

**TEXAS**  
**EMERGENCY MANAGEMENT**  
**PROCEDURES**

PROCEDURE 24

CONTAMINATION CONTROL TEAM OPERATION

Radiological Emergency Procedures of the Radiation Control Program  
Texas Department of State Health Services

PROCEDURE 24  
CONTAMINATION CONTROL TEAM OPERATIONS

**APPROVAL AND IMPLEMENTATION**

This procedure is hereby approved for implementation and supersedes all previous editions.

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Date

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**CONTAMINATION CONTROL TEAM OPERATIONS**

**I. Purpose**

This procedure provides guidance to be used by the Radiation Control Program (RCP) Contamination Control Team members at access control points during an accident involving the release of radioactive alpha and beta particles and gamma rays emitters to the environment from a radioactive material incident. This procedure provides guidance for a release from Pantex and nuclear power plants. Other facilities will be evaluated on a case-by-case basis and the contamination control team activated at the discretion of RCP management.

**II. Discussion**

The RCP will activate contamination control personnel whenever the potential for a significant release of radioactive material occurs. For fixed nuclear facilities, this would be at a site area emergency or general emergency classification. Releases from other facilities will be evaluated on a case-by-case basis and the contamination control team activated at the discretion of RCP management. If radiological conditions warrant, and if access control points have not yet been established, the Chief of Field Operations or designee will recommend to local officials that they be established.

Access control points are used to provide access to Emergency workers and others entering the area affected by the plume or by deposited radioactive materials. The points will be established by local governments and staffed by law enforcement officers.

Contamination limits in this document are guidelines for accident response. The beta/gamma limits are based on recommendation from FEMA-REP-22, Contamination Monitoring Guidance for Portable Instruments used for Radiological Emergency Response to Nuclear Power Plant Accidents. The alpha limits are based on DSHS instrument minimum detectable counts. DSHS may increase or decrease the allowable contamination limits based on the size of population that most be monitored in an accident.

**III. References**

- A. 25 Texas Administrative Code § 289
- B. Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, USEPA, May 1992
- C. Procedure 7, Personnel Dosimetry & Exposure Records

- D. Procedure 9, Radioprotective Drugs
- E. Procedure 17, Radio Communications
- F. FEMA-REP-22, Contamination Monitoring Guidance for Portable Instruments used for Radiological Emergency Response to Nuclear Power Plant Accidents.

IV. **Equipment Required**

- A. RCP Emergency Response Team Badge
- B. RCP issued Occupational TLD
- C. Electronic Dosimetry, Self-reading Dosimetry, or equivalent
- D. Beta/Gamma Release - Ludlum 14C survey meter with a 44-6 (side-window GM detector) probe and Ludlum 12 survey meter with a 44-9 (pancake GM) probe or equivalent.
- E. Alpha Release - Thermo Electron E600 survey meter with SHP-380AB (alpha/beta zinc-sulfide scintillator), SHP-360 (pancake GM), and SHP-270 (sliding-window GM) probes or equivalent.
- F. Items listed in Attachment 1, Minimum Recommended Contamination Control Team Supplies and Equipment.

V. **Precautions and Limitations**

- A. Emergency worker exposures will be maintained as low as reasonably achievable.
- B. Emergency response personnel will not exceed 200 mrem Total Effective Dose Equivalent (TEDE) during a shift without permission. Authorization to exceed 200 mrem will be obtained from the person exercising dispatch or supervisory responsibility.
- C. Emergency response personnel will not exceed a daily limit of 1 rem TEDE without prior approval of the Chief of Field Operations or designee.
- D. Emergency response personnel are limited to a total exposure of 5 rem TEDE during the course of the event, without prior approval of the Chief of Field Operations or designee.

E. Prior authorization is not necessary for emergency response team members to participate in urgent and necessary actions required to save lives or to protect the health and safety of the public. If time permits, the potential exposure/risk should be evaluated by the Chief of Field Operations or designee. The following guidance with regard to radiation exposure is provided for use of RCP emergency workers while participating in lifesaving activities:

1. Exposures of up to 25 rem TEDE during urgent and necessary actions required to save lives are authorized.
2. Exposures greater than 25 rem TEDE during urgent and necessary actions required to save lives are authorized. However, persons receiving more than 25 rem TEDE should be volunteers and fully aware of the risks involved.

Additional information regarding emergency exposure limits is contained in Procedure 7, Personnel Dosimetry and Exposure Records.

- F. Except when acting in support of life saving or other urgent emergency operations, persons entering a radioactive plume shall not proceed beyond 100 mrem per hour boundary unless prior approval has been obtained from the Chief of Field Operations or designee.
- G. Potassium Iodide (KI) is provided in accordance with Procedure 9, if appropriate.
- H. Emergency workers, including those granted permission to enter the restricted area by local officials, will obtain prescribed dosimetry prior to receiving exposure from ionizing radiation.
- I. RCP response team members will periodically check dosimeters and enter the results in their activity logs.
- J. Lost or off-scale/failed dosimetry must be reported upon discovery to the Field Monitoring Team Leader.
- K. An evaluation of an individual's exposure will be performed if any dosimetry is lost or a dosimeter is noted to be off scale or non-operational.
- L. A person suspected of ingesting radioactive materials will be referred to a designated hospital or medical facility. Ask the law enforcement officer at your location to contact the County Emergency Operations Center and determine the location of the hospital or facility.

VI. **Prerequisites**

- A. Prior to deploying from the staging area, team members will receive pre-deployment briefings from the Chief of Field Operations, or designee.
  - 1. Team members will be advised of the anticipated exposure rates and contamination levels in the response area. In addition, members will be informed concerning maximum allowable (without specific authorization) entry dose rates, or turn back rates for their assigned duties
  - 2. The briefing should identify appropriate anti-contamination clothing and equipment that is to be recommended to persons entering the restricted area through access control points. Contamination Control team members will be notified if later information warrants modification of any such recommendations.
  - 3. The briefing will include plant status and meteorological data.
  - 4. All team members will initiate their Response and Recovery Activities Record, form CI-13 (activity log) and maintain it current.

VII. **Activation**

- A. Assemble necessary supplies and equipment as suggested in Attachment 1, Recommended Contamination Control Team Supplies and Equipment.
- B. Travel to designated RCP staging area or other specified location in personal vehicle, unless directed otherwise.
- C. Report to designated location upon arrival for a briefing on emergency conditions and monitoring objectives.
- D. Provide Staging Area Coordinator with location of lodging and telephone number where you can be reached when not on duty.

VIII. **Procedure**

A. **Pre-deployment Activities**

1. Upon arrival at the Staging Area, sign in on the Status Board as on Stand-by.
2. Obtain forms, equipment, and supplies in the quantities shown in Attachment 1 from the Logistics Support team. The list can be modified to meet the specific needs that are associated with a particular accident. Document inventory on the form CI-13 activity log including any exceptions.
3. Request that Instrument Maintenance and Calibration team install a RCP radio in the Contamination Control Team vehicle.
4. Obtain four electronic dosimeters and zero the total dose. Additional personnel should obtain pocket dosimeters and zero the dose.
5. Perform an operability check, battery check and source check of meters and probes.
  - a. Beta/Gamma Release - Determine the beta and gamma dose rate (mr/hr) background (open and closed window) using the Ludlum model 44-6 (side window GM) probe or equivalent. Determine the cpm background using the Ludlum model 44-9 (pancake GM) probe or equivalent. Record the observed background readings in the form CI-13 activity log.
  - b. Alpha Release - Determine both the alpha and beta cpm background using the SHP-380AB (alpha/beta zinc-sulfide scintillator) probe. Determine the beta and gamma dose rate (mr/hr) background (open and closed window) using the E600 with SHP-270 (sliding-window GM) probe. Determine the beta and gamma cpm background using the SHP-360 (pancake GM) probe. Record observed background readings in the form CI-13 activity log.
6. Accomplish a radio communications check between emergency response organization personnel using the guidelines provided in Procedure 17, Radio Communications.

7. Record on a map any details of the accident including plume data and deposition. Familiarize yourself with map routes relative to the potential plume location.
8. Assure that the law enforcement member of your team receives a briefing on conditions and has required dosimetry, KI (if required) and necessary forms and protective equipment.

**B. Deployment**

1. Load all equipment and deploy to the access control location as directed by the Chief of Field Operations or designee. Report your arrival via the RCP radio system.
2. Conduct a radio check about one mile from the staging area with the Field Monitoring Team Leader or Staging Area personnel.
3. While riding in the vehicle, monitor general radiation levels.
4. Upon arrival, conduct an operability check and background check of all instruments. Monitoring points should be set up in areas off the road so that operations may be conducted safely and away from vehicular traffic. The background should not exceed two times the staging area (or other specified location) background. All readings should be taken waist high, except when detecting for alpha in which case the reading should be taken as close to the ground as possible without touching the ground.
  - a. Beta/Gamma Release - Determine the beta and gamma dose rate (mr/hr) background (open and closed window) using the Ludlum model 44-6 (side window GM) probe or equivalent. Determine the cpm background using the Ludlum model 44-9 (pancake GM) probe or equivalent. Record the observed background readings in the form CI-13 activity log.

- b. Alpha Release - Determine both the alpha and beta cpm background using the SHP-380AB (alpha/beta zinc-sulfide scintillator) probe. If alpha background exceeds 10-cpm/100 cm<sup>2</sup> above background, relocate the control point to an area that is less than 10 cpm/100 cm<sup>2</sup>. If these conditions are not met, obtain permission from the Field Monitoring Team Leader to move the control point, or perform monitoring at another location. Determine the beta and gamma dose rate (mr/hr) background (open and closed window) using the E600 with SHP-270 (sliding-window GM) probe. Determine the beta and gamma cpm background using the SHP-360 (pancake GM) probe. Record observed background readings in the form CI-13 activity log.
5. Set up the access point. Determine who performs duties including radio communications, filling out forms, and conducting vehicle and personnel surveys.

**C. Access Entry Control**

1. Law enforcement personnel have ultimate authority over all decisions to permit or deny entry by individuals into the restricted area. DSHS staff function as a technical resource providing risk-informed recommendations to enable access/egress decision-making. Contamination Control and Accident Assessment should communicate frequently to discuss radiological conditions including dose and contamination levels in the controlled area. Recommendations will be based upon the urgency of tasks to be performed versus the risk; i.e., radiation exposure and contamination of individuals. Normally, members of the public will not be permitted entry into the restricted area unless it is a life- threatening (or livelihood) situation.
2. Inform persons seeking access to the restricted area of known radiological and other hazards in the area. Give persons granted permission by local government to enter the restricted area a short briefing on potential hazards. The briefing should include:
  - a. Anticipated radiological conditions and likelihood of contamination and exposure.
  - b. Known or anticipated nonradiological hazards.
  - c. Recommend routes of travel while in the restricted area.

- d. Locations of other access control points and contamination control teams.
  - e. Caution all personnel against eating, drinking, chewing gum or applying cosmetics, or smoking while in the restricted area.
  - f. Advise to close car windows and turn off or close outside vents (recirculate setting) while in the restricted area.
  - g. Minimize time in the restricted area.
  - h. Recommend exit access control point.
  - i. Recommended anti-contamination clothing and/or equipment for entry into the restricted zone.
3. Ensure that all personnel entering the restricted area are equipped with appropriate dosimetry, exposure record forms, anti-contamination clothing, equipment, and respirators (as appropriate).
  4. If the recommendation has been made by the Chief of Field Operations, or designee, to take potassium iodide (KI), ensure that persons entering the restricted area are aware of the recommendation to take KI. To the extent that RCP supplies permit, and with the understanding that the decision is an individual one, provide KI to emergency workers who have no other source for it.
  5. Maintain a record of radiation exposure for all persons entering the restricted area using form CI-1, Emergency Worker Radiation Exposure Record.
    - a. The person entering the restricted area should complete initial data entry on form CI-1. They should periodically check the reading on their dosimetry while in the restricted area. When a person exits from the restricted area, the form is completed.
    - b. At the end of each shift, CI-1 forms will be submitted to the Sample Preparation and Coordination Team for retention and entry in the individual's radiation exposure history.
  6. Retrieve DSHS issued dosimetry from personnel leaving the area.

7. If medical assistance is needed at an access control point, ask the law enforcement officer at the point to contact the dispatcher with the request. As an alternate, notify the Field Monitoring Team Leader via the RCP radio network and request that an ambulance/EMS vehicle be dispatched to your location. However the request is made, provide sufficient information to enable a proper priority to be assigned to it.
8. (Airborne Alpha Contamination Only) Airborne alpha radiation from an accident at Pantex poses a serious internal contamination risk. A dose assessment using HOTSPOT code and field measurement data will be conducted. The Contamination Control Team will contact Accident Assessment to determine appropriate PPE including required breathing protection for personnel allowed entry into the restricted area.
9. With the exception of persons en route to or from the affected nuclear power plant or any other accident site, all persons entering or leaving the restricted area will be documented and a form CI-1 maintained.

**D. Monitoring Process for personnel and vehicles exiting a plume or controlled area (beta/gamma accident)**

1. Monitoring for personnel exiting the controlled area.
  - a. Types of Monitoring at Access Points
    - (1) Preliminary Monitoring – monitoring the head, hands, knees and feet of evacuees.
    - (2) Full Monitoring – monitoring the entire surface area of evacuees and all emergency workers.
  - b. Portable instruments procedures:
    - (1) Use earphone(s) attached to the instrument to listen audibly for the presence of contamination. It is preferred to not use an audible speaker while conducting radiation surveys of persons thereby not upsetting or alarming a member of the public.
    - (2) Height of probe should be approximately one half to one inch from the surface and the probe speed should be 2-4 inches per second for a preliminary survey and 1-2 inches per second for a full survey.

- c. Do not touch or lean on vehicles or civilians. Have driver and passengers step out of the vehicles.
  - (1) Get basic information and record where they are coming from, destination, and determine if they traveled through the plume.
  - (2) Perform a Preliminary survey. Conduct Full survey if radioactive contamination is detected at or above the threshold values specific below.
- d. Any person having contamination on body surfaces, shoes, or clothing in excess of 300 cpm above background will be directed to the reception center for decontamination.
- e. Detected contamination in excess of 30,000 cpm above background on emergency workers or evacuees is cause for immediate decontamination of the person. The decontamination will be performed at the closest designated facility. Since this is a health and safety issue, any available response team member excluding the contamination control team, may be tasked with escorting the person to the designated facility. Defer to the law enforcement representative who may be able to more readily obtain an escort.

2. Perform Vehicle survey

- a. Ensure you check the following areas with a Ludlum model 44-9 (pancake GM) probe or equivalent:
  - Front grill
  - Wheel covers/wheel well
  - Door handles
  - Steering Wheel
  - Control Pedals
- b. Vehicles or equipment having contamination in excess of 300 cpm above background will be directed to the designated reception center or emergency worker decontamination facility, as appropriate, for decontamination.

3. Detected contamination on individuals, vehicles, or equipment above normal background, or any suspected internal contamination, will be recorded in the Activity Log, Form CI-13.
4. Some reception centers or facilities may not have a meter that reads in cpm. For these facilities, 0.1 mr/hr with the window open should be used for the decision whether to decon the person or equipment. A reading of 10 mr/hr indicates the need for immediate decontamination.
5. Members of the Contamination Control Team, along with their equipment and vehicles, will be checked for contamination at the end of their shift or other duty period. This will be performed at the access control point prior to departing, and at the staging area upon arrival.
6. Instruments and probes will be monitored after they come into contact with a contaminated surface.
7. Retain custody of contaminated waste until the courier or licensee picks it up as directed by the Chief of Field Operations.
  - a. Wear protective clothing, shoe covers, and gloves while handling radioactive waste.
  - b. Use trash bags, or other waterproof containers for storage of radioactive waste. If trash bags are used, double-bag the waste and seal each bag with tape. If a container is used, seal the outer rim with tape.
  - c. Place completed identification labels on at least two different sides of the container. Assure that the radiation dose rate (mrem/hr) is on the labels.
  - d. Request waste pickup through the Field Monitoring Team Leader via RCP radio system.

**E. Monitoring Process for personnel and vehicles exiting a plume or controlled area (alpha radiation accident)**

1. Personnel monitoring for persons exiting the controlled area.
  - a. Types of Monitoring at Contamination Control

- (1) Preliminary Monitoring – monitoring the head, hands, knees and feet of evacuees.
  - (2) Full Monitoring – monitoring the entire surface area of each emergency worker and evacuees when there is potential for significant contamination.
- b. Portable instruments procedures:
- (1) Use earphone(s) attached to the instrument to listen audibly for the presence of contamination. It is preferred to not use an audible speaker while conducting radiation surveys of persons thereby not upsetting or alarming a member of the public.
  - (2) Height of probe should be approximately one-quarter inch from the surface and the probe speed should be 1-2 inches per second.
  - (3) Monitoring for alpha radiation is generally much slower and more tedious than when monitoring for either beta or gamma radiation. As a general rule, the detector must be within one quarter of an inch of an alpha source in order to detect it, whereas beta radiation can be detected a meter or so away from a beta particle source, and gamma rays can be detected from much longer distances. The surface to be monitored must be dry when monitoring for alpha contamination. During wet conditions, the use of a Fidler or Low energy probe may be used to identify areas of contamination.
- c. Do not touch or lean on vehicles or civilians. Have driver and passengers step out of the vehicles.
- (1) Get basic information and record where they are coming from, destination, and determine if they traveled through the plume.
  - (2) Perform Preliminary survey. Conduct Full survey if radioactive contamination is detected at or above the threshold values specific below.

- d. Monitor emergency workers and their vehicles and equipment leaving the restricted area. When monitoring for plutonium contamination, use the E600 instrument with a SHP-380AB (alpha/beta zinc-sulfide scintillator) probe. The combined alpha/beta channel should be used to search for contamination. If contamination is found, the detector can be switched to the alpha only or beta only channel to determine the source of the contamination. Crossover does exist between the two channels. This means with beta present, up to 5% of these counts will be read on the alpha channel and vice versa.

**CAUTION:**

Do not touch the mylar window on the SHP-380AB (alpha/beta zinc-sulfide scintillator) probe with sharp or jagged objects, including grass stubble, as it is easily punctured. If the count rate does not increase when the probe is exposed to the source, there is probably a hole in the Mylar. Return it to the staging area for repair or replacement.

- e. Any person having contamination on body surfaces, shoes, or clothing should be sent to the reception center based on the following criteria for monitoring:

Beta: 300 cpm/100 cm<sup>2</sup> above background

Alpha: 30 cpm/100 cm<sup>2</sup> above background

- f. Detected contamination in excess of 30,000 cpm beta/gamma or 3000 cpm alpha above background on emergency workers or evacuees is cause for immediate decontamination of the person. The decontamination will be performed at the closest designated facility. Since this is a health and safety issue, any available response team member excluding the contamination control team, may be tasked with escorting the person to the designated facility. Defer to the law enforcement representative who may be able to more readily obtain an escort.

2. Perform Vehicle survey
  - a. Ensure you check the following areas for contamination using a SHP-380AB (alpha/beta zinc-sulfide scintillator) probe on flat surfaces or large area wipes:

- Front grill
- Wheel covers/wheel well
- Door handles
- Steering Wheel
- Control Pedals

Wipes should be used in inaccessible locations, which cannot be monitored with a probe. The wipes can be paper disks, paper towels, or other available dry cloth or paper.

The wipes should be placed on a flat surface and monitored for contamination using the SHP-380AB (alpha/beta zinc-sulfide scintillator) probe. If there are indications of alpha (30 cpm above background) or beta contamination (300 cpm above background) on a vehicle, direct the driver to take it to the reception center for decontamination.

3. Members of the Contamination Control Team, along with their equipment and vehicles, will be checked for contamination at the end of their shift or other duty period. This will be performed at the access control point prior to departing, and at the staging area upon arrival.
4. Instruments and probes will be monitored after they come into contact with a contaminated surface.
5. Retain custody of contaminated waste until the courier or licensee picks it up as directed by the Chief of Field Operations.
  - a. Wear protective clothing, shoe covers, and gloves while handling radioactive waste.
  - b. Use trash bags, or other waterproof containers for storage of radioactive waste. If trash bags are used, double-bag the waste and seal the each bag with tape. If a container is used, seal the outer rim with tape.

- c. Place completed identification labels on at least two different sides of the container. Assure that the radiation dose rate (mrem/hr) is on the labels.
- d. Request waste pickup through the Field Monitoring Team Leader via RCP radio system.

MINIMUM RECOMMENDED CONTAMINATION CONTROL TEAM  
SUPPLIES AND EQUIPMENT

1. 200 copies of maps for participating reception/relocation center showing the locations and highway routes to the centers, emergency worker decontamination facilities, and designated medical facilities
2. Four Canberra Mini-Radiacs
3. 20 0-200 mrem, and 20 0-20 rem direct reading dosimeters
4. One dosimeter charger and two D-cell batteries, if applicable
5. 50 copies of Form CI-1, Emergency Worker Radiation Exposure Record
6. 10 copies of Form CI-13, Response and Recovery Activities Record
7. 20 pair of disposable shoe covers
8. 20 pair of disposable gloves
9. 20 Potassium Iodide (KI) packets and instruction sheets
10. 10 30-gallon plastic trash bags
11. Two rolls of duct or masking tape
12. 20 pressure sensitive Radioactive Material Labels
13. 16 sets of disposable coveralls in the quantities and sizes listed:
  - 4 small
  - 4 medium
  - 4 large
  - 4 extra large
14. 20 disposable caps or hoods