MANAGEMENT OF BUILDING DEMOLITION DEBRIS

Hazardous Waste Management
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1.0 INTRODUCTION

1.1 Purpose

The purpose of this guideline is to describe the methods for managing waste generated by building renovation and demolition activities performed under contract.

1.2 Scope and Applicability

The Guideline applies to all waste, except for land-clearing, generated during building construction, repair and renovation, and demolition.

The Guideline applies to work performed by contractors hired by the University for specific projects.

Waste and debris generated by University Facility Operations in the maintenance and repair of University buildings and property are managed under the Facilities Operations Policies & Procedures Manual, Policy #832.

This guideline assumes that the affected area has been cleared of all equipment which is not part of the building, room, or structure. This includes furniture, appliances, computers and peripherals, machinery, laboratory equipment, chemicals, etc.

1.3 Reference Materials

Construction Guidelines, Division 01 Contractor Safety Requirements
Construction Guidelines, Division 02 Decommissioning and Decontamination
Construction Guidelines, Division 02, Reuse, Recycling, and Waste Materials
Facilities Operations, Policies & Procedures Manual, Policy #832
NC State Waste Generators Manual
Asbestos Management Plan
EH&S Guidance for Paint Containing Lead
EPA: RCRA in Focus--Construction, Demolition, and Renovation

2.0 WASTE CATEGORIES AND TYPES

The Guideline identifies types of wastes often generated during a building demolition project and assigns it to a waste category, as defined below. Waste types described in this procedure represent a significant portion of the wastes generated by construction, demolition, and renovation projects, and is not meant to be a comprehensive listing for all wastes generated. Management of each waste category is defined in Section 3 below. Additional information is provided in Construction Management Guidelines Division 02.

2.1 Construction and Demolition Debris

Construction and demolition (C&D) debris is solid waste resulting solely from construction, remodeling, repair, or demolition operations conducted on pavement, buildings, or other structures, but does not include inert debris, land clearing debris or yard waste.

Requirements for managing C&D debris are provided in the Construction Guidelines, Division 02, Reuse, Recycling, and Waste Materials.

2.2 Regulated Waste

For the purpose of this guideline, regulated waste is waste that is regulated under the Resource Conservation and Recovery Act (RCRA) or the Toxic Substances Control Act (TSCA).

Regulated wastes that may be generated during the demolition of university buildings include, but are not limited to, the following.
- **Asbestos**: Heat-resistant fibrous silicate mineral that can be woven into fabrics, and is used in fire-resistant and insulating materials.
- **Battery**: Container consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power.
- **Caulking or Other Sealants**: Any caulk, sealant, or similar building material potentially manufactured prior to 1980 may contain PCB’s at above 50 ppm.
- **Fluorescent Lamps**: Glass tube that radiates light when phosphor on its inside surface is made to fluoresce by ultraviolet radiation from mercury vapor.
- **Light Ballasts**: Electrical device for starting and regulating fluorescent and discharge lamps. Ballasts from buildings constructed before 1980 or have a manufacture date before 1980, may contain Polychlorinated biphenyls (PCBs).
- **Mercury-Containing Equipment (MCE)**: Mercury-containing equipment means a device or part of a device that contains elemental mercury integral to its function. MCE includes thermostats, thermometers, switches, relays, gauges, printed circuit boards, large equipment (e.g., manometers), but excluding batteries and lamps.
- **Oil**: Viscous liquid derived from petroleum, animal, plants, or other sources (mineral oil) especially for use as a fuel or lubricant.
- **Lead-Containing Paint Chips**: Paint chips containing lead at a concentration exceeding 5,000 milligrams of lead per kilogram of paint chips.
- **Sink Trap Sludge**: All solids that are settled to the bottom of the sink trap. It is assumed that laboratory sink drain traps could possibly contain mercury.
- **Smoke Detectors**: Fire-protection device that automatically detects and gives a warning of the presence of smoke. Smoke detectors which have no electrical connection contain a radioactive source.
- **Emergency Exit Signs**: Signs provided at such locations and intervals as are necessary to provide the occupants with knowledge of the various means of egress available. Emergency exit signs, which have no electrical connection, contain a radioactive source.
- **Vacuum Pumps and Lines**: Any tube or pump used for an electronic device that moves air in or out of something. Laboratory vacuum systems may contain mercury.

### 3.0 WASTE MANAGEMENT AND HANDLING REQUIREMENTS

#### Generator Control
It must be clear who is responsible for the waste and where it is coming from. Keep wastes in appropriate containers and closed. Promptly take waste material to the designated waste storage area. Maintain Good Housekeeping Practices. It may be appropriate to secure or restrict access to waste storage areas.

#### Orderly Work Area, Good Housekeeping
Remove excessive clutter (papers, trash, and assorted "junk") to allow for a safer and more accessible work area. (General Housekeeping Procedures) Consider maintaining a work area that has available work surfaces and minimizes the potential for a fire or spill. For example, electrical equipment is away from flammable or corrosive liquids, and vents on equipment are kept clear, etc.

#### Aisle Space
Aisles in waste accumulation or storage areas must be sufficient for emergency personnel and equipment, generally considered a minimum of approximately 30 inches. Look at areas with shelves or racks, storage of materials or equipment on the floor, access routes to hazardous material/waste locations. Locations of wastes and hazardous materials also need to meet OSHA requirements; for example, it may not be appropriate to store hazardous materials along a corridor that serves as a means of egress.

#### Inspections
Documented weekly inspections are required for hazardous waste storage areas. Inspections include
- security
- container conditions--labeled, closed, good condition
- safety
3.1 General Waste Handling Requirements

Containers
Containers used for storage of waste must be United States Department of Transportation (DOT) approved, as indicated with a “UN” specification marking. The contractor shall supply bins, roll-offs, tanks, or tank trucks. EH&S can provide 30- and 55-gallon drums, cubic yard boxes, and boxes for 4- and 8-ft. fluorescent lamps to meet needs for most wastes generated. Containers must be kept closed, in good condition, and be compatible with the type of waste accumulated in them.

Container Markings
Container markings must clearly indicate the contents and the accumulation start date. Containers must be labeled with the words “Waste (chemical/product name)” and the date the waste was first added to the container. Specific waste names must be associated with the container (e.g., “waste PCB ballasts”). The contractor shall not mix different waste types in the same container. Ensure all markings are legible. Oil is the only material for discard that requires the term “used” instead of “waste.” All other containers accumulating waste must have the word “waste” clearly marked, regardless of whether it is disposed of through EH&S or the contractor.

Universal wastes, such as rechargeable batteries and fluorescent lamps, and PCB items must have the date they became waste recorded. For example, the date a fluorescent lamp was first placed in a box must be recorded on the box along with the words "Waste Fluorescent Lamps". Likewise, PCB ballasts must have the date they were removed from service recorded.

Onsite Storage
Hazardous, universal, and other regulated wastes must be collected and stored according to specific requirements. The contractor shall store closed and sealed waste containers on the construction site in an area that is secured, covered (sheltered from weather), and well identified with hazardous chemical signage. The contractor shall ensure that hazardous wastes are not stored for more than 90 days. Containers shall not be stored in such a way that a release may go down a drain.

Secondary Containment
Areas where liquid wastes are accumulated must have secondary containment for collecting spills. Secondary containment units must be kept clean, with accumulated materials removed in a timely manner. Containers must be placed entirely on or in the secondary containment unit.

Clean Containers
Containers must be reasonably clean with no visible outside contamination from chemicals. Containers are usually contaminated by spills that occurred while adding wastes. Clean up all spills or splashes on the chemical containers, secondary containers and floor promptly. Drums may be kept clean while adding waste by placing a large plastic bag over the top, cutting a small hole for the bung/funnel. The bag would then be evaluated for hazardous waste management as "Contaminated Debris".

Quantity Limits
Waste accumulation and storage areas will be presumed to be central accumulation areas, and not satellite accumulation at the point of generation. Ensure appropriate container sizes and timely removal of waste materials. Keep chemicals and chemical waste to a minimum. Most University areas are managed as regulated generators of hazardous waste and subject to a 90-day storage limit. Each project should be evaluated for quantities of hazardous waste to be generated, as this has an effect on generator status and storage limits.

Emergency Preparedness
Post emergency telephones numbers and have emergency equipment (fire extinguishers, spill supplies) available, and personnel familiar with their use or restrictions. Ensure personnel are familiar with means of protecting themselves in the event of an emergency.
**Waste Removal**

Ensure timely removal of waste materials. Notify NCSU as soon as each container is labeled, closed properly and ready to be removed from the site. Several pick-up dates may be necessary for each project. EH&S does not generally handle extremely large quantities (roll off boxes) of debris so disposal needs to be included in the project’s contract and coordinated with EH&S. The HWPM must sign all documents necessary for removal of hazardous and universal waste. NCSU shall receive a copy of all manifests and certificates of disposal/destruction, treatment or recycling are returned to EH&S.

**Hazardous Waste Liabilities**

Waste generated will be attributable to both the contractor and the University. The contractor will submit a waste management plan to the University for review by EH&S prior to implementing any work. The plan will serve as the basis for project-specific plans. The plan will specify procedures for all aspects of waste management. Accumulation of waste generated by project activities will be the responsibility of the contractors, as defined in their plan. The University will provide oversight. The contractor will prepare waste for shipment to vendors identified in the waste management plan. Waste generated as a direct result of project activities (e.g., demolition or decontamination of structures) will leave the University under the University’s signature. Wastes generated as an indirect result (e.g., cleaning of contractor equipment) will be the responsibility of the contractor, and included in the waste management plan. The University, specifically EH&S, shall receive copies of disposal certifications/manifests for all regulated waste shipped.

3.2 **Special Waste Handling Requirements**

**Notes for Universal and PCB Wastes**

- **Out of Service Date:**
  All Universal Waste and PCB waste will have an Out Of Service Date recorded on the individual item or on the accumulation drum. Universal wastes and PCB wastes should be turned over to EH&S within 6 months to comply with recycling and disposal requirements.

- **Universal Wastes**
  With the exception of recalled pesticides, universal wastes are manufactured articles such as batteries, lamps, thermostats, and switches. When broken, they are no longer the manufactured article, and must be managed as hazardous waste.

- **PCB Storage Area**
  Any area where PCB wastes are accumulated for more than 30 days must: be posted with a specific sign or label, adequate roof and walls to prevent rainwater reaching PCBs, above 100-year flood zone, and have no floor drains, joints, or other openings. PCB wastes and containers must be kept either on a concrete pad with curbing or in an appropriate containment system. Containers must meet DOT/UN specifications, kept closed, and labeled with the oldest out of service date. Storage areas not meeting the design requirements must have PCB wastes removed within 30 days after the out-of-service date.

**Specific Waste Handling and Disposal Procedures**

EH&S will collect hazardous, universal, and select special wastes that are the responsibility of the University for disposal. Below are specifics for management of these wastes generated by construction, demolition, decontamination, and renovation.

- **Asbestos:** The asbestos survey contractor will refer to the University-provided asbestos inventory, and supplement as necessary, as a basis for surveying the renovated area for the presence of asbestos-containing materials. The contractor must recognize the limitations of the University-provided asbestos data. Any asbestos-containing building debris can be managed as construction and demolition debris, provided necessary procedures are implemented. Asbestos removal and abatement are managed directly by the project contractor and NCSU project Construction Manager. The NCSU Construction Manager shall maintain copies of all asbestos removal documentation.
• **Lead-Based Paints:** The paint survey contractor will refer to any University-provided paint survey records of the area, and supplement as necessary, as a basis for surveying the project area for the presence of lead-based paints. The contractor must recognize the limitations of the University-provided data. Lead-based paint removal and abatement are managed directly by the project contractor and NCSU project Construction Manager, with hazardous waste (lead paint) disposal through EH&S. The NCSU Construction Manager shall maintain copies of all documentation for removal of paint containing lead.

• **Batteries:** Batteries with broken casings do not meet EPA’s definition of a battery and must be managed as waste, not recyclable materials. When removed from the building during renovation or demolition, batteries are to be segregated by type (e.g., lead acid, lithium, nickel-cadmium), terminals taped, and placed in appropriate containers labeled “Waste Batteries” and the type. Batteries are recycled by Facilities and EH&S.

• **Fume Hoods:** NCSU EH&S will inform the NCSU Construction Manager if chemical usage records on hand indicate that perchloric acid was used in the fume hood (fume hoods which have been used with perchloric acid will usually have water wash down features). As applicable, the contractor shall follow appropriate procedures for preventing fire or explosion while decontaminating. Contractors must consider the benefits of utilizing perchlorate screening tests since it is difficult to positively rule out the past use of perchloric acid in hoods without water wash down features. Hoods that will be removed for relocation or salvage must have all accessible wetted surfaces rendered safe for further handling. Disposal or recycling of these materials will be coordinated with NCSU EH&S and Construction Management.

• **Mercury-Containing Lamps** (fluorescent, ultra-violet, neon, or high intensity discharge (mercury, sodium, metal halide)): It is illegal in North Carolina to dispose of fluorescent lamps removed from public buildings in landfills. Lamps from public (state-owned) buildings must be recycled. Broken lamps must be managed as hazardous waste unless testing demonstrates they do not contain sufficient mercury. This applies to all fluorescent lamps, including "green-tip" and compacts, all high intensity discharge (HID), such as high-pressure mercury, metal halide, or high-pressure sodium. Lamps should be provided to EH&S for recycling within 6 months. Lamps are not to be placed in boxes for laboratory glass.

• Lamps must be protected from breakage when removed from the fixture. DO NOT tape lamps together. Immediately place lamps in a box or other protective device. EHS has 4- and 8-foot lamp boxes available. Indicate on the box the number, type, and size of lamps.
• Keep box closed except when removing or adding lamps.
• Record the date lamps were first added to the box.
• Mark or label containers: "Waste Lamps".
• Keep lamps in a safe place where they will not be broken. Don't store them outside of boxes. Lay box down or strap standing boxes to keep them from falling.
• Lamps are collected as universal wastes for recycling by EH&S.

To see how to handle broken lamps, See Appendix A at the end of this document.

• **Mercury-Containing Equipment** (thermometers, switches, thermostats, broken mercury-containing lamps): Materials must be collected for disposal through EH&S. Label the item or package as “Waste Mercury-Containing Equipment” or “Waste Broken Lamps” as appropriate.

• **Light Ballasts:** The process for managing light ballasts hinges upon the criteria listed below.
  Ballasts as PCB-containing waste
  • Building was constructed prior to 1980
  • Ballasts have a manufacture date prior to 1980
  • Ballasts appear “old” and do not have “No PCB’s” label
  • When in doubt, manage as PCB.
Ballasts as Non-PCB-containing wastes
- Building had complete replacement of fluorescent and HID light fixtures after 1980
- Ballasts have a manufacture date after 1980
- Ballasts have a “non-PCB” label (required 1978-1998)
- Ballasts are of a newer design (generally after 1980)
- Ballasts have an internal battery (usually NiCd, with a battery recycling logo)

Lamps and ballasts should be removed before the fixture is taken down. PCB ballasts should be placed in drums with labels that include “PCB Ballasts” and the earliest date that the ballasts were removed. Non-PCB ballast drums should be marked “non-PCB Ballasts” and the date. Ballasts with internal batteries must be accumulated separately.

- **Other Polychlorinated Biphenyls (PCBs)** (PCB capacitors, transformers, power supplies, switches, oils): May be managed as pure product, mixed in oil (some transformer oils or capacitors), or in building materials (caulk, wire insulation). Materials must be evaluated or tested for PCBs. Waste materials with more than 25 parts per million PCB must be managed in coordination with EH&S.

When PCB containing equipment is taken out of service with the PCBs inside:
- PCB-containing equipment must have the out-of-service date recorded.
- Types of equipment that may contain PCBs include transformers, and capacitors.
- Label as "Waste PCB Containing Equipment".

- **Oil—Petroleum, Mineral, Animal, Or Vegetable**: Oils must be collected for disposal through EH&S or contracted vendor. Transformer oils may require testing for PCBs. Refrigeration oils require identification of refrigerants. Label the container as "Used Oil" and describe (motor oil, transformer oil, etc.).

- **Oil Filters**: Oil filters are banned from landfills and must be recycled through EH&S. Allow filters to completely drain before placing in a pail or drum. Label the pail or drum “used oil filters”. Keep drum closed except when adding or removing materials.

- **Metal Scrap**: Scrap metals for recycling include metals and alloys that could be hazardous waste if disposed in landfills. This includes metal frames with intact lead paint, ductwork, piping, fixtures, and other metals for recycling, but not batteries or PCBs. Collect scraps from soldering operations and carry to the scrap metal collection drum. (good housekeeping practices)

- **Sink Trap Sludge**: It is assumed that laboratory sink drain traps could possibly contain mercury. The following procedure describes the collection of sludge from lab sink traps (and other system traps, as necessary) for isolation of mercury.
  - The contractor will disassemble the lab wastewater system and collect the lab sink trap sludge for visual examination. All sludge containing mercury, as well as piping and debris, will be segregated from the non-mercury contaminated debris. This mercury-containing debris will be managed as mercury-containing debris and disposed through EH&S. Lab sink piping and sludge which is determined not to contain mercury may be managed as non-hazardous building demolition debris.
  - Alternatively, the contractor will remove the trap and place the trap and its contents in a container for disposal as mercury-contaminated liquid and debris.

### 3.3 Waste Management Form

The Management of Building Demolition Debris, Waste Management Form is provided at [www.ncsu.edu/ehs/environ/Form_Waste_Management_Plan.doc](http://www.ncsu.edu/ehs/environ/Form_Waste_Management_Plan.doc) to assist in the implementation of this guideline.
4.0 POINTS OF CONTACT

The University Hazardous Waste Program Manager is Rob Pecarina, 515-6863. rmpecari@ncsu.edu

Backup contact is Bruce Stewart 515-6864. rbstewa2@ncsu.edu

Contact for asbestos and lead paint is Scott Mabry. 513-0988 csmabry@ncsu.edu

APPENDIX A

CLEAN-UP OF BROKEN FLUORESCENT LAMPS:

When a fluorescent tube or compact fluorescent lamp breaks use the following procedures for clean-up:

1. Secure the area where the breakage occurred and leave the area for 15 minutes.

2. Using gloves and eye protection pick up large pieces and put them in a box.

3. Gently, sweep up the remaining particles.

4. On rough surfaces, use a wet towel to clean up remaining pieces.

WARNING: DO NOT USE A VACUUM CLEANER. Vacuuming puts the mercury into the air.

5. Manage cleanup materials as hazardous waste. Hazardous waste cannot be put in the trash. Place debris in a drum or pail with lid.

If a box of lamps is broken, that whole box is a hazardous waste. If the box was not sealed when the lamps broke, there may be dust and other fine debris containing mercury that requires cleanup. The box must be emptied or packaged into an approved shipping container (drum), potentially exposing personnel and the work area to the mercury-contaminated dust and debris.