

## Scrap Appliances Containing Refrigerants: A Municipal Challenge

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**Key Words:** refrigerants, appliances, municipalities

**Abstract:** This presentation will address some of the questions brought about by handling appliances prior to CFC recovery, such as:

- How can CFC releases be minimized?
- What does the Clean Air Act require?
- Should this activity be in-house or out-sourced?
- Compressor Oil - How do you get it out and what do you do with it?
- Scrap Metal Recycling - Are the returns worth the effort?

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### Abstract (continued)

EPA has taken an active interest in municipal handling of appliances with refrigerants. Inspections, information requests, and enforcement actions have all focused on this issue. Incidental releases during transport have been a major focus.

Municipalities have taken a variety of approaches, from curbside CFC recovery, to CFC recovery at a dedicated site, to contracting with a landfill operator to have the landfill recover the CFCs prior to disposal. Kansas City has tried all of these approaches, and has tried overhead booms, appliance dollies, and muscle power to load and unload appliances.

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### Abstract (continued)

Kansas City's experience concludes:

- Scrap appliances with refrigerant require more attention than most municipalities have devoted to them.
- The CFCs and compressor oils found in scrap appliances raise important environmental and legal concerns.
- The approach that works best in Kansas City is labor intensive, but maximizes material recovery, minimizes costs, and assures compliance.

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# Scrap Appliances Containing Refrigerants

A Municipal Challenge

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## Introduction

- Every year, millions of households replace refrigerators, air conditioners, etc.
- Typically, Municipalities collect and manage scrap appliances.
- Scrap appliances with refrigerants raise environmental and regulatory concerns.

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## Introduction

- Every year, Kansas City collects:
  - 4,200 scrap appliances with refrigerant (refrigerators, air conditioners, water coolers, etc)
  - 2,400 scrap appliances w/o refrigerant (washers, dryers, dishwashers, etc)

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## Introduction

- A typical refrigerator contains:
  - About 5 ounces of CFC, regulated under the CAA
  - About 5 ounces of compressor oil, regulated under used oil regs.
  - A compressor motor with copper coils: not acceptable to some steel recyclers

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## Introduction – The Challenge

- To pick up and manage refrigerant containing appliances,
- While practicing good environmental stewardship,
- And minimizing costs.

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## Background

- Historically, scrap appliances were typically landfilled.
- Problems with landfilling include:
  - CFCs and oil don't belong in landfills.
  - Some states (Missouri) ban appliances from landfills.
  - Landfills are expensive. (\$190/ton vs \$20/ton for MSW).

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## Background

- Today, most scrap appliances are recycled.
- Recycling challenges:
  - Refrigerants need special handling
  - Oils may need special handling
  - Copper may need special handling
  - Process must be cost-effective

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## Refrigerant Management – Regulatory Overview

- CFCs are regulated by the Clean Air Act – 40 CFR Part 82 – Protection of Stratospheric Ozone
  - Legal standard – “no person . . . disposing of appliances may knowingly vent or otherwise release into the environment any . . . refrigerant in such equipment. De minimis releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition.”

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## Refrigerant Management – Regulatory Overview

- EPA scrutinizes scrap appliance handling.
- Kansas City has received information request letters and inspections.
- Other municipalities have been fined.

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## Refrigerant Management – Process Overview

- CFCs in refrigerators are located in the compressor and coils.
- Typically, the CFCs will be partly in a liquid phase and partly gas.
- CFCs are removed by tapping into the coils and applying vacuum. Under vacuum, liquid CFCs evaporate and are removed as a gas.

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### Refrigerant Management – Process Overview

- Freon recovery must be done by certified freon recovery technicians.
- Freon recovery must be done using EPA registered and approved equipment.

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### Refrigerant Management Case Study – Kansas City, 1998

- 1) Residents place appliances at curb.
- 2) City workers collect appliances using “clam trucks.”
- 3) Appliances are transported to landfill.
- 4) Landfill recovers freon prior to disposal.
- 5) Appliances are landfilled.

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## Refrigerant Management Case Study – What can go wrong.

1. Resident places appliance at curb.
  2. City collects appliance using "clam truck."
  3. Appliance is transported to landfill.
  4. Landfill recovers freon prior to disposal.
  5. Appliance is landfilled.
- Scavengers get appliance before City
  - Appliance is damaged causing freon release
  - Appliance is not segregated from waste
  - Damage during storage releases freon
  - Resources wasted

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## Refrigerant Management Case Study – Solving the Problems

- Problem: Scavenging
- Solutions:
  - Rapid Pick-up
  - Enforcement
- Result: Scavengers get 30% of refrigerators

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## Refrigerant Management Case Study – Solving the Problems

- Problem: Damage during handling
- Solutions:
  - Retrain clam operators
  - Use liftgates & dollies
  - Recover freon prior to transport
- Result: KC uses liftgates.

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### Refrigerant Management Case Study – Solving the Problems

- Problem: Landfill may not recover CFCs
- Solutions:
  - Monitor landfill
  - Remove freon at City facility
- Result: KC removes freon at City facility

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### Refrigerant Management Case Study – Solving the Problems

- Problem: Appliances were landfilled, rather than recycled.
- Solutions:
  - Remove compressors, and remove compressor oil
  - Compressor oil is recycled as Off-Spec Used Oil
  - Compressors and Appliances go to steel recyclers
- Result: Almost everything is beneficially reused.
- Update: A few recyclers will accept refrigerators intact.

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### Refrigerant Management Case Study – Kansas City, 2001

- 1) Residents place appliances at curb.
- 2) City workers collect appliances using dollies and liftgate.
- 3) Appliances are transported to City Facility.
- 4) Freon is removed. Appliances are crushed and baled.
- 5) Freon and Appliance are recycled.

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**1998 vs 2001 – Cost Comparison**

- 2001
  - 4,200 Appliances x \$17.25/Appliance = \$72,450/year
- 1998
  - 4,200 Appliances x .1 tons/Appliance x \$190/ton = \$79,800

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**Conclusion**

- Most municipalities deal with scrap appliances.
- Many have not focused on the issues they raise.
- Potential Benefits include:
  - Improve regulatory compliance
  - Increase recycling/reuse
  - Save money

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