



SAFETY TACTICS

INTRODUCTION

Safety is the number one objective for spill response operations. Protection of worker health and safety should be a constant consideration throughout the spill response. Section A, Part III of this manual contains a Safety Checklist which should be consulted frequently throughout the response.

The safety tactics in this section are applicable to all spill types and sizes, in all environments. For the purpose of this manual, safety tactics are divided into four main categories, and their sequence in this manual roughly corresponds to the order in which they will be addressed during a spill response.

- **Site Entry Criteria** provides guidance on establishing minimum standards for site entry by properly trained spill responders.
- **Personal Protective Equipment** provides guidance on protective equipment to be worn during site entry by properly trained spill responders.
- **Site Layout and Control** provides guidance on establishing the work site layout and control boundaries for site entry by properly trained spill responders.
- **Personnel Decontamination** provides guidance on establishing minimum standards for decontamination by properly trained spill responders.





SITE ENTRY CRITERIA

OBJECTIVE & STRATEGY



The objective of this section is to protect worker safety and health by giving guidance on establishing minimum standards for site entry by properly trained oil spill response workers. Safety is always the primary objective of any response.

Either of the following two documents supersedes this guidance:

- **Incident-specific Site Safety Plan**
- **Corporate or Agency safety procedures and training for employees/responders**

This section contains recommended site safety entry guidelines for crude oil/petroleum spill cleanup operations. In all cases, physical hazards of entry must be considered along with health hazards. The exposure limits in this section are based on standards established by the Occupational Safety and Health Administration (OSHA). More restrictive limits may be set by your employer. Verify your exposure limits before site entry.

See references for additional information.

TACTIC DESCRIPTION

General Limits to Entry

The decision as to whether or not any given entry shall be attempted is ultimately the responsibility of the On-Scene Commander with advice and guidance from:

- The Site Safety Officer
- The Field Team Leader
- Unified Command

Site Safety Assessment

Before commencing oil spill response operations, a site safety assessment should be completed by a Site Safety Officer, or a properly trained field team member. Once the site



safety assessment is completed, the proper level of Personal Protective Equipment (PPE) will be determined.

The following are four levels of respiratory protection for entry into varying conditions listed in descending order of protection. Other PPE, such as splash suits, hard hats, safety glasses, steel-toed boots, etc., will also be needed, depending on the situation, to ensure the health and safety of the responders. It is required to consult with a "competent person" for job specific PPE requirements. All employees must have had the necessary training pertaining to their tasks prior to entering any site.

Please note that the recommended levels reflect a 12-hour shift.

Level A – Highest Level of Protection*

Entry by two or more workers dressed in fully-encapsulated suits and SCBAs is allowed under the following conditions:

- Back-up observers with SCBAs standing by
- Oxygen atmospheric concentration should be below 23.5%
- Percentage of LEL is less than 10% as measured by a calibrated direct reading handheld instrument



Level B*

Entry by two workers with SCBAs is allowed under the following conditions:

- Back-up observers with SCBAs standing by
- Oxygen atmospheric concentration should be below 23.5%
- Percentage of LEL is less than 10% as measured by a calibrated direct reading handheld instrument
- Normal natural or mechanical ventilation is available
- No visible mist or fog of oil present



Level C

Entry with full-face or half-face air purifying respirator and organic vapor cartridges is allowed by any number of workers without back up observers under the following conditions:

- Oxygen atmospheric concentration is between 19.5% and 23.5%
- Percentage of LEL is less than 10% as measured by a calibrated direct reading handheld instrument
- Total hydrocarbon concentration is less than 500 ppm
- H₂S air concentration is less than 10 ppm
- Benzene air concentration:
 - Full-face respirator - less than 10 ppm
 - Half-face respirator - less than 5 ppm
- Normal natural or mechanical ventilation is available
- No visible mist or fog of oil present



Level D – Lowest Level of Protection

Entry without respiratory protection is allowed for any work required under the following conditions:

- Oxygen atmospheric concentration is between 19.5% and 23.5%
- Percentage of LEL is less than 10% as measured by a calibrated direct reading handheld instrument
- Total hydrocarbon concentration is less than 50 ppm
- H₂S air concentration is less than 10 ppm
- Benzene air concentration is less than 0.6 ppm
- Normal natural or mechanical ventilation is available
- No visible mist or fog of oil is present

Note that in environments in which excess dust and debris are present, an organic vapor/high efficiency particulate air filter is recommended (OV/HEPA).

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- A trained person using properly calibrated equipment must conduct air monitoring prior to and periodically during response operations, and as necessary when conditions change.
- If permissible entry conditions change outside of allowable criteria during entry, the entry must be terminated.
- The team conducting the site assessment should enter the site from an upwind or cross-wind aspect and progress slowly. After the airborne flammability, oxygen, and toxicity have been determined, the team should assess the site's chemical and physical hazards so that proper decisions can be made regarding PPE and other safety and health issues.
- Respiratory protection should only be worn by responders operating under respirator operating procedures (i.e., regular training, fit-testing, medical monitoring, inspection, cleaning, storage and periodic program evaluations) as required by OSHA 29 CFR 1910.134.

REFERENCES TO OTHER TACTICS



- PERSONAL PROTECTIVE EQUIPMENT



- SITE LAYOUT & CONTROL



- PERSONNEL DECONTAMINATION





PERSONAL PROTECTIVE EQUIPMENT

OBJECTIVE & STRATEGY



The objective of this section is to protect worker safety and health by giving guidance on selecting Personal Protective Equipment (PPE) to be worn during site entry by properly trained oil spill response workers. Safety is always the first objective of any response. Either of the following two documents supersedes this guidance:

- Incident-specific Site Safety Plan
- Oil Spill Response Organization safety procedures and training for employees/responders



The following are recommended PPE guidance for crude oil/petroleum spill cleanup operations.

Personal Protective Equipment is designed to protect workers from safety and health hazards, and to prevent injury resulting from incorrect use and/or malfunction of equipment. In general, the greater the level of risk, the greater the level of PPE required.

TACTIC DESCRIPTION

Personal Protective Equipment includes:

- Respiratory protection with respirators: Self Contained Breathing Apparatus (SCBA), air-purifying respirator
- Skin protection: full body covering including protective clothing with appropriate gloves and boots
- Eye protection with safety glasses, goggles, and/or face shields
- Head injury protection with a hard hat
- Thermal protection, as required, with cold weather clothing, including steel-toed footwear or arctic boots



- Hearing protection with earplugs or earmuffs



PPE is divided into four categories based on the level of personal protection afforded:

- **Level A** provides the greatest level of skin, respiratory and eye protection.
- **Level B** offers the highest level of respiratory protection but lesser level of skin protection (e.g., skin protection is required for exposure to liquids but not vapor).
- **Level C** is used when concentrations and types of airborne substances are known and the criteria for using air-purifying respirators are met.
- **Level D** consists of work clothing affording minimal protection, used for nuisance contamination only.

Most spill site workers will use Levels C and D.

Personal Protective Equipment Categories

Note: * indicates optional equipment.

LEVEL A – HIGHEST LEVEL OF PROTECTION

- SCBA or positive-pressure, supplied-air respirator with escape SCBA
- Totally encapsulating chemical-protective suit with vapor barrier
- Coveralls*
- Long underwear*
- Gloves - outer, chemical resistant*
- Gloves - inner, chemical resistant
- Boots - chemical resistant, steel toe and shank
- Boot covers*
- Hard hat (under suit)*
- Disposable protective suit, gloves, and boots (may be worn over or under encapsulating suit depending on suit design)
- Hearing protection*



LEVEL B

- SCBA or positive-pressure, supplied-air respirator with escape SCBA
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket coveralls; one- or two-piece chemical splash suit; disposable chemical-resistant overalls). May also be encapsulating.
- Coveralls*
- Gloves - outer, chemical resistant
- Gloves - inner, chemical resistant
- Boots- chemical resistant, steel toe and shank
- Boot covers*
- Hard hat*
- Face shield*
- Hearing protection*
- Personal Flotation Device (PFD)*



LEVEL C

- Full-face or half-face mask air-purifying respirators with appropriate cartridges
- Chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls.)
- Coveralls*
- Gloves - outer, chemical resistant
- Gloves - inner, chemical resistant
- Boots - steel toe and shank as appropriate to spilled product
- Boot covers*
- Hard hat*
- Face shield*
- Hearing protection*
- Personal Flotation Device (PFD)*



LEVEL D – LOWEST LEVEL OF PROTECTION

- Coveralls
- Gloves*
- Boots/shoes - steel toe and shank as appropriate to spilled product
- Boot covers*
- Safety glasses or chemical splash goggles
- Hard hat
- Hearing protection*
- Face shield*
- Personal Flotation Device (PFD)*



DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Maintaining adequate supplies of PPE is often a logistical challenge; Team Leaders should provide the Supply Unit with anticipated PPE needs in advance and on a regular basis.
- Respiratory protection should only be worn by responders operating under respirator operating procedures (i.e., regular training, fit-testing, medical monitoring, inspection, cleaning, storage and periodic program evaluations) as required by OSHA 29 CFR 1910.134.

REFERENCES TO OTHER TACTICS

-  SITE ENTRY CRITERIA
-  SITE LAYOUT & CONTROL
-  PERSONNEL DECONTAMINATION





SITE LAYOUT & CONTROL

OBJECTIVE & STRATEGY



The objective of this section is to protect worker safety and health by giving guidance on establishing the work site layout and control boundaries for site entry by properly trained oil spill response workers. Safety is always the first objective of any response. Either of the following two documents supersedes this guidance:

- Incident-specific Site Safety Plan
- Oil Spill Response Organization safety procedures and training for employees/responders

This section contains recommended site layout and control guidelines for crude oil/petroleum spill cleanup operations. In all cases, physical hazards of entry must be considered along with health hazards.

TACTIC DESCRIPTION

Control boundaries must be established for any spill site to ensure that workers and the public are not exposed to the spilled substance. Three distinct zones should be established by the Site Safety Officer around the spill site:

- **Hot Zone or Exclusion Zone** — control zone perimeter established by the Safety Officer where site safety assessment and site entry criteria have been applied.
- **Warm Zone or Contamination Reduction Zone** — allows for an orderly transition from the Hot Zone to the cold zone: workers shed contaminated clothing, equipment and personnel are decontaminated.
- **Cold Zone or Support Zone** — free of contamination: support facilities, staging area, warm-up trailer, bathroom facilities, and mobile command post.



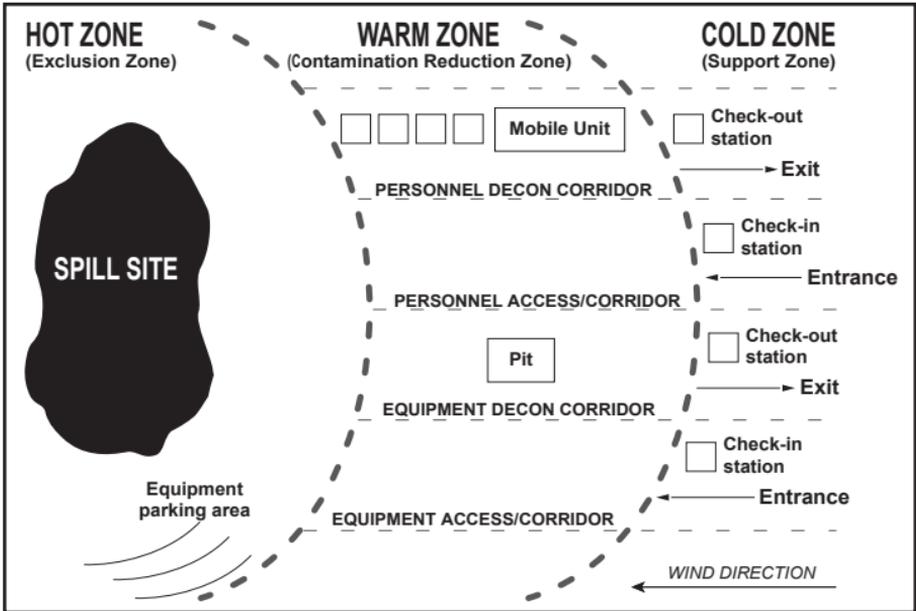


Figure SLC-1. Spill site zones layout.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

The following guidance should be considered when establishing site layout and control:

- The Hot Zone should be as small as possible to prevent the spread of contamination, but large enough to accommodate emerging conditions, such as migration of the spilled product or changes in the direction of the wind.
- The Hot Zone should provide for parking/storage of contaminated equipment in order to minimize decontamination until the work is completed.
- Walking boards or other type of traffic control will assist in minimizing the spread of contamination with the Hot Zone.
- To the extent possible, warm zone facilities should be located up-wind and up-hill from the Hot Zone.



- Security should be established around the Hot and Warm Zones to protect the public health and safety.
- Check-in/check-out procedures should be established for all personnel and equipment entering the Hot Zone.
- If the PPE for the site is designated as Level A or B, the “buddy system” should be used to account for all personnel in the Hot Zone.
- For on-water operations, the Warm Zone may be on the deck of a support vessel, with the Hot Zone on one side of the vessel and the Cold Zone on the opposite side.
- All eating and living areas must be kept in the Cold Zone.
- Keep in mind that the Site Layout and Control Plan may be implemented into the Safety Plan, Waste Management Plan, and the Decontamination Plan. Coordination with staff developing these plans could save duplication of work.

REFERENCES TO OTHER TACTICS



- SITE ENTRY CRITERIA



- PERSONAL PROTECTIVE EQUIPMENT



- PERSONNEL DECONTAMINATION



- VESSEL DECONTAMINATION





PERSONNEL DECONTAMINATION

OBJECTIVE & STRATEGY



The objective of this section is to protect worker safety and health and prevent the spread of contamination. This section provides guidance to be used in establishing minimum standards for decontamination by properly trained oil spill response workers. Safety is always the first objective of any response. Either of the following two documents supersedes this guidance:

- Incident-specific Decontamination Plan (usually part of the Site Safety Plan)
- Oil Spill Response Organization decontamination procedures and training for employees/responders

The following are recommended decontamination guidelines for crude oil/petroleum spill cleanup operations.

TACTIC DESCRIPTION

Decontamination involves the removal of oil or other contaminants from personnel or equipment after they leave the Hot Zone. The purposes of decontamination are to:

- Minimize worker contact with contaminants.
- Prevent spread of contaminants to clean areas and exposure to personnel there.
- Remove contaminants from equipment to allow its reuse.

Decontamination is conducted in the Warm Zone, which is the control point for personnel and equipment entering and leaving the Hot Zone. Decontamination is divided into four categories based on the level of personal protective equipment (PPE) being used for the spill zone. In general, personnel and equipment move through various steps of decontamination to ensure that gross contamination is removed first, and that uncontaminated clothing/equipment



do not become contaminated by the decontamination process. Flow charts are presented below for each of the four levels of protection, with the highest level being Level A.

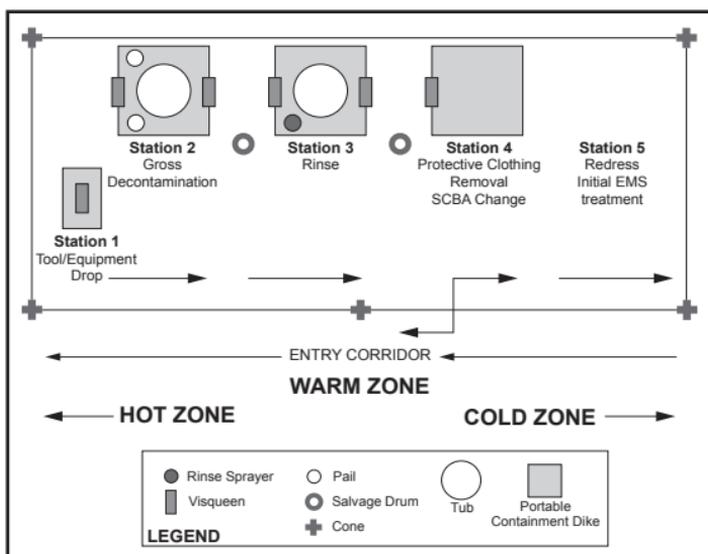


Figure D-1. Sample decontamination area.

Level A

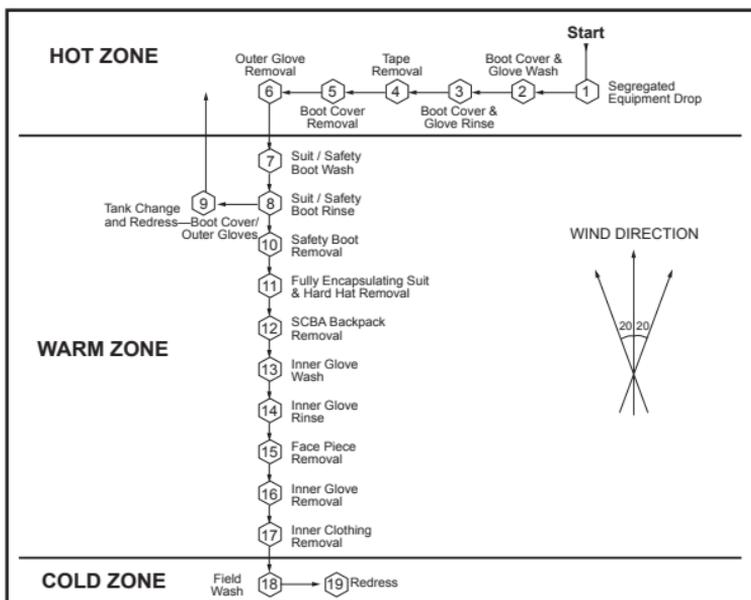


Figure D-2. Level A Decontamination Flow Chart.



Level B

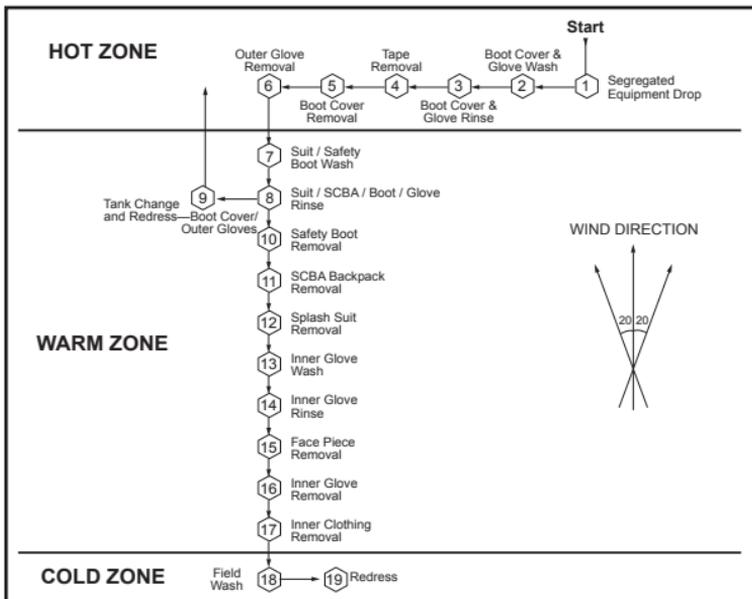


Figure D-3. Level B Decontamination Flow Chart.

Level C

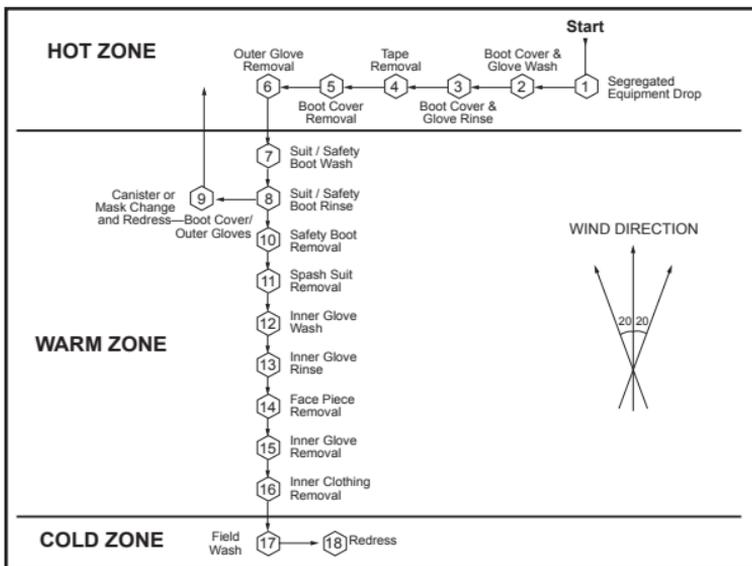


Figure D-4. Level C Decontamination Flow Chart.



Level D

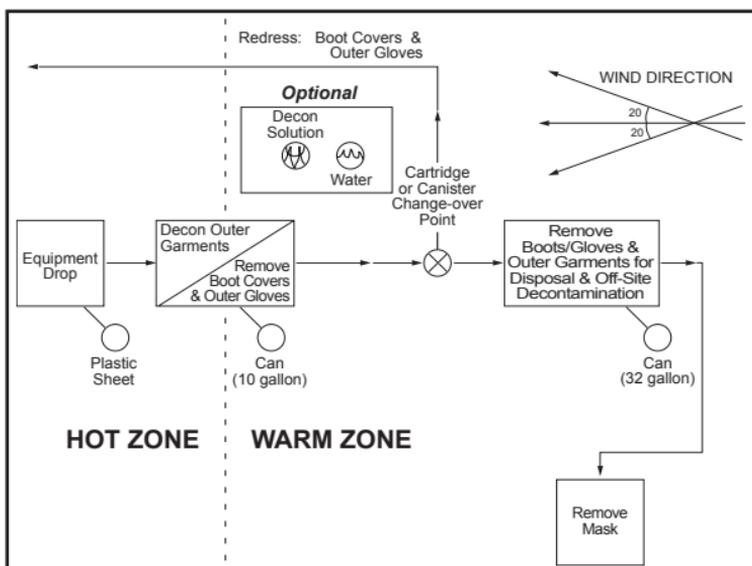


Figure D-5. Level D Decontamination Flow Chart.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Plan for containment, collection, and disposal of contaminated solutions and wastes generated from decontamination.
- Develop separate decontamination processes for heavy equipment and machinery to prevent cross-contamination of personnel.
- Separate decontamination stations to prevent personnel cross-contamination.
- Develop distinct entry and exit points, and physically separate entry paths from contaminated area to clean area and vice versa.
- Establish procedures for minimum decontamination for restroom use and medical emergencies.
- Locate medical/first aid stations to avoid exposure to contaminants.



- Stress the use of extra steps to avoid contact with or handling of contaminants.
- Wrap sampling/monitoring equipment in disposable see-through plastic bags.
- Where possible, use disposable protective clothing and equipment, such as PPE and chemical-protective clothing (CPC).
- Use strippable coatings for equipment where possible.
- Use double containerization of contaminated wastes and recovered materials (e.g., plastic liners in overpack drums).
- Inspect all PPE/CPC for cuts, tears, punctures, abrasions, and other signs of deterioration prior to use or reuse.
- Assure proper fastening and sealing of CPC and PPE.
- First-stage decontamination personnel must wear the same, or one level lower, PPE as clean-up workers.
- Consider placing containment boom around vessels where on-water decontamination is performed.
- Consider placing containment boom along shoreline where decontamination is performed adjacent to a water body.
- Use plywood walking board, or other similar material to establish pathways for heavy foot traffic areas.

REFERENCES TO OTHER TACTICS



- SITE ENTRY CRITERIA



- PERSONAL PROTECTIVE EQUIPMENT



- SITE LAYOUT & CONTROL



- VESSEL DECONTAMINATION



EQUIPMENT AND PERSONNEL RESOURCES

Resources required for decontamination and decontamination setup will depend on the following:

- Availability of potable water, electric power, and waste disposal.
- Mobilization time and duration of site activities.
- Level and type of cleanup and response activity expected at site, and site conditions.
- Available space for decontamination setup and location requirements for decontamination line.
- Health hazards presented by contaminants at cleanup/response site.
- Need for additional controls (e.g., vapor diffusion/dispersion, movement/transfer of gross waste).

Typical Decontamination Equipment and Personnel Needs for Level C and D



Typical Equipment	Function	Quantity	Notes
Wash tubs, scrub brushes, disposable rags	Decontamination	>3	
Portable decon berm	Decontamination	>4	
Galvanized bucket	Decontamination	>2	
Sprayer	Decontamination	>2	
Salvage drum	Decontamination	>2	
Traffic cone	Designate decon area	>4	
Caution tape	Designate decon area	>2 rolls	
Visqueen	Decon area	> 1 roll	
Trash cans (with liners)	Waste receptacle	>1	
Oily waste dumpster	Waste receptacle	1	
Light plant/generators	Illumination/power	>1	
Portable building/tent/heater	Keep personnel warm and dry	Optional	
Typical Personnel	Function	Quantity	Notes
Field Team Leader	Supervises operations	1	
Skilled Technicians	Crew vessels and operate response equipment	1 to 2	
General Technicians	Work under the direction of skilled technicians	2 to 10	

