	1203.1	0.6793	0.7614	1.4407	492.0
490.0	621.48	0.02021	0.72203	0.74224	476.1	727.2	1203.3	0.6769	0.7657	1.4426	490.0
488.0	610.10	0.02017	0.73641	0.75658	473.8	729.7	1203.5	0.6745	0.7700	1.4444	488.0
486.0	598.87	0.02013	0.75111	0.77124	471.5	732.2	1203.7	0.6721	0.7742	1.4463	486.0
484.0	587.81	0.02009	0.76613	0.78622	469.1	734.7	1203.8	0.6696	0.7785	1.4481	484.0
482.0	576.90	0.02004	0.78148	0.80152	466.8	737.2	1204.0	0.6672	0.7828	1.4500	482.0
480.0	566.15	0.02000	0.79716	0.81717	464.5	739.6	1204.1	0.6648	0.7871	1.4518	480.0
478.0	555.55	0.01996	0.81319	0.83315	462.2	742.1	1204.2	0.6624	0.7913	1.4537	478.0
476.0	545.11	0.01992	0.82958	0.84950	459.9	744.5	1204.3	0.6599	0.7956	1.4555	476.0
474.0	534.81	0.01988	0.84632	0.86621	457.5	746.9	1204.4	0.6575	0.7999	1.4574	474.0
472.0	524.67	0.01984	0.86345	0.88329	455.2	749.3	1204.5	0.6551	0.8042	1.4592	472.0
470.0	514.67	0.01980	0.88095	0.90076	452.9	751.6	1204.6	0.6527	0.8084	1.4611	470.0
468.0	504.83	0.01976	0.89885	0.91862	450.7	754.0	1204.6	0.6502	0.8127	1.4629	468.0
466.0	495.12	0.01973	0.91716	0.93689	448.4	756.3	1204.7	0.6478	0.8170	1.4648	466.0
464.0	485.56	0.01969	0.93588	0.95557	446.1	758.6	1204.7	0.6454	0.8213	1.4667	464.0
462.0	476.14	0.01965	0.95504	0.97469	443.8	761.0	1204.8	0.6429	0.8256	1.4685	462.0
460.0	466.87	0.01961	0.97463	0.99424	441.5	763.2	1204.8	0.6405	0.8299	1.4704	460.0
458.0	457.73	0.01958	0.99467	1.01425	439.3	765.5	1204.8	0.6381	0.8342	1.4722	458.0
456.0	448.73	0.01954	1.01518	1.03472	437.0	767.8	1204.8	0.6356	0.8385	1.4741	456.0
454.0	439.87	0.01950	1.03616	1.05567	434.7	770.0	1204.8	0.6332	0.8428	1.4759	454.0
452.0	431.14	0.01947	1.05764	1.07711	432.5	772.3	1204.8	0.6308	0.8471	1.4778	452.0
450.0	422.55	0.01943	1.07962	1.09905	430.2	774.5	1204.7	0.6283	0.8514	1.4797	450.0
448	414.09	0.01940	1.10212	1.12152	428.0	776.7	1204.7	0.6259	0.8557	1.4815	448.0
446	405.76	0.01936	1.12515	1.14452	425.7	778.9	1204.6	0.6234	0.8600	1.4834	446.0
444	397.56	0.01933	1.14874	1.16806	423.5	781.1	1204.6	0.6210	0.8643	1.4853	444.0
442.0	389.49	0.01929	1.17288	1.19217	421.3	783.2	1204.5	0.6185	0.8686	1.4872	442.0
440.0	381.54	0.01926	1.19761	1.21687	419.0	785.4	1204.4	0.6161	0.8729	1.4890	440.0
438.0	373.72	0.01923	1.22293	1.24216	416.8	787.5	1204.3	0.6136	0.8772	1.4909	438.0
436.0	366.03	0.01919	1.24887	1.26806	414.6	789.7	1204.2	0.6112	0.8816	1.4928	436.0
434.0	358.46	0.01916	1.27544	1.29460	412.4	791.8	1204.1	0.6087	0.8859	1.4947	434.0
432.0	351.00	0.01913	1.30266	1.32179	410.1	793.9	1204.0	0.6063	0.8903	1.4966	432.0
430.0	343.67	0.01909	1.33055	1.34965	407.9	796.0	1203.9	0.6038	0.8946	1.4985	430.0

Properties of Saturated Steam and Saturated Water (Temperature)

Temp.	Press.	Volume, ft^3/lbm			Enthalpy, Btu/lbm			Entropy, Btu/lbm × R			Temp.
F	psia	Water v_f	Evap. v_{fg}	Steam v_g	Water h_f	Evap. h_{fg}	Steam h_g	Water s_f	Evap. s_{fg}	Steam s_g	F
430.0	343.674	0.01909	1.3306	1.3496	407.9	796.0	1203.9	0.6038	0.8946	1.4985	430.0
428.0	336.463	0.01906	1.3591	1.3782	405.7	798.0	1203.7	0.6014	0.8990	1.5004	428.0
426.0	329.369	0.01903	1.3884	1.4075	403.5	800.1	1203.6	0.5989	0.9034	1.5023	426.0
424.0	322.391	0.01900	1.4184	1.4374	401.3	802.2	1203.5	0.5964	0.9077	1.5042	424.0
422.0	315.529	0.01897	1.4492	1.4682	399.1	804.2	1203.3	0.5940	0.9121	1.5061	422.0
420.0	308.780	0.01894	1.4808	1.4997	396.9	806.2	1203.1	0.5915	0.9165	1.5080	420.0
418.0	302.143	0.01890	1.5131	1.5320	394.7	808.2	1202.9	0.5890	0.9209	1.5099	418.0
416.0	295.617	0.01887	1.5463	1.5651	392.5	810.2	1202.8	0.5866	0.9253	1.5118	416.0
414.0	289.201	0.01884	1.5803	1.5991	390.3	812.2	1202.6	0.5841	0.9297	1.5137	414.0
412.0	282.894	0.01881	1.6152	1.6340	388.1	814.2	1202.4	0.5816	0.9341	1.5157	412.0
410.0	276.694	0.01878	1.6510	1.6697	386.0	816.2	1202.1	0.5791	0.9385	1.5176	410.0
408.0	270.600	0.01875	1.6877	1.7064	383.8	818.2	1201.9	0.5766	0.9429	1.5195	408.0
406.0	264.611	0.01872	1.7253	1.7441	381.6	820.1	1201.7	0.5742	0.9473	1.5215	406.0
404.0	258.725	0.01870	1.7640	1.7827	379.4	822.0	1201.5	0.5717	0.9518	1.5234	404.0
402.0	252.942	0.01867	1.8037	1.8223	377.3	824.0	1201.2	0.5692	0.9562	1.5254	402.0
400.0	247.259	0.01864	1.8444	1.8630	375.1	825.9	1201.0	0.5667	0.9607	1.5274	400.0
398.0	241.677	0.01861	1.8862	1.9048	372.9	827.8	1200.7	0.5642	0.9651	1.5293	398.0
396.0	236.193	0.01858	1.9291	1.9477	370.8	829.7	1200.4	0.5617	0.9696	1.5313	396.0
394.0	230.807	0.01855	1.9731	1.9917	368.6	831.6	1200.2	0.5592	0.9741	1.5333	394.0
392.0	225.516	0.01853	2.0184	2.0369	366.5	833.4	1199.9	0.5567	0.9786	1.5352	392.0
390.0	220.321	0.01850	2.0649	2.0833	364.3	835.3	1199.6	0.5542	0.9831	1.5372	390.0
388.0	215.220	0.01847	2.1126	2.1311	362.2	837.2	1199.3	0.5516	0.9876	1.5392	388.0
386.0	210.211	0.01844	2.1616	2.1801	360.0	839.0	1199.0	0.5491	0.9921	1.5412	386.0
384.0	205.294	0.01842	2.2120	2.2304	357.9	840.8	1198.7	0.5466	0.9966	1.5432	384.0
382.0	200.467	0.01839	2.2638	2.2821	355.7	842.7	1198.4	0.5441	1.0012	1.5452	382.0
380.0	195.729	0.01836	2.3170	2.3353	353.6	844.5	1198.0	0.5416	1.0057	1.5473	380.0
378.0	191.080	0.01834	2.3716	2.3900	351.4	846.3	1197.7	0.5390	1.0103	1.5493	378.0
376.0	186.517	0.01831	2.4279	2.4462	349.3	848.1	1197.4	0.5365	1.0148	1.5513	376.0
374.0	182.040	0.01829	2.4857	2.5039	347.2	849.8	1197.0	0.5340	1.0194	1.5534	374.0
372.0	177.648	0.01826	2.5451	2.5633	345.0	851.6	1196.7	0.5314	1.0240	1.5554	372.0
370.0	173.339	0.01823	2.6062	2.6244	342.9	853.4	1196.3	0.5289	1.0286	1.5575	370.0
368.0	169.113	0.01821	2.6691	2.6873	340.8	855.1	1195.9	0.5263	1.0332	1.5595	368.0
366.0	164.968	0.01818	2.7337	2.7519	338.7	856.9	1195.6	0.5238	1.0378	1.5616	366.0
364.0	160.903	0.01816	2.8002	2.8184	336.5	858.6	1195.2	0.5212	1.0424	1.5637	364.0
362.0	156.917	0.01813	2.8687	2.8868	334.4	860.4	1194.8	0.5187	1.0471	1.5658	362.0
360.0	153.010	0.01811	2.9392	2.9573	332.3	862.1	1194.4	0.5161	1.0517	1.5678	360.0
358.0	149.179	0.01809	3.0117	3.0298	330.2	863.8	1194.0	0.5135	1.0564	1.5699	358.0
356.0	145.424	0.01806	3.0863	3.1044	328.1	865.5	1193.6	0.5110	1.0611	1.5721	356.0
354.0	141.744	0.01804	3.1632	3.1812	326.0	867.2	1193.2	0.5084	1.0658	1.5742	354.0
352.0	138.138	0.01801	3.2423	3.2603	323.9	868.9	1192.7	0.5058	1.0705	1.5763	352.0
350.0	134.604	0.01799	3.3238	3.3418	321.8	870.6	1192.3	0.5032	1.0752	1.5784	350.0
348.0	131.142	0.01797	3.4078	3.4258	319.7	872.2	1191.9	0.5006	1.0799	1.5806	348.0
346.0	127.751	0.01794	3.4943	3.5122	317.6	873.9	1191.4	0.4980	1.0847	1.5827	346.0
344.0	124.430	0.01792	3.5834	3.6013	315.5	875.5	1191.0	0.4954	1.0894	1.5849	344.0
342.0	121.177	0.01790	3.6752	3.6931	313.4	877.2	1190.5	0.4928	1.0942	1.5871	342.0
340.0	117.992	0.01787	3.7699	3.7878	311.3	878.8	1190.1	0.4902	1.0990	1.5892	340.0
338.0	114.873	0.01785	3.8675	3.8853	309.2	880.5	1189.6	0.4876	1.1038	1.5914	338.0
336.0	111.820	0.01783	3.9681	3.9859	307.1	882.1	1189.1	0.4850	1.1086	1.5936	336.0
334.0	108.832	0.01781	4.0718	4.0896	305.0	883.7	1188.7	0.4824	1.1134	1.5958	334.0
332.0	105.907	0.01779	4.1788	4.1966	302.9	885.3	1188.2	0.4798	1.1183	1.5981	332.0
330.0	103.045	0.01776	4.2892	4.3069	300.8	886.9	1187.7	0.4772	1.1231	1.6003	330.0
328.0	100.245	0.01774	4.4030	4.4208	298.7	888.5	1187.2	0.4745	1.1280	1.6025	328.0
326.0	97.506	0.01772	4.5205	4.5382	296.6	890.1	1186.7	0.4719	1.1329	1.6048	326.0
324.0	94.826	0.01770	4.6418	4.6595	294.6	891.6	1186.2	0.4692	1.1378	1.6071	324.0
322.0	92.205	0.01768	4.7669	4.7846	292.5	893.2	1185.7	0.4666	1.1427	1.6093	322.0
320.0	89.643	0.01766	4.8961	4.9138	290.4	894.8	1185.2	0.4640	1.1477	1.6116	320.0
318.0	87.137	0.01764	5.0295	5.0471	288.3	896.3	1184.7	0.4613	1.1526	1.6139	318.0
316.0	84.688	0.01761	5.1673	5.1849	286.3	897.9	1184.1	0.4586	1.1576	1.6162	316.0
314.0	82.293	0.01759	5.3096	5.3272	284.2	899.4	1183.6	0.4560	1.1626	1.6185	314.0
312.0	79.953	0.01757	5.4566	5.4742	282.1	901.0	1183.1	0.4533	1.1676	1.6209	312.0
310.0	77.667	0.01755	5.6085	5.6260	280.0	902.5	1182.5	0.4506	1.1726	1.6232	310.0
308.0	75.433	0.01753	5.7655	5.7830	278.0	904.0	1182.0	0.4479	1.1776	1.6256	308.0
306.0	73.251	0.01751	5.9277	5.9452	275.9	905.5	1181.4	0.4453	1.1827	1.6279	306.0
304.0	71.119	0.01749	6.0955	6.1130	273.8	907.0	1180.9	0.4426	1.1877	1.6303	304.0
302.0	69.038	0.01747	6.2689	6.2864	271.8	908.5	1180.3	0.4399	1.1928	1.6327	302.0
300.0	67.005	0.01745	6.4483	6.4658	269.7	910.0	1179.7	0.4372	1.1979	1.6351	300.0
298.0	65.021	0.01743	6.6339	6.6513	267.7	911.5	1179.2	0.4345	1.2031	1.6375	298.0
296.0	63.084	0.01741	6.8259	6.8433	265.6	913.0	1178.6	0.4317	1.2082	1.6400	296.0
294.0	61.194	0.01739	7.0245	7.0419	263.5	914.5	1178.0	0.4290	1.2134	1.6424	294.0
292.0	59.350	0.01738	7.2301	7.2475	261.5	915.9	1177.4	0.4263	1.2186	1.6449	292.0
290.0	57.550	0.01736	7.4430	7.4603	259.4	917.4	1176.8	0.4236	1.2238	1.6473	290.0
288.0	55.795	0.01734	7.6634	7.6807	257.4	918.8	1176.2	0.4208	1.2290	1.6498	288.0
286.0	54.083	0.01732	7.8916	7.9089	255.3	920.3	1175.6	0.4181	1.2342	1.6523	286.0
284.0	52.414	0.01730	8.1280	8.1453	253.3	921.7	1175.0	0.4154	1.2395	1.6548	284.0
282.0	50.786	0.01728	8.3729	8.3902	251.2	923.2	1174.4	0.4126	1.2448	1.6573	282.0
280.0	49.200	0.01726	8.6267	8.6439	249.2	924.6	1173.8	0.4098	1.2501	1.6599	280.0

PALISADES DUMP VALVE SATURATED STEAM FLOW RATE



Proc No EI-7.4
Revision 0
Date 5/20/83

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTATION PROCEDURE
Revision and Approval Summary

TITLE: POST ACCIDENT GAS AND LIQUID ACTIVITY ANALYSIS

1. Prepared

C Embrey — Originator — 5/16/83 — Date

2. QA Concurrence

Jeffrey Hall — 5-16-83 — Date

3. Recommend Approval/Q-List (Yes) No

[signature] — Department Head — 5/17/83 — Date

4. PRC Reviewed

R H Fitzek PRC Secretary — 5/17/83 — Date

5. Approved

D W Marston — Plant Manager — 5/18/83 — Date

6. ATMS Incorporated

5/19/83 — Date

7. Biennial Review

_____ — _____ — Date

TITLE: POST ACCIDENT GAS ANB LIQUID ACTIVITY ANALYSIS

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TITLE: POST ACCIDENT GAS AND LIQUID ACTIVITY ANALYSIS

1.0 PURPOSE

The purpose of this procedure is to outline the steps of operation necessary to analyze samples for gamma activity on the ND6620 counting system during a post accident condition.

2.0 REFERENCES

2.1 ND6600 Data Acquisition and Processing System Operational Instruction Document, Nuclear Data Inc, 1978

2.2 Palisades Nuclear Plant Emergency Implementation Procedure, EI-7.1

2.3 Palisades Nuclear Plant Emergency Implementation Procedure, EI-7.2

2.4 Chemistry Procedure CH-4.40

3.0 PREREQUISITES

3.1 ND6620 acquisition system with associated software.

3.2 Up-to-date calibration of the system.

3.3 One 15 cc gas sample or one 15 cc liquid sample collected from the PASM Panel wrapped in poly sheeting.

3.4 System disc drives on line.

3.5 Line printer on line.

3.6 Tape deck on line.

3.7 Computer display terminal is operational.

3.8 Detector high voltage is set at proper voltage.

3.9 Linemans gloves for sample handling.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 If a situation develops in which the disk drives are either automatically (such as during a power failure) or manually taken off line, DO NOT (!) bring them back on line until the "safe light" indicators are on, or else extreme damage could result to the computer. Refer to Procedure F4.40 for bringing the system on line.

4.2 In a power-down situation, always take the disk drive units off line first, before shutting down the main power. Refer to procedure F4.40.

4.3 In a problem situation, do not attempt to bring the system on line (Procedure F4.40) unless you are thoroughly familiar with the ND6620. It is better to notify the appropriate personnel than to risk damaging the equipment.

4.4 Linemans gloves shall be worn when handling the sample vials.

4.5 The counting room should be cleared of all unnecessary sources of radiation while counting is taking place.

5.0 PROCEDURE

5.1 Conduct a "10% second background" analysis.

5.2 Verify that a daily source check count has been taken, to show that the equipment is performing at the calibrated efficiencies/KeV.

5.3 To access and execute job streams:

a. First, make the sample entry in the logbook, noting description, time sampled, volume, etc.

b. Use the chart on the wall to determine which job stream user number applies to the sample you want analyzed, and enter that user number in the logbook. For example, if you wanted to count a one liter evaporator distillation sample for 1000 seconds in the low level counting room, you would use "user 12", since the job stream for this user analyzes a one liter liquid sample in a 1000 second acquisition time in the low level counting room. (A different user number would apply in the high level counting room for the same sample, as shown on the chart).

c. Enter WHO on the keyboard and depress the "return" key. If a user is signed on, enter BYE UN and depress the "return" key, where "UN" is the user number signed on.

d. To sign on as the user which applies to your sample, you should enter HELLO UN,A on the keyboard, where "UN" is the user number you want, and then depress the "return" key. The ",A" is very important, because this is what accesses the job stream. In the above example you would enter HELLO 12,A and then depress the "return" key.

e. If the spectrum display screen is showing on the terminal, depress the "page" key located in the display board keys. The display screen will get either larger or smaller. If it gets larger, depress the "+-" key and release it. Then depress the "page" key again until the display screen completely disappears.

f. Follow carefully the instructions printed on the screen. Enter the requested information, such as sample identification, time sampled, etc, exactly as instructed, and in the form of the examples as shown on the screen. It is necessary to tell the computer the information it needs in the form that it understands.

g. After all requested information has been entered, the computer will count, record and print out the analyzed data. If you wish to observe the spectrum during acquisition, again depress the "+-" key, and then the "page" key to bring the spectrum display back into view. Adjust the size of the spectrum display as you wish.

h. "Job Stream completed" will appear on the terminal display when the program is finished.

i. Note the acquisition date and time on the header of the printout. Enter this into the logbook under the count time. To remove the printout from the line printer, first depress the "select switch" to cause the "select indicator" lamp to go out. This releases the line printer from the computer's control. Then depress the "top of form" button until you have enough paper to tear it at its proper perforation. Then depress the "select switch" again, to return the line printer to computer control.

NOTE: It is important to sign off as the user you signed on as, in order to allow the next user to sign on. To sign off, first depress the "CRTL" (control) key on the keyboard. While holding it down, depress the "P" key. This forces the computer to enter a "prompt" character on the screen, which is needed in order to sign off. Enter BYE UN, where "UN" is the user number you signed on as, and depress the return key. In the above example, you would sign off by entering BYE 12 and then depressing the "return" key.

5.4 Calculations:

a. For the Post Accident Gas activity analysis, use the following equation:

Total Gas Activity, μCi/cc x 8000 cc/gm = Sample gas activity μCi/gm.

Record the sample gas activity in μCi/gm on EI 7.2 Attachment 1.

b. For the post accident liquid activity analysis, use the following equation:

Total Liquid Activity, μCi/ml x 15,000 = Sample Liquid Activity μCi/gm

Record the sample liquid activity in μCi/gm on EI 7.2 Attachment 1.

5.5 Label the analysis printout with the analysts initials and the analysis time and date.

6.0 ACCEPTANCE CRITERIA

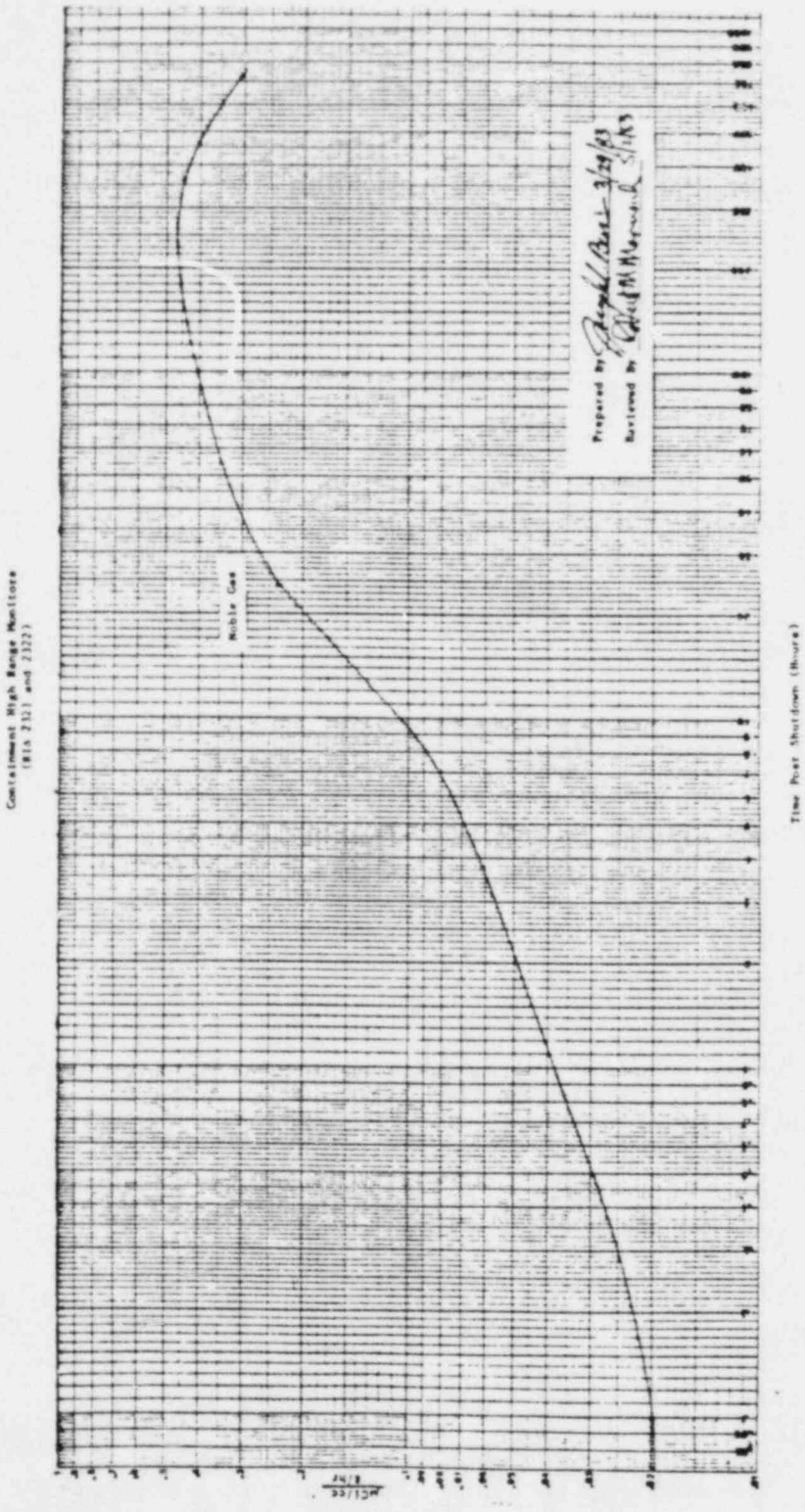
None

TITLE: POST ACCIDENT GAS AND LIQUID ACTIVITY ANALYSIS

7.0 RECORDS

Palisades Emergency Implementation Procedure 7.2.

CONTAINMENT HIGH RANGE MONITOR CONVERSION FACTORS



UNUSUAL EVENT

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
UNUSUAL EVENT Class Description Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs. Purpose Purpose of off-site notification is to (1) assure that the first step in any response later found to be necessary has been carried out, (2) bring the operating staff to a state of readiness and (3) provide systematic handling of Unusual Events information and decision making.	1. Promptly inform State and/or local off-site authorities of nature of unusual condition as soon as discovered. 2. Augment on-shift resources as needed. 3. Assess and respond. 4. Escalate to a more severe class, if appropriate, or 5. Close out with verbal summary to off-site authorities; followed by written summary.	1. Provide fire or security assistance if requested. 2. Escalate to a more severe class, if appropriate. 3. Stand by until verbal closeout.

ALERT

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
ALERT Class Description Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels. Purpose Purpose of off-site alert is to (1) assure that emergency personnel are readily available to respond if situation becomes more serious or to perform confirmatory radiation monitoring if required, and (2) provide off-site authorities current status information.	1. Promptly inform State and/or local authorities of alert status and reason for alert as soon as discovered. 2. Augment resources and activate on-site Technical Support Center and on-site Operational Support Center. Bring Emergency Operations Facility (EOF) and other key emergency personnel to standby status. 3. Assess and respond. 4. Dispatch on-site monitoring teams and associated communications. 5. Provide periodic plant status updates to off-site authorities (at least every 15 minutes). 6. Provide periodic meteorological assessments to off-site authorities and, if any releases are occurring, dose estimates for actual releases. 7. Escalate to a more severe class, if appropriate.	1. Provide fire or security assistance if requested. 2. Augment resources and bring primary response centers and Emergency Broadcast System (EBS) to standby status. 3. Alert to standby status key emergency personnel including monitoring teams and associated communications. 4. Provide confirmatory off-site radiation monitoring and injestion pathway dose projections if actual releases sub stantially exceed Tech nical Specification limits. 5. Escalate to a more severe class, if appropriate.

ALERT

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
		6. Maintain Alert status until verbal closeout or reduction of emergency class.
	8. Close out or recommend reduction in emergency class by verbal summary to off-site authorities followed by written summary.	

SITE AREA EMERGENCY

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
SITE AREA EMERGENCY Class Description Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases not expected to exceed EPA Protective Action Guideline exposure levels except near site boundary. Purpose Purpose of the Site Area Emergency declaration is to (1) assure that response centers are manned, (2) assure that monitoring teams are dispatched, (3) assure that personnel required for evacuation of near-site areas are at duty stations if situation becomes more serious, (4) provide consultation with off-site authorities and (5) provide updates for the	1. Promptly inform State and/or local off-site authorities of Site Area Emergency status and reason for emergency as soon as discovered. 2. Augment resources by activating on-site Technical Support Center, on-site Operational Support Center and near-site Emergency Operations Facility (EOF). 3. Assess and respond. 4. Dispatch on-site and off-site monitoring teams and associated communications. 5. Designate an individual for plant status updates to off-site authorities and periodic press briefings (perhaps joint with off-site authorities). 6. Make senior technical and management staff on site available for consultation with NRC and State on a periodic basis. 7. Provide meteorological and dose estimates to off-site authorities for actual releases via a designated individual or automated data transmission. 8. Provide release and dose projections based on available plant condition	1. Provide any assistance requested. 2. If sheltering near the site is desirable, activate public notification system within at least two miles of the plant. 3. Provide public within at least about 10 miles periodic updates on emergency status. 4. Augment resources by activating primary response centers. 5. Dispatch key emergency personnel including monitoring teams and associated communications. 6. Alert to standby status other emergency personnel (eg, those needed for evacuation) and dispatch personnel to near-site duty stations. 7. Provide off-site monitoring results to licensee, DOE and others and jointly assess them. 8. Continuously assess information from licensee and off-site monitoring with regard to changes to protective actions already initiated for public and mobilizing evacuation resources. 9. Recommend placing milk animals within two miles on stored feed and assess need to extend

SITE AREA EMERGENCY

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
public through off-site authorities.	information and foreseeable contingencies. 9. Escalate to General Emergency class, if appropriate, or 10. Close out or recommend reduction in emergency class by briefing of off-site authorities at EOF and by phone followed by written summary.	distance. 10. Provide press briefings, perhaps with licensee. 11. Escalate to General Emergency class, if appropriate. 12. Maintain Site Area Emergency status until closeout or reduction of emergency class.

GENERAL EMERGENCY

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
GENERAL EMERGENCY Class Description Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels off site for more than the immediate site area. Purpose Purpose of the General Emergency declaration is to (1) initiate predetermined protective actions for the public, (2) provide continuous assessment of information from licensee and off-site organization measurements, (3) initiate additional measures as indicated by actual or potential releases, (4) provide consultation with	1. Promptly inform State and local off-site authorities of General Emergency status and reason for emergency as soon as discovered (parallel notification of State/local). 2. Augment resources by activating on-site Technical Support Center, on-site Operational Support Center and near-site Emergency Operations Facility (EOF). 3. Assess and respond. 4. Dispatch on-site and off-site monitoring teams and associated communications. 5. Designate an individual for plant status updates to off-site authorities and periodic press briefings (perhaps joint with off-site authorities). 6. Make senior technical and management staff on site available for consultation with NRC and State on a periodic basis. 7. Provide meteorological and dose estimates to off-site authorities for actual releases via a designated individual or automated data transmission. 8. Provide release and dose	1. Provide any assistance requested. 2. Activate immediate public notification of Emergency status and provide public periodic updates. 3. Recommend sheltering for two-mile radius and five miles downwind and assess need to extend distances. Consider advisability of evacuation (projected time available vs estimated evacuation times). 4. Augment resources by activating primary response centers. 5. Dispatch key emergency personnel including monitoring teams and associated communications. 6. Dispatch other emergency personnel to duty stations within five-mile radius and alert all others to standby status. 7. Provide off-site monitoring results to licensee, DOE and others and jointly assess them. 8. Continuously assess information from licensee and off-site monitoring with regard to changes to protective actions already initiated for public and mobilizing evacuation resources.

GENERAL EMERGENCY

Class	Licensee Actions	State and/or Local Off-Site Authority Actions
off-site authorities and (5) provide updates for the public through off-site authorities.	projections based on available plant condition information and foreseeable contingencies. 9. Close out or recommend reduction in emergency class by briefing of off-site authorities at EOF and by phone followed by written summary.	9. Recommend placing milk animals within 10 miles on stored feed and assess need to extend distance. 10. Provide press briefings with licensee. 11. Maintain General Emergency status until closeout or reduction of emergency class.