

Responsible Appliance Disposal (RAD) Program: Guidance for Existing and Prospective Partners



Partners in EPA's Responsible Appliance Disposal (RAD) program help protect the ozone layer and reduce emissions of greenhouse gases (GHGs) by disposing of old, inefficient refrigerated appliances using the best environmental practices available. By meeting program requirements and going above what is required by law to remove appliance foam, partners can reduce emissions of ozone-depleting substances (ODS) and GHGs, and will be publicly recognized for doing so. RAD partners also help keep communities safe by ensuring that hazardous materials, such as mercury, polychlorinated biphenyls (PCBs), and used oil, are not released into the environment.

Joining the program may also serve as a way to document efforts, voluntary commitments, or pledges to reduce GHG emissions. In addition, partners that actively encourage the removal of old appliances from the electricity grid (e.g., by providing monetary incentives for old, working appliances) will also reduce energy demand and GHG emissions associated with electricity generation.

What does proper disposal of refrigerated appliances entail?

Responsible disposal of refrigerated appliances involves:

- Proper recovery and reclamation or destruction of refrigerant
- Proper recovery and reclamation or destruction of insulating foam
- Safe disposal of hazardous waste products, including PCBs and mercury
- Proper recycling of used oil
- Recycling all recoverable, durable materials including metal, plastic, and glass, to the extent possible

Refrigerant

Under Section 608 of the 1990 Clean Air Act Amendments and the implementing regulations at [40 Code of Federal Regulations \(CFR\) § 82\(f\)](#), no refrigerant may be vented during the disposal of appliances¹ (40 CFR § 82.154); therefore, refrigerant must be recovered at equipment end-of-life. Refrigerant must be properly recovered using [EPA-certified refrigerant recovery equipment](#), meaning that at least 90% of the refrigerant must be recovered if the compressor is operating, and at least 80% must be

recovered otherwise; alternatively, the refrigerant can be evacuated to 4 inches of mercury vacuum (40 CFR § 82.156). Refrigerant must either be [reclaimed](#) by an [EPA-certified reclaimer](#) (see 40 CFR § 82.164) for reuse, or destroyed using approved destruction methods (see [40 CFR § 82\(a\)](#)) in accordance with applicable federal, state, and local environmental regulations.

Foam

To prevent emissions of the foam blowing agent to the atmosphere, RAD partners agree to remove the insulating foam prior to the disposal of the appliance, either manually or by using an automated system. Partners then either send the insulating foam to a destruction facility, or use advanced technology to mechanically separate the liquid blowing agent for reclamation or destruction.

Foam Processing Technologies

Manual foam recovery is performed using saws to cut through appliances and expose the foam insulation, which is then removed by scraping or "fileting." Once manually removed, appliance foam is bagged with the blowing agent intact and sent for destruction at a waste-to-energy facility. This method is estimated to

¹ See § 82.154 for exceptions.

achieve a blowing agent recovery efficiency of 85%, meaning that only 15% of the blowing agent is released to the environment.

Semi-automated foam recovery is when foam is manually recovered from an appliance, but is then processed using automated technologies to recover the blowing agent from the appliance foam. The automated technologies capture the foam-blowing agent under negative pressure and condense it into liquid form, which is bottled and sent off-site for reclamation or destruction. This method is estimated to achieve a blowing agent recovery efficiency of 85%, meaning that only 15% of the blowing agent is released to the environment.

Fully automated foam recovery and processing uses automated technologies that both recover and process appliance foam in one step. These technologies shred the whole appliance (with foam intact) in fully enclosed equipment following the removal of refrigerant, used oil, appliance doors, and interior glass and metal shelving. This process results in the highest blowing agent recovery efficiency—estimated at 95%, meaning that only 5% of the blowing agent is released to the environment.

PCBs

PCBs are regulated by EPA as toxic substances (40 CFR § 761). PCBs may cause cancer and liver damage, and can have negative impacts on the neurological development of children, the human reproductive system, the immune system, and the endocrine system. PCBs are most likely to be found in a capacitor. If the capacitor does not state “contains no PCBs” or the capacitor (or refrigerator) was manufactured before 1979, assume that the capacitor contains PCBs (see 40 CFR § 761.2 (a)(4) for PCB concentration assumptions and 40 CFR § 761.3 for definitions). Storage of PCB capacitors, which are regulated for disposal, must be for no more than one year and must be in accordance with 40 CFR § 761.65. EPA-approved storage and disposal companies can assist you in properly handling any PCB capacitors recovered from appliances. To find an EPA-approved PCB storage or disposal facility near you, visit <https://www.epa.gov/pcbs/disposal-and-storage-polychlorinated-biphenyl-pcb-waste>.

Mercury

Mercury is regulated by EPA as a toxic substance. Potential adverse health effects from exposure to mercury include tremors, headaches, respiratory failure, reproductive and developmental abnormalities, and potentially, cancers. Therefore, in accordance with federal hazardous waste regulations (40 CFR § 273), mercury waste, such as switches and relays, must be recovered from appliances prior to disposal or shredding, sent to a qualified recovery facility that has appropriate hazardous waste management permits, and managed in accordance with applicable federal, state, and local hazardous waste regulations (e.g., waste must be properly packaged prior to transport) (40 CFR § 273). For more information on the regulatory requirements specific to mercury waste, visit <http://www.epa.gov/mercury/environmental-laws-apply-mercury>. For more information on the proper storage of hazardous waste, visit EPA's [Hazardous Waste](#) webpage. The federal hazardous waste regulations under the Resource Conservation and Recovery Act (RCRA) can be found at [40 CFR § 260-279](#).

Used oil

If improperly handled, used oil can leak into groundwater and major waterways and pollute drinking water sources. Used oil from appliances may contain toxic chemicals and heavy metals that are dangerous to human health. Therefore, used oil removed from appliances must be properly managed in accordance with the federal used oil management standards (40 CFR § 279), or the equivalent state regulations. Before recycling and disposal, used oil must be stored in appropriate containers in good condition and with no visible leaks (40 CFR § 279). Per the RCRA used oil rebuttable presumption, refrigerant contaminating the used oil should be recovered. Used oil removed from refrigerated appliances cannot be mixed with used oil from other sources (40 CFR § 279).

Where can I find more information?

Visit EPA's RAD Program website at <https://www.epa.gov/rad>.