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Davis-Besse Nuclear Power Station

EMERGENCY PLAN IMPLEMENTING PROCEDURE

RA-EP-02620

EMERGENCY DOSE CONTROL AND POTASSIUM IODIDE DISTRIBUTION

REVISION 04

Prepared by: P. F. Timmerman

Procedure Owner: Manager – Regulatory Affairs

Effective Date: MAR 2 2 2004

Procedure Classification:

__X__ Safety Related

_____ Quality Related

_____ Non-Quality Related

LEVEL OF USE:

IN-FIELD REFERENCE

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1.0 PURPOSE

1.1 Provide guidance and administrative controls for radiation dose during emergency conditions.

1.2 Provide guidance for the administration of potassium iodide (KI) during emergency conditions.

2.0 REFERENCES

2.1 Developmental

2.1.1 Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation

2.1.2 Title 10, Code of Federal Regulations, Part 50, Section 47, Emergency Plans

2.1.3 Title 21, Code of Federal Regulations, Part 1090, Potassium Iodide as a Thyroid blocking Agent in a Radiation Emergency

2.1.4 National Council on Radiation Protection (NCRP), Report No. 39, Basic Radiation Protection Criteria

2.1.5 National Council on Radiation Protection, (NCRP), Report No. 55, Protection of Radioiodine

2.1.6 Nuclear Regulatory Commission, Inspection and Enforcement (IE) Information Notice No. 84-40: Emergency Worker Doses

2.1.7 Environmental Protection Agency, EPA-400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

2.1.8 International Atomic Energy Agency (IAEA), Technical Report No. 152, Evaluation of Radiation Emergencies and Accidents

2.1.9 The Food and Drug Administration Approved Patient Package Insert for Commercially Packaged Potassium Iodide

2.1.10 Davis-Besse Nuclear Power Station Emergency Plan

2.2 Implementation

2.2.1 NOP-LP-2001, Condition Report Process

2.2.2 RA-EP-02530, Evacuation

2.2.3 RA-EP-02610, Emergency Radiation Protection Organization Activation and Response

3.0 DEFINITIONS

3.1 Emergency Dose/Exposure – Occupational dose received or exposure to radiation or radioactive materials as a result of actions taken in response to a situation or occurrence of a serious nature that develops suddenly or unexpectedly.

3.2 10 CFR 20.1201 occupational dose limits for adults:

3.2.1 "An annual limit, which is the more limiting of -

a. The Total Effective Dose Equivalent (TEDE) being equal to 5 rems,
OR
b. The sum of the Deep-Dose Equivalent and the Committed Dose Equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems."

3.2.2 "The annual limits to the lens of the eye, to the skin, and to the extremities, which are:

a. An Eye Dose Equivalent of 15 rems,
AND
b. A Shallow-Dose Equivalent of 50 rems to the skin or to any extremity."

3.3 Essential Personnel - Personnel assigned specific Emergency Response Duties as identified in the DBNPS Emergency Plan.

3.4 Nonessential Personnel - Personnel who are not assigned specific Emergency Response Duties.

3.5 Emergency Medical Consultant - A group which may be called upon to assist in the medical care of contaminated injured personnel or other radiation casualties.

4.0 RESPONSIBILITIES

4.1 The Emergency Director, or when designated, the Emergency Plant Manager, shall be responsible for emergency dose authorizations and administration of potassium iodide (KI) to essential personnel.

4.2 The Emergency Radiation Protection (RP) Manager shall be responsible for evaluating, recognizing, and formally recommending in writing, to the Emergency Director the need for emergency dose authorization and KI administration to essential personnel at DBNPS.

4.3 The Dose Assessment Coordinator shall be responsible for evaluating, recognizing, and formally recommending in writing to the Emergency RP Manager the need for emergency dose authorization and KI administration to essential personnel outside the Protected Area.

5.0 INITIATING CONDITIONS

5.1 After declaration of an emergency, this procedure shall be initiated upon either of the following conditions:

5.1.1 An essential person has or is likely to receive dose in excess of the amounts specified in Step 3.2.

5.1.2 A projected Committed Dose Equivalent (CDE) of 25 rems or greater to the thyroid has been or is likely to be received by an essential person.

6.0 PROCEDURE

6.1 Authorization of Emergency Dose

6.1.1 The Emergency Director, or when designated, the Emergency Plant Manager, shall:

a. Evaluate the risk of not performing the task against the anticipated dose associated with performing the task before authorizing emergency dose.

b. Authorize individual dose in excess of the 10 CFR 20 occupational dose limits as listed in Step 3.2, by completing Form DBEP-204, Emergency Dose Authorization.

NOTE 6.1.2

It is preferable to document authorization by the Emergency Director, or when designated, the Emergency Plant Manager, before the exposure. However, verbal authorization may be granted and then documented as soon as possible.

6.1.2 The following guidelines are provided for emergency dose:

a. Personnel performing emergency tasks should be volunteers familiar with the consequences of radiation dose.

b. Declared pregnant individuals shall not be used.

c. Emergency dose should be limited to once in a lifetime for any individual.

d. When possible, the individual should be over the age of 45.

e. Personnel shall not enter any area where dose rates are unknown, unmonitored, or cannot be determined.

f. All attempts should be made to keep emergency dose ALARA.

g. The individual's dose history should be available for review.

6.1.3 Authorize increased dose for workers performing emergency services using the following guidance:

a. Limit doses to the following when protecting valuable property and lower doses are not practical:

1. 10,000 mrem TEDE
2. 30,000 mrem to the lens of the eye
3. 100,000 mrem:

- Total Organ Dose Equivalent (TODE)
- Shallow Dose Equivalent (SDE) to the skin of the whole body or to any extremity

WARNING 6.1.3.b

The following guidelines may be exceeded only in extreme situations. The personnel involved in exceeding these guides, shall be volunteers and made fully aware of the risks involved with this dose prior to receiving this dose.

b. Limit doses to the following when protecting large populations or performing life-saving activities and lower doses are not practical:

1. 25,000 mrem TEDE

2. 75,000 mrem to the lens of the eye

3. 250,000 mrem SDE

6.1.4 The briefer and individual who will receive the emergency dose shall fill in the information required on DBEP-204, Emergency Dose Authorization, and obtain the Emergency RP Manager's signature before receiving the emergency dose.

a. Individual should review Attachment 1.

6.1.5 For any dose in excess of the 10 CFR 20 occupational dose limits specified in Step 3.2, the Emergency RP Manager shall:

a. Notify the Medical Director when emergency doses have been authorized. (The phone number is listed in the Emergency Plan Telephone Directory under *Other Resources/Medical Director.*)

b. Call the Emergency Medical Consultant for follow-up care and further evaluation, as required. (The phone number is listed in the Emergency Plan Telephone Directory under *Other Resources/ Medical Consultants.*)

6.1.6 IF radiological surveys or dosimetry data indicate conditions approaching the dose limits for nonessential personnel as stated in RA-EP-02610, Emergency Radiation Protection Organization Activation and Response,

THEN the Emergency Director, with the recommendations from the Emergency RP Manager, should consider evacuation of the affected personnel according to RA-EP-02530, Evacuation.

6.2 Administration of Potassium Iodide (KI)

6.2.1 The Emergency Director, or when designated, the Emergency Plant Manager shall authorize the use of KI.

6.2.2 The Emergency RP Manager shall recognize the need for KI distribution within the Protected Area.

a. IF KI is to be distributed, a written recommendation using Form DBEP-106, Potassium Iodide (KI) Administration, shall be completed and submitted to the Emergency Director or designee for approval.

6.2.3 The Dose Assessment Coordinator shall recognize the need for KI distribution outside the Protected Area.

a. IF KI is to be distributed, a written recommendation using Form DBEP-106, Potassium Iodide (KI) Administration, shall be completed and submitted to the Emergency RP Manager.

6.2.4 The Emergency RP Manager and/or the Dose Assessment Coordinator should:

a. Calculate, measure, or estimate the airborne radioiodine concentration in an essential person's breathing zone.

b. IF the concentration exceeds 2×10^{-5} µCi/cc for one hour (2×10^{-6} µCi/cc for ten hours), or the Committed Dose Equivalent (CDE) to the thyroid is likely to exceed 25 rems,

THEN determine if KI should be administered to essential personnel.

WARNING 6.2.4.c.

Individuals who have known allergies to iodine shall not be issued KI.

c. After briefing the Emergency Director or his designee and receiving authorization for the administration of KI, ensure the following:

1. Notify those who are to receive KI, to report to a designated location for distribution.

NOTE 6.2.4.c.2

KI is stored in the Operations Support Center (OSC) and in the Radiological Testing Laboratory (RTL).

2. Inform the individual that taking KI is voluntary.

3. The individual who will receive KI should fill in the information and sign the Potassium Iodide Administration Form, DBEP-106.

CAUTION 6.2.4.c.4

KI has the following effectiveness in blocking radioiodine uptake by the thyroid:

- 90% blockage if administered within the first hour after exposure.
- 50% blockage if administered within four hours after exposure.
- KI is ineffectual if administered more than 14 hours after exposure.

4. Issue one 130 mg KI tablet to each individual.

5. Notify the Medical Director when KI is issued.

6. The Emergency RP Manager should contact the Emergency Medical Consultant and request follow-up care for KI administration. (The phone number is listed in the Emergency Plan Telephone Directory under *Other Resources/Medical Consultants.*)

7. The Emergency RP Manager shall ensure one 130 mg KI tablet is issued daily for ten days or as directed by the Emergency Medical Consultant and record each issuance on Potassium Iodide (KI) Administration Form, DBEP-106.

8. The Emergency RP Manager shall ensure that bioassay analysis is provided in order to determine the effectiveness of the KI administration and estimate the dose commitment.

9. Forward the completed Form DBEP-106, Potassium Iodide (KI) Administration, to the Emergency RP Manager and Emergency Director for review and signatures.

7.0 FINAL CONDITIONS

7.1 Refer to NOP-LP-2001, Condition Report Process, to describe the actions necessary to investigate and report the radiation dose of an individual over the occupational limits stated in 10 CFR 20.

7.2 The completed forms have been:

7.2.1 Submitted and reviewed by the Emergency Director

7.2.2 Submitted and reviewed by the Manager - Radiation Protection

7.2.3 Submitted and reviewed by the Manager – Regulatory Affairs.

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 Emergency Dose Authorization, DBEP-204

8.2.2 Potassium Iodide (KI) Administration, DBEP-106

ATTACHMENT 1: HEALTH EFFECTS DUE TO RADIATION EXPOSURE
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TABLE 1
Health Effects Associated With Whole-Body Absorbed Doses Received Within a Few Hours[a]
(EPA 400 Table 2-3)

Whole Body Absorbed Dose (Rad)	Early Fatalities[b] (Percent)	Whole Body Absorbed Dose (Rad)	Prodromal Effects[c] (Percent Affected)
140	5	50	2
200	15	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

TABLE 2
Approximate Cancer Risk to Average Individuals from 25 Rem Effective Dose Equivalent Delivered Promptly
(EPA 400 Table 2-4)

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

COMMITMENTS

Step Number	Reference	Comments
4.1	TERMS 0 13454	Emergency Dose Authorization
6.1.3	TERMS 014577	Guidelines as stated in EPA-400-R-92-001
6.1.2.e	TERMS 0 16239	RP Response to Fires