Refrigerant Management Program

Introduction
Harvard maintains refrigerant containing equipment on each campus. This fact sheet summarizes general regulatory requirements for refrigerant installation, operation and disposal as well as compliance management practices for facility personnel and outside contractors that may maintain Harvard owned equipment.

Applicable Regulations
40 CFR 82 Subpart F: Protection of Stratospheric Ozone

Applicability
Equipment containing any amount and type of refrigerant is regulated with very specific exemptions.

The most common refrigerant containing equipment at Harvard includes chillers, rooftop unit air conditioners, food service refrigeration equipment and heat pumps.

The most common refrigerants in use at Harvard include: R-11, R-12, R-22, R-123, R-134A, R-404A, R-410A.

Summary of Requirements
1. Prohibition on Venting: Individuals are prohibited from knowingly venting refrigerant into the atmosphere while maintaining, servicing, repairing, or disposing of equipment.

2. Evacuation Requirements: Certified technicians must evacuate the refrigerant from equipment of any size when opening the equipment for maintenance or disposal.

3. Leak Repair Requirements
   - Building managers must maintain records indicating quantity of refrigerant added during servicing and maintenance and calculate the leak rate every time refrigerant is added to an appliance having refrigerant capacity greater than 50 pounds.
   - Leaks must be repaired when the appliance leaks at a rate exceeding the applicable trigger rate for a 12-month period.
   - The leak repair regulations do not apply to equipment with refrigerant charge sizes less than 50 pounds. However, smaller equipment is not exempt from the refrigerant venting prohibition as described above.

Trigger Rates

<table>
<thead>
<tr>
<th>Appliance Type</th>
<th>Leak Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Refrigeration (equipment found in supermarkets, convenience stores, restaurants and other food service establishments.)</td>
<td>20%</td>
</tr>
<tr>
<td>Comfort Cooling (chillers, commercial split systems and packaged roof top units)</td>
<td>10%</td>
</tr>
<tr>
<td>All other appliances (ice makers, etc.)</td>
<td>10%</td>
</tr>
</tbody>
</table>
Building managers that operate equipment that is leaking refrigerant above the applicable trigger rate must either:

- Repair leaks within 30 days from the date the leak was discovered, or
- Develop, within 30 days, a plan to retrofit or retire the appliance and complete the actions under that plan within one year. A copy of the plan must be kept on site, and the original plan must be made available to EPA upon request.
- An initial and follow-up verification test of leak repairs, for appliances that exceed the applicable leak rate is required:
  - An initial verification test must be performed before any additional refrigerant is added to the appliance to demonstrate that the leak is repaired.
  - A follow-up verification test must be performed only after the appliance has returned to normal operating characteristics and conditions. There is no minimum timeframe.

4. Leak Reporting
Releases of some refrigerants must be reported to MassDEP immediately if the release is over a certain threshold. These include R-11, R-12, R-140A, R-142, R-151 and Methyl Bromide. Contact EH&S immediately in the event of a release for further guidance.

5. Technician Certification
- Service or disposal of appliances containing any amount of refrigerant (other than vehicle a/c) can only be done by EPA certified technicians.
- All Harvard technicians or contractors who perform maintenance, service, repair, or disposal must pass an EPA-approved test to earn Section 608 Certification and provide proof of certification prior to service or repair work.

6. Purchasing Refrigerants
- Technicians who have earned the Section 608 Technician Certification.
- Employers of a Section 608 certified technician (or the employer's authorized representative) if the employer provides the refrigerant wholesaler with written evidence that he or she employs at least one properly certified technician.

7. Disposal Requirements
- All major refrigerant containing equipment must have their refrigerant recovered prior to on site dismantling.
- Small units that can enter waste stream intact, such as freezers, window air conditioners shall have their refrigerant recovered prior to waste pick up.

8. Recordkeeping Requirements
- Technicians must keep a copy of their proof of certification on site at Harvard.
- Contractors must provide the owner with an invoice that indicates the amount of refrigerant added to the appliance
For appliances that contain 50 or more pounds of refrigerant, building managers must keep servicing records documenting the date and type of service, as well as the quantity of refrigerant added and disposal logs.

Disposal of appliances containing between 5 and 50 pounds of refrigerant must keep records of the disposal.

Building managers must maintain records of leak inspections and tests performed to verify repairs of leaking appliances.

Starting January 1, 2019, a report must be submitted to EPA for any appliance containing 50 or more pounds of refrigerant that leaks 125 percent or more of the full charge in a calendar year. This report must describe efforts to identify leaks and repair the appliance.

All records must be maintained onsite for five years.

Responsibilities

9. Building Managers

- Maintain refrigerant-containing equipment inventory in Hara. Any change, addition, or removal to the inventory shall be communicated to EH&S for updating in Hara;
- Ensure that all technicians who perform maintenance on refrigerant-containing equipment are certified by EPA;
- Maintain servicing records for appliances containing 50 or more pounds of refrigerants for five years. These records shall document date and type of service, the quantity of refrigerant added and the leak rate any time refrigerant was added to the system.

10. Environmental Health & Safety (EH&S)

- Maintain refrigerant-containing equipment inventory in Hara and review yearly as part of the Annual Compliance Certification;
- Maintain an inventory of EPA certified recovery equipment;
- Maintain a list of EPA certified refrigerant service technicians;
- Provide technical assistant to facility managers in reviewing contractors/vendors servicing refrigerant-containing equipment;
- Provide training to facility managers as needed.
Refrigerant Management Program

Reportable Concentrations (Massachusetts Only)

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Common Name</th>
<th>Reportable Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DICHLORODIFLUOROMETHANE</td>
<td>CFC-12 or R-12</td>
<td>100 LBS</td>
</tr>
<tr>
<td>TRICHLOROFLUOROMETHANE</td>
<td>CFC-11 or R-11</td>
<td>100 LBS</td>
</tr>
<tr>
<td>1-CHLORO-1,1-DIFLUOROETHANE</td>
<td>HCFC-142 or R-142</td>
<td>10 LBS</td>
</tr>
<tr>
<td>CHLOROFLUOROETHANE</td>
<td>HCFC-151 or R-151</td>
<td>10 LBS</td>
</tr>
<tr>
<td>METHYL CHLOROFORM</td>
<td>R-140a</td>
<td>50 LBS</td>
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<tr>
<td>BROMOMETHANE</td>
<td>Methyl Bromide</td>
<td>50 LBS</td>
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</table>

Regulated Refrigerants

Appendix A to Subpart A of Part 82—Class I Controlled Substances

A. Group I:
- CFCl3-Trichlorotrifluoroethane (CFC-113)
- CF2Cl2-Dichlorotetrafluoroethane (CFC-114)
- C2F3Cl3-Trichloro trifluoroethane (CFC-115)
- All isomers of the above chemicals

B. Group II:
- CF2ClBr-Bromochlorodifluoroethane (Halon-1211)
- CF3Br-Bromotetrafluoroethane (Halon-1301)
- C2F4Br2-Dibromotetrafluoroethane (Halon-2402)
- All isomers of the above chemicals

C. Group III:
- CF3Cl-Chlorotrifluoroethane (CFC-13)
- C2FCl3-(CFC-111)
- C2F2Cl2-(CFC-112)
- C3FCl3-(CFC-211)
- C2F2Cl2-(CFC-212)
- C3F2Cl2-(CFC-213)
C₃F₄Cl₋(CFC-214)  
C₃F₅Cl₋(CFC-215)  
C₃F₆Cl₋(CFC-216)  
C₄F₇Cl₋(CFC-217)  
All isomers of the above chemicals  

D. Group IV: CCl₄-Carbon Tetrachloride  
E. Group V:  
C₂H₃Cl₋1,1,1 Trichloroethane (Methyl chloroform)  
All isomers of the above chemical except 1,1,2-trichloroethane  

F. Group VI: CH₃ Br—Bromomethane (Methyl Bromide)  
G. Group VII:  
CHFBr₂  
CHF₂ Br (HBFC-2201)  
CH₂FBr  
C₂HFBr₂  
C₂HF₂ Br₃  
C₂HF₃ Br₂  
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C₂H₂FBr₃  
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C₂H₂F₅ Br₂  
C₂H₂F₆ Br.
### Appendix B to Subpart A of Part 82—Class II Controlled Substances

<table>
<thead>
<tr>
<th>Controlled Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. HCFC-21 (CHFCI2) Dichlorofluoromethane</td>
</tr>
<tr>
<td>2. HCFC-22 (CHF2CI) Monochlorodifluoromethane</td>
</tr>
<tr>
<td>3. HCFC-31 (CH2FCI) Monochlorofluoromethane</td>
</tr>
<tr>
<td>4. HCFC-121 (C2HFCI4) Tetrachlorofluorooctane</td>
</tr>
<tr>
<td>5. HCFC-122 (C2HF2CI3) Trichlorodifluorooctane</td>
</tr>
<tr>
<td>6. HCFC-123 (C2HF3CI2) Dichlorotrifluorooctane</td>
</tr>
<tr>
<td>7. HCFC-124 (C2HF4CI) Monochlorotetrafluorooctane</td>
</tr>
<tr>
<td>8. HCFC-131 (C2H2FCI3) Trichlorofluoroethane</td>
</tr>
<tr>
<td>9. HCFC-132 (C2H2F2CI2) Dichlorodifluoroethane</td>
</tr>
<tr>
<td>10. HCFC-133 (C2H2F3CI) Monochlorotrifluoroethane</td>
</tr>
<tr>
<td>11. HCFC-141 (C2H3FCI2) Dichlorofluoroethane</td>
</tr>
<tr>
<td>12. HCFC-141b (CH3CFCI2) Dichlorofluoroethene</td>
</tr>
<tr>
<td>13. HCFC-142 (C2H3F2CI) Chlorodifluoroethane</td>
</tr>
<tr>
<td>14. HCFC-142b (CH3CF2CI) Monochlorodifluoroethane</td>
</tr>
<tr>
<td>15. HCFC-151 (C2H4FCI) Chlorofluoroethane</td>
</tr>
<tr>
<td>16. HCFC-221 (C3HCO6) Hexachlorofluoropropene</td>
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Appendix F to Subpart A of Part 82—Listing of Ozone-Depleting Chemicals

<table>
<thead>
<tr>
<th>Controlled substance</th>
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<tbody>
<tr>
<td>A. Class I:</td>
</tr>
<tr>
<td>1. Group I:</td>
</tr>
<tr>
<td>CFCI_3- Trichlorofluoromethane (CFC-11)</td>
</tr>
<tr>
<td>CF_2 Cl_2-Dichlorodifluoromethane (CFC-12)</td>
</tr>
<tr>
<td>C_2 F_3 Cl_2-Trichlorotrifluoroethane (CFC-113)</td>
</tr>
<tr>
<td>C_2 F_4 Cl_2-Dichlorotetrafluoroethane (CFC-114)</td>
</tr>
<tr>
<td>C_2 F_5 Cl-Monochloropentafluoroethane (CFC-115)</td>
</tr>
<tr>
<td>All isomers of the above chemicals</td>
</tr>
</tbody>
</table>
2. Group II:
- CF₂ClBr-Bromochlorodifluoromethane (Halon-1211)
- CF₃Br-Bromotrifluoromethane (Halon-1301)
- C₂F₄Br₂-Dibromotetrafluoroethane (Halon-2402)
- All isomers of the above chemicals

3. Group III:
- CF₃Cl-Chlorotrifluoromethane (CFC-13)
- C₂F₂Cl₂-(CFC-111)
- C₂F₂Cl₃-(CFC-112)
- C₃F₃Cl₂-(CFC-211)
- C₃F₃Cl₃-(CFC-212)
- C₃F₃Cl₄-(CFC-213)
- C₃F₄Cl₃-(CFC-214)
- C₃F₄Cl₄-(CFC-215)
- C₃F₅Cl₃-(CFC-216)
- C₃F₆Cl-(CFC-217)
- All isomers of the above chemicals

4. Group IV:
- CCl₄-Carbon Tetrachloride

5. Group V:
- C₂H₃Cl₃-1,1,1-Trichloroethane (Methyl chloroform)
- All isomers of the above chemical except 1,1,2-trichloroethane

6. Group VI:
- CH₃Br-Bromomethane (Methyl Bromide)

7. Group VII:
- CHFBr₂-
- CHF₂Br-(HBFC-22B1)
- CH₂FBr
- C₂HFBr₄
- C₂HF₂Br₃
- C₂HF₃Br₂
- C₂HF₄Br
- C₂H₂FB₁₅
### Group VIII:

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<th>Formula</th>
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<tr>
<td>C₂H₂FBr</td>
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</tbody>
</table>

8. Group VIII:

- CH₂BrCl (Chlorobromomethane)

### Class II:

- CHFC₂-Dichlorofluoromethane (HCFC-21)
- CHF₂ Cl-Chlorodifluoromethane (HCFC-22)
- CH₂ FCl-Chlorofluoromethane (HCFC-31)
<table>
<thead>
<tr>
<th>Chemical Formula</th>
<th>Name</th>
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<tbody>
<tr>
<td>C₂HFCl⁻ (HCFC-121)</td>
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<tr>
<td>C₂HF₂Cl⁻ (HCFC-122)</td>
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<tr>
<td>C₂HF₃Cl⁻ (HCFC-123)</td>
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<tr>
<td>C₂HF₄Cl⁻ (HCFC-124)</td>
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<td>C₂H₂FCl⁻ (HCFC-131)</td>
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<td>C₂H₂F₂Cl⁻ (HCFC-132b)</td>
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<td>C₂H₃FCl⁻ (HCFC-142b)</td>
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<td>C₂H₃F₂Cl⁻ (HCFC-221)</td>
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<td>C₂H₃F₃Cl⁻ (HCFC-222)</td>
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<td>C₂H₃F₄Cl⁻ (HCFC-223)</td>
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<td>C₂H₄F₂Cl⁻ (HCFC-224)</td>
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<tr>
<td>C₂H₄F₃Cl⁻ (HCFC-225ca)</td>
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<td>(HCFC-225cb)</td>
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<tr>
<td>C₂H₄F₄Cl⁻ (HCFC-226)</td>
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<td>C₂H₅FCl⁻ (HCFC-231)</td>
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<td>C₂H₅F₂Cl⁻ (HCFC-232)</td>
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<td>C₂H₅F₃Cl⁻ (HCFC-233)</td>
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<tr>
<td>C₂H₅F₄Cl⁻ (HCFC-234)</td>
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<tr>
<td>C₂H₆F⁻Cl⁻ (HCFC-235)</td>
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<td>C₂H₆F₂Cl⁻ (HCFC-241)</td>
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</tr>
<tr>
<td>C₂H₆F₃Cl⁻ (HCFC-242)</td>
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<tr>
<td>C₂H₆F₄Cl⁻ (HCFC-243)</td>
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</tr>
<tr>
<td>C₂H₇F₂Cl⁻ (HCFC-244)</td>
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</tr>
<tr>
<td>C₂H₇F₃Cl⁻ (HCFC-251)</td>
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<tr>
<td>C₂H₇F₄Cl⁻ (HCFC-252)</td>
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<tr>
<td>C₂H₈F⁻Cl⁻ (HCFC-253)</td>
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<tr>
<td>C₂H₈F₂Cl⁻ (HCFC-261)</td>
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<tr>
<td>C₂H₈F₃Cl⁻ (HCFC-262)</td>
<td></td>
</tr>
<tr>
<td>C₂H₉FCl⁻ (HCFC-271)</td>
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</tbody>
</table>

All isomers of the above chemicals