

Davis Besse Power Station
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Davis-Besse Nuclear Power Station

EMERGENCY PLAN IMPLEMENTING PROCEDURE

RA-EP-02245

Protective Action Guidelines

REVISION 01

Prepared by: Paul F. Timmerman

Procedure Owner: Manager - Security

Effective Date: JAN 10 2003

Procedure Classification:

- Safety Related
- Quality Related
- Non-Quality Related

LEVEL OF USE:
IN-FIELD REFERENCE

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1.0 PURPOSE

- 1.1 This procedure defines specific guidelines for determining protective action recommendations for emergencies involving abnormal releases of radioactivity at the Davis-Besse Nuclear Power Station (DBNPS).

2.0 REFERENCES

2.1 Developmental

- 2.1.1 U.S. Food and Drug Administration, Federal Register, Vol. 47, No 205, Oct 22, 1982
- 2.1.2 NRC IE Information Notice No. 83-28: Criteria for Protective Action Recommendations for General Emergencies, dated May 4, 1983.
- 2.1.3 EPA-400-R-92-001, May 1992, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents
- 2.1.4 Anno, George, Dore, and Michael: The Effectiveness of Sheltering as a Protective Action Against Nuclear Accidents Involving Gaseous Releases, EPA 520/I-78- 001A, April 1978.
- 2.1.5 SAND 77-1725, Public Protection Strategies for Potential Nuclear Reactor Accidents – Sheltering Concepts with Existing Public and Private Structures.
- 2.1.6 Davis-Besse Nuclear Power Station Emergency Plan.
- 2.1.7 KLD Associates, Inc., “Development of Evacuation Time Estimates for Davis-Besse Nuclear Power Station”, Revision 4, November 1991.

2.2 Implementation

- 2.2.1 RA-EP-02110, Emergency Notification
- 2.2.2 RA-EP-02240, Offsite Dose Assessment
- 2.2.3 RA-EP-02520, Assembly and Accountability
- 2.2.4 RA-EP-02530, Evacuation
- 2.2.5 RA-EP-02620, Emergency Dose Control and Potassium Iodide Distribution

3 0 DEFINITIONS

- 3.1 ALARA – As Low As Reasonably Achievable, means making every reasonable effort to maintain exposures to radiation as far below the dose limits in 10CFR20 as is practical and consistent with the purpose for which the licensed activity is undertaken.
- 3.2 COMMITTED DOSE EQUIVALENT (CDE) – The dose equivalent to organs or tissues that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
- 3.3 CORE MELT SEQUENCE – A situation in which the core could be uncovered and there is no means for restoring cooling to the core. Without cooling, overheating and melting of the fuel will occur.
- 3.4 DADS – The Data Acquisition and Display System is a computerized system which provides plant parameters, meteorology data, dose calculations, and other related programs.
- 3.5 EMERGENCY PLANNING ZONE(S) – The two zones that are established around a nuclear power station in which predetermined protective actions plans are needed.
- 3.5.1 The first zone has an approximate radius of 10 miles for the plume exposure pathway.
- 3.5.2 The second zone has an approximate radius of 50 miles for the ingestion exposure pathway.
- 3.6 EVACUATION DOSE – The dose that a potential evacuee would receive if he or she were openly exposed during the evacuation.
- 3.7 EVACUATION EXPOSURE PERIOD – The period during which those people being evacuated are exposed to the radioactive plume.
- 3.8 EXPOSURE TIME – That period of time during which the offsite population will be exposed to radiation as a result of an airborne radioactive release.
- 3.9 LAKE BREEZE – A meteorological condition that may occur on clear, sunny days. During a lake breeze, a radioactive release can travel inland, rise, reverse course in an overhead return flow, and then return to land in a convoluted path.
- 3.10 MINIMUM PROTECTIVE ACTION RECOMMENDATIONS (PAR) – The minimum PAR is evacuate Subarea 1, Subarea 12, and affected downwind subareas within five miles.
- 3.11 OFFSITE – Any area outside the Owner Controlled Area surrounding Davis-Besse Nuclear Power Station.
- 3.12 SAFETY PARAMETER DISPLAY SYSTEM (SPDS) – The SPDS is a group of graphic displays developed to assist with monitoring plant operations.
- 3.13 SECTOR – One of the 16 areas bounded by radii 22½ degrees apart into which the 10-mile EPZ is divided. Sectors are designated by the Letters A through P, excluding I and O. Sector A is north, E is East, J is south, and N is west.
- 3.14 TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE) – The sum of the deep-dose equivalent (for external exposure) and the Committed Effective Dose Equivalent (for internal exposure).

4.0 RESPONSIBILITIES

- 4.1 The Emergency Director is responsible for directing protective actions for Station personnel and recommending protective actions to offsite officials for the Plume Exposure Pathway (10-mile EPZ).
- 4.2 The Dose Assessment Coordinator is responsible for collecting and analyzing offsite dose assessment data used to provide the basis for protective action recommendations.

5.0 INITIATING CONDITIONS

Initiate this procedure when a declared emergency has the potential for an abnormal release of radioactivity.

6.0 PROCEDURE6.1 Onsite Protective Actions

6.1.1 The Emergency Director shall initiate the necessary actions to protect DBNPS personnel.

- _____ a. Evacuate personnel in accordance with RA-EP-02530, Evacuation
- _____ b. Account for personnel in accordance with RA-EP-02520, Assembly and Accountability.
- _____ c. Distribute potassium iodide in accordance with RA-EP-02620, Emergency Dose Control and Potassium Iodide Distribution

6.1.2 All supervisors shall ensure that appropriate safety and ALARA precautions are implemented

NOTE 6.2

- Any condition that justifies issuing an offsite Protective Action requires a General Emergency declaration.
- Offsite Protection Action Recommendations shall be made with initial notification of a General Emergency.

6.2 Offsite Protective Actions

- _____ 6.2.1 Verify a General Emergency has been declared.
- _____ 6.2.2 IF the reactor is in a CORE MELT SEQUENCE, GO TO Attachment 1, Flowchart For Determining Protective Action Recommendations During Core Melt Sequence, otherwise N/A this step.
- _____ 6.2.3 IF no radioactive release is in progress or imminent THEN recommend the minimum PAR (evacuate subarea 1, subarea, 12, and affected downwind subareas to 5 miles) as determined from Attachment 3, Affected Subareas By Wind Directory, otherwise N/A this step.
- _____ 6.2.4 IF the Safety Parameter Display System (SPDS) is available, Refer To RA-EP-02240, Offsite Dose Calculations, for dose calculations and Protective Action Recommendations (PARs), otherwise N/A this step.
- _____ 6.2.5 IF SPDS is not available, GO TO Attachment 2, Protective Action Recommendations (PARs) By Affected Subareas, otherwise N/A this step
- _____ 6.2.6 Notify offsite agencies and the NRC of the PARs and the affected subareas using RA-EP-02110, Emergency Notification, and Initial Notification Form. If a lake breeze is occurring, the wind direction is unknown, or the wind direction is from between 162° and 277°, inform the NRC that the release may enter Canadian territory

_____ 6.2.7 As Radiation Monitoring Team (RMT) data becomes available, compare it to dose projections and verify that Protective Action Recommendations are adequate.

6.3 Continue to monitor radiological and meteorological conditions, and repeat Steps 6.1 and 6.2 as conditions change.

7.0 FINAL CONDITIONS

Terminate this procedure when the Emergency Director, and offsite agencies determine that dose assessment and protective actions are no longer necessary.

8.0 RECORDS

8.1 The following quality assurance records are completed by this procedure and shall be listed on the Nuclear Records List, captured, and submitted to Nuclear Records Management in accordance with NG-NA-00106:

8.1.1 None

8.2 The following non-quality assurance records are completed by this procedure and may be captured and submitted to Nuclear Records Management, in accordance with NG-NA-00106:

8.2.1 None

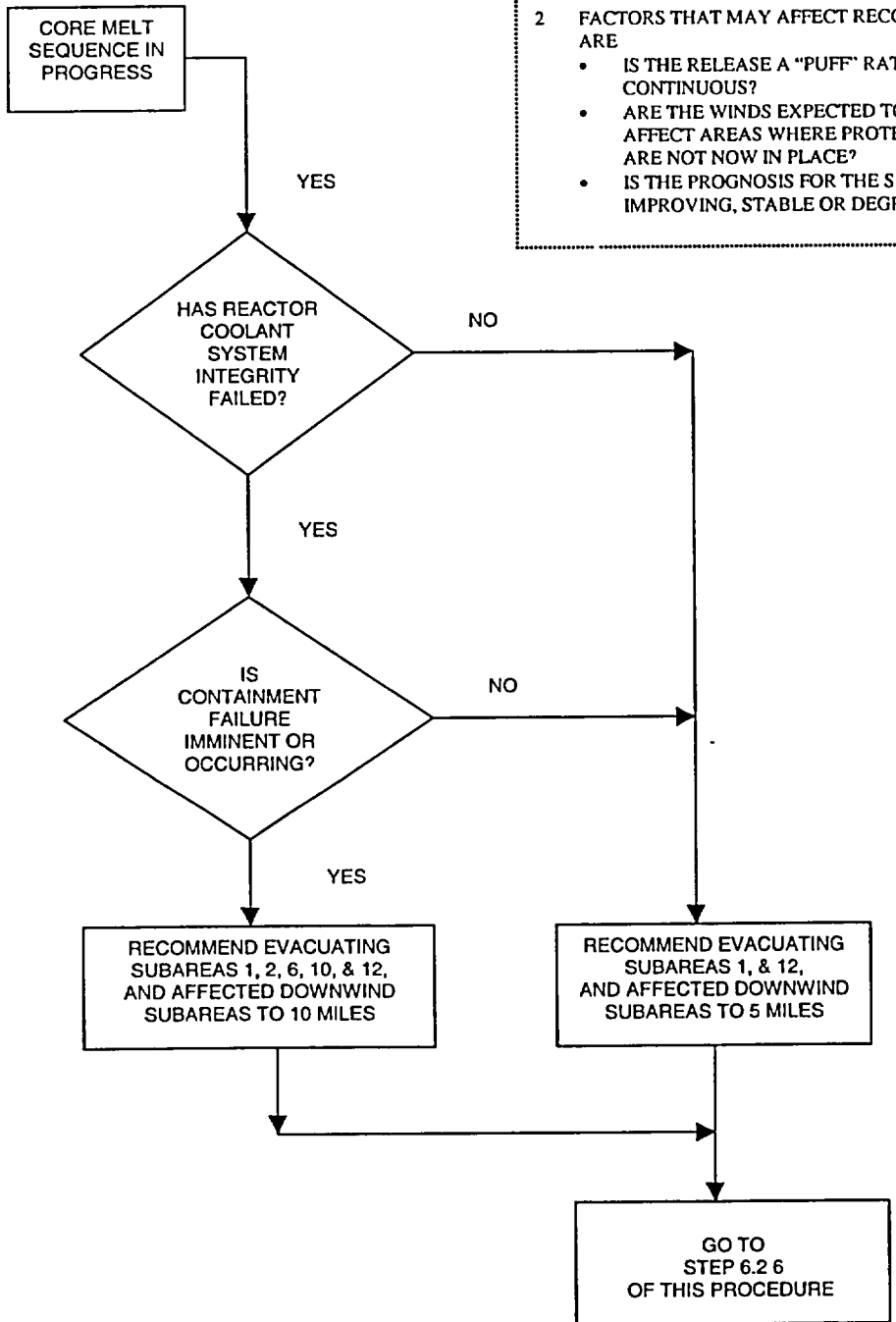
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**ATTACHMENT 1: FLOWCHART FOR DETERMINING PROTECTIVE ACTION
RECOMMENDATIONS DURING CORE MELT SEQUENCE**

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NOTES

- 1 SUBAREAS ARE FOUND ON ATTACHMENT 4, COMPARISON OF OFFSITE SECTORS AND SUBAREAS
- 2 FACTORS THAT MAY AFFECT RECOMMENDATIONS ARE
 - IS THE RELEASE A "PUFF" RATHER THAN CONTINUOUS?
 - ARE THE WINDS EXPECTED TO SHIFT AND AFFECT AREAS WHERE PROTECTIVE ACTIONS ARE NOT NOW IN PLACE?
 - IS THE PROGNOSIS FOR THE SITUATION IMPROVING, STABLE OR DEGRADING?



ATTACHMENT 2:
PROTECTIVE ACTION RECOMMENDATIONS (PARs) BY AFFECTED SUBAREA

Page 1 of 2

NOTE: Step 1

A nomogram will only provide a TEDE value

- _____ 1 Calculate the TEDE and CDE dose rates at 0.75, 2, 5, and 10 miles using RA-EP-02240, and insert value in Column B of Table 1, IF TEDE value is < 1 Rem AND the CDE value is < 5 Rem, GO TO Step 6.
- _____ 2. In Column A of Table 1, circle subareas 1 and 12, and all of the two-mile and five-mile affected subareas determined from Attachment 3, Affected Subareas By Wind Direction.
- _____ 3. Insert the expect release duration (in hours) in Column C of Table 1, IF unknown, use 2 hours
- _____ 4 Calculate the dose rate 0.75, 2, and 5 miles by multiplying the value in Column B by the value in Column C and enter dose rate in Column D of Table 1.
- _____ 5 For the affected subarea(s) with TEDE value \geq 1 Rem and/or the CDE value \geq 5 Rem, THEN circle "YES" in Column F and recommend evacuation for all affected subareas circled in Column A, AND verify a General Emergency has been declared, OTHERWISE, circle "NO".
- _____ 6. IF the affected subarea(s) TEDE value is < 1 REM, AND the CDE value is < 5 Rem AND a General Emergency has been declared, THEN recommend the evacuation of subarea 1 and subarea 12 and all affected downwind subareas within 5 miles as determined from Attachment 3, OTHERWISE, N/A.
- _____ 7. Make appropriate notifications in accordance with Step 6 2.6.

ATTACHMENT 2:
PROTECTIVE ACTION RECOMMENDATIONS BY AFFECTED SUBAREA

TABLE 1: PROTECTIVE ACTIONS AND AFFECTED SUBAREAS

Distance From Plant	A Affected Subareas		B Doserate (REM/hr)	C Release Duration (hr)	D Dose (REM)	E Limit (REM)	F Protective Action Recommendation
.75 to 2 miles	1	TEDE				≥ 1	Yes Evacuate
							No: No Action (Evacuate if in General Emergency)
	12	Thyroid CDE (I ₂)**				≥ 5	Yes: Evacuate
							No: No Action (Evacuate if in General Emergency)
2-5 miles	2	TEDE				≥ 1	Yes: Evacuate
							No: No Action (Evacuate if in General Emergency)
	6	Thyroid CDE (I ₂)**				≥ 5	Yes: Evacuate
							No: No Action (Evacuate if in General Emergency)
5-10 miles	3	TEDE				≥ 1	Yes: Evacuate
							No: No Protective Action
	4	Thyroid CDE (I ₂)**				≥ 5	Yes. Evacuate
							No: No Protective Action
5							
						7	
8							
						9	
11							

**N/A CDE row if nomogram is used to determine dose rate.

Performed by:

Signature Date

ATTACHMENT 3 AFFECTED SUBAREAS BY WIND DIRECTION

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NOTE

This table was based on the inclusion of 22 ½° segments on either side of the plume centerline.

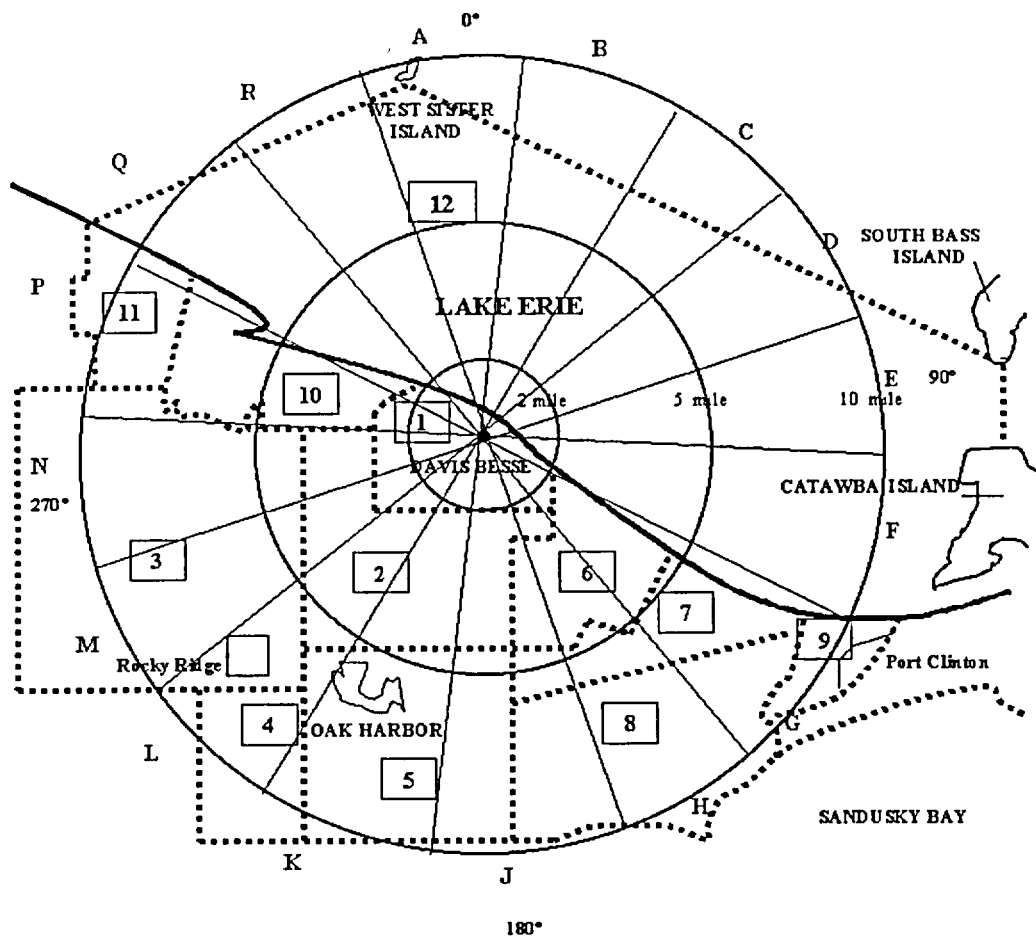
- 1 IF a lake breeze is occurring or the wind direction is unknown, THEN select "Unknown" subareas. OTHERWISE, record the wind direction (if known) _____°, and identify affected subareas for distances of 2-5 miles and 5-10 miles from the plant.

Wind Direction (from) _____°

Wind Direction From	0 - 2 Miles	2 - 5 Miles	5 - 10 Miles
141° to 278°	1, 12	(None)	(None)
279° to 286°	1, 12	6	7, 9
287° to 293°	1, 12	6	7, 8, 9
294° to 330°	1, 12	2, 6	7, 8, 9
331° to 005°	1, 12	2, 6	5, 7, 8
006° to 013°	1, 12	2, 6	4, 5, 7, 8
014° to 020°	1, 12	2	4, 5
021° to 065°	1, 12	2	3, 4, 5
066° to 072°	1, 12	2	3, 4
073° to 078°	1, 12	2, 10	3
079° to 117°	1, 12	2, 10	3, 11
118° to 122°	1, 12	10	3, 11
123° to 140°	1, 12	10	11
Unknown or Lakebreeze	1, 12	2, 6, 10	3, 4, 5, 7, 8, 9, 11

ATTACHMENT 4: COMPARISON OF OFFSITE SECTORS AND SUBAREAS

Page 1 of 1



COMMITMENTS

<u>Step Number</u>	<u>Reference</u>	<u>Comments</u>
Attachment 4	TERMS O 13602	Depiction of both 22 5° sectors and evacuation subareas
Attachments 1, 2	TERMS O 13523	Combination of subareas 1 and 12 for protective action recommendations
Attachment 2	TERMS O 13592	Release duration considered in projected dose calculations
Attachments 1, 2, 4	TERMS O 13645	Automatic recommendation to evacuate "keyhole"
Attachments 1, 2, 3, 4	TERMS O 13920	Combine Subareas 1, 8, and 11 of Evacuation Sector Map
Attachment 3	TERMS O 13684	Large scale EPZ map same as this attachment
Attachment 2	TERMS O 14992	Protective Action decisions during Lake Breeze
Attachment 2	TERMS O 13584	Provide sufficient guidance to make appropriate Protective Action Recommendations
Entire Procedure	TERMS Q 00780	Procedure for determining protective measures during an emergency