Conducting a Removal Assessment

Certain safety precautions should be considered before entering an area of any description that is suspected to be contaminated with hazardous substances. The National Contingency Plan, 40 CFR Section 300.410, gives the minimal procedures for conducting a removal site evaluation, which "includes a removal preliminary assessment and, if warranted, a removal site inspection." According to the NCP:

300.410(c)(1) **The lead agency shall, as appropriate, base the removal preliminary assessment on readily available information. A removal preliminary assessment may include, but is not limited to:**

(i) **Identification of the source and nature of the release or threat of release;**

This may be as easy as reading the U.S. Department of Transportation (DOT) placard on a tank truck. In the case of a hazardous waste site with hundreds of possibly unlabeled drums of different chemicals, recognition of the source and nature of the threat posed requires use of all information available; e.g., historical data, visual observation, monitoring data, sample data, package labels, shipping manifests, and witnesses.

(ii) **Evaluation by ATSDR or by other sources, such as state public health agencies, of the threat to public health;**

In order to evaluate the level of threat that a site poses to public health, ATSDR (Agency for Toxic Substances and Disease Registry) requires a report that describes the site and its history; lists the substances present on site and the quantity of contaminated material in different media (soil, water, air); describes the relationship between the site and such environmental pathways as groundwater, surface water, soil, sediment, and air; and provides documentation of quality control/quality assurance for supporting sample data. Similar reports can be prepared for EPA toxicologists and other public health officials so they can evaluate the degree of threat posed by a site.

(iii) **Evaluation of the magnitude of the threat;**

Evaluation is determining the actual or potential impact of a threat to public health and welfare and to the environment. To evaluate the magnitude of a hazardous materials site, all substances must be identified, their concentrations determined, and their dispersion pathways established. Then, risk can be assessed on the basis of exposure or the threat of exposure to the public and the environment.

(iv) **Evaluation of factors necessary to make the determination of whether a removal is necessary; and**

The eight criteria for a removal are set forth in Section 300.415 of the NCP. These criteria are qualitative in nature, and it is not necessary that all of them be satisfied for a removal to be initiated. The criteria are discussed below.

(v) **Determination of whether a nonfederal party is undertaking proper response.**

Research whether state and/or local agencies or the potentially responsible party (PRP) have taken action to mitigate conditions at the site.

300.410(c)(2) **A removal preliminary assessment of releases from hazardous waste management facilities may include collection or review of data such as site management practices, information from generators, photographs, literature searches, and personal interviews conducted, as appropriate.**

300.410(d) **A removal site inspection may be performed if more information is needed. Such inspection may include a perimeter (i.e., off-site) or on-site inspection, taking into consideration whether such inspection can be performed safely.**

Initial entry personnel should determine the presence of any hazards that may affect response personnel, the public, and the environment; verify existing information and obtain additional information about the site; evaluate the need for prompt action to mitigate any situation on-site; and collect information to establish safety requirements for additional personnel entering the site.

NCP Criteria For Initiating A Removal Action

Section 300.415 of the NCP sets forth the criteria for determining whether a removal action is warranted. If the site meets one or more of the criteria, a removal action may be necessary.

300.415(b)(2) **The following factors shall be considered in determining the appropriateness of a removal action pursuant to this section:**

(i) **Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;**

Determine whether the site poses a direct exposure threat. Look for evidence of children playing in or near the site. Look for evidence of people walking or riding through the area, possibly stirring up contaminated dust. Check for schools, retirement communities, hospitals or other institutions nearby with sensitive populations that may be affected by site emissions.

emissions. Explore whether contaminated runoff from the site enters nearby streams or impoundments. Look for wells in the vicinity of the site that are affected by groundwater contaminants. Determine whether the contaminants are likely to enter the food chain through biouptake.

(ii) **Actual or potential contamination of drinking water supplies or sensitive ecosystems;**

Determine whether the release affects, or has the potential to affect, a groundwater aquifer or surface waterway used for drinking water. Check for any fragile natural areas (e.g., the habitat of an endangered species; wetlands) that may be affected by contaminants from the site.

(iii) **Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;**

Determine how structurally secure containers are. Look for any signs of weathering or structural instability. Based on the condition of any containers and the quantity of material present, determine whether an uncontrolled release is an imminent threat.

(iv) **High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;**

Look for visible discoloration of the soil and for standing pools of discolored liquid. Look for any dead or dying vegetation; it may imply the presence of soil contamination that is not visible. Determine the direction of runoff.

(v) **Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;**

Determine whether precipitation can initiate a release (e.g., a lagoon overflow) or cause contaminants already released to migrate. Check for any containers that are exposed to the weather, which facilitates structural deterioration.

(vi) **Threat of fire or explosion;**

Check for any flammable/explosive substances that may be present, including any initially stable substances that may have deteriorated to the point of being explosively unstable. Check for the presence of strong oxidizers. Determine whether any incompatible substances are stored together. Examine the history of the site for incidences of accidental fire, explosion, or arson.

(vii) **The availability of other appropriate federal or state response mechanisms to respond to the release;**

Ascertain whether other federal or state agencies can provide resources to mitigate the release or threat of release.

(viii) **Other situations or factors that may pose threats to public health or welfare or the environment.**

Be alert for any other condition, in addition to the ones specifically given in the NCP criteria, that may pose an imminent threat.

Conducting a Removal Preliminary Assessment and Site Inspection

PRELIMINARY ASSESSMENT

Before site entry, the investigation team should gather and review information about site activities and the chemicals used and/or generated so that hazards can be evaluated to the extent possible and preliminary controls established to protect initial entry personnel. This preliminary evaluation should provide the following information:

- The location and approximate size of the site.
- The site history, especially waste disposal history.
- A description of the topography of the site, the number and types of structures present, and routes of accessibilty. Natural wind barriers such as buildings, hills, and storage tanks should also be identified, as well as how land surrounding the site is used.

- Descriptions of the hazardous substances known or suspected to be on site, their chemical and physical properties and associated risks.
    - An estimation of the types of changes that may have occurred on site as the result of aging, weathering, fire/explosion, and so forth. Changes include structural damage to buildings and containers, as well as chemical alteration of hazardous substances present. Any such changes may increase the risk to personnel entering the site.
- Pathways for dispersion of hazardous substances from the site. Potential pathways include the air, such biologic routes as the food chain, groundwater, surface water, and direct contact. Adjacent properties and the sensitivity of the surrounding environment should be considered.
- A description of the response activities or other tasks to be performed on site and an estimate of their duration.

Information can be obtained through a search of state and federal regulatory and enforcement records (including previously gathered U.S. EPA removal and remedial data and information from other EPA programs such as the National Pollutant Discharge Elimination (NPDES) System for water), local government records, the potentially responsible party's records (logbooks, shipping manifests, ledgers, etc.), interviews with adjacent property owners and previous site workers, and perimeter reconnaissance. If the preliminary off-site evaluation does not produce sufficient information to identify and quantify the suspected hazards, an initial site entry and characterization are performed.

SITE INVESTIGATION

During the site investigation, entry personnel should monitor the air for conditions that are immediately dangerous to life and health (IDLH) or that may cause serious harm. Such conditions include combustible or explosive atmospheres, oxygen deficiency, and the presence of airborne toxic substances that pose a high threat through skin absorption and/or inhalation. To supplement air monitoring, personnel should look on site for indicators of IDLH conditions. Indicators include dead animals, stressed vegetation, and bulging,

presence of something on site that may imply the presence of a hidden hazard; for example, the edge of one rusty drum protruding through a tangle of vines could indicate that the vines are covering a pile of drums. Personnel should also monitor for ionizing radiation and note any slip, trip, and/or fall hazards. Once the hazards on site have been evaluated and the initial safety plan revised accordingly, periodic monitoring should occur to ensure the safety of site workers during the remainder of the investigation.

It is critical that the hazardous materials on site be identified exactly to assure safe and effective field operations. Several basic clues to identification of hazardous materials include:

- Container shape and size. Distinctive container shapes are used for certain types of substances, so basic clues to the identity of a hazardous material can be gathered from the container in which it is stored. Refer to Appendix 4 for silhouettes of some containers used in the transportation, storage, and use of hazardous materials.

- Markings, placards, and labels. Identifying markings, placards, and labels, along with container shape and size, are the safest and easiest methods for determining the presence of hazardous materials. The DOT requires placards on containers used to transport 1000 pounds or more of most hazardous substances across state lines; the DOT requires placards for any amount of some particularly hazardous substances. The DOT Code of Federal Regulation, 49 CFR, gives the requirements for labeling and placarding hazardous materials within the United States. There is also a marking system administered by the National Fire Protection Association (NFPA) for fixed facility storage tanks. Refer to Appendix 5 for additional information on U.S. DOT and NFPA placards and labels.

NOTE: Remember that containers may be unlabeled or even mislabeled, either intentionally or through error. Exercise extreme caution until the presence or absence of a hazardous substance has been confirmed.

- Senses. The senses of sight, hearing, and smell can aid in the identification of hazardous materials. Sight and hearing are the safest senses to employ and are very valuable resources in determining the presence of hazardous materials. The sense of smell is potentially dangerous. Some materials are toxic at concentrations too low to be detected by smell, and other materials induce olefactory fatigue, so workers cannot distinguish increased concentrations. Generally, standard operating procedures state that if a worker is close enough to smell a substance, the worker is too close.

Qualitative Hazard Recognition

Qualitative hazard recognition, the realization that a hazard actually exists on site, is the most crucial part of a removal site investigation. This section contains a general checklist of questions, pertinent to every site, to provide guidance in qualitative hazard recognition. Following the general checklist is a series of drawings of specific conditions that may not occur at every site. When they do occur, these conditions require a thorough evaluation, so a detailed checklist follows each drawing. This section concludes with a modified map of an actual site. A checklist follows the site map.

Use of the general checklist should give each project manager or inspector an idea of whether a removal may be warranted and provide background information about the site. The checklists associated with the drawings should be used in making a more detailed assessment of specific hazards.

The purpose of each checklist is to direct the thinking of site investigators; the checklists are guides, not all encompassing field lists that address every condition that may be encountered.

General Hazard Recognition Checklist for Each Site

- Key Points and Potential Hazards -

1. **Note any indicators of potential exposure to hazardous substances:**
   - Dead fish, animals or vegetation.
   - Dust or spray in the air.
   - Fissures or cracks in solid surfaces that expose deep waste layers.
   - Pools of liquid.
   - Foams or oils on liquid surfaces.
   - Gas generation or effervescence.
   - Deteriorating containers.
   - Cleared land areas or possible landfilled areas. See detailed checklist on page 29.
   - Anything that appears unusual, out of the ordinary, for whatever reason.

2. **Note the types of containers, impoundments, or other storage systems:**
   - Paper or wooden packages.
   - Metal (stainless steel, lead, etc.) or plastic barrels or drums, concrete storage containers. The composition of the container can be a clue to the contents.
   - Underground tanks.
   - Aboveground tanks.
   - Compressed gas cylinders.
   - Pits, ponds, or lagoons.
   - Other.
   - See detailed checklist on page 24, 27, 32, and 34.

3. **Note the condition of waste containers and storage systems:**
   - Structural soundness.
   - Visibly rusted or corroded.
   - Leaking or bulging.
   - Types and quantities of materials in container(s).

- Types and quantities of materials in container(s).

- Container labels indicating corrosive, explosive, flammable, radioactive, toxic, or biologically pathogenic material.
- Presence or absence of secondary containment, such as a berm.

4. **Note the physical condition of materials on site:**
   - Physical state: gas, liquid, or solid.
   - Color and turbidity.
   - Behavior, e.g., corroding, foaming, or vaporizing.
   - Conditions conducive to splash or contact.

5. **Identify features of the land and natural wind barriers:**
   - Buildings, large aboveground storage tanks.
   - Hills.
   - Rows of trees.

6. **Determine the potential pathways of dispersion:**
   - Air.
   - Surface water.
   - Groundwater.
   - Land surface (direct contact).
   - Biologic routes such as plants and animals affecting the food chain.

7. **Note any safety hazards. Consider:**
   - Condition of site structures.
   - Obstacles to entry and exit.
   - Homogeneity of the terrain.
   - Stability of the terrain.
   - Stability of stacked material.

8. **Identify any reactive, incompatible, flammable, or highly corrosive wastes. How are they stored?**

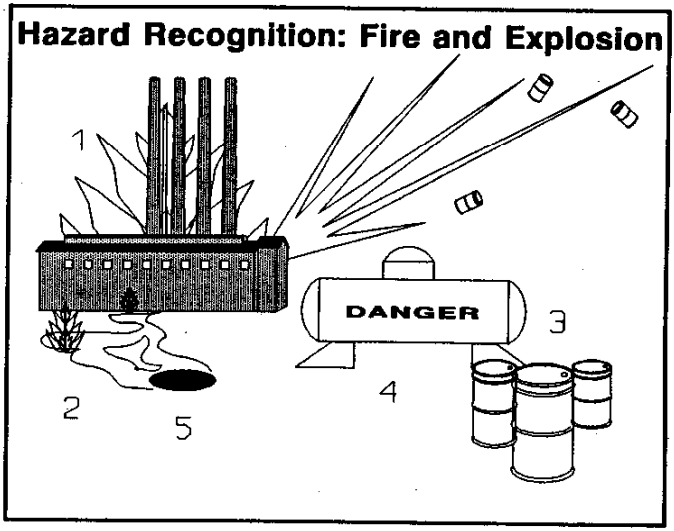
9. **Note the presence of any naturally occurring potential skin irritants or dermatitis-inducing agents or of any potentially hazardous animals. For example:**
   - Poison ivy, poison oak, and/or poison sumac.
   - Poisonous snakes.
   - Stray dogs.

10. **Note any tags, labels, markings, or other identifying indicators.**

11. **If warranted, use one or more of the following investigative techniques to locate buried wastes or contaminant plumes:**
   - Electromagnetic resistivity.
   - Seismic refraction.
   - Magnetometry.
   - Metal detection.
   - Ground-penetrating radar.

12. **Collect samples from:**
   - Air.
   - Drainage ditches.
   - Soil (surface and subsurface).
   - Standing pools of liquids.
   - Storage containers.
   - Streams and ponds (upgradient, at suspected source, and downgradient).
   - Groundwater (upgradient, beneath site, downgradient).

13. **Sample for or otherwise identify:**
   - Biologic or pathologic hazards.
   - Radiologic hazards.



Fire/Explosion Scene Checklist

- Key Points and Potential Hazards -

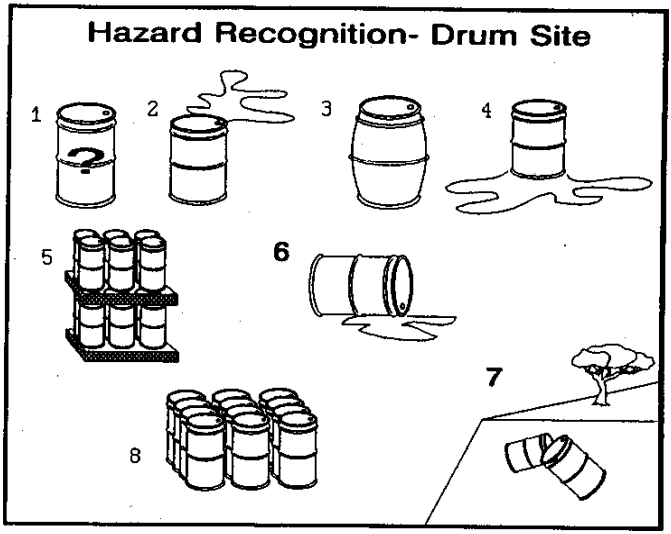
1. **Damaged Structure**
   - Unstable structures may pose physical hazards.
   - Debris increases the risk of slip, trip, fall hazards.
   - Fire often causes friable asbestos to become airborne.
   - Smoke from even simple structure fires may contain many toxic chemicals.

2. **Contaminated Runoff**
   - Runoff of water used to treat a fire will often be contaminated with chemicals released during the incident.
   - The water may cause adverse reactions with reactive or unstable chemicals.
   - The water may also be contaminated with combustion byproducts of chemicals stored or used at the facility.

3. **Drum Storage**
   - Determine whether the drums have been impacted by either the fire, water, or chemical foam.
   - Do the drums seem stable or stressed by heat or pressure?
   - Can any special hazards be noted from visible label information?
   - Note any physical damage caused by heavy equipment.
   - Research the toxicity and physical properties of chemicals expected to be present.

4. **Bulk Storage**
   - Determine whether the containers have been affected by either the fire, water, or chemical foam.
   - Do the containers seem stable or stressed by heat or pressure?
   - Are the pressure relief systems intact and actively venting?
   - Are primary and secondary containment structures available and stable?
   - Research the toxic and physical properties of chemicals expected to be present.

5. **Drains**
   - Look for storm, sanitary sewer, and process water drains in the area.
   - Are drain outfalls directed to a stream, river, or other sensitive area?
   - Are drains connected to sump pits or other potential containment areas?
   - Can drains be utilized for containment or blocked for protection if necessary?



Drum Site Checklist

- Key Points and Potential Hazards -

1. **Unknown Drums**
   - Do not make assumptions regarding the safety of drum contents until positive identification can be made; labels may not reflect the actual drum contents.
   - Shaking drums to determine whether empty or not can initiate adverse reaction.
   - Seemingly empty drums can still contain toxic residues.
   - Determine materials drums are made of, e.g., fiber, stainless steel, aluminum, poly, lead. These materials may give clues to the nature of the contents and the associated hazards.
   - Drums containing incompatible substances may be found together. If the drums are leaking, they may pose a fire/explosion threat.

2. **Vapor Release**
   - Not all vapors are visible. Look near bung holes for air movement similar to heat waves.
   - Respiratory protection is critical to cover inhalation and ingestion exposure routes.
   - Determine if vapors can be confined and concentrated due to the nature of the surrounding area or structures.

3. **Bulging Drum**
   - Determine if bulging is caused by pressure buildup or thermal expansion/contraction.
   - Bulging drums should never be opened by hand. A remote drum punch can open the drum and relieve the pressure.

4. **Leaking Drum**
   - Contain leakage in place or block off any drains.
   - Use pH paper to determine if the leaking material is corrosive.
   - Any visibly stressed vegetation may indicate toxicity.
   - If a smoking, fuming, or bubbling reaction is evident, it may indicate reactivity.

5. **Drum Tiers**
   - Uneven stacking or corroded pallets/drums can present a physical hazard.
   - Leaking drums on an upper tier can present a chemical hazard above the worker's head.
   - Wooden pallets do not constitute a chemical barrier to prevent leaks from mixing and can pose a fire hazard in the presence of oxidizers.

6. **Tipped Drum**
   - If a tipped drum is leaking from the bung, setting the drum upright or rolling it so the bung is upright can eliminate the problem.
   - A leak underneath the drum may not be visible; look for clues such as discolored soil and stressed vegetation.

7. **Buried Drums**
   - An uneven or disturbed soil surface may indicate buried objects.
   - Drum heads often rise and break through the soil surface after burial.
   - Caution should be exercised when using heavy equipment in areas that have or are suspected to have buried drums.
   - An excavated drum may not be structurally sound due to container deterioration.
   - Data obtained from soil gas testing, magnetometer surveys, and x-ray fluorescence may indicate the presence of buried drums.

8. **Packed Drums**
   - Do not assume that inner drums in a tightly packed area of drums contain the same chemical as the accessible drums, or that the contents are compatible.
   - Large amounts of chemicals can pool beneath and between the packed drums.
   - It can be extremely difficult to identify and handle, or even to reach, a leaking or fuming drum within the pack.