

N. C. Department of the Environment and Natural Resources  
Division of Waste Management  
Solid Waste Section

**Suggested Procedures for Large Scale Removal of White Goods from  
Disaster Affected Areas**

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**Description**

This paper briefly discusses recommended procedures for the collection and management of large numbers of disposed appliances which would occur in the event of a hurricane, flood, tornado, or other large scale natural disaster in North Carolina.

Please note that the statutes regulating the management of white goods can be found in G.S. 130A-309.80 – 87.

**Types of Appliances**

On average each home will have four or five appliances for disposal. Some will have more. The most common will be refrigerators, washers, dryers, stoves and dish washing machines. Multiply this by the number of homes in a given area and one can estimate the numbers of appliances that may be involved. Many homes may have one or more room air conditioners. Other types include: hot water heaters, freezers, dehumidifiers.

Commercial facilities may seek to repair damaged restaurant equipment rather than dispose of them since these appliances tend to be more valuable than most than domestic appliances. That being said, it is likely that personnel may encounter commercial equipment. These may consist of refrigerators, stoves, ovens, table warmers, chillers, etc. A more comprehensive list is below.

Any metallic debris has recyclable potential and would decrease the amount of material needing to be landfilled.

**Defined as white goods in North Carolina**

1. Vending machines (refrigerated, heated, nonrefrigerated and nonheated types - does not include gumball and similar small dispensers).
2. Large floor-model oil, gas and wood-fired heaters and fireplace inserts (not small portable space heaters).
3. Trash compactors

4. Large floor-model humidifiers and dehumidifiers (not small plastic vaporizers).
5. Water treatment equipment (not small faucet-mounted or under-sink filtering devices).
6. Dish sanitizers.
7. Commercial fry cookers.
8. Drinking water coolers;
9. Freestanding ice makers;
10. Built-in stove surface units;
11. Built-in ovens;
12. Floor-model popcorn machines;
13. Hot food bar used to keep food hot;
14. Refrigerated soft ice cream dispensers;
15. Commercial refrigeration equipment manufactured and sold as a self-contained unit; and
16. Steam tables used to keep food hot.

The major distinction comes to whether the appliance has chlorofluorocarbon refrigerants (CFC's) present as heat transfer material. The rest of this paper will primarily discuss procedures for removing CFCs from appliances.

### **Types of Hazards in Disposed Appliances**

#### **Physical and Chemical**

- Chlorofluorocarbon (CFCs) and hydrochlorofluorocarbon (HCFCs) refrigerants; various types, 5 most common.- inhalation and eye hazard.
- Highly chlorinated compressor oil; -inhalation, ingestion, and eye hazard
- Capacitors and ballasts containing Polychlorinated Biphenyls (PCBs); phased out but on older models.-ingestion, inhalation, and eye hazard.
- Mercury switches; also phased out but on older modals. - ingestion and inhalation hazard
- Sulfur dioxide gas; phased out but on some older units. Inhalation hazard and eye hazard
- Ammonia gas; used in cold storage applications, boats, motor homes, and propane refrigerators. Inhalation and eye hazard
- Desiccant filter dryers. -ingestion hazard

- Sharp or damaged metal edges that may cause punctures or lacerations. Possible tetanus exposure.

### Biological

- Poisonous snakes and spiders.
- Stinging/biting insects- wasps, hornets, bees, ants, mosquitoes, centipedes.
- Rodents and other disease vectors.
- Disease potential from putrefied food stuffs.

There are 5 commonly used refrigerants in domestic refrigeration equipment; R-12, most commonly used in refrigerators; R-22, found in freezers and air conditioners; R-114, originally used in refrigerators, but now mostly found in marine air conditioning; ammonia (NH<sub>3</sub>), commonly used in cold storage applications, boats, motor homes, and propane refrigerators; and sulfur dioxide (SO<sub>2</sub>), found in older refrigeration units. Of these, R-12 and R-114 are CFCs, R-22 is an HCFC, and NH<sub>3</sub> and SO<sub>2</sub> are exotic refrigerants, not regulated by the Clean Air Act.

In addition, HFC replacement refrigerants such as R-124, R-125, and 134a are now commonly used in new refrigerators, freezers, and air conditioners. <sup>1</sup>

### **Personnel Protective Equipment Recommended and Training of Personnel**

In November 14, 1994, the EPA began requiring certification of technicians involved in: maintaining or repairing appliances containing less than 5 pounds of refrigerant (Type I Certification); maintaining, repairing, or disposing of appliances containing greater than 5 pounds of refrigerant (Type II Certification); and maintaining, repairing, or disposing of low pressure appliances (Type III Certification). Although certification of technicians involved in maintaining or repairing automotive air conditioners has been required since August 13, 1992, the EPA does not require certification of individuals involved in the disposal of automotive air conditioners or small refrigerated appliances.

- \* **Please note, it is strongly recommended that personnel performing the recovery of refrigerants and disposal of refrigeration equipment complete an EPA approved certification program. The cost of training is small compared to the cost to public health, environmental damage and potential fines incurred.**
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- \* It is also recommended that personnel employ the highest level of personal protective equipment necessary to guard against the various hazards mentioned above. Typically this would consist of full body and face protection and may even involve some level of respiratory protection.

## **SUGGESTED PROCEDURES**

Please note that enforcement action can be taken for the mismanagement of white goods and for not collecting CFC refrigerants. See **130A-309.84. (Civil penalties for improper disposal)** for more details.

More than likely, residents returning to emergency affected areas will have brought their damaged appliances to the curb for pick-up and disposal. It is not recommended that technicians depend on the advice of homeowners as to the presence of CFCs in appliances. In most cases, homeowners lack the expertise to determine if a damaged or disposed appliance contains CFCs.

Non-CFC bearing appliances may be initially collected, as these, in most cases, do not require additional special handling. The following procedures refer to CFC bearing appliances.

- Before collection is to begin, personnel certified in refrigerant collection should patrol neighborhoods and areas scheduled for pick-up looking for refrigerators, freezers, and similar CFC bearing appliances. The use of a **gas identifier** is highly recommended as the placard installed by the manufacturer may be damaged or removed, or a previous technician may have added additional dissimilar refrigerant gas.
- It is important to remember that for refrigerant gasses to be recyclable they must be kept as pure as possible. Typically, less than 90% purity will render the gas non-marketable. *If possible, several different cylinders and machines dedicated for each gas type (R-12,R-122,R-134a) plus a trash cylinder should be available.* If this is not possible then, keep in mind, that collected CFC's will need to be disposed of at a hazardous waste incinerator which may be more expensive than paying additional personnel for collection activities.
- After the appliance has been cleared of CFCs, it should be clearly marked as such. Individual extraction machines are preferred over one machine that can be used to extract several types of gasses. If one machine is inoperable it can be easily replaced whereas the single multi-gas machine may be

completely out of service. Also, several machines each dedicated to a gas can be used simultaneously.

- Collection of CFCs before pick-up is to begin will allow pick-up personnel to quickly collect these appliances with less regard to care. If refrigerant gasses are not removed prior to pick-up then personnel risk damaging these appliances in a number of ways such as: using exposed refrigerant lines to move or lift an appliance; dropping or dragging appliances on the ground; appliances shifting in a transport truck; catching the blade of a two wheel hand truck on refrigerant lines; an unsecured compressor motor tearing loose refrigerant lines during rough handling, stacking of refrigeration units in a collection container; loading units in a compactor truck; “defrosting” the-freezer with a knife or screwdriver; a technician assuming a refrigeration unit is already vented and cutting refrigerant lines: use of a knuckleboom loader truck which could damage refrigerant lines.
- Many refrigerators and freezers will still have food stuffs remaining. It is advisable that personnel request that residents remove food stuffs before collection. If this is not possible then refrigerators with foodstuffs remaining in them will need to be cleaned at the collection site or central facility. Have personnel or residents clearly mark the unit with a large “F” to indicate that foods stuffs remain in the unit and duct tape the unit closed to prevent fluids and decayed material from accidentally escaping the unit.
- After the appliances are collected they may be brought to a central facility or site. Bare in mind, those appliances with compressors can still have compressor oils and other potentially harmful substances still in them. If further processing is planned then these types of appliances should be separated from other types.
- Many appliances will have putrefied food stuffs remaining, these should be cleaned out using a hoe or similar implement and dumped into a bin, bucket or similar receptacle. Decayed material should then be landfilled. The unit should then be clearly marked in some fashion, identifying it as being cleaned and vented.
- Appliances may be stockpiled and loaded en-masse with the use of heavy equipment into an open top semi-trailer and taken to a recycler. Pre-crushing is an option that will maximize transport vehicle space. Remember that appliances with compressors may still have oils and other fluids still present if

they have not been previously removed. Crushing of these appliances with either a pre-crusher or use of heavy equipment will allow these fluids to possibly contaminate the area or endanger personnel.

- Finally, authorities should be resourceful and innovative in developing strategies and methods that adapt to the availability of resources and financial and time restraints. White goods have a positive value and it is quite probable that white goods collection activities may pay for themselves. The focus should be on protecting personnel from the hazards of white goods management, protecting the public health and the environment.

### **The Solid Waste Section's White Goods Program**

The NC Division of Waste Management's Solid Waste Section has a state wide white goods program. This program was initiated by the NC State legislature to fund and support individual county's in the collection and management of white goods. The primary purpose is to prevent the unlawful disposal of white goods and the illegal venting of refrigerant gasses. To this effect, the legislature set up the white goods fund to make grants to North Carolina counties to buy equipment and infrastructure and to reimburse counties for operational expenses directly related to white goods management.

Counties stricken by disaster and in need of funds to collect and dispose of white goods may apply to the Solid Waste Section for clean-up grants or for grants to help pay for operational expenses incurred during clean-up activities.

As mentioned, white goods have a net positive value as scrap metal and requests made to the Solid Waste Section for additional funds will take into account the present market value of scrap metal. Grant amounts made to individual counties for collection and transport costs for clean-up activities will be based upon the percentage of white goods collected as determined by visual inspection and/or weight tickets. Photos of white goods collection sites and invoices for equipment and services and the input by Regional Waste Management Specialists will also be required.

For more details, visit our website at:

[www.wastenotnc.org](http://www.wastenotnc.org) and look for the white goods links or call Bill Patrakis at 336-771-5091.

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### **References**

1. Small-Scale Technologies to Remove and Manage Refrigerants and Compressors from Discarded Appliances, Washington State Department of Ecology, Publication # 94-171
2. North Carolina Department of Revenue, Sales and Use Technical Bulletin, Section 29