

Compactor Instruction and Safety Guidebook

The University of North Carolina at Chapel Hill



Books in circulation: OWRR (3), Generator Shop (1), Maintenance (1)

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Service Notes by Location These sheets are not included in the online version. Each sheet lists details such as manufacturer, electrical info (including cutoff and breaker locations), and any relevant installation info or notes.	Tab
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COMPACTOR SAFETY VIDEO AND BROCHURE

You may watch the self-study training “Compactor Safety” video on Environment, Health, and Safety's website (http://www.ehs.unc.edu/training/self_study/compactor/).

Please note that you must complete the post-test after watching the video.

The video is available in English, Spanish, and Karen. Please choose the best option for you and your staff.

Download the Compactor Training Brochure for your staff (<http://www.wastereduction.unc.edu/Portals/Recycling/Compactor%20Safety%20Brochure.pdf>).

OWRR can also provide hard copy brochures with your key order. Please request them in your email. Please note that the brochures are only available in English.

FREQUENTLY ASKED QUESTIONS

Who is required to complete the Compactor Safety Training?

Anyone who regularly uses compactors must watch the safety video and complete the post-test through Environment, Health, and Safety (EHS).

When do I need to complete the training?

Please complete the training as soon as possible, as it is required in order to be issued a compactor key.

I've been using compactors for a long time. Do I need to take the training?

Yes. Even if you are familiar with compactors, EHS requires that all users complete the training.

Our compactor key is missing. How can we get a new one?

Compactor keys will no longer stay in the key switch. OWRR employees will remove shared keys left in the switch. This is to ensure that only users who are safety trained are able to operate the compactor. Tell your supervisor that they key is missing and they will be able to order a replacement.

For Supervisors: How can I order compactor keys for my staff?

Supervisors may request keys by completing an online work request, calling or emailing the Office of Waste Reduction and Recycling (OWRR) at RECYCLING REQUEST, 919-962-1442 or recycling@fac.unc.edu. OWRR needs the following information to fulfill a compactor key work request:

1. Type of request: Compactor Key Request
2. Contact info: Supervisor name, phone number and email
3. Details:
 - a. Department, work unit and zone (if applicable)
 - b. Names of trained employees
 - c. Number of keys requested
4. Property: Compactor Location/Building
5. Delivery method
 - a. Campus Box Number (keys will be mailed to you)
 - b. Pick-up (OWRR is located in the General Storeroom Bldg. near the gas pumps and HVAC shops.)

BASIC OPERATING PROCEDURES

For full operational procedures, consult your manufacturer manual or call OWRR at (919) 962-1442.

Basic Operating Procedures for Horizontal Compactors

1. Load the compactor. The “hopper” or space in the compactor where trash or cardboard is loaded should be empty when you arrive. If not, run the compactor before loading more materials into it. [Figure 4]
2. To run the compactor:
 - a. Close the door(s). [Figure 1]
 - b. Make sure the emergency stop button is not engaged (pulled out). [Figure 2]
 - c. If it is a split-body compactor with sides for trash and cardboard, be sure the switch is turned to the correct side. [Figures 2 and 3]

- d. Insert your key in the start switch, turn and release to run the compactor. This compresses the materials. The compactor ram (sometimes called the “blade”) will extend and retract. Some machines will do this multiple times (usually twice). Once the cycle has stopped, the ram retracts and the hopper is ready for the next user. [Figure 3]

Note: The Davis Library compactor requires two-handed operation for safety reasons. The key must be turned and the button depressed at the same time to operate.

3. After use, **leave the door closed** and remember to **remove the key**.
4. Safety first!
 - a. Keys must not be left in the switch. This violates OSHA guidelines.
 - b. Keep the door closed when not in use.
 - c. Never reach into or enter the compactor to remove items.
 - e. Use the emergency stop button if needed. [Figure 3]
 - d. Call OWRR if the compactor is broken or damaged: 962-1442.



Figure 1

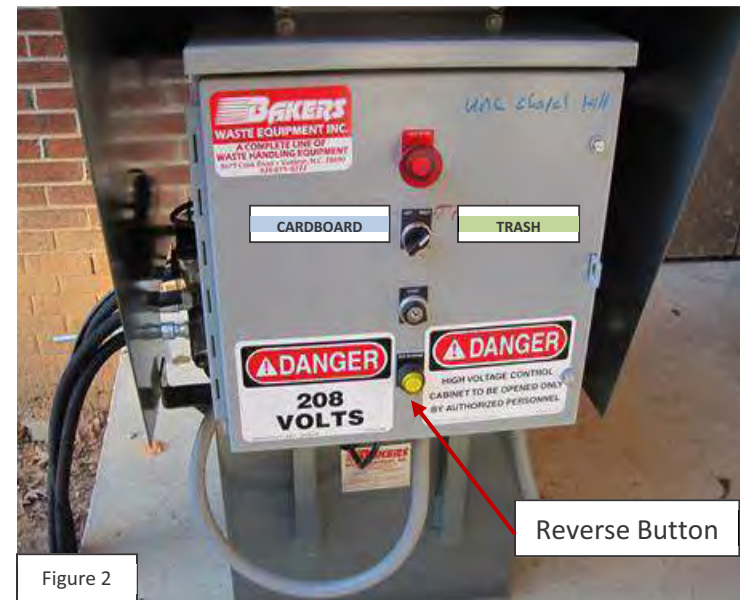


Figure 2

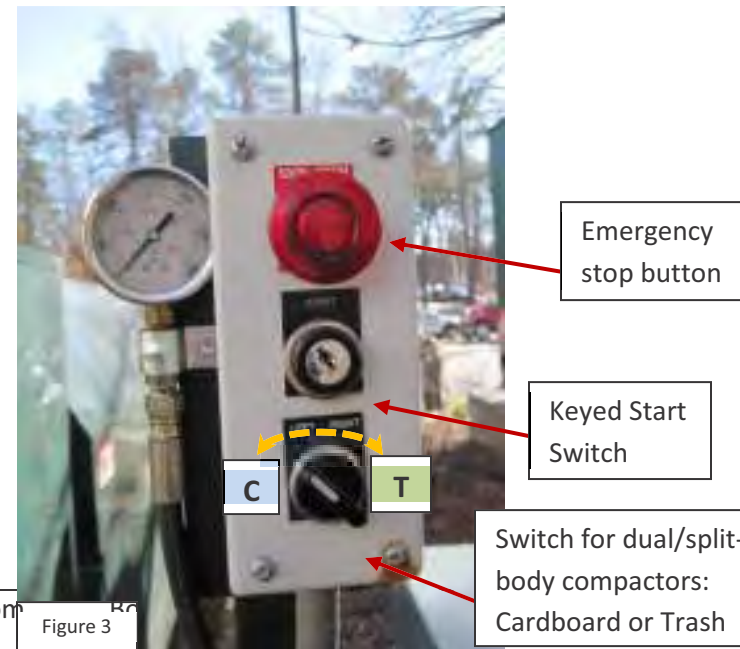


Figure 3

Basic trouble shooting procedures for horizontal compactors:

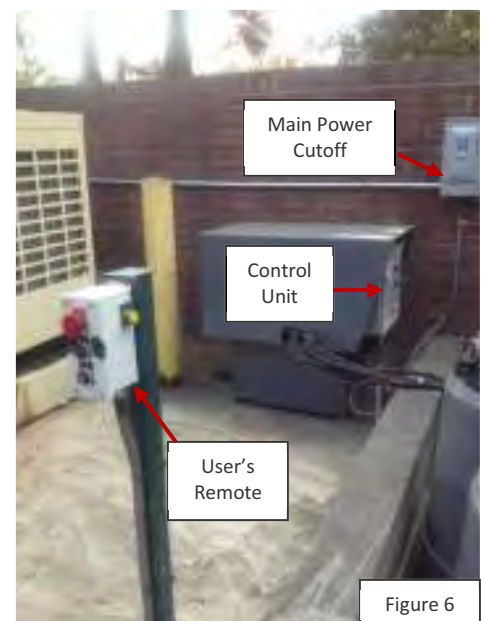
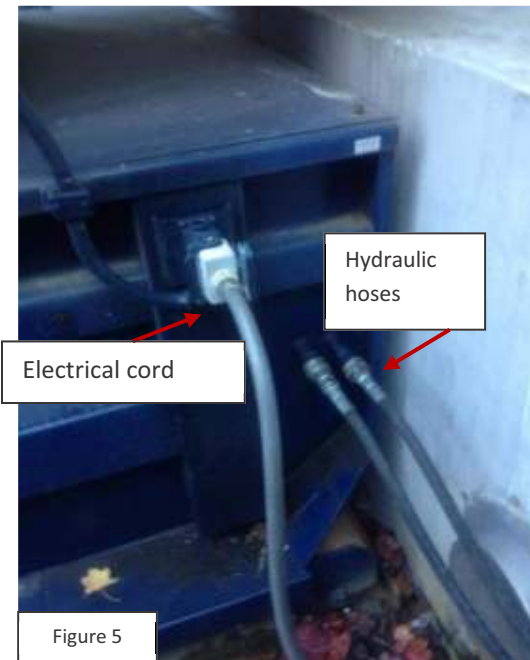
Is the motor running?

If the motor runs:

- If the motor runs but the trash or cardboard does not compress or fall into the hopper, try once more by running the compactor.
- If it still remains, the box may be jammed.
 - o Remove what you can without entering the compactor.
 - o Try running the compactor with only a small amount of trash or cardboard.
 - o If this works, continue running the compactor in batches without overloading the hopper.
 - o Always run the compactor after loading materials.

If the motor doesn't run:

- Make sure the stop button is pulled out [Figure 3]
- Make sure the doors are closed. There are safety switches on the doors. Therefore the doors must be tightly closed in order for the compactor to operate.
- Make sure the hydraulic hoses are securely attached (to the compactor) [Figure 5]
- Make sure the power cord is plugged in (to the compactor) [Figure 5]
- Make sure the main power cutoff is in the "on" position. If in the "off" position... why? Should it be locked out? [Figure 7]
- Additionally, both McColl and George Hill Watts Alumni Center dual/split-body compactors have remote switches (see photo below). The main control panel switch must be in the neutral position. This gives the user a more convenient point of operations. The user's remote is used to select whether to run the cardboard or trash side of the compactor. [Figure 6]





Electrical cord unplugged [Figure 8]



Electrical cord being plugged in [Figure 9]



Hydraulic hose unplugged [Figure 10]



Hydraulic hose connected [Figure 11]

COMPACTOR STICKERS AND SIGNS

All compactors should host a "No Parking" sign

Instructional

- *Trash:*
 1. Yellow "University Trash Only, Not for Public Use"
 2. Yellow "University Trash Only, No Cardboard Boxes, No Pallets, ... Please Recycle"
- *Cardboard:*
 1. Yellow "A Corrugated Cardboard Ban is in effect for users of Orange Regional Landfill"
 2. Horizontal Blue and White "Corrugated Cardboard"
 3. Yellow and Red "Flatten All Boxes, Insert into Slot, No Pizza Boxes, No Cereal Boxes"

Safety

1. White and Orange "Report Safety, Damage and Other Problems Immediately"
2. Red and White "Do Not Enter" signs in English and Karen
3. Red and White "Do Not Enter" signs in English and Spanish
4. Horizontal Orange and Black "Pinch Point Hazard" (Vertical compactor only)

COMPACTOR SIGNS



PREVENTATIVE MAINTENANCE AND INSPECTION PROCEDURES

PM Work Orders can be obtained through UNC-CH Facilities Services.

Maintenance Supplies

- Hydraulic oil is kept in a fifty-five (55) gallon drum on a spill pad or in 5 gallon buckets on the shelf in the confidential paper section of the OWRR warehouse.
- OWRR service vehicles (224, 776, & 399) have the following tools to service compactors. To contact for maintenance requests, call (919)962-1442.
 - 18 volt, 6 tool combo kit (as of 12/2013 one set shared between 224 and 776)
 - 18 volt impact wrench kit (as of 12/2013 one set shared between 224 and 776)
 - 51 piece socket set (224 and 776)
 - 20 piece gear wrench set (224 and 776)
 - 12 piece ½" socket set (224 and 776)
 - 5 gallons of hydraulic fluid (224 and 776)
 - Spill kits (see spill prevention section) (399, 224 and 776)
 - Grease gun (399, 224 and 776)
 - Flex grease gun hose (399, 224 and 776)
 - Allen wrenches (399, 224 and 776)
 - T-handle tap wrench (399, 224 and 776)
 - Flashlights (399, 224 and 776)

NOTE: In order to perform repairs and preventative maintenance, lock-out/tag-out (LOTO), compactor entry documentation, electrical safety and spill protection procedure must be followed.

PREVENTATIVE MAINTENANCE AND INSPECTION PROCEDURES

PM Work Orders can be obtained through UNC-CH Facilities Services.

Horizontal Compactors

A. Monthly

1. **Check** external **hoses** for cracking and deterioration
2. **Check oil** in hydraulic reservoir
 - Should be $\frac{3}{4}$ of sight glass
3. Check hydraulic system for leaks
4. Listen for unusual **pump noise**
5. **Lubricate** ends of **cylinders** and **ram pivot shaft** [LOTO and entry documentation required]
6. **Lubricate** door **hinge**, door **latch**, and mechanical door **interlock**
7. **Remove material accumulated behind ram** [LOTO and entry documentation required]
8. Note any **hazardous situations** or conditions associated with or **near the compactor**
9. **Check guide shoes** for wear
10. **Lubricate** the **ram guidance tracks** [LOTO and entry documentation required]
11. **Check end door seal** for leakage
12. **Check** unit to base **anchoring bolts** for looseness
13. Inspect **paint condition** (good, fair, bad, poor)
14. Note any **hazardous situations** or conditions associated with or **near the compactor**
15. Note comments

B. Quarterly

1. **Check functional operation of controls and options, such as: stop buttons, timers, lights, etc.**
2. **Check** hydraulic **cylinder** and **connections** for leakage [LOTO required]
3. **Check** internal **hoses** for **leakage, chafing** and **wear** [LOTO required]
4. **Lubricate** the container door **hinges**
5. Note comments

C. Annually

1. **Lubricate** motor bearings per manufacturer's instructions [LOTO recommended]
2. **Change** hydraulic **fluid** in the power reservoir [LOTO and spill protection required]
3. **Clean** the hydraulic **filter** [LOTO and spill protection required]
4. Note comments

COMMON PROBLEMS AND ADVANCED TROUBLESHOOTING

For repairs, call OWRR at (919) 962-1442.

OWRR Technicians work Monday through Friday from 6 a.m. to 2:30 p.m.

Service calls are on a tiered approach.

- **Level One:** The user
- **Level Two:** OWRR or other maintenance technician
- **Level Three:** Electrical shop support
- **Level Four:** Manufacturer support

Priority calls consist of:

- Anything that creates **hazardous** or **unsafe** working conditions
- **Leaks:**
 - Hydraulic leaks
 - Seal leaks or “dumpster juice”
- **Critical use** compactors such as at dining facilities

Priority locations include:

- **Graham Student Union** (Wendy’s operates 24/7)
- **Ram’s Head Dining Hall** (when residence halls are open)
- **Hill Alumni Center** (when they are having after hour or weekend events)
- **Lenoir Dining Hall** (when open weekends or when urgent repairs are needed to keep functional through the week.)

Self-contained Compactor Service Manual (Tab G):

- Container specifications
- Operation and safety instructions (including manufacturer’s Lock-Out Tag-Out instructions)
- Manufacturer’s periodic maintenance
- **Manufacturer’s settings (pressure, timers, cycles)**
- Cylinder removal instructions
- Tailgate seal replacement
- **Fuses, wiring, panel box configuration, electrical schematic, hydraulic schematic**
- **Troubleshooting chart**
 - Won’t start
 - Doesn’t continue running with start button released
 - Motor runs but ram doesn’t move normally
 - Unit will not reverse
 - Pump makes noise (sounds like gravel)
 - Pump shaft seal leaking
 - Excessive heat
 - Rapid wear
 - Erratic operation
 - Overloads trip frequently
- Installation instructions
- Hauler instructions

Level One – The user

Basic trouble shooting procedures for HORIZONTAL compactors:

If the motor runs:

- If the motor runs but the trash or cardboard does not compress or fall into the hopper, try once more by running the compactor.
- If it still remains, the box may be jammed.
 - o Remove what you can without entering the compactor.
 - o Try running the compactor with only a small amount of trash or cardboard.
 - o If this works, continue running the compactor in batches without overloading the hopper.
 - o Always run the compactor after loading materials in the hopper. [Figure 1]

If the motor doesn't run:

- Make sure the stop button is pulled out [Figures 2, 4-6, 17]
- Make sure the doors are closed. There are safety switches on the doors. Therefore the doors must be tightly closed in order for the compactor to operate. [Figure 1]
- Make sure the hydraulic hoses are securely attached (to the compactor) [Figures 11, 14-16]
- Make sure the power cord is plugged in (to the compactor) [Figure 11, 12, 13]
- Make sure the main power cutoff is in the “on” position. If in the “off” position... why? Should it be locked out? [Figures 5-10]
- Additionally, both McColl and George Hill Watts Alumni Center dual/split-body compactors have remote switches (see photo below). The main control panel switch must be in the neutral position. This gives the user a more convenient point of operations. The user's remote is used to select whether to run the cardboard or trash side of the compactor. [Figure 5]

Level Two – Any Technician (OWRR or Other)

Common Problems

Leaking hydraulic fluid

- Cut or worn hose -- replace hose [Figures 11, 14-16]
- Leaking hydraulic fluid at the control unit/motor: [Figures 2, 5, 11]
 - o Hose disconnected or loose at motor -- Untwist hose by unhooking at the quick release coupling and then reattach and tighten hose at the motor
- Leaking hydraulic fluid at the compactor coupling [Figures 11, 14-16]
 - o Check the coupling and o-ring for debris -- Clean out around o-ring and replace the seal (o-ring) if necessary. Replace the coupling disconnect if necessary.
- Cylinder failure

No power to unit

- Could be main disconnect, breakers, fuses [Figures 5-10, 18]

Power but won't operate

- Check stop button [Figures 2-4]
- Check door switches and magnets (including wiring to and from switches and magnets) [Figure 1]
- Check timers [Figure 18]

Ram runs too much or not enough

- Check timers, hydraulic fluid level and pressure, pump

Level Three – Qualified Electricians

Problems that require additional in-house technical assistance

- Installation wiring
- Reset timers
- Switch replacement
- Electrical problems

Level Four – Manufacturer or Equipment Supplier

Problems that require outside assistance from a supplier or manufacturer

- Unusual problems and troubleshooting
- Extreme emergencies
- Damaged containers (including holes in containers)

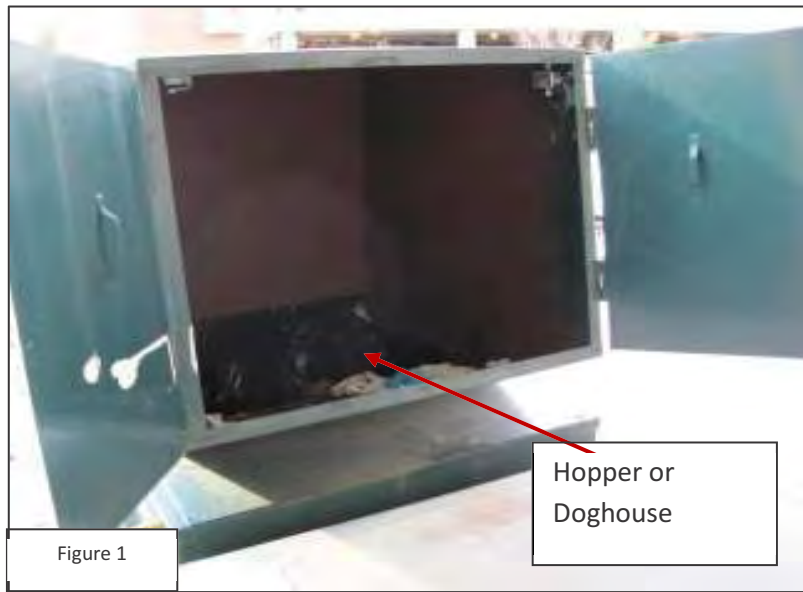


Figure 1

Hopper or Doghouse

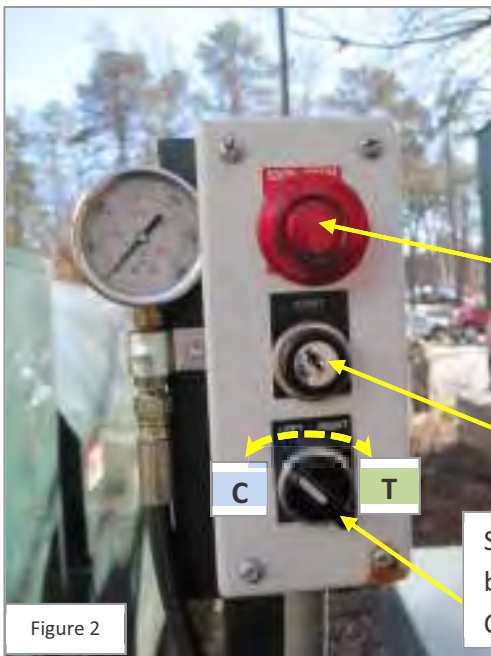


Figure 2

Reverse button

Emergency stop button

Keyed Start Switch

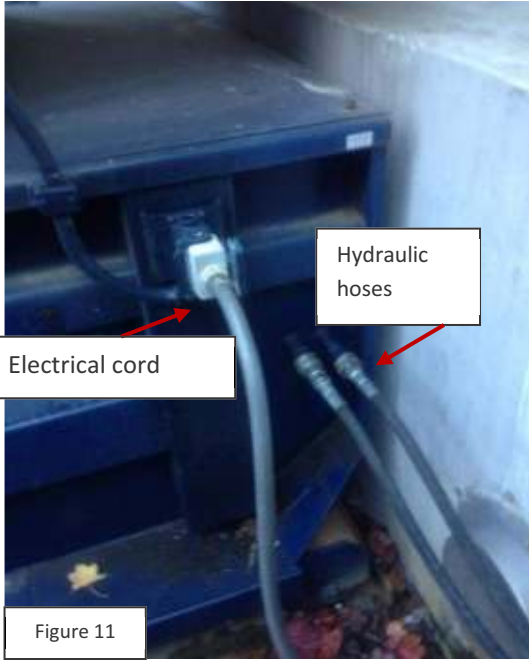
Switch for dual/split-body compactors: Cardboard or Trash





Note: The cutoff switches for LOTO at Murray, Ram's Head and Murray look like this. The lock can be attached to the red lever once the switch is in the off position.

ALWAYS verify that the power is off after the LOTO procedure has been done and before repair or maintenance work begins.



Electrical cord

Hydraulic hoses

Figure 11



Figures 12 and 13



Figures 14 and 15



Figure 16

2 for trash and 2 for cardboard
(split-body compactor)
Note: Each hydraulic hose pair includes a feed and return. Usually, when unhooked, each pair will include a male and female coupling. These can be joined when the container is being hauled to prevent leakage and to keep the coupling free of debris.



Figure 17



Figure 18

SPILL PREVENTION AND PROCEDURES

Spill Kit Contents

Oil absorbed pads are in each vehicle, and speedy dry for oil spills is located in the Warehouse and in OWRR vehicles serving compactors. Truck 523 has a separate spill kit for serving any large spills from hose bursting, leaks, etc.

Procedures

If there is a spill:

1. Safety comes first!
2. Extinguish any source of ignition
3. Warn others and isolate the area
4. Determine the source of release
5. If it can be done safely, attempt to stop the release at its source
6. Prevent spill from spreading
7. Protect storm drains with an appropriate material to prevent a spill from reaching surface water
8. Call the Department of Environment, Health and Safety (EHS) at (919) 962-5507 for assistance

Any spill greater than one (1) gallon should be immediately reported to UNC EHS at (919) 962-5507.

Any spill near a storm drain should be immediately reported to UNC EHS at (919) 962-5507.

UNC EHS is available 24/7 to:

- Contain and clean up the released material
- Decontaminate the impacted area
- Arrange for the proper disposal of waste materials
- Notify appropriate State and Federal authorities

UNC Spill Prevention Control and Countermeasure (SPCC) Plan Design Guidelines

Fuel and oil storage at UNC shall be conducted in accordance with the Spill Prevention Control and Countermeasure (SPCC) requirements of the Code of Federal Regulations, Title 40, Part 112 (40 CFR 112). Fuel and oil storage are also subject to the requirements of the UNC SPCC Plan.

All fuel and oil tanks, including day tanks, shall comply with the following:

- Tanks shall be double walled with at least 110% secondary containment of the primary tank volume.
- Tanks shall be equipped with a direct vision gauge that clearly indicates the liquid level within the primary tank.
- Tanks shall be equipped with overfill prevention equipment consisting of either a high liquid level alarm or high liquid level flow cutoff device set at 95% of the primary tank volume.
- Tank fill ports shall be lockable.
- Tanks shall be equipped with an automatic detection device to monitor the interstitial space between the primary and secondary tank walls.
- Any aboveground piping located in close proximity to a storm sewer inlet shall be double walled. Any below ground piping shall be double walled and will satisfy the North Carolina corrosion protection standards.
- Lighting in the vicinity of the tank and piping must be sufficient to discover discharges occurring during the hours of darkness and to prevent discharges from occurring through acts of vandalism.

Additional SPCC requirements are contained in 40 CFR 112 and the UNC SPCC Plan. The UNC Department of Environment, Health, and Safety can be contacted for more information on the SPCC plan at (919) 962-5507.

LOCKOUT/TAGOUT PROCEDURE FOR TRASH AND CARDBOARD COMPACTORS

Before work

1. Identify all energy sources.
2. Notify other employees working in the vicinity of the LOTO activity.
3. Put on safety glasses and gloves.
4. Isolate the power to the compactor:
 - a. Turn off the control circuit power (key switch) to the “Off” position. [figure A]
 - b. Unplug the power cord. [figure D]
 - c. Turn the main power disconnect to the “Off” position. Always stand to the side of main disconnect when turning off the main disconnect. Also, not all disconnects are in the form of a large disconnect as shown in figure B. Some are small switches such as figure C.
5. Verify that there is no hydraulic pressure on the compactor.
 - a. Disconnect the hydraulic hoses. [figure D]
 - b. Manually depress the solenoid valve pin located in the center of each coil end of the directional control valve shown on figures E and F.
6. **Place lock and notification tag on main disconnect.**
 - a. Turn the key switch to the “On” position to verify isolation. [figure A]
 - b. If isolation has been achieved (i.e. compactor does not start), remove the key from the switch.

Once the compactor is locked and tagged out

1. Perform the work.
2. Clean up work space and clear area of tools. [figure G]

Prior to re-energizing the compactor

1. Clear work area of personnel.
2. Verify key switch is in the “Off” position. [figure A]
3. Attach hydraulic hoses and power cord. [figure D]
4. Remove lock and tag on power disconnect. [figures B and C]
5. Standing to the side of the unit, switch power disconnect to “On”. [figures B and C]
6. Notify affected employees.
7. Activate compactor.
8. Verify that all safety features are in working condition before leaving (emergency stop button, door switches, and reverse button).

Before entering any part of the compactor, LOTO procedures must be performed and an entry documentation form must be completed.

If the ram is pressing against a load, move the ram rearward before shutting the compactor down.

Energy Sources

Electrical: 208-460 volts

Hydraulic: ≤2000 psi

Mechanical: Compactor Ram



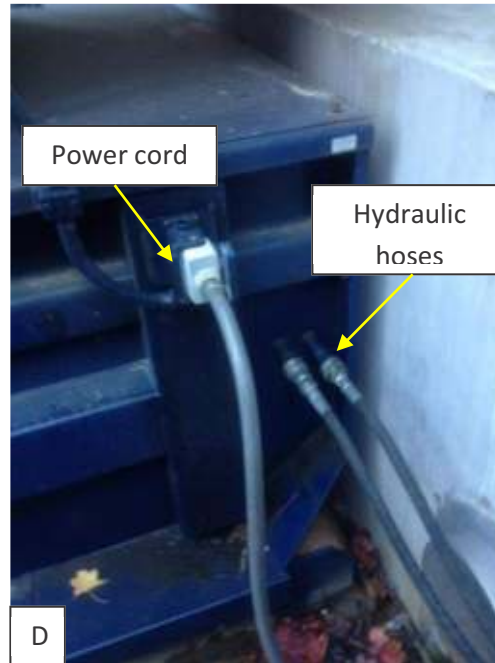
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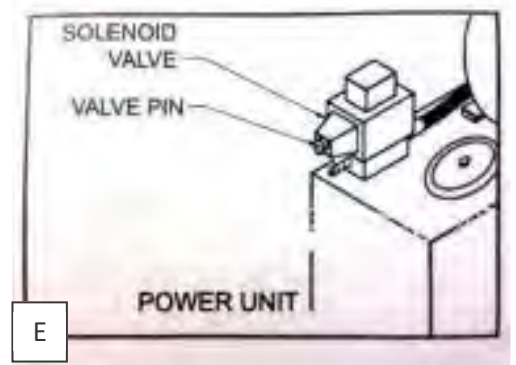
B



C



D



E



F



G

ELECTRICAL SAFETY

Compactors run on 208 or 460 volts. Arc flash and electrical shock are possible.

OWRR does not perform live electrical work. All OWRR work such as replacing key and door safety switches, inspecting wiring for damage, and testing fuses are done in a Lock Out Tag Out status.

Any “power on” work such as opening the panel box, testing timers, or wiring **must** be performed by qualified electricians. The Generator and second shift Maintenance shops assist OWRR with this type of work when necessary.

HISTORICAL PERSPECTIVE

Compactor Improvements as of December 2013:

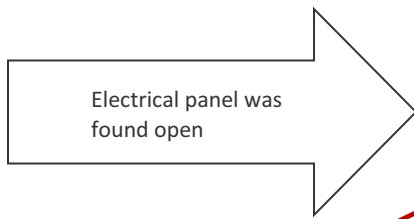
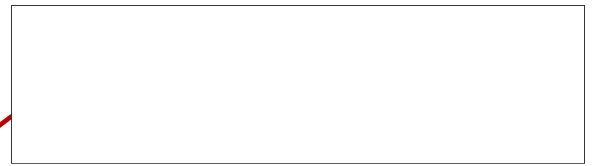
1. Established design guidance for space and building needs for compactors
2. Implemented documented monthly and annual inspections and procedures
3. Technicians are trained at “compactor school”
4. Replaced vertical compactors with horizontal or dumpsters (to eliminate pinch point hazard and fall protection requirement)
5. Modified the height of opening from dock or ground for safety
6. Replaced gates with closed doors
7. Installed safety switches on all doors
8. Had rails installed on docks around compactor entry points
9. Had cutoff switch covers converted to lockable covers (for LOTO) on cutoffs at Murray, Tarrson, and Rams Head
10. Switched keys so that all units are keyed alike
11. Created a video and brochure for training. The video is available via the EHS training website.
12. Created signage for confined space, pinch point and reporting problems.
13. Documented LOTO procedures with EHS
14. Working on non-permit space entry documentation and requirements
15. Working with the Generator Shop to perform electrical work outside the scope of OWRR technician’s training



Replaced “project installed” cutoff switches so that they could be locked-out



Program to remove keys left in compactors



Dumpster Improvements as of December 2013:

Between 2010 and 2013, we have repaired and replaced 208 trash and cardboard dumpsters with refurbished units.

