

TEXAS
EMERGENCY MANAGEMENT
PROCEDURES

PROCEDURE 4
TOOL AND EQUIPMENT DECONTAMINATION

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

PROCEDURE 4
TOOL AND EQUIPMENT DECONTAMINATION

APPROVAL AND IMPLEMENTATION

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

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Date

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TOOL AND EQUIPMENT DECONTAMINATION

I. Purpose

This procedure provides suggested methods for tool and equipment decontamination.

II. Discussion

Any decontamination effort must be adapted to the specific conditions of the situation; but guides and techniques are usually applicable to any situation.

The goal of any decontamination effort is to reduce contamination to some acceptable level while keeping the spread contamination, personnel exposure and waste volumes to a minimum.

III. References

- A. Procedure 3, Area Survey and Decontamination
- B. 25 TAC § 289.202(ggg)(6)

IV. Equipment Required

- A. Cleaning materials, such as rags, oil impregnated cloths (Masslin), brushes, etc.
- B. Abrasive materials, such as emery paper, steel wool, pumice stones, etc.
- C. Detergent
- D. Absolute filtered wet/dry vacuum cleaner
- E. Chemicals; such as alcohol, Stoddard's solvent, EDTA, etc.
- F. Ultrasonic tanks
- G. Decontamination sinks
- H. Abrasive cleaning machines; such as sandblasters
- I. High pressure water spray system

V. Precautions and Limitations

- A. The compatibility of detergents and chemicals with the radioactive waste disposal system must be checked prior to disposal in the system.

- B. Tools and equipment should be decontaminated in a room equipped for decontamination whenever possible. The areas ventilation system should be in operation anytime the room is used.
- C. Do not place hands in an ultrasonic tank solution while the tank is operating.
- D. Normal safety requirements must be followed when volatile liquids are used.

VI. Prerequisites

- A. A contamination survey has been performed on the item(s) being decontaminated using the techniques in Procedure 3 to identify contaminated areas and associated contamination levels. Prior to release to unrestricted use, the following must be met:
 - 1. Tools and equipment decontaminated for release to unrestricted use shall have maximum fixed contamination levels of ≤ 15000 dpm/100cm² beta-gamma, and ≤ 15000 dpm/100cm² alpha. Address Reference B for these guidelines.

VII. Procedure

A. General Recommendations

- 1. The selection of a decontamination method should be made after evaluating which of the available method(s) will be the most effective while keeping contamination spread, personnel exposure, and waste volumes to a minimum. Factors such as size of the item, type of surface, if contamination is loose or fixed must be considered (see Attachment 1).
- 2. Decontamination of surfaces with varying contamination levels should begin in areas with lower levels and proceed toward areas with higher levels. An exception to this is when the higher contaminated areas are small and spotty, for which a more effective method might be decontamination of the spotty areas first and then the entire area.
- 3. Contamination surveys made in accordance with Procedure 3, are used to evaluate the effectiveness of the method and to determine when the acceptable contamination levels have been reached.
- 4. Greasy or oily items should first be degreased using a solvent or make decontamination more effective and to extend the life of cleaning solutions.

B. Dry Methods

1. An attempt should be made to pick up and contain dry, loose contamination, when possible, using an absolute filtered vacuum cleaner or other available methods.
2. Tack cloths, tape, or oil-impregnated cloths (Masslin) can be used to remove dry, loose contamination from relatively smooth surfaces.

C. Wet Methods

1. Solutions

- a. Cleaning solutions should normally consist of just water or water and detergent. If common household type detergents are being used, about one ounce of detergent should be used per gallon of water. Other detergents should be used in accordance with manufacturer's recommendations.
- b. When a solution is used in a tank or sink, the solution temperature should be maintained between 150 degrees Fahrenheit and 200 degrees Fahrenheit for effective decontamination.
- c. Solutions should be evaluated periodically to determine their ability to reduce contamination levels. A solution should be replaced when the radioactivity concentration creates a radiological hazard and/or when it becomes ineffective for its intended purpose.
- d. Chemical solutions should not be used unless other methods prove ineffective and only after being approved (usually on a case-by-case basis) by an appropriate radiation safety specialist.

2. Wiping and Scrubbing

- a. Damp rags may be effective on fairly smooth surfaces and should be used, if possible, to reduce liquid waste volumes. Rags used to wipe items with low contamination levels can be used to gross decontamination of items with higher contamination levels.
- b. If rags are being used in a solution, the rag should be dampened only once to prevent contaminating the solution. The surface being decontaminated should be wiped in one direction only (rather than back and forth) from lower toward higher levels of contamination. After the first clean surface of a rag has been used, the rag, should be folded to a new unused surface, used, refolded, used, etc. until the rag has been completely used.

- c. Stiff bristle brushes may be effective for decontaminating items with porous surfaces, threaded areas, crevices, engraved areas, etc. A brush should be used under the surface of the cleaning solution when possible to minimize splatter.

3. Tanks and Sinks

- a. Whenever possible, items to be decontaminated by wiping or scrubbing should be permitted to soak prior to decontamination.
- b. When items are to be decontaminated in a sink or tank, the items with lower contamination levels should be decontaminated first. The cleaning solution can then still be used to at least partially decontaminate items with higher contamination levels.
- c. Tanks and sinks should be filled with water to depth that will completely cover the items being decontaminated to minimize splatter and airborne radioactivity.
- d. When scrubbing items in a tank or sink, keep the brush below the surface of the cleaning solution when possible to minimize splatter.

4. Ultrasonic Cleaning

- a. An ultrasonic tank containing cleaning solution should be initially operated for about 10 minutes prior to putting items in the tank in order to degas the solution.
- b. For maximum effectiveness, items being decontaminated should be suspended in the solution or should be in a wire basket. Items should not be permitted to remain in contact with interior tank surfaces.

5. High Pressure Spray System

Porous surfaces and areas of stubborn contamination can be decontaminated with a high-pressure spray if the area drains to a radioactive waste system.

6. Rinsing and Drying

After decontamination, and prior to surveying, items should be rinsed with clean water and wiped dry or permitted to air dry.

D. Abrasive Methods

- 1. For stubborn contamination on non-critical surfaces, an abrasive method such as sandblasting, filing, stoning, etc. may be effective for removing the contamination.

2. For fixed contamination on critical surfaces, an abrasive material such as emery cloth may be effective for removing the contamination, depending on the amount of surface, which may be removed before adversely affecting dimensions.

TOOL AND EQUIPMENT DECONTAMINATION METHODS

METHODS	ADVANTAGES	DISADVANTAGES
Absolute filtered vacuum cleaner	Minimizes contamination spread; minimizes airborne; almost no waste; large surfaces can be rapidly decontaminated.	Contamination must be dry and loose; cleaner may need frequent emptying because of increasing exposure rates as waste accumulates.
Tape	Minimizes contamination spread; minimizes airborne; almost no waste.	Contamination must be dry and loose; good for very small areas only; surface must be smooth.
Tack or oil impregnated cloths	Minimizes contamination spread; minimizes airborne.	Contamination must be dry and loose; cloths may have to be replaced frequently; surface must be smooth; a large volume of solid waste may be generated
Damp rags (wiping)	Minimizes contamination spread; minimizes airborne.	Contamination must be loose; rags may have to be replaced frequently; surface must be smooth; liquid waste and a large volume of solid waste may be generated; a slow method.
Brushes (scrubbing)	Minimizes airborne if done in a liquid; can be used on porous surfaces; may remove lightly adhering fixed contamination; complex surfaces can be decontaminated.	Large volumes of liquid waste may be generated; a slow method; cleaning solution may splatter.
Ultrasonic Tank	Minimizes contamination spread; minimizes airborne; complex surfaces can be decontaminated; effective for tightly adhering fixed contamination.	Large volume of liquid waste may be generated; size of item that can be decontaminated limited to tank size.
High pressure spray system	Effective for porous surfaces; large surfaces can be decontaminated fairly rapidly; effective for tightly adhering fixed contamination.	May cause contamination spread; may cause airborne; large volumes of liquid waste may be generated; may be used only in areas with radioactive waste drains.
Chemicals	Cleans oily, greasy surfaces; effective for tightly adhering fixed contamination not removable by other non-abrasive methods.	Chemical may be hazardous; waste liquid may require solidification; airborne may be caused by the evaporation of chemicals such as alcohol and acetone.
Abrasive methods	Removes contamination not removable by other methods.	High airborne levels may be generated; may cause contamination of adjacent areas; alters dimensions as a result of base material removal.