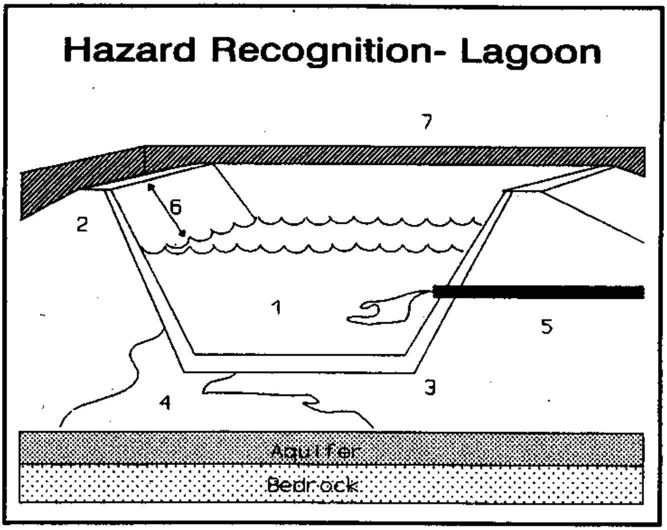


Lagoon Checklist

- Key Points and Potential Hazards -

1. **Lagoon**
   - Document whether the lagoon is permitted or unpermitted.
   - Determine the toxic and physical properties of the chemicals present in the lagoon.
   - Note any stained soil or dead/dying vegetation in the area of the lagoon.
   - Monitor for any air emissions in the vicinity of the lagoon.
   - Characterize all layers of the lagoon - both liquid and solid layers.
   - Check records for previous monitoring analysis of the lagoon contents.
   - Research the hydrogeology of the area and the location of the water table with respect to the lagoon.

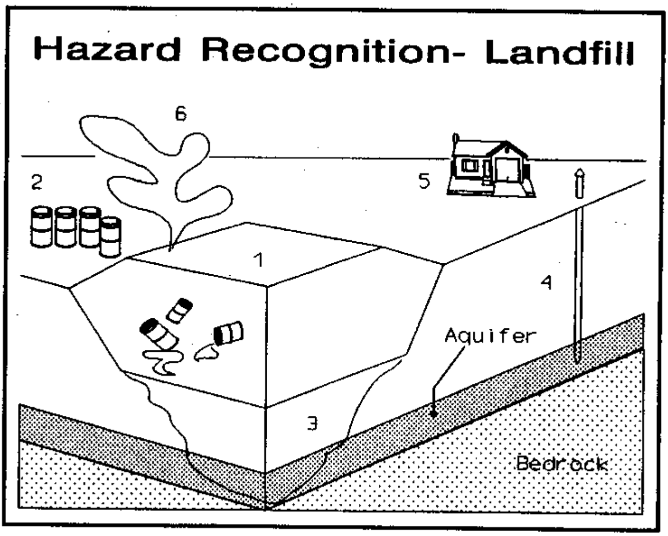
2. **Containment Structure**
   - Note the stability of the berm construction.
   - Document whether secondary containment is available in the event of failure.
   - Document any seepage through the berm.
   - Check whether the containment structure is adequately engineered to withstand normal stresses and strains.

3. **Liner**
   - Check for a lagoon liner.
   - Determine whether the construction materials of the liner are compatible with the contents of the lagoon.
   - If possible, determine whether the liner was installed by professionals.

4. **Leachate**
   - Determine what types of chemicals can be expected to leach from the lagoon. Determine whether direct contact is a threat with any surface leachate seeps.
   - Determine whether surface seeps affect any surface waters, and whether a leachate pathway to a local aquifer is available.

5. **Drainage**
   - Identify all sources of drainage into the lagoon.
   - Identify all sources of drainage out of the lagoon.
   - Determine whether the lagoon liquid level rises or falls at unexpected times.
   - Determine whether sufficient freeboard is available to prevent overflow of the lagoon under heavy precipitation.

6. **Access Control**
   - Access should be restricted by a fence or other barrier.
   - Look for any evidence of trespassers around the lagoon.
   - Look for evidence of children playing in the vicinity of the lagoon.



Landfill Checklist

- Key Points and Potential Hazards -

1. **Landfill**
   - Document whether the landfill is permitted or unpermitted.
   - If permitted, document materials that are allowed.
   - Document the history of disposal practices.
   - Determine whether the landfill is lined or unlined.
   - Look for evidence of illegal dumping or of dumping that is inconsistent with accepted practices.
   - Research the hydrogeology of the area and the location of the water table with respect to the landfill.
   - Research the toxic and physical properties of the chemicals present.

2. **Staging Area**
   - Check for the presence of hazardous materials that are staged for disposal.
   - Look for such surface contamination as stained soil or dead/dying vegetation in the staging area.
   - Document whether access to the staging area is restricted by fencing or other barriers.

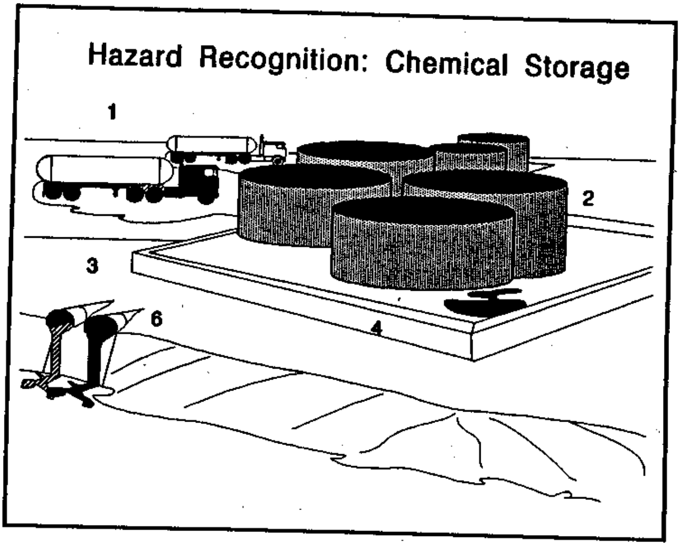
3. **Leachate**
   - Determine the types of chemicals that can be expected to leach out of the landfill.
   - Identify any pathways for leachate to local aquifers.
   - Determine whether any surface leachate seeps pose a direct contact threat.
   - Look for surface seeps that may affect surface waters.

4. **Wells**
   - Document any monitoring wells in the area.
   - Note any drinking water wells in the area.
   - Research any sample information (both past and present) that may be available for nearby wells.
   - Determine whether the state has more stringent or less stringent water quality criteria than does EPA.

5. **Community Access**
   - Look for evidence of trespassers onto the landfill.
   - Look for children's play areas in the migration pathways of leachate.
   - Find out if the community is aware of any actual or potential hazards posed by the landfill.
   - Determine whether access to the landfill can be sufficiently restricted using signs or barriers.

6. Air Emissions

- Determine whether air emissions are controlled at the landfill.
- Check for emissions that can be detected with monitoring instruments.
- Determine whether prevailing winds carry contaminants into sensitive populations or environments.



Chemical Storage Checklist

- Key Points and Potential Hazards -

1. **Transfer Points**
   - Determine whether bulk chemical transfer was performed on a concrete pad or over soil/gravel.
   - Look for any stained soil and stressed vegetation.
   - Was vehicle decontamination performed? How were decontamination agents disposed of?
   - Note the condition of pipes/hoses, fittings, valves, and joints.

2. **Containers**
   - Determine whether containers are filled or empty.
   - Is the container structure compatible with the stored chemical, if the contents are known?
   - If the contents are unknown, do the composition and structure of each container give clues to the contents and their associated hazards?

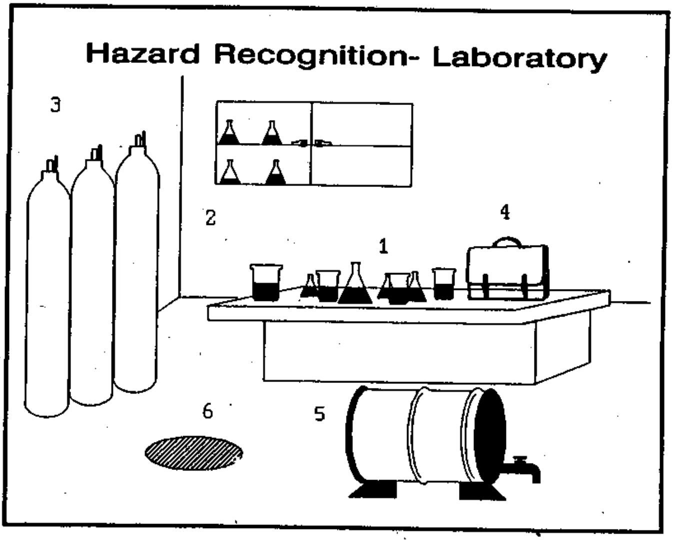
- Look for such indicators of structural instability as weak welds, bulging panels, missing rivets, and so forth.
- Are access portals intact; can any leakage be observed?
- Can the containers be expected to remain intact until remedition is complete?

3. **Chemical Types**
   - Research the toxic and physical properties of the stored chemicals.
   - Do signs or markings on the containers provide clues to potential dangers?
   - Are incompatible chemicals stored adjacent to one another?
   - Do the stored chemicals have the potential to degrade into a more hazardous form?

4. **Secondary Containment**
   - Calculate whether the containment volume is sufficient to hold the contents of the largest primary container plus freeboard.
   - Determine whether the containment structure is compatible with the chemicals present.
   - Is the containment structure totally enclosing, with four walls and a floor?
   - Look for any breaches, whether intentional or otherwise, present in the secondary containment structure.
   - Look for any drains present in the structure.

5. **Spill History**
   - Determine whether spills were frequent during past operations.
   - Do past spills have the continuing potential to migrate off site?
   - Have spills compromised the structures of either the primary containers or the secondary containment structure?

6. **Drainage**
   - Determine whether the secondary containment structure is designed to allow for drainage of rainwater.
   - Are drainage areas directed to sumps, to a treatment plant, or to the environment?
   - Can the drains be blocked or otherwise closed?



Laboratory Checklist

- Key Points and Potential Hazards -

1. **Unknown Chemicals**
   - Over time, chemicals can degrade into different, more hazardous forms.
   - Older labs may have used obsolete nomenclature, so labels and papers may be confusing.
   - Often, handwritten labels may be incorrect.
   - Packages may become unstable over time.
   - Incompatible chemicals may be stored in close proximity.
   - Instruments and tubing may still contain chemicals and chemical residues.

2. **Shock Sensitive Chemicals**
   - Many chemicals, such as ethers, are peroxidizable and so can become explosively shock sensitive over time.

- Shock sensitive chemicals can be detonated by falling off a shelf or by the shear force generated by turning the cap. Some chemicals can violently decompose spontaneously.
- Many common lab chemicals such as picric acid can, over time, become shock sensitive.

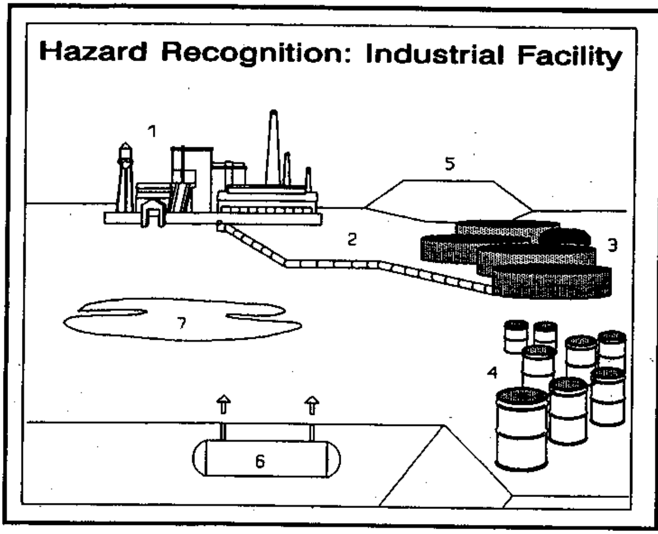
3. **Cylinders**
   - Cylinders can contain either liquids or gases.
   - They can be constructed for high pressure or low pressure use.
   - Color coding is manufacturer specific and is not common to the industry.
   - Cylinders can hold extremely toxic or corrosive materials.
   - They should only be examined and moved by experts.
   - Structural instability is not always visible from the exterior.

4. **Unknown Packages**
   - Chemicals can be present in a variety of packaging, apart from the common flasks and glass bottles.
   - Acid carboys are sometimes shipped in cardboard boxes or wooden crates.
   - Radioactive materials can be shipped in metal flasks or small boxes.

5. **Drums**
   - Laboratories occasionally maintain chemicals in larger containers, such as 55-gallon drums.
   - Larger volume chemicals would typically be caustic cleaners or solvents.
   - These drums commonly rest on their sides, incorporate spigots, and have a high potential for leakage.
   - Note the condition of the floor under any drums.

6. **Drains**
   - Often, chemicals have been washed into floor drains.
   - Determine whether drains are connected to sump pits or other potential containment areas.
   - Pools of chemicals may accumulate in sumps.

- Incompatible chemicals may generate toxic gases in drains, sumps, or drain lines.
- Outfalls for these drains should be examined for signs of contamination.
- Are drain outfalls directed to a stream, river, or other sensitive area?



Industrial Facility Checklist

- Key Points and Potential Hazards -

1. **Facility**
   - Evaluate the structural stability of the building(s).
   - Document whether asbestos or nonasbestos insulation was used.
   - Document whether PCB or non-PCB transformers were used.
   - Document whether process units are filled or empty, pressurized or nonpressurized.
   - Note the presence of raw materials, byproducts, and wastes in addition to chemical products.
   - Obtain the history of operations, past disposal practices, and chemical spills.

2. Pipelines

- Note the structural stability of interior pipe racks and exterior feed pipes.
- Document whether asbestos or nonasbestos insulation was used.
- Note the compatibility of chemicals and pipe construction materials.
- Document whether pipelines or other types of tubing are filled or empty.
- Note the condition of valves, fittings, joints and so forth.
- Research the toxicity and physical properties of chemicals known to be used at the facility.

3. Bulk Storage Tanks

- Evaluate the structural stability of the outer skin and document any signs of physical or chemical deterioration.
- Document whether tanks are connected or disconnected to feed pipes.
- Document whether tanks are pressurized or nonpressurized, insulated or noninsulated.
- Note the condition of valves and fittings.
- Note the presence of additional heating or cooling systems to keep contents at a steady state.
- Research the toxicity and physical properties of stored chemicals.

4. Drum Storage

- Note the age of drums.
- Document whether drums are sheltered or exposed to the elements.
- Look for any signs of deterioration or stress.
- Look for any visible label or placard information.
- Look for any visible stencilled or handwritten information.
- The drum shape may potentially indicate the contents (i.e., acid carboy for corrosives or fiber drum for solids).
- If drum is bulging, determine whether bulging is due to built-up pressure or to thermal expansion/contraction.
- Document whether drums contain pure chemicals or waste materials.

- Look for any standing discolored water, stained soil, or stressed vegetation, any one of which may indicate spillage.
- Research the toxicity and physical properties of stored chemicals.

5. **Landfill**
   - Determine whether the landfill is permitted or unpermitted.
   - If permitted, document the materials known to be present.
   - Research the past history of disposal practices.
   - Determine whether the landfill is lined or unlined.
   - Research the hydrogeology of the area and where the water table lies with respect to the landfill.
   - Are there any monitoring or drinking water wells in the area?
   - Research the toxicity and physical properties of chemicals present.

6. **Underground Storage Tank**
   - Note the age of tank.
   - Obtain the maintenance history.
   - Research the hydrogeology of the area; note the location of the water table.
   - Note the condition of exterior fittings.
   - Note any seepage in the surrounding area.
   - Research the toxicity and physical properties of stored chemicals.
   - Document whether the tank is double lined or has cathodic corrosion protection.
   - Look for evidence of frequent overflows.

7. **Lagoon**
   - Note the stability of berm construction.
   - Determine whether there is sufficient freeboard to avoid overflow.
   - Is the lagoon lined or unlined?
   - Research the toxicity and physical properties of chemicals present.
   - Research the hydrogeology of the area; where does the water table lie with respect to the lagoon.

- Is secondary containment available?
- Note any standing discolored water, stained soil, or stressed vegetation in the area.
- Note any seepage through the berm.

What's Wrong With This Picture?

The map on page 42 is a modified version of a map of an actual removal site. Look at the map in terms of the hazard recognition checklists, pick out the hazards, then rank them according to degree of threat to the site investigation team. What immediate threats does the site pose to the environment and to the health and welfare of any residents nearby? What long-term hazards are at the site? What clues to the level of threat should the investigation team look for on site?

BACKGROUND

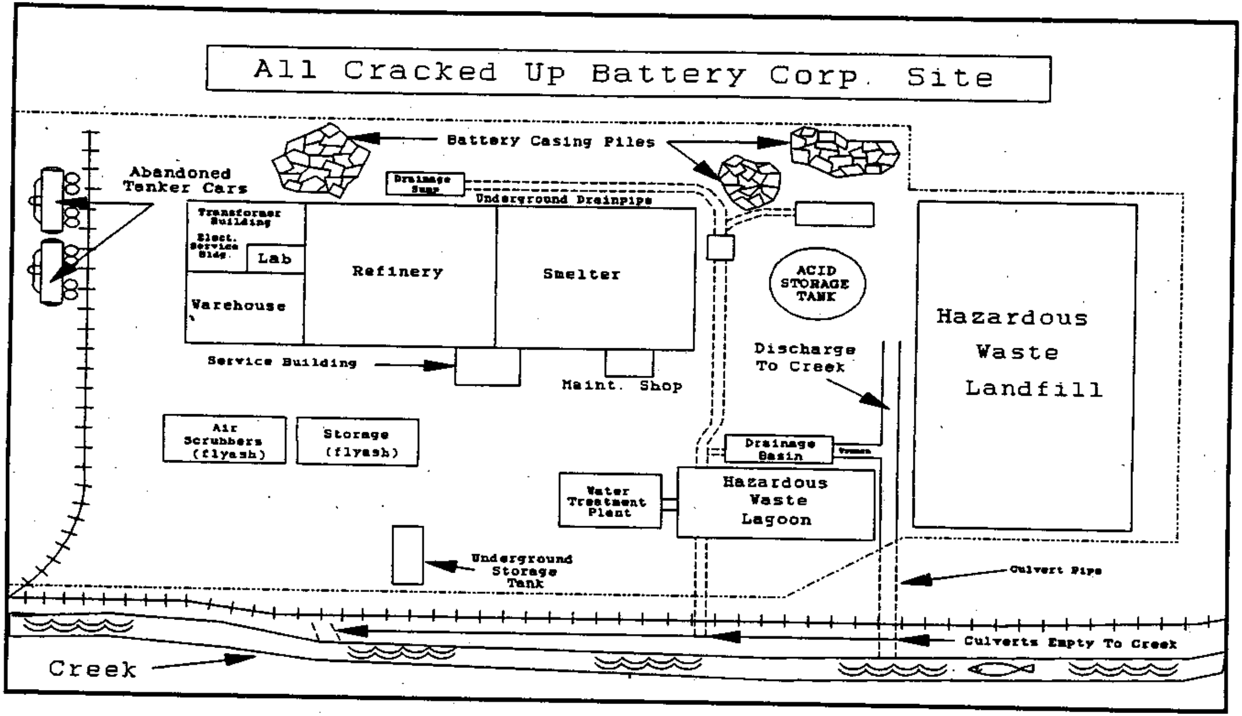
The All Cracked Up Battery Corp. smelted and refined lead extruded from used batteries to produce lead ingots. The facility operated for 10 years until it went bankrupt and was abandoned two years ago.

All Cracked Up received spent batteries of all sizes and had them dumped on a concrete pad to drain the acid. Battery acid and contaminated runoff from the pad were collected in a sump and then directed into a hazardous waste lagoon. After the acid was drained, the batteries were transported from the dumping area to a hammermill, where they were crushed for materials separation and cleaning. Wastewater from the cleaning process was collected in a sump and directed to the lagoon. After separation of plastics and other unrecyclable materials, the metal component of the batteries was smelted then refined. Emissions from smelters were scrubbed using a lime slurry and liquid from the lagoon. Residue from the scrubbing process was placed in a landfill on site. Emissions from the smelters and refinery were also fed through a bag house. The fly ash generated from this process was stored in a building on site. The fly ash contained heavy metals in the three percent concentration range.

Crushed battery casings from the hammermill were left in piles throughout the portion of the site north of the operations building and in the hazardous waste landfill along the east boundary fence. Surface runoff from the piles of battery casings was collected in a sump and directed to the lagoon, resulting in the migration of small battery casing chips into the sumps, drainage lines, and the lagoon itself.

The lagoon was treated with lime to neutralize its contents. Liquid from the lagoon passed into the water treatment plant, where it was treated with flocculants to remove heavy metals. The precipitates were disposed of in the landfill. The treated water was discharged into a nearby creek.

A site inspection by state officials revealed the presence of a trench between the collection sump and a drainage ditch, which facilitated the bypassing of the lagoon during periods of heavy surface runoff. Battery casing chips were found throughout the course of the drainage ditch and the creek downstream of the site.



All Cracked Up Battery Corp. Site
Battery Casing Piles
Abandoned Tenker Cars
Drainage Sump
Underground Drainpipe
Transformer Building
Elect. Service Bldg.
Lab
Warehouse
Refinery
Smelter
ACID STORAGE TANK
Service Building
Maint. Shop
Discharge To Creek
Hazardous Waste Landfill
Air Scrubbers (flyash)
Storage (flyash)
Drainage Basin
Water Treatment Plant
Hazardous Waste Lagoon
Underground Storage Tank
Culvert Pipe
Culverts Empty To Creek
Creek

Piles of battery casing chips

- What types of residues can you expect to be on the chips?
- Relate these residues to past industrial activities.
- How hazardous are these residues?
- Is there any evidence that residues on these chips are migrating from the piles, into the sumps, or off site?
- How will extensive rainfall affect these piles?
- Is there vegetation around the piles; if so, in what condition is it?
- Is there any means by which persons could gain access to these piles, especially children?

Drainage sumps and underground drainpipes

- Runoff from the piles of battery casing chips flows to several drainage sumps and then into an underground drainpipe system. Is there standing water around the sumps?
- If so, is the water discolored and/or cloudy? Perform a pH test using pH paper.
- Are the drainpipes clogged?
- Where can surface runoff be expected to pool?
- Do winds generate excessive dusts in areas where water can collect? Dusts are most likely contaminated.

Liquid waste storage tank

- This container holds unknown waste material.
- Is there secondary containment around the tank? If so, is it sufficient to hold the contents of the tank?
- In what condition is the tank; is it corroded; does there appear to be structural instability?
- Is there evidence that the tank leaks?
- Is there stressed vegetation or discolored soil around the tank?
- If there is standing water near the tank, test it with a strip of litmus paper.
- Are there process lines to and from the tank? Perhaps they are underground. The lines may contain chemicals and chemical residues.
- Apply the checklist beginning on page 32 to help determine the hazards posed by the storage tank.

Hazardous waste landfill

- Is the landfill lined or unlined?
- Is there evidence of leachate seepage?
- If so, what color is the seepage; is it cloudy?
- How does the seepage test with pH paper?
- Is there access for liquids (precipitation) into the landfill?
- Did the company dispose of hazardous liquids in the landfill?
- Evaluate company records; remember that these may be deliberately incorrect.
- Is the landfill secure? Be sure that curious persons, particularly children, can not gain access.
- Use the checklist beginning on page 29 to help determine the hazards posed by the landfill.

Drainage basin and hazardous waste lagoon

- Are the drainage basin and lagoon each lined or unlined?
- How much freeboard does each one have?
- Are the process lines into each free of debris?
- Is there evidence that one or both impoundments has overflowed in the past?
- Is there standing water in the overflow trench?
- If so, what does the water look like; how does it test with pH paper?
- Are there battery casings in the overflow trench?
- Apply the checklist on page 27 to the drainage basin and lagoon.

Underground storage tank

- Note the presence of seepage along the banks of the creek, which may be indicative of a release from the storage tanks.
- Review company records. What type of fuel did the facility use? Where and how was it stored, transported and burned?
- Refer to the discussion on page 37 about chemical production facilities for additional hazards posed by USTs.

Air scrubbers and flyash storage

- Ensure that access to flyash storage is secure, particularly from curious children.
- Evaluate all piping, process lines and machinery for residual materials.
- Note the locations of drainage sumps and treatment tanks.
- Do winds generate excessive dusts? Dusts are most likely contaminated.

Abandoned tank cars

- These should be treated like storage tanks containing unknown chemicals.
- Look for any markings or placards on the outside of the cars that may indicate what they contain.
- Refer to Appendix 1 for silhouettes of railcars in order to determine what they may contain, e.g., pressurized gas, corrosive materials, etc.
- After identification, are incompatibles next to each other?
- Are the cars structurally sound and uncorroded?
- Do they appear to be leaking? Check ditches, puddles and culverts adjacent to tanks. Do they contain free-standing liquid? Test with pH paper.
- Apply the checklist beginning on page 32 to the tank cars.

Warehouse

- Locate drainage sumps, process lines, and utilities.
- Be aware of contaminated surfaces.
- Spent/old machinery poses additional hazards, e.g., laceration.
- Is the building properly ventilated? Be aware of confined space entry hazards.
- Are materials stored in the warehouse? Identify materials if possible.
- Are incompatibles stored next to each other?
- Ensure that the building is structurally sound and that adequate lighting is available.
- Watch for slip, trip, and fall hazards.

Refinery/Smelter

- Ensure that the building and large equipment (kettles, cranes, hammermill) are structurally sound.
- Locate process lines and utilities.
- Most surfaces in this area will be contaminated.
- It is likely that the atmosphere in this area is also contaminated. Watch for confined space entry hazards.
- Watch for slip, trip and fall hazards.

Service Building/Maintenance Area

- Look for chemical hazards, e.g., cleaning agents, degreasers and associated solvents, stripping agents, lubricants, etc.
- Check for storage of incompatible materials.
- Old machinery is a potential source of injury.
- Most surfaces in this area will be contaminated.
- Note the presence of gas cylinders.
- There may be a fire and explosion threat, particularly in areas with low ceilings and confined spaces.

Facility

- Thoroughly evaluate company records to be sure of industrial processes and all materials involved.
- Because this facility was involved in metals analysis and recycling, it is possible that industrial radiography may have been used. Look for radiation symbols; scan with rad meter if possible.
- How structurally sound is the building?
- What is the condition of the transformer room? Is there evidence of spilled oil which could contain PCBs?
- What is the condition of the lab? Apply the checklist beginning on page 34 to the lab.
- How secure is the facility? Is there any evidence of entrance to the facility, e.g., vandalism, children playing?

Topographics

- Is the site upgradient or downgradient to established surface water flow patterns?
- Does surface water flow through the site?

- Consult a hydrologist for groundwater concerns.
- Are there waterways nearby which may be affected?

Demographics
- What is the prinicipal use of the land immediately adjacent to the site?
- How close is the nearest residence?
- Is there a possibility for off-site migration of contaminants to residential property?
- Are there any sensitive populations nearby, particularly children and the elderly?
- Does this site have the potential to affect the water supply of nearby residents?
- Are there any heavy use areas nearby, e.g., schools, industry, hospitals, shopping centers, farming, recreational areas, convalescent homes?
- Is there any other local industry which may have contributed to problems with this site?

After thoroughly evaluating all known aspects of the site, it is necessary to make a preliminary judgment about the degree of threat posed by this facility. At many sites, the conclusion will often be that the facility does pose a threat, but the threat should be thoroughly characterized to determine whether the site qualifies as a candidate for an immediate action, or if the site is secure enough to wait for a long-term cleanup. Assistance in these decisions can be provided by review of the NCP. If the All Cracked Up Battery Site, or another site, meets any of the criteria in the NCP for a removal action, then site conditions may be considered an emergency situation. Emergency situations do not always involve the classic fire and explosion, or oil spill. Frequently, emergency actions involve the stabilization of time critical threats until the non-time critical threats associated with the site can be addressed. Further assistance in emergency determination for a facility such as the one pictured here can be obtained through consultation with any of the Section Chiefs and On-Scene Coordinators (OSCs) in the Removal Branch.

Additional Guidance Documents

EPA (U.S. Environmental Protection Agency). 1990. "Superfund Removal Procedures Manual," OSWER Directive 9360.3-01. Office of Solid Waste and Emergency Response. Washington, DC. December.

EPA. 1992. "Guidance for Performing Site Inspections Under CERCLA." Office of Emergency and Remedial Response. Washington, DC. September.

EPA. 1991. "Removal Program Representative Sampling Guidance," Volume 1-Soil, PB892-963408. Office of Emergency and Remedial Response. Washington, DC. November.