

WISCONSIN PUBLIC SERVICE CORPORATION

Kewaunee Nuclear Power Plant

EMERGENCY PLAN IMPLEMENTING PROCEDURE

NO. EP-AD-11

REV. C

TITLE: Emergency Radiation Controls

DATE: JUN 21 1983

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REVIEWED BY

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APPROVED BY

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#### 1.0 PURPOSE

The purpose of this procedure is to maintain exposure to emergency workers As Low As Reasonably Achievable (ALARA).

#### 2.0 APPLICABILITY

This procedure will be implemented during an Alert, Site Emergency or General Emergency.

#### 3.0 REFERENCES

- 3.1 Emergency Plan, Kewaunee Nuclear Power Plant
- 3.2 NUREG-0654 FEMA-REP-1, REV. 1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plant (Nov. 1980).
- 3.3 EPA-520/1-75-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (June 1980)
- 3.4 Code of Federal Regulations 10 CFR Part 20.
- 3.5 Radiation Protection Manual and Health Physics Procedure Manual Kewaunee Nuclear Power Plant.
- 3.6 EP-RET-2D - Emergency Radiation Entry, Controls and Implementation.

#### 4.0 RESPONSIBILITIES

- 4.1 All personnel involved with the Emergency are responsible for adhering to the requirements of this procedure.
- 4.2 The Radiological Protection Director (RPD) and Emergency Director (ED) are responsible for reviewing and approving all requests for exposures in excess of 10 CFR 20 limits.
- 4.3 The RPD has the overall responsibility for inplant personnel monitoring.
- 4.4 The In-plant Radiation Emergency Team (RET) is responsible for performing those activities necessary to implement the requirements of this procedure.

## 5.0 REQUIREMENTS

### 5.1 All Emergency Personnel

- 5.1.1 The requirements of the Health Physics Procedure Manual and the Radiation Protection Manual shall be applicable during all radiological emergencies, except as authorized by the RPD or ED.
- 5.1.2 Prior to entering a Radiation Hazard Area or highly contaminated area during an Emergency, an Emergency Radiation Work Permit (ERWP, Form AD-11.1) must be completed.
- 5.1.3 For emergency actions requiring immediate access to radiation hazard areas, the ERWP may be bypassed. Approval of the RPD or ED is required and the ERWP must be completed as soon after the entry as possible.
- 5.1.4 For any entry where an exposure greater than 10 CFR 20 limits is likely, an Authorization For Increased Exposure (Form AD-11.3) must be completed.

NOTE: For the purposes of emergency repair/operation, personnel will not be allowed to receive a dose exceeding 25 REM to the whole body.

### 5.2 Emergency Entry Teams

- 5.2.1 An Emergency Entry Team shall be formed for entries into highly radioactive or contaminated areas for the purpose of search and rescue on life saving missions.
- 5.2.2 The RPD shall designate an Entry Team Coordinator.
- 5.2.3 Communications will be maintained via two-way radios between the Entry Team Coordinator and the In-Plant RET.
- 5.2.4 Only self-contained pressure demand respiratory equipment shall be used for worker protection during emergency entries.
- 5.2.5 Each team shall be briefed prior to entry. The briefings shall cover: purpose of the mission; exposure limits; work methods for reduced exposures; conditions expected to be encountered; abort instructions; stay times; personal dosimeter monitoring; respiratory protection equipment and anti-C clothing requirements.

### 5.3 Radiological Protection Director

- 5.3.1 Any exposure to radiation in excess of 10 CFR Part 20 limits shall be authorized by the RPD with the concurrence of the ED (Form AD-11.3). In the absence of the RPD, the ED may authorize an overexposure directly after concurring with the on-shift HP or an In-plant RET member.
- 5.3.2 The RPD will inform personnel of the availability of thyroid blocking agents (Potassium Iodide) for use in accordance with EP-AD-18.
- 5.3.3 ERWP's must be reviewed and approved by the RPD.

### 5.4 In-plant Radiation Emergency Team

- 5.4.1 All implant radiological conditions will be reported to the Radiological Protection Director.
- 5.4.2 The RET will make radiological assessments of all implant areas requiring access and occupation during an emergency.
- 5.4.3 The projected amount of time implant emergency workers will be allowed to stay in a radiation and/or contaminated area shall be determined in accordance with Stay Time (Form AD-11.2) and shall include a review of:
  - a. Projected route exposures
  - b. Measured dose rates and airborne concentrations
  - c. Personnel exposure history
  - d. Projected duration of task
  - e. Information on current plant conditions and the plant area under consideration
- 5.4.4 Continuous radiation monitoring coverage will be provided in occupied areas when the potential for increased radiation levels exist and the area is occupied.
- 5.4.5 Radiation surveys need not be performed in areas of extremely high radiation levels. Rather, surveys should be performed only if entry into these areas is required for other emergency actions.
- 5.4.6 Air sample surveys and radiological assessment surveys shall be completed depending on the nature and seriousness of the emergency.

5.4.7 For all entries into a Radiation Hazard area, exposures to airborne concentrations of radioactivity shall be limited by the following:

- a. Whenever practicable, total exposure of any individual during an emergency should be limited to 40 MPC-hours. MPC hours are calculated by multiplying the concentration in terms of the number of MPC's by the total time of exposure (in hours).
- b. If emergency operations demand, total exposure of any individual shall be limited to 1,200 MPC-hours. This is roughly equivalent to the 3 Rem/quarter limit for external radiation exposure.
- c. Limits for exposure to Xe-133 and other noble gases are based on beta plus gamma dose limits to the skin and whole body.
- d. An integrated exposure of 10,000 MPC-hours for nuclides with short effective half-lives is roughly equivalent to an external, whole-body exposure of 25 Rem and should be received only with the approval of the Radiological Protection Director or Emergency Director. Similar exposure to nuclides with long effective half-lives are to be avoided and should be restricted to 1,200 MPC-hours as in b above.
- e. Since the effects of external and internal exposure are additive, personnel should avoid exposures over 1,200 MPC-hours, even in the event of life-saving or rescue action, unless external radiation fields are minimal and unless effective half-lives are short.
- f. Personnel who have been exposed to more than 10,000 MPC-hours shall be removed from further emergency duty, whole body counted, and referred to a physician for attention.

5.4.8 For all special entries the RET shall review with the team members the task to be performed including the following where applicable.

- a. Potential stress conditions and problems
- b. Work methods
- c. Number of personnel required
- d. Allowable exposure limits
- e. Tools, equipment, and parts
- f. Lighting
- g. Communications requirements

- 5.4.9 A Radiation Emergency Team Member shall accompany any personnel entering any radiation or contaminated area where radiological conditions are unknown.
- 5.4.10 Any individual who has exceeded 10 CFR 20 limits shall be temporarily removed from radiation exposure work. His exposure record shall be reviewed by the RPD and ED prior to further radiation work.



WISCONSIN PUBLIC SERVICE CORPORATION  
KEWAUNEE NUCLEAR POWER PLANT

Form 145-49-1

EMERGENCY  
RADIATION WORK PERMIT

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Form AD-11.1

Number: E- Associated Work Number: \_\_\_\_\_ Date Prepared: \_\_\_\_\_

☐ REGULAR ☐ EXTENDED EFFECTIVE: \_\_\_\_\_ through \_\_\_\_\_

TO BE COMPLETED BY WORK SUPERVISOR: (Attach Work Request if available)

Job Location and Description: \_\_\_\_\_

ASSIGNED WORKERS	EXP. LIMIT	TOTAL REC'D	ASSIGNED WORKERS	EXP. LIMIT	TOTAL REC'D

TO BE COMPLETED BY HEALTH PHYSICS:

General Area Radiation: \_\_\_\_\_ Instrument Used: \_\_\_\_\_  
Contamination Levels: \_\_\_\_\_ \*\*HP Coverage Req. YES/NO \_\_\_\_\_  
Airborne Activity: \_\_\_\_\_ Surveyed By: \_\_\_\_\_

INDIVIDUAL REQUIREMENTS: (Circle Required Items)

Dosimetry:	TLD Badge	Dosimeter	Wrist Badge	Finger Badge
Protective Clothing:	Labcoat	Skullcap/Hood	Liners	Rubber Gloves
	Coveralls	Plastic Suit	Plastic Hood	Rubber Overshoes
	Plastic Boots			

Other: \_\_\_\_\_

SPECIAL INSTRUCTIONS: \_\_\_\_\_

APPROVAL

Work Supervisor: \_\_\_\_\_  
RADIOLOGICAL PROTECTION DIRECTOR \_\_\_\_\_  
EMERGENCY DIRECTOR \_\_\_\_\_

TERMINATION

By: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Reason: \_\_\_\_\_

ADDITIONAL: OverExposure Authorization  
Predicted Exposure \_\_\_\_\_

Rad Protection Director \_\_\_\_\_  
Emergency Director \_\_\_\_\_

An Airborne Exposure Analysis must be completed for each assigned worker following exit from an Airborne Contaminated area (Form AD-11.2)

WHITE COPY - - - - Monitor Room  
PINK COPY - - - - Job Location  
YELLOW COPY - - - - Control Room

Time: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Location: \_\_\_\_\_

Airborne  
 Exposure  
 Analysis

Emergency  
 Radiation  
 Work Permit  
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 Form AD-11.2

ISOTOPE	t <sub>1/2</sub>	OBSERVED CONCEN.	OCCUPATIONAL MPC	RATIO CONC./MPC	REG. NO.	BODY BURDEN 30 MINUTE EXPOSURE
Ar-41	1.827 h		2 E-6		1	
Kr-85	10.720 y		1 E-5		2	
Kr-85m	4.480 h		6 E-6		3	
Kr-87	76.300 m		1 E-6		4	
Kr-88	2.840 h		1 E-6		5	
Xe-133	5.245 d		1 E-5		6	
Xe-133m	2.190 d		1 E-5		7	
Xe-135	9.110 h		4 E-6		8	
Xe-135m	15.360 m		1 E-6		9	
Xe-138	14.130 m		1 E-6		10	

PARTICULATES: Less than 8 day t<sub>1/2</sub>

Na-24	15.000 h		1 E-6		11	
Mn-56	2.578 h		5 E-7		12	
Rb-88	17.800 m		1 E-6		13	
Sr-92	2.710 h		4 E-7		14	
Mo-99	66.020 h		2 E-7		15	
Te-132	78.200 h		2 E-7		16	
Cs-138	32.200 m		1 E-6		17	
La-140	40.220 h		2 E-7		18	

PARTICULATES: Greater than 8 day t<sub>1/2</sub>

Pb-210	27.704 d		2 E-6		19	
Pb-214	312.700 d		4 E-8		20	
Pb-218	70.800 d		5 E-8		21	
Fe-59	44.630 d		5 E-8		22	
Co-60	5.271 y		9 E-9		23	
Zn-65	244.400 d		6 E-8		24	
Nb-95	35.060 d		1 E-7		25	
Zr-95	64.020 d		3 E-8		26	
Cs-134	2.062 y		4 E-8		27	
Cs-136	13.160 d		4 E-7		28	
Cs-137	30.170 y		6 E-8		29	
Ba-140	12.789 d		1 E-7		30	
Ce-144	284.300 d		1 E-8		31	

HALOGENS

F-18	109.740 m		5 E-6		32	
Br-84	31.800 m		1 E-6		33	
I-131	8.040 d		9 E-9		34	
I-132	2.300 h		2 E-7		35	
I-133	20.800 h		3 E-8		36	
I-134	52.600 m		5 E-7		37	
I-135	6.610 h		1 E-7		38	
TRITIUM	12.280 y		2 E-3		39	
Sr-90	28.600 y		1 E-9		40	

STAY TIME CALCULATION: (based on  
 a 40hr week)

TOTAL:

WORKER NAME:

TIME IN

TIME OUT

40 hrs =  
 TOTAL

STAY TIME x 60 =

(min./week)

STAY TIME

MPC-HOUR CALCULATION:  $\left\{ \frac{\text{TOTAL}}{\text{RESPIRATOR PROTECTION FACTOR}} \right\} \left\{ \frac{\text{EXPOSURE TIME}}{\text{IN MINUTES}} \right\} \left\{ \frac{\text{HR}}{60 \text{ MIN}} \right\} = \left\{ \right\} \left\{ \right\} \left\{ \frac{\text{HR}}{60 \text{ MIN}} \right\} = \text{MPC-HOURS RECEIVED}$

FORM AD-11.3

WISCONSIN PUBLIC SERVICE CORPORATION

KEWAUNEE NUCLEAR POWER PLANT

## AUTHORIZATION FOR EMERGENCY RADIATION EXPOSURE

DATE: \_\_\_\_\_

Name: \_\_\_\_\_ Social Security No.: \_\_\_\_\_

Employer: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

Reason for Emergency Exposure: \_\_\_\_\_

Requested by: \_\_\_\_\_ Title: \_\_\_\_\_

Present Exposure Limit is ..... REM

Increased Exposure Limit Will Be ..... REM

Total Lifetime Exposure at Start of this Quarter was ..... REM

Accumulated Exposure for this Quarter is ..... REM

Total Lifetime Exposure to date is ..... REM

5(N-18) Limit is ..... REM

Unused Lifetime Exposure Remaining is ..... REM

Form NRC-4 up-to-date? ..... Yes \_\_\_\_\_ No \_\_\_\_\_

NOTE: Environmental Protection Agency guidance states that emergency worker exposures should be limited to 25 REM for emergency repair/operation. This limit may be exceeded for life saving operations.

"I agree that I have not previously received a once in a lifetime dose of 25 REM and that my radiation exposure limit can be increased."

Signed: \_\_\_\_\_

Approved by Radiological Protection Director: \_\_\_\_\_

Emergency Director: \_\_\_\_\_