

Generator Control

Areas inspected must be under the control of the Principal Investigator, with only his/her waste being accumulated at or near the point of generation. No one else has waste, including abandoned materials, in that specific location. Wastes generated in areas under the control of more than one PI should be maintained separately. Wastes from intra-connected rooms under the control of the Principal Investigator may be acceptable, while those from “down the hall” are not, even when from the same PI. EPA may consider chemicals that are improperly stored, degraded, or in degraded or contaminated containers to be waste (abandoned by neglect). Consider waste may pass through only one doorway from point of generation to point of accumulation.

Corrective actions: It must be clear who is responsible for work areas, or where wastes are coming from. Implement appropriate controls to ensure areas and wastes are under control of the Principal Investigator, and wastes are accumulated at or near the point of generation.

Orderly Work Area

There should be a “reasonable” amount of clear work space where chemicals are dispensed, handled, or used, including reactions/equipment in fume hoods and initial waste accumulation areas. Combustible materials (e.g., paper, chemicals) are away from electrical outlets, ventilation panels on equipment, etc. Work areas should use good housekeeping practices.

Corrective actions: Remove excessive clutter (papers, dirty glassware, and assorted “junk”) to allow for a safer and more accessible work area. Appearance or perception issues have some basis in regulatory interpretation and applicability, and may include housekeeping practices and operational indicators such as:

- Clean secondary containment pans;
- Residual contaminants may appear as film or stain on containers;
- Inks that “run” or “bleed” may be indicative of solvent contamination;
- Residues in reaction vessels may be regarded as wastes, possibly leading to open container and identification issues; and
- Inherent wastes, such as abandoned materials (e.g., professor leaves and no one assumes immediate responsibility for materials) or old chemicals in deteriorating condition or containers.

Contaminated surfaces, whether containers, countertops, or containment systems, are indicative of a release (spill or leak) that has not been cleaned and may therefore pose an unnecessary risk to persons or the environment.

Aisle Space

Under EPA regulations, aisle space must be sufficient to allow unobstructed movement of emergency personnel and equipment to any area to contain or control fires or spills. In general, this is understood to be a minimum of approximately 30 inches. Work areas will typically be cited if they have less than 24 inches of aisle space, or if equipment must be moved to provide sufficient access.

Corrective actions: Ensure sufficient aisle space throughout work areas, or sufficient notice of how access may be made by emergency personnel around obstructions. Emergency personnel should not be expected to move heavy equipment, climb over tables, or crawl under equipment.

Container Selection

Containers must be suitable for their contents, including appropriate closures. Liquids are accumulated in narrow-neck screw-capped bottles, carboys, or drums. Collapsible containers for liquids must be in rigid outer packaging. Solids may be accumulated in wide-mouth screw-capped bottles, sturdy bags, boxes, or drums. No staining of boxes (indicative of leak or potential defect). Corrosives should be in plastic or glass (hydrofluoric acid in plastic only, nitric acid in glass only). Flasks, beakers, and other lab glassware are typically inappropriate for waste accumulation because they cannot be properly closed, or have rounded bottoms (cannot stand without support).

Corrective actions: Ensure containers and their closures are appropriate and compatible.

Container Handling

Containers, including hazardous articles such as fluorescent lamps, must be managed in a manner that minimizes the potential for breakage, spills, or leaks. Lamps must be in boxes that meet container management requirements. Containers should not be stacked when filling. Containers should not be handled or stored in such a way that a release or spill may occur.

Corrective actions: Ensure containers and hazardous articles are stored safely, and potential spills are minimized and contained.

Closed Containers

Containers must be kept closed except when adding or removing material. Parafilm or similar material does not satisfy requirements for closure. Funnels must be of a specific design (fixed lid that ensures closure, funnel secured to container) if they are to remain in a container. Although empty bottles may be allowed to dry, it is not acceptable to minimize wastes by venting them in a fume hood. Collection bottles connected to lab equipment, such as waste bottles for HPLC's or GC's, must be disconnected and closed or have the drain line reasonably fitted and secured to the bottle. The opening should not be more than is necessary to provide venting when equipment is operating. For example, a half-inch opening may be considered too large for a quarter-inch outside diameter drain line.

Corrective actions: Ensure containers are kept closed with appropriate closures (caps, bungs, etc.), opening them only when adding or removing wastes. Some lab processes warrant keeping the container open for an extended period, which may be acceptable only if attended (person must be in close proximity to the container, with container in plain view, and not conducting extensive activities that would distract his attention from the waste container).

Filling of Containers

Containers must have at least 10% head space to allow for thermal expansion.

Corrective actions: Ensure bottles/carboys are not filled over the "shoulder" of the container (where the curvature starts to become more horizontal). A minimum of one inch head space is required for five-gallon cans or drums. Three inches is required for 55-gallon drums.

Secondary Containment

Secondary containment is the use of device to minimize the uncontrolled release of material. This may be a tray or pan, dike or berm, or similar open containment system where waste is initially accumulated (poured into a container). We recommend a simple system to collect incidental spills that may occur while adding waste based on the presumption that small containers will have small volumes added at a time, while large containers will have relatively large volumes added at a time. Minimum requirements should be considered as:

- Containers up to 4 liters capacity may use a shallow tray (cafeteria-type), without regard to cumulative capacity (not practical to have more than four 4-liter bottles on a tray).
- Containers up to 15 gallons capacity may be in a shallow pan (sides typically 1-4 inches high, depending on size of pan relative to size of container). The larger the container, the greater the recommended containment capacity.
- A dike, curbing, or berm of sufficient height to minimize the potential for liquids to enter a sink or drain.
- Secondary containment is not required where labs/shops store full containers unless there are floor drains or a spill is likely to flow out of the room. In this case, secondary containment should be the greater of 100% of the largest or 10% of all containers within the system.

Corrective actions: Secondary containment needs to be provided for liquid wastes, especially in areas where wastes are poured into containers. EHSC can provide assistance, through departmental offices, by providing a limited number of trays or pans for containers up to 5 gallons capacity where they are not currently available.

Clean Containers

Containers, including secondary containment systems, should be reasonably clean, preferably with no visible outside contamination. Stains, ink runs, and other indicators of “wastes not getting into the container” may attract attention, and should be justified as to materials that caused the problem and what was done to clean or remove the hazard.

Corrective actions: Containers are usually contaminated by spills that occurred while adding wastes. Review filling procedures, and ensure appropriate equipment and materials are available for this activity.

Container Markings

Container markings should clearly indicate the container contents. Containers must be marked with the words “Hazardous Waste”, or “Waste (chemical/process name)”, or similar words that identify the contents. The one exception to this is that oil must be marked as “Used Oil” when determined to be for discard. Batteries, fluorescent lamps, and other universal wastes are labeled “Universal Waste” and the accumulation start date is recorded on the box or individual item. It is not acceptable to simply mark a location designated for a particular type of waste without also marking the container. Original container labels must be defaced if containers are used for collecting waste or other materials.

Corrective actions: Ensure oils for discard are marked “used oil.” Ensure all other containers are clearly marked with the words “Hazardous Waste” or “Waste (chemical/process name)” and all previous markings or labels are defaced. Specific chemical names must be associated with the container. Terms such as “organic waste” or “aqueous waste” may meet minimum EPA requirements, but do not adequately identify the material under hazard communication or emergency planning and response criteria. Container markings may become illegible as a result of spills while filling the container, or using pencil or other easily defaced markers.

Quantity Limits

Areas must not exceed the limit of 55 gallons total of hazardous waste, or 1 kilogram of acutely hazardous waste. Typically, "acutely hazardous waste" involves unused products that are outdated, physically mixed with other wastes or materials, or abandoned.

Corrective actions: (1) Ensure appropriate container sizes and timely removal of waste materials. Submitting chemical waste forms over the internet informs EHSC of the type and quantity of waste materials in an area. Wastes are scheduled for pickup based on location (building), and consideration of quantity or significant hazard.

(2) If it is necessary to store more than 55 gallons of hazardous waste in an area, designate (by signs, partitions, or other means) accumulation areas for specific wastes. For example, a 55-gallon drum may be associated with a specific process and/or disposal option and placed in one area of the lab/shop, while various small containers may come from other steps or processes in the same room and placed in a designated area nearby (but still in the same room, i.e., "near the point of generation and under the control of the process operator"). Each designated area would have a 55-gallon limit.

Emergency Preparedness

All areas where hazardous materials are used or stored, or where hazardous processes may be conducted, are required to be covered by current Safety Plans, which outline chemical inventories, standard and emergency procedures, and availability of equipment. Work areas should have ready access to telephones, and emergency numbers should be posted. Emergency equipment (fire extinguishers, spill supplies) should be available, and personnel familiar with use or restrictions.

Corrective actions: Ensure safety plans are prepared for all areas where hazardous materials are used or stored. Ensure safety plans are updated on an annual basis, and when significant changes are made to processes or inventories. Notify EHSC (Bruce Macdonald and Rob Pecarina) of area reassignments, and provide updated plans as soon as possible. Ensure personnel are familiar with means of protecting themselves in the event of an emergency.