

**ANNEX 6-Basic Plan
RADIOLOGICAL EXPOSURE CONTROL
APPENDIX 2**

I. INTRODUCTION

General

South Carolina government at all levels must maintain the means to protect the populace from radiological exposure during an accidental radioactive release from a Nuclear Power Plant (NPP). To this end, state and local emergency management agencies have insured they have emergency procedures and established exposure guidelines that are disseminated among all emergency workers.

II. PURPOSE

- A. The purpose of this plan is to 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. This plan also provides for an effective state and local radiation protection plan for the public and emergency workers during a potential or actual radioactive release during a fixed nuclear facility incident.

II. CONCEPT OF OPERATIONS

- A. In the event of a release or threat of release of radionuclides from a NPP, State ESF 10 assesses the need for and recommends to SCEMD the initiation of radiological exposure control activities specified herein. 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 need not be monitored for radionuclides, or decontaminated, until there is an order to do so. That order will be the result of a deliberate decision at the state level. That decision will be relayed to state departments/agencies and county emergency management agencies in the form of an instruction from the SEOC to implement radiological exposure control response.
- C. Emergency workers may be authorized by ESF 10 to exceed exposure levels specified in Protective Action Guides (PAGs). All others, including county and municipal employees serving as radiological emergency workers, will be authorized to exceed PAG exposure levels in the following manner:
 - 1. The ESF 10 Radiological Emergency Response Coordinator recommends exposure level limitations to the Director, SCEMD.

2. The SCEMD Director passes recommendations to the County Emergency Management Director, who makes a recommendation to the Chairman, County Council/Administrator/Supervisor.
 3. County authorities (Chairman, County Council/Administrator/Supervisor), with ESF 10 consent, will authorize emergency workers to exceed specific radiation level limits specified in the General Public Protective Action Guides.
 4. Under emergency conditions, an Incident Commander may authorize informed (trained) first responders who volunteer to exceed EAL limits for life-saving rescue or protecting large populations.
- D. Local governments will distribute SRDs and PRDs pre-positioned by the state. The county radiological officer will maintain permanent records of each individual's accumulated radiological exposure and submit them daily to ESF 10 at the SEOC.

IV. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

A. SCEMD

1. Coordinates with 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.
2. Provides periodic information to counties during the emergency.
3. Specifies procedures for decontamination of the public and emergency workers' clothing, vehicles and equipment.
4. Distributes dosimetry and coordinates emergency distribution of dosimeters to risk and host county emergency management agencies.
5. Collects PRDs, personnel and equipment monitoring records from the affected county after each incident (See Basic Plan, Attachment C).

B. ESF 10

1. Calculates projected Total Effective Dose Equivalent (TEDE) to the whole body and Committed Effective Dose Equivalent (CEDE) to the thyroid and reports these projections as well as actual radiation exposure rates and total doses received by affected areas to SCEMD.
2. Maintains emergency worker radiation exposure records.
3. In coordination with the SC Department of Agriculture (SCDA) and Clemson University Cooperative Extension Service (CUCES), conducts environmental, agricultural and food stuff sampling

4. Reports its findings to SCEMD and recommends protective actions.
5. Distributes adequate quantities of KI to county health departments for pre-event availability to the public who reside within 10 miles of a nuclear power plant (NPP).
6. Maintains adequate quantities of KI for emergency issue to institutionalized individuals, state and local government emergency workers.
7. Maintains close communication with the utility Emergency Operations Facility (EOF).

C. County Emergency Management Agencies

Counties will rely on SCEMD for incident assessment, field monitoring, and representation at the utility EOF. County emergency management agencies:

1. Provide training, dosimetry and KI to all county emergency workers and State Law Enforcement officers (DPS-HP and DNR-LE) supporting EPZ evacuations.
2. Provide pre-event distribution of KI to the public who reside within the 10-mile EPZ of a NPP.
3. Provide for monitoring and decontamination of the public as well as federal, state, county and municipal emergency workers.
4. Provide for monitoring of pertinent personal items including vehicles and emergency equipment and decontaminates them as necessary.
5. Make appropriate medical referrals for further monitoring, decontamination, and treatment.
6. Maintain emergency worker dosimetry and a radiological exposure record system.
7. Certify farmers with livestock and necessary industrial workers as emergency workers for access to the plume exposure pathway EPZ.
8. Coordinate issuance of dosimetry.
9. Coordinate traffic control points with SCEMD where emergency workers may enter the EPZ.

D. Personnel Monitoring/Decontamination Teams

Monitoring/decontamination teams will monitor for radioactive contamination, with a Ludlum Model 52 (LM 52) Portal Monitor and Ludlum Model 3 (LM 3) survey meter, members of the public and emergency workers to ascertain if individuals are contaminated with radioactive materials.

V. RADIOLOGICAL EXPOSURE CONTROL FOR THE PUBLIC

A. General Principles

1. Rapid action will be needed to protect members of the public during an incident involving a large release, or having the potential for a large release, of radioactive materials to the atmosphere.
2. During an airborne release of radioactive materials, initial protective actions may include evacuation and/or sheltering. Appropriate protective actions will be recommended by ESF 10 during the incident assessment phase.
3. 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.

B. U.S. Environmental Protection Agency (EPA) Protective Actions Guides (PAGs)

1. The PAGs for response during the early phase of an incident are summarized in Table A.
2. 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: whole body, skin, or thyroid.
3. The whole body PAG is expressed in terms of the projected sum of the Effective Dose Equivalent (EDE) from external radiation and the Committed Effective Dose Equivalent (CEDE) incurred from inhalation of radioactive materials from exposure and intake during the early phase. The sum of EDE and CEDE is expressed as the Total Effective Dose Equivalent (TEDE). Supplementary guides are specified in terms of committed dose equivalent to the thyroid and dose equivalent to the skin. The PAG for the administration of stable iodine is specified in terms of the Committed Effective Dose Equivalent to the thyroid from radioiodine.
4. When projected doses have the potential to exceed the PAG, the decision whether to recommend evacuation, sheltering, or administration of KI should be made. See Paragraph C below.

Table A PAGs for the Early Phase of a Nuclear Accident

<u>Protective Action</u>	<u>PAG (projected dose)</u>	<u>Comments</u>
Evacuation (or sheltering ^a)	1 rem ^b	Evacuation (or, for some situations, sheltering ^a) should normally be initiated at 1 rem.
Administration of stable iodine (KI)	5 rem ^c	Requires approval of ESF 10.

^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 equivalent resulting from exposure to external sources and the committed effective dose equivalent incurred from all significant inhalation pathways during the early phase. Committed dose equivalents to the thyroid and to the skin may be 5 and 50 times larger, respectively.

^c Committed dose equivalent to thyroid from radio iodine.

C. Evacuation and Sheltering

1. Evacuation of the public will usually be justified when the projected dose to an individual is 1 rem. This conclusion is based primarily on EPA's judgment concerning 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.
2. Sheltering may be preferable to evacuation as a protective action in some situations. Because of the higher risk associated with evacuation of some special groups in the population (e.g., those who are not readily mobile), sheltering may be the preferred alternative for such groups as a protective action at projected doses up to 5 rem. In addition, under unusually hazardous environmental conditions use of sheltering at projected doses up to 5 rem to the affected population (and up to 10 rem to special groups) may become justified. 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. Illustrative examples of situations or groups for which evacuation may not be appropriate at 1 rem include: a) the presence of severe weather, b) competing disasters, c) institutionalized persons who are not readily mobile, and d) local physical factors which impede evacuation.
3. Some judgment will be necessary when considering the types of protective actions to be implemented and at what levels in an emergency. Although the PAGs are expressed as a range of 1-5 rem, it is emphasized that, under normal conditions, evacuation of members of the public should be initiated for most incidents at a projected dose of 1 rem.

D. Thyroid Blocking Agent

1. The accumulation of radioiodides (radioactive isotopes of the common element iodine) in the thyroid gland is a potential threat during a nuclear power plant incident. Potassium iodide (KI) acts as a blocking agent to radioiodine preventing it from lodging in the thyroid gland.
2. KI tablets are available to the population who reside within 10 miles of a NPP. Quantities of KI, stockpiled at DHEC facilities, including county public health departments, will be transported on order to school pick-up points, reception centers and shelters for emergency distribution.
3. 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 to all 10-mile EPZ residents.
4. KI shall be taken only upon order of the SC DHEC Commissioner or designee.
5. General information regarding KI and protection of the thyroid gland is included in Attachment B to this Annex.

VI. RADIOLOGICAL EXPOSURE CONTROL FOR EMERGENCY WORKERS

A. Justification

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, themselves, from exposure to radiation, and the risks and costs associated with a specific protective action. Unlike members of the public, emergency workers with assignments within the plume exposure pathway (EPZ) are not always able to take shelter or evacuate the area due to their duties. On the other hand, workers assure protection of others and of valuable property. The resulting exposures will be justified if the maximum risks permitted to workers are acceptably low, and the risks or costs to others that are avoided by their actions outweigh the risks to which workers are subjected.

B. Emergency Workers

Emergency workers are those individuals who, by virtue of their duties, will assist others to avoid radiation exposure and will protect lives and property; all other individuals should be considered members of the public. Workers who may incur increased levels of exposure under emergency conditions may include those employed in law enforcement, fire fighting, radiation protection, traffic control, health services, environmental monitoring, transportation services, and animal care. In addition, selected workers at institutional, utility, industrial facilities, farms and other agribusiness may be required to protect others, or to protect valuable property during an emergency. The above are examples—not designations—of workers that may be exposed to radiation under emergency conditions.

C. Dose Limits for Emergency Workers

1. The EPA issued guidance for emergency worker dose limits is provided as the Total Effective Dose Equivalent (TEDE) values. These limits are identified in the first column of Table B. These dose limits are the sum of the external, or Effective Dose Equivalent (EDE), and Internal, or Committed Effective Dose Equivalent (CEDE), doses to the emergency workers during the response to the incident. However, during an emergency response, the CEDE portion of the TEDE cannot be measured to ensure that the emergency workers' TEDE does not exceed the EPA dose limits.
2. The State of South Carolina has developed administrative dose limits, identified in the second column of Table B, that are set lower than those recommended by EPA. Emergency workers monitor their external dose using a direct or Self-Reading Dosimeter. Limiting the emergency workers external dose to these administrative limits provides reasonable assurance that after including the internal dose, the emergency workers' TEDE will likely not exceed the relevant dose limit. 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	
10 rem	2 R	protecting valuable property	lower dose not practicable
25 rem	5 R	lifesaving or protection of large populations	lower dose not practicable
>25 rem	>5 R	lifesaving or protection of large populations	only on a voluntary basis to persons fully aware of the risks involved

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

^a Sum of external EDE and CEDE to non-pregnant adults from exposure and intake during an emergency situation. Workers performing services during emergencies should limit dose to the lens of the eye to three times the listed value and dose to any other organ (including skin and body extremities) to ten times the listed value. 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 or Self-Reading Dosimeter.

D. Dosimetry

1. Prior to dispatch, all emergency workers with assignments inside the plume exposure pathway EPZ will be equipped with one Self-Reading Dosimeter (SRD)

with a range capable of measuring a radiation exposure of 0.5 R to at least 5 R, a Permanent Record Dosimeter (PRD) and a two-day supply of Potassium Iodide (KI). The SRD enables the emergency worker to monitor himself/herself during the emergency for total external radiation dose received. 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. Each emergency worker is responsible for following the procedures, including record keeping contained in Attachment C to this Annex.

2. In situations where emergency worker teams are assigned in close proximity to each other during an entire mission and adequate control of exposure can be affected for all members of the team, one SRD may be worn by the team leader or his designee.
3. Emergency workers assigned to low-exposure rate areas outside the plume exposure pathway (e.g., at reception centers, counting laboratories, emergency operations/communications centers) will be equipped with a PRD. These workers may also be assigned individual SRDs 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.
4. SCEMD has pre-positioned Ludlum survey meters, portal monitors, PRDs, and SRDs in NPP risk and host counties throughout the state. In the event of an incident at a NPP, the state will activate its dosimetry redistribution plan to re-enforce the threatened area. Key elements of the redistribution plan include:
 - a. Mutual aid agreements among Risk and Host counties to support threatened areas of the state with their radiological equipment.
 - b. Issue of additional PRDs and SRDs stored at the SCEMD.
 - c. Use of state law enforcement agencies (DPS) to supplement the transport of needed equipment.
 - d. Acquisition of additional equipment from unaffected NPPs and commercial companies.
5. Affected counties will issue PRDs, SRDs and KI to emergency workers assigned to the affected area.

E. Thyroid Blocking Agent

1. KI tablets for emergency workers are pre-distributed to each risk county health department. Subject to the approval of ESF 10, KI may be pre-distributed to the county emergency management agency. KI may be issued to individual emergency workers at the Alert Emergency Classification Level (ECL) and will be issued to emergency workers at the Site Area Emergency ECL.
2. KI shall be taken only upon order of the SC DHEC Commissioner or designee.

VII. RADIOLOGICAL MONITORING/DECONTAMINATION

A. Monitoring and Decontamination at Reception Centers

1. Reception Centers for evacuees will serve as points where radiological contamination monitoring and decontamination will be conducted when ordered. 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 Attachment A. ESF 10 will provide technical guidance and advice. This activity, although co-located with the shelter, is not an integral part of that operation.
2. When radiological contamination monitoring is ordered, persons will first be monitored for contamination and, if necessary, be decontaminated after which they can be admitted to the “general living” portion of the shelter. Persons who do not intend to stay at a shelter, but who wish to be monitored, will be extended these services. Monitoring of individuals takes first priority and must be completed as soon as possible; monitoring of evacuees’ vehicles can be accomplished after they have been processed, and as time and resources permit.

B. Monitoring/Decontamination Stations for Emergency Workers

1. Monitoring stations for emergency workers are provided by each risk county emergency management agency. After monitoring procedures have been placed in effect by SCEMD, and upon completion of his/her mission or more often as directed by supervisors, 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.
2. 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. Therefore, emergency workers will not be required to travel the longer distance to monitoring centers co-located with the mass care centers.
3. Monitoring and decontamination procedures for emergency workers, vehicles and equipment are the same as those used for evacuees.

C. Procedures for Monitoring and Decontamination

1. Monitoring teams will organize their areas and traffic flow patterns so that contaminated persons and those to be monitored will not mix with the contamination-free individuals already processed. 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.

2. The monitoring site selected must be free of other than background radiation, and persons waiting to be monitored must be separated from the area so that it will not cause false readings on the person being monitored. Care must also be taken to avoid areas where high voltage electrical lines and electrical equipment such as computers are present. Those items may cause false readings on the survey meter.
3. Background radiation must be measured prior to starting monitoring operations. Background readings should be taken at a central location away from evacuees or other potentially contaminated items. Detailed monitoring and decontamination procedures are contained in Attachment A.

D. Equipment and Personnel Requirements

1. The LM52 Portal Monitor is the primary instrument to be used for the monitoring of evacuees who may have been exposed to radioactive material. The LM3 survey meters will be used for vehicle and equipment monitoring and for evacuee monitoring subsequent to decontamination activities.
2. LM52 Portal Monitors are pre-positioned in strategic locations in nuclear risk and host counties throughout the state. All portal monitors can be rapidly transported to any county in need to assure large numbers of evacuees can be monitored efficiently. Additional monitoring equipment will be provided in accordance with the SCEMD Dosimetry Redistribution Plan.
3. Personnel requirements for LM52's and LM3's are one trained monitor and one recorder for each instrument as a minimum. Each monitor and recorder will be equipped with a PRD. Self-Reading Dosimeters are not required, but may be issued or strategically placed in the monitoring location. All personnel involved in personnel monitoring and decontamination activities will wear two pair of disposable gloves. Protective outer garments, such as Tyvek coveralls and shoe covers, are not required but may be worn if desired.

E. Contamination Action Levels

1. Personnel.
 - a. The state action level for contamination is equal to or greater than 330 CPM measured with a LM3 survey meter.
 - b. The state action level for contamination is 200 CPM above background measured with a Ludlum Model 52 Portable Portal Monitor.
2. Vehicles/equipment
 - a. The state external action level for decontamination of vehicles/equipment is (equal to or greater than) ≥ 330 CPM measured with a LM3 survey meter.
 - b. The state internal action level for decontamination of vehicles is equal to or greater than 330 cpm whichever is more conservative.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES**I. PERSONNEL REQUIRED**

One trained monitor and one recorder (assistant to the monitor) for each portal monitor and/or survey meter.

II. EQUIPMENT REQUIRED

- Portal Monitors Ludlum Model 52 (LM52)
- Ludlum Model 3 (LM3) survey meter with compatible pancake detector probe
- D cell batteries (2-LM3, 6-LM52)
- PRD for each worker
- Self-Reading Dosimeter (0-500 mR) for each monitoring team
- Thin plastic wrap (.5mm thickness) to cover detector probes; rubber bands
- Masking tape
- Paper stepoff pads/plastic sheeting
- Disposable gloves
- Soap, water and towels
- Monitoring/Decontamination Report Forms

NOTE: Ludlum Model 3 survey meters will be recalibrated annually and Self-Reading Dosimeters will be leak-tested annually. Ludlum Model 52 Portal Monitors will be recalibrated at least within every two years.

III. MONITORING STATION SET-UP

Establish monitoring stations at reception centers or shelters ensuring that radiation background is less than 150 CPM. Organize work areas and traffic flow patterns so that contaminated persons and those waiting to be monitored do not cross pathways.

IV. LM52 MONITORING PROCEDURES

- A. The LM52 monitor is used for beta/gamma personnel monitoring and meets the DHS standard for emergency Response Portal Monitoring (FEMA REP Manual 21). Each state LM52 monitor has been preset to alarm at 200 CPM above background. The monitoring parameters have been preset at the SCEMD lab to meet state standards.
- B. LM52 Monitor Operation
 - 1. Assemble the monitor. Cover the top and side of detectors with one layer of thin plastic wrap. Place a sheet of thin plastic on the footplate to prevent contamination.
 - 2. Turn the power switch to on (power cord or battery powered). Green Ready light must be lit to use the monitor.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

3. Test instrument response by using the beta check source (located in wooden box). Hold the beta check source (gold side towards the detector) and step on the monitor base plate. When the monitor beeps (six seconds or less), it is ready for use.
4. Evacuees to be monitored start at the ready line established three feet from the monitor.
5. Foot pressure on the base plate activates the monitor. Evacuees must stand in the monitor until a green or red light is activated on the display (approximately six seconds).
6. LED Displays:
 - a. Green - Not contaminated, does not exceed state standard.
 - b. Red - Contaminated, exceeds state standard.
 - c. Yellow - Incomplete count. Evacuee did not stay on the base plate for a complete count.
 - d. Orange - Do not use. The machine is performing an automatic background update. Once complete, the green light will come on.
7. Complete Portal Monitor Form, (See Figure 1).

V. HAND HELD INSTRUMENT MONITORING PROCEDURES FOR PEOPLE

- A. Check the operability of the LM3. Place LM3 Survey Meter range switch on the X0.1 scale. Turn audio on and wrap the pancake probe with one layer of thin plastic wrap to prevent contamination. For maximum sensitivity, use the open face side of the pancake probe, with the plastic protective shield removed.
- B. Determine and record background radiation levels. The monitoring location must be established in a low background area (less than 100 CPM).
- C. Put on disposable gloves and monitor the individual as follows
 1. Have the individual being monitored stand on paper or plastic sheeting (change sheeting frequently).
 2. Instruct the person to stand straight, feet spread slightly, arms extended with palms down and fingers straight out.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

3. Place the survey meter probe approximately one to three inches from the top of person's head. Move the probe downward approximately two inches per second on one side of the neck, the collar, the shoulder, arm, wrist, hand, underarm, armpit, side of body, side of leg, and around the cuff and shoe. Then monitor the inside of the leg from cuff to the groin and continue the procedure on the other side of the body (See Figure 3). NOTE: Time required for monitoring one average size person is approximately 3-5 minutes, unless contamination is detected.
4. Monitor the chest and stomach area and the middle of the back and buttocks.
5. Monitor the shoes and soles of each shoe.
6. If no contamination is detected, complete the Individual Monitoring/Decontamination Report Form (See Figure 2). Return all original copies of monitoring/decontamination forms to the county emergency preparedness agency.
7. If any reading equals or exceeds 330 cpm, record that information on the Monitoring/Decontamination Report Form (See Figure 2) and require the individual to undergo decontamination.

VI. DECONTAMINATION OF PERSONNEL

- A. Contaminated persons should wash with mild, non-abrasive soap and warm water, i.e., a thorough shower should be sufficient. Emphasis should be placed on any specific spots found to be contaminated in the monitoring process. Also, special attention should be given to the hair, hands and fingernails.
- B. After thorough cleansing, the individual will be monitored again. If some contamination remains, the individual should shower again. If monitoring after the second thorough cleansing indicates that the contamination is still present, State ESF 8 should be notified for referral to the nearest medical facility capable of treating contaminated persons.
- C. Care should be taken that persons who are decontaminated do not become re-contaminated by dressing in contaminated clothing. If an individual does not have contamination free clothing, then clothing should be issued until the clothing can be decontaminated or other suitable arrangements made.
- D. Persons with contaminated wounds will be referred to an appropriate medical facility for radiation decontamination and treatment.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

VII. CLOTHING DECONTAMINATION PROCEDURES

- A. Articles, which are machine washable, should be laundered with a conventional detergent, line dried in a contamination free area or machine dried, and retained until they can be re-monitored. Water repellent items may be scrubbed with water and detergent, and retained until re-monitored.
- B. Clothing articles, which cannot be decontaminated by laundering, should be disposed of as follows:
 - 1. Package clothing in a plastic bag, tie securely at the top and place in a metal or plastic container with a snug fitting lid (garbage can). Mark the bag and container as "Radioactive."
 - 2. Accumulated contaminated clothing should be secured or isolated and reported to the county emergency preparedness agency and ESF 10.

VIII. MONITORING PROCEDURES FOR VEHICLES

- A. Check the operability of the LM3 survey meter.
- B. Turn sound on.
- C. Wrap the probe in one layer of thin plastic material to prevent contamination. Use the open face side of the pancake probe, and set the range switch on the X0.1 scale.
- D. Ensure vehicle motor and electronic equipment is turned off.
- E. Put on rubber gloves. Hold the probe about two inches from the exterior surface and scan complete vehicle. Record the highest reading (See Figure 4).
- F. Monitor and record radiation readings at the following locations.
 - 1. L front wheel well
 - 2. Drivers seat and floorboard
 - 3. L rear wheel well
 - 4. R rear wheel well
 - 5. R front wheel well
 - 6. Radiator
 - 7. Air filter intake
- G. Consider the vehicle contaminated if any radiation reading is equal to or greater than 330 CPM with a LM3 Survey Meter.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

H. Vehicle Decontamination Procedures

NOTE: Decontamination of the interior of vehicles is not required.

1. Use a water spray. Wear a rain suit/coat, rubber boots and latex gloves to keep dry and to avoid contamination.
2. Work from top to bottom, and upwind to downwind to avert recontamination. Flush entire outside surface of vehicle initially, then;
 - a. Flush specific location previously determined to be contaminated.
 - b. Flush insides of front and rear wheel wells.
 - c. Flush grille/radiator.
 - d. Flush engine compartment.
 - e. Flush tires and wheel wells.

NOTE: Ensure water from decontamination activities runs directly to a storm sewer, drain system, or moving water (river or stream). Do not allow water to stand in low spots or areas where exposure to individuals may occur.

3. Re-monitor the vehicle and revise the vehicle decontamination record. Quarantine vehicles whose exterior cannot be decontaminated to a dose rate of less than 330 cpm.
4. Place vehicle decontamination record in the vehicle and forward the original to the county emergency preparedness director/coordinator.

NOTE: You may wish to quarantine all contaminated vehicles and decontaminate later, when time permits.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

Figure 1

EVACUEE PORTAL MONITOR FORM

O SUM

O HEAD		
O L3		O R3
O L2		O R2
O L1		O R1
FEET O		

Portal monitor has been pre-set to automatically subtract area background radiation readings. Any alarming channel will indicate that state contamination limits have been exceeded and decontamination is required.

DIRECTIONS

- 1) Ask evacuee to enter the portal monitor for a six second count. The monitor's "**counting**" green light will illuminate. When the count is complete, the monitor's "**check ok**" green light will illuminate. **NOTE:** If the monitor's "**incomplete**" yellow light is illuminated the evacuee must re-enter the monitor until a complete count is obtained.
- 2) **If no channels are alarming**, ask evacuee to proceed to the registration desk.
- 3) **If any channels are alarming**, place an "**X**" in the corresponding circle for all alarming monitor channels on the diagram above and direct evacuee to the **decontamination showers**.

NAME: _____

SOCIAL SECURITY NUMBER: _____

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)**EVACUEE MONITORING/DECONTAMINATION REPORT**

1. Advise individual to remove clothes and shower with soap and water, paying close attention to contaminated spots, hair, hands, and fingernails.
2. Contaminated clothing should be disposed of or tagged for decontamination. If the individual does not have contamination free clothing, then clothing should be issued.
3. After thorough cleansing, monitor individual again using a Ludlum-3 monitor. If contamination remains, note on this form and ask the evacuee to shower again if contamination is greater than limits specified below.
4. After the second shower, monitor individual again using a Ludlum-3 monitor. If contamination is still present in excess of the limits below, notify State ESF 8 for referral to nearest medical facility capable of treating contaminated persons.

Figure 2

CONTAMINATION SURVEY DATA (INITIAL FOLLOW-UP)		CONTAMINATION SURVEY DATA (FINAL FOLLOW-UP)	
LOCATION	CPM	LOCATION	CPM
HAIR		HAIR	
HEAD		HEAD	
NECK		NECK	
SHOULDER (L/R)		SHOULDER (L/R)	
ARM (L/R)		ARM (L/R)	
HAND (L/R)		HAND (L/R)	
CHEST		CHEST	
BACK		BACK	
LEG (L/R)		LEG (L/R)	
FOOT (L/R)		FOOT (L/R)	
RESULTS EQUAL TO OR GREATER THAN 330 CPM _____ RESHOWER RESULTS LESS THAN 330 cpm _____ RELEASE		RESULTS EQUAL TO OR GREATER THAN 330 CPM _____ RESHOWER RESULTS LESS THAN 330 cpm _____ RELEASE	

LUDLUM MODEL 3 SERIAL #: _____ PROBE (44-9) SERIAL #: _____

BACKGROUND _____ CPM

MONITOR/RECORDER SIGNATURE: _____

MONITORS NAME _____ DATE OF SURVEY ____-____-____

PORTAL MONITOR SERIAL NUMBER _____

SCORERP

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

HAND HELD INDIVIDUAL MONITORING/DECONTAMINATION REPORT FORM

NOTE: Not to be used with Portal Monitoring Operation.

NAME: _____ SSN: _____ AGE: _____

LUDLUM MODEL 3 SERIAL #: _____ PROBE (44-9) SERIAL #: _____

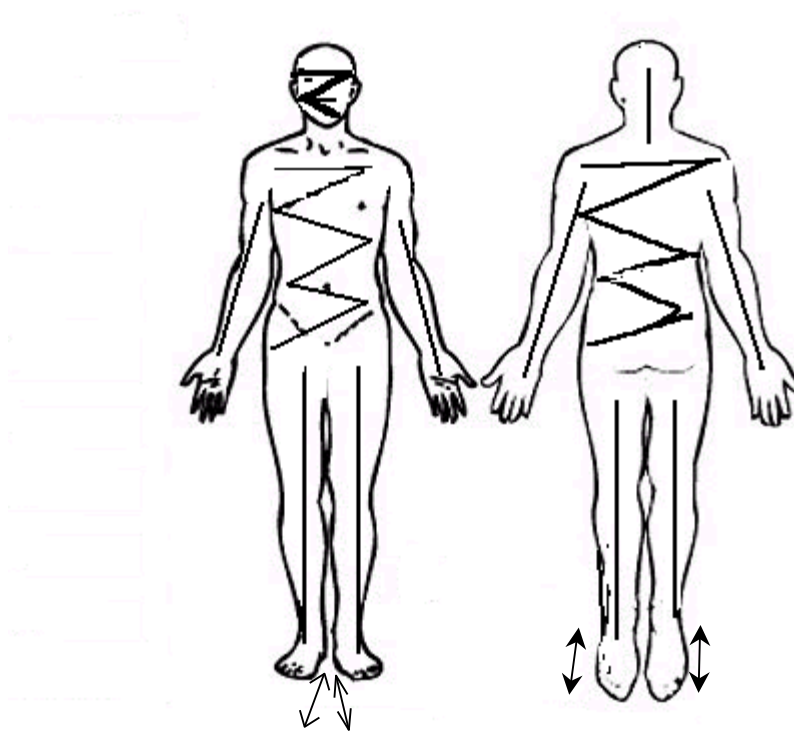
BACKGROUND _____ CPM

MONITOR/RECORDER SIGNATURE: _____

DIRECTIONS: Indicate levels of contamination on the corresponding body parts.

NOTE: Contamination Action Level is equal to or greater than 330 CPM.

Figure 3



SURVEY RESULTS: Check the appropriate response.

- ☐ No contamination found, released to shelter registration.
- ☐ Decontamination required (see reverse).
- ☐ Notify ESF 8 if decontamination is unsuccessful after second attempt.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

Figure 4**VEHICLE MONITORING FORM**

VEHICLE OWNER: _____ SSN: _____

TAG #: _____ MAKE/MODEL: _____

LUDLUM MODEL 3 SERIAL #: _____ PROBE (44-9) SERIAL #: _____

MONITOR/RECORDER SIGNATURE: _____

EXTERIOR SURVEY DATA

<u>Location</u>	<u>Readings</u>
R Front Tire/Wheel Well	_____
R Rear Tire/Wheel Well	_____
L Front Tire/Wheel Well	_____
L Rear Tire/Wheel Well	_____
Radiator	_____
Air Filter Intake	_____
Other	_____

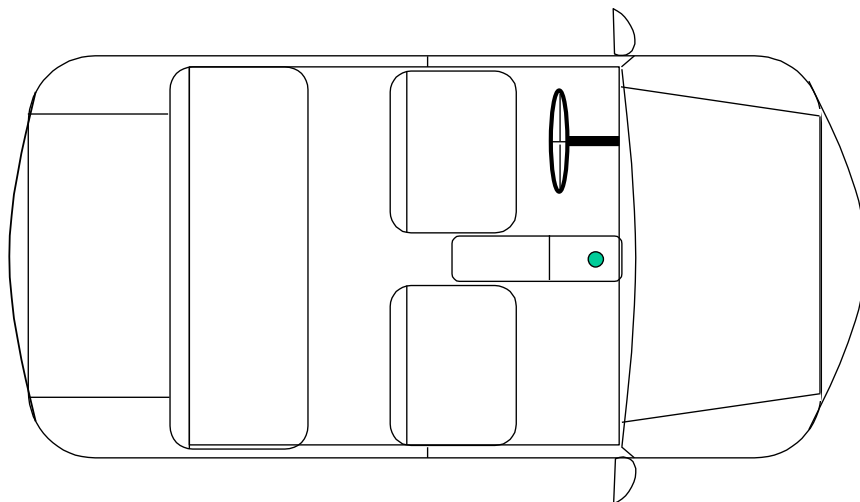
EXTERIOR SURVEY RESULTS: Check the appropriate response.

___ Readings (less than) <**330** cpm; released.___ Readings (equal to or greater than) =>**330** cpm; decontamination required.

ANNEX 6, ATTACHMENT A--RADIATION MONITORING PROCEDURES (continued)

VEHICLE MONITORING FORM (continued)

Shade in the appropriate locations that correspond to areas of contamination.

Figure 5

INTERIOR SURVEY DATA

<u>Location</u>	<u>Readings</u>
Drivers Seat and Floor Boards	_____
R Front Passenger Seat and Floor Board	_____
L Rear Passenger Seat and Floor Board	_____
R Rear Passenger Seat and Floor Board	_____
Steering Wheel	_____
Other	_____

INTERIOR SURVEY RESULTS: Check the appropriate response.

___ Readings less than <330 cpm: released.

___ Readings greater than >330 cpm; quarantined.

ANNEX 6, ATTACHMENT B-POTASSIUM IODIDE POLICY AND PROCEDURES**1. General**

- A. Under normal conditions, the common element iodine will accumulate in the thyroid gland. During a nuclear power plant incident, radioactive isotopes of iodine may be released into the atmosphere. This form of iodine poses a threat to individuals exposed to a radioactive plume in that it will also accumulate in the thyroid if inhaled or ingested. Taking Potassium Iodide (KI) will have the effects of saturating the thyroid with iodide so that radioactive iodine will be blocked from accumulating there in large quantity.
- B. The toxicity level of KI is very low and dangers in taking this drug are considered to be minimal. Nonetheless, individuals should not take more than the recommended dose. Although side effects to KI are unlikely because of the low dose and the short time period it will be taken, some side effects are possible. The side effects may include: skin rashes, swelling of the salivary glands, and “iodism” (metallic taste, burning mouth and throat, sore teeth and gums, cold symptoms and sometimes gastrointestinal symptoms). A few people may have an allergic reaction with more serious symptoms. These symptoms could be: elevated temperature, joint pains, swelling of the face and body, and at times severe shortness of breath which requires immediate medical attention. Individuals who know they are allergic to iodine or shellfish should not take KI.
- C. The effectiveness of KI as a blocking agent is greatest if administered before the time of exposure to radioiodine, but some exposure saving can be obtained by administration shortly after exposure. A user information sheet on KI is included in Attachment C.

2. State Policy

- A. The State of SC maintains liquid and tablet forms of potassium iodide for use by emergency workers, the public and institutionalized individuals. KI will be available in sufficient quantities for:
 - 1. The population residing within 10 miles of a nuclear power plant (NPP).
 - 2. Potential emergency workers (fire, police, medical, farmers keeping livestock and selected industrial workers).
 - 3. Hospitals, nursing homes and prisons located within the plume exposure pathway EPZ.
- B. The S.C. DHEC Commissioner or designee is responsible for ordering administration of KI to emergency workers, the public and non-mobile institutionalized individuals. The Commissioner will issue the order when the Committed Effective Dose Equivalent (CEDE) to the thyroid is projected to be greater than 5 Rem. If circumstances allow, the Governor and the Commissioner may issue the order jointly. However, nothing herein shall be construed to limit the Commissioner’s authority to issue such an order

when the situation calls for prompt and timely action. The S.C. DHEC Commissioner's order will be disseminated to state agencies, emergency workers and the public through emergency management channels, EAS and emergency news releases.

ANNEX 6, ATTACHMENT C-POTASSIUM IODIDE USER INFORMATION

CAUTION: Potassium Iodide (KI) should be taken only on the advice of the SC DHEC Commissioner, or designee, and as directed by State or Local Public Health or Emergency Preparedness Authorities.

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 increase the risk of side effects. Do not take this drug if you know you are allergic to Iodide. (See side effects below.)

A. RADIOACTIVE IODINE

1. In the event of a nuclear plant incident, radioactive materials can be released into the environment. Once released, radioactive iodine can enter the body if someone breathes contaminated air, eats contaminated food, or has direct body contact with something that is contaminated. Exposure to radioactive iodine can damage the thyroid, an important gland in your neck.
2. Radioactive iodine can harm the thyroid or cause thyroid cancer. If a radiological emergency occurs, **evacuation is the best action** to protect your health. If an evacuation is ordered and you cannot leave the area, you should stay indoors or shield yourself to limit the exposure to radiation. Emergency management and public health officials will provide guidance to emergency responders about protective action measures. Public health officials will provide recommendations about using Potassium Iodide (KI) to prevent thyroid damage.

B. POTASSIUM IODIDE (KI)

1. KI is a substance that can prevent radioactive iodine from affecting the thyroid gland. KI is available in drug stores without prescription. Emergency responders will be offered KI in the event of a nuclear incident involving a NPP where emergency response is required.
2. **KI does not protect against any other type of radiation exposure besides radioactive iodine. KI will not protect other organs or tissues besides the thyroid gland.** Avoid contaminated air exposure by evacuation and avoiding contaminated foods are the most important ways to reduce the risk of radioactive iodide exposure. **KI should be used only when evacuation is not possible.**
3. **Do not take KI unless public health officials advise the emergency responders to use KI.** In the event of a radiological emergency, taking KI may be recommended if experts determine that a radioactive release has occurred that could harm emergency responders in the area of the release. If a radioactive iodine release occurs, local or State Emergency Management officials will give an order to evacuate. **Evacuation is the most effective protective measure after a release of radiation.** Listen to the Emergency Alert System on television and radio stations for information about protective measures and the use of KI.

ANNEX 6, ATTACHMENT C-POTASSIUM IODIDE USER INFORMATION (continued)

4. Infants, children, fetuses and pregnant and breast feeding women are most in need of protection. Infants and young children are at risk from harm at very low levels of exposure to radioactive iodine because their thyroids take in more iodine.
5. If advised to take KI, take only one dose a day. **Taking more than one dose will not increase your protection** and may increase the risk of side effects. Take only one dose of KI for each 24-hour period that you are not able to leave the affected area. Public health officials will provide regular information about how long to take KI if it is needed.
 - (a) Persons 18 years of age and up and/or adolescents who weigh more than 150 pounds:
Take 130mg (one 130 mg tablet, two 65 mg tablets or 2 ml of liquid KI) each day.
 - (b) Persons age 3 through 18 years of age (or persons who weigh less than 150 pounds):
Take 65mg (½ of one 130 mg tablet, one 65 mg tablet or 1 ml of liquid KI) each day.
 - (c) Infants and children up to 3 years of age (liquid KI is preferred for accurate dosing):
Take 32mg of KI (¼ of a 130 mg tablet, ½ of a 65 mg tablet, or .5 ml of liquid KI) each day. If the tablet form is the only form available, use a pill cutter or knife on a hard surface to divide the pill in halves or quarters then crush the correct size piece of the pill into a powder and mix with applesauce, pudding, or something else that the child likes to eat.
 - (d) Infants from birth through one month of age:
Take 16mg of KI (.25 ml of liquid KI).
6. **KI should be stored in a dry place and kept at room temperature out of reach of children.**

C. PRECAUTIONS AND WARNINGS

1. Persons who have allergies to iodine, x-ray dye or shellfish (such as shrimp, oysters, and crab) should **NOT** take KI.
2. Persons taking thyroid medications, pregnant women, women who are breast feeding, and newborns up to one month old may take KI but they should contact their physician for a check of their thyroid function after taking KI. **Repeated dosing in pregnant women, nursing mothers, or newborns should be avoided.**

ANNEX 6, ATTACHMENT C-POTASSIUM IODIDE USER INFORMATION (continued)**D SIDE EFFECTS**

Side effects may include skin rashes, salivary gland swelling, metallic taste, burning mouth or throat sensation, sore teeth and gums, head cold symptoms, and/or upset stomach and diarrhea. See the attached product insert for details about warnings and side effects. If side effects are severe or if you experience fever, joint pains, swelling, or shortness of breath, you should seek medical attention immediately.

E. PRECAUTIONS

1. Persons with dermatitis herpetiformis and hypocomplementemic vasculitis are at an increased risk of iodine allergy and should only take KI if advised by their physician. KI may affect the activity of the thyroid gland in persons with multinodular goiter, Graves' disease, and autoimmune thyroiditis. These persons should only take KI if advised to do so by their physician.
2. KI must be taken within the first few hours of a radioactive exposure in order 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 another uncommon medical condition and you are unsure about KI, ask your physician at your next visit if you can safely take KI for thyroid protection in the event of a disaster.

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ANNEX 6, ATTACHMENT D-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 (SRD, TLDs, KI), to his/her 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 ESF 10 for analysis, follow-up and record keeping.
3. ESF 10 will retain original copies of all radiation exposure records and establish individual files/records for inclusion of PRD reports and incident related material. ESF 10 will establish priorities for expeditious processing of PRDs in cases where exposure records indicate exposures exceeding dose limitations. In these instances, the SCEMD will expedite delivery of PRDs to the service contractor for rapid turn around.
4. Upon completion of PRD processing and comparison with individual exposure records, ESF 10 will ensure that each emergency worker is informed of his/her accumulated dose.

ANNEX 6, ATTACHMENT D-EMERGENCY WORKER RADIATION EXPOSURE RECORDS
(continued)

NAME _____

AGE _____

HOME ADDRESS _____

SOCIAL SECURITY NUMBER _____

AGENCY/ORGANIZATION NAME _____

TLD NUMBER _____

CAUTION: RAD EXPOSURE LIMITS

Call Back Value	0.1R
Turn Back Value	1R
Protecting Valuable Property	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 _____