

ANNEX 6
(RADIOLOGICAL EXPOSURE CONTROL)
TO THE SOUTH CAROLINA OPERATIONAL RADIOLOGICAL EMERGENCY
RESPONSE PLAN

I. INTRODUCTION

South Carolina government at all levels must maintain the means to protect the populace from radiological exposure during a radioactive release from a nuclear power plant (NPP). To this end, State and local emergency management agencies have disseminated emergency procedures and established exposure guidelines among all emergency workers.

II. PURPOSE

- A. Specify responsibilities for incident assessment, radioactive plume monitoring, protective action measures, monitoring of the public and emergency workers for radioactive contamination to include clothing and equipment, and for the disposal of radioactively contaminated waste.
- B. Provide for an effective State and local radiation protection plan for the public and emergency workers during a potential or actual radioactive release from an NPP incident.

III. CONCEPT OF OPERATIONS

- A. In the event of a release or threat of release of radionuclides from an NPP, Emergency Support Function (ESF)-10 (Environmental and Hazardous Materials Operations) will assess and make recommendations to the South Carolina Emergency Management Division (SCEMD), of the need for initiation of radiological exposure control activities. SCEMD instructs State departments, agencies, and county emergency management agencies to commence radiological exposure control operations (monitoring, decontamination, recording, etc.), and to take protective action measures, when advised.
- B. The public and emergency workers will be monitored for radionuclides and decontaminated as warranted and in accordance with State or county plans. State and county officials will coordinate all protective measures.
- C. Emergency Worker Exposure Authorization
 - 1. The South Carolina Department of Environmental Services (SCDES) may authorize agency emergency workers to exceed exposure levels specified in the South Carolina Technical Radiological Emergency Response Plan (SCTRERP).
 - 2. All others, including State, county, and municipal employees serving as radiological emergency workers, may be authorized to exceed the SC Administrative Dose Limits of Table B in the following manner:

- a. ESF-10 will provide as much information as is available about the radiological environment in areas impacted by a radiological release, including actual or projected dose rates in rem/hr.
 - b. The principal officer or designee of each organization deploying emergency workers may authorize emergency workers to incur exposures in excess of the SC Administrative Dose Limits of Table B.
 - c. Emergency workers will be provided direct reading dosimeters, Potassium Iodide (KI), a briefing on the known radiological environment in the proposed area of operation, the risks of radiological exposure, and specific taskings for which radiation exposure in excess of the Administrative Limits are justified: lifesaving, protection of large populations, protection of critical infrastructure.
- 3. Under emergency conditions, an Incident Commander may authorize informed and trained first responders who volunteer to exceed the SC Administrative Dose Limits of Table B for the purpose of life-saving rescue or protecting large populations.
- D. For purposes of this Annex, an exposure of 1 R shall be considered equivalent to an exposure of 1 rem.
- E. Entities deploying emergency workers will distribute Direct-Reading Dosimeters (DRDs) and Permanent Record Dosimeters (PRDs) which have been pre-positioned by the State. The county radiological officer will maintain permanent records of each individual's accumulated radiological exposure and submit copies daily to ESF-10 at the State Emergency Operations Center (SEOC).
- F. Counties will rely on the SEOC for information on incident assessment, field monitoring, and representation at the utility Emergency Operations Facility (EOF).
- G. Distribution of KI and an order or recommendation to ingest KI are not synonymous. The following table gives a high-level overview of the distinctions.

Overview of KI Distribution and Authorization to Ingest

Time ↓	County Emergency Management Tasked state agencies	Institutionalized individuals* in 10 mile EPZ	General public
	Blue Sky: No event in progress		
	KI supplied to county emergency managers	KI offered to Institution managers	KI available on request at risk county health departments
	Event in progress resulting in State Emergency Response Team (SERT) activation; No release yet		
	Agencies and counties distribute KI to emergency workers; “do not ingest until directed”	As time permits, renew offer for KI	Reception centers activated; KI distribution teams in place; no distribution
	Evacuation ordered to avoid plume exposure		
	Agencies and counties distribute KI to emergency workers; “do not ingest until directed”	ESF-8 (Health and Medical Services) Monitor progress of Institution evacuation	Evacuees register at reception centers; distribution but no ingestion of KI
	Release in progress; KI ingestion recommended by ESF-10 and the designated Public Health Physician, ordered by Governor		
	Emergency workers instructed to ingest	Institutions should ingest KI (ingested by staff, administered to residents with instruction to ingest)	Two scenarios: -evacuation complete before release begins: no ingestion -evacuees exposed to plume: KI distributed with instruction to ingest

*Institutionalized individual: a person who resides in an institution, such as a nursing home or correctional facility, and who may need to depend on others for assistance with taking protective actions. For purposes of this plan, an “institution” refers to regulated inpatient healthcare facilities to include hospitals, hospice facilities, residential treatment facilities, community residential care facilities, and detention centers. Staff remaining in these facilities must be provided the same protections.

H. Radiological Exposure Control for the Public

1. General Principles

- a. Rapid action may be needed to protect members of the public during an incident having the potential for or involving a release of radioactive materials to the atmosphere. During a release of airborne radioactive materials, initial protective actions may include evacuation and/or sheltering.
- b. ESF-10 will recommend appropriate protective actions during the incident assessment phase.

- c. Consideration of all risks is important in determining the appropriate response recommendation. Protective actions should not expose individuals to greater risks than the risk avoided.
2. U.S. Environmental Protection Agency (EPA) Protective Actions Guides (PAGs)
 - a. The PAGs during the early phase of an incident are summarized in Table A (PAGs for the Early Phase of a Nuclear Release).
 - b. Because radioactive releases may involve different radionuclides, the resulting risk may be greater for one body system than another. The PAGs take these differences into account, resulting in different measures for PAGs depending on the body system at greatest risk (i.e., whole body, skin, or thyroid).
 - (1) The whole body PAG is expressed in terms of the Total Effective Dose (TED). TED is the sum of the Effective Dose (ED) from external radiation and the Committed Effective Dose (CED) incurred from inhalation of radioactive materials from exposure and intake during the early phase.
 - (2) Supplementary guides are specified in terms of CED to the thyroid and dose equivalent to the skin.
 - c. The PAG for the ingestion of KI is specified in terms of the CED to the projected child thyroid dose from radioiodine.
 - d. The decision to recommend evacuation, sheltering, or ingestion of KI should be made when projected doses have the potential to exceed the respective PAGs.

Table A. PAGs for the Early Phase of a Nuclear Release

PAG (Projected Dose)	Protective Action	Comments
1 rem ^b	Evacuation (or sheltering ^a)	Evacuation (or sheltering ^a) should normally be initiated at 1 rem.
5 rem ^c	Ingestion of potassium iodide (KI)	Designated Public Health Physician will make a recommendation.

^a Sheltering may be the preferred protective action when it will provide protection equal to or greater than evacuation, based on consideration of factors such as source term characteristics and temporal or other site-specific conditions.

^b The sum of the effective dose resulting from exposure to external sources and the CED incurred from all significant inhalation pathways during the early phase. CED to the thyroid and to the skin may be 5 and 50 times larger, respectively.

^c CED to thyroid from radioiodine.

3. Evacuation and Sheltering

- a. Evacuation of the public is usually justified when the projected dose to an individual is 1 rem TED. This conclusion is primarily based on the EPA's judgment concerning the acceptable levels of risk of effects on public health from radiation exposure in an emergency. At this radiation dose, the risk avoided is usually greater than the risk from evacuation itself.
- b. Sheltering may be preferable to evacuation as a protective action in some situations.
 - (1) Because of the higher risk associated with evacuation of some groups in the population (i.e., institutionalized individuals), sheltering may be the preferred alternative for such groups as a protective action at projected doses up to 5 rem.
 - (2) Under unusually hazardous environmental conditions, use of sheltering at projected doses up to 5 rem TED to the affected population (and up to 10 rem to certain groups) may become justified.
- c. Sheltering may also provide protection equal to or greater than evacuation due to the nature of the source term and/or in the presence of temporal or other site-specific conditions. Examples of situations or groups for which evacuation may not be appropriate at 1 rem include:
 - (1) Presence of severe weather
 - (2) Competing disasters
 - (3) Institutionalized individuals who are not readily mobile: regulated inpatient healthcare facilities; correctional and detention facility inmates; and staff remaining at all of the aforementioned facilities
 - (4) Local physical factors which impede evacuation
 - (5) When Evacuation Time Estimate (ETE) exceeds expected plume exposure duration
- d. Some judgment will be necessary when considering the types of protective actions to be implemented and at what levels in an emergency. During hot and cold weather, the consequences of turning off heating, ventilation and air conditioning systems should be considered before making a shelter-in-place recommendation.

4. Thyroid Blocking Agent for the Public
 - a. The accumulation of radioiodine (radioactive isotopes of the common element iodine) in the thyroid gland is a potential threat during a nuclear power plant incident. KI acts as a blocking agent to radioiodine preventing it from accumulating in the thyroid gland.
 - b. South Carolina Department of Public Health (SCDPH) will pre-position KI at county health departments and make it available to the population residing within a 10-mile EPZ and offer it to facilities within each 10-mile EPZ housing institutionalized persons (see C.3.c above).
 - c. SCDPH will transport KI to reception centers when activated and operate distribution stations when directed during or after a radioactive release.
 - d. Information on the availability of KI and locations where it can be obtained is published annually in NPP emergency information brochures/calendars that are distributed by the utility to all residents in the 10-mile EPZ.
 - e. ESF-10 in coordination with ESF-8 will recommend ingestion of KI when the PAG is, or projected to be, exceeded. Any Protective Action Decision to ingest KI will be communicated in an Executive Order of the Governor.
 - f. General information regarding KI and protection of the thyroid gland is included in Attachment A (Recommendations for KI Use During a Nuclear Power Plant Emergency).

I. Radiological Exposure Control for Emergency Workers

1. Justification
 - a. The PAGs for protection of the public and dose limits for workers performing emergency services are derived under different assumptions. PAGs consider the risks to individuals from exposure to radiation and the risks and costs associated with a specific protective action.
 - b. Unlike members of the public, emergency workers with assignments within the plume EPZ are not always able to take shelter or evacuate the area due to their duties.
 - c. The resulting exposures will be justified if the maximum risks permitted to workers are acceptably low and the risks or costs to

others avoided by their actions outweigh the risks to which workers are subjected.

2. Emergency Workers

- a. Emergency workers are individuals who have an essential mission to protect the health and safety of the public, and who could be exposed to ionizing radiation from the plume or from its deposition. All other individuals should be considered members of the public.
- b. Workers who may incur increased levels of exposure during emergency conditions may include those employed in:
 - (1) Law Enforcement
 - (2) Firefighting
 - (3) Radiation Protection
 - (4) Traffic Control
 - (5) Medical Services
 - (6) Environmental Monitoring
 - (7) Transportation Services
 - (8) Animal Care
- c. Additionally, selected workers at institutional, utility, industrial facilities, and farms and other agribusiness may be required to protect others or valuable property during an emergency.

3. Dose Limits for Emergency Workers

- a. The EPA issued guidance for emergency worker dose limits is provided as the TED values. These limits are identified in the first column of Table B (Guidance on Dose Limits for Workers Performing Emergency Services).
- b. These dose limits are the sum of the external (i.e., ED) and internal (i.e., CED) doses to the emergency workers during the response to the incident. However, during an emergency response, the CED portion of the TED cannot be measured to ensure the emergency workers' TED does not exceed the EPA dose limits.
- c. The State of South Carolina administrative dose limits, identified in the second column of Table B, are lower than those recommended

by EPA. During the Intermediate or Late Phases, these limits may be revised after full consideration of all available information.

- d. Emergency workers monitor their external dose using a DRD. Limiting the emergency workers' external dose to these administrative limits provides reasonable assurance that, after including the internal dose, the emergency workers' TED will not likely exceed the relevant dose limit.
- e. Other protective measures available to emergency workers are enumerated in Table B.

Table B. Guidance on Dose Limits for Workers Performing Emergency Services

EPA Dose Limit ^a (rem)	SC Administrative Dose Limit ^b (R)	Activity	Condition
5 rem	1 R	All occupational exposures	All reasonable achievable actions have been taken to minimize dose.
10 rem	2 R	Protection of critical infrastructure necessary for public welfare	Exceeding 1 rem (10 mSv) unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.
25 rem	5 R	Lifesaving or protection of large populations	Exceeding 1 rem (10 mSv) unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.
>25 rem	>5 R	Lifesaving or protection of large populations	All conditions above and only for people fully aware of the risks involved.

Note: Report immediately any exposure ≥ 0.1 R or 100 mR.

^a Total Effective Dose is the sum of effective dose (external) and the committed effective dose (internal) to non-pregnant adults from exposure and intake during an emergency situation. These limits apply to all doses from an incident, except those received in unrestricted areas as members of the public during the intermediate phase of the incident.

^b Exposure as measured with a direct reading dosimeter (DRD).

4. Dosimetry

- a. Prior to dispatch, all emergency workers with assignments inside the plume exposure pathway EPZ will be equipped with one DRD with a range capable of measuring a radiation exposure of 0 R to at least 5 R, a PRD, and a two-day supply of KI.

- (1) The DRD enables the emergency worker to monitor himself/herself during the emergency for total external radiation dose received.
 - (2) The PRD (independently read by the PRD service contractor) provides a more accurate and legal record of the emergency worker's radiation exposure during the duration of the incident response.
- b. Each emergency worker is responsible for following the procedures, including record keeping contained in Attachment B (Emergency Worker Radiation Exposure Records).
- c. Group dosimetry, assigning PRDs to each individual and one DRD for the group, is only permitted within the 10-mile EPZ for emergency workers assigned to a fixed location. If emergency workers are deployed outside the fixed location, they must be issued a separate DRD.
- d. Emergency workers assigned to low-exposure rate areas outside the plume exposure pathway (e.g., reception centers, counting laboratories, emergency operations/communications centers, etc.) will be equipped with a PRD. These workers may also be assigned individual DRDs with a range capable of measuring a radiation exposure of 0-500 mR, or they may be monitored by dosimeters strategically placed in the work area. Group dosimetry, as defined in the previous paragraph, is permitted for these emergency workers so long as they remain in close proximity for the duration of their exposure.
- e. SCEMD has pre-positioned survey meters, portal monitors, PRDs, and DRDs in NPP risk and host counties throughout the state.
 - (1) In the event of an incident at an NPP, the state will activate its SCEMD Redistribution SOP to reinforce the threatened area.
 - (2) Key elements of the SCEMD Redistribution SOP include:
 - (a) Mutual aid agreements among risk and host counties to support threatened areas of the state with their radiological equipment and personnel.
 - (b) Use of state law enforcement agencies (i.e., SCDPS) to supplement the transport of needed equipment.
 - (c) Acquisition of additional equipment from unaffected NPPs and commercial companies.

- f. Affected counties will issue PRDs, DRDs, and KI to emergency workers assigned to the affected area.
5. Thyroid Blocking Agent for Emergency Workers
 - a. KI tablets for emergency workers are pre-distributed to each risk county health department. Additionally, KI may be pre-distributed to the county emergency management agency.
 - b. KI will be issued to emergency workers at the Site Area Emergency ECL or sooner, in accordance with agency plans and procedures.
 - c. Emergency workers should be instructed not to ingest KI until the decision is made by the State.
 - d. After the decision to ingest KI is made, the Designated Public Health Physician will sign the Recommendations For Potassium Iodide Use During A Nuclear Power Plant Emergency, an Executive Order will be signed by the Governor, and a signed copy will be sent to county officials.
- J. Radiological Exposure Limits for Occupational Workers and the Public
 1. General Principles
 - a. Radiological exposure control for the early phase is contained in the section Radiological Exposure Control for Emergency Workers of this plan.
 - b. Once the early phase has ended, radiological exposure controls are based upon occupational exposure standards, as listed below in Table C, Radiological Exposure Limits for Occupational Workers and the General Public.

Table C. Radiological Exposure Limits for Occupational Workers and the General Public

Category	Guidance	Dose (rem)
Occupational Worker (Intermediate/ Late Phase)	An annual limit, which is the more limiting of — • The total effective dose equivalent being equal to 5 rems (0.05 Sv); or • The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other	5 rem TED or 50 rem CED (whichever is more limiting)

	than the lens of the eye being equal to 50 rems (0.5 Sv).	
Occupational Worker (Intermediate/ Late Phase)	The annual limits to the lens of the eye, to the skin of the whole body, and to the skin of the extremities, which are: • A lens dose equivalent of 15 rems (0.15 Sv), and • A shallow-dose equivalent of 50 rems (0.50 Sv) to the skin of the whole body or to the skin of any extremity	15 rem lens dose equivalent and 50 rem skin (whole body or any extremity)
General Public*	Dose values for which reentry may be authorized for the general population or relocation may be warranted.	2 rem first year, 0.5 rem second and subsequent years

* The US Nuclear Regulatory Commission has established a dose limit for the general public as a condition of the operating license for each NPP. The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year, exclusive of the dose contributions from background radiation.

K. Radiological Monitoring/Decontamination

1. Monitoring and Decontamination at Reception Centers

- a. Reception Centers for evacuees will serve as points where radiological contamination monitoring and decontamination will be conducted when ordered.
 - (1) Trained monitoring teams, under the supervision of the county radiological officer, will conduct the monitoring for radiological contamination, carry out decontamination procedures, and complete associated records in accordance with local SOPs.
 - (2) ESF-10 will provide technical guidance.
- b. When radiological contamination monitoring is ordered:
 - (1) Persons will first be monitored for contamination and, if necessary, decontaminated after which they can be admitted to the “general living” portion of the shelter.
 - (2) Persons who do not intend to stay at a shelter, but who wish to be monitored, will be extended these services.
 - (3) Monitoring of individuals takes priority and must be completed as soon as possible.

- (4) Monitoring of evacuees' vehicles can be accomplished after they have been processed and as time and resources permit.
 - c. Radiological monitoring and decontamination will be provided for service animals in accordance with local plans and procedures. A service animal is defined as an animal trained to do work or perform tasks for people with disabilities. Service animals are working animals, not pets.
- 2. Monitoring/Decontamination Stations for Emergency Workers
 - a. Monitoring stations for emergency workers are provided by each risk county in accordance with local plans and procedures. Once established, each emergency worker must report to a monitoring station or a reception center monitoring point to be monitored for radiological contamination, and if necessary, to be decontaminated upon completion of his/her mission.
 - b. Most emergency workers will be working within the Plume Exposure Pathway EPZ that extends about ten miles in a 360-degree circle around the NPP. Since the monitoring centers for the public are located 15 or more miles from the nuclear power plant, special monitoring stations for emergency workers should be established just outside the plume exposure pathway EPZ.
 - c. Monitoring and decontamination procedures for emergency workers, service animals, vehicles, and equipment are the same as those used for evacuees.
- 3. Monitoring and Decontamination Requirements
 - a. Monitoring teams will organize their areas and traffic flow patterns so contaminated persons and those to be monitored will not mix with the contamination-free individuals already screened. For example, persons will be sent to the decontamination area (shower) by a route that will not place them in contact with contamination-free areas. Showers used for decontamination will not be available for general use until they are decontaminated.
 - b. The monitoring site must be free of radiation other than background radiation, and persons waiting to be monitored must be separated from the area so it will not cause false readings on the person being monitored.
 - c. Background radiation must be measured prior to starting monitoring operations. Background readings should be taken at a representative location away from evacuees or other potentially contaminated items.

- d. Detailed monitoring and decontamination procedures are contained in local SOPs.
4. Equipment and Personnel Requirements

a. Equipment

- (1) The LM 52 or LM 52-1 Portal Monitor, or equivalent, is the primary instrument to be used for the monitoring of evacuees who may have been exposed to radioactive material. If equipped, the LM 52-1 may be used for pre-screening evacuee vehicles for contamination.

LM 52 and LM 52-1 Portal Monitors, or equivalent, are pre-positioned in strategic locations in nuclear risk and host counties throughout the state.

- (2) The LM 3 survey meter with 44-9 "pancake" probe, or equivalent, will be used for vehicle and equipment monitoring and for evacuee monitoring after decontamination activities.
- (3) Additional monitoring equipment will be transported to impacted counties in accordance with the SCEMD Redistribution SOP.

b. Personnel

- (1) The minimum number of personnel required for portal monitors and survey meters are one trained monitor and one recorder for each instrument.
 - (a) Each monitor and recorder will be equipped with a PRD.
 - (b) DRDs are not required but may be issued or strategically placed in the monitoring location.
- (2) All personnel involved in personnel monitoring and decontamination activities will wear at least two pairs of disposable gloves. Protective outer garments, such as Tyvek coveralls and shoe covers, are not required but may be worn if desired.
- (3) Additional monitoring personnel will be provided to impacted counties in accordance with the SCEMD Redistribution SOP.

5. Contamination Action Levels

a. Personnel

- (1) The state action level for contamination is greater than or equal to ($\geq$) 300 counts per minute (CPM) measured with a survey meter and pancake probe.
- (2) Individuals and equipment may be screened using an LM 52 or LM 52-1 portal monitor, or equivalent. If a measurement results in a validated alarm, individuals will be separately surveyed in accordance with section a. Personnel (1).

b. Vehicles/Equipment

The state internal/external action level for decontamination of vehicles/equipment is greater than or equal ($\geq$) 300 CPM measured with a survey meter and pancake probe.

IV. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

A. ESF-5 (Emergency Management)

1. SCEMD

- a. Coordinate with ESF-8, ESF-10, the utility, other state agencies, federal government agencies, and risk and host counties to determine protective actions to be taken by the public and emergency workers.
- b. Provide County Emergency Management Agencies with information on incident assessment.
- c. Provide representation at the utility EOF.
- d. Provide periodic information to counties during the emergency.
- e. Coordinate emergency distribution of dosimeters to risk and host county emergency management agencies as outlined in the South Carolina Radiological Equipment and Personnel Redistribution Standard Operating Procedures (SCEMD Redistribution SOP).
- f. Collect PRDs from the affected county(ies) after each incident or the end of each quarter and submit to manufacturer for analysis. Provide analysis results from PRDs to ESF-10 for emergency worker exposure records.

B. ESF-8 (Health and Medical Services)

1. SCDPH

- a. Maintain adequate quantities of Potassium Iodide (KI) for emergency issue to institutionalized individuals and state/local government emergency workers in accordance with plans and procedures.
- b. Distribute adequate quantities of KI to county health departments for pre-event availability to the public who reside within a 10-mile EPZ.
- c. Transport KI and establish and operate KI distribution stations at community reception centers when the reception centers are activated.
- d. Maintain copies of SCDPH emergency worker radiation exposure records, as well as personnel and equipment monitoring records.
- e. In coordination with the counties, provide referrals to medical facilities for individuals who cannot be decontaminated after two attempts.
- f. Consult with ESF-10 on protective action recommendations and report those recommendations to the SERT.

C. ESF-10 (Environmental and Hazardous Materials Operations)

1. SCDES

- a. Calculate projected Total Effective Dose (TED) to the whole body and Committed Effective Dose (CED) to the thyroid. Report these projections as well as actual radiation exposure rates and total doses received by affected areas to the SERT and recommend protective actions.
- b. Maintain close communication with the utility's Emergency Operations Facility (EOF).
- c. Provide technical guidance to emergency workers at Reception Centers and Congregate Care facilities.
- d. Consult with ESF-8 on protective action recommendations and report those recommendations to the SERT.
- e. Maintain copies of SCDES emergency worker radiation exposure records, as well as personnel and equipment monitoring records.

D. County Emergency Management Agencies

1. Provide training, dosimetry, and KI to all county emergency workers and state law enforcement officers supporting operations within the 10-mile Emergency Planning Zone (EPZ).
2. Provide for monitoring and decontamination of the public as well as federal, state, county, and municipal emergency workers/FEMA-REP-1, rev 2.
3. Provide for monitoring of pertinent personal items including vehicles and emergency equipment. Perform decontamination as necessary.
4. Make appropriate medical referrals for further monitoring, decontamination, and treatment.
5. Maintain emergency worker dosimetry and radiological exposure records.
6. Coordinate reentry to restricted areas for farmers with livestock, necessary industrial workers, and other emergency workers.
7. Coordinate issuance of dosimetry.
8. Identify access control points where emergency workers may reenter the EPZ.
9. Personnel Monitoring/Decontamination Teams monitor members of the public and emergency workers, to ascertain if individuals are contaminated with radioactive materials.

ANNEX 6, ATTACHMENT A – RECOMMENDATIONS FOR POTASSIUM IODIDE USE DURING A NUCLEAR POWER PLANT EMERGENCY (SCDPH)

(Template: SCDPH Physician’s Recommendation)

Recommendation: For reasons given more fully below, unless you have been previously advised by your physician not to take antithyroid drugs, all individuals located within or evacuating from Emergency Planning Zones _____ surrounding the _____ Nuclear Station should take one (1) dose of Potassium Iodide as soon as possible. In addition, emergency workers and health care facility residents in all EPZs around the _____ Nuclear Station should take one (1) dose of Potassium Iodide at this time.

Background

In the event of a nuclear plant radiation emergency, radioactive iodine can be released into the environment. Contact with radioactive iodine can harm your thyroid gland and potentially lead to thyroid disease. Potassium Iodide, also known as “KI,” can protect your thyroid from being harmed by radioactive iodine. Taking a KI pill within four (4) hours of contact fills your thyroid with iodine that prevents your thyroid from taking in any of the radioactive iodine. KI protects only your thyroid, not other parts of your body. Therefore, KI should be used in addition to other emergency measures recommended by public officials.

Indications

KI should be used only during a nuclear plant radiation emergency when recommended by public officials. KI should not be taken more than once every 24 hours. The recommended dose of KI for each person varies depending on the person’s age, according to the chart in Appendix A. Taking a stronger dose or taking KI more often than once every 24 hours does not offer more protection and can cause illness. Do not take KI if you are allergic to iodine.

Assessment

If a disaster or emergency occurs that puts the public at risk of radiation exposure, the Director of SCDPH will designate a public health doctor to recommend KI for the protection of public health.

Basis for Public Health Recommendation

1. A plume containing radioactive iodine is threatening an area within a 10-mile radius of a nuclear facility or other defined geographic area.
2. The best way to protect yourself is to leave. However, taking KI can protect your thyroid only.
3. SCDPH has determined that radioactive iodine has been released or the potential for release is high. The anticipated levels of exposure may exceed acceptable limits.
4. The public health doctor has reviewed the projections as described in Appendix A, agrees with the assessment, and has informed the Director that KI should be given.

This recommendation should be shared with the Emergency Management Division, other partner agencies, and the general public.

This public health recommendation for the release of KI is being issued by the public health doctor under the authority of the Director of the S.C. Department of Public Health or his or her designee.

Designated Public Health Physician
S.C. Department of Public Health

Date



SOUTH CAROLINA
DEPARTMENT OF
PUBLIC HEALTH

Recommendations for Potassium Iodide (KI) Use During a Nuclear Power Plant Emergency

Read this information carefully and keep it with your tablets.

What could happen following a radiation release?

Nuclear power plants produce radioactive materials, including radioactive iodine. A nuclear power plant could release radioactive materials into the environment. If this happens, radioactive iodine can get into your body. If you breathe contaminated air, eat contaminated food or have direct contact with something that is contaminated with radioactive iodine, you could become sick. Exposure can damage your thyroid gland, which is important for body functions.

What actions should I take following a radiation release?

In a radiological emergency, evacuation could be the best action to protect yourself. If you cannot leave the area, shelter-in-place/stay indoors to limit your exposure. Monitor TV or radio broadcasts for updates from emergency management and public health officials. The radio, TV and Emergency Alert System will tell you what to do to protect yourself and your family. Authorities might advise you to evacuate or shelter-in-place/stay indoors, and will announce if potassium iodide (KI) is recommended.

What is Potassium Iodide (KI)?

Potassium iodide (KI) is an over-the-counter medicine that can protect one part of the body – the thyroid – if a person is exposed to radioactive iodine during a nuclear power plant emergency. In a nuclear power plant emergency, public health officials may advise you to take the KI if you are unable to leave the area.

How does KI work?

The thyroid gland uses KI as a stable iodine that prevents radioactive iodine from being absorbed. Taking KI before or shortly after exposure to radioactive iodine protects the thyroid from damage by radioactive iodine.

Will KI protect me from all types of radiation exposure?

No, KI will only protect your thyroid from radioactive iodine. The best way to reduce the risk of radiation exposure to your body is to evacuate the area and avoid eating contaminated food. **KI should be used when evacuation is not possible.**

When should I take KI?

Do not take KI unless public health officials recommend it. If a potentially harmful radioactive release occurs, or is likely, during a nuclear power plant emergency, listen to the Emergency Alert System on television and radio stations for information about protective measures and the use of KI. Local or state emergency management officials may order you to evacuate the area to protect yourself, or public health officials may advise you to take KI. Evacuation may be the most effective way to protect yourself.

How much KI should I take?

Take only one dose of KI every 24 hours until you are able to leave the contaminated area or until public health officials advise it is no longer needed. Taking more than one dose will not increase your protection and it may increase the risk of side effects.

The dose depends on a person's age. See the table on the back for the recommended doses.

If the tablet must be cut into smaller pieces for the correct dose, use a pill cutter or a sharp knife on a hard surface. To get the correct dose for young children and infants, crush the entire tablet into a fine powder, divide the powder into four equal piles, and mix the needed portion into applesauce, pudding or another favorite food or liquid.

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<u>Adults</u>	130mg	2 tablets 
<u>Children 3-18 yrs</u> (Under 150 lbs.)*	65mg	1 tablet 
<u>Infants</u> (1 month – 3 yrs)**	32mg	1/2 tablet 
<u>Infants</u> (Birth – 1 month)**	16mg	1/4 tablet 

* Adolescents approaching adult size (150 pounds) should receive the adult dose (130mg).

** KI tablets may be crushed to form a powder. Powdered KI may be mixed in milk, water, formula, or soft foods.

Where should I store my KI pills?

KI should be stored in a dry place at room temperature and kept out of reach of children.

Does KI have side effects?

The FDA has determined that KI is safe for most people. Some people may have mild side effects such as nausea, upset stomach and skin rash. Side effects may also include salivary gland swelling, a metallic taste in the mouth, a burning sensation in the mouth and throat, sore teeth and gums, or head cold symptoms. If side effects are severe or you experience fever, joint pain, swelling, or shortness of breath, seek medical attention immediately.

Individuals who are taking thyroid medications, are pregnant, are breastfeeding, or are under one month of age should take only one dose of KI (see table above). These individuals should consult their physician about having their thyroid function checked if repeat dosing is needed.

Who should not take KI?

If you are allergic to iodine, X-ray dye, or shellfish (such as shrimp, oysters, and crab), do NOT take KI unless your doctor says it is safe for you. People with dermatitis herpetiformis, hypocomplementemic vasculitis, multinodular goiter, Graves' disease or autoimmune thyroiditis, should not take KI unless their doctor says it is safe.

Remember — KI must be taken within the first few hours of a radioactive exposure to be effective, and you may be unable to reach your physician quickly during a nuclear emergency. If you have one of the above conditions or are unsure if you can safely take KI, ask your physician BEFORE an emergency.

WARNING: Keep out of the reach of children. In case of an allergic reaction (difficulty breathing, speaking or swallowing, wheezing, shortness of breath or swelling of the mouth or throat), call 911 or get medical care right away. In case of overdose, get medical help or call a Poison Control Center right away at 1-800-222-1222. Call your doctor for medical advice about side effects. You may report side effects to the U.S. Food and Drug Administration at 1-800-332-1088.

If you have questions about KI or how you can protect yourself from harmful radiation, call 844-RAD-RESP (844-723-7377). You can also find information about KI and nuclear power plants at <http://www.scdph.gov/radiation>.

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ANNEX 6, ATTACHMENT B - EMERGENCY WORKER RADIATION EXPOSURE RECORDS

1. Each emergency worker is responsible for completing a Radiation Exposure Record (next page) and for returning it, along with issued dosimeter (i.e., DRD, TLD) and KI, to the individual's parent organization when the incident is over.
2. Each emergency organization will forward exposure records and PRDs to appropriate county/state emergency management agency for consolidation and delivery to SCEMD. SCEMD will deliver PRDs to the service contractor for processing (reading) and will forward individual exposure records to the ESF-10 for analysis. ESF-10 will provide the analysis results to SCEMD. SCEMD will send analysis records to the appropriate emergency organization for record keeping and tracking of emergency workers accumulated dose.
3. ESF-10 will establish priorities for expeditious processing of PRDs in cases where exposure records indicate exposures exceeding dose limitations. In these instances, SCEMD will expedite delivery of PRDs to the service contractor for rapid turnaround.

RADIATION EXPOSURE RECORD

NAME (first and last) _____

DATE OF BIRTH _____

HOME ADDRESS _____

LAST 4 OF SOCIAL SECURITY NUMBER _____

AGENCY/ORGANIZATION NAME _____

TLD NUMBER _____

CAUTION: RAD EXPOSURE LIMITS

Call Back Value 0.1R

Turn Back Value 1R

Protecting Critical Infrastructure 2R

Life Saving 5R

DATE	DOSIMETRY SERIAL NUMBER	INITIAL READING	FINAL READING	TOTAL SHIFT EXPOSURE

Dosimetry instructions

1. Charge dosimetry prior to initial use.
2. Keep dosimetry on your person while on duty.
3. Read dosimetry every 15-30 minutes.
4. Report immediately any reading greater than 0.1R (100 mR).

Record Keeping

1. Record initial and final dosimetry reading at end of each shift.
2. Calculate exposure by subtracting the initial from the final reading. Record exposure.
3. Recharge dosimetry and complete steps 1 & 2 for each successive shift. Add accumulated exposures and record total.
4. At end of incident turn in Radiation Exposure Record to supervisor or parent organization.

DATE _____ TOTAL EXPOSURE _____

SIGNATURE _____

SCORERP _____