PILGRIM NUCLEAR POWER STATION

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CHANGE INSTRUCTION NOTICE (CIN)

Transmittal No.: 02-446 Date: 11-22-02

Please update your copy of EPIP with the attachments to this transmittal as instructed below.

REMOVE AND DISCARD	REV. NO.	INSERT	REV. NO.
TOC	79	TOC	80
EPIP 310	4	EPIP 310	5
EPIP 440	6	EPIP 440	7

RType H8.24

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EP-IP-100	Emergency Classification and Notification	20	08/29/02
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EP-IP-200	On-Call Emergency Director	10	08/29/02
EP-IP-201	Emergency Plant Manager	3	08/29/02
EP-IP-202	Company Spokesperson	3	02/07/01
EP-IP-210	Control Room Augmentation	8	08/29/02
EP-IP-220	TSC Activation and Response	11	11/15/00
EP-IP-225	Severe accident Management Support	0	02/15/02
EP-IP-229	TSC/OSC Equipment Operation	5	07/25/00
EP-IP-230	OSC Activation and Response	4	08/08/01
EP-IP-231	Onsite Radiation Protection	6	08/29/01
EP-IP-240	Emergency Security Organization Activation and Response	10	08/29/02
EP-IP-250	EOF Activation and Response	9	02/07/01
EP-IP-251	Offsite Radiation Protection	5	12/26/00
EP-IP-252	Facilities Support	8	08/29/02
EP-IP-253	Relocation of the EOF	3	07/13/00
EP-IP-254	Communications Support	3	05/20/02
EP-IP-259	EOF Equipment Operation	4	09/17/01
EP-IP-300	Offsite Radiological Dose Assessment	4	05/01/01
EP-IP-310	Radiation Monitoring Team Activation and Response	5	11/22/02
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EP-IP-440	Emergency Exposure Controls	7	11/22/02
EP-IP-501	Transport of Contaminated Injured Personnel	3	05/24/00
EP-IP-520	Transition and Recovery	5	02/07/01

PILGRIM NUCLEAR POWER STATION

Procedure No. EP-IP-310

RADIATION MONITORING TEAM ACTIVATION AND RESPONSE

Stop
Think
Act
Review

SAFETY RELATED

REVISION LOG

REVISION 5 **Date Originated 10/02**

Pages Affected	Description
5,8,11,13	Delete references to specific brands and types of instruments as some equipment was replaced. This will prevent need to revise Procedure for future changes to vendors/suppliers.
14	Revise title of EP-IP-251 in Attachment 4 (Document Cross-Reference).

REVISION 4 **Date Originated 9/00**

Pages Affected	Description
All	Revise Procedure to reflect PNPS 1.3.4-1 format. Revision bars are not shown for reformatting.
8	Correct editorial reference to "Rad Lab and RMT Coordinator."

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1.0 PURPOSE

This Procedure provides instructions to Radiation Monitoring Team (RMT) members assigned to the Emergency Operations Facility (EOF). The RMTs will ascertain the radiological conditions in the environment during an emergency situation. The survey results obtained will help to determine and verify the protective action recommendations for the general public.

2.0 REFERENCES

[1] EP-PP-01, "*PNPS Emergency Plan*"

3.0 DEFINITIONS

None

4.0 DISCUSSION

None

5.0 RESPONSIBILITIES

[1] The Rad Lab and RMT Coordinator is responsible for:

(a) Dispatching and directing the Radiation Monitoring Teams.

(b) Reporting directly to the Offsite Radiological Supervisor all survey and sample results obtained by the Radiation Monitoring Teams.

[2] The Radiation Monitoring Teams are responsible for:

(a) Directly monitoring radiological conditions in the environs as directed by the Rad Lab and RMT Coordinator.

6.0 PROCEDURE

6.1 RMT ACTIVATION

When the Emergency Operations Facility (EOF) is to be activated, upon arrival the Radiological Monitoring Teams shall:

[1] Obtain team assignments and designation from the Rad Lab and RMT Coordinator. If the Rad Lab and RMT Coordinator is not present, pair up in RP Technician/Driver Teams.

[2] Sign in on the EOF Manpower status board.

[3] Obtain an RMT procedure packet from the procedure cabinet.

[4] When all checks and inventories according to Section 6.2 have been completed, report to the Rad Lab and RMT Coordinator for the dispatch briefing.

NOTES

1. The key to the Field Logistics area is located in the key box outside the door. The combination to the padlock is 000.
2. The keys to the RMT vehicles are located in the key box inside the security area.

6.2 EQUIPMENT CHECKS AND INVENTORY

[1] Instrument Checks

(a) Obtain a set of instruments.

(b) Perform the necessary instrument checks. Conduct physical checks, calibration checks, battery checks, and source checks as appropriate.

(c) Verify operability of each type of air sampler.

(d) Record the equipment checks as listed on Attachment 1 (RMT Equipment Checklist).

[2] Field Kit Checks

(a) Obtain an RMT field kit from the Field Logistics area.

(b) If the seal on the kit has been broken, then inventory the field kit.

(c) Obtain a package of silver zeolite cartridges from the cabinet in the Field Logistics area.

(d) Synchronize watches with the EOF clock.

(e) Distribute thermoluminescent dosimetry (TLD) and self-indicating dosimetry (SID) to each team member.

(f) Record name and Social Security number on the TLD. Don the TLD.

(g) Zero and don the SID.

(h) Record the results of the field kit inventory on Attachment 1 (RMT Equipment Checklist) (inventory is "SAT" if seal is intact).

[3] Vehicle Checks

(a) Obtain a set of keys for an RMT vehicle.

(b) Perform the vehicle checks in accordance with Attachment 2 (RMT Vehicle/Communications Checklist).

[4] Communications Checks

(a) Obtain a portable radio from the Field Logistics area.

(b) Verify communications with the EOF by testing the equipment listed on Attachment 2 (RMT Vehicle/Communications Checklist).

NOTE

RMTs are not to proceed from the EOF without a full briefing by the Rad Lab and RMT Coordinator or Offsite Radiological Supervisor.

6.3 OFFSITE MONITORING

[1] Continuously observe radiation levels while traveling.

[2] While operating inside a radiation field, periodically check the SID reading. If it becomes necessary to re-zero the SID, ensure the final and new initial values are reported to the Rad Lab and RMT Coordinator.

[3] Boundary information on the leading edge, trailing edge, and outer edges of the plume should be relayed to the Rad Lab and RMT Coordinator when available.

6.4 SURVEYS

[1] Surveys taken in the early stages of an accident will be primarily involved with plume assessment and tracking.

NOTE

Radiation and airborne surveys reported to the EOF for use in dose assessment should be centerline values. Survey data reported to the EOF is recorded on Attachment 3 (RMT Sample/Survey Sheet).

[2] Radiation Surveys

(a) Using the dose rate meter, perform and record the survey at waist level with the beta window closed.

(b) Using the dose rate meter, perform and record the survey at waist level with the beta window open.

(c) Using the dose rate meter, perform and record the survey at ground level with the beta window open.

(d) Report radiation levels to the Rad Lab and RMT Coordinator. Record all information on Attachment 3 (RMT Sample/Survey Sheet).

[3] Airborne Surveys

(a) Load a silver zeolite cartridge, arrow pointing in the direction of the air flow, into the sample apparatus.

(b) Place the air sampler 3 to 4 feet off the ground.

NOTE

Exceeding a 2 SCFM flow rate may give erroneous iodine concentration levels.

(c) Draw a 20 cu. ft. air sample (2 SCFM for 10 minutes) unless otherwise directed by the EOF.

(d) Continue to monitor radiation levels while sampling. Record and report any significant changes.

(e) After the sample has been obtained, record the start time, stop time, and sample flow rate on Attachment 3 (RMT Sample/Survey Sheet).

(f) Proceed to an area of low background for counting of the sample. Monitor and report radiation levels while tracking plume boundaries.

(g) Particulate Filter Field Analysis

(1) Determine background using a count rate meter with an HP-210 probe (or equivalent).

(2) Count the particulate filter.

(3) Store the particulate filter in a sealed petri dish. Mark the dish with the appropriate sample number and record all information on Attachment 3 (RMT Sample/Survey Sheet).

(h) Iodine Cartridge Field Analysis

(1) Connect the NaI probe to the E-600 (or equivalent).

(2) Turn the function switch to the scaler position.

NOTE

Avoid using the E-600 in high background locations (e.g., 2 to 5 mR/hr). Contact Rad Lab and RMT Coordinator if background count rates exceed 40,000 cpm for a 1-minute count time. Rad Lab and RMT Coordinator should recommend another counting location (i.e., one with a lower background).

(3) Perform a 1-minute background count by pressing the "*" button located on the E-600 handle.

(4) Place the iodine cartridge in a sample bag and record its dose rate.

(5) Place the sample bag next to the detector ensuring that the flow arrow is pointing away from the face of detector.

(6) Count the sample for 1 minute by pressing the "*" button.

(7) Remove and label the sample. Record all information on Attachment 3 (RMT Sample/Survey Sheet).

(8) Perform another background count by pressing the "*" button. Notify the EOF if background has changed by more than a factor of two. Recount the sample and verify background as directed by the EOF.

(i) Record all data on Attachment 3 (RMT Sample/Survey Sheet) and report the results to the Rad Lab and RMT Coordinator.

6.5 TEAM DEACTIVATION

When told to deactivate by the Rad Lab and RMT Coordinator, the RMTs shall:

[1] Return to the EOF and transfer all samples to the Rad Lab and RMT Coordinator.

NOTE
Vehicle air cleaners could have high dose rates.

[2] Survey the RMT vehicles. Pay particular attention to the wheel wells, air cleaner, and door handles.

[3] Remove any anti-contamination clothing (as applicable) and perform a whole body frisk.

[4] Report any contamination found to the Rad Lab and RMT Coordinator and await further instructions.

[5] Debrief with the Rad Lab and RMT Coordinator. Ensure at least the following is done:

(a) All survey records are turned in.

(b) All checks and inventories are turned in.

(c) Any procedural problems are reported.

(d) Any equipment problems are reported.

(e) All applicable exposure records are correct and current.

[6] Inventory and restock the field kits.

[7] Clean out the RMT vehicles and refill the fuel tank.

7.0 RECORDS

The following documents are generated as a result of the implementation of this Procedure:

- RMT Equipment Checklist
- RMT Vehicle/Communications Checklist
- RMT Sample/Survey Sheet

The completed documents are to be turned in to the Rad Lab and RMT Coordinator in the EOF.

8.0 ATTACHMENTS

ATTACHMENT 1 - RMT EQUIPMENT CHECKLIST

ATTACHMENT 2 - RMT VEHICLE/COMMUNICATIONS CHECKLIST

ATTACHMENT 3 - RMT SAMPLE/SURVEY SHEET

ATTACHMENT 4 - DOCUMENT CROSS-REFERENCE

ATTACHMENT 5 - IDENTIFICATION OF COMMITMENTS

RMT EQUIPMENT CHECKLIST

TEAM: _____ DATE: _____

TEAM MEMBERS: _____ _____

_____ _____

Ion Chamber

Type: _____

Serial No.: _____

Cal Due: _____

Source Check: _____

Beta Corr. Factor: _____

Dose Rate Meter

Type: _____

Serial No.: _____

Cal Due: _____

Source Check: _____

Analyzer with NaI probe

Type: _____

Serial No.: _____

Cal Due: _____

Efficiency: _____

Count Rate Meter

Type: _____

Serial No.: _____

Cal Due: _____

Source Check: _____

HP-210 Probes (2)

Serial No.: _____

Cal Due: _____

Serial No. _____

Cal Due: _____

Air Sampler

Type: _____

Serial No.: _____

Cal Due: _____

Air Sampler

Type: _____

Serial No.: _____

Cal Due: _____

Instrument Check(s): _____ (SAT/UNSAT)

Kit Inventory: _____ (SAT/UNSAT)

Comments: _____

_____

_____

RMT VEHICLE/COMMUNICATIONS CHECKLIST

TEAM: _____ DATE: _____

Vehicle No.: _____

Fuel Level (fill if < 1/2)	_____	(Check)
Vehicle Lights	_____	(Operates)
Spotlights	_____	(Operates)
Emergency (Strobe) Lights	_____	(Operates)
Power Inverter	_____	(Operates)
Spare Tire	_____	(Check)
Winch	_____	(Operates)
Condition of Tires	_____	(Sat/Unsat)
Battery Parallel	_____	(Operates)

Communications

Vehicle Radio	_____	(Operates)
Portable Radio	_____	(Operates)
Cellular Telephone	_____	(Operates)

Vehicle Check:	_____	Sat/Unsat)
Communications Check:	_____	(Sat/Unsat)

COMMENTS: _____

_____

_____

RMT SAMPLE/SURVEY SHEET

TEAM: _____ DATE: _____

Sample No.: _____

Detailed Location: _____

_____

Radiation Survey

Survey Time: A) _____

Dose Rate (Closed Window waist high): B) _____ mR/hr

Dose Rate (Open Window waist high): C) _____ mR/hr

Dose Rate (Open Window 2" off ground): D) _____ mR/hr

Airborne Activity Survey

Sample Start Time: E) _____

Sample Stop Time: F) _____

Sample Flow Rate: G) _____ CFM

Cartridge Dose Rate: H) _____ mR/hr

Frisker Background: I) _____ cpm

Particulate Filter Count Rate: J) _____ cpm

Initial E-600/NaI Background: K) _____ cpm

Iodine Cartridge Count Rate: L) _____ cpm

Final E-600/NaI Background: M) _____ cpm

COMMENTS: _____

_____

_____

Note if survey/sample was not taken at plume centerline or large variances in background occurred while sampling.

DOCUMENT CROSS-REFERENCE

This Attachment lists those documents, other than References, which may be affected by changes to this Procedure.

Document Number	Document Title
EP-IP-251	Offsite Radiation Protection

IDENTIFICATION OF COMMITMENTS

This Attachment lists those external commitments (i.e., NRC commitments, QA audit findings, and INPO inspection items) implemented in this Procedure.

Reference Document	Commitment	Affected Sections(s)/Step(s)
None		

RTYPE H8.24

PILGRIM NUCLEAR POWER STATION

Procedure No. EP-IP-440

EMERGENCY EXPOSURE CONTROLS

Stop
Think
Act
Review

SAFETY RELATED

REVISION LOG

REVISION 7 **Date Originated 10/02**

Pages Affected	Description
5	Correct the TEDE definition.
7	Add TEDE in Step 6.2[2] to clarify dose category.
11	Replace reference to SAM-11 with NaI equipped E-600 or equivalent.

REVISION 6 **Date Originated 5/01**

Pages Affected	Description
All	Reformat to reflect PNPS 1.3.4-1. Revision bars are not shown for reformatting.
3,13,14	Add "Dose Card" to title of Attachment 1.
10,12	Change "Boston Edison Medical Director" to "Entergy Medical Department".
11	Change "Chemical Engineer" to "Core Damage Engineer".
12	Add reference to supplies of KI stored with the Medical Department. Clarify verbiage of instruction to individual regarding continued administration of KI.

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1.0 PURPOSE

This Procedure provides guidelines and administrative controls for radiation exposure received by PNPS controlled emergency workers during the course of a declared emergency.

2.0 REFERENCES

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

[2] EP-PP-01, "PNPS Emergency Plan"

[3] International Atomic Emergency Agency (IAEA), Technical Report No. 152, Evaluation of Radiation Emergencies and Accidents

[4] National Council on Radiation Protection (NCRP) Report 39, Basic Radiation Protection Criteria

[5] National Council on Radiation Protection (NCRP) Report 55, Protection of the Thyroid Gland in the Event of Releases of Radioiodine

[6] The Food and Drug Administration Approved Patient Package Insert for Commercially Packaged Potassium Iodide

3.0 DEFINITIONS

[1] Corrective Action - Includes surveillance and/or assessment actions and plant operations necessary to minimize further deterioration of the level of plant safety or to mitigate the consequences of the accident, if failure to perform these actions could result in a significant increase in offsite exposures.

[2] Emergency Exposure - Radiation exposure received by an emergency worker conducting accident mitigating or life saving actions during a declared emergency.

[3] Emergency Exposure Limits

Dose Limit*	Activity	Conditions
5	All	
10	Protecting valuable property.	Lower dose not practical.
25	Life saving or protection of large populations.	Lower dose not practical.
> 25	Life saving or protection of large populations.	Only on a voluntary basis to persons fully aware of the risks involved.

* EPA TEDE values for nonpregnant adults from exposure and intake during an emergency situation in rem. Workers performing services during emergencies should limit dose to the eyes to three times the listed value and dose to any other organ (including skin and body extremities) to ten times the listed value.

[4] Emergency Worker - An individual who holds an emergency response function as indicated by the PNPS Emergency Plan during a declared emergency.

[5] Life Saving Action - Actions related to the search for and rescue of injured persons, or corrective or protective actions to mitigate conditions which could result in imminent injury or substantial overexposure to an individual.

[6] Total Effective Dose Equivalent (TEDE) - Sum of the external Deep Dose Equivalent (DDE) and the internal Committed Effective Dose Equivalent (CEDE).

4.0 DISCUSSION

None

5.0 RESPONSIBILITIES

[1] The Emergency Director (ED), or the Emergency Plant Manager (EPM) when delegated, is responsible for the authorization of:

(a) Individual dose in excess of the lower emergency exposure limits.

(b) The administration of potassium iodide (KI).

[2] The Onsite and Offsite Radiological Supervisors are responsible for:

(a) Tracking dose received by the emergency workers during the course of the emergency.

(b) Ensuring that proper emergency exposure guidelines are followed by emergency workers.

(c) Evaluating, recognizing, and recommending the need for KI.

6.0 PROCEDURE

6.1 DOSES ≤ THE LOWER EMERGENCY EXPOSURE LIMITS

[1] Individual exposure received over the course of the emergency shall be recorded and documented in accordance with Section 6.3.

[2] From the time an emergency is declared, ERO personnel are considered emergency workers. Emergency workers are allowed to receive the following exposure over the course of the emergency, exclusive of previous exposure and without special authorization:

(a) 5 rem TEDE (whole body).

(b) 15 rem to the eyes.

(c) 50 rem to the skin, thyroid, and extremities.

[3] Radiation exposures to emergency personnel shall be maintained, when possible, within the PNPS administrative exposure guides.

[4] In order to maintain personnel exposures as low as possible, methods used during normal Station operation to control and minimize exposures, such as ALARA (As Low As Reasonably Achievable), shall remain in force during an emergency condition to the degree consistent with timely implementation of emergency measures.

[5] To assure adequate protection of minors and the unborn during emergencies, the performance of emergency activities should be limited to nonpregnant adults.

6.2 DOSES > THE LOWER EMERGENCY EXPOSURE LIMITS

[1] Individual exposure received over the course of the emergency shall be recorded and documented in accordance with Section 6.3.

[2] Prior ED/EPM approval must be given for all emergency exposures anticipated to exceed 5 rem TEDE or to cause an individual to have accumulated greater than 5 rem TEDE over the course of the emergency.

[3] Pre-Exposure Evaluation: Consideration of the following guidelines shall be given prior to authorizing doses greater than the lower exposure limits:

(a) The risk of not performing the task shall be evaluated against the anticipated exposure.

(b) Dosimetry equipment capable of measuring the anticipated maximum exposure and type of radiation shall be worn by personnel receiving emergency exposures.

(c) Personnel shall not enter any area where dose rates are unmonitored or immeasurable.

(d) Where practical, all attempts shall be made to keep emergency exposures ALARA (for example, use of protective clothing, respiratory protection, thyroid blocking agent).

[4] Personnel undertaking any emergency operation in which the dose will exceed 25 rem to the whole body shall be identified by signature on the Emergency Volunteer Acknowledgment Form (Attachment 3) and should:

(a) Do so only on a voluntary basis.

(b) Be more than 45 years of age.

(c) Be made fully aware of the risks involved, including the numerical levels of dose at which acute effects of radiation exposure will be incurred and numerical estimates of the risks of delayed effects.

6.3 EMERGENCY EXPOSURE DOCUMENTATION

[1] Emergency exposure documentation for ERO personnel shall be maintained by the Onsite and Offsite Radiological Supervisors (as applicable). Individual exposures will be recorded on Attachment 1 or other similar form to ensure adequate documentation and tracking during the course of the emergency.

[2] Activities in support of emergency efforts which involve emergency exposure must include a radiological briefing and will be documented through a Radiation Work Permit (RWP) or on an Emergency Radiological Controls Form (Attachment 2).

> NOTE
>
> Although it is preferable to document radiological controls prior to dispatching individuals on emergency related tasks, radiological controls and precautions may be provided verbally and documented as soon as possible thereafter.

[3] Radiological controls determined to be necessary for a task conducted during the emergency are documented on Attachment 2 as follows:

(a) Task Assignment: The task, number, location, and date are copied from the OSC Team Task Assignment Sheet or completed as appropriate (for tasks such as RMT dispatch).

> NOTE
>
> Prior ED/EPM approval must be given for all emergency exposures anticipated to cause an individual to have accumulated greater than 5 rem over the course of the emergency.

(b) Task Exposure (Individual) Estimate: The maximum expected dose to any single member of the team. Team members are instructed to either contact the team coordinator or to return prior to exceeding this dose. Consideration shall be given to the benefit of performing the task versus the exposure to be received by personnel when this value has been determined.

(c) Task Dose Rate Limit: The maximum expected whole body dose rate. Team members are to fall back to an area of lower dose rate and contact the team coordinator or return when this limit is encountered.

(d) Dosimetry: Describes any requirements beyond a TLD and SID. A TLD and SID are automatic requirements for all tasks involving radiological controls.

(e) PCs and Respiratory Protection: Denotes the necessary protective clothing and equipment required for the task.

(f) Suggested Route: Best or preferred route to the task site or the sequence to follow for tasks conducted at multiple locations.

(g) Anticipated Conditions: Radiation, contamination, and airborne conditions. Values need not be provided for tasks which could be hindered by stopping to conduct contamination and airborne surveys. When air sampling is required, ensure guidance is provided regarding:

(1) Sample location(s).

(2) Sample volume (collection time and flow rate).

(3) Analysis or counting method to be used.

(4) Actions for high exposure rates on collected samples.

(h) Survey Equipment and Maps: Describes any radiological equipment and logs or maps used to conduct surveys performed as part of or during the task.

(i) Special Instructions: Describes any additional radiological information or instructions necessary to the task.

[4] Task Exposure: The task exposure section is used to identify the individuals assigned to and track exposure received during conduct of the task. Current emergency dose will be checked against the task exposure estimate prior to team dispatch to ensure no exposure limits are exceeded without proper authorization.

NOTE

Although it is preferable to document authorization prior to tasks which allow extended exposure, authorization may be granted verbally and documented as soon as possible thereafter.

[5] Extended Exposure: The extended exposure section provides authorization by the Emergency Director (or Emergency Plant Manager for onsite ERO personnel when delegated) prior to activities which would result in doses greater than the lower emergency limits.

(a) If the task exposure estimate exceeds 5 rem or the task exposure will result in an individual's emergency exposure exceeding 5 rem, an extended limit must be determined and authorized.

(b) Extended emergency exposures for life saving or protection of large populations anticipated to exceed 25 rem must include additional briefing and documentation in accordance with the Emergency Volunteer Acknowledgment Form (Attachment 3).

6.4 POSTEXPOSURE EVALUATION

[1] EPA-400 specifies that emergency exposures received during an emergency are considered a once-in-a-lifetime exposure and are not added to occupational exposure accumulated under nonemergency conditions.

[2] 10CFR20 specifies doses received during emergencies must be subtracted from the limits for Planned Special Exposures that the individual may receive during the current year and during the individual's lifetime.

[3] Individuals receiving doses beyond the lower exposure limits shall be restricted from further occupational (nonemergency) radiation exposure pending the outcome of exposure evaluations and medical surveillance.

[4] The Entergy Medical Department shall be contacted for follow-up care and further evaluation, as required.

6.5 ADMINISTRATION OF POTASSIUM IODIDE (KI)

[1] The Emergency Director or the Emergency Plant Manager shall be responsible for authorizing the administration of KI to PNPS emergency workers.

NOTE

KI is 90% effective in blocking the uptake of radioiodine by the thyroid if administered within the first hour of uptake, and is 50% effective if administered within 4 hours after uptake. Almost no benefit will be obtained if KI is administered 10 to 14 hours after exposure; therefore, it shall not be administered after such a duration.

[2] KI should be considered as a potential dose reducing option for any situation in which airborne radioactive iodine is present (an additional ALARA option).

[3] Dose Determination: KI should be administered to emergency workers if by calculation, measurement, or estimation the total dose to the thyroid will exceed 50 rem.

(a) The isotopic halogen concentrations must be determined before a thyroid dose can be estimated. Concentrations can be determined by direct measurement of each isotope or by estimations based on a known I-131 concentration.

(1) Concentration estimations can be determined as follows:

- By the use of the Halogen Concentration Worksheet (Attachment 4).
- Through the use of the Excel spreadsheet file SAMPLE. SAMPLE is loaded on the TSC core damage computer and the EOF dose assessment computers.

(2) When estimated concentrations are used, the estimations should be confirmed by direct measurement as soon as practical.

(3) The sample data and calculation sections are used to determine I-131 activity if an NaI equipped E-600 (or equivalent) is used to analyze the I-131 concentration. Otherwise, the I-131 concentration can be entered directly.

(4) Accident type is determined by the Reactor or Core Damage Engineer in the TSC. If the accident type is unknown, assume a gap release.

(b) Thyroid dose can be estimated from isotopic concentrations (in µCi/cc) as follows:

(1) Direct Calculation

$$\textbf{Thyroid Dose}_i = Concentration_i \times DCF_i \times \left(\frac{-1}{\lambda} \times e^{-\lambda t} + \frac{1}{\lambda}\right)$$

Isotope	$DCF\left(\frac{rem \bullet cm^3}{\mu Ci \bullet hr}\right)$	$\lambda(hr^{-1})$
I-131	1.3E+06	3.59E-03
I-132	7.7E+03	3.01E-01
I-133	2.2E+05	3.33E-02
I-134	1.3E+03	7.88E-01
I-135	3.8E+04	1.05E-01
Te-132	2.9E+05	8.86E-03

Where t = exposure period in hours.

Total thyroid dose is the sum of the individual doses from each of the isotopes above.

(2) Through the use of the Excel spreadsheet file titled SAMPLE. SAMPLE is loaded on the TSC core damage computer and the EOF dose assessment computers.

(3) Through the use of the dose assessment computer application titled DAPAR. DAPAR is loaded on computers in the Control Room and the EOF.

[4] Issuing KI: The Onsite Radiological Supervisor or the Offsite Radiological Supervisor, as applicable, shall:

NOTE

The Emergency Director or the Emergency Plant Manager is responsible for authorizing the administration of KI to PNPS emergency workers.

(a) Ensure approval and documentation are recorded on the Potassium Iodide Administration Form (Attachment 5).

CAUTION

Individuals who have known allergies to iodide shall NOT be issued KI.

(b) Notify those who are to receive KI to report to a designated location for distribution.

(c) Issue one 130 mg KI tablet to each individual who is to receive KI. KI is stored in the OSC Medical locker and in the EOF Medical locker. Additional supplies are also located in the Medical Department.

(d) Contact the Entergy Medical Department and request follow-up care and further guidance concerning KI administration.

(e) Instruct individuals to take one 130 mg KI tablet daily for 10 days or as directed by the Entergy Medical Department and record each issuance on the Potassium Iodide Administration Form (Attachment 5).

7.0 RECORDS

[1] The following documents may be generated by the implementation of this Procedure:

(a) Emergency Worker Exposure Record

(b) Emergency Radiological Controls Form

(c) Emergency Volunteer Acknowledgment Form

(d) Halogen Concentration Worksheet

(e) Potassium Iodide Administration Form

[2] Completed documents shall be collected by the Onsite Radiological Supervisor or the Offsite Radiological Supervisor, as applicable, who reviews and submits all records to the Emergency Preparedness Superintendent.

8.0 ATTACHMENTS

ATTACHMENT 1 - EXAMPLE - EMERGENCY WORKER EXPOSURE RECORD/DOSE CARD

ATTACHMENT 2 - EMERGENCY RADIOLOGICAL CONTROLS FORM

ATTACHMENT 3 - EMERGENCY VOLUNTEER ACKNOWLEDGMENT FORM

ATTACHMENT 4 - HALOGEN CONCENTRATION WORKSHEET

ATTACHMENT 5 - POTASSIUM IODIDE ADMINISTRATION FORM

ATTACHMENT 6 - DOCUMENT CROSS-REFERENCE

ATTACHMENT 7 - IDENTIFICATION OF COMMITMENTS

EXAMPLE - EMERGENCY WORKER EXPOSURE RECORD/DOSE CARD

PNPS EMERGENCY DOSE CARD				
NAME: LAST FIRST M I.				
SLOT #		SID SERIAL #		
DATE:		AVAILABLE DOSE		
TASK #	**SID IN**	**SID OUT**	**TASK DOSE**	**TOTAL DOSE**

EMERGENCY RADIOLOGICAL CONTROLS FORM

Assignment

Task:	**No:**
Location:	**Date:**

Radiological Controls

Task Exposure (Individual) **Estimate:**	**Task Dose Rate Limit:**	**Dosimetry** (TLD and SID as a minimum) **:**

Protective Clothing & Respiratory Protection:

- ☐ None
- ☐ Other (see below)
- ☐ Cotton Liners
  Rubber Gloves
  Shoe Covers
  Rubbers
- ☐ Lab Coat
- ☐ Full PCs
- ☐ Full Face Part
- ☐ Full Face Part/Iod
- ☐ SCBA

Suggested Route:

Anticipated Conditions:	**Enroute**	**At Location**
Radiation (mR/hr)		
Contamination		
Airborne		

Survey Equipment and Maps:

Special Instructions (attach additional pages if necessary):

Task Exposure

Team Member Name	Current Emergency Dose	SID Dose In	SID Dose Out	Task Dose

Extended Exposure

Task Requires an Individual's Emergency Exposure to Exceed 5 Rem:

☐ No ☐ Yes **Extended Limit:**

Authorization (ED or EPM):	**Time:**

EMERGENCY VOLUNTEER ACKNOWLEDGMENT FORM

Assignment	
Task:	**No:**
Location:	

Health Effects associated with Whole Body Absorbed Doses Received Within a Few Hours[a] (Acute Dose)

Dose (Rad)	% Precursory Effects[b]	% Early Fatalities[c]
50	2	
100	15	
140		5
150	50	
200	85	15
250	98	
300		50
400		85
460		95

a Risks will be lower for protracted exposures.
b Forewarning symptoms of more serious health effects associated with large doses of radiation.
c Supportive medical treatment may increase the dose at which these frequencies occur by approximately 50 percent.

Approximate cancer Risk to Average Individuals from 25 Rem Acute Exposure

Age at Exposure (years)	Approximate risk of premature death (deaths per 1000 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

I have been briefed on the radiological consequences and hazards associated with the authorized emergency exposure, and I have volunteered to perform the task described.

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Note: Detailed information for the above tables is located in Appendix B and Appendix C of EPA-400

HALOGEN CONCENTRATION WORKSHEET

Halogen Concentration Worksheet

Calculations Performed By

Name: _____ **Date:** _____

Sample Data		
Gross Sample Count Rate (CPM)	A.	
Background Count Rate #1 (CPM)	B.	
Background Count Rate #2 (CPM)	C.	
Meter Efficiency (%)	D.	
Sample Duration (min)	E.	
Sample Flow (scfm)	F:	
Time After Shutdown (hrs)	G:	
Accident Type (G or M)	H:	

Sample Calculations		
Average Background = (B + C) / 2	J:	
Net Counts = A - J	K:	
Sample Correction = D x E x F	L:	

Isotopic Concentrations		uCi/cc	Ratio
I-131 = (K / L) x 1.59E-09	M:		N/A
I-132 = Table Ratio x M			
I-133 = Table Ratio x M			
I-134 = Table Ratio x M			
I-135 = Table Ratio x M			
Te-132 = Table Ratio x M			

Time After Shutdown	I-132	I-133	I-134	I-135	Te-132 (Gap)	Te-132 (Melt)
0	1.45	2.09	2.31	1.95	0.01	12.63
1	1.45	2.05	1.63	1.76	0.01	12.54
2	1.44	2.00	0.96	1.59	0.01	12.47
3	1.44	1.94	0.52	1.44	0.01	12.41
4	1.43	1.89	0.26	1.30	0.01	12.34
5	1.43	1.83	0.13	1.17	0.01	12.28
6	1.43	1.78	0.06	1.06	0.01	12.21
7	1.42	1.73	0.03	0.96	0.01	12.15
8	1.41	1.68	0.01	0.87	0.01	12.08
16	1.35	1.32	0.00	0.38	0 01	11.58
24	1.30	1.04	0.00	0.17	0.01	11.11
48	1.14	0.51	0.00	0.01	0.01	9.79
72	1.01	0.25	0.00	0.00	0.01	8.62
96	0 89	0.12	0.00	0.00	0 01	7.60
120	0.78	0.06	0.00	0.00	0.00	6.70
144	0.69	0.03	0.00	0.00	0.00	5.90
168	0.61	0.01	0.00	0.00	0.00	5.20

*Mix ratio assumes end of core life source term.

POTASSIUM IODIDE ADMINISTRATION FORM

Name: _____ SSN: _____
(Last) (MI) (First)

I-131 Concentration (µCi/cc area) _____ µCi/cc

Duration Of Exposure: _____ Hours

Projected Thyroid Dose (Estimated): _____ Rem

Respiratory Protection Worn: ☐ Yes ☐ No Protection Factor: _____

Determined by: _____ Time: _____
Onsite/Offsite Radiological Supervisor

Approved by: _____ Time: _____
ED/EPM

I have read and understand the precautions in Attachment 4 and understand that taking KI is voluntary. I also verify to the best of my knowledge I have no known allergies to iodide

Signature of Individual Taking KI:

KI Administration Record

Date	Time	Issued By

POTASSIUM IODIDE ADMINISTRATION FORM (CONT.)

THE FOOD AND DRUG ADMINISTRATION APPROVED PACKAGE INSERT

THYRO-BLOCK®
TABLETS
(POTASSIUM IODIDE TABLETS, USP)
(pronounced poe-TASS-e-um EYE-oh-dyed)
(abbreviated: KI)

TAKE POTASSIUM IODIDE ONLY WHEN PUBLIC HEALTH OFFICIALS TELL YOU. IN A RADIATION EMERGENCY, RADIOACTIVE IODINE COULD BE RELEASED INTO THE AIR. POTASSIUM IODIDE (A FORM OF IODINE) CAN HELP PROTECT YOU.

IF YOU ARE TOLD TO TAKE THIS MEDICINE TAKE IT ONE TIME EVERY 24 HOURS DO NOT TAKE IT MORE OFTEN MORE WILL NOT HELP YOU AND MAY IN-CREASE THE RISK OF SIDE EFFECTS. *DO NOT TAKE THIS DRUG IF YOU KNOW YOU ARE ALLERGIC TO IODINE.* (SEE SIDE EFFECTS BELOW.)

INDICATIONS

THYROID BLOCKING IN A RADIATION EMERGENCY ONLY.

DIRECTIONS FOR USE

Use only as directed by State of local public health authorities in the event of a radiation emergency.

DOSE

Tablets	ADULTS AND CHILDREN 1YEAR OF AGE OR OLDER: One (1) tablet once a day. Crush for small children. BABIES UNDER 1 YEAR OF AGE: One-half (1/2) tablet once a day. Crush first.

Take for 10 days unless directed otherwise by State or local public health authorities

Store at controlled room temperature between 15° and 30° C (59° to 86° F). Keep container tightly closed and protect from light.

WARNING

Potassium iodide should not be used by people allergic to iodine. Keep out of the reach of children In case of overdose or allergic reaction, contact a physician or the public health authority.

DESCRIPTION

Each THYRO-BLOCK® TABLET contains 130 mg of potassium iodide. Other ingredients. magnesium stearate, microcrystalline cellulose, silica gel, sodium thiosulfate

HOW POTASSIUM IODIDE WORKS

Certain forms of iodine help your thyroid gland work right. Most people get the iodine they need from foods, like iodized salt or fish The thyroid can "store" or hold only a certain amount of iodine.

In a radiation emergency, radioactive iodine may be released in the air. This material may be breathed or swallowed It may enter the thyroid gland and damage it. The damage would probably not show itself for years. Children are most likely to have thyroid damage

If you take potassium iodide, it will fill up your thyroid gland This reduces the chance that harmful radioactive iodine will enter the thyroid gland

WHO SHOULD NOT TAKE POTASSIUM IODIDE

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

HOW AND WHEN TO TAKE POTASSIUM IODIDE

Potassium Iodide should be taken as soon as possible after public health officials tell you You should take one dose every 24 hours More will not help you because the thyroid can "hold" only limited amounts of iodine Larger doses will increase the risk of side effects You will probably be told not to take the drug for more than 10 days

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 for 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 an allergic reaction with more serious symptoms These could be fever and joint pains, or swelling of parts of the face and body and at times severe shortness of breath requiring immediate medical attention

Taking iodine 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 the side effects are severe or if you have an allergic reaction, stop taking potassium iodide Then, if possible, call a doctor or public health authority for instructions

HOW SUPPLIED

THYRO-BLOCK® TABLETS (Potassium Iodide Tablets, UPS) bottles of 14 tablets (NDC 0037-0472-20). Each white, round, scored tablet contains 130 mg potassium iodide.

WALLACE LABORATORIES
Division of
CARTER-WALLACE, INC
Cranbury, New Jersey 08512

IN-0472-01 Rev 2/85

DOCUMENT CROSS-REFERENCE

This Attachment lists those documents, other than source documents, which may be affected by changes to this Procedure.

Document Number	Document Title
EP-IP-230	OSC Activation and Response
EP-IP-231	Onsite Radiation Protection
EP-IP-251	Offsite Radiation Protection

IDENTIFICATION OF COMMITMENTS

This Attachment lists those external commitments (i.e., NRC commitments, QA audit findings, and INPO inspection items) implemented in this Procedure.

Reference Document	Commitment	Affected Section(s)/Step(s)
NRC Inspection Finding 84-05-16/85-19-01	Describe or reference by Procedure the program for exposure control during emergencies. Improve program for evaluation/control of re-entry team radiation exposure.	All