REVIEW AND APPROVAL TRACKING FORM

Procedure Information:

Number: PMP-2081 EPP.105 Revision: 04 Change: 01

Title: Initial Core Damage Assessment

Category:

- ☐ Change (Full Procedure) with Review of Change Only
- ☒ Change (Page Substitution) with Review of Change Only
- ☐ New Procedure or Change with Full Review
- ☐ Superceded By: _____
- ☐ Correction (Full Procedure)
- ☐ Correction (Page Substitution)
- ☐ Cancellation

Required Reviews:

- ☐ Operations
- ☐ Maintenance
- ☐ Design Engineering
- ☐ Plant Engineering
- ☒ Chemistry/RP
- ☐ Other: (Includes Technical Reviewer Determined Reviews)
- ☐ ALARA
- ☐ Training
- ☐ Surveillance Section
- ☐ Performance Assurance
- ☒ Business Services Procedure Group
- ☐ Nuc. Doc. Management
- ☐ None Required

NUCLEAR RECORDS MANAGEMENT SECTION
JUN 16 2000
CONTROLLED DOCUMENT

Writer Task Reviews:

Revision Summary attached? ☒ Yes

Safety Screening complete? SS/SE Tracking No: 2000-1338-0 ☒ Yes ☐ Exempt ☐ N/A

Implementation Plan developed? (Ref. Step 3.4.17) ☐ Yes ☒ N/A

Periodic Review conducted? (Data Sheet 5 Complete) ☐ Yes ☒ No

Cognizant Org Review: [signature] Date: 6/6/00

Technical Review: [signature] Date: 6/9/00

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This form is derived from the information in PMP-2010.PRC.002, Procedure Correction, Change, and Review, Rev. 5, Data Sheet 1, Review and Approval Tracking Form.

REVISION SUMMARY

Number: PMP-2081 EPP.105 Revision: 04 Change: 01

Title: Initial Core Damage Assessment

Section or Step	Change/Reason For Change
3.9	Change: Added step 3.9 to the Reference section of the procedure. Reason: The reference to the Design Information Transmittal (DIT) was added to this section to help track the reference to future revisions. The DIT directly references the approved calculation DC-D-3200S-227 Revision 5. This is a correction per PMP 2010 PRC.002 step 3.1.6.a.15.
Appendix E.4	Change: The Containment Sump Volume vs. Containment Sump Level Indication graph and the Containment Volume vs. Containment Level Indication graph are being updated to reflect calculations performed under DC-D-3200S-227 Revision 5. Reason: During the review of containment sump issues the team assigned to the review indicated the two above referenced graphs in PMP-2081 EPP.105 "Initial Core Damage Assessment" were not correct and needed updating based on changes to the flow paths for the Containment Sump Level Indicators and the Containment Level Indicators. Design changes to the plant (i.e., Containment flood-up wall penetrations just above the floor) have altered the flow path for water once it overflows the containment and recirculation sumps. This change rectifies the correlation between containment and containment sump level indication and containment volume. **The changes to the graphs will not effect the method used to determine core damage.** See Design Information Transmittal (DIT) DIT-B-01288-00 for detail information.
	Change: Reason:
	Change: Reason:

Office Information For Form Tracking Only – Not Part of Form

This is a free-form as called out in PMP-2010.PRC.002, Procedure Correction, Change, and Review, Rev. 5.

INDIANA MICHIGAN POWER

NUCLEAR RECORDS MANAGEMENT SECTION

AUG 11 1997

DONALD C. COOK NUCLEAR PLANT

PLANT MANAGER PROCEDURE COVER SHEET

CONTROLLED DOCUMENT

PROCEDURE USAGE LEVEL

☐CONTINUOUS ☑REFERENCE ☐INFORMATION

(✓check one)

Procedure No.	PMP 2081.EPP.105
Revision No.	4

TITLE INITIAL CORE DAMAGE ASSESSMENT

SCOPE OF REVISION Procedure revised to completely include current analytical methodology for core damage assessment.

SIGNATURES	REVISION NUMBER			
******				
PREPARED BY	RmClaes			
QUALITY ASSURANCE SUPERINTENDENT APPROVAL	BruceRanick			
PLANT NUCLEAR SAFETY COMMITTEE	#2734 NBD			
PLANT MANAGER APPROVAL	[signature]			
APPROVAL DATE	9/30/93			
EFFECTIVE DATE	10/13/93			

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INDIANA MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT

1.0 TITLE: INITIAL CORE DAMAGE ASSESSMENT

2.0 OBJECTIVE

2.1 The purpose of this procedure is to provide a method to classify and estimate the extent of core damage through measurement of fission products released to the coolant and containment atmosphere together with auxiliary measurements of core exit thermocouple temperature, water level within the pressure vessel, containment radiation monitors, and containment atmosphere hydrogen monitors.

2.2 Discussion

Estimations of post accident core damage can be determined through a correlation of containment atmosphere radiation monitor readings to the appropriate NRC category of core damage.

Estimations of post accident core damage can be determined through a correlation of reactor coolant core exit thermocouple temperature to NRC fuel damage categories.

Additionally, estimations of post accident core damage can be determined through a correlation of PASS total measured hydrogen generated through clad oxidation to the degree of core damage.

Finally, for estimations of post accident core damage utilizing fission product nuclide concentrations measured in samples obtained from the post accident sampling system, there are three factors to be considered which are related to the specific activities of the samples. These include the identification of the nuclides released from the core, the respective ratios of the specific activity of those nuclides, and the percent of the source inventory at the time of the accident which is observed to be present in the samples. The resulting estimate of core damage can be related to one or more of the ten NRC categories of core damage.

3.0 REFERENCES

3.1 Westinghouse Owner Group NUREG 0737, Item II.B.3 Post Accident Core Damage Assessment Revision 2, to WOG Methodology, November, 1984.

3.2 D. C. Cook Post Accident Core Damage Assessment Methodology (developed by AEPSC), August, 1984.

3.3 The Gamma Rays of the Radionuclides, Volume 7, Erdtmann and Soyka, N.Y. 1979.

3.4 PMI-5042, Revision 3, Safety Related Computer Software Control.

3.5 Memo from E. Neymotin to S. Brewer and T. Harshbarger of February 4, 1987; Procedure No. PMP 2081 EPP.105.

3.6 Memo from H. W. Jones to T. Andert dated October 18, 1990; Donald C. Cook Nuclear Plant PMP 2081 EPP.105, Attachment M and N Source Term Corrections for Extended Fuel Burnup and Increased Fuel Enrichment.

3.7 A Radioactive Decay Data Tables by D. C. Kocker, Oak Ridge National Laboratory, 1981, DOE/TIC-11026.

3.8 Core Damage Assessment, Rev. 1 REM Technology, 1993.

3.9 AEP Design Information Transmittal (DIT), DIT-B-01288-00. C1

4.0 RESPONSIBILITIES

4.1 The Plant Evaluation Team in the Technical Support Center will be responsible for initial assessment of core damage based on containment radiation monitor readings and post accident sample results. The Initial Assessment Group may assume this responsibility as a backup measure.

4.2 Records generated from this procedure are to be turned over to the emergency plan coordinator.

5.0 LIMITIATIONS/PRECAUTIONS

5.1 The results from this procedure have limited accuracy based on the assumptions made in the core damage assessment methodology. Each sample describes a static event in the system. Multiple static samples over an extended time period will give a better indication of the dynamic event. Samples that will be most indicative of actual core damage will be taken under stabilized plant conditions.

5.2 Hydrogen measurement is not a unique indicator of the amount of core clad oxidation since a mixture of hydrogen generated within the core by clad oxidation and also hydrogen from the radiolytic decomposition of

in the containment atmosphere.

5.3 Four stages of reactor core damage are categorized by the NRC.

5.3.1 No Damage

Indications of core damage in these categories are halogen spiking and tramp uranium where typically less than one percent of the total core inventory is released to the coolant. A defective fuel fraction can be estimated.

5.3.2 Clad Rupture/Gas Gap Release

An increase in reactor coolant noble gas concentration will be observed.

In the event of a LOCA, containment radiation monitor indications will be elevated.

Containment building pressure and temperature increase are an additional indication of a continuing leakage from the primary system.

5.3.3 Grain Boundary/oxidation/overheat

Temperatures in the RCS as indicated by Incore Thermocouples exceed saturation temperature as the water level in the core drops and the fuel temperature increases.

Containment area monitor indications increase noticeably from normal levels. This indicates probable fuel cladding damage (failure) in the hotter regions of the core releasing fission products from the fuel pellets.

Containment building pressure and/or temperature will be at abnormal high levels.

The coolant level in the core may continue to decrease if the water is boiling off. Fuel pellet overheating due to increasing temperatures causes additional fission products to diffuse out of the fuel pellets.

Containment Spray system will be actuated to remove 99% of the elemental radioiodines and air particulates from containment.

5.3.4 Core melt.

Further decreases in coolant level result in increasing temperatures. The temperature of the upper portion of the core increases and can reach and exceed the melting point of the zircalloy cladding (typically, zircalloy melts at > 2200°F).

Continued heating for a still longer period of time causes core uncovery, extensive core damage takes place and the upper, central portion of the core may begin melting.

The containment radiation monitors progressively increase and may saturate.

6.0 PREREQUISITES

6.1 Any plant condition in which the operator would suspect defect or failed fuel, and an estimate of the amount of defect or failed fuel is required.

6.2 Any plant condition in which an operator would suspect a loss of reactor core cooling or knows reactor core cooling will no longer be maintained.

6.3 If the CDA computer program will be used, verify functionality by entering the data on APPENDIX F. Print the CDA report and verify results with those listed.

NOTE

Perform an initial core damage assessment (to determine if a safe sampling environment exists) by evaluating the data on Attachment 1. The evaluation should be the best estimate based on the parameters, their interrelationships, and engineering judgment. The TSC PET-Chemistry establishes priorities for evaluating core damage using the following methods: Only the sections determined to be applicable need be completed and in the order directed by TSC PET-Chemistry.

Attachment 1 is an executive summary of all Core Damage estimations. Complete APPENDIX E as necessary to assemble Control Room information and determine common factors used in Core Damage estimations.

7.0 ESTIMATION OF CORE DAMAGE STATE

7.1 Initial Estimation of Core Damage Based on Containment Radiation Monitor Indications (APPENDIX A)

7.1.1 Record the time of reactor shutdown, the time after shutdown the containment high range area radiation monitor indications were obtained, the containment radiation monitor number, and containment high range area radiation monitor indications on APPENDIX A.1.

7.1.2 Divide the radiation monitor readings by the power correction factor determined in APPENDIX E.2 and record on APPENDIX A.1.

7.1.3 Compare the corrected readings with APPENDIX A.2 to estimate the corresponding extent of core damage. In general, values below region C represent 3% release of noble gases and are indicative of cladding rupture, values within region B indicate between 3% and 50% noble gas release and are in the fuel pellet overtemperature region, while values in region A indicate > 50% noble gas release and are in the core melt region.

7.1.4 Based on containment radiation monitor readings, record the estimated core damage state(s) from APPENDIX A.3 on Attachment 1.

7.1.5 Report preliminary findings to the TSC PET-Chemistry or TSC Technical Director.

7.2 Initial Estimation of Core Damage Based on Core Exit Thermocouple Indications (APPENDIX B)

CAUTION

If a large break LOCA is suspected or indicated, undetected core heat-up and flashing of cooling water during core recovery will occur. Thermocouple readings may rise sharply, then quench when core recovery commences. In this case, this section would yield low estimates of core damage.

NOTE

If a void develops in the upper internals area of the core, the core exit thermocouples may not be immersed in RCS water and can indicate lower temperatures than actually exist in the core. RVLIS is used to measure RCS water level. The top of the core is at approximately 60% on the narrow range indication. This section yields damage estimates in NRC categories 5 through 10 and is most appropriate for core uncovery with a maximum temperature above the rapid oxidation temperature of 1800 ^{0} F. A smooth core exit thermocouple trend recording and an uncovery duration 20 minutes or longer are indicators for a good prediction of clad oxidation.

7.2.1 Record the maximum core exit thermocouple temperature data on APPENDIX B, Characteristics of Categories of Fuel Damage, and compare these values to determine the estimated core damage state.

7.2.2 Based on APPENDIX B, record the estimated core damage state(s) on Attachment 1.

7.2.3 Report preliminary findings to the TSC PET-Chemistry or TSC Technical Director.

NOTE

The Core Damage Assessment computer program may be used to complete sections 7.3 and/or 7.4.

7.3 Comprehensive Estimation of Core Damage Based on Hydrogen Production (Appendix C)

7.3.1 Determine from the reactor vessel level instrumentation or other sources if at any time the core became uncovered. Clad rupture (gas gap release) could have occurred without any core uncovery. Momentary core uncovery may indicate only clad rupture, while extended core uncovery may very well indicate clad oxidation followed by some degree of core melt.

7.3.2 Record containment hydrogen concentration as % H_2 when the Post Accident Containment Hydrogen Monitor (PACHMS) is activated on APPENDIX C.1. If ignitors have been used, the results obtained may be inaccurate. In this event, an estimate of the H_2 removal should be made.

CAUTION

Primary systems water inventories need to be accounted for at the time of sampling. Coordinate the reported time of sampling with the primary system water inventory data available for the same point in time.

7.3.3 Obtain a liquid sample of RCS and analyze for hydrogen concentration. Record as cc/Kg H_2 on APPENDIX C.1

7.3.4 Determine the total hydrogen inventory (RCS and containment atmosphere) in units of cubic feet at standard temperature and pressure.

7.3.5 Estimate the hydrogen production in containment due to the oxidation of aluminum and zinc using the worksheet in APPENDIX C.3. A plot of production rate vs. general containment temperature is provided as Appendix C.4. The maximum hydrogen yield due to the oxidation of aluminum

and zinc at D.C. Cook is 9.81E3 SCF in Unit 1 and 9.64E3 SCF in Unit 2. Record this value on Appendix C.1

7.3.6 Estimate the hydrogen volume generated by the radiolysis of water. The rate of hydrogen production by radiolysis of water is dependent on power history. Determine the hydrogen production rate for the time period, Δt (from APPENDIX E), from the graph in Appendix C.5 or C.6 and multiply by the adjusted thermal power obtained in APPENDIX E. Record this value on Appendix C.1.

7.3.7 On Appendix C.1, determine the volume of hydrogen produced by core clad oxidation by subtracting the values for aluminum and zinc reaction and radiolysis from the total hydrogen volume to obtain the net core clad oxidation hydrogen volume.

7.3.8 Divide the net core clad oxidation hydrogen volume determined by the total theoretical hydrogen volume from core clad oxidation to determine extent of the zirconium-water reaction. Record the estimated core damage state(s) on Attachment 1. If ignitors have been activated or a burn has been indicated, quantitative use of the hydrogen concentration is limited. It can be assumed that for ignition of hydrogen to occur a minimal concentration of 4 percent hydrogen is needed. This assumption can be used qualitatively to indicate that some percentage of zirconium has reacted, but it is difficult to determine extent of the reaction.

7.4 Comprehensive Estimation of Core Damage Based on Radionuclide Analysis (Appendix D)

CAUTION

Primary systems water inventories need to be accounted for at the time of sampling. Coordinate the reported time of sampling with the primary system water inventory data available for the same point in time.

7.4.1 Request samples (decay corrected to the time of sampling only) of reactor coolant, containment atmosphere, and/or containment sump as indicated in the table of suggested sampling locations. Initial core damage assessments should be relayed to any post accident sample teams at the time of sample request.

Scenario	Primary Sampling Location	Alternate Sampling Location
LOCA Small Break		
power < 1%	RCS H/L, CTMT AT	Pressurizer
power > 1%	RCS H/L	Pressurizer
LOCA Large Break		
power < 1%	CTMT Sump, CTMT AT, RCS H/L	
power > 1%	CTMT Sump, CTMT AT	
Steam Line Break	RCS H/L	Pressurizer, CTMT AT
SG Tube Rupture	RCS H/L, Secondary Sys.	CTMT AT
CTMT Sump Increase	CTMT Sump, CTMT AT	
CTMT RMS Alarm	CTMT AT, CTMT Sump	
Safety Injection Actuation	RCS H/L	Pressurizer
High RCS Activity	RCS H/L	Pressurizer

7.4.2 Analyze the selected samples for nuclide specific activity with decay correction to the time of sampling applied to sample activities.

NOTE

Use the verified CDA computer program
OR
Complete APPENDIX D for RCS (D.1), Containment Sump (D.2), and/or Containment Atmosphere (D.3) as applicable through step 7.4.10. If the CDA computer program is unavailable and time is of the essence, perform a rapid calculation of core damage using Xe-133, I-131, Te-132, Ba-140, and La-142. Fully complete the core damage estimation when time permits.

7.4.3 Record the measured nuclide activities in Curies/gm or Curies/cc as applicable with no decay correction from the Post Accident Sample System (PASS) analysis.

7.4.4 Determine and record the Decay Correction Factor using APPENDIX D.4, Decay Correction Factor with Parent-Daughter Effect.

7.4.5 Determine and record the corrected specific activity by multiplying the reported nuclide activity by the decay correction factor.

7.4.6 Record the total sample dilutions made on the Post Accident RCS sample. This includes dilutions by the sampling system and in the sample preparation. Containment Atmosphere PASS sample dilution factors will be found in 12 THP 6020.PAS.007.

7.4.7 Multiply the corrected activity by the dilution factor and record the corrected specific activities of nuclides in Ci/gm or Ci/cc as applicable.

7.4.8 Record the total liquid mass from completed APPENDIX E, section 3.0 on RCS (D.1) and containment sump (D.2). If the accident did not involve a LOCA, estimate only the RCS liquid mass. If the accident did involve a LOCA, and a RCS sample and a containment sump sample were obtained, an estimate of both the RCS water mass and containment sump water mass are needed. If only one of the liquid samples (RCS or containment sump) was obtained, use the total estimated liquid mass as the water mass associated with the obtained sample. Record the appropriate liquid mass.

7.4.9 Record the total estimated Containment Volume from completed APPENDIX E, section 4.0 on APPENDIX D.3.

7.4.10 Calculate Total Post Accident (TPA) activity of each nuclide released by multiplying the decay corrected specific activity by the estimated mass for liquid samples or the estimated volume for Containment Atmosphere samples. Copy to APPENDIX D.5 (Unit 1) or D.6 (Unit 2) in the appropriate column.

7.4.11 Using the data recorded on APPENDIX D.5 or D.6, sum the activities of each nuclide of each sample to determine TPA total activity released for each nuclide.

NOTE

The Total Core Inventory (TCI) must be corrected for Power History.

7.4.12 From APPENDIX E, section 2.0 record the power correction factor as a decimal. The number 4 or 30 in the column indicates the power history period to use for that nuclide.

7.4.13 Determine and record on APPENDIX D.5 or D.6 the adjusted core inventory for each nuclide by multiplying the equilibrium full power total core inventory (TCI,) by the power correction factor.

7.4.14 Determine and record on APPENDIX D.5 or D.6 the release fraction of each nuclide by dividing the Total Post Accident activity in column A by the Corrected Total Core Inventory in column B.

7.4.15 Transpose the release fractions to the appropriate column in APPENDIX D.7.

NOTE

If the resulting percentage is greater than 100%, recalculate with the next higher RF_e value for that nuclide. If the resulting percentage is again greater than 100%, recalculate with the final RF_e value for that nuclide. The Characteristic Nuclide column lists those nuclides which may be identified in the lowest classification. these nuclides also increase in concentration in the next higher classifications.

7.4.16 Divide the nuclide release fraction in APPENDIX D.7 by the core release fraction (RF_e) listed for each classification of core damage and multiply by 100 to determine the percentage of release from the core of each nuclide.

7.4.17 Transpose the nuclide release percentages between 0.1 and 100 % in each classification of core damage to the appropriate columns in Attachment 1.

NOTE

Knowledgeable judgement is used to relate the activity ratios determined to the definitions of 10 NRC categories of core damage found in Attachment 1 and Appendices A through D. Core damage is not expected to occur uniformly. Therefore, when evaluating all the parameters, it will be possible to identify one or more of the 10 NRC categories existing simultaneously.

7.4.18 Evaluate the nuclide release percentages on Attachment 1 against the NRC Categories listed on page 2 of Attachment 1, Characteristics of Categories for Fuel Damage. The Characteristic Nuclide column is arranged such that the most characteristic nuclide in each classification is listed first.

7.4.19 Select the NRC Category that corresponds to between 0.1% to 100% for each nuclide. In case of overlapping categories, engineering judgement would select the higher category.

7.5 Perform the final core damage assessment by evaluating the data on Attachment 1. It is unlikely that complete agreement between the indicators will result in exactly the same estimate of core damage. The evaluation should be the best estimate based on all parameters, their interrelationship, and engineering judgment. The evaluator should use as many indicators as possible to differentiate between the various core damage states. Because of overlapping values of release and potential simultaneous conditions of clad rupture, clad oxidation, and/or core melt, considerable judgment needs to be applied.

7.6 Deliver completed Attachment 1 to the TSC PET-Chemistry or TSC Technical Director for appropriate disposition.

ATTACHMENT 1
Estimation of Core Damage

UNIT ___	Estimated State(s) of Core Damage				Reactor Shut Down Date/Time ___/___	
Measurement	No Damage	Clad Rupture	Clad Oxidation	Core Melt	Cat	Cat
Containment Rad Monitor						
Core Exit Thermocouple						
Hydrogen Production						
Radionuclide Analysis						
Kr 85						
Kr 87						
Kr 88						
Xe 131M						
Xe 133						
Xe 133M						
Xe 135						
I 131						
I 132						
I 133						
I 135						
Cs 138						
Te 129						
Te 132						
Ba 140						
La 140						
La 142						
Pr 144						

ATTACHMENT 1
Estimation of Core Damage

Characteristics of Categories for Fuel Damage						
	Characteristic Nuclides	% TCI Released	Source of Release	Hydrogen % Core	NRC Description	NRC Cat
No Damage	I 131 Cs 138	< 1	Gas Gap	Normal	No Damage	1
Rupture	Xe 131m, 133 Xe 133m, 135 Kr 85, 87, 88 Te 129, 132 I 131, 133	< 10	Gas Gap	Normal	Initial Cladding Failure	2
		10 to 50	Gas Gap	Normal	Intermediate Cladding Failure	3
		> 50	Gas Gap	Normal	Major Cladding Failure	4
Oxidation	Ba 140 La 140 Cs 138 Te 129 Te 132	< 10	Fuel Pellet	< 10	Initial Fuel Pellet Overheating	5
		10 to 50	Fuel Pellet	10 - 50	Intermediate Fuel Pellet Overheating	6
		> 50	Fuel Pellet	> 50	Major Fuel Pellet Overheating	7
Core Melt	La 142 Pr 144 Ba 140 La 140	< 10	Fuel Pellet	< 10	Initial Fuel Pellet Melt	8
		10 to 50	Fuel Pellet	10 - 50	Intermediate Fuel Pellet Melt	9
		> 50	Fuel Pellet	> 50	Major Fuel Pellet Melt	10

APPENDIX A.1
Estimation of Core Damage
Based on Containment Radiation Monitor Indications

Time of reactor shut down _____
Time of monitor measurement _____
Time Post Accident, Δt _____hours

Containment radiation monitor number _____

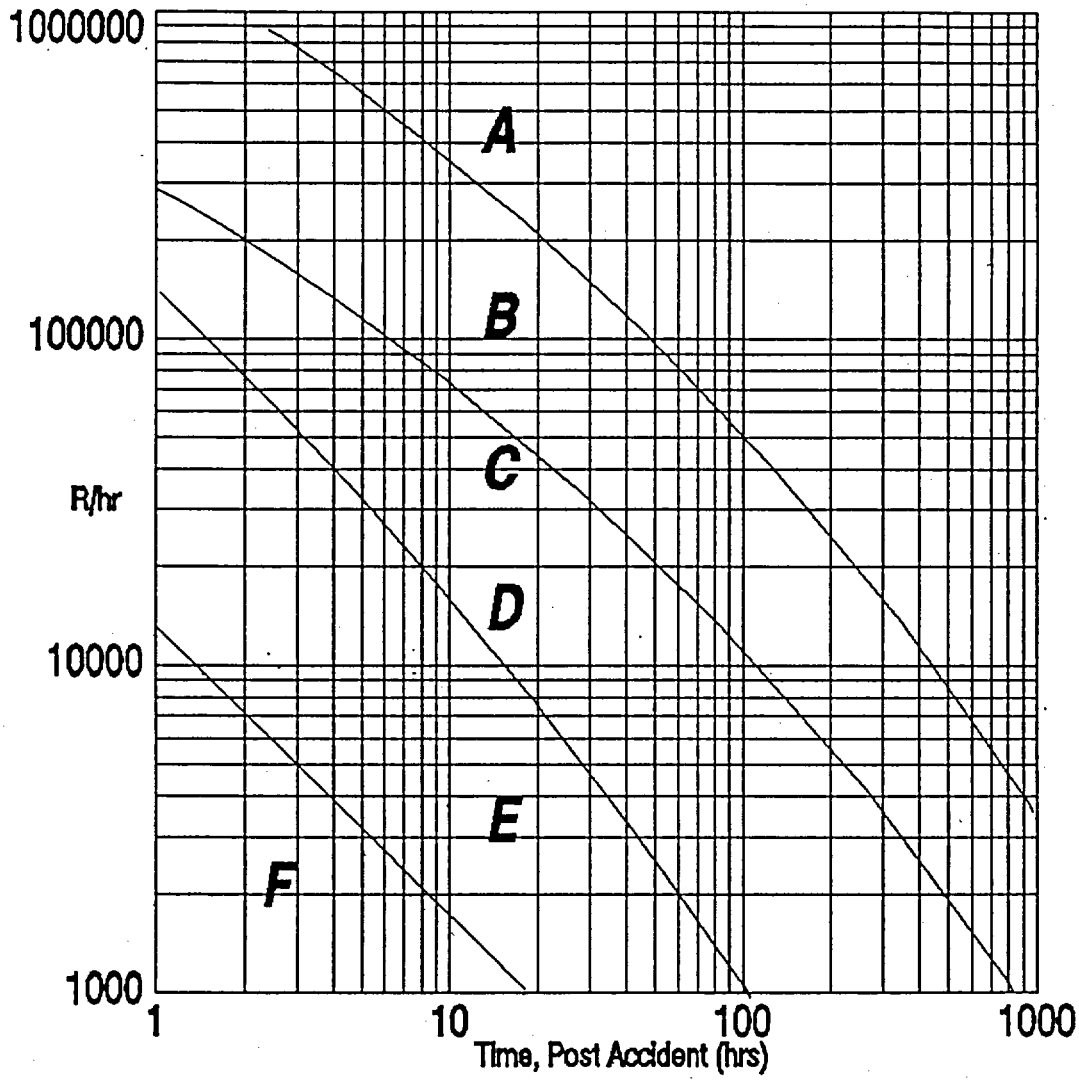
Containment radiation monitor indication A_____R/hr
Power correction factor from APPENDIX E B_____%
Corrected containment radiation monitor indication [A ÷ (B/100)] _____R/hr

Evaluate the corrected containment radiation monitor indication against APPENDIX A.2 OR A.3. Record estimation of core damage here and on Attachment 1.

Estimation of Core Damage State:_____

APPENDIX A.2
Estimation of Core Damage
Based on Containment Radiation Monitor Indications

Typical Analysis for Post Accident Dose Rate Inside a Cylindrical Containment



A	Major Fuel Overheat	D	Major Cladding Failure
B	Intermediate Fuel Overheat	E	Intermediate Cladding Failure
C	Initial Fuel Overheat	F	Initial Cladding Failure

APPENDIX A.3
Estimation of Core Damage
Based on Containment Radiation Monitor Indications

Characteristics of Categories for Fuel Damage					
	Containment Radiation Monitor R/hr	Percent Damage	Source of Release	NRC Description	NRC Cat #
No Damage	Normal	< 1	Gas Gap	No Damage	1
Rupture	Normal to 660	< 10	Gas Gap	Initial Cladding Failure	2
	660 to 990	10 to 50	Gas Gap	Intermediate Cladding Failure	3
	990 to 1325	> 50	Gas Gap	Major Cladding Failure	4
Oxidation	1325 to 8.6E4	< 10	Fuel Pellet	Initial Fuel Pellet Overheating	5
	8.6E4 to 1.7E5	10 to 50	Fuel Pellet	Intermediate Fuel Pellet Overheating	6
	1.7E5 to 3.4E5	> 50	Fuel Pellet	Major Fuel Pellet Overheating	7
Core Melt	3.4E5 to 4.6E5	< 10	Fuel Pellet	Initial Fuel Pellet Melt	8
	4.6E5 to 5.8E5	10 to 50	Fuel Pellet	Intermediate Fuel Pellet Melt	9
	> 5.8E5	> 50	Fuel Pellet	Major Fuel Pellet Melt	10

Record estimation on Attachment 1

APPENDIX B
Estimation of Core Damage
Based on Core Exit Thermocouple Indications

Maximum Observed Core Exit Thermocouple indication _____ F^0

_____
Date / Time

Characteristics of Categories for Fuel Damage						
	Maximum Core Exit Thermocouple Temperature F^0	Reference Radiation Monitor R/hr	Percent Damage	Source of Release	NRC Description	NRC Cat #
No Damage	Normal	Normal	< 1	Gas Gap	No Damage	1
Rupture	Normal to 750	Normal to 660	< 10	Gas Gap	Initial Cladding Failure	2
	750 to 1300	660 to 990	10 to 50	Gas Gap	Intermediate Cladding Failure	3
	1300 to 1650	990 to 1325	> 50	Gas Gap	Major Cladding Failure	4
Oxidation	> 1650	1325 to 8.6E4	< 10	Fuel Pellet	Initial Fuel Pellet Overheating	5
	> 1650	8.6E4 to 1.7E5	10 to 50	Fuel Pellet	Intermediate Fuel Pellet Overheating	6
	> 1650	1.7E5 to 3.4E5	> 50	Fuel Pellet	Major Fuel Pellet Overheating	7
Core Melt	> 1650	3.4E5 to 4.6E5	< 10	Fuel Pellet	Initial Fuel Pellet Melt	8
	> 1650	4.6E5 to 5.8E5	10 to 50	Fuel Pellet	Intermediate Fuel Pellet Melt	9
	> 1650	> 5.8E5	> 50	Fuel Pellet	Major Fuel Pellet Melt	10

Record estimation on Attachment 1

APPENDIX C.1
Estimation of Core Damage
Based on Hydrogen Production

1.0 History or indication of Core Uncovery yes___ no___
Comments:_____

Containment Hydrogen Inventory

2.0 PACHMS Hydrogen Concentration _____%

Containment H_2 in SCF $= \frac{[H_2]\%}{100} \times 1.24E06 \text{ SCF} \times \frac{(P_{containment} + 14.7)}{14.7} \times \frac{492}{(T_{containment} + 460)} =$_____

3.0 RCS Hydrogen Concentration _____cc/Kg

RCS H_2 in SCF $= \frac{[H_2 \times V_{RCS} \times 0.03531}{1000} =$_____

(V_{RCS} from APPENDIX E or default to 3.34E5 Kg)

4.0 Total Hydrogen Concentration (2.0 + 3.0) A_____

5.0 Estimate of hydrogen volume generated by the oxidation of aluminum and zinc in containment using APPENDIX C.3 and C.4 (maximum: 9.81E3 SCF-Unit 1; 9.64E3 SCF-Unit 2). B_____

6.0 Estimate of the hydrogen volume generated by the radiolysis of water in Containment

Record Δt from APPENDIX E _____
Record corrected MWt from APPENDIX E _____
Using APPENDIX C.5 or C.6, determine the H_2 production rate at Δt and multiply by the corrected MWt C_____

7.0 Estimate of the hydrogen volume generated in Containment by the oxidation of core cladding (A minus B and C) D_____

8.0 Percent oxidation of core cladding, (D / 4.10E05 SCF) X 100 _____%

9.0 Determine the Estimated Core Damage Category based on the percent oxidation of core cladding from APPENDIX C.2. Record on Attachment 1.

APPENDIX C.2
Estimation of Core Damage
Based on Hydrogen Production

Characteristics of Categories for Fuel Damage						
Classification	Characteristic Measurement	% H_2 Released	Percent Oxidation of Core	Source of Release	NRC Description	NRC Cat #
No Damage	Core Exit Thermocouple Containment Radiation Monitor	< 1	< 1	Gas Gap	No Damage	1
Rupture				Gas Gap	Initial Cladding Failure	2
				Gas Gap	Intermediate Cladding Failure	3
				Gas Gap	Major Cladding Failure	4
Oxidation	Hydrogen Produced due to Core Oxidation	< 10	< 10	Fuel Pellet	Initial Fuel Pellet Overheating	5
		10 to 50	10 to 50	Fuel Pellet	Intermediate Fuel Pellet Overheating	6
		> 50	> 50	Fuel Pellet	Major Fuel Pellet Overheating	7
Core Melt	Hydrogen Produced due to Core Oxidation	< 10	< 10	Fuel Pellet	Initial Fuel Pellet Melt	8
		10 to 50	10 to 50	Fuel Pellet	Intermediate Fuel Pellet Melt	9
		> 50	> 50	Fuel Pellet	Major Fuel Pellet Melt	10

Record estimation on Attachment 1

APPENDIX C.3
Estimation of Core Damage
Based on Hydrogen Production

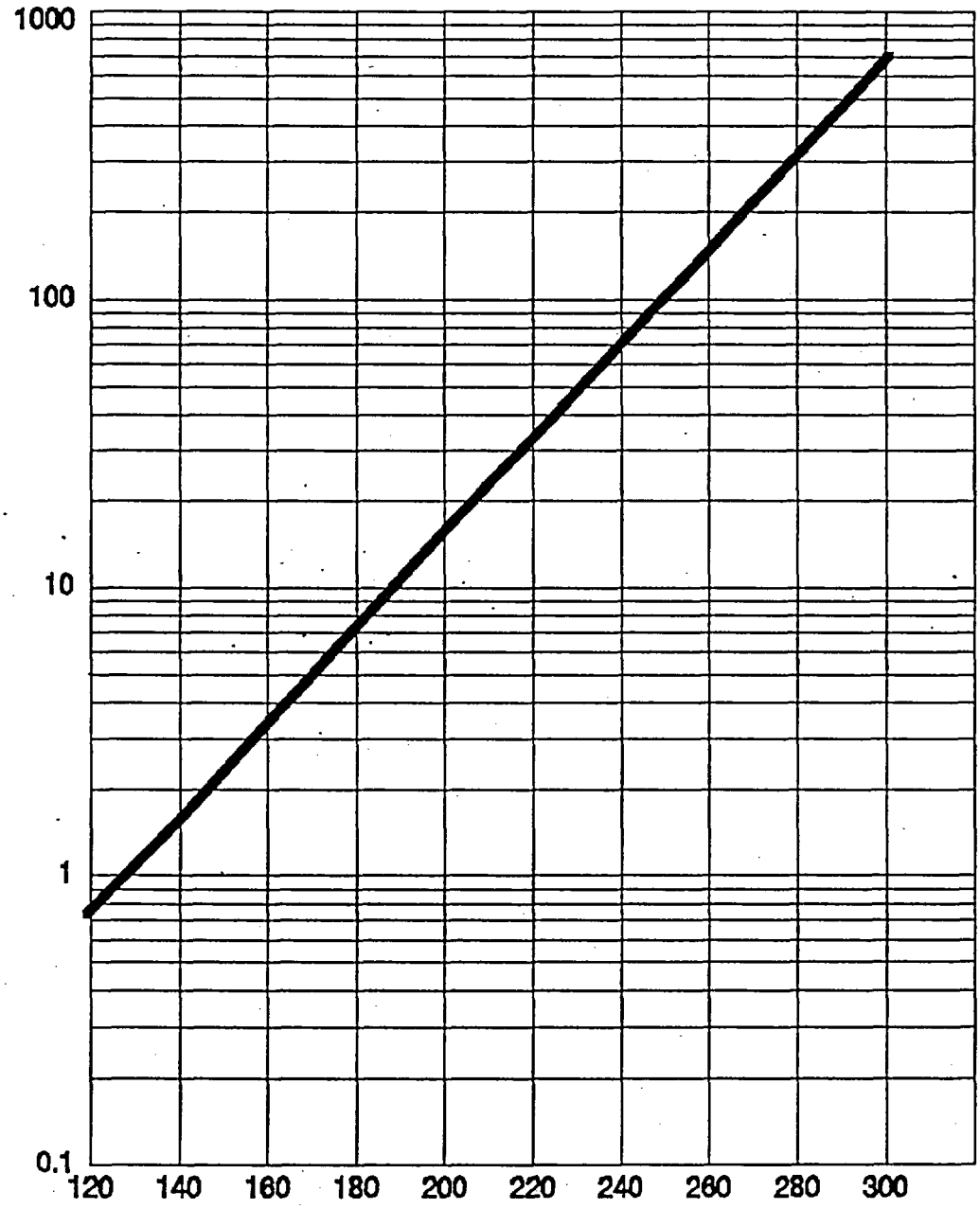
Hydrogen Volume Generated by the Oxidation of Aluminum and Zinc in Containment

Time of Interval	Interval Duration (hrs) A	Average CTMT Temperature (F^0)	H_2 Production Rate (SCF/hr) B	H_2 Produced (SCF) A x B
Start Accident				
Sample Time				
Total Hydrogen Produced by Oxidation of Aluminum and Zinc				

APPENDIX C.4
Estimation of Core Damage
Based on Hydrogen Production

Hydrogen Production Rate from Oxidation of Aluminum and Zinc

SCF/hr UNIT 1 and UNIT 2



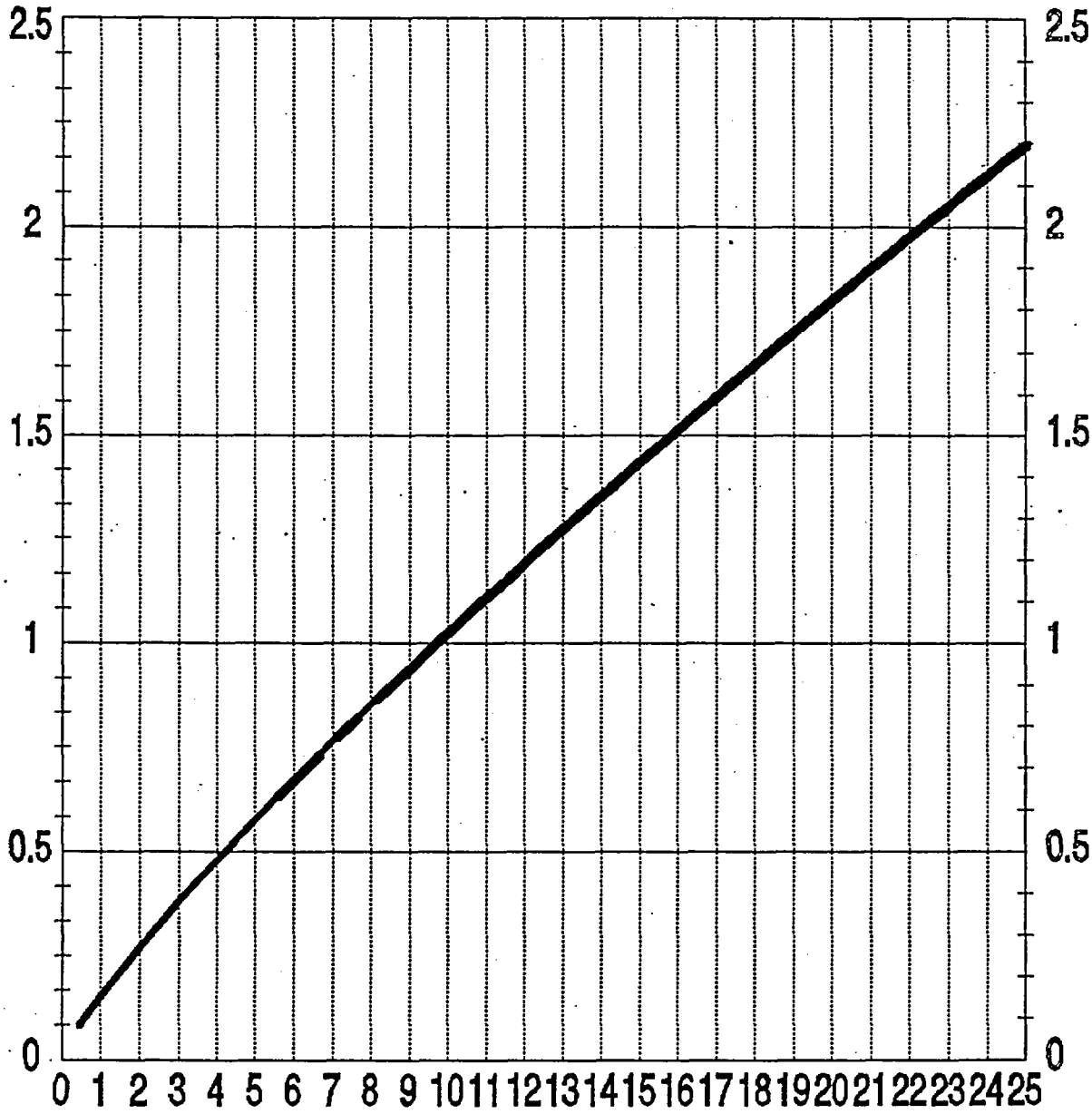
(For this intent, Unit's 1 and 2 have similar amounts of aluminum and zinc which produce graphs that are relatively identical)

APPENDIX C.5
Estimation of Core Damage
Based on Hydrogen Production

Hydrogen Volume Generated by the Radiolysis of Water

Time versus Generation from 0 to 25 hours

SCF/MWt

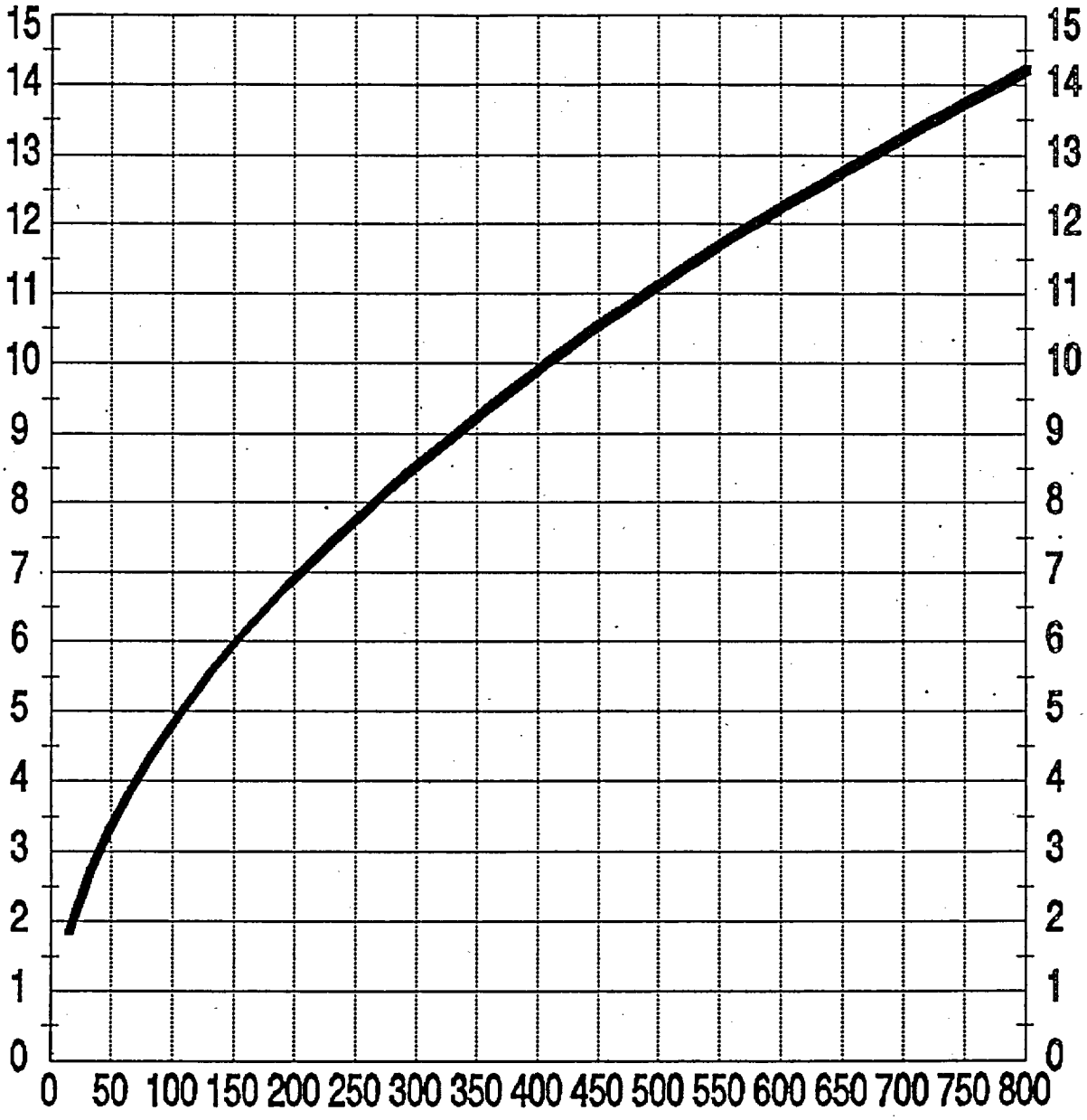


APPENDIX C.6
Estimation of Core Damage
Based on Hydrogen Production

Hydrogen Volume Generated by the Radiolysis of Water

Time versus Generation from 0 to 800 hours

SCF/MWt



APPENDIX D.1
Estimation of Core Damage
Based on Radiochemical Analysis

RCS Activity Worksheet

Nuclide	RCS Measured Activity	Decay Correction	Specific Activity	Dilution Factor	Corrected Specific Activity	RCS Mass	TPA RCS Activity
	Curies/gm	APP. D.4	Ci/gm		Ci/gm	gm	Curies
Kr 85							
Kr 87							
Kr 88							
Xe 131m							
Xe 133							
Xe 133m							
Xe 135							
I 131							
I 132							
I 133							
I 135							
Cs 138							
Te 129							
Te 132							
Ba 140							
La 140							
La 142							
Pr 144							

APPENDIX D.2
Estimation of Core Damage
Based on Radiochemical Analysis

Containment Sump Activity Worksheet

Nuclide	Sump Measured Activity	Decay Correction	Specific Activity	Dilution Factor	Corrected Specific Activity	Sump Mass	TPA Sump Activity
	Curies/gm	APP. D.4	Ci/gm		Ci/gm	gm	Curies
Kr 85							
Kr 87							
Kr 88							
Xe 131m							
Xe 133							
Xe 133m							
Xe 135							
I 131							
I 132							
I 133							
I 135							
Cs 138							
Te 129							
Te 132							
Ba 140							
La 140							
La 142							
Pr 144							

APPENDIX D.3
Estimation of Core Damage
Based on Radiochemical Analysis

Containment Atmosphere Activity Worksheet

Nuclide	CTMT Measured Activity	Decay Correction	Specific Activity	Dilution Factor	Corrected Specific Activity	CTMT Volume	TPA CTMT Activity
	Curies/cc	APP. D.4	Ci/cc		Ci/cc	cc	Curies
Kr 85							
Kr 87							
Kr 88							
Xe 131m							
Xe 133							
Xe 133m							
Xe 135							
I 131							
I 132							
I 133							
I 135							
Cs 138							
Te 129							
Te 132							
Ba 140							
La 140							
La 142							
Pr 144							

APPENDIX D.4
Estimation of Core Damage
Based on Radiochemical Analysis

Decay Correction Factors with Parent-Daughter Effect (USE Δt from APPENDIX E)

Nuclide	Decay Correction Factor
Kr 85	$e^{+1.55E-01\ \Delta t}$
Kr 87	$e^{+5.46E-01\ \Delta t}$
Kr 88	$e^{+2.44E-01\ \Delta t}$
Xe 131m	$1/\left[-195.4\ e^{-3.59E-03\ \Delta t} + 196.4\ e^{-2.44E-03\ \Delta t}\right]$
Xe 133	$1/\left[-0.189\ e^{-3.33E-02\ \Delta t} - 3.42E-02\ e^{-1.32E-02\ \Delta t} + 1.22\ e^{-5.51E-03\ \Delta t}\right]$
Xe 133m	$1/\left[-22.8\ e^{-3.33E-02\ \Delta t} + 23.8\ e^{-1.32E-02\ \Delta t}\right]$
Xe 135	$1/\left[-2.65\ e^{-0.105\ \Delta t} + 1.91E-04\ e^{-2.71\ \Delta t} + 3.65\ e^{-7.61E-02\ \Delta t}\right]$
I 131	$1/\left[2.18E-02\ e^{-1.81\ \Delta t} - 1.27E-02\ e^{-2.31E-02\ \Delta t} - 4.41\ E-02\ e^{-1.66\ \Delta t} + 1.017e^{-3.59E-03\ \Delta t}\right]$
I 132	$1/\left[1.03\ e^{-8.86E-03\ \Delta t} - 3.00E-02\ e^{-0.301\ \Delta t}\right]$
I 133	$1/\left[4.37E-04\ e^{-16.84\ \Delta t} - 1.35E-02\ e^{-0.751\ \Delta t} + 4.31E-03\ e^{-3.34\ \Delta t} + 1.018\ e^{-3.33E-02\ \Delta t}\right]$
I 135	$e^{+0.105\ \Delta t}$
Cs 138	$1/\left[1.78\ e^{-1.29\ \Delta t} - 0.78\ e^{-2.94\ \Delta t}\right]$
Te 129	$1/\left[1.21\ e^{-0.158\ \Delta t} + 0.11\ e^{-8.6E-04\ \Delta t} - 0.32\ e^{-0.598\ \Delta t}\right]$
Te 132	$e^{+8.86E-03\ \Delta t}$
Ba 140	$e^{+2.26E-03\ \Delta t}$
La 140	$1/\left[1.15\ e^{-2.26E-03\ \Delta t} - 0.15\ e^{-1.72E-02\ \Delta t}\right]$
La 142	$1/\left[1.126\ e^{-0.436\ \Delta t} - 0.126\ e^{-3.89\ \Delta t}\right]$
Pr 144	$e^{+1.016E-04\ \Delta t}$

UNIT 1

APPENDIX D.5
Estimation of Core Damage Based on Radiochemical Analysis

Total Release Activity/Percent Released Worksheet

Nuclide	RCS Activity	CTMT Sump Activity	CTMT Atmosphere Activity	TPA Total Activity (A)	Total Core Inventory TCI	Power Correction Factor	Corrected TCI (B)	Nuclide Release Fraction (A/B)
	Curies	Curies	Curies	Curies	Curies	APP. E	Curies	
Kr 85					4.05E7	4		
Kr 87					8.84E7	4		
Kr 88					1.24E8	4		
Xe131m					1.09E6	30		
Xe 133					2.32E8	30		
Xe133m					4.46E6	30		
Xe 135					2.27E8	4		
I 131					1.00E8	30		
I 132					1.49E8	4		
I 133					2.32E8	30		
I 135					2.27E8	4		
Cs 138					2.32E8	4		
Te 129					2.44E7	4		
Te 132					1.49E8	30		
Ba 140					2.15E8	30		
La 140					2.15E8	30		
La 142					2.02E8	4		
Pr 144					1.91E8	4		

UNIT 2

APPENDIX D.6
Estimation of Core Damage Based on Radiochemical Analysis

Total Release Activity/Percent Released Worksheet

Nuclide	RCS Activity	CTMT Sump Activity	CTMT Atmosphere Activity	TPA Total Activity (A)	Total Core Inventory TCI	Power Correction Factor	Corrected TCI (B)	Nuclide Release Fraction (A/B)
	Curies	Curies	Curies	Curies	Curies	APP. E	Curies	
Kr 85					2.1E7	4		
Kr 87					3.8E7	4		
Kr 88					5.4E7	4		
Xe131m					6.0E5	30		
Xe 133					2.7E7	30		
Xe133m					3.5E7	30		
Xe 135					1.9E8	4		
I 131					9.3E7	30		
I 132					1.3E8	4		
I 133					1.9E8	30		
I 135					1.7E8	4		
Cs 138					5.5E7	4		
Te 129					3.1E7	4		
Te 132					1.3E8	30		
Ba 140					1.6E8	30		
La 140					1.7E8	30		
La 142					1.4E8	4		
Pr 144					1.1E8	4		

APPENDIX D.7
Estimation of Core Damage
Based on Radiochemical Analysis

Percent of Nuclide Released/Release Fraction (RF_e)

Nuclide	Release Fractions	Gas Gap Release	Corrected Release	Clad Oxidation	Corrected Release	Core Melt	Corrected Release	NRC Cat
	D.5 or D.6	(RF_e)	0.1 - 100 %	(RF_e)	0.1-100%	(RF_e)	0.1-100%	
Kr 85		0.03		0.5		1.0		
Kr 87		0.03		0.5		1.0		
Kr 88		0.03		0.5		1.0		
Xe131m		0.03		0.5		1.0		
Xe 133		0.03		0.5		1.0		
Xe133m		0.03		0.5		1.0		
Xe 135		0.03		0.5		1.0		
I 131		0.02		0.5		1.0		
I 132		0.02		0.5		1.0		
I 133		0.02		0.5		1.0		
I 135		0.02		0.5		1.0		
Cs 138		0.05		0.5		1.0		
Te 129		1E-4		0.1		0.3		
Te 132		1E-4		0.1		0.3		
Ba 140				0.01		0.2		
La 140						1E-4		
La 142						1E-4		
Pr 144								

APPENDIX D.8
Estimation of Core Damage
Based on Radiochemical Analysis

Core Release Fractions (RF_e) Assumptions

Core Condition	Fuel Cladding Temperature	Fission product	Release Fraction
Core Intact (Normal Leakage)	$\leq$ 600° F	Normal Coolant Concentrations	
Gap Release (Cladding Failure)	1300° F - 2100° F	Xe, Kr I Cs Te, Sb	0.03 0.02 0.05 1E-4
Grain Boundary (Clad Oxidation)	3000° F	Xe, Kr I, Cs Te Sb Ba Mo Sr Ru	0.5 0.5 0.1 0.02 0.01 0.01 1E-3 1E-4
Core Melt	> 4500° F	Xe, Kr Cs I Sb Te Ba Sr Mo Ru La Y Ce Np	1.0 1.0 1.0 0.02 0.3 0.2 0.07 0.1 1E-3 1E-4 1E-4 1E-4 1E-4

APPENDIX E.1
Critical Data

UNIT ____ Reactor Shut Down Date/Time _____/_____

Control Room Information

Measurement Parameters

	CTMT RMS	CET $^0F_{max}$	PACHMS	CTMT ^0F
Date/Time of Measurement				
Measurement Indication				

System Volume Parameters

	RCS	Sump	C.A.	S/G	Other$_{(a)}$	Other$_{(b)}$
Date/Time of Measurement						
Level Indication (%)						
System Volume						

PASS Samples

	RCS	Sump	C.A.	S/G	Other$_{(a)}$	Other$_{(b)}$
Sample Date/Time						
Temperature						
Analysis Date/Time						

Reactor Power History: Section 2.0

APPENDIX E.2
Determination of Essential Time Periods, Power Correction Factor, Estimated Liquid Mass, and Estimated Containment Volume

1.0 DETERMINATION OF ESSENTIAL TIME PERIODS

RCS Liquid Sample

Record time of Reactor shut down (t_{so}).	Date_____ Time_____
Record time of RCS liquid sample (t_s).	Date_____ Time_____
Determine the decay time interval (Δt), (t_{so}) minus (t_s)	Interval Time(Δt)_____ (Min)

Containment Liquid Sample

Record time of Reactor shut down (t_{so}).	Date_____ Time_____
Record time of RCS liquid sample (t_s).	Date_____ Time_____
Determine the decay time interval (Δt), (t_{so}) minus (t_s)	Interval Time(Δt)_____ (Min)

Containment Atmosphere Sample

Record time of Reactor shut down (t_{so}).	Date_____ Time_____
Record time of Containment Atmosphere sample (t_s).	Date_____ Time_____
Determine the time interval (Δt), (t_{so}) minus (t_s)	Interval Time(Δt)_____ (Min)

2.0 Power Correct Factor Calculations

2.1 Determination of Average Reactor Power

If reactor power has not changed by more than $\pm$ 10 % for a period greater than thirty days, the power at the time of the shut down can be used.

If the power has changed by more than $\pm$ 10 % during the 4 or 30 days prior to the accident, an estimate must be made to establish the most representative power level. The thirty day average power level is not necessarily the most representative indication. Weighted average power history is determined by summing the products of power level durations multiplied by the power levels and dividing by the total duration length. Perform this estimation for the prior four day period and thirty day period. (The number 4 or 30 in the Power Correction Factor column of APPENDIX D.5 or D.6 indictes which period to use)

APPENDIX E.3
Determination of Essential Time Periods, Power Correction Factor, Estimated Liquid Mass, and Estimated Containment Volume

$$\frac{\Sigma\ (\text{days at power}_1 \times \%\text{power}_1) + (\text{days at power}_2 \times \%\text{power}_2) + \ldots}{\text{Total days considered in this history}}$$

	Percent Power	Duration, Days
Prior four days	_____	_____
	_____	_____
	_____	_____
Prior 30 days	_____	_____
	_____	_____
	_____	_____
	_____	_____

Four Day Estimated Reactor Power at time of shut down (t_{so}). _____
Thirty Day Estimated Reactor Power at time of shut down (t_{so}). _____

2.2 Determination of Gross Thermal Power (Hydrogen Production)

Determine the adjusted gross megawatt thermal (MWt) at t_{so} by multiplying the estimated fraction of full power determined above by 3250 MWt (U-1) or 3411 MWt (U-2).

_____

3.0 Determination of Liquid Mass

3.1 Reactor Coolant System

Date/Time ____/____
RCS level % _____

Determine RCS volume from available level indications (%) and multiply by a default value of 88,114 gallons (3.34E08 ml) for the system volume. Record on page 1 of APPENDIX E.

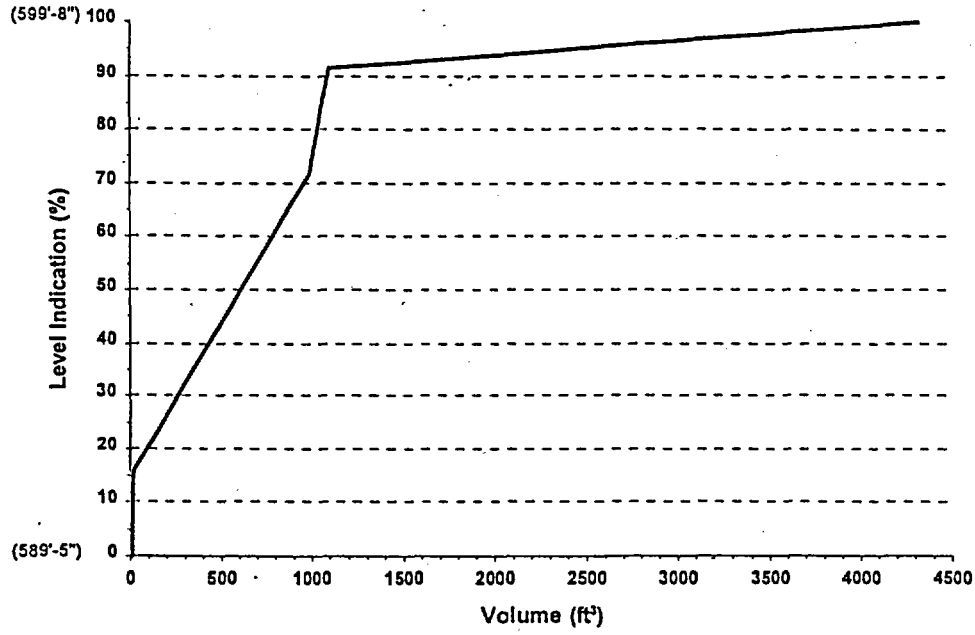
3.2 Containment Liquid Mass

Date/Time ____/____
Containment Sump Level _____
Containment Level _____

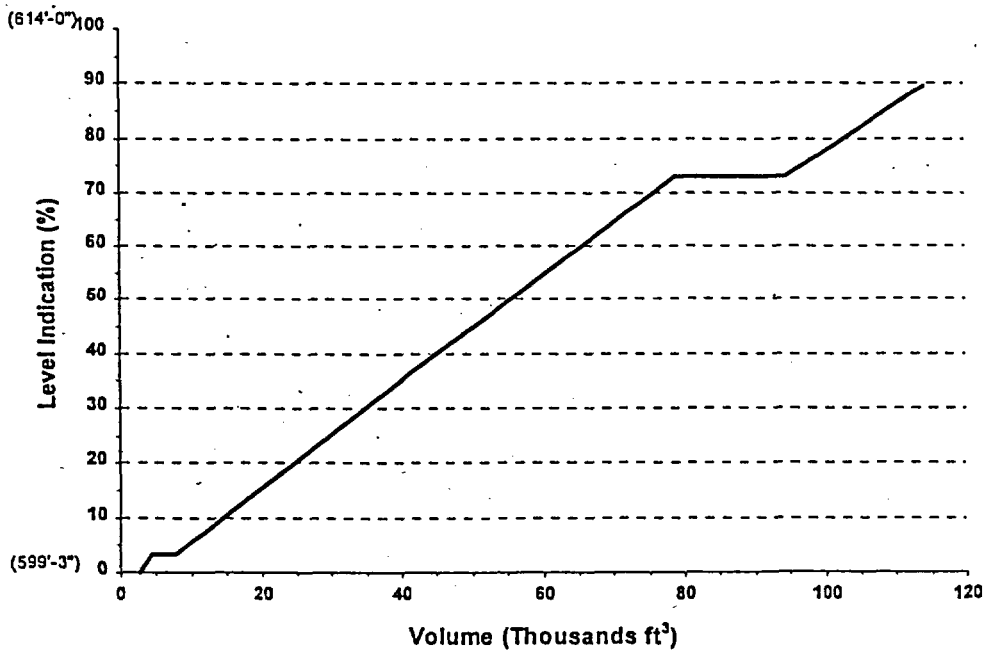
3.2.1 From the level indications, determine the volume of water in the containment sump and/or containment from the graphs below. Containment level indication includes the sump volume. Multiply the volume by 28,317 ml/ft^3. Record on page 1 of APPENDIX E.

APPENDIX E.4
Determination of Essential Time Periods, Power Correction Factor, Estimated Liquid Mass, and Estimated Containment Volume

Containment Sump Volume vs Containment Sump Level Indication



Containment Volume vs Containment Level Indication



C.1

APPENDIX E.5
Determination of Essential Time Periods, Power Correction Factor, Estimated Liquid Mass, and Estimated Containment Volume

3.2.2 In the event the other water inventories become necessary due to the accident scenario, determine the volume in accordance with the chart below. Record on page 1 of APPENDIX E.

Source	Maximum Volume (gal)	Estimated Volume Added (gal)
Refueling Water Storage Tank	372,250	
Accumulator A	7,263	
Accumulator B	7,263	
Accumulator C	7,263	
Accumulator D	7,263	
Boron Injection Tank	900	
Spray Additive Tank	4,000	
Melted Ice	2.7E6 (lb /8.34lb/gal)	lb/8.34=
Steam Generator	See Graphs E.6	
RHR	4019/train	
Other		
Total Volume Added (gal)	Sum of Volumes	(gal)
Total Volume Added (gm)	Total Volume x 3,785	(gm)

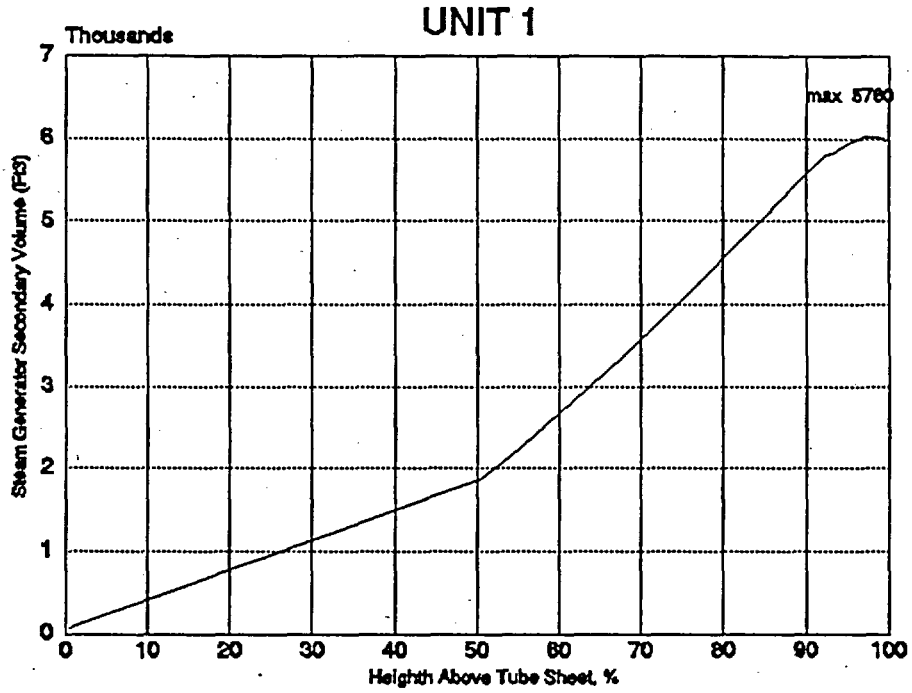
4.0 Determination of Containment Volume

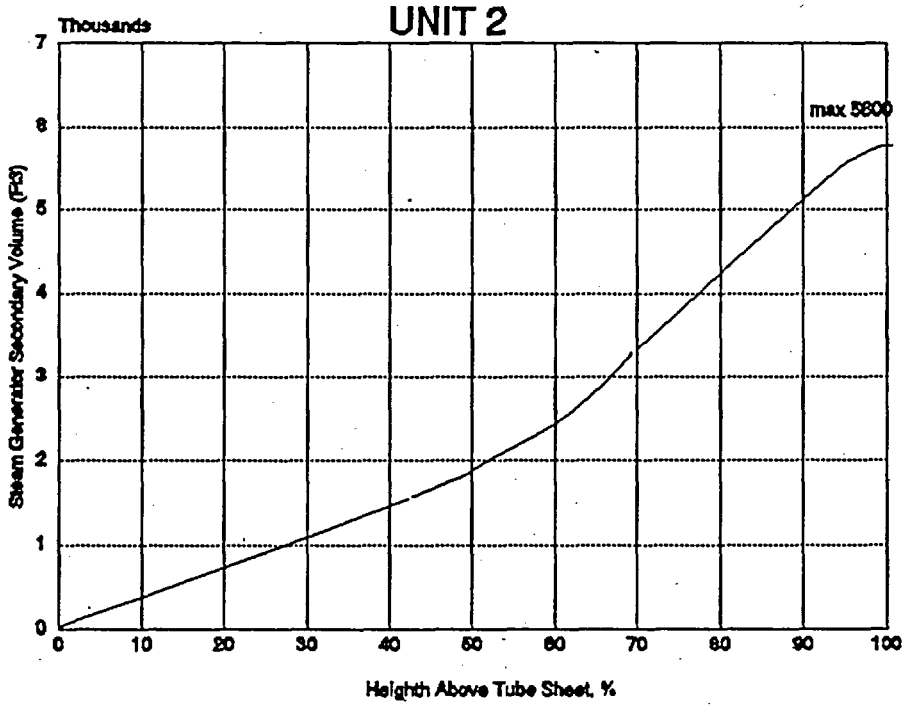
Date/Time _____
Pressure _____
Temperature _____

Containment Volume cc = $3.50E10 \text{ cc} \times \frac{(P_{containment} + 14.7)}{14.7} \times \frac{492}{(T_{containment} + 460)} =$ _____

APPENDIX E.6
Determination of Essential Time Periods, Power Correction Factor, Estimated Liquid Mass, and Estimated Containment Volume

Steam Generator Volume versus Percent





APPENDIX F.1
Core Damage Assessment Software Verification

1.0 Enter the data from the clear boxes on the following page into page 1 of the CDA computer program. Verify the results contained on page two of the program to the second page of the verification form. Ensure that the values are the same. If some error is identified, proceed with section 7.0 of the procedure.

2.0 The graphs included in this Appendix and on the CDA program menu may also be used when formally utilizing the CDA program for real accident scenarios.

		UNIT	1
DATA		MWt	3250
Shutdown		6/3/93	1:00AM
Sampling	RCS	SUMP	C.ATMOS
Date	6/3/93	6/3/93	6/3/93
Time	8:00AM	4:00AM	2:00AM
Delta T	7.00	3.00	1.00

CORE DAMAGE ASSESSMENT

Donald C.Cook Nuclear

by

REM Technology

Dr. Robert E. Mayer 5/93

VOLUMES	
RCS	6.0E4
SUMP	3.0E4
Letdown	0

RCS	2.27E8
SUMP	1.14E8

CALC.	Nuclide	RCS	RCS	SUMP	SUMP	C.Atmos	C.Atmos	
	Kr85m							
	Kr87							
	Kr88							
	Xe131m							
	Xe133	5.0E-05	1.01E00	5.0E-05	1.00E00	5.0E+02	1.00E00	
	Xe133m							
	Xe135							LCD
	I131	5.0E+03	1.02E00	5.0E+03	1.01E00	5.0E-02	1.003887	
	I132							
	I133							
	I135							
	Cs138							
	Te129							
	Te132	5.0E+03	1.06E00	5.0E+03	1.03E00			
	Ba140	5.0E+02	1.02E00	5.0E+02	1.01E00			
	La140							
	La142	5.0E-02	1.88E01	5.0E-02	3.28E00			
	Pr144							

Cs Ratio	Cs134	2	134/137	1
Calc	Cs137	2		

HYDROGN			Al/Zn	Hrs @ Temp x Graph #		SCF H2
			1	1.28	150	1.92E02
Radiolysis			2			
Delta Tss	1.00		3			
Graph #	0.2	650	4			
			5			
C.Atmos%	2.1		6			
Vol C.A.	3.5E10		7			
	1.24E6		8			
	160		9			
C.A. Press	3.5		10			
			CET			1.92E02
POWER	All cells	100	Rx lvl	45%		
			RCS Vol	4.5E4		

APPENDIX F.3

TOTAL C.A. H2	2.42E4
Net Hydrogen	2.33E4
%FF from H2	5.75

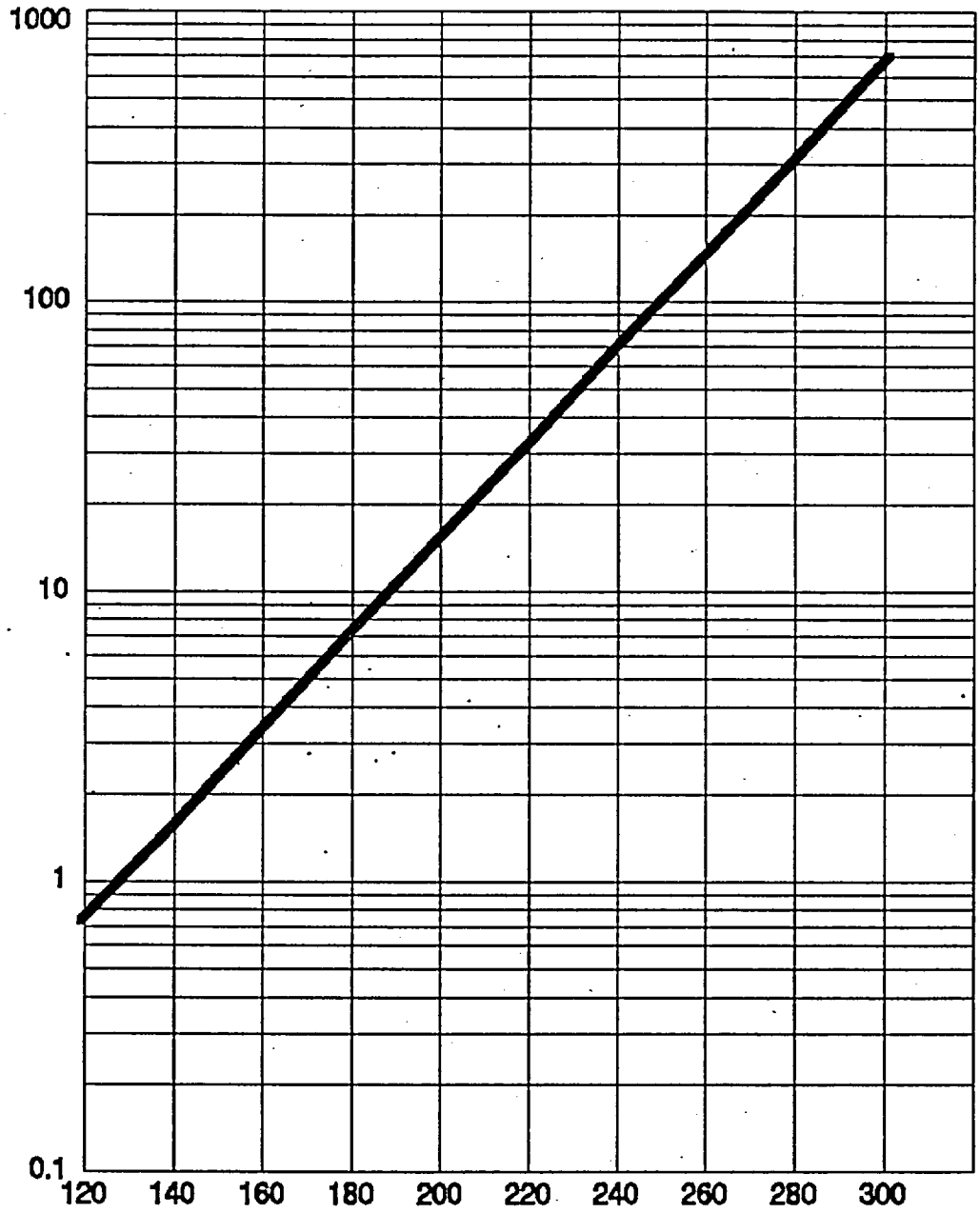
UNIT	1
S/D Date	6/3/93
S/D Time	1:00AM
Report #	1

NUCLIDE	CORE Inventory	TPA Nuclides	NO DAMAGE	% FAILED FUEL from Specific Release Fractions (Rfe) CLAD RUPTURE	CLAD OXIDATION	CORE MELT
Kr85m						
Kr87						
Kr88						
Xe131m						
Xe133	2.32E08	1.76E13		252.26	15.14	7.57
Xe133m						
Xe135						
I131	1.00E08	1.73E12	1.04	86.52	3.46	1.73
I132						
I133						
I135						
Cs138						
e129						
Te132	1.49E08	1.79E12		12021.45	12.02	4.01
Ba140	2.15E08	1.73E11			8.02	0.40
La140						
La142	2.02E08	2.32E09				1.15
Pr144						

APPENDIX F.4
Estimation of Core Damage
Based on Hydrogen Production

Hydrogen Production Rate from Oxidation of Aluminum and Zinc

SCF/hr UNIT 1 and UNIT 2

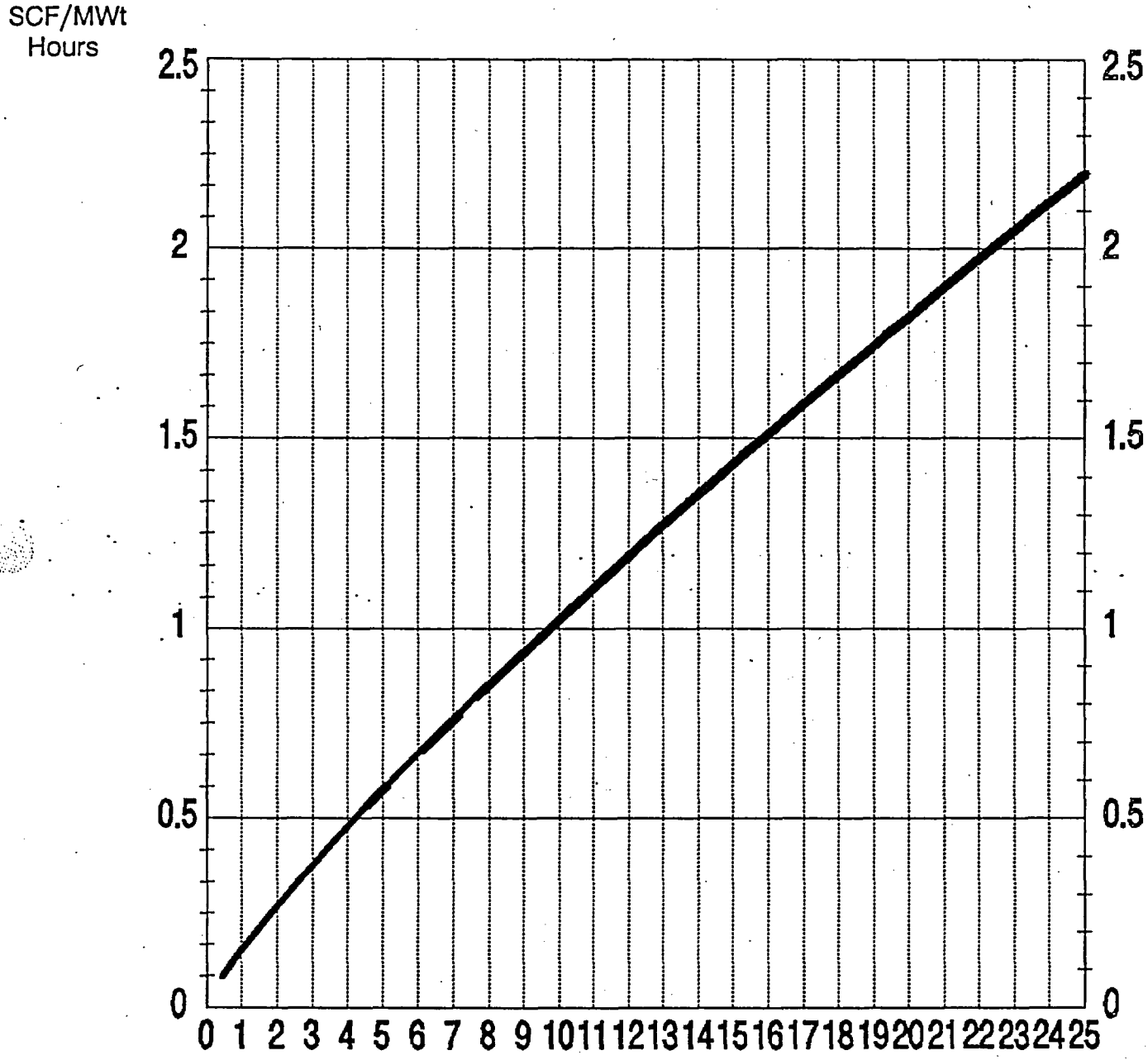


(For this intent, Unit's 1 and 2 have similar amounts of aluminum and zinc which produce graphs that are relatively identical

APPENDIX F.5
Core Damage Assessment Software

Hydrogen Volume Generated by the Radiolysis of Water

Time versus Generation from 0 to 25 hours

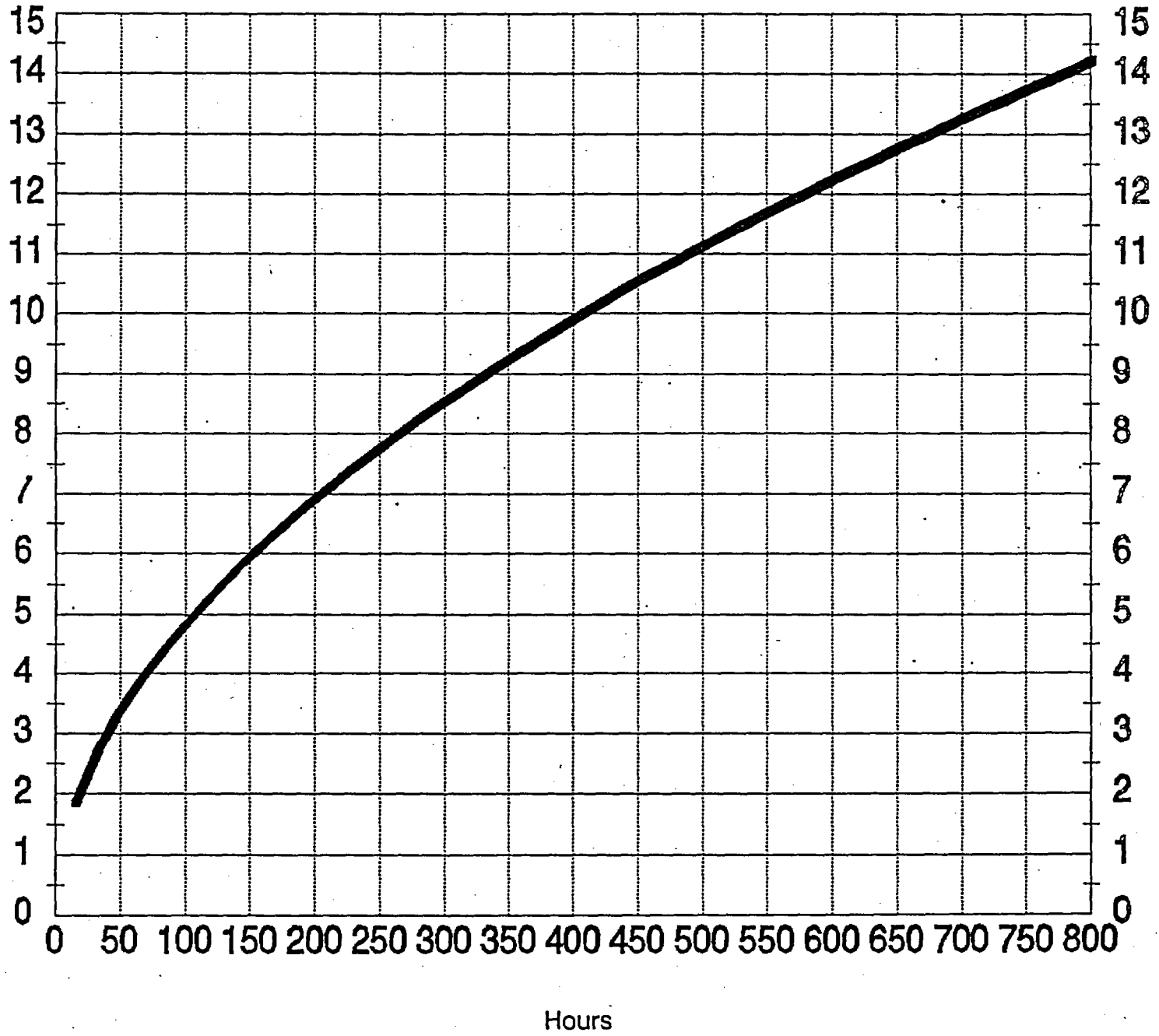


APPENDIX F.6
Core Damage Assessment Software

Hydrogen Volume Generated by the Radiolysis of Water

Time versus Generation from 0 to 800 hours

SCF/MWt



REVIEW AND APPROVAL TRACKING FORM

Procedure Information:

Number: RMT-2080-EOF-001 Rev. 03 Change: 00

Title: Activation and Operation of the EOF

Category (Select One Only):

- ☐ Correction (Full Procedure)
- ☐ Correction (Page Substitution)
- ☐ Cancellation
- ☐ Superseded (list superseding procedures): _____
- ☐ Change (Full Procedure) with Review of Change Only
- ☐ Change (Page Substitution) with Review of Change Only
- ☒ New Procedure or Change with Full Review

Associated Configuration Impact Assessments:

Change Driver/CDI Tracking No(s).: _____ ☒ N/A

Required Reviews:

Cross-Discipline Reviews:

- ☐ Chemistry
- ☐ Maintenance
- ☐ NDM
- ☐ Operations
- ☐ PA/PV
- ☐ Reg Affairs
- ☒ RP
- ☐ Training
- ☐ Work Control
- ☒ Emergency Directors
- ☐ _____
- ☐ _____
- ☐ None Required

Programmatic Reviews:

- ☐ ALARA
- ☐ Component Engineering
- ☐ Design Engineering
- ☐ Emerg Oper Proc Grp
- ☐ Environmental
- ☐ ISI/IST Coordinator
- ☐ Performance Assurance
- ☐ Reactivity Mgmt Team
- ☐ SPS (Safety & Health)
- ☐ Surveillance Section
- ☐ System Engineering
- ☐ SOMS Administrator
- ☐ _____
- ☒ None Required

☒ Cognizant Org Review: Darrell Edwards Date: 3/10/03

☒ Technical Review: Brian Colby Date: 3/10/03

Concurrence:

☐ Ops Director Concurrence: N/A Date: / /

Package Check:

Updated Revision Summary attached? ☒ Yes

10 CFR 50.59 Requirements complete? Tracking No.: 2003-0063-00 ☒ Yes ☐ N/A

Implementation Plan developed? (Ref. Step 3.4.17) ☐ Yes ☒ N/A

Package Complete: Cindy Krakowiak Date: 3/10/03

Approvals:

PORC Review Required: ☒ Yes ☐ No Mtg. No.: 4004 4/7/03

Administrative Hold Status: ☐ Released ☐ Reissued ☒ N/A CR No.: N/A

Approval Authority Review/Approval: _____ Date: 4/15/03

Expiration Date/Ending Activity N/A Effective Date: 4/21/03

Periodic Review:

Periodic Review conducted? (Data Sheet 5 Complete) 4/21/03 ☒ Yes ☒ No

Follow-up Actions:

Commitment Database update requested in accordance with PMP-7100-CMP-001? ☐ Yes ☒ N/A

NDM notified of new records or changes to records that could affect record retention? ☐ Yes ☒ N/A

NDM Use Only

NUCLEAR DOCUMENT MANAGEMENT SECTION

APR 21 2003

CONTROLLED DOCUMENT

Office Information For Form Tracking Only – Not Part of Form

This form is derived from the information in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 10a, Data Sheet 1, Review and Approval Tracking Form.

REVISION SUMMARY

Number: RMT-2080-EOF-001 Revision: 03 Change: 00

Title: **Activation and Operation of the EOF**

Section or Step	Change/Reason For Change
Step 2.5	Change: Revised step to remove "in Appendix C" and insert the title of the applicable reference section of the Emergency Plan. Reason: Use of the title (v. Appendix) clarifies which reference to the Emergency Plan is to be used for additional industry/agency support.
Step 2.6	Change: New step to address OSC/TSC responders directed to the Buchanan Office Building via Dialogic pager code '007'. Reason: Establishes communication and transportation contingencies in the event of a '007'-code response.
Step 2.7	Change: Corrected typo in the referenced procedure for termination and recovery. Reason: Typo correction.
Step 3.1.3	Change: Revised reference to the correct procedure number. Reason: Typo correction.
Attachment 1, Step 1.1	Change: Removed "continuous air monitor" from the bulletized list of equipment. Reason: Continuous air monitor is not required equipment outside the 10-mile EPZ per any regulatory requirement or guidance in NUREG-0737, NUREG-0654, or NUREG-0696. This equipment was intended for those EOFs within the 10-mile EPZ per NUREG-0696 and Supplement 1 to NUREG-0737.
Attachment 3, Step 1	Change: Deleted the "Start the continuous air monitor" step. Reason: Continuous air monitor is not required equipment outside the 10-mile EPZ.
Attachment 4, Step 6.2	Change: Deleted the units "R/hr" in first bullet. Reason: Units could be in units other than R/hr., e.g., μR/hr.
Attachment 4, Step 12	Change: Removed the bulleted statement, "The ED approves the EMD-32b form." Reason: Unnecessary step since a change in classification or PAR would result in negating the need for the EMD-32b form.
Attachment 5, Step 1.1.2	Change: Revised "request to speak to the Nuclear Emergency Director" to "request to speak to meteorological forecaster." Reason: Murray & Trettle do not have a "Nuclear Emergency Director".

Office Information For Form Tracking Only – Not Part of Form

This is a free-form as called out in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 10a.

REVISION SUMMARY

Number: RMT-2080-EOF-001 Revision: 03 Change: 00

Title: Activation and Operation of the EOF

Section or Step	Change/Reason For Change
Attachment 5, Step 1.1.4	Change: Added, "use the NOAA" website. Reason: Provides another optional resource for obtaining the weather forecast.
Attachment 7, Step 2.5.1	Change: Corrected typo "PARS" to "PARs". Reason: Typo correction.
Attachment 7, Step 2.5.2	Change: Corrected two typos in the first bullet (removed "." at the beginning of the step, and added "a" to "EMD-32". Reason: Typo correction.
Attachment 8, Step 2, Second Bullet	Change: Added commas to the sentence. Reason: To correct sentence structure.
Attachment 8, Step 4	Change: Added "or change in PAR" to this step. Reason: Provides clarification in the event a PAR has already been issued and an additional PAR becomes necessary.
Attachment 9, Step 7	Change: Added clarification on frequency of faxing EMD-32 forms to the State of Michigan; deleted the News Center as a destination and revised JPIC to read ENC/JPIC. Reason: Provides clarification as to the frequency these forms are faxed; reference to News Center was for its previous location at the Cook Energy Information Center-no longer applicable.
Attachment 10, Step 1	Change: Added NOTE to prompt Dose Assessment personnel that help from other utilities is available with off-site activities per pre-arranged agreements. Reason: Reminds EOF personnel that additional help with off-site activities is available from other utilities.
Attachment 10, Step 2	Change: Added NOTE prior to Step to regarding administration of KI for field team members. Reason: Allows for permission to be obtained from SEC and EAD for KI administration for field team members.
Attachment 10, Step 4 and Step 5	Change: Added these steps to specify facilities that can be used for analysis and to implement analysis of samples. Reason: For clarity as this was not previously specified.
Attachment 10, Step 3.2.3.a.4	Change: Corrected typo "boundries" to "boundaries". Reason: Typo correction.

Office Information For Form Tracking Only – Not Part of Form

This is a free-form as called out in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 10a.

REVISION SUMMARY

Number: RMT-2080-EOF-001 Revision: 03 Change: 00

Title: Activation and Operation of the EOF

Section or Step	Change/Reason For Change
Attachment 11, Step 7	Change: Added step regarding analysis of sampling media. Reason: For clarity as this was not previously specified.
Attachment 12, Step 4	Change: Corrected referenced procedure typo ("12" prior to procedure #). Reason: Typo correction.
Attachment 12, Step 6	Change: Deleted Emergency Planning from the list of persons to be contacted. Reason: Position eliminated from the EOF; this position is not required by the Emergency Plan or any regulatory guidance.
Attachment 13, Step 1.3	Change: Renamed the "Security Directors' lock box" to "Dialogic Pager Code lock box". Reason: New name for pager lock box.
Attachment 14, Step 3	Change: Added an apostrophe to "Directors". Reason: Typo correction.
Attachment 15, Steps 1.1.2 and 1.2.2	Change: Added text to ensure that control room is informed of transfer of communications duty with the county. Reason: Clarifies when/how the control room is informed of this function.
Attachment 18, Step 3	Change: Revised area code from "616" to "269" in Michigan State Police phone number. Reason: Change in area code.
Figure 2	Change: Deleted position description for Emergency Planning; added a bullet to the EAD and Industry Support Communicator positions regarding solicitation of assistance from other utilities per pre-arranged agreements. Reason: Position eliminated from the EOF; remind individuals that offsite RP and laboratory support is available per the agreements.

TABLE OF CONTENTS

1 PURPOSE AND SCOPE

1.1 This procedure provides guidance to Emergency Operations Facility (EOF) personnel during emergencies.

1.2 Use of this procedure is restricted to emergency conditions or drills/exercises only.

NOTE: 10 CFR 50.54(x) and (y) describe the actions required if deviation from Technical Specifications or License Condition becomes necessary.

2 DETAILS

2.1 The Emergency Director (ED) implements this procedure.

2.2 Use Attachment 1, Activation, when an emergency response is initiated.

2.3 Use Figure 1, Definitions and Abbreviations for a listing of abbreviations, acronyms, and their meanings.

2.4 Figure 2, Position Descriptions contains supplemental directions for ERO personnel.

2.5 **IF** additional assistance from other utilities or agencies is required **THEN** refer to "Agreements With Off-Site Support Agencies" in the Emergency Plan. Phone numbers are available in the Emergency Response Organization Phone Directory.

2.6 **IF** emergency responders have been directed to the Buchanan Office Building per Dialogic pager code '007', **THEN** make the following provisions:

NOTE: The Shift Manager/SEC may direct that alternate communication links be used after initial contact is established with the control room.

2.6.1 Establish a line of communication with the affected unit Control Room or Unit 1 Control Room if a dual unit event is in progress.

a. Any available personnel (such as the Control Room Communicator, Operations Advisor, or PET Operations) may establish communications between the EOF and the Control Room.

2.6.2 When conditions warrant (i.e., safe conditions at the plant) arrange for transportation of necessary OSC/TSC responders to the plant site.

NOTE: O = Optional M = Mandatory

2.7 Perform activities based on the following table.

Activity	Attachment/ Procedure	Responsible Position	UE	Alert	SA	GE
Activation	1	ED	O	M	M	M
Briefings	2	ED	M	M	M	M
Habitability	3	EAD			M	M
Dose Assessment (EMD-32)	4	EAD		O	M	M
PAR	8	ED				M
Core Damage Assessment	PMP-2081-EPP.105	Reactor Physics Analyst		O	O	O
Classification	7	ED	M	M	M	M
Document Transmission / Distribution	9	Communications Director	O	M	M	M
Field Team Communications	10	FMT Coordinator		O	M	M
Environmental Sampling	11	Field Teams				
Logistical Support	14	Scheduling/Planning Manager			O	O
Shift Designation	12	Security Director	O	O	O	O
Information Requests	20	Communications Director				
External Support	19	Industry Support Communicator		O	O	O
ENS Communications	16	ENS Communicator		M	M	M
HPN Communications	17	HPN Communicator		M	M	M
County Communications	15	Berrien County Communicator			M	M
State Communications	18	MSP Communicator			M	M
Termination/Recovery	RMT-2080-EOF-002	ED		M	M	M

3 REFERENCES

3.1 Use References:

3.1.1 PMP-2080-EPP-101, Emergency Classification.

3.1.2 PMP-2081-EPP.105, Initial Core Damage Assessment.

3.1.3 RMT-2080-EOF-002, Emergency Termination and Recovery.

3.1.4 Donald C. Cook Nuclear Plant Emergency Plan.

3.2 Writing References:

3.2.1 Source References.

a. Donald C. Cook Nuclear Plant Emergency Plan.

b. EPA 400-R-92-001 Manual of Protective Action Guides and Protective Actions for Nuclear Incidents.

c. Dose Assessment Program – Computer Program, Rev. 7.

d. Meteorology and Atomic Energy 1968. U. S. Atomic Energy Commission.

e. Evacuation Time Estimates for the D. C. Cook Nuclear Plant Plume Exposure Emergency Planning Zone HMM Associates July 1992 (Rev.1).

3.2.2 General References

a. Michigan Emergency Preparedness Plan.

b. Berrien County Emergency Preparedness Plan.

NOTE:	The EOF should be activated within 60 minutes of the time of a declaration of an Alert, SAE, or GE.

1 Ensure the facility has the following or an acceptable alternate prior to activation.

1.1 Equipment

- Facility Power
- Plant Process Computer (RDR)
- Dose Assessment Programs and Printers
- Area Radiation Monitor
- Clocks set with the Plant Process computer

1.2 Communications

1.2.1 Telephones, Fax machines, or Radios to:

- State of Michigan Emergency Operations Center
- Berrien County Emergency Operations Center

1.2.2 Field Monitoring Team Radios

1.2.3 Communications with the Control Room

1.2.4 Managers Telephone Bridge

1.3 Personnel

NOTE:	With the exception of the Emergency Director, the use of non-qualified personnel is permissible provided they are briefed and understand the position specific requirements.

- ☐ Emergency Director
- ☐ Communications Director
- ☐ Environmental Assessment Director
- ☐ Boardwriter
- ☐ Communicator – Berrien County Sheriff Department
- ☐ Communicator – Michigan State Police
- ☐ Communicator –ENS

2 Perform the following:

- Assume responsibilities for communications with offsite agencies.
- Assume responsibilities for Classification, Notification and PARs from the SEC.
- Determine the time the control room will issue their last EMD-32.
- Determine the time the EOF will issue the first EMD-32, Nuclear Plant Event form. The EMD-32a must be issued within 15 minutes of a classification or PAR change. The EMD-32b must be issued within 30 minutes of the last EMD-32a or EMD-32b.

3 Perform a facility brief.

4 Activate the facility.

5 Inform the other ERO facilities that the EOF has been activated.

1 Announce the briefing time 2 to 3 minutes prior to it beginning.

2 Ensure everyone is paying attention, there are no phone conversations or side discussions taking place, and personnel remain stationary during the brief.

3 Perform the briefing. (Time limits are for reference only.)

3.1 **Current Plant Status** (1- Minute Maximum)

- Major on-going events
- Major Equipment out of service
- Prognosis
- Facility priorities

3.2 **Current Classification** (30-Seconds Maximum)

- PAR in effect
- Anticipated changes in classification or PAR

3.3 **Status of the EOF** (for initial briefings up to and including activation)

- Activation Status (When command and control will be taken over from the Control Room),
- Problems delaying activation,
- Time the first EMD-32 is required for transmission to the State (at activation only).

3.4 **Ask the EOF team for updates on important information**

- Don't solve the problems here. Delegate; then update at the next briefing if necessary.

3.5 **Ask the EOF team if anyone is having any problems**

- Don't solve the problems here. Delegate; then update at the next briefing if necessary.

NOTE:	The EOF has no specific habitability requirements because it is outside the 10-mile Emergency Planning Zone. Actions taken are at the discretion of the EAD.

1 IF a radioactive plume is expected to pass over the EOF, THEN:

- Issue dosimetry to all EOF occupants.
- Shelter or evacuate non-essential personnel in the Buchanan Office Building.
- Turn off or close dampers on ventilation systems that draw air from outside the facility.
- Have personnel remain in the EOF and office building.
- Perform routine surveys to assess dose rates, airborne activity, and post plume contamination.

2 Maintain the dose to the occupants of the EOF below the following for the duration of the emergency.

- TEDE < 5 Rem
- CDE Thyroid < 25 Rem

1 UNLESS the State of Michigan EOC has been notified in advance of a delay or change in frequency, THEN transmit Nuclear Plant Event Technical Data forms (EMD-32b) to the State of Michigan at least every 30 minutes.

2 Obtain and record an 8-hour and 24-hour weather forecast on Data Sheet 1, Meteorological Forecast.

2.1 Forecasts are normally obtained through Murray and Trettle. The phone number is available in the Emergency Response Organization Phone Directory.

2.2 Provide Data Sheet 1, Meteorological Forecast, to the runners for distribution.

2.3 Obtain subsequent forecasts approximately every 8 hours.

3 IF a projected dose is NOT available from the Dose Assessment Program, THEN use projected doses based on measured dose rates from the field and expected duration of the exposure time.

4 IF projected doses are NOT available and a PAR is necessary, THEN use the default PAR. See Attachment 8, PAR.

5 Obtain Meteorological Data. See Attachments 5, Meteorological Data, and 6, Pasquill Category, for additional information and help.

6 Obtain radiological data as applicable.

6.1 Radiation Monitoring System (RMS) data listed in order of preference:

- PPC/RDR
- RMS Display Terminals
- Technical Support Center
- Direct readings from the Local Area Data Acquisition Modules

6.2 Field Team data

- Radiation reading
- Iodine concentration in µCi/cc
- Sample location

7 Determine the Coolant Type from:

- EOF Reactor Physics Analyst
- Technical Support Center Plant Evaluation Team
- GO TO Initial Core Damage Assessment procedure, PMP-2081-EPP-105.

8 Determine the Projected Duration of the Release.

- IF the projected duration of the release is unknown, **THEN** use 1-hour.
- IF releases are occurring from multiple points, **THEN** use the longest projected duration.

9 Determine if an Actual Release versus a Potential Release is occurring.

9.1 An actual release is occurring when any of the following are true:

- Valid indication on release point radiation monitoring system channels are present that are associated with a classified event, or
- Measured offsite radiation readings indicate a release is in progress, or
- Indications exist that an unmonitored release may be occurring.

9.2 A potential release exists if calculated data is postulated based on present plant conditions (i.e., Containment Loss Of Coolant Accident, CLOCA).

10 Complete the EMD-32b form.

- The EMD-32b, Release/Offsite Dose Data section, is only required to be completed if a release is or is suspected to be occurring.
- The EMD-32b, Measured Offsite Radiation Levels section, needs only be reported when available.

11 Review the EMD-32b form to determine if a change in classification or PAR is required.

12 IF a change is necessary, **THEN**:

- Follow the instructions on the Classification or PAR attachment.

13 IF a change is not necessary, **THEN**:

- The ED approves the EMD-32b form.
- Provide the EMD-32b form to the Fax operators for transmittal.

NOTE:	Wind speeds are expressed as Miles per Hour. To convert Knots to Miles per Hour multiply by 1.15.

1 Consider lake breezes in the dose assessment process if all the following are true:

- The current date is between April 15 and October 31,
- The current time is between 1-hour after sunrise and 1-hour after sunset,
- Ambient temperature measured at the main tower must be greater then the Lake Michigan temperature,
- Wind speed on the shoreline tower is ≤ 13.4 Miles per Hour,
- Pasquill category must be A, B, C, or D,
- Shoreline tower wind direction is FROM 205° to 23° (i.e., Wind is from the lake).

1.1 Obtain meteorological data from one of the following sources. Sources are listed in order of preference.

1.1.1 Plant Process Computer

- 10 Meter Main
- 10 Meter Backup
- 60 Meter Main

1.1.2 Murray and Trettle

a. Obtain the phone number from the Emergency Response Organization Phone Directory.

b. Request to speak to a meteorological forecaster.

c. Obtain

- Wind Speed in Miles per Hour
- Wind Direction from, in degrees
- Pasquill Category as a letter NOT a number
- Eight and 24-hour meteorological forecast

1.1.3 Manual Acquisition of Meteorological Tower Data

- Contact the Technical Support Center and request a team be dispatched to collect this data.

1.1.4 National Oceanic and Atmospheric Administration (NOAA)

- Obtain the plants NOAA phone extension from the Emergency Response Organization Phone Directory.
- Use any NOAA weather radio.
- Use the NOAA website

1 Obtain Pasquill Category data from one of the following sources. Sources are listed in order of preference.

1.1 Plant Process Computer

1.2 Temperature Differential

ΔT °F = T @ 60m – T @ 10m (Z = 50 Meters)	Pasquill Category	ΔT °C = T @ 60m – T @ 10m (Z = 50 Meters)
ΔT °F ≤ - 1.8	A	ΔT °C ≤ - 1.0
-1.8 < ΔT °F ≤ - 1.6	B	-1.0 < ΔT °C ≤ - 0.9
-1.6 < ΔT °F ≤ - 1.4	C	-0.9 < ΔT °C ≤ - 0.8
-1.4 < ΔT °F ≤ - 0.5	D	-0.8 < ΔT °C ≤ - 0.3
-0.5 < ΔT °F ≤ +1.3	E	-0.3 < ΔT °C ≤ +0.7
+1.3 < ΔT °F ≤ +3.6	F	+0.7 < ΔT °C ≤ +2.0
+3.6 < ΔT °F	G	+2.0 < ΔT °C

1.3 Standard Deviation of the Horizontal Wind Direction (STD)

STD	Pasquill Category
STD ≥ 22.5	A
22.5 ≥ STD > 17.5	B
17.5 ≥ STD > 12.5	C
12.5 ≥ STD > 7.5	D
7.5 ≥ STD > 3.8	E
3.8 ≥ STD > 2.1	F
2.1 ≥ STD	G

1.4 Murray and Trettle

- See Attachment 5, Meteorological Data.

1.5 Observation

Incoming Solar Radiation (Day Only) (1 hour after sunrise to 1 hour before sunset)					
Sun Angle Degrees from Horizon	Cloud Cover				
	None	1/8 – 5/8	5/8 – 7/8		8/8
			Middle Clouds	Low Clouds	
15° - 35°	Slight	Slight	Slight	Slight	Slight
35° - 60°	Moderate	Slight	Slight	Slight	Slight
> 60°	Strong	Strong	Moderate	Slight	Slight

	Day			Night	
Wind Speed @ 10 meters Miles per Hour (Mph)	Incoming Solar Radiation			Thinly Overcast or ≥ 4/8 Low Clouds	≤ 3/8 Clouds
	Strong	Moderate	Slight		
Mph ≤ 5	A	A – B	B	--	--
5 < Mph ≤ 7	A – B	B	C	E	F
7 < Mph ≤ 11	B	B – C	C	D	E
11 < Mph ≤ 13	C	C – D	D	D	D
Mph > 13	C	D	D	D	D

1 Perform classifications using PMP-2080-EPP-101.

2 If a classification upgrade is made:

2.1 Note the time of the classification and determine the 15-minute notification time.

2.2 Notify the control room to initiate plant public address announcements and sound the Nuclear Emergency Alarm as specified in the control room procedures.

2.3 Complete an EMD-32a, Nuclear Plant Event Notification, form.

2.3.1 Reason for Classification:

- **IF** (H-1) SEC Judgement is used, **THEN** select the reason most applicable to the situation.

2.3.2 Radiological Release in Progress Due to Event is yes when:

- Valid indications on release point radiation monitoring system channels are present that are associated with a classified event, or
- Measured offsite radiation readings indicate a release is in progress, or
- Indications exist that an unmonitored release may be occurring.

2.3.3 **IF** the classification is a General Emergency, **THEN** develop a PAR.

2.4 The ED approves the classification upgrade.

2.5 The ED notifies the State/County authorities.

2.5.1 If the State EOC has **NOT** been activated:

- Transmit the EMD-32a to the Berrien County Sheriff's Department
- The ED discusses the EMD-32a data and applicable PARs, with the Berrien County Sheriff's Department.

2.5.2 If the State EOC has been activated:

- Transmit the EMD-32a to the State of Michigan EOC.
- The ED discusses the EMD-32a data, and applicable PARs, with the State EOC.

2.6 Notify the other facilities as applicable.

2.7 Perform a facility brief.

2.8 Update the facility status boards/maps with classification data, PARs, and Protective Action Orders received from the State of Michigan.

NOTE:	PARs must accompany the declaration of a General Emergency.

1 Note the time of the PAR and determine the 15-minute notification time.

2 Use the Default PAR if:

- A General Emergency has been declared for non-radiological release conditions, or
- It is not possible to determine the Site Boundary TEDE or CDE dose and a release is, or is suspected to be, in progress.

3 Prior to developing a PAR, consider any forecasts of changing weather conditions.

4 IF a PAR or change in PAR is based on Dose Calculations, **THEN** an EMD-32b, Nuclear Plant Event Technical Data sheet must accompany the EMD-32a, Nuclear Plant Event Notification form.

5 Compare field team data to the projected area of the PAR.

6 IF the field team data indicates the plume is outside the projected area, **THEN** change the PAR to include the actual data.

7 Update the EMD-32a with the PAR information.

8 The ED approves the PAR change.

9 The ED notifies the State/County authorities.

9.1 If the State EOC has **NOT** been activated:

- Transmit the EMD-32a (and EMD-32b as applicable) to the Berrien County Sheriff's Department.
- The ED discusses the EMD-32 data, and applicable PARs with the Berrien County Sheriff's Department.

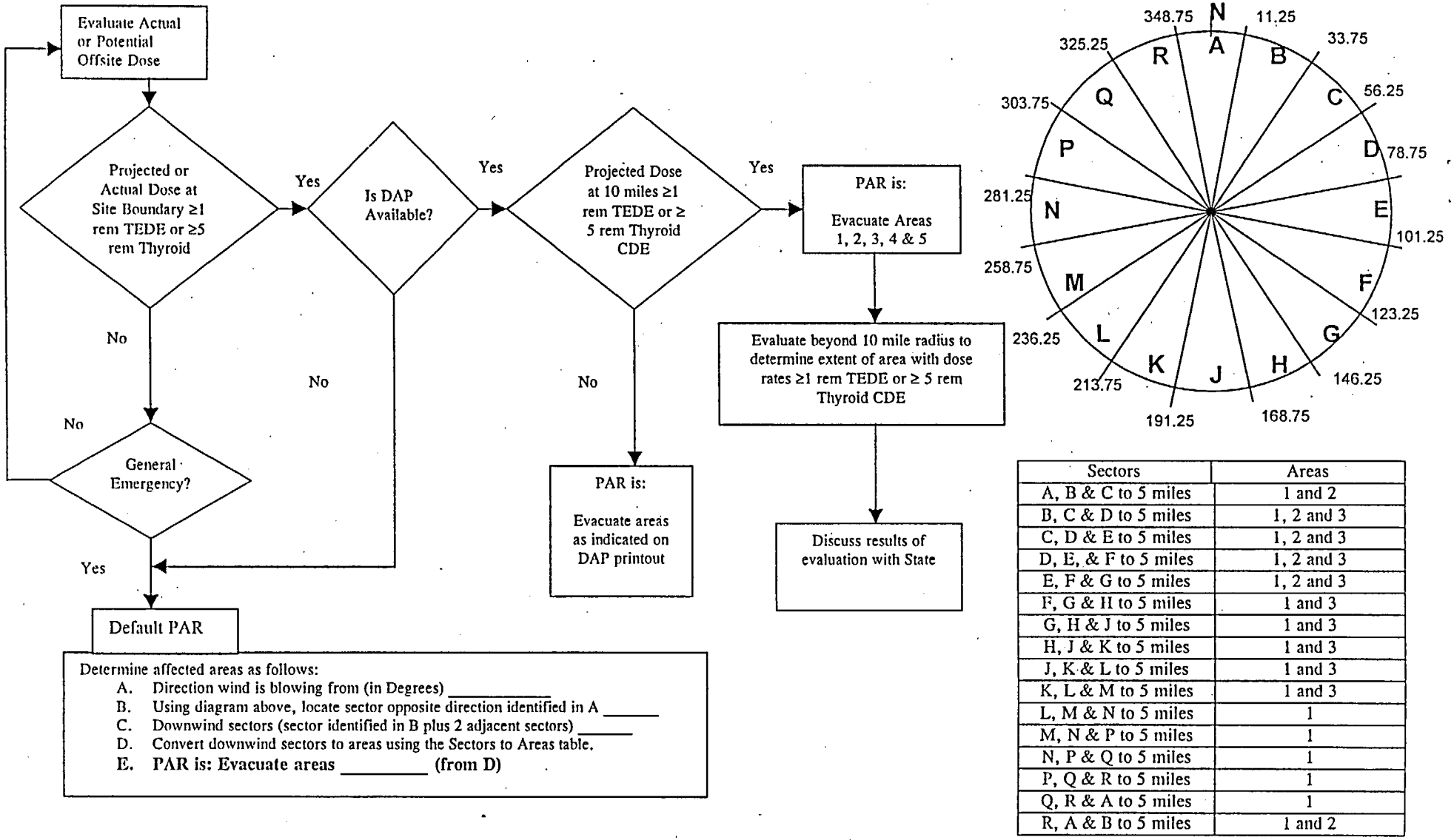
9.2 If the State EOC has been activated:

- Transmit the EMD-32a (and EMD-32b as applicable) to the State of Michigan EOC.
- The ED discusses the EMD-32 data, and applicable PARs with the State EOC.

10 Notify the other facilities as applicable.

11 Perform a facility brief.

12 Update the facility status boards/maps with classification data, PARs, and Protective Action Orders received from the State of Michigan.



Sectors	Areas
A, B & C to 5 miles	1 and 2
B, C & D to 5 miles	1, 2 and 3
C, D & E to 5 miles	1, 2 and 3
D, E, & F to 5 miles	1, 2 and 3
E, F & G to 5 miles	1, 2 and 3
F, G & H to 5 miles	1 and 3
G, H & J to 5 miles	1 and 3
H, J & K to 5 miles	1 and 3
J, K & L to 5 miles	1 and 3
K, L & M to 5 miles	1 and 3
L, M & N to 5 miles	1
M, N & P to 5 miles	1
N, P & Q to 5 miles	1
P, Q & R to 5 miles	1
Q, R & A to 5 miles	1
R, A & B to 5 miles	1 and 2

NOTE:	Some of the facility Fax machines are designated within the phone directory as TRANSMIT and others as RECEIVE. These machines should remain in their designated mode to better facilitate communications between facilities.

1 Ensure the Fax machine dates and times are set correctly.

2 Obtain the Fax machine phone numbers for the facilities and off site agencies from the Emergency Response Organization Phone Directory.

3 Forward all documents for duplication and distribution to the facility runners.

4 Forward all original documents to the Communication Director.

5 Log all incoming and outgoing Fax's in the facility Fax Log.

6 IF a Fax is NOT specifically addressed to an individual or position, THEN distribute incoming Fax's to all positions as described on the facility distribution map located in the copy area.

7 The following table gives additional direction on the transmission and distribution of material:

Document	Destination	Frequency	Additional Instructions
Nuclear Plant Event Notification Form (EMD-32a) Nuclear Plant Event Technical Data (EMD-32b)	State EOC	EMD-32a Within 15 minutes of a classification or PAR change EMD-32b • 30-Minutes after EMD-32a or EMD-32b is sent; • Accompanying EMD-32a at General Emergency, **OR** PAR upgrade due to dose.	The EMD-32a and b forms transmitted to the State of Michigan should have priority over all other Fax's.
	TSC	As Available	
	ENC/JPIC	As Available	Distribution to the ENC/JPIC members.
	EOF Personnel	As Available	Distribute to EOF members.
Meteorological Forecast Data Sheet 1	State EOC	As Available	None
	Berrien County EOC	As Available	None
	NRC	As Available	None
	EOF Personnel	As Available	Distribute to EOF members.
Boardwriter Notes	EOF Personnel	As Available	Distribute to EOF members.

NOTE:	Assistance with off-site radiation protection activities may be arranged with the Industry Support Communicator and EAD per Step 2.5, Details, of this procedure.

1 WHEN dose assessment is considering lake breezes, THEN dispatch the field teams along the standard routes to locations either North and/or South of the plant to determine if the plume is moving in a parallel path to the Lake Michigan shore line.

NOTE:	Verbal permission from the EAD and SEC may be used to authorize KI administration for field team members. RMT-2080-OSC-001, Data Sheet 3, KI Consent Form, should be completed as soon as practical thereafter.

2 IF the projected offsite dose rates for the team positions exceed 1 rem/hr TEDE or 5 rem/hr CDE Thyroid, THEN consider:

- Repositioning the team(s) to reduce the overall expected exposure.
- Distribution of Potassium Iodine (KI) to team members.

3 Have the field teams perform surveys based on the appropriate release status:

3.1 Pre-release - no release has occurred.

3.1.1 Determine the postulated direction and dispersion width of the plume based on the wind direction, wind speed, Pasquill Category stability class, and its associated isopleth.

3.1.2 Position the survey vehicles downwind on Red Route 1.

3.1.3 Have the survey vehicle traverse the downwind portion of the route while surveying for radiation readings above background.

3.1.4 IF above background readings are reported, THEN notify the EAD immediately. An unmonitored release may be occurring.

3.2 Plume Phase

3.2.1 Determine the postulated direction and dispersion width of the plume based on the wind direction, wind speed, Pasquill Category stability class, and isopleth.

3.2.2 Use the projected dose rates as guidance to determine the best distance from the plant to collect airborne sample data without risking overexposure to field team members. Iodine and particulate materials tend to plate out quickly on surrounding surfaces. Airborne samples should be collected at the location of the highest dose rate reading within the plume.

3.2.3 Direct the survey teams to perform either a full traverse or plume definition survey.

a. Full Traverse

1. Direct the survey teams to traverse the plume reporting back, as a minimum, boundary (0.1 mR/hr) and centerline (highest reading) data.

2. IF an air sample is necessary, THEN have it taken at the plume centerline.

3. Record the Field Team data on Data Sheet 2, Offsite Survey Log.

4. Plot the data on a map to define the plume boundaries and centerline.

b. Plume Definition

1. Direct the survey teams to:

- Enter the plume until ≥ 0.1 mR/hr is detected.
- Immediately exit the plume.
- Report back the plume boundary location and radiation reading.

2. Record the Field Team data on Data Sheet 2,Offsite Survey Log.

3. Plot the data on a map to define the plume boundary.

3.2.4 IF field teams report a reading ≥ 1R/hr, THEN immediately notify the EAD. A change in the emergency classification may be necessary.

3.2.5 Compare the field team data to the most recent PARs.

3.2.6 IF the field team data does NOT match the projected location of the plume, THEN immediately notify the EAD. A change to the PAR may be necessary.

3.3 Post Plume Phase

3.3.1 The post plume phase should be performed in 2 stages: (initial and long term)

a. Initial (Ground Deposition Foot Print)

1. Direct the field monitoring teams to traverse the areas the plume covered starting close-in to the plant and working outward.

2. Plot the results on a map to determine the extent of the ground deposition.

3. WHEN the deposition footprint has been determined, THEN initiate the long-term post plume phase sampling.

b. Long Term

NOTE:	Though the emergency may have been terminated prior to entering the long-term post plume phase, these directions are intended to give the field team guidance for the collection of samples.

1. Direct the field teams to collect soil, water, snow, and vegetation samples as applicable within the ground deposition area. Take samples in locations to define deposition on the ground.

2. Direct the field teams to collect soil, water, snow, and vegetation samples as applicable outside the ground deposition area. Negative results are necessary to confirm no hazards are present.

3. Plot the sample positions on a map to allow for further deposition analysis.

4 Direct field team(s) to one of the following locations (as appropriate) for analysis of sampling media as necessary during/after the emergency:

- Plant counting facility (OSC counting facility, Chemistry Lab., or RP counting facility).
- Palisades Nuclear Plant (coordinated with the Industry Support Communicator).

5 Analyze (or direct the analysis of) sampling media per RP and/or Chemistry counting room procedures.

1 Collect samples that are representative of the topography of the area unless otherwise specifically requested.

2 Change the volume or surface area of samples collected as conditions warrant. Note the changes in the comment section on the appropriate form.

3 Log all samples on Data Sheet 3, Environmental Sample Collection, giving a specific location listed in order of preference.

- Physical location
- On a map
- Using landmarks; ensure sufficient references are documented to relocate the specific area.

4 Perform Plume Surveys, as directed:

4.1 Plume Traverse

4.1.1 Traverse the route as instructed by the EOF, keeping the closed window probe outside the vehicle.

4.1.2 Record the location and reading on Data Sheet 2, Offsite Survey Log, where the instrument indicates:

- The leading edge of the plume (0.1 mR/hr)
- The centerline (highest reading) of the plume
- The trailing edge of the plume (0.1 mR/hr)

4.1.3 Transmit the data to the EOF.

4.1.4 **IF** an air sample was requested, **THEN** re-enter the plume to the instructed location and obtain the sample. This is normally performed at the plume centerline.

4.2 Plume Definition

4.2.1 Start the route as instructed by the EOF, keeping the closed window probe outside the vehicle.

4.2.2 Record the location and reading on Data Sheet 2,Offsite Survey Log, where the instrument indicates the leading boundary ($\geq$ 0.1 mR/hr) of the plume.

4.2.3 Exit the plume.

4.2.4 Transmit the data to the EOF.

5 Obtain an air sample as follows:

- Draw a minimum of 4 cubic feet of air.
- Document all air sample data on the air sample envelope.

6 Obtain soil, snow, water, and vegetation samples as follows:

- Use Data Sheet 3 for instructions for collection and documentation of environmental samples.

7 Return collected samples to the location specified by the EOF for analysis.

NOTE:	Obtain individual phone numbers from the Emergency Response Organization Phone Directory.

1 Managers coordinate shift turnovers to ensure plant conditions allow individuals to report to their respective facilities without undue risk or exposure.

2 Security Director coordinates and communicates any plant access restrictions with the security force.

3 Finalize routing instructions prior to notifying any individuals.

4 Obtain position lists specific to the OSC and TSC from RMT-2080-OSC-001 and RMT-2080-TSC-001.

5 IF roadblocks have been established by local or state law enforcement, **THEN** the State EOC should be notified with the list of oncoming personnel to allow passage through roadblocks.

6 IF desired, **THEN** the Dialogic Paging system can be used to contact off-duty team members. Attachment 13, Dialogic Paging System gives detailed instructions for reprogramming and activation.

Shift Start Time: _____

Routing Instructions:

_____

_____

Position Title	Name
Berrien County Liaison	
Boardwriter	
Communicator – Berrien County Sheriff Department	
Communications Director	
Communicator – Michigan State Police	
Communicator –ENS	

Communicator –HPN	
Computer Analyst	
Emergency Director	
Engineering Design & Site Services Manager	
Environmental Assessment Coordinator (1)	
Environmental Assessment Coordinator (2)	
Environmental Assessment Director	
Fax Operator	
Field Monitoring Team Coordinator	
Industry Support Communicator	
Michigan State Police Liaison	
Operations Advisor	
Reactor Physics Analyst	
Regulatory Affairs Coordinator	
Runner (1)	
Runner (2)	
Scheduling & Planning Manager	
Security Director	

NOTE:	The Dialogic Paging system can be reprogrammed to contact off-duty members of the Emergency Response Organization. These actions should only be performed from one facility, preferably the EOF, and should be done to provide subsequent staffing for ALL facilities.

1 Prior to contacting Dialogic:

1.1 Notify the facility managers to instruct all ERO members who are currently in a facility, NOT to respond to the page.

1.2 Prescript the instructions (Dialogic refers to this as a greeting) that will be recorded prior to the activation of the pagers. Consider:

1.2.1 All ERO pagers will be activated. You cannot select a specific team for response.

1.2.2 Having ERO members contact the EOF at particular phone number(s) to receive further instructions after accepting a position.

1.2.3 Where and how the individuals should report. If a release has occurred, it may be advantageous to have member's report to the EOF for transport to the plant.

1.2.4 What time the ERO members are to report.

1.3 Obtain the password code, located in the Dialogic Pager Code lock box in the EOF.

2 To change the recorded instructions for responding ERO members and activate the scenario:

2.1 Call Dialogic. The Dialogic Pager Activation phone number can be obtained from the Emergency Response Organization Phone Directory.

2.2 The system will ask you for your company ID number, followed by the # sign. Enter 1344 #

2.3 The system will ask for your scenario activation password, followed by the # sign. Enter the password code followed by the # sign.

2.4 To start a scenario, enter the scenario ID followed by the # sign or press # alone for more options. Enter 911 #

2.5 The system will state:

2.5.1 To listen to the current scenario message, Press 1

2.5.2 To re-record the scenario message, Press 2

- The system will direct you to record the new message followed by the # sign.

2.5.3 To start the scenario, Press 3

- The system will respond with "The scenario is building". Press # and hang up.

2.5.4 To return to the main menu, Press #

- The system will give more options to consider or press # to end this call.

2.6 Reports will be faxed to the EOF containing the names of the individuals who have responded and accepted a position.

2.7 Forward results to the appropriate facility managers.

NOTE: The Scheduling and Planning Manager can provide the following services to the ERO. This position has the authority to purchase or lease materials and equipment necessary to support the ERO and the Plant and to generate contracts necessary for the augmentation of staffing.

- Arranging lodging for ERO personnel who cannot return to their homes because of an evacuation.
- Arranging lodging for personnel responding from outside agencies.
- Providing for the purchase of food to ERO facility members and support personnel.
- Purchasing or renting equipment necessary to mitigate or respond to emergencies.
- Providing for additional assistance from contractors or other agreement facilities.
- Arranging for delivery of equipment and materials.
- Providing assistance for contractual issues.
- Other services as deemed necessary by the Emergency Director.

1 Obtain permission from the Emergency Director to initiate the requested actions.

2 Generate the appropriate documents necessary to perform the requested action.

3 **UPON** completion of the documents, **THEN** obtain the Emergency Director's approval.

4 IF the materials need to be brought into the 10-mile Emergency Planning Zone, THEN:

- Obtain concurrence from the Environmental Assessment Director for delivery restrictions.
- Discuss the delivery route with the TSC Security Director.
- Ensure the State of Michigan EOC has been notified of the intended delivery and route.

5 Implement the approved request, including any restrictions.

NOTE:	The Berrien County Emergency Operations Center may not be operational immediately after the declaration of a Site Area or General Emergency. Continue to communicate with the Berrien County Sheriff's Department until the Berrien County EOC is operational.

1 Contact the appropriate Berrien County facility based on the emergency classification.

1.1 Alert

1.1.1 Contact the Berrien County Sheriff's Department.

1.1.2 Once communications are established and upon activation of the EOF ensure that the unaffected Control Room is informed that the EOF has taken over communications with Berrien County. This may be done via the Boardwriters' or Managers' Bridge.

1.1.3 UPON receipt of an EMD-32a or EMD-32b, THEN provide the following information:

a. Provide your name, Title (BCSD Communicator), and your telephone number.

b. Provide the remainder of the information as entered on the EMD-32.

1.1.4 UPON receipt of any inquiries from the Sheriff's Department, THEN follow the instructions on the Information Request attachment.

1.1.5 UPON completion of each communication with the Sheriff's Department, THEN hang up the phone and re-establish communications when necessary.

1.2 SAE OR GE

1.2.1 Contact the Berrien County Liaison at the Berrien County EOC. This individual is provided to the county EOC by AEP and is an AEP employee.

1.2.2 Once communications are established and upon activation of the EOF ensure that the unaffected Control Room is informed that the EOF has taken over communications with Berrien County. This may be done via the Boardwriters' or Managers' Bridge.

1.2.3 **UPON** receipt of an EMD-32, **THEN** provide the following information:

a. Provide your name, Title (BCSD Communicator), and your telephone number.

b. Provide all information except the Protective Action Recommendations on the EMD-32a.

1.2.4 **UPON** receipt of any inquiries from the Berrien County EOC, **THEN** follow the instructions on the Information Requests attachment.

1.2.5 Maintain constant communications with the Berrien County EOC. Do not hang up the phone.

1 Contact the NRC using the Emergency Notification System phone.

1.1 Dial the MAIN number listed on the phone. **IF** there is no answer, **THEN** dial the BACKUP number.

1.2 Once communications is established state the following:

- "This is the D. C. Cook Emergency Operations Facility. This is an initial contact notification to ensure communications have been established. The EOF is not activated at this time. Communications relative to plant status should continue from the control rooms.

2 Provide the NRC Duty Officer with the following information relative to plant conditions:

- Current emergency classification.
- Emergency Condition Category (ECC) under which the emergency was declared. Include the ECC number, title, and a brief description of the actual event.
- Current plant conditions.

3 Continue to notify the NRC of changes such as:

- Changes to the emergency classification
- Status of injured personnel
- Equipment unavailability
- Damage control team status
- Calculated leak rates
- Core damage assessment
- Fission product barrier status

4 **UPON** receipt of any inquiries from the NRC that cannot be answered using data already available from other sources, **THEN** follow the instructions on the Information Requests attachment.

1 Contact the NRC using the Health Physics Notification System phone.

1.1 Dial the MAIN number listed on the phone. IF there is no answer, THEN dial the BACKUP number.

1.2 Once communications is established state the following:

- "This is the D. C. Cook Emergency Operations Facility. This is an initial contact notification to ensure communications have been established. Communications relative to Health should continue from the control rooms."

2 Provide the NRC Duty Officer with the following information relative to plant conditions:

- Current emergency classification.
- Emergency Condition Category (ECC) under which the emergency was declared. Include the ECC number, title, and a brief description of the actual event.
- Current plant conditions.

3 Continue to notify the NRC of changes from the EMD-32 such as:

- Changes to the emergency classification
- Meteorological data
- Radiological releases
- Calculated offsite dose and dose rates
- Field Team monitoring data
- PAR

4 UPON receipt of any inquiries from the NRC that cannot be answered using data already available from other sources, THEN follow the instructions on the Information Requests attachment.

NOTE:	Phone extension 1088 exists in the control rooms and the EOF MSP Communicators position. Communications should already be established between the Control Room and the MSP.

1 Contact the Control Room and the MSP Operations Center by:

1.1 Using EOF phone extension 1088, pick up the handset and listen for a dial tone.

1.2 IF a dial tone is present, THEN using another phone, contact the Control Room MSP Communicator by dialing extension 1088.

1.3 IF a dial tone is NOT present, THEN identify yourself and wait for a reply from the Control Room and/or the State.

2 WHEN communications is established, THEN provide the current activation status of the EOF.

3 IF, after activation, the EOF is NOT capable of faxing EMD-32 forms to the State, THEN transmit the information verbally.

- Provide your name, Title (MSP Communicator), and your telephone number (1-269-465-5901, Ext. 1088).
- Provide the remainder of the information as entered on the EMD-32a or EMD-32b.

4 UPON receipt of any inquiries from the MSP, that cannot be answered using data already available from other sources, THEN follow the instructions on the Information Request attachment.

1 **UPON** declaration of an Alert, SAE, or GE, and activation of the EOF, **THEN** contact the following agencies. Obtain phone numbers and contact names from the Emergency Response Organization Phone Directory.

- American Nuclear Insurers (ANI)
- Institute of Nuclear Power Operators (INPO)
- Westinghouse

2 Provide each with the following information:

2.1 ANI

- Plant status
- Current emergency classification
- Offsite PAR
- Offsite Protective Action Orders

2.2 INPO

- Plant status
- Unavailable equipment
- Current emergency classification
- Offsite PARs
- Offsite Protective Action Orders

2.3 Westinghouse

- Plant status
- Unavailable equipment
- Current emergency classification

3 **UPON** receipt of any inquiries that cannot be answered using data already available from other sources, **THEN** follow the instructions on the Information Requests attachment.

4 IF requested, arrange for assistance from the following power plants per Step 2.5, Details, of this procedure.

- Palisades Nuclear Power Plant for analysis of sampling media (Reciprocal Laboratory Use Agreement).

- Palisades Nuclear Plant or Fermi II for assistance with off-site radiation protection activities.

NOTE:	Information requests are designed to document questions and answers for information not normally available.

1 Generating a request.

1.1 Print information request on all-purpose forms in complete and legible format.

1.2 Supply the following minimal information:

- Position requesting the information.
- Position the request is being sent to.
- Detailed question.

1.3 Retain the bottom copy.

1.4 Forward the request to the Communications Director.

1.5 The Communications Director:

1.5.1 Reads the request and ask for clarification if necessary.

1.5.2 Forwards the request to the appropriate position.

2 Responding to a Request.

2.1 Print responses in complete and legible format.

2.2 Forward the response to the Communications Director.

2.3 The Communications Director:

2.3.1 Forwards a copy of the response to the originator.

2.3.2 Retains the original message form.

Facility: Cook Nuclear Plant

Time/Date Forecast Obtained:
_____/_____

Forecast Source: _____ Murray & Trettle
_____ NOAA
_____ Other _____

A. Eight Hour Forecast

1. Wind Direction: _____ Degrees From
2. Wind Speed: _____ Miles Per Hour
3. Differential Temperature: _____ °F or °C
4. Stability Class: _____
5. Remarks: _____
_____
_____
_____

B. Twenty-four Hour Forecast

1. Wind Direction: _____ Degrees From
2. Wind Speed: _____ Miles Per Hour
3. Differential Temperature: _____ °F or °C
4. Stability Class: _____
5. Remarks: _____
_____
_____
_____

Date	Time	Leading Edge		Centerline		Trailing Edge		Initials
		Location	Reading	Location	Reading	Location	Reading	

Environmental Sample Collection Data Sheet
Date: _____ Time: _____ Sampled By: _____ Type: Soil Snow Water Vegetation _____ Location: Location _____ Comments: _____
Soil 1) Do NOT obtain samples from disturbed areas or under trees containing foliage. 2) Remove sufficient soil from the surface of the area to fill a 4-liter sample container. 3) Mark all containers with the date, time, and samplers initials. Surface area of material removed _____ cm^2
Snow 1) Do NOT obtain samples from drifts, disturbed areas, or under trees containing foliage. 2) IF additional snow has fallen since the release occurred, **THEN** remove fresh snow to obtain a representative sample. 3) **IF** it was snowing during the plume phase, **THEN** take the sample to the depth of the accumulated snow exposed to the plume. 4) Collect a minimum of 12-liters of snow. 5) Mark all containers with the date, time, and samplers initials. Surface area of material removed _____ cm^2 Depth _____ cm
Water 1) Do NOT collect samples from stagnant pools under trees containing foliage. 2) Avoid disturbing and collecting the surrounding sediment. 3) Collect a minimum of 4 liters of water. 4) Mark all containers with the date, time, and samplers initials. Sample obtained from a: Stagnant Pool Running Tributary
Vegetation 1) Do NOT obtain samples from disturbed areas or under trees containing foliage. 2) Cut as close to the root as possible, when sampling ground vegetation. 3) Remove material from the outer, exposed areas only, when sampling trees or bushes. 4) Collect only the normally edible portion, when sampling foodstuffs. 5) Collect a minimum of 12 liters of vegetation. 6) Mark all containers with the date, time, and samplers initials Surface area of material removed _____ cm^2

Term	Meaning
AEP	American Electric Power
ANI	American Nuclear Insurers
BCSD	Berrien County Sheriff's Department
CDE	Committed Dose Equivalent
CLOCA	Containment Loss of Coolant Accident
DAP	Dose Assessment Program
EAD	Environmental Assessment Director
ECC	Emergency Condition Category
ED	Emergency Director
EMD-32a	Nuclear Plant Event Notification form
EMD-32b	Nuclear Plant Event Technical Data form
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
ENS	Emergency Notification System
ERO	Emergency Response Organization
FMT	Field Monitoring Team
GE	General Emergency
HPN	Health Physics Network
INPO	Institute of Nuclear Power Operations
JPIC	Joint Public Information Center
KI	Potassium Iodine thyroid blocking agent

Term	Meaning
MSP	Michigan State Police
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
OSC	Operations Support Center
PAO	Protective Action Order
PAR	Protective Action Recommendation
PC	Personal Computer
PET	Plant Evaluation Team
PPC	Plant Process Computer
PORV	Power Operated Relief Valve
RDR	Real-Time Data Repository
RMS	Radiation Monitoring System
SAE	Site Area Emergency
STD	Standard Deviation
TEDE	Total Effective Dose Equivalent
TSC	Technical Support Center
X/Q	Mathematical term for Dispersion Coefficient
ΔT	Net Temperature Difference
ΔZ	Net Vertical Distance

The position descriptions provided are intended as guidance. Deviations and additions to these descriptions are allowed as long as the accomplished objectives can be achieved.

Berrien County Liaison

- Reports to the Berrien County EOC at an SAE or GE. He should be dispatched at an Alert if escalation is expected.
- Assists county personnel with interpretation of data supplied by plant and state facilities as necessary.

Boardwriter

- Reports to the Communications Director.
- Obtains data from the other facilities and the EOF that is considered common to all facilities and the affected control room in a chronological order.
- Provides other facilities with information and decisions generated in the EOF.
- Maintains the Emergency classification Board with the proper emergency classification, classification time, and reasons for the classification.
- Documents incoming messages or inquiries to other EOF personnel on all-purpose message forms and forwards them to the Communication Director.
- Provides the EOF runners with copies of board data at, at least, 15-minute intervals.

Berrien County Sheriff Department Communicator

- Reports to the Communications Director.
- Prior to activation of the Berrien County EOC, provides plant status to the county.
- Upon activation of the Berrien County EOC, provides plant status and radioactive release data to the Berrien County Liaison.

Communications Director

- Reports to the Emergency Director.
- Directs and coordinates communication activities within the facility.

Computer Analyst

- Reports to the Communications Director.
- Provides for all repair/replacement of computer related equipment in the EOF.
- Operates the PPC/RDR used to display data throughout the EOF.

Emergency Director

- Is responsible for the overall command and control of the emergency.
- Assumes responsibility for Classification, Notification and PAR's.
- Communicates with senior state and county officials on plant conditions and PARs.
- Reviews press releases.
- Directs and coordinates EOF activities.

- Activates the EOF.
- Maintains regular communication with the other facility managers on the Managers Bridge.
- Updates EOF members through facility briefs on the status of the emergency approximately every 30 minutes.
- Informs the Environmental Assessment Director of changes in plant parameters that may effect off-site releases or PARs.

Engineering Design & Site Services Manager

- Reports to the Emergency Director.
- Coordinates engineering and technical support from sources outside the ERO.
- Provides engineering support and analysis to the EOF.

ENS Communicator

- Reports to the Communications Director.
- Provides information to the NRC relative to plant equipment conditions and plant status.

Environmental Assessment Coordinator

- Reports to the Environmental Assessment Director.
- Evaluates plant effluent readings for indications of radiological releases.
- Evaluates off-site field team data.
- Performs dose assessment.
- Generates EMD-32 Nuclear Plant Accident Notification forms.
- Make recommendations to the Environmental Assessment Director relative to radioactive releases and plant status.

Environmental Assessment Director

- Reports to the Emergency Director.
- Directs and coordinates offsite radiological assessment.
- Provides basic direction to the Environmental Assessment Coordinators for performing dose assessment.
- Generates PARs
- Directs the Field Team Coordinator for placement of survey vehicles.
- Provides overall radiological habitability assessments of the EOF.
- Requests off-site assistance per pre-arranged agreements with other utilities, if necessary.

Fax Operator

- Reports to the Communications Director.
- Provides Fax services to personnel within the EOF.

- Forwards all copies of incoming Fax's to the facility Runners for distribution and maintenance.
- Forwards all original outgoing Fax's and data sheets to the Communications Director.

Field Monitoring Team Coordinator

- Reports to the Environmental Assessment Director.
- Directs off-site monitoring teams for tracking of radioactive releases (Plumes).
- Directs off-site monitoring teams for collection of post plume samples.
- Provides data plots to the Environmental Assessment Team showing plume locations and footprints.

HPN communicator

- Reports to the Communications Director.
- Provides information to the NRC relative to radiological conditions on-site and off-site releases.
- Provides PARs and Protective Action Orders information.

Industry Support Coordinator

- Reports to the Communications Director.
- Provides communications links to ANI, Westinghouse, and INPO relative to plant status and radioactive releases.
- Arranges for assistance per pre-arranged agreements with other utilities, if necessary.

Michigan State Police Communicator

- Reports to the Communications Director
- Provides plant status and PAR data to the State of Michigan EOC.

Michigan State Police Liaison

- Reports directly to the State of Michigan Emergency Operations Center in Lansing, Michigan.
- Reports to the State of Michigan EOC at a SAE or GE. He should be dispatched at an Alert if escalation is expected.
- Obtains answers to inquiries form the State of Michigan and ensuring these responses are relayed to the State.
- Assists state personnel with interpretation of data supplied by plant facilities as necessary.

Operations Advisor

- Reports to the Emergency Director.
- Assists the ED with classification determinations.
- Provides EOF personnel and off-site agencies with plant status clarifications.

Reactor Physics Analyst

- Reports to the Engineering Design & Site Services Manager.
- Provides EOF personnel with the current core status.
- Determines the current reactor coolant status used in dose assessment.
- Coordinates core damage assessment with TSC-PET personnel.

Regulator Affairs Coordinator

- Reports to the Emergency Director.
- Provides guidance to the Emergency Director for license-based decisions and actions.
- Primary EOF contact for the NRC site response team.

Runner

- Reports to the Communications Director.
- Picks up and delivers copies of forms generated by EOF personnel needing either faxing to other facilities or duplication and distribution to EOF personnel.

Scheduling & Planning Manager

- Reports to the ED and Engineering Design and Site Services Manager.
- Provides support for items such as meals, transportation, temporary lodging, and other logistical issues for personnel within the ERO and other organizations responding to the facility.
- Purchases, leases, or contracts with suppliers for equipment, materials, or personnel necessary to support the emergency.

Security Director

- Reports to the Emergency Director.
- Maintains control of personnel entering and exiting the facility.
- Maintains control of unauthorized personnel within the owner-controlled area at the Buchanan Office Building
- Provides transportation to and from the plant as necessary.
- Arranges shift designations.

Telecommunications Personnel

- Reports to the Communications Director.
- Provide any communications equipment or repair/replacement necessary to support the emergency facilities.

REVIEW AND APPROVAL TRACKING FORM

Procedure Information:

Number: RMT-2080-EOF-002 Rev. 1 Change: 0

Title: Emergency Termination and Recovery

Category (Select One Only):

- ☐ Correction (Full Procedure)
- ☐ Correction (Page Substitution)
- ☐ Cancellation
- ☐ Superseded (list superseding procedures): _____
- ☒ Change (Full Procedure) with Review of Change Only
- ☐ Change (Page Substitution) with Review of Change Only
- ☐ New Procedure or Change with Full Review

Associated Configuration Impact Assessments:

Change Driver/CDI Tracking No(s).: _____ ☒ N/A

Required Reviews:

Cross-Discipline Reviews:

- ☐ Chemistry
- ☐ Maintenance
- ☐ NDM
- ☐ Operations
- ☐ PA/PV
- ☐ Reg Affairs
- ☐ RP
- ☐ Training
- ☐ Work Control
- ☒ Emergency Directors
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ None Required

Programmatic Reviews:

- ☐ ALARA
- ☐ Component Engineering
- ☐ Design Engineering
- ☐ Emerg Oper Proc Grp
- ☐ Environmental
- ☐ ISI/IST Coordinator
- ☐ Performance Assurance
- ☐ Reactivity Mgmt Team
- ☐ SPS (Safety & Health)
- ☐ Surveillance Section
- ☐ System Engineering
- ☐ _____
- ☐ _____
- ☒ None Required

☒ Cognizant Org Review: Cindy Shaffenius Date: 11/18/02

☒ Technical Review: B K Mallory Date: 12/3/02

Concurrence:

☐ Ops Director Concurrence: N/A Date: / /

Package Check:

Updated Revision Summary attached? ☒ Yes

10 CFR 50.59 Requirements complete? Tracking No.: 2002-1658-00 ☒ Yes ☐ N/A

Implementation Plan developed? (Ref. Step 3.4.17) ☒ Yes ☐ N/A

Package Complete: Cindy Shaffenius Date: 12/3/02

Approvals:

PORC Review Required: ☒ Yes ☐ No Mtg. No.: 3785

Administrative Hold Status: ☐ Released ☐ Reissued ☒ N/A CR No.: _____

Approval Authority Review/Approval: _____ Date: 1/13/03

Expiration Date/Ending Activity N/A Effective Date: 1/17/03

Periodic Review:

Periodic Review conducted? (Data Sheet 5 Complete) ☐ Yes ☒ No

Follow-up Actions:

Commitment Database update requested in accordance with PMP-7100-CMP-001? ☐ Yes ☒ N/A

NDM notified of new records or changes to records that could affect record retention? ☐ Yes ☒ N/A

NDM Use Only		**Office Information For Form Tracking Only – Not Part of Form**
		This form is derived from the information in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 10, Data Sheet 1, Review and Approval Tracking Form.

REVISION SUMMARY

Number: RMT-2080-EOF-002 Revision: 1 Change: 0

Title: Emergency Termination and Recovery

Section or Step	Change/Reason For Change
Step 2.3	Change: Added the following text to the step: "for a Site Area Emergency or General Emergency only. PORC concurrence is not required for an Unusual Event or Alert." Reason: Lesson learned from Alert event of 6/12/02; Plant Manager input. Consensus of managers revealed that PORC concurrence not necessary for an Unusual Event or Alert termination.
Step 2.4	Change: Removed the reference to obtain agreement from "local organizations, and FEMA" to terminate an emergency classification. Reason: The State of Michigan (or Berrien County if State EOC is not activated) and the NRC are the concurrence organization contacts necessary to terminate an event; concurrence of FEMA and "local organizations" are not required to terminate.
Step 2.5	Change: Added text for EOF to send a final EMD-32a form upon termination and for notifying the ERO of the termination. Reason: Incorporation of "termination" check box on State of Michigan EMD-32a form; enhancement to inform the remainder of the ERO of event termination.

AMERICAN ELECTRIC POWER	RMT-2080-EOF-002	Rev. 1	Page 1 of 5
Emergency Termination and Recovery			
Information		Effective Date: 1/17/03	
C. J. Graffenius	S. M. Partin	Emergency Planning	
Writer	Owner	Cognizant Organization	

TABLE OF CONTENTS

1 PURPOSE AND SCOPE

1.1 This procedure provides guidance to the Emergency Response Organization (ERO) for termination of the emergency and initiating recovery actions from an Alert, Site Area Emergency, General Emergency, or when directed by the Site Emergency Coordinator (SEC).

1.2 The termination of an emergency and subsequent recovery efforts will depend on the nature of the emergency and the status of plant systems following the emergency. The general provisions within this procedure are expected to be applicable to all emergencies, however, it is permissible to supplement or deviate from this guidance with provisions specific to the emergency at hand.

1.3 Use of this procedure is restricted to emergency conditions or drills/exercises only.

2 DETAILS

2.1 **IF** the Emergency Directors' (ED) position has been staffed **THEN**, the ED assumes the responsibilities for implementation of this procedure **OTHERWISE**, the SEC maintains these responsibilities.

2.2 Prior to termination of the emergency or reduction in the emergency staff and its facilities the ED:

- Evaluates existing conditions with respect to the criteria established for each emergency classification.
- Determines that plant conditions are stable and will continue to improve.
- Determines the plant has control of and terminated any non-routine releases of radioactive material to the environment and dose assessment/protective action recommendations can be terminated.
- Determines the control or cessation of any fires, floods, earthquakes, windstorms, or similar natural occurring phenomenon.
- Determines equipment availability is adequate and can be accessed for repair or redundant systems are available.
- Determines the plant status relative to technical specifications, including any compensatory actions.
- Determines that long term core cooling is available.
- Determines the core shutdown margin is adequate.

- Determines the core shutdown margin is adequate.
- Determines offsite power is available for long term operation of emergency equipment.
- Determines offsite conditions will not limit access of personnel or support resources.
- Determines access to radiological areas of the plant necessary for operation of plant equipment is adequate.
- Ensures all required notifications have been completed.

2.3 Obtain Plant Operations Review Committee (PORC) concurrence with the above evaluation for a Site Area Emergency or General Emergency only. PORC concurrence is not required for an Unusual Event or Alert.

2.4 **IF** it is determined the emergency can be terminated **THEN** prior to termination the ED obtains agreement to terminate the emergency with the NRC and the State of Michigan, (or Berrien County if the State EOC is not operational).

2.5 **IF** an agreement is reached, **THEN** the ED terminates the emergency by:
- Faxing a final EMD-32a form to offsite agencies indicating that the event is terminated,
- Informing the ERO that the event is terminated.

2.6 **UPON** termination of the emergency, **THEN** the ED:

2.6.1 Assembles a Recovery Team with the following recommended disciplines:

- Managerial
- Operations
- Engineering
- Maintenance
- Radiation Protection
- Chemistry
- Safety
- Scheduling

- Emergency Planning
- Plant Protection
- Licensing
- Training

2.6.2 The ED briefs the Recovery Team on current plant and emergency status.

NOTE: Steps 2.6.3 and 2.6.4 should be performed concurrently.

2.6.3 The Recovery Team:

1. Develops an initial recovery plan and recovery organization
2. Obtains PORC approval of the plan
3. Implements the plan

2.6.4 The Recovery Team:

- Apprises all offsite agencies of the recovery process.
- Coordinates recovery activities with offsite agencies, as applicable.
- Assembles all documentation generated during the emergency.
- Terminates all emergency radiation exposure limit controls.
- Obtains PORC review and approval of any procedures to be used relative to nuclear safety and plant recovery.
- Documents any procedural changes or corrections instituted during the emergency either through termination or the procedure change process.
- Restores the emergency response facilities and organization to its full readiness.

2.7 **WHEN** the plant has been restored to its pre-emergency status or to a modified pre-emergency status capable of power operations, **THEN** the ED terminates recovery efforts.

3 REFERENCES

3.1 Use References:

3.1.1 None

3.2 Writing References:

3.2.1 Source References

a. D. C. Cook Nuclear Plant Emergency Plan

b. NUREG-0654 Criteria For Preparation And Evaluation Of Radiological Emergency Response Plans And Preparedness In Support Of Nuclear Power Plants.

3.2.2 General References

a. 10 CFR 50, Appendix E

REVIEW AND APPROVAL TRACKING FORM

Procedure Information:

Number: RMT-2080-OSC-001 Rev. 2 Change: 0

Title: Activation and Operation of the OSC

Category (Select One Only):

- ☐ Correction (Full Procedure)
- ☐ Correction (Page Substitution)
- ☐ Cancellation
- ☐ Superseded (list superseding procedures): ______
- ☒ Change (Full Procedure) with Review of Change Only
- ☐ Change (Page Substitution) with Review of Change Only
- ☐ New Procedure or Change with Full Review

Associated Configuration Impact Assessments:

Change Driver/CDI Tracking No(s).: ______ ☒ N/A

Required Reviews:

Cross-Discipline Reviews:

☐ Chemistry	☐ Training
☐ Maintenance	☐ Work Control
☐ NDM	☒ SEC/ED
☐ Operations	☐ ______
☐ PA/PV	☐ ______
☐ Reg Affairs	☐ ______
☐ RP	☐ None Required

Programmatic Reviews:

☐ ALARA	☐ Performance Assurance
☐ Bus. Services Proc Grp	☐ Reactivity Mgmt Team
☐ Component Engineering	☐ SPS (Safety & Health)
☐ Design Engineering	☐ Surveillance Section
☐ Emerg Oper Proc Grp	☐ System Engineering
☐ Environmental	☐ ______
☐ ISI/IST Coordinator	☒ None Required

☒ Cognizant Org Review: Cindi Graffenius Date: 9/27/02

☒ Technical Review: BKMalloy Date: 9/30/02

Concurrence:

☐ Ops Mgr Concurrence: N/A Date: / /

☒ Owner Concurrence: [signature] Date: 9/27/02

Package Check:

Updated Revision Summary attached? ☒ Yes

10 CFR 50.59 Requirements complete? Tracking No.: 2002-~~1428~~ 1430-00 [initials] 10/2/02 ☒ Yes ☐ N/A

Implementation Plan developed? (Ref. Step 3.4.18) ☐ Yes ☒ N/A

Package Complete: BKMalloy Date: 10/3/02

Approvals:

PORC Review Required: ☒ Yes ☐ No Mtg. No.: 3972 [initials]

Administrative Hold Status: ☐ Released ☐ Reissued ☒ N/A CR No.: ______

Approval Authority Review/Approval: JMolden Date: 10/4/02

Expiration Date/Ending Activity ______ Effective Date: 10/9/02

Periodic Review:

Periodic Review conducted? (Data Sheet 5 Complete) ☐ Yes ☒ No

Follow-up Actions:

Commitment Database Updated? ☐ Yes ☒ N/A

NDM notified of new records or changes to records that could affect record retention? ☐ Yes ☒ N/A

NDM Use Only

Office Information For Form Tracking Only - Not Part of Form

This form is derived from the information in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 9a, Data Sheet 1, Review and Approval Tracking Form.

REVISION SUMMARY

Number: RMT-2080-OSC-001 Revision: 2 Change: 0

Title: Activation and Operation of the OSC

No marginal markings used.

Section or Step	Change/Reason For Change
Note prior to Step 1 of Attachment 1	Change: Changed note to state that the facility should be activated within an hour, rather than having a one hour requirement. Reason: To bring procedure in line with the Emergency Plan which states that one hour activation is a goal.

Office Information for Form Tracking Only - Not Part of Form

This is a free-form as called out in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 9a.

TABLE OF CONTENTS

1 PURPOSE AND SCOPE

1.1 This procedure provides guidance to Operation Support Center (OSC) personnel during emergencies.

1.2 Use of this procedure is restricted to emergency conditions or drills/exercises only.

NOTE:	If a deviation from Technical Specifications or License Condition is necessary, then refer to 10 CFR 50.54(x) and (y) for requirements.

2 DETAILS

2.1 The OSC Manager implements this procedure.

2.2 Limit dose to all workers during an emergency to 5 rem whole body unless a dose extension is authorized by the SEC.

2.3 This procedure provides guidance through the use of attachments.

2.4 Use Attachment 1, Activation, when an emergency is declared.

2.5 Use Figure 1, Definitions and Abbreviations, for listing of abbreviations, acronyms, and their meanings.

2.6 Figure 2, Position Descriptions contains supplemental directions for ERO personnel.

2.7 Perform activities based on the following table:

NOTE: O = Optional M = Mandatory

Activity	Attachment	Responsible Position	UE	Alert	Site Area	General
Activation	1	OSC Manager	O	M	M	M
Facility Briefings	2	OSC Manager	M	M	M	M
Habitability	3	RPD		O	M	M
Meteorological Data	4	Maintenance Supervisor		M	M	M
Plant PABX	5	OSC Security		O	M	M
Team Briefing	6	Skills Supervisors		M	M	M
Team Status	7	Resource Coordinator		M	M	M
Personnel Rescue	8	OSC Manager		M	M	M
OSC Shift Designation	9	OSC Manager		M	M	M
Document Transmission	10	Asst. OSC Manager		M	M	M
Exposure Tracking	THP-6010-RPP-705	RPD	M	M	M	M

3 REFERENCES

3.1 Use References:

3.1.1 THP-6010-RPP-705, Manual Access Control.

3.2 Writing References:

3.2.1 Source References

a. Donald C. Cook Nuclear Plant Emergency Plan

b. NUREG-0654/FEMA-REP-1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants

c. NUREG-0696, Functional Criteria for Emergency Response Facilities

3.2.2 General References

a. None

NOTE: The OSC should be activated within 60 minutes of the time of the declaration of an Alert, SAE or GE.

1 Ensure the facility has the following or an acceptable alternate (as determined by the OSC Manager) prior to activation.

1.1 Equipment

- Facility power
- Survey instruments
- Clocks set with the PPC (RDR)

1.2 Communications

- Telephone or radios
- Communications with the TSC
- Manager's telephone bridge

NOTE: The use of non-qualified personnel is permissible provided they are briefed and understand the position specific requirements.

1.3 Personnel

- ☐ OSC Manager or assistant
- ☐ RP Director
- ☐ OSC Boardwriter
- ☐ Maintenance Supervisor
- ☐ RP Technicians (4)(includes personnel reporting to the Control Room)
- ☐ Maintenance Personnel (4)
- ☐ Chemistry Technician (2)(includes personnel reporting to the Control Room)

2 Prior to activation of the OSC, perform a facility briefing.

3 Notify the other facilities that the OSC is activated.

NOTE:	Facility briefings should be conducted at least once every 30 minutes unless changing plant conditions warrant more frequent briefings.

1 Announce the briefing time 2 to 3 minutes prior to it beginning.

2 Ensure everyone is paying attention, there are no phone conversations or side discussions taking place, and personnel should restrict movement during the brief.

3 Perform the briefing. (Time limits are for reference only.)

3.1 Current Plant Status (1- Minute Maximum)

- Major on-going events
- Major Equipment out of service
- Prognosis
- Significant radiological problem areas
- Direction of airborne release, if known

3.2 Current Classification (30-Seconds Maximum)

3.3 Status of the OSC (for initial briefings up to and including activation)

- OSC equipment or communications problems
- Activation Status
- Problems delaying activation

4 Identify any High Priority information that the TSC is waiting for from the OSC (30 seconds maximum).

5 Identify the OSC's first priority (15 seconds maximum).

6 Request updates from the OSC team on important information or problems

- Don't solve the problems here. Delegate; then update at the next briefing if necessary.

1 Periodically assess OSC for protective actions (evacuation, KI administration) for OSC personnel based upon the following:

Whole Body Dose Rate	100 mR/hr. dose rate	Evacuate OSC within 1 hr.
Total Effective Dose Equivalent	3 rem individual(s) cumulative dose	Evaluate need for affected individual(s)
I-131 Airborne Concentration	2E-6 µCi/cc *	Evacuate OSC immediately AND recommend KI administration *

* KI should be distributed when activity reaches approximately 2E-6µCi/cc of I-131. KI is available in the OSC RPD office. Use Data Sheet 3, KI Consent Form.

2 Post OSC according to RP procedures.

- Post signs and control points where necessary.

3 Perform routine habitability surveys where and when necessary.

3.1 Check plant areas for habitability where plant personnel are assembled:

- Both Control Rooms
- Operations Shift Manager's Office
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)
- TSC
- Assembly Areas
- North Access Control
- South Access Control

4 Perform routine plant surveys where necessary.

4.1 Check plant areas for habitability as directed by RPD.

- Turbine Building
- Auxiliary Building
- Inside the Protected Area

5 Request assistance from the EOF.

- Survey plant areas outside the Protected Area

NOTE:	This attachment is ONLY required if Met Data cannot be obtained from the PPC (RDR).

1 To obtain local Met Tower data:

1.1 Obtain the keys to the Met Tower from the OSC key box in the RP supply room.

1.2 Contact the affected Control Room prior to obtaining the Met Data.

1.3 Proceed to the Met Tower, located east of the plant across Red Arrow Highway.

1.4 Take directions from the EOF.

2 Open the box (on the North wall) housing the data logger.

3 Remove the blue ribbon cord plug from the receptacle near the center of the data recorder.

4 Plug the other blue ribbon cord from the keypad into the receptacle on the data recorder where the previous plug was removed.

NOTE:	Pressing "A" will advance to the next parameter, pressing "B" will backup one parameter.

5 Establish communications using the data recorder key pad by pressing:

a. *
b. *
c. 6
d. A

6 Obtain the requested parameters, using the following table of codes:

Parameter	Code
Wind Speed at 10 meters (m)	01
Wind Speed at 60 m	02
Wind Direction at 10 m	03
Wind Direction at 60 m	04
Temperature at 10 m (°C)	05
Delta Temperature (60 – 10 m)	06
Dew Point at 10 m	07
Precipitation	08

7 Communicate requested Data to the EOF.

8 **UPON** completion of obtaining Met Data, **THEN:**

8.1 Remove the keypad ribbon from the receptacle.

8.2 Plug the data recorder ribbon into the receptacle.

8.3 Close the data logger box.

8.4 Exit and lock building.

8.5 Return to the OSC or as directed by the EOF or OSC.

8.6 Return the keys to the key box.

1 Perform the following to bar the plant PABX:

- Proceed to the PABX room, located 2nd floor, Lakeside Office Building.
- Turn Switch # 1 from "Normal" to "Emergency".
- Turn Switch # 2 from "Normal" to "Emergency".
- Report position of the PABX switch to the OSC Manager.

2 **WHEN** it is desired to unbar the PABX System, **THEN** perform the following:

- Turn Switch # 1 from "Emergency" to "Normal".
- Turn Switch # 2 from "Emergency" to "Normal".
- Report position of the PABX switch to the OSC Manager.

NOTE: The following teams are automatically dispatched as soon as the appropriate personnel are available:

- Two Offsite survey teams (Designated as Teams #1 and #2))

1 Onsite Teams

1.1 Obtain the Team Request Form.

1.2 Determine Initial Plant Conditions.

1.3 Determine the type of team needed:

- Damage Control
- Rescue
- Survey

1.4 Assemble appropriate team members.

1.5 Complete Team Briefing Form.

1.6 Conduct Data Sheet 1, Team Briefing and consider the following:

- Determine tools and equipment needed to complete mission
- Determine drawings/prints needed for mission
- Determine protective clothing needed for mission
- Determine respiratory equipment needed for mission
- Determine the need for potassium iodide tablets
- Determine in-plant route to follow

1.7 Notify Resource Coordinator prior to leaving OSC

1.8 Update Team Status Board

1.9 Ongoing Mission Status Reports:

- Brief the appropriate skills supervisor approximately every 15 minutes
- The skills supervisor will brief the assistant OSC Manager on the field team status for Team Status Board Updates.

1.10 Mission Completion:

- Check in with the Resource Coordinator
- De-Brief with appropriate skills supervisors, RPD, and Assistant OSC Manager and complete Data Sheet 2, Team De-Briefing Form.
- Update Team Status Board
- Brief the TSC

2 Offsite Teams

2.1 Offsite Briefing:

- Determine if a radiological release is in progress
- **IF** the EOF is activated, **THEN** contact the FMT Coordinator in the EOF, for survey instructions
  -OR-
- **IF** the EOF is not activated, and a release is in progress, **THEN** information needs to be provided to the offsite team(s) by the Control Room or TSC (such as):
  - Release point
  - Wind direction
  - Wind speed

1 Appropriate Skills Supervisors

1.1 Obtain the following information from the Field Team(s), approximately every 15 minutes.

- Job progress
- Problems encountered
- Dose levels
- Dose rate levels
- Estimated job duration

1.2 Brief Team Status to the Assistant OSC Manager.

2 Assistant OSC Manager

2.1 Update Team Status Board in the OSC Manager's Office.

2.2 Brief the TSC.

1 Personnel Rescue

- Medical emergencies have priority.
- Consideration should be given to the radiological exposure already obtained by the injured person and rescue personnel.
- Consider plant conditions prior to leaving the OSC (plant lighting, radiation levels, steam line breaks, etc.).
- Consider Dose Extension paperwork. This can be done during the team briefing.
- Dose extensions should be automatic for life saving and rescue missions.
- Dose extensions **CAN NOT** be approved for personnel if they have already exceeded their limits.

2 Assign two individuals to the team at a minimum.

- Assign a RP Technician and a plant EMT to the team if possible or have one readily available.
- Assign an OSC person to receive continuous radio transmissions from the rescue team.
- Provide a short briefing to the team. (A briefing form does not need to be completed prior to the team being dispatched out of the OSC.)

3 Consider the following safety concerns (Activities in hazardous areas).

- Be aware of hazardous material exposure areas.
- Be aware of entries into confined areas.
- Caution should be taken in areas where fires are present or could start.
- Consider moving the person out of the area if high radiation levels are present.
- Deviation from normal RP controls and policies is only permitted when it has been identified to be a life-threatening situation.

4 Rescue Actions

4.1 Report findings to the Operations Shift Manager (or Designee) and OSC:

- Number of injured personnel (if known)
- Nature and severity of injuries
- Contamination levels (if known)
- Location of injured personnel
- Cause of injury (if known)
- Special medical needs
- Ambulance/hospitalization required
- Is additional assistance required from the OSC

5 Egress Actions

5.1 Contact the Operations Shift Manager and request the location on the ambulance.

5.2 Notify the Operation's Shift Manager to notify the hospital(s) to prepare to receive contaminated or non-contaminated patient(s) from the plant.

5.3 Inform the hospital of the patient(s) status.

5.4 Transport the patient(s) to the ambulance.

5.5 Report patient(s) conditions to the ambulance personnel:

- Injuries
- First Aid measures taken
- Patient's current condition
- Radiological status
- Contamination status

6 Debrief with OSC

- Complete De-Briefing form

NOTE:	Obtain individual phone numbers from the Emergency Response Organization Phone Directory.

1 Facility Managers coordinate shift turnovers to ensure plant conditions allow individuals to report to their respective facilities without undue risk or exposure.

2 Facility Managers should determine manpower resources required for next shift designation and report this to the EOF Security Director.

3 Next Shift Notification

3.1 Provide a list of the current OSC responders to the EOF Security Director.

Position Title	Name
OSC Manager	
Asst. OSC Manager	
OSC Boardwriter	
Maintenance Supervisor	
RP Director	
Chemistry Supervisor	
Resource Coordinator	
Mechanic (3)*	
Electrician (4)*	
I&C Technician (4)*	
Welder (2)*	
Chemistry Technician (3)*	
RP Technician (7)*	
Driver (2)	
Fire Brigade	
Security	

* These OSC responders do not carry ERO pagers and must be contacted by phone.

NOTE:	Some of the facility Fax machines are designated within the phone directory as TRANSMIT and others as RECEIVE. These Fax machines should remain in their designated mode to better facilitate communications between facilities.

1 Ensure the Fax machine's date and time is set correctly.

2 Obtain the Fax machine phone numbers for the facilities from the Emergency Response Organization Phone Directory.

3 **IF** an incoming Fax is NOT specifically addressed to an individual or position, **THEN** distribute the incoming Fax within the facility as directed by the document.

4 Copy and distribute incoming documents within the facility as directed by the document.

5 Log all incoming and outgoing Fax's in the facility Fax Log.

6 Utilize the following table for directions on the distribution of material:

Document	Destination	Frequency	Additional Instructions
Team Request Form	Assistant OSC Manager	As Available	Incoming team request from the TSC.
Boardwriter Notes	OSC Personnel	As Available	The boardwriter notes shall be distributed to the OSC Manager, RPD, and posted for OSC skilled personnel.
Dialogic Persons Responding Report	OSC Manager	As Available from Dialogic	ERO personnel responding to emergency or next shift.

Team Mission:

Team Number: Team Priority:

Team Members: ACAD Number

TL -

Team Mission Details:

Turn Back Dose Rate: Turn Back Dose:

Dosimetry Required | Protective Clothing Required | Respiratory Required

Potassium Iodide Required: YES / NO

Dose Extension Approved: YES / NO

Limits: Rem TEDE Rem Thyroid CDE

Special Instructions:

Team Mission:

Team Number: Team Leader:

Work Performed:

Problems Encountered:

Radiological Conditions:

Notes:

Was Mission Completed: YES / NO

Were KI Tablets Ingested: YES / NO

WHO SHOULD NOT TAKE POTASSIUM IODIDE TABLETS

The only people who should not take potassium iodide are people who know they are allergic to iodide. You may take potassium iodide even if you are taking medicines for a thyroid problem (for example, a thyroid hormone or antithyroid drug). Pregnant and nursing women, babies, and children may also take this drug.

SIDE EFFECTS: Usually side effects of potassium iodide happen when people take higher doses for a long time. You should be careful not to take more than the recommended dose or take it longer than you are told. Side effects are unlikely because of the low dose and the short time you will be taking the drug.

Possible side effects include skin rashes, swelling of the salivary glands, and "iodism" (metallic taste, burning mouth and throat, sore teeth and gums, symptoms of a head cold, and sometimes stomach upset and diarrhea).

A few people have had an allergic reaction with more serious symptoms. These could be fever and joint pains; swelling of parts of the face and body and at times severe shortness of breath requiring immediate medical attention.

Taking iodide may rarely cause overactivity of the thyroid gland, underactivity of the thyroid gland, or enlargement of the thyroid gland (goiter).

WHAT TO DO IF SIDE EFFECTS OCCUR: If side effects are severe or a possible allergic reaction occurs, notify plant RP or your immediate supervisor.

DOSAGE: Take one tablet a day for a total period of ten (10) days. Report to RP each day to receive your KI dose or take it on your own if RP gave the whole bottle to you.

INDIVIDUAL RIGHTS: The use of KI as a thyroid blocking agent is voluntary. If you have a known allergy to iodide or iodine, do not participate in this activity. If you choose to participate, you must complete this KI CONSENT FORM.

I, _____, volunteer to receive 130 milligrams per day of the thyroid blocking agent potassium iodide (KI), for a period of the next ten (10) days consecutive days. I have been informed of the intent and possible consequences of the use of potassium iodide.

Signature: _____ Date: _____

KI administration has been authorized
by the SEC: _____ / _____
Time / Date

Dosage/Date Taken: 1 / _____, 2 / _____, 3 / _____, 4 / _____, 5 / _____,

6 / _____, 7 / _____, 8 / _____, 9 / _____, 10 / _____

RP Supervisor/Engineer Review: _____
Upon completion of KI Administration

Term	Meaning
ALARA	As Low As Reasonable Achievable
CDE	Committed Dose Equivalent
ED	Emergency Director
EMT	Emergency Medical Technician
EOF	Emergency Operations Facility
ERO	Emergency Response Organization
FMT	Field Monitoring Team
GE	General Emergency
KI	Potassium Iodide
OSC	Operations Support Center
PABX	Private Automated Branch Exchange (Plant Telephone System)
PPC	Plant Process Computer
RAC	Radiological Assessment Coordinator
RDR	Real-Time Data Repository
RP	Radiation Protection
RPD	Radiation Protection Director
SAE	Site Area Emergency
SEC	Site Emergency Coordinator
SPO	Security Post Order
TEDE	Total Effective Dose Equivalent
TL	Team Leader

TLD	Thermoluminescent Dosimeters
TSC	Technical Support Center
UE	Unusual Event

The position descriptions provided are intended as guidance. Deviations and additions to these descriptions are allowed as long as the accomplished objectives can be achieved.

OSC Manager

- Directs and coordinates OSC activities
- Activates the OSC
- Maintains constant communications with the other facility managers on the "Managers Bridge"
- Updates OSC members through facility briefs on the status of the emergency approximately every 30 minutes

Assistant OSC Manager

- Reports to the OSC Manager
- Assumes the duties of the OSC Manager in his absence
- Assist in the briefs of the OSC Teams
- Distributes all-purpose message forms as needed
- Maintains the OSC Team Board in the OSC Manager's office
- Directs the de-briefs of the teams upon returning to the OSC

RP Director

- Reports to the OSC Manager
- Briefs the OSC Teams on radiological concerns
- Obtains plant conditions from the Radiological Assessment Coordinator in the TSC
- Directs and coordinates the activities of the RP Technicians
- Assists in the de-briefs of the teams upon returning to the OSC

OSC Boardwriter

- Reports to the Asst. OSC Manager
- Obtains data from the other facilities and the OSC that is considered common to all facilities and the affected Control Room in a chronological order
- Provides other facilities with information and decisions generated in the OSC
- Maintains the Emergency Classification Board with the proper emergency classification, classification time, and reasons for the classification
- Documents incoming messages or inquiries to other OSC personnel on all-purpose message forms and forwards them to the Asst. OSC Manager
- Provides the OSC Manager/Asst. OSC Manager, RP Director, and skilled personnel with copies of board data
- Maintain the Fax Logbook

Maintenance Supervisor

- Reports to the OSC Manager
- Directs and coordinates the activities of the Maintenance personnel
- Briefs the Maintenance Teams prior to being dispatched
- Assists in the de-briefs of the teams upon returning to the OSC
- Communicates information from the teams in the field and advises team status back to the Asst. OSC manager

Chemistry Supervisor

- Reports to the OSC Manager
- Directs and coordinates the activities of the Chemistry Technicians
- Assist in the de-briefs of the Chemistry teams upon returning to the OSC

RP Technicians

- Reports to the RP Director
- Provides radiological support and coverage to ERO Teams and Facilities
- Performs plant habitability surveys

Maintenance Personnel

- Reports to the Maintenance Supervisor
- Performs maintenance activities as directed

Chemistry Technicians

- Reports to the Chemistry Supervisor
- Performs chemistry activities as directed

Off-Site Survey Drivers

- Upon initial arrival to the OSC, reports to the RP Director
- After leaving site, reports to the FMT Coordinator in the EOF
- Drives the RP Survey Team as directed by the FMT Coordinator

Resource Coordinator

- Reports to the Asst. OSC Manager
- Maintains the OSC Team Status Board
- Coordinates Teams in and out of the OSC

Fire Brigade

- Reports to the OSC Manager
- Provides Fire Protection Services to the OSC Manager
- Coordinates OSC and plant activities pertaining to fighting, HAZMAT and rescue concerns

OSC Security Officer

- Reports to the OSC Manager
- Maintains the emergency key cards and plant keys
- Bars the PABX as directed

REVIEW AND APPROVAL TRACKING FORM

Procedure Information:

Number: RMT-2080-TSC-001 Rev. 2 Change: 0

Title: **Activation and Operation of the TSC**

Category (Select One Only)

- ☐ Correction (Full Procedure)
- ☒ Change (Full Procedure) with Review of Change Only
- ☐ Correction (Page Substitution)
- ☐ Change (Page Substitution) with Review of Change Only
- ☐ Cancellation
- ☐ New Procedure or Change with Full Review
- ☐ Superseded (list superseding procedures): ______

Associated Configuration Impact Assessments

Change Driver/CDI Tracking No(s).: ______ ☒ N/A

Required Reviews

Cross-Discipline Reviews:		Programmatic Reviews:	
☐ Chemistry	☐ Training	☐ ALARA	☐ Performance Assurance
☐ Maintenance	☐ Work Control	☐ Bus. Services Proc Grp	☐ Reactivity Mgmt Team
☐ NDM	☒ SECs/EDs	☐ Component Engineering	☐ SPS (Safety & Health)
☐ Operations	☐ ______	☐ Design Engineering	☐ Surveillance Section
☐ PA/PV	☐ ______	☐ Emerg Oper Proc Grp	☐ System Engineering
☐ Reg Affairs	☐ None Required	☐ Environmental	☐ ______
☐ RP		☐ ISI/IST Coordinator	☒ None Required

☒ Cognizant Org Review: Cindy Graffenius Date: 9/27/02

☒ Technical Review: B K Malloy Date: 9/30/02

Concurrence

☐ Ops Mgr Concurrence: N/A Date: _/_/_

☒ Owner Concurrence: [signature] Date: 9/27/02

Package Check

Updated Revision Summary attached?	☒ Yes	
10 CFR 50.59 Requirements complete? Tracking No.: 2002-1429-00	☒ Yes	☐ N/A
Implementation Plan developed? (Ref. Step 3.4.18)	☐ Yes	☒ N/A
Package Complete: B K Malloy	Date: 10/2/02	

Approvals

PORC Review Required: ☒ Yes ☐ No Mtg. No.: 3972

Administrative Hold Status: ☐ Released ☐ Reissued ☒ N/A CR No.: ______

Approval Authority Review/Approval: [signature] Date: 10/4/02

Expiration Date/Ending Activity: ______ Effective Date: 10/9/02

Periodic Review

Periodic Review conducted? (Data Sheet 5 Complete) ☐ Yes ☒ No

Follow-up Actions

Commitment Database Updated? ☐ Yes ☒ N/A

NDM notified of new records or changes to records that could affect record retention? ☐ Yes ☒ N/A

NDM Use Only

Office Information For Form Tracking Only – Not Part of Form

This form is derived from the information in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 9a, Data Sheet 1, Review and Approval Tracking Form.

REVISION SUMMARY

Number: RMT-2080-TSC-001 Revision: 2 Change: 0

Title: Activation and Operation of the TSC

Section or Step	Change/Reason For Change
Note prior to Step 1 of Attachment 1	Change: Revised note to state that the TSC *should* be activated within 60 minutes of emergency declaration, rather than *requiring* facility activation within 60 minutes of emergency declaration. Reason: Revised statement to match the Emergency Plan, that the 60-minute activation time is a goal, not a requirement.

Office Information for Form Tracking Only – Not Part of Form

This is a free-form as called out in PMP-2010-PRC-002, Procedure Correction, Change, and Review, Rev. 9a.

TABLE OF CONTENTS

1 PURPOSE AND SCOPE

1.1 This procedure provides guidance to Technical Support Center (TSC) personnel during emergencies.

1.2 Use of this procedure is restricted to emergency conditions or drills/exercises only.

2 DETAILS

NOTE:	10 CFR 50.54(x) and (y) describe the actions required if deviation from Technical Specifications or License Condition becomes necessary.

2.1 The SEC/Assistant SEC implements this procedure.

2.2 Use Attachment 1, Activation, when an emergency response is initiated.

2.3 Refer to Figure 1, Definitions and Abbreviations, for a listing of abbreviations, acronyms, and their meanings.

2.4 Refer to Figure 2, Position Descriptions, for supplemental directions for ERO personnel.

NOTE: O = Optional M = Mandatory

2.5 Perform activities based on the following table.

Activity	Attachment	Responsible Position	UE	Alert	Site Area	General
Activation	1	SEC/Assistant SEC	O	M	M	M
Briefings	2	SEC/Assistant SEC	M	M	M	M
Habitability	3	RAC		O	M	M
Shift Designation	4	SEC/Assistant SEC	O	M	M	M
Document Transmission/Distribution	5	Administrative Coordinator	O	M	M	M
Emergency Response Data System (ERDS)	6	Computer Analyst	O	M	M	M
Radiological Assessment/Release in Progress	7	RAC	O	M	M	M
Team Requests/Team Priority	8	PET/SEC		O	O	O
Team Status	8	Team Coordinator		O	O	O
Accountability	9	Security Director		O	M	M
Site Evacuation	10	Security Director		O	M	M
Loss of RDR	11	PET OPS/RAC (ARAC)	O	O	O	O
Dose Extension Authorization	12	SEC		M	M	M
Potassium Iodide (KI) Administration Authorization	13	SEC		M	M	M
Classification	14	SEC	M	M	M	M
Core Damage Assessment	PMP-2081-EPP-105	PET Reactor Physics Analyst		M	M	M
Barring of the Plant PABX	RMT-2080-OSC-001, Attachment 5	Security Director		O	M	M
Fission Product Barrier Status (relative to Emergency Classifications)	12-PMP-2080-EPP-101	PET Operations	O	O	O	O

3 REFERENCES

3.1 Use References:

3.1.1 EPA-400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

3.1.2 10 CFR 20, Standards for Protection Against Radiation

3.1.3 Donald C. Cook Nuclear Plant Emergency Plan

3.2 Writing References:

3.2.1 Source References

a. EPA-400-R-92-001

b. 10 CFR 20

c. Donald C. Cook Nuclear Plant Emergency Plan

d. NRC Commitment #3863

3.2.2 General References

a. 10 CFR 50, Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities

NOTE:	The TSC should be activated within 60 minutes of the time of a declaration of an Alert, SAE, or GE.

1 Ensure the facility has the following or an acceptable alternate (as determined by the Assistant SEC or SEC) prior to activation.

1.1 Equipment

- Facility Power
- Continuous Air and Area Radiation Monitor
- PPC (RDR)
- Clocks synchronized with the PPC

1.2 Communications

- Telephones, Fax machines, or Radios
- Communications with the Control Room
- Managers Telephone Bridge
- Communicators Bridge

1.3 Personnel

NOTE:	The use of non-qualified personnel is permissible if they are briefed and understand the position specific requirements.

- ☐ Administrative Coordinator
- ☐ Boardwriter
- ☐ Control Room Communicator (located in the Control Room, but vital to TSC operation)
- ☐ SEC
- ☐ PET Operations or PET Training
- ☐ PET Maintenance Engineering
- ☐ PET Reactor Physics Analyst *
- ☐ Radiological Assessment Coordinator *

* Position may not be necessary in all situations (e.g., non-radiological emergencies).

2 Prior to activation of the TSC, perform a facility briefing.

3 Inform TSC personnel and the other ERO facilities that the TSC has been activated.

1 Announce the briefing time 2 to 3 minutes prior to it beginning.

2 Ensure personnel are paying attention, there are no phone conversations or side discussions taking place, and personnel remain stationary during the brief.

3 Perform the briefing. (Time limits are for reference only.)

3.1 **Current Plant Status** (1 Minute Maximum)

- Major on-going events
- Major equipment out of service
- Prognosis

3.2 **Current Classification** (30 Seconds Maximum)

- PAR in effect
- Anticipated changes in classification or PAR

3.3 **Identify any high priority information that the Control Room is waiting for from the TSC** (30 seconds maximum)

3.4 **Identify the TSC's first priority** (15 seconds maximum)

4 **Status of the TSC** (not required after activation)

- Activation Status (When command and control will be taken over from the Control Room)
- Problems delaying activation

5 **Ask the TSC team for updates on important information**

- Don't solve the problems here. Delegate; then update at the next briefing if necessary.

6 **Ask the TSC team if anyone is having any problems**

- Don't solve the problems here. Delegate; then update at the next briefing if necessary.

1 TSC Ventilation System

1.1 Request permission from the Control Room to place the TSC ventilation system in the recirculation mode if any of the following apply:

- The emergency involves a loss of coolant accident
- The Control Room Pressurization System has been activated
- Other air quality issues (e.g., smoke, fumes) affect the TSC.

1.2 **IF** permission is obtained from the affected unit control room, **THEN** place the TSC ventilation switch in the recirculation mode. This switch is located on the north wall of the communications room.

1.3 Inform the SEC that the TSC ventilation has been placed in the recirculation mode.

2 Radiological Monitoring

2.1 Periodically assess the TSC for protective actions (evacuation, KI administration) for TSC personnel based upon the following:

Parameter	Action Level	Recommended Action
Whole Body Dose Rate	2 R/hr. dose rate	Evacuate TSC immediately
Total Effective Dose Equivalent	3 rem individual(s) cumulative dose	Evacuate affected individual(s) immediately
I-131 Airborne Concentration	2E-5 μCi/cc *	Evacuate TSC immediately AND recommend KI administration *

* KI should be distributed when activity reaches approximately 2E-5μCi/cc of I-131. KI is available in the TSC NRC room. Obtain authorization from the SEC and consent from affected individuals using Data Sheet 3 of 12-RMT-2080-OSC-001.

3 Evacuation of TSC

3.1 Per the recommendation of the RAC, or based upon the SEC's discretion, the TSC may be evacuated for radiological or other habitability considerations. This should be accomplished via the following guidance:

- Only the minimum number of staff members (as determined by the SEC) should be relocated to the unaffected unit's Control Room. All others should be evacuated to the OSC for radiological assessment and possible site evacuation.
- Staff members evacuating to the OSC will do so by following the route designated by the RAC.
- Notify the SEC, Control Room, OSC and EOF of the evacuation of the TSC.

1 Facility Managers coordinate shift turnovers to ensure plant conditions allow individuals to report to their respective facilities without undue risk or exposure.

2 Managers should determine manpower resources required for next shift designation and report this to the EOF Security Director.

3 To aid in the callout process, provide a list of the TSC responders currently in attendance to the EOF Security Director, using the following table:

Position Title	TSC Responders Currently in Attendance
Assistant Radiological Assessment Coordinator	
Radiological Assessment Coordinator	
Site Emergency Coordinator	
TSC Administrative Coordinator	
TSC Boardwriter	
TSC Control Room Communicator	
TSC Administrative Support	
TSC PET-Computer Analyst	
TSC PET-Maintenance	
TSC PET-Operations	
TSC PET-Training	
TSC Team Coordinator	
TSC PET-Reactor Physics Analyst	
TSC Public Affairs Liaison	
TSC Security Director	
Assistant SEC	

NOTE:	Some of the facility Fax machines are designated within the phone directory as TRANSMIT and others as RECEIVE. These machines should remain in their designated mode to better facilitate communications between facilities.

1 Documentation to be Distributed or Transmitted (Faxed or hand carried)

1.1 Ensure the Fax machine Dates and Times are set correctly.

1.2 Fax machine phone numbers for the facilities and offsite agencies are available in the Emergency Response Organization Phone Directory.

1.3 Duplicate all documents for distribution per Steps 1.6 and 1.7.

1.4 Forward all originals to the Administrative Coordinator.

1.5 Log incoming and outgoing faxes in the facility Fax Logbook.

1.6 Distribute incoming faxes to the positions as described on the facility distribution map located in the copy area.

1.7 The following table gives additional direction on the transmission/distribution of material:

Document	Destination	Frequency	Additional Instructions
EMD-32a (class. Upgrade) and/or EMD-32b (technical update)	Received from EOF	Upgrade or 30 minutes	Distributed to TSC personnel.
Technical Information Sheet (PMP-2080-EPP-100, Data Sheet 1) (Completed/distributed **ONLY** when the PPC is unavailable)	Obtained from the Control Room, it is Faxed to the EOF and ENC or JPIC; also distributed in TSC	15 minutes **ONLY** when the PPC is unavailable	Only sent/distributed when the PPC is unavailable; copies to TSC personnel.
Radiation Monitoring System Data Sheet (Data Sheet 2 of this procedure) (Completed/distributed **ONLY** when the PPC is unavailable)	Obtained by the RAC or designee, it is Faxed to the ENC or JPIC; also distributed in TSC	15 minutes **ONLY** when the PPC is unavailable	RAC completes this form with data of interest. Only sent when the PPC is unavailable.
TSC Plant Chronological Status Board Notes	Distribute in TSC	As available	TSC Boardwriter prints a copy of the status board before cleaning to make room for new data.
Response Team Request (Data Sheet 1 of this procedure)	Approved by the SEC, this form is Faxed to the OSC	As necessary	TSC faxes this form to the OSC; this information can be disseminated concurrent with verbal communications through the TSC OSC Communicator.
Persons Responding Report (Dialogic)	Received from Dialogic	15 min. (for 1 hr. after pager activation)	Distributed to SEC/Assistant SEC (ERO personnel responding to emergency or next shift)

NOTE:	10 CFR 50, Appendix E requires ERDS to be activated within 1 hour following an Alert or higher event classification.

1 Activate ERDS from the PPC by:

1.1 Clicking on 'Cook E-Plan Tasks'.

1.2 Clicking on the appropriate unit designator (1, 2, or Simulator).

1.3 Either:

- Type in "ERDS" and press enter or
- Click on "ER", then "ERDS"

1.4 Activate the ERDS transmission to the NRC by:

- Pressing the F1 key or
- Click on the screen location labeled "ACTIVATE"

2 IF ERDS transmission is lost, **THEN**:

- Press the F3 key or
- Click on the screen location labeled "RECONNECT"

3 Terminate ERDS transmission by:

3.1 Contacting the NRC to request permission to terminate the ERDS transmission. (The ERDS Operation Center phone number is located in the Emergency Response Organization Phone Directory.)

3.2 IF permission is granted, **THEN**:

- Press the F2 key or
- Click on the screen location labeled "TERMINATE"

1 Review the Radiation Monitoring System channel and meteorological data concentrating on:

1.1 Effluent release points;

1.1.1 **IF** an unmonitored release is suspected to be in progress and the associated RMS monitor is unavailable, **THEN** dispatch off-site monitoring team(s) immediately to perform a site boundary survey, and inform the SEC and EAD.

1.2 Containment high range area monitors. Trigger points for classification changes are:

- 10 R/hr – Alert
- 200 R/hr – SAE
- 1000 R/hr - GE

1.3 Channel operability status;

1.4 Trends;

NOTE:	PPC displays what direction the wind is coming **from** (e.g., a PPC display of wind direction at 270° indicates that the wind is coming from due west).

1.5 Wind speed and wind direction.

2 Review current locations of personnel within the facility to:

2.1 Determine occupied downwind facilities;

2.2 Evaluate the need for pre-release facility evacuation.

3 Evaluate radiological conditions for the OSC by:

3.1 Review Radiation Monitoring System monitors to determine site radiological conditions;

3.2 Determine best entry and egress team routes.

4 **IF** any significant changes occur which could affect teams or other plant personnel, **THEN** notify:

- Radiation Protection Director (in the OSC)
- Site Emergency Coordinator

5 **IF** a radiological release is imminent or occurring, **THEN:**

5.1 Immediately notify the Assistant SEC or SEC.

5.2 Evacuate downwind facilities.

5.3 Inform the Radiation Protection Director in the OSC. Determine consequences and implement corrective actions for dispatched teams and other occupied facilities. Consider:

- Sheltering in an unaffected area of the plant
- Evacuation back to the OSC
- Effect on or need for on-site accountability and evacuation
- Facilities occupied outside the Control Rooms, TSC and the OSC

5.4 Pinpoint the release origin point with the assistance of the PET.

5.5 Initiate Control Room, TSC, OSC, and assembly area habitability assessments.

5.6 Evaluate the need to administer KI to individuals exposed to, or potentially exposed to the plume.

5.7 Evaluate the need for any uptake assessments or medical follow-up observations for individuals exposed to the plume.

NOTE:	The SEC approves requests for OSC teams.

1 Request a response team by:

1.1 Completing Data Sheet 1, Response Team Request.

1.2 Obtaining RAC opinion/concurrence on the feasibility of the team being able to perform the task (from a radiological standpoint).

2 The SEC determines overall need and team priority by:

2.1 Determining the immediate need of the request.

2.2 Comparing the need to teams already being assembled or dispatched. Consider:

- The effect on the OSC of re-prioritization of previously requested teams
- Possibility of existing teams performing the work

2.3 The SEC then approves the request as appropriate and determines team priority.

3 The TSC Team Coordinator:

3.1 Updates the team status board.

3.2 Informs the OSC verbally of the request.

3.3 Updates the OSC of team priorities as they are established or changed.

4 **WHEN** the SEC has approved the request, **THEN** transmit Data Sheet 1, Response Team Request, to the OSC.

NOTE:	Plant conditions may have required the evacuation of the SAS or CAS

1 Notify the SAS or CAS to initiate accountability per Security procedures.

2 **WHEN** accountability has been completed, **THEN** notify the SEC of any unaccounted for individuals [Commitment #3863]. This must be accomplished within 30 minutes of the accountability order.

3 **IF** individuals are unaccounted for, **THEN** the Security Director shall:

3.1 Provide a list of unaccounted personnel to each of the facilities.

3.2 Instruct the managers of each facility to verify the missing personnel are not in the facilities.

3.3 Initiate searches for the missing personnel. Searches can be done via:

- Plant public address system
- Plant personnel paging system
- Assembling search teams via the TSC

3.4 Provide the SEC and facilities with periodic updates on status until all missing personnel are accounted for.

1 IF in an alert, THEN:

1.1 Recommend to the SEC the immediate evacuation of containment buildings and the Auxiliary Building of all personnel not responding to the emergency.

1.1.1 IF the recommendation is approved and has not already been performed by the Control Room, THEN:

a. Notify the Control Room that an announcement will be made.
b. Notify the other emergency facility managers the announcement will be made.
c. Make the following announcement 2 times on the plant public address system:

"Attention all plant personnel. Attention all plant personnel. Because of plant conditions, all personnel within the Auxiliary and Containment buildings immediately evacuate the area."

1.2 Recommend to the SEC that all non-essential personnel be required to leave site.

1.2.1 IF the recommendation is approved and has not already been performed by the Control Room, THEN:

a. Notify the control room that an announcement will be made.
b. Notify the other emergency facility managers the announcement will be made.
c. Make the following announcement 2 times on the plant public address system:

"Attention all plant personnel. Attention all plant personnel. Because of plant conditions, all non-essential personnel are to leave the plant site at this time using their vehicles and normal plant access routes."

d. Make the same announcement 2 times in the training building by:

Dialing 1646

e. Initiate Security actions (via the TSC Security Director) to evacuate all personnel from all plant facilities outside the protected area.

NOTE:	It is possible to enter a Site Area Emergency or General Emergency without having passed through an Alert. Because accountability is required at a Site Area Emergency or a General Emergency, all personnel within the plant-protected area should be either at or in the process of reporting to an emergency assembly area.

2 **IF** in a Site Area Emergency or General Emergency, **THEN:**

2.1 Obtain directions from the RAC for the evacuation process and route to be used. Consider:

- If a release of radioactive material has occurred.
- The potential for a release of radioactive material to occur during the evacuation process.
- Wind direction, wind speed, and the potential for a wind shift
- Current weather conditions or plant conditions that might affect evacuees safety.
- If sheltering is preferred over evacuation until a release of radioactive material is terminated or other conditions warrant.
- If evacuees should use personal vehicles or mass transit.
- If evacuees should assemble at an off-site location outside the 10-mile EPZ for further instructions or subsequent staffing.

2.2 Notify the SEC of the intended route and evacuation process to be used.

2.3 **IF** the evacuees cannot use their personal vehicles, **THEN:**

- Arrange for mass transportation to be available at a predetermined pickup point through the Berrien County EOC.
- Release personnel only after transportation has been confirmed in route or in place.

2.4 **IF** the Security procedure for the evacuation of personnel outside the protected area has not already been initiated, **THEN** initiate the procedure.

2.5 Request a team from the OSC to brief evacuees and direct them offsite using the recommended evacuation route.

2.6 Periodically report the evacuation progress to the SEC until completed.

NOTE:	Loss of the RDR or PPC in any facility will require personnel from the TSC to respond and supply data as needed. The methods used for collection of data are listed in order of preference to minimize interference with control room operations and employ ALARA principals.

1 IF the RDR is not available in a facility, THEN determine which data is needed. It is recommend this data be supplied at 15-minute intervals with significant changes being transmitted immediately.

1.1 RMS (RAC or ARAC)

1.1.1 Obtain data from:

- RMS Interface Terminals
- PPC
- Unaffected control room Control Terminal
- Affected control room Control Terminal
- Local DAM readings (request a team from the OSC)

1.1.2 Record RMS data for requested channels on Data Sheet 2, Radiation Monitoring System.

1.1.3 Supply data sheets to TSC Administrative personnel for transmittal and dissemination (as per Attachment 5, Document Transmission/Distribution, of this procedure).

1.2 Plant Status (PET Operations or PET Training)

1.2.1 Obtain data from:

- PPC
- Affected control room
- Available local devices (request a team from the OSC)

1.2.2 Record plant status data on Technical Information Sheet (PMP-2080-EPP-100, Data Sheet 1).

1.2.3 Supply data sheets to TSC Administrative personnel for transmittal and dissemination.

1.2.4 WHEN the RDR returns to service, THEN recall any field teams, if appropriate.

NOTE:	The SEC authorizes dose extensions (doses in excess of 10 CFR 20 and per the guidance in EPA-400-R-92-001) for individuals/teams during emergencies. Section 1 is provided as guidance when considering dose extensions. Exposures exceeding 25 REM whole body should only be considered and used as a last resort. The use of ALARA principles and multiple personnel shall be considered first.

1 Precautions and Limitations

1.1 Dose to all workers during an emergency should be limited to 5 rem whole body when practical.

1.2 Dose to workers performing emergency services under emergency conditions are treated as a once in a lifetime exposure.

1.3 Individuals who have received >10 rem in a previous incident have received their "once in a lifetime" exposure and are not allowed to exceed 10 rem in this incident.

1.4 Dose extensions should not be authorized for exposures which would be accrued in an emergency that are not related to the incident. Administrative dose limits should apply in these cases.

1.5 Minors and Declared Pregnant Females are not to be considered for receiving emergency doses.

1.6 Workers should not be allowed dose limits greater than 5 rem whole body unless both of the following conditions have been satisfied.

- Lower doses through the rotation of workers or other commonly used dose reduction methods are not possible, and,
- Instrumentation is available to measure their exposure.

1.7 Workers performing services during emergencies should, for the duration of the incident, be limited to:

- Dose to the lens of the eye to three (3) times the listed whole body values
- Dose to any other organ, including skin and body extremities, to ten (10) times the listed whole body values

1.8 Exposures should be limited as follows:

1.8.1 Protection of Valuable Property

- 10 rem whole body per incident for the protection of valuable property

1.8.2 Protection of Large Population

a. <25 rem whole body per lifetime if the exposure of workers that is incurred for the protection of large population may be considered justified for situations in which the collective dose avoided by the emergency operation is significantly larger than that incurred by the workers involved

b. >25 rem whole body per lifetime if the exposure of workers that is incurred for the protection of larger populations may be considered justified for situations in which the collective dose avoided by the emergency operation is significantly larger than that incurred by the workers involved provided:

- The dose received is on a voluntary basis
- The individual has full awareness of the risks involved
- The individual has signed next to his/her name on the dose extension form

1.8.3 Life Threatening Situations

a. <25 rem whole body per lifetime for life saving activities

b. >25 rem whole body per lifetime for an unavoidable life threatening situation provided:

- The Dose received is on a voluntary basis
- The individual has full awareness of the risks involved (see Section 2 of this attachment)
- The individual has signed next to his/her name on the dose extension form

1.9 Dose extensions are given for the task, not for the duration of the emergency.

2 Provide the information contained in this section to the individuals receiving emergency dose extensions:

Health Effects Associated with Whole Body Absorbed Doses Received Within a Few Hours[a]			
Whole Body Absorbed dose (rad)	Early Fatalities[b] (percent)	Whole Body Absorbed dose (rad)	Prodromal Effects[c] (percent affected)
140	5	50	2
200	5	100	15
300	50	150	50
400	85	200	85
460	95	250	98

[a] Risks will be lower for protracted exposure periods.

[b] Supportive medical treatment may increase the dose at which these frequencies occur by approximately 50 percent.

[c] Forewarning symptoms of more serious health effects associated with large doses of radiation.

Approximate Cancer Risk to Average Individuals from 25 rem Effective Dose Equivalent Delivered Promptly. To estimate average cancer mortality for moderately higher doses the results may be increased linearly.

Age at exposure (years)	Appropriate risk of premature death (deaths per 1,000 persons exposed)	Average years of life lost if premature death occurs (years)
20 to 30	9.1	24
30 to 40	7.2	19
40 to 50	5.3	15
50 to 60	3.5	11

3 Complete Data Sheet 3, Dose Extension Form (using TSC Administrative personnel between the OSC and TSC as necessary).

3.1 Once SEC permission has been obtained, individuals may be dispatched from the OSC.

NOTE:	The SEC authorizes the use of KI during emergencies, under the recommendations of the RAC or RPD. Section 1 provides guidance for when KI should be administered.

1 The RAC or RPD should consider KI administration to affected individuals in the following instances:

1.1 Prior to teams being dispatched when a radioactive release is known or suspected following fuel or clad damage.

1.2 Prior to teams being dispatched when airborne concentrations to iodine are likely, suspected, or unknown following fuel or clad damage.

1.3 Within 2 hours of a known or suspected uptake of iodine.

1.4 When I-131 airborne concentrations approach 2E-5μCi/cc.

2 IF the RAC or RPD determines that KI administration is advisable, **THEN** request authorization of the SEC for KI administration.

3 IF authorization for KI administration has been obtained from the SEC, **OBTAIN** consent from individual(s) via 12-RMT-2080-OSC-001, Data Sheet 3, KI Consent Form.

4 IF consent has been given, **THEN** administer KI per the instruction of the RAC or RPD.

NOTE:	KI is normally taken once per day for 10 days.

5 **UPON** completion of KI administration, **RETURN** the completed KI Consent Form to RP.

1 Perform classifications using PMP-2080-EPP-101.

2 IF a classification upgrade is warranted and the EOF has not been activated:

- Note the time of the classification.
- Notify the control room of the following:
  - classification upgrade
  - the time of the classification
  - to initiate plant public address announcements
  - sound the Nuclear Emergency Alarm as specified in the control room procedures
  - to make off-site notifications as specified in the control room procedures.
- Notify the other facilities as applicable.
- Perform a facility brief.

3 IF the EOF has been activated, **THEN** the Emergency Director must approve all classification upgrades.

TIME/DATE _____/_____

MISSION DETAILS:

_____

_____

_____

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_____

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_____

_____

_____

_____

_____

_____

_____

ADDITIONAL INFORMATION: _____

APPROVED: _____ _____/_____
SEC TIME DATE

TRANSMITTED TO OSC: _____/_____
TIME DATE

Unit No. _____ Date _____ Time _____

Data Collected by _____ Reviewed by _____

	ALARMS / TRENDS	MONITOR	CURRENT READING	UNITS	LOCATION
1	/	VRS-1101 / 1201		mR/h	Upper CTMT Area
2	/	VRS-2101 / 2201		mR/h	Upper CTMT Area
3	/	VRA-1310 / 2310		R/h	Upper CTMT High Range Area
4	/	VRA-1410 / 2410		R/h	Lower CTMT High Range Area
5	/	ERS-1301 / 2301		µCi	Lower CTMT Airborne Particulate
6	/	ERS-1303 / 2303		µCi	Lower CTMT Airborne Iodine
7	/	ERS-1305 / 2305		µCi/cc	Lower CTMT Airborne LRNG
8	/	ERS-1307 / 2307		µCi/cc	Lower CTMT Airborne MRNG
9	/	ERS-1309 / 2309		µCi/cc	Lower CTMT Airborne HRNG
10	/	ERS-1401 / 2401		µCi	Lower CTMT Airborne Particulate
11	/	ERS-1403 / 2403		µCi	Lower CTMT Airborne Iodine
12	/	ERS-1405 / 2405		µCi/cc	Lower CTMT Airborne LRNG
13	/	ERS-1407 / 2407		µCi/cc	Lower CTMT Airborne MRNG
14	/	ERS-1409 / 2409		µCi/cc	Lower CTMT Airborne HRNG
15	/	VRS-1501 / 2501	/	µCi	Unit Vent Effluent Particulate
16	/	VRS-1503 / 2503	/	µCi	Unit Vent Effluent Iodine
17	/	VRS-1505 / 2505	/	µCi/cc	Unit Vent Effluent LRNG
18	/	VRS-1507 / 2507	/	µCi/cc	Unit Vent Effluent MRNG
19	/	VRS-1509 / 2509	/	µCi/cc	Unit Vent Effluent HRNG
20	/	MRA-1601 / 2601		µCi/cc	S/G PORV Loop 1
21	/	MRA-1602 / 2602		µCi/cc	S/G PORV Loop 4
22	/	MRA-1701 / 2701		µCi/cc	S/G PORV Loop 2
23	/	MRA-1702 / 2702		µCi/cc	S/G PORV Loop 3
24	/	SRA-1805 / 2805		µCi/cc	Gland Steam Leakoff LRNG
25	/	SRA-1807 / 2807		µCi/cc	Gland Steam Leakoff MRNG
26	/	SRA-1809 / 2809		µCi/cc	Gland Steam Leakoff HRNG
27	/	SRA-1905 / 2905		µCi/cc	Steam Jet Air Ejector LRNG
28	/	SRA-1907 / 2907		µCi/cc	Steam Jet Air Ejector MRNG
29	/	SRA-1909 / 2909		µCi/cc	Steam Jet Air Ejector HRNG
30	/	DRS-3101 / 4101		µCi	S/G Blowdown
31	/	DRS-3201 / 4201		µCi	S/G Blowdown Treatment
32	/	SFR-1810 / 2810		CFM	Gland Steam Leakoff Flow
33	/	SFR-1910 / 2910		CFM	Steam Jet Air Ejector Flow
34	/	VFR-1510 / 2510	/	CFM	Unit Vent Effluent Flow
35	/	Wind Speed		MPH	
36	/	Wind Direction		° (From)	
37	/	Air Temp. Δ T		° F	

ALARMS: (H) High, (A) Alert, (F) Fail, etc. **TREND:** ↑ ↓ → (Increase, Decrease, Steady, etc.)
Comments:

DOSE RATES IN AREAS OF THE PLANT:	OTHER:
650' SFP Area	
633' Hallway	
609' Hallway	
587' Hallway	
573' Hallway	
609' Access Control	
Emergency Sampling	
U1 591' BDFT Area	
U2 591' BDFT Area	

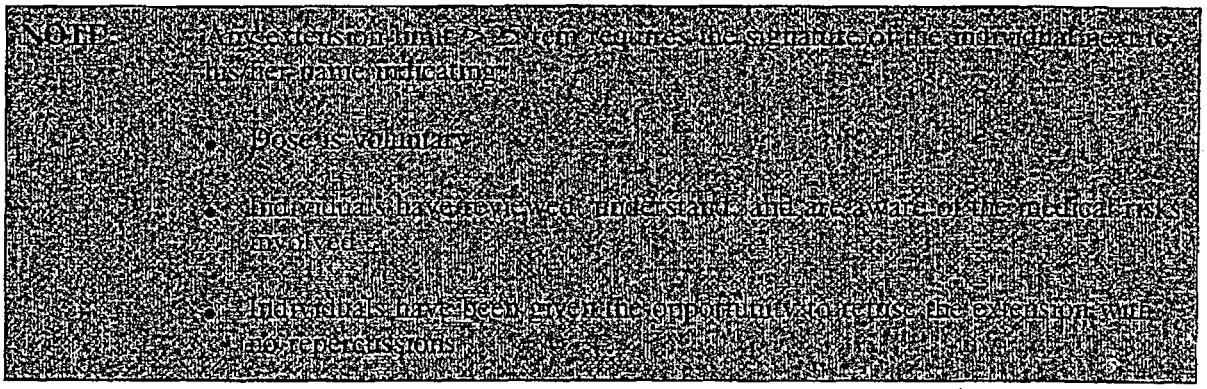
Request Date: _____ Time: _____

Estimated Dose Rate: _____

Estimated Stay Time: _____

Estimated Dose: _____

Reason for Dose Extension Request:


NOTE: Any exclusion limit > 25 rem requires the signature of the individual next to his/her name indicating:

- Dose is voluntary
- Individuals have reviewed, understand, and are aware of the radiological risks involved
- Individuals have been given the opportunity to refuse the extension with no repercussions

Name	SSN	Current Incident Dose	Dose Extension Limit

Radiological Assessment Coordinator: _____ Date/Time: _____
Approval Authority (Non-Delegable Signature)

Site Emergency Coordinator: _____ Date/Time: _____
Approval Authority (Non-Delegable Signature)

Term	Meaning
ARAC	Assistant Radiological Assessment Coordinator
CAS	Central Alarm Station
DAM	Data Acquisition Module
EAD	Environmental Assessment Director (EOF)
EOC	Emergency Operations Center (Lansing)
EOF	Emergency Operations Facility
ENC	Emergency News Center
ERDS	Emergency Response Data System
ERO	Emergency Response Organization
GE	General Emergency
JPIC	Joint Public Information Center
KI	Potassium Iodide (thyroid blocking agent)
OSC	Operations Support Center
PAR	Protective Action Recommendation
PET	Plant Evaluation Team
PPC	Plant Process Computer
RAC	Radiological Assessment Coordinator
RDR	Real-time Data Repository
RMS	Radiation Monitoring System
SAE	Site Area Emergency

Term	Meaning
SAS	Secondary Alarm Station
SEC	Site Emergency Coordinator
TSC	Technical Support Center
UE	Unusual Event

The position descriptions provided are intended as guidance. Deviations and additions to these descriptions are allowed as long as the accomplished objectives can be achieved.

Assistant SEC

- Ensures all TSC staff carry out their assigned functions;
- Ensures timely exchange of information within the TSC staff and among interfacing facilities;
- Manages the activities of the Plant Evaluation Team (PET);
- Works with the Operations Support Center Manager to implement repair and corrective action activities;
- Interfaces with the SEC on matters such as emergency classification and on-site actions in progress.
- Confers and/or advises the Public Affairs Liaison in determining responses to requests for information when requested.
- Fulfills SEC duties in the absence of the SEC.

Radiological Assessment Coordinator and Assistant RAC

- Provides expertise in the area of radiation protection to the PET and Assistant SEC;
- Provides assistance to the Radiation Protection Director in determination of protective actions for on-site personnel, including emergency response teams. These protective action determinations include:

  - Assembly/evacuation of non-essential personnel,
  - Evacuation of on-site emergency response facilities due to adverse radiological conditions,
  - Administration of KI.

- Determines staffing needs in the area of radiation protection and informs the SEC/Assistant SEC of deficiencies in this area.
- Obtains the approval of the Site Emergency Coordinator (SEC) for individuals to exceed the dose limits specified in 10 CFR 20.
- Periodically assesses TSC radiological habitability and makes recommendations to the SEC/Assistant SEC for facility evacuation if necessary.
- Obtains RMS data from the Control Terminal or directly from radiation monitors when the PPC is unavailable. Applicable data is transcribed on the Radiation Monitoring System Data Sheet for transmission to the EOF and applicable public information center (ENC or JPIC).

Plant Evaluation Team

- Requests OSC response team(s) (through the SEC) to perform diagnostic or mitigating actions as necessary;
- Provides an independent technical analysis of plant conditions;
- Develops corrective action recommendations;
- Provides technical assistance to Operations personnel when requested;
- Monitors fission product barrier status (PET Operations);
- Recommends emergency classification changes as necessary;
- Responds to questions from off-site agencies, as directed by the SEC/Assistant SEC;
- Provides a person to act as Scribe in updating the Plant Status Board in the event that the PPC becomes unavailable (PET-Training representative is suggested), as requested by the Administrative Coordinator.

Public Affairs Liaison

- Communicates with public affairs personnel at the ENC or JPIC to provide information relative to the emergency when requested.
- Confers with the SEC/Assistant SEC to determine responses to public affairs personnel information requests when necessary.

TSC Boardwriter

- Maintains the chronological event status board based upon information obtained from the Control Room Communicator and as deemed necessary by the Assistant SEC;
- Communicates information from the TSC to the EOF and Control Room, including status/activities of the OSC;
- Relays incoming messages/requests to the applicable TSC member when requested by the Control Room or EOF.

TSC Administrative Support

- Transmission of hard copy documents from the TSC to the EOF and/or OSC;
- Transmission of hard copy documents from the TSC to the ENC or JPIC as appropriate (see Attachment 5 "Document Transmission/Distribution" for documents that are "routinely" transmitted).
- Hand carries documents between the TSC and Control Room (conditions permitting);
- Duplicates and distributes documents within the TSC;

- Performs general administrative tasks as directed by the Administrative Coordinator (see Attachment 5 "Document Transmission/Distribution" for documents that are "routinely" distributed).

TSC Team Coordinator

- Communicates directions regarding team dispositioning from the Assistant SEC or SEC to the OSC;
- Receives status reports on emergency response teams from the OSC and provides this information to the TSC.
- Relays messages from the OSC to the applicable TSC personnel.

TSC Administrative Coordinator

- Directs and coordinates communications activities in the TSC, including providing direction to the FAX Administrative Support, Boardwriter, and TSC Team Coordinator;
- Duplicates and distributes hard copy documents within the TSC;
- Transmits hard copy documents to the EOF, ENC, or JPIC;
- Acquires technical documents (prints, procedures, technical manuals, etc.) at the request of the Plant Evaluation Team.
- Compiles information to be reported off-site from the PET and RAC;
- Obtains approval of the SEC/Assistant SEC prior to releasing any information off-site.
- Announces information over the plant Public Address system as directed by the SEC/Assistant SEC.
- Assigns a TSC member to act as a Scribe in updating the Plant Status Board in the event that the PPC is not functioning. (It is suggested that the PET-Training representative perform this function.)

Security Director

- Initiates and oversees Security actions for site personnel assembly and accountability when requested by the SEC.
- Initiates and oversees Security actions for evacuation of site personnel when requested by the SEC.
- Implements Security actions to bar the PABX (plant telephone system) upon the declaration of a Site Area Emergency or higher classification.

Site Emergency Coordinator

- Reviews the emergency situation with the Shift Supervisor.
- Assumes the Site Emergency Coordinator responsibilities from the Shift Supervisor for overall management of plant and emergency response functions, and assures that proper actions are being taken to mitigate the event.
- Ensures that the proper State/County authorities, NRC and AEP officials are notified.
- Makes recommendations to State/County authorities responsible for offsite emergency measures during the initial phase of the nuclear incident prior to activation of the EOF.
- Orders the assembly, accountability, and evacuation of all non-essential plant personnel upon the declaration of a Site Area Emergency (or higher) classification, or at a lower classification if deemed prudent by SEC judgement. (Accountability may be performed via the plant exit turnstiles, rather than assembly areas, if so designated by the SEC.)
- Grants approval of PET requests for OSC team actions.
- Prioritizes OSC team missions by importance.
- Orders the evacuation of the TSC for habitability concerns, if necessary, and relocation or evacuation of TSC personnel.
- Relinquishes all TSC and Control Room responsibilities and functions relative to Classification, Notification, and PAR's upon activation of the EOF.