SHORE FACILITIES
OZONE DEPLETING SUBSTANCES
CONVERSION GUIDE
FOR
HEATING, VENTILATION, AIR CONDITIONING/REFRIGERATION
AND
FIRE PROTECTION SYSTEMS

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APRIL 1996
REVISED: NOVEMBER 1997

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1 INTRODUCTION

This document has been prepared by Naval Facilities Engineering Command to provide guidance to select the best alternatives for phasing out Class I ozone depleting substance (ODS) at Navy's shore activities heating, ventilation, air conditioning and refrigeration (HVAC&R) and fire protection systems.

The production phase out of substances that destroy stratospheric ozone, such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) refrigerants, is expected to be one of the greatest worldwide industrial transformations ever undertaken for reasons other than war. Production of CFC has been down to 25 percent of the 1986 production level since 1994 and totally banned since 1 January 1996. A significantly limited supply of CFC refrigerants is expected to occur within the next years. Historically shore facilities have been effected by industrial transformations in a manner similar to the private sector. The major manufacturers of HVAC&R equipment have responded in a timely manner and have developed CFC free equipment that in many cases is even more energy efficient than its predecessors. They expect that the demand for CFC free equipment surpasses their ability to supply. The main reason for a spike in demand of CFC free equipment is procrastination in planning and implementing phase out strategies by the customers. According to a recent survey of the Air-Conditioning and Refrigeration Institute (ARI), approximately 80 percent of the centrifugal chillers in the United States used in commercial and institutional buildings will operate using a CFC refrigerant after the production ban, and about 60 percent will still remain in service a year latter. To minimize the effects of the ODS production phase out in their mission, shore facilities need to develop and implement effective plans that identify the current uses of ODS and program an orderly transition to acceptable alternatives.

The following is a summary of the circumstances that resulted in the phase out of ODS.

Based on substantial scientific evidence, a national and international consensus exists that production of certain man-made halocarbons, such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform must be restricted because of the high risk of depletion of the stratospheric ozone layer through the release of chlorine and bromine. The stratospheric ozone layer protects the Earth from the penetration of harmful ultraviolet (UV-B) radiation. The destruction of this layer will result in significant adverse effects to all forms of life in the planet.

In response to the threat of destruction of the ozone layer 23 nations, including the United States, signed an international agreement in 1987 known as the Montreal Protocol which limits the production of ODS. The Protocol mandates that signatories reduce ODS production according to a strict phase-out schedule. The Protocol was amended in 1990 and 1992. More than 130 nations have ratified the Montreal Protocol. In November of 1990, the United States Congress passed the Clean Air Act (CAA) Amendments of 1990. Title VI of the CAA include requirements for controlling ODSs. These requirements are generally consistent with , but in some cases more stringent that those contained in the Montreal Protocol.

The US Navy is committed to progressively minimize and eventually eliminate the use of ODSs. The Environmental protection Agency (EPA) has developed a program to expedite the phase out of ODS. The program identified substitutes that offer lower overall risks to human health and the environment, known as the Significant New Alternatives Policy (SNAP) program. The Navy is required to only use substitutes that have been approved under the SNAP program.

Following the phase out schedule of the CAA, the Navy's phase out began with the substances listed in the CAA as Class I ODSs due to their high ozone depletion potential (ODP). Eventually those substances listed as Class II ODSs, which are in some cases alternatives to Class I ODS, will also be eliminated. During the initial phase out, special consideration has been given to certain uses of Class I ODS which are considered mission critical. The use of Class I ODSs for mission critical applications must be continued until the appropriate safe alternative substances or systems are available. Almost all of the shore based HVAC&R and fire protection equipment and systems are considered non-mission critical.

2. RECOMMENDED MEASURES TO PHASE OUT HVAC&R SYSTEMS.

The Class I refrigerants are used in many types of equipment with the major use in the following types of equipment: large chillers (e g air conditioning loads over 100 tons) and refrigeration/cold storage equipment. Class I refrigerants are also used in small appliances (like refrigerators) and in mobile equipment (e. g. automobiles). The remainder of the equipment serves smaller air-conditioning loads and generally uses HCFC-22 as the refrigerant, which is listed in the CAA as a Class II ODS. This typical breakdown of types of equipment by use provides the structure for the remaining sections of this chapter. The refrigerant phase out presents a significant challenge for the Navy. Early planning, and budgeting are the main steps for a successful phase out program and a less painful transition period. The development and implementation of an ODS conversion plan is the keystone to phase out ODS in an orderly fashion at shore activities.

2-1 CFCs HVAC&R Phase out Options.

Dealing with existing CFC equipment comes down to three basic options. The equipment can be:
(1) retrofitted to the use of approved EPA's SNAP substitute refrigerants, or;
(2) replaced with new units designed for use with EPA's SNAP alternate refrigerants;
(3) as a last option "run as-is", making sure leak rate is within the applicable regulatory allowable annual leak rate (Note: CNO approval via the major claimant is required to operate past December 31, 2000).

The first criteria for alternative selection is that the alternative be EPA SNAP-approved. Section 7-3 of this guide presents additional information on the SNAP program which promotes the use of alternatives to Class I and Class II substances that minimize human health risks and are environmentally friendly. The SNAP list is published in the Federal Register and updated regularly. The second criteria for alternative selection is that the alternative must have an ODP of 0.05 or less. All alternatives that are selected must meet performance criteria. Other considerations include material availability and cost. Specific information on alternatives is available from your Engineering Field Division (EFD), Engineering Field Activity (EFA) or your Public Work Center (PWC). Information can also be obtained from the U.S. Navy Shipboard Environmental Information Clearinghouse (SEIC) at (703)416-1132. Another excellent source of information for alternatives for your equipment is the Original Equipment Manufacturer (OEM).

The third option is in conflict with the Navy policy and requires a waiver from the Chief of Naval Operations as indicated in section 6-5.19 of OPNAVINST 5090.1B. This option should be used only as a temporary measure for equipment that is in excellent operational condition and when availability of CFCs is feasible through the transition period. In all cases, the overall goal of every CFC equipment management program should be the phase out of CFC refrigerants as required by OPNAVINST 5090.1B. This can only be achieved with the implementation of the first or second option. During the production phase out of ODSs, CFC refrigerants will become

increasingly scarce and prices are expected to increase. Therefore, during the conversion of equipment it is important to minimize leaks and preserve the refrigerant being used in all types of HVAC&R equipment, as required by 40 CFR 82.156(i). This can be accomplished with periodic leak testing and repair to minimize refrigerant loss, the addition of high efficiency purge units (for low pressure systems), proper handling of recovered and recycled refrigerants, and adequate training for personnel. **See section 3.**

2-2 CFCs HVAC&R Phase out Strategies.

2-2.1 Small Appliances.

The strategy to phase out small appliances that use CFCs as a refrigerant is by attrition. Small appliances are appliances that do not normally require routine maintenance of the sealed refrigerant system and have a cooling capacity rating of 5 tons or less. Some examples of small appliances are refrigerators, freezers, small ice makers, water coolers, vending machines, etc. For the purpose of this section motor vehicle air conditioners (MVACs) are considered small appliances. The phase out requirement of OPNAVINST 5090.1B does not apply to small appliances. Small appliances using a CFC as a refrigerant should remain in use as long as they are in sound operational conditions and do not require expensive repairs or repairs involving opening the appliances refrigerant system. Small appliances using a CFC refrigerant should be replaced at the end of their useful life with new CFC free small appliances when available.

2-2.2 Other HVAC&R Systems (Appliances).

The strategy to implement the three options available for phase out appliances (other than small appliances) is covered in the following sections for each of the major categories of HVAC&R systems typically found in Navy's shore facilities. Your local EFD/EFA/PWC air conditioning/refrigeration engineer can provide complete guidance concerning the retrofit/conversion alternatives. Table 2-1 provides information on the HCFCs phase out schedules. Table 2-2 provides a quick reference on NAVFAC's recommended solutions for the retrofitting/conversion HVAC&R systems.

2-2.2.1 Large AC Units (Water Chillers).

Traditionally, water chillers of over 100 tons capacity have been designed with centrifugal compressors and CFC refrigerants. The most commonly used refrigerants for this group of equipment were CFC-11, CFC-12, CFC-500, and HCFC-22. Existing chillers using HCFC-22 require no immediate attention other than prevention of unnecessary refrigerant release per EPA rules. It is likely these machines will have reached the end of their useful lifetime before the phase out of this refrigerant. The machines of interest in this section are therefore those using the CFC refrigerants.

Table 2-1
Class II ODS Production Phase Out Schedule

Control Period (yr.)	HCFC-141b	HCFC-142b	HCFC-22	All other HCFCs
2003	**Production Banned (3)**			
2010		**Production Frozen (1,3)**	**Production Frozen (1,3)**	
2015				**Production Frozen (2,3)**
2020		**Production Banned (3)**	**Production Banned (3)**	
2030				**Production Banned (3)**

NOTES:
1. Exemptions to "Frozen" and "Banned" production identified in parenthesis in the table (other exemptions not related to refrigeration also apply, refer to 40 CFR 82.4 for more details):
"(1)" Except for use in servicing equipment manufactured before 1 January 2010.
"(2)" Except as a refrigerant in equipment manufactured before 1 January 2020.
"(3)" Except for use in medical devices and export to developing countries.

Table 2-2
NAVFAC Recommended Solutions For HVAC&R Retrofitting

Current System Age	Less than 10 years old	10 to 20 years old	older that 20 years
CFC-11 system (Low Pressure)	**note 1**	**note 1 or 3**	**note 3**
CFC-12/CFC-500 system (Med Pressure)	**note 2**	**note 2 or 3**	**note 3**
HCFC-22 system (Class 2)	**no immediate action**	**no immediate action**	**no immediate action**

NOTES
1. Retrofit to a HCFC-123 system. Best done at the time of major maintenance.
2. Retrofit to a HFC-134a system. Best done at the time of major maintenance.
3. Replace system with a HCFC-123, HFC-134a or HCFC-22 system or other replacement system Depends on condition of system and estimated cost of new system. Market choice depends on economics.
Conversion during a scheduled overhaul can save $10,000 to $15,000.
Small (under 5 tons) hermetic systems (water coolers and small appliances) should be replaced at the end of their useful life. Buy what is on the market at the time. Manufacturers will make ODS free units in the near future.

2-2.2.1.1 Retrofit of Chillers. The first option is to retrofit CFC-based machines to an SNAP alternative refrigerant. Generally, this option will be economical for newer machines (those less than 10 years old) that are in good operational conditions. Even for these newer machines, the decision to retrofit to an alternative refrigerant should be considered very carefully. The decision should be based on a life-cycle cost analysis that includes such factors as: mechanical/structural integrity and remaining life of the chiller, first cost of conversion, energy costs (retrofits may change energy consumption rates), loss of capacity, and operation and maintenance costs. The remaining life must be factored into the decision since a retrofit will probably not increase the useful life of the machine. A reliable contractor, the OEM, or an in-house refrigeration technical expert should be able to provide a feasibility study as a prerequisite to performing the actual retrofit. As part of the feasibility study, the contractor or in-house person should be able to provide estimates of efficiency, capacity loss, expected lifetime, etc. Contractors who can perform both the feasibility study and the actual conversion as well as having strong ties to the OEM should be sought. Strong ties to the OEM are so crucial because the alternative refrigerants have different chemical compositions and often use different lubricants than those specified in the original system design. The OEM is in a better position to know which seals, gaskets, and other parts must be replaced to achieve a successful retrofit. This is especially important because material incompatibility problems that may not surface immediately could eventually lead to catastrophic failures. Approval by the EPA under SNAP must be a precondition for consideration of any alternative refrigerant. Alternative refrigerants approved by the EPA and familiar to the OEM should be considered as the only viable options for a conversion.

2-2.2.1.1.1 For low pressure systems, CFC-11 has been the most commonly used refrigerant. As an alternative to CFC-11, HCFC-123 is the recommended substitute but, it is not a drop-in substitute and extensive system modifications are necessary. Although the same oil as used in CFC-11 systems can be used in the HCFC-123 systems, HCFC-123 is a more aggressive solvent. Depending on the construction of the particular chiller, conversion to HCFC-123 may require that seals, gaskets, bushings, diaphragms, motor insulation, or even the compressor motor be replaced. A retrofit addressing only the material compatibility requirements would likely result in efficiency losses of up to 5 percent and capacity reductions up to 20 percent. Correcting this with modifications to the compressor and refrigerant flow metering devices, the decrease in efficiency would be between 2 and 4 percent with a loss in capacity of less than 5 percent. The cost for this type of retrofit on a hermetic chiller should run about 20 to 40 percent ($60 to $140 per ton) of the cost of replacement chiller.

2-2.2.1.1.2 For high pressure systems using CFC-12 and CFC-500, the recommended substitute is HFC-134a. HFC-134a has shown excellent material compatibility with polymers and metals used in centrifugal chillers. However, the mineral oils typically used with CFC-12 are insoluble in HFC-134a. The HFC-134a systems must use synthetic oils. A direct retrofit from CFC-12 or CFC-500 to HFC-134a that includes the new refrigerant and service time to flush the system of its mineral oil and recharge with the recommended synthetic oil will cost approximately 26 percent of a new chiller price. The retrofit from CFC-12 will result in an 8 to 10 percent capacity loss with a 1 to 2 percent loss in efficiency. Retrofits of CFC-500 chillers result in little or no capacity loss and about 0.5 percent efficiency loss. As with the low pressure systems, a

more extensive retrofit can regain the capacity and efficiency of the original configuration. This would require changes in impeller and/or speed. Overall retrofit costs generally range from $20K to $70K per system.

2-2.2.1.2 Replacement. The second option for compliance is replacement of existing machines with new ones. This option should be reserved for machines not cost-effective to fully repair or retrofit. Generally, this option will be economical for older machines (those more than 20 years old). Even though HCFC refrigerants are scheduled for phase out, for the near future it is perfectly acceptable to purchase new equipment that uses EPA's SNAP approved refrigerants. As shown in Table 2-1, production of new HCFC-141b will be banned for both existing and new systems beginning in year 2003, but it is not expected to affect the HVAC&R industry because of its limited use. Comparatively, the production of HCFC-22 and HFCF-142b will be frozen in year 2010 but will allow production to continue for servicing equipment manufactured prior to 1 January 2010 until year 2020. For all other Class II HCFCs, like HCFC-123, beginning in year 2015 production will be restricted (frozen) but will allow production to continue for servicing equipment manufactured prior to year 2020 until year 2030. The useful lifetime of equipment using HCFC refrigerants will likely not extend beyond the banning of new refrigerant production. The major alternatives for new chillers are HCFC-22, HCFC-123, and HFC-134a. HFC-134a is the alternative with a zero-Ozone Depleting Potential.

2-2.2.1.3 Maintain/run as-is. The third option for dealing with existing CFC equipment is to leave it running as-is. Because of the Navy policy, this option should be looked at as a temporary/transitory measure preceding the final phase out of the system. If the CFC system will be kept maintain/run as-is beyond 31 December 2000 a waiver from CNO (N45) will be required per Section 6-5.19 of OPNAVINST 5090.1B. This option is probably most appropriate for older chillers in good operating condition. Waivers will most likely not be granted by CNO. Therefore, facilities should eliminate Class I ODS as soon as possible. Considering the budget cycle, activities have no time to delay. Hopefully, replacement CFC refrigerants will continue to be available as recycling and reclamation programs develop, although the cost will surely continue to rise. The availability of CFCs for the continuing maintenance/servicing of the equipment is the most important factor to consider to establish the time that this option will be in place. It is also important to understand that the Navy's Class I ODS Reserve is for the exclusive use of the established mission critical applications. Practically all shore activities HVAC&R systems are **NOT** considered mission critical applications. Thus the success of this option will depend on management and service practices that minimize the need for purchasing replacement refrigerant. An important advantage to maintaining some of the equipment in its current configuration is that maintenance personnel are already familiar with the operation and maintenance procedures. This could help prevent maintenance personnel from being overloaded with new operation and maintenance procedures.

2-2.2.2 Small to Mid-Sized Equipment. These machines serve air-conditioning loads of less than 100 tons and are generally based on reciprocating compressors using HCFC-22. HCFC-22 is a Class II ODS and does not now need to be replaced. Examples of this type of equipment are window air-conditioners, family housing split units (e.g. heat pumps), and small building air-conditioning units. These units should only be replaced at the end of their useful lifetime. Replacement with similar units (HCFC-22) is probably the best choice during the period up to

the year 2000. It is anticipated that, systems using the next generation of refrigerants will appear by the turn of the century.

2-2.2.3 Cold Storage and Refrigeration. The cold storage and refrigeration equipment is the remaining group using large amounts of CFC refrigerants. This segment of the CFC-based equipment inventory is especially important because the systems are normally custom-designed and field-assembled. This increases the likelihood of refrigerant leaks developing in the system as compared to OEM-designed and manufactured package units. Examples of this group of equipment are systems used for retail food refrigeration and warehouse food storage. These systems are usually designed around reciprocating compressors. The larger systems (compressors larger than 5 Tons) generally use CFC-12 as the refrigerant. Smaller systems are for use with CFC-12, CFC-500, or HCFC-22, depending upon the application.

2-2.2.3.1 Small/Self-contained Equipment. An important exception to the recommendations for this group are the small, self-contained refrigeration systems such as refrigerators, reach-in coolers, beverage coolers, etc. These systems typically contain only a small amount of refrigerant and develop leaks only under rare circumstances. Any equipment with less than 5 tons capacity does not require retrofit or replacement until the end of its useful life. As indicated in Section 2-2.2.2 above, even though they may be using CFC refrigerants, these systems (5 tons or less) should only be replaced with non-CFC systems when there has been a system failure and repair is not economical. Any of these small systems with more than 5 tons capacity are not exempted from the Navy phase out policy and will require a waiver from CNO unless they are phased-out prior to 31 December 2000.

2-2.2.3.2 Equipment Using HCFC-22. As with air-conditioning, cold storage and refrigeration equipment using HCFC-22 should be maintained as-is. This should be the only refrigerant run as-is for Cold Storage or Refrigeration applications. The only exception should be systems that, because of age or design, are leaking excessively and cannot be repaired economically. As discussed earlier, HCFC-22 has been approved by the EPA for use as a transition refrigerant and will continue to be available until 1 January 2020.

2-2.2.3.3 Retrofit. Some refrigeration equipment is being retrofitted. Table 2-2 provides a quick reference to the most common solutions. Your local EFD/EFA/PWC air conditioning/refrigeration engineer can provide complete guidance concerning the retrofit alternatives. The most common retrofit is from CFC-12 to HFC-134a. Although successful conversions have been reported in the private sector, this option should be considered with the same caution as the retrofit/conversion of chiller systems. See Section 2-2.2.1 of this guide for more specific information. Retrofits should only be done by contractors or in-house experts who are able to demonstrate the economic feasibility of the retrofit and have strong ties to the OEM. The best candidates for retrofit will probably be newer systems that are in good operating condition. One of the most cost effective approaches to retrofit is to perform the retrofit during regularly scheduled servicing. Equipment modifications necessary for a HFC-134a system to equal or better the capacity of the existing CFC-12 system include:

(1) replacement or adjustment of the expansion device,
(2) use of a HFC-134a compatible desiccant (filter/drier), and
(3) replacement of incompatible materials.

Especially important is to flush the old oil from the system and replace it with an HFC-134a compatible oil. Generally, medium to high temperature (above zero degrees Celsius) HCFC-12 systems have been retrofitted since changing the compressor displacement is not necessary.

2-2.2.3.4 Another option is to replace old units with new equipment. This requires the largest initial investment. The best candidates are systems in poor condition and that cannot cost-effectively be put in good condition. New equipment refrigerant must be from the SNAP list. Typical choices are HCFC-22, HCFC-123 or HFC-134a.

2-2.2.3.5 To retrofit systems that use R-13 or R-503 the best alternative is a change-out to HFC-23. This refrigerant provides less capacity than R-503 but, more capacity than R-13. With this refrigerant there will be higher discharge temperatures.

2-3 Blended Refrigerants.

Some chemical manufacturers have blended refrigerants for almost every application. NAVFAC does not recommend any blend. Blended refrigerants should be used only if there is no other option. If a blend is used in existing equipment it should be a temporary step before a system is replaced and should never be used for more than 12 months. Blends are not recommended as a permanent solution at this time. In a few years if blends prove to be trouble free they very well may be the answer for certain applications. New equipment should be installed using HCFC-22, HCFC-123 or HFC-134a.

2-4 Energy Efficiency and Economic Analysis.

With the phase-out of the CFCs refrigerants the HVAC&R industry was forced to find ozone safe alternative refrigerants. Unfortunately, the thermodynamic properties of most of the alternative refrigerants are inferior to their predecessors. This required the improvement of the mechanical components of the HVAC&R equipment to compensate the loss in efficiency resulting from the less effective thermodynamic properties of the alternative refrigerants. Improvement of the mechanical components resulted in a new generation of HVAC&R equipment that uses alternative refrigerants and has significantly better efficiencies than those manufactured a few years ago that used CFC's refrigerants. Energy efficiency is equivalent to monetary savings. For example, replacing a 500 ton CFC chiller that has 0.85kW/ton efficiency with a 500 ton non-CFC centrifugal chiller that has 0.60 kW/ton efficiency and is used for 2000 equivalent full load hours (EFLH) per year can save about $15,000/year at an energy rate of 6.0¢/kWh. [500 tons x 2000 EFLH x 0.25 kW/ton (efficiency difference) x $0.06/kWh cost = $15,000/year savings] If instead of using the 60 kW/ton centrifugal chiller you use a centrifugal chiller that has 0.50 kW/ton efficiency you can save an additional $6,000/year when compared to the original 0.85kW/ton efficiency CFC chiller. Additional savings are possible when the notion of "integrated chiller retrofits" is considered to calculate the cooling capacity of the new chiller. For example, the use of this notion can demonstrate that the capacity of a new chiller should be 450 tons instead of 500 tons. Integrated energy efficiency practices should be considered for determining the appropriate size of the equipment and an economic analysis (often referred as

life cycle cost analysis) should be performed. ***The use of the "Economic Analysis Handbook, NAVFAC P-442" is recommended to maximize the use of available resources to achieve the given objective in an effective and efficient manner.*** Your EFD, EFA, or your PWC can help you choose the most appropriate conversion alternative after considering both energy and economic factors.

2-4.1 Integrated Energy Efficient Practices.

In many cases, the load for a new or retrofitted chiller can be significantly reduced by accomplishing integrated energy efficient practices. When consideration is given to other available technology that improve the energy efficiency of buildings it may be possible to retrofit or replace existing air conditioning systems with smaller capacity systems. For example, the new chiller's capacity should be based on the ASHARE calculation procedure considering the new chiller efficiency in conjunction with other existing and/or proposed building and system energy improvements rather than replacement with a chiller of the same size. Under the same principle a chiller that has been retrofitted for using a non ODS refrigerant or a Class II ODS refrigerant may be adequate even when the resulting cooling capacity is less than its original. An integrated chiller retrofit combines the replacement of the CFC refrigerant with energy efficiency improvements to the cooling system (such as adding variable frequency drives, variable air volume, or upgrading the control system) or measures to reduce cooling loads by improving the building lighting or the insulation of the building. A load analysis should be performed as part of the ODS conversion Plan to obtain estimates of anticipated reduced load capacities and consider these in determining the size (tonnage) needed for the new or retrofitted system.

2-4.2 Energy Efficiency Requirements for the Procurement of Heating, Ventilation and Air-conditioning (HVAC) Equipment.

The following energy efficiency related requirements must be considered for the procurement of HVAC equipment for Federal buildings.

(1) 10 CFR 435.108 - HVAC equipment. §108.8.3.1.1. of 10 CFR 435 sets minimum equipment efficiency standards for Federal buildings by requiring that HVAC equipment installed in Federal buildings have a minimum efficiency of not less than the values shown in Tables 8.3-1 through 8.3-10 of 10 CFR 435.108.

(2) Executive Order 12902 - Energy Efficiency and Water Conservation at Federal Facilities. Requires that each agency increase, to the extent practicable and cost effective, purchases of products that are in the top 25 percent of energy efficiency for all similar products, or products that are at least 10 percent more efficient than the minimum level that meets Federal standards.

2-4.2.1 Example of Energy Performance Analysis The following is an example of the application of these requirements for the procurement of a centrifugal water chiller. ***Because chillers operate at less than full load most of the time and chillers efficiency vary with load the analysis should be made for both full and partial load conditions.*** Lets assume that the

efficiency performance range of similar chillers available in the market is from 0.50 kW/ton to 0.75 kW/ton for the least and most efficient respectively.

- Determine the applicable Federal standard per 40 CFR 435.108: Per Table 8-3.7 of 10 CFR 435.108 the applicable standards are:
  Coefficient of Performance (COP) = 5.2 (full load) = 0.676 kW/ton
  Integrated Part Load Value (IPLV) = 5.3 (partial load) = 0.663 kW/ton
- Calculate the **minimum performance standard**: Per the Executive Order 12902 should be at least 10% more efficient than the minimum level that meets that Federal Standard.
  0.676 kW/ton x 0.90 = **0.608 kW/ton (Full load)**
  0.663 kW/ton x 0.90 = **0.597 kW/ton (Partial Load)**
- Calculate the **desired performance standard range** using the efficiency range available in the market: Per the Executive Order 12902 is the "top 25% range".
  Upper limit = [0.50 kW/ton + (0.75 kW/ton - 0.50 kW/ton) x 0.25]= 0.563 kW/ton
  Top 25% range is (from 0.50 kW/ton to 0.563kW/ton)

Per Executive Order 12902 higher efficiency equipment within the top 25% (from 0.50 kW/ton to 0.563kW/ton) should be used if a life circle cost analysis (per methodology established in 10 CFR 436.11) shows it will be paid back in 10 years or less. Otherwise the equipment at least should have a performance equal to the calculated minimum performance standard (0.608 kW/ton for full load, and 0.597 kW/ton for partial load, in this example).

2-4.3 Department of Energy (DOE) and General Service Administration (GSA) Basic Ordering Agreement (BOA) for Chillers.

DOE and GSA worked in coordination to develop a BOA and a set of specifications for the procurement of chillers by Federal agencies that meets the requirements of Executive order 12902. The BOA is an innovative, streamlined procurement process for 100 to 2,000 ton commercial centrifugal and rotary screw water-chilling packages. The DOE-developed chiller specifications were based on the lowest life cycle cost analysis (LCCA) and the minimum efficiency criteria for centrifugal and rotary screw water-chilling packages. DOE has also developed a software package illustrating mock procurement scenarios using the chiller BOA, and one that produces evaluations of vendors chillers bids based on LCCA. Both software are available from DOE. For information on the GSA BOA's term and conditions, contact the GSA Contracting Officer, at (817) 978-2929 and specify publication #CHIL0001. For information regarding the DOE-developed chiller specifications and software call the DOE Defense Programs Construction and capital Projects office at (301) 903-3557 or Systematic Management Services, Inc. at (301) 353-0072.

2-5 Selection Process Guide.

Figure 2-1 shows a simplified process for selecting an alternate refrigerant. Figure 2-2 shows a graphical form of selecting a HVAC&R equipment with consideration to its energy efficiencies. This is a of a generalization. To insure the correct decision is made, each system should be examined by an engineer or another qualified technician to determine the best solution.

PROCESS GUIDE TO SELECTING ALTERNATE REFRIGERANTS

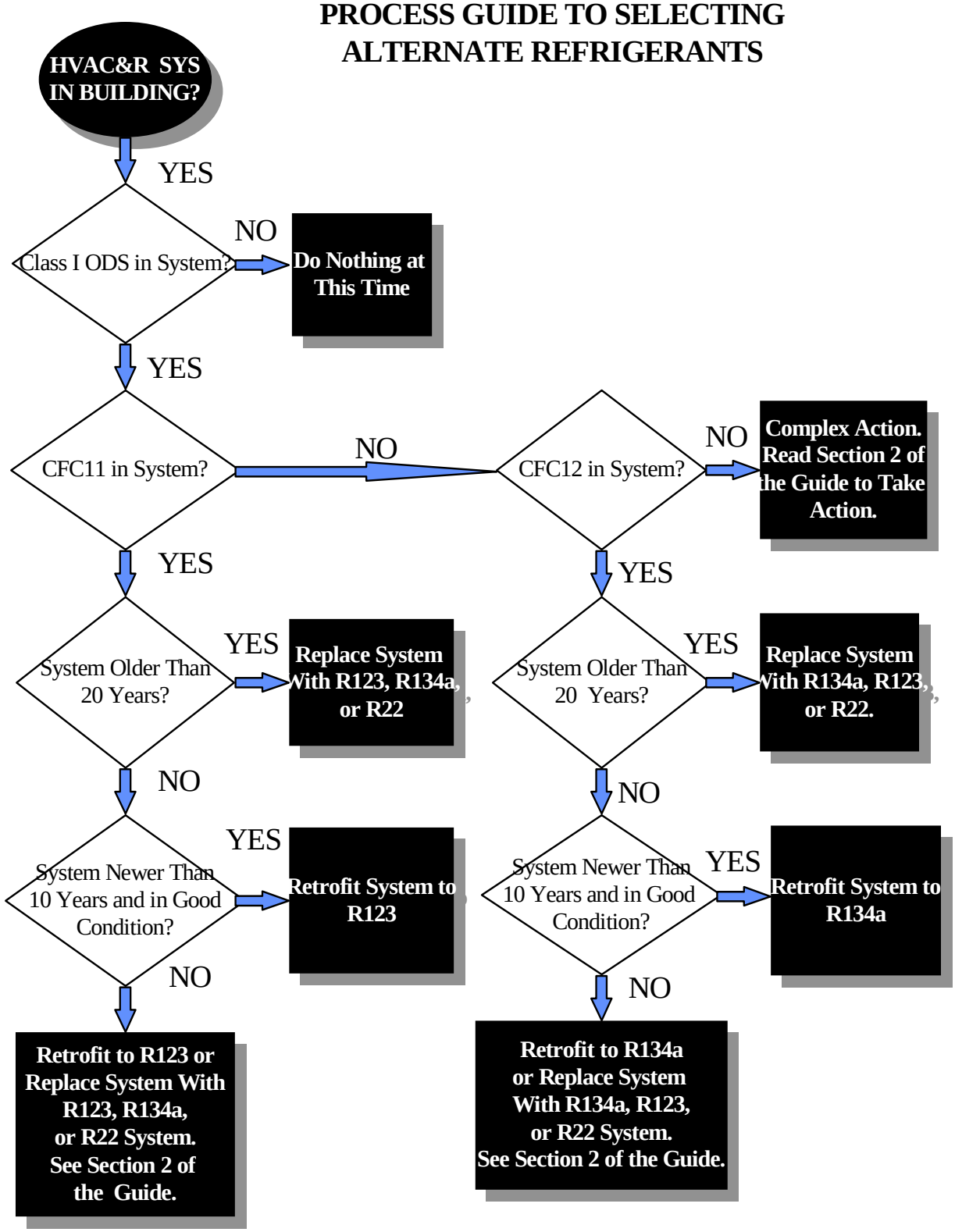

FIGURE 2-1

FIVE STEPS PROCESS GUIDE TO SELECTING ENERGY EFFICIENT HVAC&R EQUIPMENT

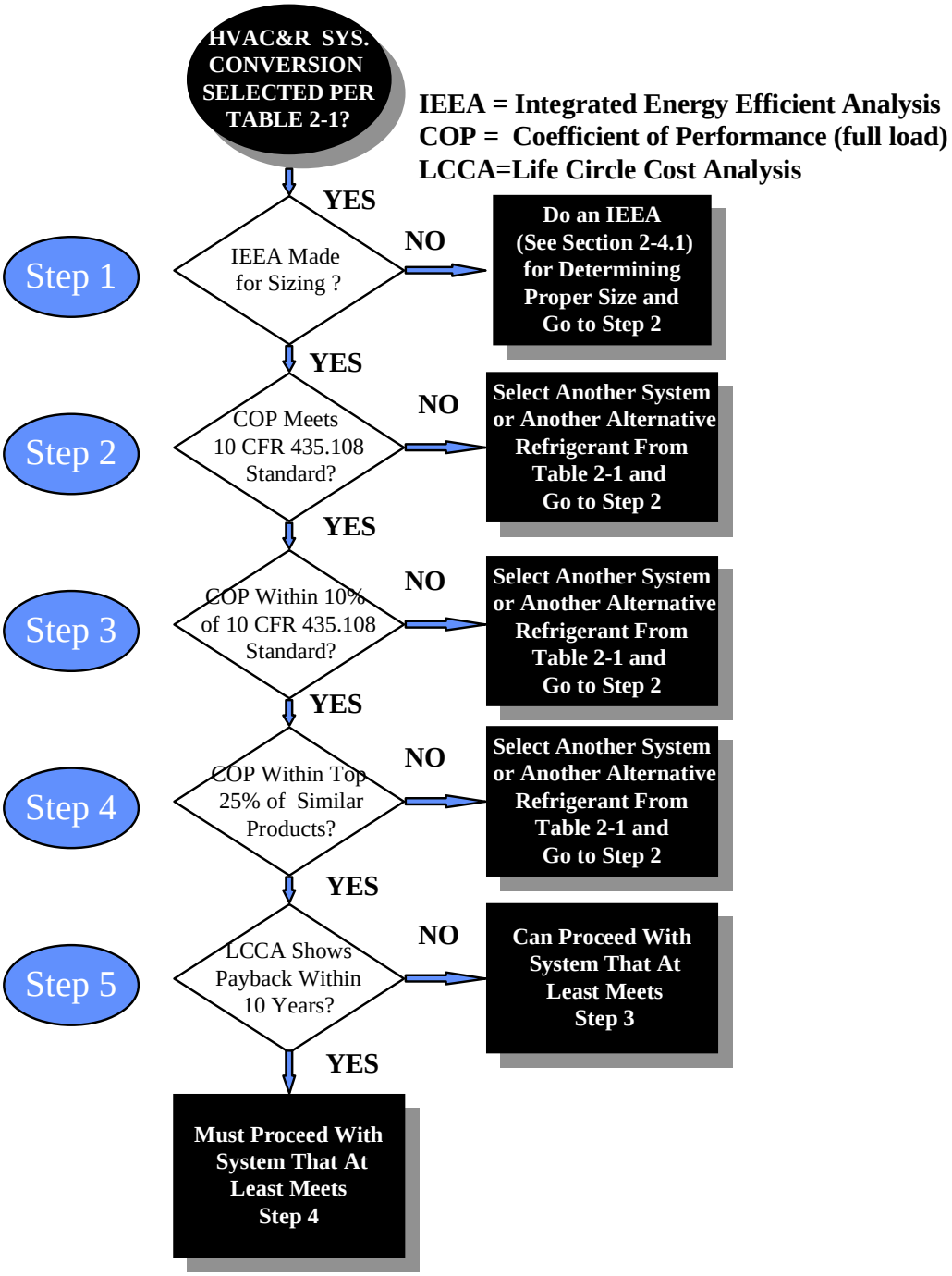

FIGURE 2-2

2-6 Budgeting Phase Out of CFCs HVAC&R Systems.

Appendix A provides copy of Chapter XI , Ozone Depleting Substances, of the Cookbook, which provides a menu of items identifying regulatory requirements and budgetary cost guidance on specific ODS requirements. Conversion costs related to improvements of the HVAC&R system air distribution ducts or energy efficiency integrated improvements are not considered environmental requirements and therefore are not funded by the Navy Environmental Compliance Account (NECA). The enclosed version of the Cookbook is the latest to this date and was updated by NAVFAC for the environmental project submissions of the Navy Environmental Program Baseline Assessment Memorandum (BAM) for the 2000 Program review (POM-00).

2-7 Additional Considerations For Conversion of HVAC&R Systems. The following are situations that could affect conversion plans and should be considered during the planning, design and/or construction stages of the conversion work.

2-7.1 Presence of Asbestos Containing Materials. It is extremely important to contact the activity's Asbestos Program Manager to verify the presence of asbestos containing materials (ACM) in any area of a building or an equipment that will be affected by the conversion work. Due to its advantageous physical properties asbestos was commonly used in buildings and equipment for thermal insulation, and fireproofing. ACM can become hazardous when, due to damage, disturbance, or deterioration over time, release fibers into the air. Inhalation of asbestos fibers has been shown to cause very serious health problems such as asbestosis and lung cancer. The removal of existing HVAC&R systems and/or its components, when located in close proximity to ACM, can result in the disturbance of these materials and the release of asbestos fibers with the potential contamination of personnel and property. Removal of asbestos is strictly regulated by both the Occupational Safety and Health Administration (OSHA) and EPA with specific regulatory requirements applicable to notification, surveillance, controls, work practices, recordkeeping, worker protection, training, and transportation and disposal of removed ACM. The applicable Navy policy is contained in OPNAVINST 5100.23 series, Chapter17.

2-7.2 Questions To Ask Before Retrofitting With an Alternative Refrigerant. EPA recommends that before resources are committed to retrofit an existing HVAC&R system with an alternative refrigerant appropriate answers to the following questions should be obtained. Many new alternative refrigerants marketed for use in the motor vehicle and stationary/commercial sectors are being touted by their manufacturers and distributors. Whether you are a Navy-wide distribution or a one-man service shop, you should take the time to determine how well an alternative will work and whether it may pose any problems for your customers or liability for you. Consider asking your supplier, whether it is the refrigerant manufacturer or a distributor, the following questions.

- **Is the refrigerant on the Environmental Protection Agency's SNAP (Significant New Alternatives Policy) Program list of acceptable substitutes? If so, are there any restrictions on how the refrigerant can be used?**

EPA's SNAP program determines what risks alternatives to CFC or HCFC refrigerants pose to human health and the environment. EPA evaluates the alternative refrigerant's ozone-depleting potential, global warming potential, flammability, and toxicity. The SNAP evaluation, however, does not determine whether the alternative will provide adequate performance or will be compatible with the components of an a/c or refrigeration system. Call the EPA's Hotline number (800) 296-1996 for the SNAP fact sheet on alternative refrigerants and for lists of refrigerants accepted under SNAP. EPA may place conditions or restrictions on how an alternative can be used. Both service technicians and do-it-yourself who use alternatives found unacceptable under SNAP or ignore use conditions have violated the Clean Air Act.

- **What does the system manufacturer have to say about this refrigerant and whether it is compatible with your system components?**

Because of the wide range in equipment types and designs, EPA does not issue retrofit procedures. The best source of information on how a given substitute will perform in a system are the manufacturers of the system and its components. In addition to questions about the alternative's performance in a particular end use, you should determine whether charging a system with a new refrigerant will void any warranty.

- **What recycling and/or reclamation standards apply to the refrigerant? Can the refrigerant be recycled or reclaimed to those standards?**

The Clean Air Act requires that EPA establish standards for the extraction, recycling and reclamation* of refrigerants, including alternatives accepted under SNAP. For example, the Agency will shortly publish proposed standards for extracting, recycling and reclaiming R-134a, a SNAP-approved substitute for CFC-12 in both motor vehicles and stationary/commercial applications, and for extracting and for extracting other refrigerants from motor vehicle air conditioning systems. Until standards are written for recycling any motor vehicle refrigerant other than HFC-134a, recycling of those refrigerants is illegal. The Agency's standards for extraction and recycling refrigerants in motor vehicles are generally based on Society of Automotive Engineers (SAE) standards. EPA's standards for reclaiming refrigerants from motor

vehicles and stationary/ commercial a/c and refrigeration systems are generally based on Air-Conditioning and Refrigeration Institute (ARI) standards. If these standards have not been published by EPA for a particular alternative, then they may be under development by EPA, SAE or ARI. Check to make sure that the refrigerant manufacturer intends to work with these organizations to develop uniform methods for extraction, recycling and reclamation. You can call the Hotline number listed above to determine the status of EPA standards and requirements.

**Reclamation* is the reprocessing of refrigerant to a level of purity which permits the refrigerant to be reused in another a/c or refrigeration system. *Recycling* refrigerant involves cleaning the refrigerant without meeting all of the requirements for reclamation. EPA regulations issued under section 609 of the CAA allow refrigerant used in motor vehicles to be recycled on site or reclaimed off site, while section 608 regulations govern refrigerant used in home a/c and refrigeration and other applications, which must be reclaimed prior to reuse in another system. Unless the existing refrigerant is contaminated it can be reused in the same system that it was removed from.

- **Has the alternative refrigerant been evaluated by ARI (the Air-Conditioning and Refrigeration Institute)? If an alternative is to be reclaimed, will it be reclaimed to ARI's 700 standard? If not, then how will the purity of the reclaimed alternative refrigerant be assured?**

ARI, an a/c and refrigeration manufacturers' trade association, develops standards for the industry. ARI's 700 standard specifies acceptable levels of refrigerant purity for fluorocarbon refrigerants including R-12, R-22, R-134a, R-500, and R-502 and for certain refrigerant blends. The purpose of the 700 standard is to enable users to evaluate and accept or reject refrigerants, whether virgin, reclaimed or repackaged. Reclamation of these refrigerants in both the motor vehicle and stationary/commercial sectors must follow the 700 standard.

- **Has the alternative refrigerant been classified by ASHRAE (the American Society of Heating, Refrigerating and Air-Conditioning Engineers) under Standard 34?**

ASHRAE sets many of the stationary a/c and refrigeration industry's standards and guidelines. Standard 34, together with Standard 15, provides a uniform method of rating refrigerants for toxicity and flammability, assigns refrigerant numbers (e.g., R-12 or R-502), and establishes safe practices in designing and installing equipment. ASHRAE also publishes other guidance and technical information. Before ARI determines that its 700 standard should apply to a particular refrigerant, the refrigerant must receive a classification from ASHRAE. ASHRAE classification is not required to gain SNAP acceptability.

- **Is the alternative refrigerant flammable?**

As noted above, both ASHRAE and EPA evaluate refrigerant flammability. As part of its SNAP review, EPA requires that a new refrigerant be tested according to the American Society of Testing Materials (ASTM) E-681 testing method. E-681 is used to determine the concentrations in air at which a substance is flammable, at normal atmospheric pressure. For example, CFC-12 is classified as nonflammable because at no concentration is it flammable. In

contrast, many hydrocarbons ignite at concentrations as low as 2% by volume. In addition to testing the refrigerant itself, if a blend contains a flammable component, EPA requires leak testing to ensure that the composition does not change and become flammable. There are also other measures of flammability (flash point, autoignition temperature, etc.) that may be relevant for SNAP review. If a substitute is flammable, EPA requires a comprehensive risk assessment for each proposed end-use. This risk assessment estimates the likelihood of fire and the potential results if a fire were to occur, in addition to suggesting measures to mitigate this risk. Without such a risk assessment, EPA cannot accurately assess the risk posed by the refrigerant's flammability. State governments, fire marshals, building code organizations, and other local authorities may have issued prohibitions or other regulations related to flammable refrigerants. Check with them before buying, distributing, or using a flammable refrigerant.

- **Is the refrigerant readily and widely available?**

If a service technician charges a system with an alternative refrigerant that later becomes unavailable, then at the next servicing, the system may have to be retrofitted to another appropriate substitute.

- **What is my liability (and that of those that sell) if I put in a customer's system an alternative refrigerant not yet approved by EPA?**

Under EPA regulations, a refrigerant manufacturer must submit information on a new refrigerant for SNAP review at least 90 days before marketing the product. This 90-day period is required by Section 612 of the Clean Air Act, but the Act did not prohibit sale and use of that refrigerant after the 90-day period. Thus, if the Agency is still engaged in its review when the 90 days elapses, the product can be sold and used, even though it is not "EPA approved." However, EPA may later determine that the product is unacceptable under SNAP. It makes sense, then, to determine whether SNAP review is complete -- if not, it may be only temporarily legal to use the alternative refrigerant. <u>If you purchased the refrigerant during the SNAP review, and EPA later determines that it is unacceptable, you may be stuck with a large inventory of refrigerant no one can legally use!</u>

Note: The CAA only granted EPA the authority to regulate the *use* of alternative refrigerants, not the *sale* of them. Even if EPA determines that an alternative is unacceptable, it is still legal to sell it. However, putting it in a customer's a/c or refrigeration system is considered use, not sale, so a service technician who charges a system with an unacceptable refrigerant may be subject to a $25,000 fine and up to five years' jail time.

3. LEAK DETECTION AND PREVENTION GUIDELINES for HVAC&R SYSTEMS

Leak detection and prevention is not only a desirable practice but in many cases it is a requirement by law. In accordance with §608 of the CAA, EPA promulgated regulations that contain required practices to reduce the emissions of ODS refrigerants from HVAC&R equipment. This regulation is contained in Appendix E-2 of this guide, codified as 40 CFR Part 82, Subpart F. This rule regulates refrigerant emissions resulting from the normal operation of HVAC&R equipment as well as those practices associated with the maintenance, servicing, repair, or disposal of the equipment. The rule requires periodic monitoring of leak rates, record keeping, notification of excessive leak rates, and repair or elimination of HVAC&R equipment having 50 pounds or more of normal operating full refrigerant charge with an excessive leak rate. See additional details in Section 6 of this guide. It should be noted that for refrigeration systems that have two or more refrigeration circuits that are completely isolated from each other (i.e., they are designed to prevent mingling refrigerant from one circuit with refrigerant from another circuit), each of the circuits are considered independent refrigerant circuits. Leak repair requirements apply only if the independent refrigerant circuit has more than 50 pounds of refrigerant. For information on the Navy Policy regarding determination of refrigerants leakage rates see Navy ODS Advisory 96-02(Appendix C-3) and Navy ODS Advisory 96-03 (Appendix C-4). Section 3-9 provides information on NAVFAC's Ozone Depleting Substances Inventory Tracking and Management System computer software which can be used to calculate refrigerant leakage rates.

3-1. Operations and Maintenance.

All equipment should be used in accordance with manufacturer's recommendations. All equipment must be properly operated and maintained to assure minimum refrigerant leakage.

3-2. Monitoring and Inspections.

3-2.1 General. Proper and frequent inspections of equipment can prevent failures and can minimize refrigerant leakage. A simple walking inspection can reveal things such as oil leaks and in some cases, excessive refrigerant leaks. A portable leak detector can amplify this search for refrigerant leaks. In general, a system that is routinely inspected is less likely to leak. Record keeping and frequency of inspections are two of the most important aspects of a sound leak detection and prevention strategy. The appropriate frequency of inspections is dependent on many factors such as regulatory requirements, manufacturer guidance, the performance history of the equipment, its age, and the conditions of its working environment. This section is intended to be used as a guide to develop your site specific leak detection and prevention strategy. The following sub-sections are divided based on the main components of HVAC&R systems.

3-2.2 Compressors. The most important routine compressor inspection would be for oil leaks. This could indicate a seal leak that would probably either leak refrigerant out of or air into a low-pressure system. Seals on open compressors that are shut down for any length of time will dry out. The seal faces should be oiled periodically. This can be done by turning or running the compressor to insure that the seal has a continuous oil film for sealing. The absence of oil or the presence of excessive amounts of refrigerant in the oil reservoir should also be noted during the inspection. Both conditions can cause compressor failure and result in loss of refrigerant. The presence of water in the oil reservoir can indicate an eroded water-cooled oil-cooler. This could ultimately cause bearing failure and introduce water into the refrigerant. Periodic oil analysis should be performed to determine the condition of the compressor. The appearance of bearing metals, tube metals, and contaminants can be used to catch a failure before it occurs. Catastrophic damage can therefore be avoided.

Typically, critical parameters for a compressor are pressures, temperatures and vibration levels. Oil temperatures should be maintained within design tolerances to maintain bearing life and performance. Oil pressure must be held within design tolerances in order to supply adequate lubrication to prevent bearing overheating and to maintain sealing surfaces. Excessive vibration could damage the seals and will eventually damage the compressor. Damaged seals will result in oil and refrigerant leaks. Refrigerant temperatures and pressures at the compressor suction and discharge should also be logged. These will give performance indications that can be tied to carryover caused by faulty evaporator eliminators and high liquid level in the evaporator.

3-2.3 Heat Exchangers.

3-2.3.1 Shell and Tube Condensers and Evaporators. Condensers should be opened annually and evaporators as often as needed to allow visual inspection of the tubes, the tube sheets, and the heads. The inspection should detect excessive corrosion, plugging of tubes, and binding of the tube sheets (excessive fouling should also be apparent). An eddy current test may be performed to check relative tube wall thickness. Additionally, on the refrigerant side, a spectrographic oil analysis will show excessive tube metal buildup which is an indication of internal tube damage. These inspections can minimize catastrophic failure of the tubes and will allow scheduling the timely replacement of damaged tubes.

3-2.3.2 Evaporators. Checks of performance logs of the evaporator and review of service logs can show evidence of excessive fouling or pluggage, low or high refrigerant levels, damaged heat exchangers, etc. Fouling or pluggage can cause tube leaks directly due to erosion or indirectly if low evaporator temperatures are experienced in the evaporator. This can cause freezing in the tubes and rupture the tube. Low refrigerant levels can decrease performance, reduced capacity, and cause excessively low evaporator pressures and temperatures.

3-2.3.3 Direct Expansion (DX) Coils and Air-Cooled Condensers. These heat exchangers can generally be inspected externally when the air handlers are shut down. Visual inspection should include condition of the fins, excessive fouling with foreign matter, corrosion of fins and tubes, appearance of oil leaks, dye leaks on equipment charged with a dye leak detector, cracks in tubes or manifolds, etc.

3-2.3.4 Condensers. By checking system temperatures and pressures, the presence of air and non-condensables can easily be confirmed and corrective action taken without excessive refrigerant loss. Periodic checks of water flow, pressure drops, and temperatures will confirm that the system is not fouled and that the tubes are not subjected to excessive velocities, both of which can cause erosion.

3-3 Purge Units. Significant losses can occur here. A simple walking inspection will show if the purge unit is working properly. Purge system pressures should be compared to design values. Oil and water levels should be checked. Excessive water collection in the purge units can indicate air in-leakage or a tube leak. The pressure relief set point should be checked and adjusted at least monthly. At least annually, a mechanical purge unit should be opened and inspected for oil fouling and corrosion. The purge unit should be fitted with a run indicator which notes either operating time or number of discharges. This is an indication of the condition of the purge unit and leakage in the refrigeration system. Air purgers are used to remove air from the refrigeration systems in order to improve performance and to minimize corrosion of the internal surfaces. A well-designed and maintained system should need to use an air purge system only a minimal amount of time. Continuous air purge units are primarily relevant to units which operate at sub-atmospheric pressures. Air purge units are also used to purge air introduced into systems during charging and servicing. The mass ratio of refrigerant lost to air purged varies from as much as 8 parts of refrigerant per part of air to as low as 1 part of refrigerant per part of air, depending on the purge unit design and the type of refrigerant. Significant savings of refrigerant can be accomplished by lowering the condensing temperature of the refrigerant in the air purger. Higher pressure operation within the purge condensing chamber can also reduce refrigerant loss. Some designs of air purgers also can collect water that has leaked into the system from air or tubes leaks. If the air purger is exposed to a corrosive environment, the materials of construction should be capable of withstanding the acidic conditions to which the purge unit is exposed. The air purger is designed to operate by exchanging heat to a sink. It is preferable to use as low a temperature heat sink as possible, to a lower limit of approximately 35°F to avoid freezing moisture in the system. If ambient air is used as the sink, the relief pressure must be set so that it will allow the refrigerant to be condensed. Otherwise the air purger becomes a suction pump that constantly discharges refrigerant to the atmosphere. The same holds true for refrigerant or water-cooled heat exchangers that use pressure as the set relief point. Some mechanical air purgers use oiled reciprocating compressors. Excessive oil carryover can foul heat exchangers and cause purge devices to become non-functional. This will cause the unit to pump refrigerant from the refrigeration system and can cause excessive refrigerant loses. Care must be taken to keep oil in the compressor and not in the heat exchanger. Consideration should also be given to replacing oiled reciprocating compressors with oil-less compressors. The purge unit should be monitored automatically since the operation is a prime indication of air leakage into the system. This can be done with a run-time indicator, a recording purge flow meter, or some other device that indicates how much the purge is operating.

3-4 Maintenance

3-4.1 Compressor Maintenance. Predictive, scheduled, and preventive maintenance techniques should be practiced with all types of compressors. Several key parameters to the successful continued operation of a compressor can be checked externally on the compressor without a teardown; however, the compressor must be opened periodically for inspection and maintenance. (Opening any compressor introduces the possibility of refrigerant loss and seal problems when the system is restarted.) The equipment manufacturer's operating guides should be consulted concerning the recommended frequency. Some typical frequencies for various equipment types are shown in the following table.

Frequencies for Periodic Teardown

Positive Displacement (Reciprocal and Screw)	
Normal Temperature	5 Years or 15,000 hours of Operation
Low Temperature	2 Years

Centrifugal Units	
Normal Temperature	5 Years
Open Units	Annually for External Bearings and Seals

3-5 Additional System Maintenance. Several items to be noted during major internal inspections include metering or expansion devices, eliminators in the evaporator, suction dampers and butterfly dampers (air seals), slide-valve operators, cylinder unloader mechanisms, discharge-line oil separators and coolers, filter-dryers, etc. The presence of excessive rust and loose material should be noted and corrective action taken.

3-6 General Logs. Routine operating logs should be kept so that the operator knows how much refrigerant and oil are used. Table 3-1 provides data items that should be logged at least daily on centrifugal and large positive displacement systems:

Table 3-1
Recommended Routine Operation Logs

Item No.	Log Items
1	Chilled water or other secondary coolant temperatures
2	Chilled water Outlet temperatures
3	Chilled water or secondary coolant flow
4	Chilled water or other secondary coolant inlet pressures
5	Chilled water Outlet pressures
6	Evaporator refrigerant pressures
7	Evaporator Temperatures
8	Condenser refrigerant pressure
9	Condenser Liquid temperature
10	Condenser water inlet temperatures
11	Condenser Outlet temperatures
12	Condenser water inlet pressures
13	Condenser water outlet pressures
14	Condenser water flow (if available)
15	Refrigerant levels
16	Oil pressures
17	Oil temperatures
18	Oil levels
19	Compressor refrigerant suction temperature
20	Addition of refrigerant
21	Addition of oil
22	Vibration levels (if monitored) or observation that vibration is not excessive

3-7 Evacuation, Leak Testing, and Charging. Portable leak testing devices can be used to find refrigerant leaks when only trace quantities of refrigerant are in the system. Also available are portable helium detectors that can find smaller leaks. It is important that all leaks are noted and repaired immediately.

3-7.1 Leak Detection Methods

3-7.1.1 Water Submersion test. The most popular method of leak and strength testing is the water submersion test. The unit or component is pressurized to the specific positive pressure and submerged in a well-lighted tank filled with clean water. A long time may be needed to obtain the leak sensitivity desired.

3-7.1.2 Pressure testing. The unit is sealed off under pressure or vacuum, and a decrease or rise in pressure versus time is noted. The disadvantages of this test are the time involved, the lack of sensitivity, and the inability to determine the exact location of the leak.

3-7.1.3 Soap Bubble leak Test. A pressurized system's suspected leak areas are brushed with a soapy solution. Bubbles will form in the immediate leak zone.

3-7.1.4 Halide Leak Testing. The halide torch is used on systems charged with a halogenated refrigerant. The sensitivity of this test is approximately 30g per year. The gas, drawn across a faintly bluish flame, turns the flame greenish blue and varies in intensity with the size of the leak. Each joint or area can easily be probed, thus locating the leak. The sensitivity of halide torches is reduced by refrigerant contamination; therefore, testing should be done in well-ventilated areas or chambers. Large leaks, even in well-ventilated areas, may cause contamination levels so high that small leaks are not detected. **Caution**: Some of the newer halocarbon refrigerant blends may contain flammable components; the use of a halide torch may be dangerous, especially if the leak is large.

3-7.1.5 Electronic Leak Testing. The electronic leak detector consists of a probe that draws air over a platinum diode, whose positive ion emission is greatly increased in the presence of a halogen gas. This increased emission is translated into a visible or audible signal. Electronic leak testing shares with halide torches the disadvantages that every suspect area must be explored and that contamination makes the instrument less sensitive; however, it does have some advantages. The main advantage is increased sensitivity. With a well-maintained detector, it is possible to identify very low leakage rates. These low rates are roughly equivalent to the loss of 30g of refrigerant in 100 years. Another advantage is that the detector can be calibrated in many ways so that a leak can be measured quantitatively. The instrument also can be desensitized to the point that leaks below a predetermined rate are not found. Some models have an automatic compensating feature to accomplish this.

With increased sensitivity, the problem of contamination becomes more critical. To use this improved sensitivity, the unit under test is placed in a chamber slightly pressurized with outside air, which keeps contaminants out of the production area and carries contaminating gas

from leaky units. An audible signal allows the probe operator to concentrate on probing, without having to watch a flame or dial. Equipment maintenance presents a problem because the sensitivity of the probe must be checked at short intervals. Any exposure to a large amount of refrigerant causes loss of probe sensitivity. A rough check (such as air underwater testing), prior to use of the electronic device, is frequently used to find large leaks.

3-7.1.6 Fluorescent Leak Detection. This system involves infusing a small quantity of a fluorescent additive into the oil/refrigerant charge of an operating system. Leakage is observed as a yellow-green glow under an ultraviolet (UV) lamp. This method is suitable for halocarbon systems.

3-7.1.7 Mass Spectrometer. The most sensitive leak detection method is probably the mass spectrometer. The unit to be tested is evacuated and then surrounded by helium and air mixture. The vacuum is then sampled through a mass spectrometer, and any trace of helium indicates one or more leaks. The sensitivity of the mass spectrometer is extremely high. The helium for testing is normally kept inside a chamber completely closed except at the bottom. The unit to be tested is simply raised into the lighter-than-air helium atmosphere.

This method, in addition to being extremely sensitive, has the advantage of measuring all leaks on all joints simultaneously. Therefore, a quick test is possible. However, the cost of equipment is high, helium is expensive, the instrument must be maintained carefully, and a method of locating individual leaks must be developed.

The concentration of helium needed depends on the maximum leak permissible, the configuration of the system under test, the time it can be left in the helium atmosphere, and the vacuum level in the system being tested; the lower the vacuum level, the higher the helium readings. The longer a unit is exposed to the helium atmosphere, the lower a concentration is necessary to maintain the required sensitivity. If, because of the shape of the test unit, a leak occurs at a point distant from the point of sampling, a good vacuum must be drawn, and sufficient time must be allowed for traces of helium to appear on the mass spectrometer.

In general, a helium concentration of more than 10% is costly. The inherently high diffusion rate causes it to disperse to the atmosphere, no matter how effectively the chamber is designed. As in the case of other methods described, the best testing procedure in using the spectrometer is to locate calibrated leaks at extreme points of the test unit and to adjust exposure time and helium concentration in the most economical manner. One manufacturer of refrigeration equipment found leaks at a rate of 1.4g of refrigerant per year using a 10% concentration of helium and exposing the tested system for 10 minutes.

Although the mass spectrometer method is extremely sensitive, the sensitivity that can be used may be limited by the characteristics of the tested system. Since only the total leak rate is found with this method, it is impossible to tell whether a leakage rate of, for example, 30g per year, is the result of one fairly large leak or a number of small leaks. If a sensitivity is desired that rejects units outside of the sensitivity range of tests listed earlier, it is necessary to use a helium probe for the location of leaks. In this method, the component or system to be probed is evacuated fully to clear it of helium; then, while it is connected to the mass spectrometer, a fine jet of helium is sprayed over each joint or suspect area. If a large system is tested, a waiting period is necessary because some time is required for the helium to pass from the leak point to the mass spectrometer. Isolated areas, such as return blends on one end of a coil, may be hooded

and sprayed with helium on one end of a coil to determine whether the leak is in this region, thus saving time.

3-7.2 Special Considerations. Two general categories of leak detection may be selected: one group furnishes a leak check before refrigerant is introduced into the system, and the other group requires the use of refrigerant. The methods that do not use refrigerant have the advantage that heat applied to repair a joint has no harmful effects. Repairs requiring heat on units containing refrigerant must have the refrigerant removed and vented before attempting to weld, braze, or solder. This practice prevents breakdown of the refrigerant and pressure buildup, which would prevent the successful completion of a sound joint.

All leak-testing equipment must be calibrated frequently to ensure maximum sensitivity. The electronic leak detector or the mass spectrometer is usually calibrated with equipment furnished by the manufacturer. Mass spectrometers, for example, are usually checked by a flask containing helium. A glass orifice in the flask allows the helium to escape at a known rate, and the operator maintains the desired sensitivity by comparing the noted escape rate with a known standard.

The effectiveness of the detection system can best be checked with calibrated leaks made of glass, which can be bought commercially. These leaks can be built into a test unit and sent through the normal leak-detection cycles to evaluate the effectiveness of the detection method. Care must be taken that the test leakhole does not become closed. To check against closing, the leakage rate of the test leak must be determined before and after each system audit.

3-8 Low-Pressure Systems. Many large CFC11 and 113 systems are used for chilled-water refrigeration for building air conditioning. Usually, the system operates only during the summer air conditioning season. During the winter months they usually stand idle and under a vacuum. If the compressors are not rotated, the shaft seal may begin to leak. The unit will eventually fill with air, moisture, and non-condensables. To prevent these problems several measures should be considered. Periodic rolling of the compressor will keep the seal oiled and functional. Maintaining the system at a slight positive pressure will eliminate air in-leakage. A secondary benefit is the ability to sense refrigerant leaks. This can be accomplished by heating the condenser-water system or by attaching electric heaters to the evaporator. (Tight shutoff valves on the water system are necessary.) Care must be taken to control the pressure at slightly above atmospheric. Excessive pressure can cause refrigerant to leak from the system.

3-9 Ozone Depleting Substances Inventory Tracking and Management System (ODS-ITMS) Software. The Northern Division, Naval Facilities Engineering Command developed ODS-ITMS as an easy to use software program that provides database capability with customized forms and reports, including the annual CNO's ODS data call report. ODS-ITMS was designed to assist inventory, tracking, and reporting ODS on hand and its use in HVAC&R, fire protection, and solvent cleaning operations. ODS-ITMS also have capabilities to calculate and document leaks in HVAC&R equipment, ODS procurement and reclamation, ODS equipment inventory and servicing. This software can be downloaded from the Naval Facilities Engineering Service Center (NFESC) web page "http://enviro.nfesc.navy.mil//" and the CFC and

Halon Clearinghouse web page “http://home.navisoft.com/navyozone. For assistance from the NFESC for the installation and use of ODS-ITMS contact Mike Nace at DSN 551-3550 or (805) 982-3550.

3-10 ASHRAE Journal. Appendix F is an article from the August 1996 ASHRAE Journal that deals with leak detection in Mechanical Rooms and is provided for your use.

4. FIXED HALON FIRE PROTECTION SYSTEMS

Halons are listed in the CAA as Class I ODS and are specifically targeted in the Navy policy for phase out. Due to the high ODP of halons, the phase out of these chemicals has been ahead of the phase out of the other CFCs. For halons, the production ceased on 31 December 1993 in accordance with the CAA schedule. All non-mission critical shore-based halon 1301 systems shall be replaced by 31 December 2000 per Section 6-5.8.1 of OPNAVINST 5090.1B. Section 6-5.9.2 of OPNAVINST 5090.1B requires that no later than 1 January 1996 all non-mission critical halon portable fire extinguishers be removed and redistributed locally to support mission critical requirements, or turned in for inclusion in the Navy portion of the DoD ODS reserve. Also the installation of shore based halon 1301 fire protection systems and the procurement of portable halon fire extinguishers, except for mission critical uses, is prohibited by OPNAVINST 5090.1B. Fixed fire extinguishing systems in Naval shore installations are typically total flooding systems which consist of halon storage tanks, a piping distribution system and discharge nozzles. These systems are generally activated by a fire alarm detection system within the same protected space. Fixed total flooding halon systems have been installed in a variety of spaces including but not limited to computer rooms, communications center, electrical equipment rooms, telephone switching rooms, rare book vaults, clock vaults, paint storage lockers, anechoic chambers, fuel storage areas, and hospital diagnostic equipment rooms. In computer rooms with raised floors, the halon systems may protect both the space above and below the raiser floor, or it may simply be limited to the space below the raised floor. In some rare cases, the halon system also protects the space above the suspended ceiling. Over 95% of these total flooding systems use halon 1301; however, some systems protecting unoccupied spaces may still be using halon 1211. In either case, the halon systems must be removed by 31 December 2000 and the halon shall be recovered and deposited in the Navy portion of the DoD ODS Reserve.

4-1 Fire Protection Systems Replacement Decision Matrix. Although all fixed halon fire extinguishing systems must be removed by 31 December 2000, not all of those systems have to be replaced. MIL-HDBK-1008C, "Fire Protection for Facilities Engineering, Design and Construction," lists the requirements for fixed fire protection systems for all shore-based Navy installations. In numerous facilities, the spaces presently protected by total flooding halon systems are also protected by automatic sprinklers. In many of these facilities, the existing halon systems can simply be removed without installing a replacement agent, provided the sprinkler system is fully operational.

4-1.1 Buildings Which Are Not Protected by Automatic Sprinklers. In this situation total flooding halon systems can often be replaced with automatic sprinklers provided there is a sufficient water supply. Where there is an insufficient water supply, an alternative replacement agent may be used.

4-1.2 Computer Rooms. In this situation MIL-HDBK-1008C requires complete automatic sprinkler protection. In computer rooms with raised floors, automatic sprinklers can and should be used to protect the space above the raised floor. However, sprinkler protection is not practical for spaces below the raised floor. Below-floor spaces do not require a fire extinguishing system if all power wiring is in conduit and all data cabling is plenum rated. However, if these conditions are not met, an alternate halon replacement agent should be used.

4-1.3 Decision Matrix. Table 4-1 is a decision matrix to be used for the replacement of existing Navy shore halon systems. In all cases, this table should be used by an engineer who is experienced in fire protection system design. Your local EFD/EFA/PWC fire protection engineer can provide complete guidance concerning the use of this matrix and the removal and/or replacement of halon fire extinguishing systems.

4-2 Fire Protection Systems - Halon Alternatives. Both the EPA SNAP List, as well as the National Fire Protection Association (NFPA) Standard Number 2001, list numerous halon replacement agents. Not all of the replacement agents listed in these publications are recommended for use by NAVFAC. Instead, NAVFAC has prepared a halon alternatives matrix included here as Table 4-2. Again, your local EFD/EFA/PWC fire protection engineer can provide you the assistance needed to utilize this table.

4-3 Budgeting Phase Out of Halon Fire Protection Systems. Appendix A provides copy of Chapter XI , Ozone Depleting Substances, of the Cookbook, which provides a menu of items identifying regulatory requirements and budgetary cost guidance on specific ODS requirements. Conversion costs related to improvements of the halon fire protection system that are not related to the use of a halon replacement agent are not considered environmental requirements and therefore are not funded by the Navy Environmental Compliance Account (NECA). The enclosed version of the Cookbook is the latest to this date and was updated by NAVFAC for the environmental project submissions of the Navy Environmental Program Baseline Assessment Memorandum (BAM) for the 2000 Program review (POM-00).

4-4 Portable Halon Fire Extinguishers. Approved halon alternatives are now available in hand-held fire extinguishers. These are known in the industry as halon streaming agents. Halon streaming agents on the SNAP list include both HFCs and HCFCs. HFCs such as FE-36 are preferred over HCFCs. These new streaming agents are very expensive, and will produce toxic gases when exposed to high heat. Consequently, these devices are only recommended for use where the area can be readily evacuated after an extinguisher is discharged.

4-5 Additional Considerations For Conversion of Halon Systems. The following are situations that could affect conversion plans and should be considered during the planning, design and/or construction stages of the conversion work.

4-5.1 Presence of Asbestos Containing Materials. It is extremely important to contact the activity's Asbestos Program Manager to verify the presence of asbestos containing materials (ACM) in any area of a building or an equipment that will be affected by the conversion work. Due to its advantageous physical properties asbestos was commonly used in buildings for thermal insulation, fireproofing, and in many building materials. ACM can become hazardous when, due to damage, disturbance, or deterioration over time, they release fibers into the air. Inhalation of asbestos fibers has been shown to cause very serious health problems such as asbestosis and lung cancer. The removal of existing fixed fire protection systems and/or its components, when located in close proximity to ACM, can result in the disturbance of these materials and the release of asbestos fibers with the potential contamination of personnel and property. Removal of asbestos is strictly regulated by both the OSHA and EPA with specific regulatory requirements applicable to notification, surveillance, controls, work practices, recordkeeping, worker protection, training, and transportation and disposal of removed ACM. The applicable Navy policy is contained in OPNAVINST 5100.23 series, Chapter17.

Table 4-1 Decision Matrix for Replacement of Navy Shore-Based Halon Systems

	IF NO EXTINGUISHING SYSTEM REQUIRED*	SPACE PROTECTED BY AUTOMATIC SPRINKLERS	ALTERNATE EXTINGUISHING SYSTEM REQUIRED BUT NOT IN PLACE**	POWER CABLE IN CONDUIT DATA CABLE PLENUM RATED	POWER CABLE IN CONDUIT DATA CABLE NOT PLENUM RATED	POWER CABLE NOT IN CONDUIT	EPA SNAP LIST NFPA 2001
OCCUPIED SPACES WITH TOTAL FLOODING HALON	**1**	**1**	**2 OR 3**				
UNOCCUPIED SPACES WITH TOTAL FLOODING HALON	**1**	**1**	**2,3 OR 4**				
COMPUTER ROOM UNDER FLOOR SPACES	**1**	**1**	**3 OR 4**	**1**	**3 OR 4**	**3 OR 4**	
ALTERNATE AGENT SELECTION							**5**

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*** See MIL-HDBK-1008B and Applicable NFPA Standards.**

**** Consult EFD/EFA/PWC Fire Protection Engineer.**

1 - Remove Halon without Replacement

2 - Install Automatic Sprinklers

3 - Install Approved Alternate Agent

4 - Install CO_2 System

5 - See Selection Matrix in Both Documents

Table 4-2 Halon Alternatives

	ADVANTAGES	DISADVANTAGES
FM-200 (HFC-227)	Use in occupied and unoccupied areas. Lowest Global Warming Potential. Zero Ozone Depleting Potential. Most commercially available agent.	Cylinders must be located in or adjacent to protected area. Limit design concentration in occupied areas to 7%-9%.
FE-13 (HFC-23)	No EPA restrictions. NOAEL: 30%, typical design: 16-20%. Zero Ozone Depleting Potential. Gaining commercial availability.	Requires use of high pressure storage cylinders and piping.
INERGEN (IG-541)	Use in unoccupied areas. Little or no environmental drawbacks. Ingredients: normal atmospheric gases (N_2, Ar and CO_2).	Lowers O_2 concentration below 16%. CO_2 causes hyperventilation. Requires high pressure cylinders. Requires large volumes-Stored as a gas not a liquid. NAVFAC does not recommend use in occupied areas.
SPRINKLERS	Usually mandatory even with an alternate clean agent (i.e., gaseous extinguishing systems).	Not recommended below raised floors.
CO_2	Good inexpensive agent below computer room raised floors.	Use in unoccupied areas only. Navy has had fatal experiences with CO_2.

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DESIGN CONSIDERATIONS:

1. Existing fire alarm detection systems usually can remain unchanged.
2. Most alternative agents are presently only listed for ceiling heights not exceeding 12 feet. Higher ceilings presently require an additional row of discharge nozzles above the 12 feet level.
3. The acceptance test must include a door fan pressurization test to verify the integrity of the enclosure.
4. Automatic sprinklers will usually still be required in most areas protected by clean agent alternative halon systems. Ensure these areas also incorporate trapped floor drains.

5. OZONE DEPLETING SUBSTANCES CONVERSION PLAN

Section 6-6.9.1.a of OPNAVINST 5090.1B requires that all activities develop an ODS Conversion Plan (addressed as "ODS phase out plan") to eliminate use of non-mission critical Class I ODS by 31 December 2000 and non-mission critical portable halon fire extinguishers by 1 January 1996. Section 6-6.9.1.a of OPNAVINST 5090.1B requires that Commanding Officers at shore activities approve and submit such plans to claimants for review and funding in the POM cycle. ODS Conversion Plans must be used as a programming, scheduling, and budgeting tool to manage the transition away from ODSs. CNO ltr N451I/5U597356 of 1 November 1995 requires that major claimants provide a report on the status of their activity conversion plans to CNO N45 by 1 February 1996. This letter also details the content requirements for a facility ODS Conversion Plan. At a minimum, plans should contain the following:

a) Inventory of Class I ODS equipment CNO ltr N451I/5U597891 of 20 March 1996 clarified which HVAC&R equipment shall be included in a facility ODS Conversion Plan as follows:

(1) Refrigeration equipment with more than five pounds of refrigerant (i.e., all refrigeration equipment that is not small, hermetically-sealed appliance)

(2) Air conditioning equipment with more than five tons cooling capacity (60,000 BTU).

[Note: No distinction or limit has been set for fire protection systems.]

b) Description of alternatives that will be implemented

c) Time schedule for conversion/replacement

d) Estimated costs for plan implementation

e) Plans for recovery/recycling/reuse of existing stocks of ODS (OPNAVINST 5090.1B, and 40 CFR Part 82 detail requirements)

f) Plans for leak monitoring (OPNAVINST 5090.1B and 40 CFR Part 82 detail requirements)

g) Plan for support of training requirements (OPNAVINST 5090.1B and 40 CFR Part 82 detail requirements)

When presenting information on the alternatives that have been selected, schedule for implementation, and estimated costs, activities may want to include a description of the economic/trade-off analysis that was performed in evaluating the alternatives. This is not required, but is strongly recommended.

ODS Conversion Plans include both retrofitting and replacement as alternatives to phase out the use of Class I ODS for HVAC&R and fire protection. The remaining portions of this document will focus on items (b), (c), and (d) above. These items identify some of the basic decisions to be made in plan development including the decision to retrofit or replace existing equipment (usually dependent on age of equipment and condition), the choice of alternatives, and the scheduling of corrective actions. There are a significant number of trade

off analyses that must be performed as part of this task. The information in this document is intended to be used as general guidance and should be one of the many tools used by facility managers, environmental personnel, and cognizant engineers to make appropriate decisions for the equipment at their facility.

5-1 Scheduling Equipment Conversions.

Navy policy requires that all HVAC&R and fire protection non-mission critical applications of Class I ODS be eliminated by 31 December 2000. All non-mission critical halon portable fire extinguishers shall have been removed by 1 Jan 1996. This time frame provides activities with ample time to develop logical, rational, and reasonable plans for conversion that will not adversely effect operations.

In developing a conversion plan, an activity must determine when conversion will occur. One of the primary drivers for this decision is budget. Direct fund activities should have submitted funding requirements to major claimants with a copy of their conversion plan for review. DBOF/reimbursable fund activities should incorporate conversion costs into their normal operating budgets.

In addition to funding, availability of Class I ODS is another major issue in scheduling conversions. After 31 December 1995, it is unclear if Class I ODS will be available. The DoD ODS Reserve is not available for non-mission critical applications. Therefore, facilities must develop support plans for equipment during its phase out schedule. Ideally, activities will be able to schedule a small number of conversions per year. The CFCs recovered from retrofitted or replaced equipment can be recycled and used to service remaining equipment that will be converted in the out-years. If recovered material will be insufficient to meet maintenance requirements, facilities should attempt to accelerate their conversion schedules. Through proper management of existing refrigerant stocks, maximum use of recovery/recycling equipment, improved maintenance to reduce leakage, and insuring that technicians are trained, it will be possible to maximize the useful life of existing CFC refrigerant stocks and insure equipment supportability during implementation of a facility ODS Conversion Plan.

6. APPLICABLE NAVY POLICY

6-1 OPNAVINST 5090.1B, Environmental and Natural Resources Program Manual.

Chapter 6, Management of Ozone Depleting Substances, of OPNAVINST 5090.1B, implements the Department of Defense (DoD) and Secretary of the Navy (SECNAV) policy concerning the use and management of ODS. A copy is included as Appendix B for easy reference. The following sections of OPNAVINST 5090.1B are listed to help the reader to find the requirements pertaining to the development and implementation of Class I ODS Conversion Plans (also known as phase out plans) at shore facilities:

6-1.1 Section 6-1: Exempts small appliances from phase out requirements of Section 6-5.6.

6-1.2 Section 6-5.2: Requires compliance with Navy policy pertaining to acquisition of Class I ODS per the DoD Authorization Act of 1993.

6-1.3 Section 6-5.3: Requires Navy activities to procure recycled or reclaimed ODSs whenever possible.

6-1.4 Section 6-5.4: Establishes mission critical applications.

6-1.5 Section 6-5.5: Provide information on who has access to the DOD ODS Reserve.

6-1.6 Section 6-5.7: Requires that:

(1) New HVAC&R equipment use an EPA Significant New Alternative Program (SNAP) approved refrigerant with an ODP of 0.05 or less.

(2) Non-mission critical ODS Class I HVAC&R equipment be replaced or converted (retrofitted included) not latter than 31 December 2000 to an EPA SNAP approved refrigerant with an ODP of 0.05 or less, or otherwise a waiver from CNO must be obtained. Requires refrigerant recovered, recycled, and reclaimed be stored and use for local Navy use or deposited in the Navy portion of the DoD ODS reserve for mission critical applications.

(3) Conversion/replacement plans be developed for all non-mission critical HVAC&R equipment.

6-1.7 Section 6-5.8.1: Requires non-mission critical Halon 1301 systems be replaced by 31 December 2000 and the halon be recovered and deposited in the Navy portion of the DoD ODS Reserve.

6-1.8 Section 6-5.8.2: Prohibits the installation of shore based Halon 1301 fire protection systems.

6-1.9 Section 6-5.9.1: Section 6.5.9.1: Prohibits the use of portable Halon fire extinguishers except for mission critical uses.

6-1.10 Section 6-5.9.2: Requires removal of portable Halon fire extinguishers no later than 1 January 1996 for redistribution to support local Navy mission critical requirements, or deposited in the Navy portion of the DoD ODS reserve for mission critical applications.

6-1.11 Section 6-5.19: Indicates that requests for waivers to the provisions of Chapter 6 of OPNAVINST 5090.1B shall be submitted to CNO (N45) via the chain of command and requires demonstration that application of the policy's requirements is impractical or that the expenditures of resources are not commensurate with the reduction in the potential to release ODS to the environment. Also indicates that statutory requirements can not be waived.

6-1.12 Section 6-6: Assigns responsibilities to CNO, COMNAVSEASESCOM, COMNAVSUPSYSCOM, COMNAVFACENGCOM, BUMED,CNET, Major claimants and subordinate commands, Director of Test and Evaluation Technology Requirements, and commanding officers shore and afloat.

6-2 Navy ODS Advisory System. As directed by CNO Naval Sea Systems Command (NAVSEA) has established a single Navy ODS Advisory System to provide consistent guidance to the Fleet and shore activities. Appendix C contains copies of the current Advisories issued by NAVSEA to complement or further clarify the policy and requirements of OPNAVINST 5090.1B. All future advisories and/or revisions will be distributed by NAVSEA to the Echelon II commands for further distribution within their claimancy. Upon receipt, Appendix C should be updated accordingly.

6-3 NAVFACNOTE 5090, Ozone Depleting Substances (ODS). NAVFACNOTE 5090 provides instructions for the implementation of the Navy policy concerning the procurement, use , reduction, elimination and final disposition of Class I ODS. Copy is provided in Appendix D. Section 326 of the National Defense Authorization Act for Fiscal Year 93 (P. L. 102-484) prohibits the award of a contract after 1 June 1993 that requires the

use of Class I ODS without prior approval of a senior acquisition official (SAO). Section 6-5.2 of OPNAVINST 5090.1B requires adherence to the requirement of the P. L. 102-484, established Navy policy and all implementing procurement regulations. The Navy policy requires that the SAO approval be based on an assessment by an authorized technical representative (ATR) that a suitable substitute or alternate technology is not currently available or not economically feasible for the application.

6-3.1 Application of NAVFACNOTE 5090 The process prescribed in NAVFACNOTE 5090 applies to Naval Facilities Engineering Command (NAVFAC) activities which include Engineering Field Divisions/Engineering Field Activities (EFDs/EFAs), Public Works Centers (PWCs), Construction Battalion Centers (CBCs), and the Naval Facilities Engineering Service Center (NFESC). As requested NAVFACHQ, and NAVFAC activities will assist Navy's activities in execution of their procurement requests. EFDs/EFAs and PWCs have been assigned special responsibilities in NAVFACNOTE 5090 to provide technical assistance by facilitating ATRs and developing and implementing ODS Phase out Plans. Refer to Appendix B of NAVFACNOTE 5090 for information on:

(1) Class Approvals for the procurement of Class I ODS;
(2) Individual Approvals for the procurement of Class I ODS;
(3) SAO determinations/approvals;
(4) NAVFAC's ATRs list with telephone numbers and area of expertise;
(5) Contract Review Process, and;
(6) Reporting of Class I ODS approvals, review/elimination, and use.

6-3.2 Points of Contacts. For assistance concerning the availability and feasibility of suitable substitutes for an application of an Class I ODS contact an ATRs listed in enclosure (2) of Appendix D of NAVFACNOTE 5090. Any contracting questions can be directed to any contracting officer at an EFD, EFA, or PWC, or at NAVFACHQ Code 111, DSN 221-9021, or (703) 325-9021.

7. APPLICABLE ENVIRONMENTAL PROTECTION AGENCY REGULATIONS

CAA Tile VI requires that the Environmental Protection Agency (EPA) promulgate regulations for controlling the production, consumption, trade, and use of ODSs. Appendix E provides copies of regulations promulgated by EPA that are of relevance to the management of ODSs at shore facilities. A brief description of these regulations follows:

[NOTE: The following requirements are summarized <u>with the only purpose</u> of helping the reader find the section(s) of the regulation that relates to the topic. <u>Proceed to Appendix E and read definitions of words shown in quotations (" ") and the referenced sections (§) of the regulation for a clear understanding of the requirements</u>.]

7-1 40 CFR PART 82, SUBPART B - Servicing of Motor Vehicles Air Conditioners (Copy provided in Appendix E-1). These rules were promulgated by EPA as required by § 609 of the CAA to establish standards and requirements regarding the servicing of motor vehicle air conditioners (MVACs). The EPA's rules require the use of EPA certified refrigerant recycling equipment by appropriately trained and certified of technicians for servicing MVACs, establish recordkeeping procedures, and restrict the sale of "small containers" of ODSs.

7-1.1 Technician Certification and Approved "Refrigerant" Recycling Equipment. §82.34 prohibits a person to repair or service ("service involving refrigerant") "motor vehicle air conditioners" (MVACs) without "properly using" "approved refrigerant recycling equipment" pursuant to §82.36 and without being properly trained and certified by a technician certification program pursuant to §82.40.

7-1.2 Owner's Certification of Refrigerant Recycling Equipment and Recordkeeping. §82.42 requires that owners of refrigerant recycling equipment submit to EPA an equipment certification for each piece of equipment owned and comply with the applicable recordkeeping requirements.

7.2 40 CFR PART 82, SUBPART F - Recycling and Emission Reduction (Copy provided in Appendix E-2). These rules were promulgated by EPA as required by §608 of the CAA to reduce emissions of Class I and Class II refrigerants to the lowest achievable level during the use, service, maintenance, repair, and disposal of "appliances". The EPA's rules prohibit the venting or release into the atmosphere of any Class I or Class II refrigerant, require the use of: established practices ; certified recovery or recycling equipment; appropriate certified technicians; and recordkeeping and reporting procedures for the service, maintenance, repair, and disposal of appliances.

7-2.1 Refrigerant Venting/Releases. §82.154(a) prohibits a "person" to knowingly vent or otherwise release into the environment any Class I or Class II ODS used as a refrigerant in any "appliance" being maintained, serviced, repaired, or disposed ("disposal") and provides the applicable refrigerant evacuation procedures. *De minimis* releases (as indicated in §§82.154(a)(1) and (2)) associated with good faith attempt to recycle and recover are not covered.

7-2.2 Prohibitions for Opening or Disposal of Appliances. §82.154(b) prohibits a person from "opening an appliance" (except MVACs for maintenance, service, or repairs [see MVACs rules in Subpart B]) and disposing an appliance (except MVACs, "small appliances", and "MVAC-like appliances") without observing the required practices set forth in §82.156, and using equipment that is certified for that type of appliance pursuant to §82.158. See other applicable prohibitions and requirements in §§82.154(c) through (o).

7-2.3 Required Practices for Opening or Disposal of Appliances. See §§82.156 (a) through (h) for applicable requirements for refrigerant evacuation practices and required equipment.

7-2.4 Refrigerant Leaks Requiring Corrective Action.

7-2.4.1 §82.156 (i)(1) requires that owners of "commercial refrigeration" equipment "normally containing a quantity of refrigerant" of more that 50 pounds repair leaks within 30 days after discovery in accordance with §82.156(i)(9) if the appliance's leaks rate exceed 35 percent of the total charge during a 12-month period. Additional time to repair the leak could be obtained from EPA as described in §§82.156(i)(1)(i), (i)(1)(ii), (i)(1)(iii), or when a retrofit or retirement plan for the equipment can be developed and implemented in accordance with §§82.156(i)(6), (i)(8), and (i)(10). The request/notification to EPA must be made within 30 days of discovering the leaks and in accordance with §82.166(n).

7-2.4.2 §82.156 (i)(2) requires that owners of "industrial process refrigeration" equipment normally containing a quantity of refrigerant of more that 50 pounds repair leaks within 30 days after discovery in accordance with §82.156(i)(9) if the appliance's leaks rate exceed 35 percent of the total charge during a 12-month period. Additional time to repair the leak could be obtained from EPA as described in §§82.156(i)(2)(i) and (i)(2)(ii), or when a retrofit or retirement plan for the equipment can be developed and implemented in accordance with §§82.156 (i)(6), (i)(7), and (i)(10). The request/notification to EPA must be made within 30 days of discovering the leaks and in accordance with §82.166(n).

7-2.4.3 §82.156(i)(5) requires that owners and operators of appliances not covered by §§82.156(i)(1) and (i)(2) and normally containing a quantity of refrigerant of more that 50 pounds repair leaks within 30 days after discovery in accordance with §82.156(i)(9) if the appliance's leaks rate exceeds 15 percent of the total charge during a 12-month period.

Additional time to repair the leak could be obtained from EPA as described in §§82.156(i)(5)(i), (i)(5)(ii), (i)(5)(iii), or when a retrofit or retirement plan for the equipment can be developed and implemented in accordance with §§82.156 (i)(6), (i)(8), and (i)(10). The request/notification to EPA must be made within 30 days of discovering the leaks and in accordance with §82.166(n).

7-2.5 Time Extensions for Leaks Corrective Action.

[Note: Extensions are rare and should not be counted on. Typically, a facility or activity should be able to repair leaks within the required amount of time]

7-2.5.1 §82.156 (i)(1)(i), provides procedures for owners and operators of federally-owned commercial refrigerant appliances, to notify and request from EPA an extension of the 30 days repair requirement when it has been determined that the leaks can not be repaired in accordance with §82.156(i)(9) within the prescribed 30 days period.

7-2.5.2 §82.156 (i)(1)(ii), indicates that owners and operators of federally-owned commercial refrigerant equipment may have more than 30 days to repair leaks if the refrigeration appliance is located in an area subject to radiological contamination or where the shutting down of the appliance will directly lead to radiological contamination.

7-2.5.3 §82.156 (i)(1)(iii), requires owners or operators of federally-owned commercial refrigeration equipment requesting or who are granted time extensions to comply with §§82.156 (I)(3) and(4).

7-2.5.4 §82.156 (i)(2)(i), provides procedures for owners and operators of industrial process refrigeration equipment, to notify and request from EPA an extension of the 30 days repair requirement. This applies when it has been determined that the leaks can not be repaired in accordance with §82.156(i)(9) within the prescribed 30 days period (or 120 days where an "industrial process shutdown" is required) because the necessary parts are unavailable, or when requirements of other applicable federal, state, or local regulation make a repair within 30 or 120 days impossible.

7-2.5.5 §82.156 (i)(2)(ii), indicates that owners and operators of industrial process refrigeration equipment have a 120-day repair period, rather than a 30-day repair period, to repair leaks in instances where an industrial process shutdown is needed to repair the leaks from industrial process refrigeration equipment.

7-2.5.6 §82.156 (i)(5)(i), provides procedures for owners and operators of federally-owned comfort -cooling appliances, to notify and request from EPA an extension of the 30 days repair requirement when it has been determined that the leaks can not be repaired in accordance with §82.156(i)(9) within the prescribed 30 days period.

7-2.5.7 §82.156 (i)(5)(ii), indicates that owners and operators of federally-owned comfort -cooling appliances may have more than 30 days to repair leaks if the refrigeration appliance

is located in an area subject to radiological contamination or where the shutting down of the appliance will directly lead to radiological contamination.

7-2.5.8 §82.156 (i)(5)(iii), requires owners or operators of federally-owned comfort -cooling appliances requesting or who are granted time extensions to comply with §§82.156 (i)(3) and(4).

7-2.6 Verification of Leak Repairs. §82.156(i)(3) requires verification of leak repairs within prescribed time frames. When an industrial process shutdown has occurred or when repairs have been made while an appliance is mothballed ("system mothballing"), an initial verification test shall be conducted at the conclusion of the repairs and a "follow-up verification test" shall be conducted within 30 days of completing the repairs or within 30 days of bringing the appliance back on-line, if taken off-line. When repairs have been conducted without an industrial process shutdown or system mothballing, an initial verification test shall be conducted at the conclusion of the repair and a follow-up verification test within 30 days of the initial verification test. In all cases, follow-up verification test shall be conducted at "normal operating characteristics and conditions". §82.156(i)(4) requires that in the case of a failed follow-up verification test leak rate determination parameters be identified by the owner and operator and approved by EPA.

7-2.7 Bringing Refrigeration Equipment Back On-Line. §82.156(i)(3)(i) requires that when an industrial process refrigeration equipment is taken off-line, it can not be brought back on-line until an initial verification test indicates that the repairs have been successfully completed or the equipment is covered under a one year retrofit/replace/retirement plan prepared in accordance with §82.156(I)(6). Notice that for this case a time extension beyond one year is not available.

7-2.8 Time Frames for Replacing and Retrofitting Leaking Equipment.

7-2.8.1 §82.156(i)(3)(ii), requires that when a follow-up verification test indicates that the repairs have not been successfully completed, the owner must retrofit or replace the equipment within one year or within such longer period of time as may apply pursuant to §§82.156(i)(7)(i), (ii), and (iii) or (i)(8)(i). The owner or operator are relieved of this requirement if the conditions of §82.156(i)(3)(iv) [a second repair effort is successful] and/or §82.156(i)(3)(v) [it has been established and EPA is notified in accordance with §82.156(i)(4) that the appliance's annual leak rate does not exceed the applicable allowable annual leak rate].

7-2.8.2 §82.156(i)(9) requires owners or operators to repair leaks per §§82.156(i)(1), (i)(2), and (i)(5) within 30 days after discovery, or within 30 days after the leaks should have been discovered if the owners intentionally shield themselves from information which would have revealed a leak, unless granted additional time pursuant to §82.156(i). §82.156(i)(10) allows temporary suspension of time to complete repairs, retrofit plans or

retrofits/replacements/retirements per §§82.156(i)(1), (2), (5), (6), (7), (8), and (9) at the time an appliance is mothballed (as defined in §82.152).

7-2.9 Follow-Up Leak Repair Tests Failures and Notifications to EPA.

§82.156(i)(3)(iii) requires that the owner or operator of industrial process refrigeration equipment that fails a follow-up verification test notify EPA within 30 days of the failed test in accordance with §82.166(n).

7-2.10 Time Frames for the Preparation of Retrofit or Retirement Plan for Leaking Appliances.

7-2.10.1 §82.156(i)(6). requires development of the plan within 30 days of discovering exceeding of the applicable leak rate, or within 30 days if it has been decided not to repair the leak or within 30 days of a failed follow-up verification date.

7-2.10.2 §82.156(i)(7) contains requirements to allow additional time to complete the retrofit or retirement of industrial process refrigeration equipment.

7-2.10.3 §82.156(i)(8) contains requirements to allow additional time to complete the retrofit or retirement of federally-owned commercial or comfort cooling appliances.

7-2.11 Counting of Purged Refrigerant in Calculation of Annual Leak Rates.

§82.156(i)(11) indicates that purged refrigerant that is destroyed at a verifiable destruction efficiency of 98 percent or greater will not be counted for the calculation of the annual leak rate. It also requires recordkeeping and notification to EPA within 60 days after such exclusion is first used.

7-2.12 Certification of Recycling and Recovery Equipment.

§82.158 provides the standards for the certification of recycling and recovery equipment and requires the use of "certified refrigerant recovery equipment" during the maintenance, service, or repair of appliances. §82.160 provides requirements for the EPA's approval of equipment testing organizations.

7-2.13 Technician Certification:

7-2.13.1 §82.161 requires certification of persons who maintain, service, or repair appliances, except MVACs, and persons who dispose of appliances, except for small appliances, room air conditioners, and MVACs.

7-2.13.2 §82.161(a)(1) requires certification of persons who maintain, service, or repair small appliances as Type I "technicians".

7-2.13.3 §82.161(a)(2) requires certification of persons who maintain, service, repair, or dispose "high pressure appliances" or "very high pressure appliances", except small appliances and MVACs as Type II technicians.

7-2.13.4 §82.161(a)(3) requires certification of persons who maintain, service, or repair "low pressure appliances" as Type III technicians.

7-2.13.5 §82.161(a)(4) requires certification of persons who maintain, service, or repair low-and high-pressure equipment as "Universal technicians".

7-2.13.6 §82.161(a)(5) requires certification of persons who maintain, service, or repair MVAC-like appliances as Type II technicians or complete the training and certification test offered by a training and certification program under §82.40.

7-2.14 Certification Required by Owners of Recovery and Recycling Equipment. §82.162 requires that owners of refrigerant recovery and recycling equipment submit an equipment certification for each piece of equipment owned.

7-2.15 Reporting and Recordkeeping Requirements. §82.166 requires that persons who sell, distribute, purchase, recover, reclaim, and dispose Class I and Class II refrigerant comply with reporting and recordkeeping requirements as indicated.

7-2.15.1 §82.166(a) requires persons who sell or distribute any Class I or Class II substance for use as a refrigerant to retain invoices indicating the name of the purchaser, date of sale, and quantity of refrigerant purchased.

7-2.15.2 §82.166(b) requires purchasers of any Class I or Class II refrigerant employing technicians who recover refrigerants to provide evidence of each technician's certification to the wholesaler who sell them refrigerant. The wholesaler will keep this information on file and the purchaser must notify the wholesaler any change in a technician's certification or employment status.

7.2.15.3 §§82.166(g) and (h) provides recordkeeping requirements applicable to reclaimers.

7-2.15.4 §82.166(i) requires persons disposing of small appliances, MVACs, and MVAC-like appliances to maintain copies of signed statements obtained pursuant to §82.156(f)(2).

7-2.15.5 §82.166(j) requires persons servicing appliances containing 50 or more pounds of refrigerant to provide the owner/operator of the appliances documentation that indicates amount of refrigerant added to the appliance.

7-2.15.6 §82.166(k) requires owners /operators of appliances normally containing 50 or more pounds of refrigerant to keep servicing records documenting the date and type of service and the quantity of the refrigerant added. The owner/operator also must keep records of refrigerant purchased and added in cases where owners add their own refrigerant indicating the date(s) when the refrigerant is added.

7-3 40 CFR PART 82, SUBPART G - Significant New Alternatives Policy Program (Copy provided in Appendix E-3).

This rule was promulgated pursuant to § 612 of the CAA to identify and restrict the use of substitutes for Class I and Class II ODS where EPA has determined that other alternatives exist that reduce overall risk to human health and the environment. The Significant New Alternative Policy Program (SNAP) covers substitutes in the following major industrial use sectors: refrigeration and air conditioning, foam blowing, solvent cleaning, fire suppression and explosion protection, tobacco expansion, adhesives, coating and inks, aerosols, and sterilants. EPA publishes in the Federal Register on a quarterly basis a complete list of the acceptable and unacceptable alternatives that have been reviewed to date. The list includes information on any use restrictions that applies.

7-3.1 Introduction of New Substitutes.

§82.174(a) prohibits the introduction of a new "substitute" into interstate commerce before 90 days after notifying EPA in pursuant to 40 CFR 82.176(a). For specific exemptions see 40 CFR 82.176(b).

7-3.2 Use of Substitutes.

7-3.2.1 §82.174(b) prohibits the use of any substitute by a person when the person knows or has reason to know that the substitute was manufactured, processed or imported in violation of this regulation.

7-3.2.2 82.174(c) prohibits the use of any substitute without adhering to any applicable use restriction.

7-3.2.3 §82.174(d) prohibits the use of any substitute after such substitute has been added to the list by EPA as an unacceptable substitute and requires users to adhere to any use restriction set by the acceptability decision, after the effective date of any rulemaking imposing such restrictions.

7-3.2.4 §82.176(c) allows the use of a substitute listed as unacceptable or acceptable subject to narrowed use limits in the possession of an end-user as of 18 March 1994, until the individual end-user's existing supply as of that date is exhausted.

7-3.2.5 §82.176(b) Describes the five types of acceptability determinations under which EPA list a substitute: acceptable; acceptable subject to use conditions; acceptable subject to narrowed use limits; unacceptable; and pending.

7-4 Environmental Protection Agency ODS Proposed Rules Agenda

EPA's regulatory agenda is published each April and October in the Federal Register (FR). It serve as a semiannual summary of current and planned rulemaking, review of existing regulations, and EPA's actions completed. Table 6-1 contains the status of ODS rules (published April 1997) in EPA's agenda.

Table 7-1 Proposed ODS Rules Stage

RULE	CFR REFERENCE	ACTION *	DATE	FR CITE
Final Rule for Servicing of MVAC; to include all substitute of CFC-12	40 CFR 82, subpart B	NPRM FA	03/06/96 06/00/97	61 FR 9014
Supplemental Rule Regarding a Recycling Standard Under §608;	40 CFR 82, subpart F	NPRM FA	02/29/96 04/00/97	61 FR 7858
Amendments to the refrigerant recycling rule to include all refrigerants; to apply the venting prohibition to substitute refrigerants	40 CFR 82, subpart F	NPRM FA	12/15/97 12/15/98	
Reconsideration of Section 608 Sales Restrictions; as it relates to split systems.	40 CFR 82, subpart F	NPRM FA	06/00/97 01/00/98	
Reconsideration of Ban on Fire Extinguishers Containing HCFCS	40 CFR 82, subpart C	NPRM FA	12/04/96 ?	61 FR 47012
Sale of Halon Blends, Intentional Release of Halon, Technical Training and Disposal of Halon and Halon-Containing Equipment	40 CFR 82, subpart H	NRPM FA	07?07/97 ?	62 FR 36428

* NPRM means new proposed rule making

FA means final action.

APPENDIX A

ENVIRONMENTAL REQUIREMENTS COOKBOOK
CHAPTER XI - ODS

CHAPTER XI

OZONE DEPLETING SUBSTANCE (ODS) REQUIREMENTS

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POM-00 ENVIRONMENTAL REQUIREMENTS COOKBOOK

CHAPTER XI: OVERVIEW OF OZONE DEPLETING SUBSTANCE (ODS) REQUIREMENTS

1. General: Title VI of the Clean Air Act Amendments of 1990 (CAAA 90), Stratospheric Ozone Protection, contains an aggressive program to phase out stratospheric ozone depleting substances (ODSs) in accordance with the Montreal Protocol. On April 21, 1993, Executive Order 12843, Procurement Requirements and Policies for Federal Agencies for Ozone Depleting Substances, was signed by President Clinton. Congress has established a Class I and Class II substances list directing the Environmental Protection Agency (EPA) to add to the list as appropriate and to assign ozone depleting and global warming potential values to each listed substance [40 Code of Federal Regulations (CFR) Part 81].

1.1 Project Grouping: To facilitate the identification of applicable projects to the specific need of the reader the projects contained in this chapter have been classified within the following groups:

Group No.	Group Name	Project Identification Nos.
1	**Air Conditioning and Refrigeration Equipment**	**11001**
2	**Fire Protection Equipment**	**11003**
3	**Solvents**	**11004**
4	**Training**	**11940, 11941**
5	**Activity Specific Compliance**	**11950, 11960, 11970**
6	**Administrative**	**11002, 11005**

2. Title VI: Stratospheric Ozone Protection: Activities will be required to comply with the applicable requirements of Title VI which are enforceable even if the EPA fails to finalize the regulations.

3. Motor Vehicle Air Conditioner Servicing Requirements: Requires use of EPA approved equipment and personnel certification for repairing or servicing motor vehicle air conditioners. This requirement has been in force since August 1992 (1 January 1993 for small entities) per 40 CFR 82.42(a)(2). See CAAA 90 §609-618 and 40 CFR 82.

4. Prohibitions for Venting Class I and Class II Ozone Depleting Substances (ODS): Requires activities to recycle Class I and Class II ODSs, use of EPA approved ODS recycling equipment, and the certification of refrigeration technicians. This requirement has been effective since 1 July 1992. See CAAA 90 §608 and 40 CFR 82, Subpart F.

5. Accelerated Phase-out of ODS: In accordance with CAAA 90 §606, President Bush announced in February 1992 that the United States would accelerate the phase-out of Class I ODSs to January 1995. Final amendments to the rules for phase-out of ODS (1993 phase-out acceleration) were promulgated by EPA on 10 December 1993, 58 FR 65018 as 40 CFR Part 82 Subpart A, Production and Consumption Controls. The rules banned the production of Class I, Group II ODSs (halons) on 1 January 1994 Groups I, III, IV, V, and VII on 1 January 1996, and Class I, Group VI on 1 January 2001. See Table 6.1 of OPNAVINST 5090.1B for a complete list of Class 1 ODS and CAAA 90 §604, 605, 606, 607, and 616 for additional information on the statutory requirements. The bulk of

the phase-out requirements directly affect only producers and importers of ODS. Users will be indirectly affected by significant increases in cost and lack of availability of Class I ODSs.

5.1 HVAC and Refrigeration Equipment: Also, in accordance with OPNAVINST 5090.1B shore based heating, ventilating, and air conditioning (HVAC), and refrigeration equipment containing a Class I ODS must be converted or replaced with an EPA SNAP approved ODS replacement having an ozone depletion potential of 0.05 or less by 31 December 2000.

5.2 Halon Systems: All non-mission critical Halon portable fire extinguishers must be removed by 1 January 1996, and shore-based non-mission critical Halon 1301 systems must be replaced by 31 December 2000.

5.3 Per OPNAVINST 5090.1B, 6-5.8, activities will be required to develop and implement an ODS management plan to either remove, replace or retrofit their Class I ODS equipment so that it is compatible with appropriate EPA approved replacement substances.

6. Ban on Nonessential ODS Products: The prohibitions listed in the Table below are primarily oriented to sellers or distributors of the product in interstate commerce. The Navy is neither a seller nor distributor, but rather would appear to fit the Subpart C definition of a consumer; that is, "the ultimate purchaser, recipient or user of a product" [40 CFR 82.62(c)]. Thus, the prohibitions may not directly regulate Navy actions regarding Class I and Class II substances. However, the prohibitions will most likely affect the Navy's supply of these materials. The following Table cites key regulations in the ban on nonessential products containing Class I substances and nonessential products containing or manufactured with Class II substances:

CFR Citation	Description
40 CFR 82, Subpart C	Implementing regulations for the requirements of CAAA 90 §608 and §610 regarding the emission reductions from nonessential products containing Class I substances and products containing or manufactured with Class II substances.
40 CFR 82.64	Lists the prohibitions of the sales and distribution in interstate commerce of items containing Class I substances.
40 CFR 82.66	Lists the products which release a Class I substance (defined in 40 CFR Part 82, Appendix A to Subpart A) which are identified as being nonessential, and subject to the prohibitions specified under 40 CFR 82.64.
40 CFR 82.70	Lists the products which release Class II substance (defined in 40 CFR part 82, Appendix B to Subpart A) which are identified as being nonessential and the sale or distribution of such products is prohibited under 40 CFR 82.64 (d),(e), or (f).

7. Labeling of Products Using Ozone Depleting Substances: Products containing or manufactured with certain ozone depleting substances require warning statements on containers, pursuant to CAAA 90 §611 and 40 CFR 82, Subpart E. This requirement is primarily relevant to manufacturers, distributors, retailers, and non-military importers or exporters. The Navy again does not appear to fit these definitions, but rather appears to fit the Subpart E definition of a consumer; that is, "a commercial or non-commercial purchaser of a product or container that has been introduced into interstate commerce" [40 CFR 82.104(c)]. The primary requirement on the Navy under Subpart E is to ensure that the labels remain with the product up to and including the point of sale to the ultimate consumer [40 CFR 82.112 (a)].

8. Significant New Alternatives Policy (SNAP) Program (40 CFR Part 82, Subpart G): 40 CFR Part 82, Subpart G implements the safe alternative policy on the acceptability of substitutes for ozone depleting compounds as required under CAAA 90 §612. Substitutes for ozone depleting compounds must be identified and the acceptability of those substitutes evaluated. Those substitutes believed to present lower overall risks to human health and the environment (relative to the Class I and Class II compounds being replaced) as well as other substitutes for the same end use are to be promoted. 40 CFR Part 82, Appendix A to Subpart G, Substitutes Subject to Use Restrictions and Unacceptable Substitutes, lists the ODS substitutes acceptable for use, conditions or narrow use limitations, and unacceptable substitutes. The EPA will publish in the Federal Register on a quarterly basis a complete list of acceptable and unacceptable alternatives that have been reviewed to date.

9. SNAP Program (OPNAVINST 5090.1B, 6-5.7, 5.13): All shore based (non-mission critical) HVAC and refrigeration equipment for which procurement was initiated after March 18, 1994 shall use a Significant New Alternatives Policy (SNAP) Program approved refrigerant with an ozone depleting potential (ODP) of 0.05 or less. Currently installed shore based (non-mission critical) HVAC and refrigeration equipment containing a Class I ODS shall be replaced or converted to a SNAP approved refrigerant with an ODP of 0.05 or less by 31 December 2000. In selecting an alternative, activities should consider that the production and phase-out schedule for Class II ODS begins in 2020 and is subject to possible acceleration.

Reference #:	**11001**
Project Name:	**Conversion of Shoreside Class I ODS Air Conditioning and Refrigeration Equipment**
Project Group:	**Group 1, Air Conditioning and Refrigeration Equipment**
Pollutant	**Class I ODS; CFCs**
Requirement:	CAAA 90 phases out the production of all Class I ozone depleting substances (ODSs) by January 1996, including chlorofluorocarbon (CFC) refrigerants. These ODSs will not be available to support shoreside air conditioning and refrigeration (AC&R) system requirements. Navy activities must replace/convert existing AC&R systems in accordance with Clean Air Act Amendments of 1990 (CAAA 90) and OPNAVINST 5090.1B. For the EPR submission provide specific details of the Federal, State, and local regulations that apply and specific information such as number of units, building number, equipment identification number, size etc., as opposed to simply restating the generic information contained in this document.

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11001
PPI #:	21
Progress Code:	1 [Non-recurring, but can be phased]
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1, 5-7
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:

Effective Date: FY 96

Reference #: **11001 (Continued)**

Project Name: **Conversion of Shoreside Class I ODS Air Conditioning and Refrigeration Equipment**

Cost Guidance: Ensure an air conditioning and refrigeration engineer is involved in cost estimating process. Consult the NAVFAC ODS Conversion Guide for a technical process flow chart. Estimate your specific requirements using one of the following methods:

1. Obtain estimate from EFDs/EFAs or a local environmental services contractor
2. Use the following cost guidance:

To estimate conversion costs, assume; (A) one-third of the equipment will need replacing, (B) one-third will require major modifications, and (C) one-third will require minor modifications. Cost estimates for replacements/conversions are:

System Capacity	A	B	C
100+ Tons:	$150,000	$70,000	$25,000
20 - 100 Tons:	$50,000	$15,000	$8,000
5 - 20 Tons:	$10,000	$3,500	$2,000

3. Use the following cost guidance:

Costs per ton can be approximated as follows:

$400 to $500 per ton for conversions.

$700 to $1200 per ton for replacements.

4. If your ODS conversion plan is completed, estimates provided in the plan can be used. The plan should be referenced in your EPR exhibit with the date and author of the plan annotated in the narrative.

Reference #:	**11002**
Project Name:	**ODS Conversion Plan**
Project Group:	**Group 6, Administrative**
Pollutant	**N/A**
Requirement:	Regulations under 40 CFR 82, Subpart A prohibits the production of Class I ODS commonly known as Halons and chlorofluorocarbons (CFC). Halons and CFC are used by the Navy in many fire protection systems and in most heating, ventilation, air conditioning and refrigeration (HVAC&R) systems. Navy policy contained in OPNAVINST 5090.1B requires the development of conversion/replacement plans detailing the steps to be taken for the phase-out all non-mission critical shore-based Halon 1301 systems and HVAC&R systems by 31 December 2000. CNO letter 5090 Ser N451I/6U598314 of 5 August 1996 established 31 December 1996 as the deadline for completion of facility ODS Conversion Plans. Periodic updates to existing plans may be required to account for potential accelerated phase-out requirements affecting HCFC and other ODS or change in site conditions (additional units for replacement). For the EPR submission provide specific details indicating if your project is an update to an existing plan, otherwise indicate why a complete new plan is needed. If an update is required, the EPR exhibit should specify what revisions need to be accomplished (for example, specific building numbers should be provided if additional units are identified at buildings).

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11002
PPI #:	21
Progress Code:	1 [Non-recurring]
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1, 5-7
Narrative:	See Appendix D
Reference #:	**11002 (Continued)**
Project Name:	**ODS Conversion Plan**

1st Fund Code: 2 (O&MN)

Other Comments:

Effective Date: Begin in 1994; Plans support phase-out program ending in FY 00.

Cost Guidance: Estimate your specific requirements using one of the following methods:

1. Obtain estimate from EFDs/EFAs or a local environmental services contractor
2. Use the following cost guidance:

	Update Plan	New Plan
Large activity:	$30,000	$60,000
Medium activity:	$20,000	$40,000
Small activity:	$10,000	$20,000

Reference #:	**11003**
Project Name:	**Conversion of Shoreside Halon Fire Protection Equipment**
Project Group:	**Group 2, Fire Protection Equipment**
Pollutant	**N/A**
Project Group:	**Group 1, Fire Protection Equipment**
Pollutant	**Class I ODS; Halons**
Requirement:	CAAA 90 phases out the production of ozone depleting substances (ODSs) by January 1996 with Halon production ceasing by January 1994. Halons will not be available to support shoreside fire protection equipment. Navy activities must remove, replace, or convert existing Halon fire protection systems in accordance with the Clean Air Act Amendments of 1990 (CAAA 90) and OPNAVINST 5090.1B. For the EPR submission provide specific details of the Federal, State, and local regulations that apply and specific information such as a building number, equipment identification number, size etc., as opposed to simply restating the generic information contained in this document.

EPR Data Entries

Law/Regulatory Area:	MULT
Environmental Category:	PGMT
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11003
PPI #:	21
Progress Code:	1 [Non-recurring, but can be phased]
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1, 5-7
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:

Effective Date: FY 96 (FY 93)

Reference #: **11003 (Continued)**

Project Name: **Conversion of Shoreside Halon Fire Protection Equipment**

Cost Guidance: Ensure that a fire protection engineer is included in the cost estimating process. Consult the NAVFAC ODS Conversion Guide for technical decision-making process flow diagram.

Estimate your specific requirements using one of the following methods:

1. Obtain estimate from EFDs/EFAs or a local environmental services contractor
2. Use the following cost guidance:

   Fire Protection equipment:

Halon 1301 Systems:	$20,000/System
Halon 1211 Hand Portable Extinguishers:	$107/Extinguisher

3. If ODS conversion plan is completed, cost estimates may be derived from the plan. Reference to the plan must be annotated in the EPR exhibit.

Reference #:	**11004**
Project Name:	**ODS Solvent Elimination at Shore-based Activities**
Project Group:	**Group 3, Solvents**
Pollutant	**Class I ODS, CFCs**
Requirement:	CAAA 90 phased out the production of all class I ozone depleting substances (ODSs) by January 1996, including chlorofluorocarbon (CFC) solvents. These ODSs will not be available to support solvent applications. Clean Air Act Amendments of 1990 (CAAA 90); SECNAV ODS Policy; and OPNAVINST 5090.1B. For the EPR submission provide specific details of the Federal, State, and local regulations that apply and specific information such as a project description, number of units involved, quantity of solvent installed, type of solvent involved, as opposed to simply restating the generic information contained in this document.

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11004
PPI #:	21
Progress Code:	1 [Non-recurring, but can be phased]
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:

Effective Date: FY 95

Reference #: **11004 (Continued)**

Project Name: **ODS Solvent Elimination at Shore-based Activities**

Cost Guidance: Estimate your specific requirements as follows:

1. Obtain estimate from EFDs/EFAs or a local environmental services contractor
2. Use the following cost guidance:

Elimination costs dependent on local solvent applications. Alternative materials and/or processes have been identified to date for all maintenance applications of Class I ODSs. An inventory of processes utilizing ODSs and alternatives available can be obtained from facility ODS Conversion Plans and Pollution Prevention Plans, which were completed by 31 Dec 1995. Consult cognizant engineering command, the Pollution Prevention Opportunity Handbook , the Pollution Prevention Technical Library, or Naval Air Systems Command 0- and I-level Solvent Substitution Guide for alternatives information and cost estimates. Approval to implement each alternative must be obtained from cognizant engineering authority for each solvent application. Oxygen system cleaning alternatives will be centrally implemented by Naval Air Systems Command and Naval Sea Systems Command. No funds will be provided to augment non-ODS solvent purchase costs. Projects submitted under this project line are intended to support equipment replacements not being addressed by centrally-managed programs.

Reference #:	**11005**
Project Name:	**Elimination of ODS Requirements in Technical Manuals**
Project Group:	**Group 6, Administrative**
Pollutant	**N/A**
Requirement:	Under the CAAA 90, chlorofluorocarbon (CFC) refrigerants and solvents were phased out of production as of 1 Jan 1996, and Halon production was discontinued as of Jan 1994. The Navy is eliminating shore-based non-mission critical applications of all ODS by 31 Dec 2000 in accordance with SECNAV ODS Policy and OPNAVINST 5090.1B. In many cases, the use of ODSs is required by existing technical manuals and specifications. To comply with phase-out dates set forth in SECNAV ODS Policy and OPNAVINST 5090.1B, Navy technical manuals and specifications must be screened and revised to eliminate requirements for use of ODSs. Clean Air Act Amendments of 1990 (CAAA 90); SECNAV ODS Policy; and OPNAVINST 5090.1B.

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11001
PPI #:	21
Progress Code:	1 [Non-recurring]
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1-7
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:

Effective Date: FY 98

Reference #:	**11005 (Continued)**
Project Name:	**Elimination of ODS Requirements in Technical Manuals**
Cost Guidance:	To estimate technical manual revision costs, separate task into technical manual screening costs (manual or electronic depending on TM format) and cost to reproduce and distribute TM.

Reference #:	**11940**
Project Name:	**Training (Required by Statute/Regulation)**
Project Group:	**Group 4, Training**
Pollutant	**N/A**
Requirement:	The 40 CFR Parts 82.40 and 82.161 require the training and certification of air conditioning and refrigeration technicians. Dependent upon specific ozone depleting substance (ODS) related training requirements. For the EPR submission provide specific details of the Federal, State, and local regulations that apply In addition, include specific information such as purpose of the training, number of students, number of courses.

EPR Data Entries

Law/Regulatory Area:	MULT
Environmental Category:	TRNG
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11940
PPI #:	9
Progress Code:	Dependent on specific ODS related training requirements.
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1, 5-7
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:	This Cookbook Item should only be used for training requirements that are mandated by statute or regulation and not addressed in the requirements of an existing Cookbook Item.
Effective Date:	Dependent on specific ODS related training requirements**.**
Cost Guidance:	Dependent on specific ODS related training requirements.

Reference #:	**11941**
Project Name:	**Training (Required by Navy Policy or to Stay Abreast of Regulatory Changes)**
Project Group:	**Group 4, Training**
Pollutant	**N/A**
Requirement:	Dependent upon specific Navy Policy and ozone depleting substance (ODS) related program requirements. For the EPR submission provide specific details of the Navy Policy that applies. In addition, include specific information such as purpose of the training, number of students, number of courses.

EPR Data Entries

Law/Regulatory Area:	MULT
Environmental Category:	TRNG
Project Assessment:	M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11941
PPI #:	9
Progress Code:	Dependent on specific ODS related training requirements.
Navy Assessment Level:	1
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	4, 5-7
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:	This Cookbook Item should only be used for training requirements that are <u>not</u> mandated by statute or regulation, but are required by Navy Policy, and the requirements applicable to the Environmental and Natural Resources Program Navy Systems Plan of June 1996, or needed to stay abreast of regulatory changes.
Effective Date:	Dependent on specific ODS related training requirements.
Cost Guidance:	Dependent on specific ODS related training requirements.

Reference #:	**11950**
Project Name:	**Specific State Requirements**
Project Group:	**5 N/A**
Pollutant	**N/A**
Requirement:	Specific State ozone depleting substance (ODS) related requirements which are either more stringent than or not addressed in existing Federal requirements. For the EPR submission provide specific details of the State regulations that apply and specific information about the project. as opposed to simply restating the generic information contained in this document.

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11950
PPI #:	10
Progress Code:	Dependent on specific ODS related requirements.
Navy Assessment Level:	1-5 (Determined by activity)
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	2
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:	This Cookbook Item should only be used for state specific requirements that are not addressed in the requirements of an existing Cookbook Item.
Effective Date:	Dependent on specific State ODS related requirements.
Cost Guidance:	Dependent on specific State ODS related requirements.

Reference #:	**11960**
Project Name:	**Specific Local Requirements**
Project Group:	**5 N/A**
Pollutant	**N/A**
Requirement:	Specific local ozone depleting substance (ODS) related requirements which are either more stringent than or not addressed in existing Federal or State requirements. For the EPR submission provide specific details of the local regulations that apply and specific project information as opposed to simply restating the generic information contained in this document.

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11960
PPI #:	10
Progress Code:	Dependent on specific ODS related requirements.
Navy Assessment Level:	1-5 (Determined by activity)
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	3
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:	This Cookbook Item should only be used for specific local requirements that are not addressed in the requirements of an existing Cookbook Item.
Effective Date:	Dependent on specific local ODS related requirements.
Cost Guidance:	Dependent on specific local ODS related requirements.

Reference #:	**11970**
Project Name:	**Specific Overseas Requirements**
Project Group:	**5 N/A**
Pollutant	**N/A**
Requirement:	DoD Inst. 4715.5 and OPNAVINST 5090.1B require compliance with the Final Governing Standards (FGS) or the Overseas Environmental Baseline Guidance Document (OEBGD), if a FGS has not been written, to protect human health and the environment

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided.
Pillar:	CMP
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11970
PPI #:	21
Progress Code:	Dependent on specific Overseas Environmental Baseline Governing Document (OEBGD) or Final Governing Standards (FGS) ODS requirements.
Navy Assessment Level:	1-5. Determined by activity
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project.
Regulatory Authority:	5, 6, or 7
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:	Project name/title must be specific describing the exact requirement that is being addressed. Costs should be based upon historical data and similar projects in CONUS. Your geographical EFD/EFA can assist in the formalization of the requirement and provide budget estimates.
Effective Date:	Dependent on specific Final Governing Standards (FGS) or Overseas Environmental Baseline Governing Document (OEBGD) ODS requirements.
Cost Guidance:	Dependent on specific Final Governing Standards (FGS) or Overseas Environmental Baseline Governing Document (OEBGD) ODS requirements.
Reference #:	**11999**

Project Name:	**Miscellaneous Requirements (activities please use a descriptive title)**
Project Group:	**N/A**
Pollutant	**N/A**
Requirement:	Provide support for specific ozone depleting substance (ODS) related requirements not addressed in an existing Cookbook Item.

EPR Data Entries

Law/Regulatory Area:	CAA
Environmental Category:	ODCS
Project Assessment:	H/M/L
Compliance Status:	Select from list of options provided
Pillar:	PVN
Fund Command:	Indicates the claimant providing the funds for the project
Resource Sponsor:	04 (N4-Logistics) or 46 (N46 Fleet)
Cookbook #:	11999
PPI #:	21
Progress Code:	Dependent on specific ODS related requirements.
Navy Assessment Level:	1-5 (Determined by activity)
AG/SAG:	Depends on type of activity
Approving Command:	Indicates the claimant with the authority and responsibility for approving the project
Regulatory Authority:	1-7 (Determined by activity)
Narrative:	See Appendix D
1st Fund Code:	2 (O&MN)

Other Comments:	This Cookbook Item should only be used for specific requirements that are not addressed in the requirements of an existing Cookbook Item.
Effective Date:	Dependent on specific ODS related requirements.
Cost Guidance:	Dependent on specific ODS related requirements.

APPENDIX B

OPNAVINST 5090.1B
CHAPTER - 6 - MANAGEMENT OF OZONE DEPLETING SUBSTANCES

(NOT PROVIDED IN ELECTRONIC FORMAT)

APPENDIX C

NAVY ODS ADVISORY SYSTEM

APPENDIX C-1

NAVY ODS ADVISORY 95-01
MISSION-CRITICAL APPLICATIONS OF CLASS 1 OZONE-DEPLETING SUBSTANCES

APPENDIX C-2

NAVY ODS ADVISORY 96-01A
OZONE-DEPLETING SUBSTANCE (ODS) SUPPLY SUPPORT

APPENDIX C-3

NAVY ODS ADVISORY 96-02
REFRIGERANT LEAK REPAIR AND RECORD KEEPING

APPENDIX C-4

NAVY ODS ADVISORY 96-03
SHIPBOARD REFRIGERANT LEAK REPAIR AND RECORD KEEIPNG

APPENDIX D

NAVFACNOTE 5090
OZONE DEPLETING SUBSTANCES

APPENDIX E

ENVIRONMENTAL PROTECTION AGENCY REGULATIONS

APPENDIX E-1

40 CFR PART 82, SUBPART B -
SERVICING OF MOTOR VEHICLE AIR CONDITIONERS

Appendix E-1:

40 CFR Part 82, Subpart B- Servicing of Motor Vehicle Air Conditioners

82.30 Purpose and Scope
82.32 Definitions
82.34 Prohibitions
82.36 Approved Refrigerant Recycling Equipment
82.38 Approved Independent Standards Testing Organizations
82.40 Technician Training and Certification
82.42 Certification and Recordkeeping Requirements
Appendix A to Part 82 Subpart B * - Standard for Recycle/Recover Equipment
Appendix B to Part 82 Subpart B * - Standard for Recover Equipment
*[Appendixes A and B not included]

Section 82.30 Purpose and Scope

(a) The purpose of these regulations is to implement section 609 of the Clean Air Act, as amended (Act) regarding the servicing of motor vehicle air conditioners.

(b) These regulations apply to any person performing service on a motor vehicle for consideration when this service involves the refrigerant in the motor vehicle air conditioner.

Section 82.32 Definitions

(a) *Approved Independent Standards Testing Organization* means any organization which has applied for and received approval from the Administrator pursuant to §82.38.

(b) *Approved Refrigerant Recycling Equipment* means equipment certified by the Administrator or an organization approved under §82.38 as meeting either one of the standards in §82.36. Such equipment extracts and recycles refrigerant or extracts refrigerant for recycling on-site or reclamation off-site.

(c) *Motor vehicle* as used in this subpart means any vehicle which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to passenger cars, light duty vehicles, and heavy duty vehicles. This definition does not include a vehicle where final assembly of the vehicle has not been completed by the original equipment manufacturer.

(d) *Motor vehicle air conditioners* means mechanical vapor compression refrigeration equipment used to cool the driver's or passenger's compartment of any motor vehicle. This definition is not intended to encompass the hermetically sealed refrigeration systems used on motor vehicles for refrigerated cargo and the air conditioning systems on passenger buses using HCFC-22 refrigerant.

(e) (1) Properly using means using equipment in conformity with Recommended Service Procedures and Recommended Practices for the Containment of R-12 (CFC-12) set forth in appendix A or appendix B to this subpart, as applicable. In addition, this term includes operating the equipment in accordance with the manufacturer's guide to operation and maintenance and using the equipment only for the controlled substance for which the

machine is designed. For equipment that extracts and recycles refrigerant, properly using also means to recycle refrigerant before it is returned to a motor vehicle air conditioner. For equipment that only recovers refrigerant, properly using includes the requirement to recycle the refrigerant on-site or send the refrigerant off-site for reclamation.

(2) Refrigerant from reclamation facilities that is used for the purpose of recharging motor vehicle air conditioners must be at or above the standard of purity developed by the Air-conditioning and Refrigeration Institute (ARI 700-93) (which is codified at 40 CFR part 82, subpart F, appendix A, and is available at 4301 North Fairfax Drive, Suite 425, Arlington, Virginia 22203). Refrigerant may be recycled off-site only if the refrigerant is extracted using recover only equipment, and is subsequently recycled off-site by equipment owned by the person that owns both the recover only equipment and owns or operates the establishment at which the refrigerant was extracted. In any event, approved equipment must be used to extract refrigerant prior to performing any service during which discharge of refrigerant from the motor vehicle air conditioner can reasonably be expected. Intentionally venting or disposing of refrigerant to the atmosphere is an improper use of equipment.

(f) *Refrigerant* means any class I or class II substance used in a motor vehicle air conditioner. Class I and Class II substances are listed in Part 82, Subpart A, Appendix A. Effective November 15, 1995, refrigerant shall also include any substitute substance.

(g) *Service for consideration* means being paid to perform service, whether it is in cash, credit, goods, or services. This includes all service except that done for free.

(h) *Service involving refrigerant* means any service during which discharge or release of refrigerant from the motor vehicle air conditioner to the atmosphere can reasonably be expected to occur.

Section 82.34 Prohibitions

(a) Effective Aug. 13, 1992, no person repairing or servicing motor vehicles for consideration may perform any service on a motor vehicle air conditioner involving the refrigerant for such air conditioner

(1) without properly using equipment approved pursuant to §82.36 and

(2) unless such person has been properly trained and certified by a technician certification program approved by the Administrator pursuant to §82.40. The requirements of this paragraph do not apply until January 1, 1993 for small entities who certify to the Administrator in accordance with section §82.42(a)(2).

(b) Effective November 15, 1992, no person may sell or distribute, or offer for sale or distribution, any class I or class II substance that is suitable for use as a refrigerant in a motor vehicle air-conditioner and that is in a container which contains less than 20 pounds of such refrigerant to any person unless that person is properly trained and certified under §82.40 or intended the containers for resale only, and so certifies to the seller under §82.42 (b)(4).

(c) No technician training programs may issue certificates unless the program complies with all of the standards in §82.40(a).

Section 82.36 Approved Refrigerant Recycling Equipment

(a)(1) Refrigerant recycling equipment must be certified by the Administrator or an independent standards testing organization approved by the Administrator under §82.38 to meet either one of the following standards:

(2) Equipment that recovers and recycles the refrigerant must meet the standards set forth in appendix A to this subpart (Recommended Service Procedure for the Containment of R-12, Extraction and Recycle Equipment for Mobile Automotive Air-Conditioning Systems, and Standard of Purity for Use in Mobile Air-Conditioning Systems). Equipment that recovers refrigerant for recycling on-site or for reclamation off-site must meet the standards set forth in appendix B to this subpart (Recommended Service Procedure for the Containment of R-12, Extraction Equipment for Mobile Automotive Air-Conditioning Systems).

(b) Refrigerant recycling equipment purchased before September 4, 1991 that recovers and recycles refrigerant, and refrigerant recycling equipment purchased before April 22, 1992 that recovers refrigerant for recycling on-site or reclamation off-site, that has not been certified under paragraph (a) of this section, shall be considered approved if the equipment is substantially identical to equipment certified under paragraph (a) of this section. Equipment manufacturers or owners may request a determination by the Administrator by submitting an application and supporting documents that indicate that the equipment is substantially identical to approved equipment to: MVACs Recycling Program Manager, Stratospheric Protection Division (6205J), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, Attn: Substantially Identical Equipment Review. Supporting documents must include process flow sheets, lists of components and any other information that would indicate that the equipment is capable of processing the refrigerant to the standards in appendix A or appendix B to this subpart, as applicable. Authorized representatives of the Administrator may inspect equipment for which approval is being sought and request samples of refrigerant that has been extracted and/or recycled using the equipment. Equipment that fails to meet appropriate standards will not be considered approved.

(c) The Administrator will maintain a list of approved equipment by manufacturer and model. Persons interested in obtaining a copy of the list should send written inquiries to the address in (b) of this section.

Section 82.38 Approved Independent Standards Testing Organizations

(a) Any independent standards testing organization may apply for approval by the Administrator to certify equipment as meeting the standards in appendix A and appendix B to this subpart, as applicable. This application shall be sent to: MVACs Recycling Program Manager,

Stratospheric Protection Division (6205J), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

(b) Applications for approval must document the following:

(1) That the organization has the capacity to accurately test whether refrigerant recycling equipment complies with the applicable standards. In particular, applications must document:

(i) The equipment present at the organization that will be used for equipment testing;

(ii) The expertise in equipment testing and the technical experience of the organization's personnel;

(iii) Thorough knowledge of the standards as they appear in appendix A and appendix B of this subpart, as applicable; and

(iv) The test procedures to be used to test equipment for compliance with applicable standards, and why such test procedures are appropriate for that purpose.

(2) That the organization has no conflict of interest and will receive no financial benefit based on the outcome of certification testing; and

(3) That the organization agrees to allow the Administrator access to verify the information contained in the application.

(c) If approval is denied under this section, the Administrator shall give written notice to the organization setting forth the basis for his or her determination.

(d) If at any time an approved independent standards testing organization is found to be conducting certification tests for the purposes of this subpart in a manner not consist with the representations made in its application for approval under this section, the Administrator reserves the right to revoke approval.

Section 82.40 Technician Training and Certification

(a) Any technician and certification program may apply for approval, in accordance with the provisions of this paragraph, by submitting to the Administrator at the address in §82.38(a) verification that the program meets all of the following standards:

(1) Training

Each program must provide adequate training, through one or more of the following means: on-the-job training, training through self-study of instructional material, or on-site training involving instructors, videos or hands-on demonstration.

(2) Test Subject Material

The certification tests must adequately and sufficiently cover the following:

(i) The standards established for the service and repair of motor vehicle air conditioners as set forth in appendix A and appendix B to this subpart. These standards relate to the recommended service procedures for the containment of refrigerant, extraction equipment, extraction and recycle equipment, and the standard of purity for refrigerant in motor vehicle air conditioners.

(ii) Anticipated future technological developments, such as the introduction of HFC-134a in new motor vehicle air conditioners.

(iii) The environmental consequences of refrigerant release

and the adverse effects of stratospheric ozone layer depletion.
(iv) As of Aug. 13, 1992, the requirements imposed by the Administrator under §609 of the Act.

(3) Test Administration
Completed test must be graded by an entity or individual who receives no benefit based on the outcome of testing; a fee may be charged for grading. Sufficient measures must be taken at the test site to ensure that tests are completed honestly by each technician. Each test must provide a means of verifying the identification of the individual taking the test. Programs are encouraged to make provisions for non-English speaking technicians by providing tests in other languages or allowing the use of a translator when taking the test. If a translator is used, the certificate received must indicate that translator assistance was required.
(4) Proof of Certification
Each certification program must offer individual proof of certification, such as a certificate, wallet-sized card, or display card, upon successful completion of the test. Each certification program must provide a unique number for each certified technician.

(b) In deciding whether to approve an application, the Administrator will consider the extent to which the applicant has documented that its program meets the standards set forth in this section. The Administrator reserves the right to consider other factors deemed relevant to ensure the effectiveness of certification programs. The Administrator may approve a program which meets all the standards in paragraph (a) except test administration if the program, when viewed as a whole, is at least as effective as a program that does meet all the standards. Such approval shall be limited to training and certification conducted before Aug. 13, 1992. If approval is denied under this section, the Administrator shall give written notice to the program setting forth the basis for his determination.

(c) Technical Revisions. Directors of approved certification programs must conduct periodic reviews of test subject material and update the material based upon the latest technological development in motor vehicle air conditioner service and repair. A written summary of the review and any changes made must be submitted to the Administrator every two years.

(d) Recertification. The Administrator reserves the right to specify the need for technician recertification at some future date, if necessary.

(e) If at any time an approval program is conducted in a manner not consistent with the representations made in the application for approval of the program under this section, the Administrator reserves the right to revoke approval.

(f) Authorized representatives of the Administrator may require technicians to demonstrate on the business entity's premises their ability to perform proper procedures for recovering and/or recycling refrigerant. Failure to demonstrate or failure to properly use the equipment may result in revocation of the technician's certificate by the Administrator. Technicians whose certification is revoked must be

recertified before servicing or repairing any motor vehicle air conditioners.

Section 82.42 Certification, Recordkeeping and Public Notification Requirements

(a) Certification requirements

(1) No later than January 1, 1993, any person repairing or servicing motor vehicle air conditioners for consideration shall certify to the Administrator that such person has acquired, and is properly using, approved equipment and that each individual authorized to use the equipment is properly trained and certified. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(i) The name of the purchaser of the equipment,

(ii) The address of the establishment where the equipment will be located; and

(iii) The manufacturer name and equipment model number, the date of manufacture, and the serial number of the equipment. The certification must also include a statement that the equipment will be properly used in servicing motor vehicle air conditioners, that each individual authorized by the purchaser to perform service is properly trained and certified in accordance with §82.40, and that the information given is true and correct. The certification should be sent to: MVACs Recycling Program Manager, Stratospheric Protection Division, (6205J), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

(2) The prohibitions in §82.34(a) shall be effective as of January 1, 1993 for persons repairing or servicing motor vehicle air conditioners for consideration at an entity which performed service on fewer that 100 motor vehicle air conditioners in calendar year 1990, but only if such person so certifies to the Administrator no later than [insert date 30 days from date of publication]. Persons must retain adequate records to demonstrate that the number of vehicles serviced was fewer than 100.

(3) Certificates of compliance are not transferable. In the event of a change of ownership of an entity which services motor vehicle air conditioners for consideration, the new owner of the entity shall certify within thirty days of the change of ownership pursuant to §82.42(a)(1).

(b) Recordkeeping requirements

(1) Any person who owns approved refrigerant recycling equipment certified under §82.36(a)(2) must maintain records of the name and address of any facility to which refrigerant is sent.

(2) Any person who owns approved refrigerant recycling equipment must retain records demonstrating that all persons authorized to operate the equipment are currently certified under §82.40.

(3) Any person who sells or distributes any class I or class II substance that is suitable for use as a refrigerant in a motor vehicle air conditioner and that is in a container of less than 20 pounds of such refrigerant must verify that the purchaser is properly trained and certified under §82.40. The seller must have a reasonable basis for believing that the

information presented by the purchaser is accurate. The only exception to these requirements is if the purchaser is purchasing the small containers for resale only. In this case, the seller must obtain a written statement from the purchaser that the containers are for resale only and indicate the purchasers name and business address. Records required under this paragraph must be retained for a period of three years.

(4) All records required to be maintained pursuant to this section must be kept for a minimum of three years unless otherwise indicated. Entities which service motor vehicle air conditioners for consideration must keep these records on-site.

(5) All entities which service motor vehicle air conditioners for consideration must allow an authorized representative of the Administrator entry onto their premise (upon presentation of his or her credentials) and give the authorized representative access to all records required to be maintained pursuant to this section.

(c) Public Notification. Any person who conducts any retail sales of a class I or class II substance that is suitable for use as a refrigerant in a motor vehicle air conditioner, and that is in a container of less than 20 pounds of refrigerant, must prominently display a sign where sales of such containers occur which states: "It is a violation of federal law to sell containers of Class I and Class II refrigerant of less than 20 pounds of such refrigerant to anyone who is not properly trained and certified to operate approved refrigerant recycling equipment."

APPENDIX E-2

40 CFR PART 82, SUBPART F -
RECYCLING AND EMISSION REDUCTIONS

Appendix E-2:

40 CFR Part 82, Subpart F - **Recycling and Emissions Reduction**

Summary: The refrigerant recycling regulations under section 608 of the Clean Air Act establish a recycling program for ozone-depleting refrigerants recovered during the servicing and disposal of air conditioning and refrigeration equipment. Together with the prohibition on venting during the servicing, repair, and disposal of class I and class II substances that took effect July 1, 1992, the regulations should substantially reduce emissions of ozone-depleting refrigerants. The regulations require persons servicing air conditioning and refrigeration equipment to observe certain service practices that reduce refrigerant emissions and establish equipment and offsite reclaimer certification programs, as well as a technician certification program. A sales restriction on refrigerant is included, whereby only certified technicians are authorized to purchase such refrigerant, EPA's regulations also require repair of significant leaks, based on annual leak rates of equipment. In addition, the regulations require that ozone-depleting compounds contained "in bulk" in appliances to be removed prior to disposal of the appliances, and that all air conditioning and refrigeration equipment, except for small appliances, be provided with a servicing aperture that would facilitate recovery of the refrigerant.

Effective Date: 30 days after publication of the May 14, 1993, final rule, except where otherwise noted. Amendments incorporated into the rule have different effective dates. Sections of the rule revised by the August 19, 1994, rule became effective October 18, 1994. Sections of the rule revised by the November 9, 1994, rule became effective October 28, 1994. Sections of the rule revised by the March 17, 1995, rule became effective May 16, 1995. Sections of the rule revised by the May 9, 1995, rule became effective April 27, 1995. Sections of the rule revised by the August 8, 2995, rule became effective September 7, 1995.

For Further Information Contact: Section 608 Recycling Program Manager, Program Implementation Branch, Stratospheric Protection Division, Office of Atmospheric Programs, Office of Air and Radiation (6205-J), 401 M Street, S.W., Washington, D.C. 20460. The Stratospheric Ozone Information Hotline also can be contacted for further information at (800) 296-1996.

Subpart F - Recycling and Emissions Reduction

Sec.

82.150 Purpose and Scope
82.152 Definitions
82.154 Prohibitions
82.156 Required Practices
82.158 Standards for Recycling and Recovery Equipment
82.160 Approved Equipment Testing Organizations
82.161 Technician Certification
82.162 Certification by Owners of Recovery and Recycling Equipment
82.164 Reclaimer Certification
82.166 Reporting and Recordkeeping Requirements
Appendix A to Subpart F-Specifications for Fluorocarbon Refrigerants

Appendix B to Subpart F *-Performance of Refrigerant Recovery, Recycling, and/or Reclaim Equipment
Appendix C to Subpart F *-Method for Testing Recovery Devices for Use with Small Appliances
Appendix D to Subpart F *-Standards for Becoming a Certifying Program for Technicians
***[Note: Appendixes B, C, and D not included in this guide]**

Subpart F-Recycling and Emissions Reduction

Section 82-150 Purpose and Scope

(a) The purpose of this subpart is to reduce emissions of class I and class II refrigerants to the lowest achievable level during the service, maintenance, repair, and disposal of appliances in accordance with section 608 of the Clean Air Act.

(b) This subpart applies to any person servicing, maintaining, or repairing appliances except for motor vehicle air conditioners. In addition, this subpart applies to refrigerant reclaimers, appliance owners, and manufacturers of appliances and recycling and recovery equipment

Section 82.152 Definitions

Appliance means any device which contains and uses a class I or class II substance as a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer.

Apprentice means any person who is currently registered as an apprentice in service, maintenance, repair, or disposal of appliances with the U.S. Department of Labor's Bureau of Apprenticeship and Training (or a State Apprenticeship Council recognized by the Bureau of Apprenticeship and Training). If more than two years have elapsed since the person first registered as an apprentice with the Bureau of Apprenticeship and Training (or a State Apprenticeship Council recognized by the Bureau of Apprenticeship and Training), the person shall not be considered an apprentice.

Approved equipment testing organization means any organization which has applied for and received approval from the Administrator pursuant to §82.160.

Certified refrigerant recovery or recycling equipment means equipment certified by an approved equipment testing organization to meet the standards in §82.158(b) or (d), equipment certified pursuant to §82.36(a), or equipment manufactured before November 15, 1993, that meets the standards in § 82.158(c), (e), or (g).

Commercial refrigeration means, for the purposes of §82.156(i), the refrigeration appliances utilized in the retail food and cold storage warehouse sectors. Retail food includes the refrigeration equipment found in supermarkets, convenience stores, restaurants and other food service establishments. Cold storage includes the equipment used to store meat, produce, dairy products, and other perishable goods. All of the equipment contains large refrigerant charges, typically over 75 pounds.

Critical component means, for the purposes of §82.156(i), a component without which industrial process refrigeration equipment will not function, will be unsafe in its intended environment, and/or will be subject to

failures that would cause the industrial process served by the refrigeration appliance to be unsafe.

Custom-built means, for the purposes of §82.156(i), that the equipment or any of its critical components cannot be purchased and/or installed without being uniquely designed, fabricated and/or assembled to satisfy a specific set of industrial process conditions.

Disposal means the process leading to and including:

(1) the discharge, deposit, dumping or placing of any discarded appliance into or on any land or water;

(2) the disassembly of any appliance for discharge, deposit, dumping or placing of its discarded component parts into or on any land or water; or

(3) the disassembly of any appliance for reuse of its component parts.

Follow-up verification test means, for the purposes of §82.156(i), those tests that involve checking the repairs within 30 days of the appliance's returning to normal operating characteristics and conditions. Follow-up verification tests for appliances from which the refrigerant charge has been evacuated means a test conducted after the appliance or portion of the appliance has resumed operation at normal operating characteristics and conditions of temperature and pressure, except in cases where sound professional judgment dictates that these tests will be more meaningful if performed prior to the return to normal operating characteristics and conditions. A follow-up verification test with respect to repairs conducted without evacuation of the refrigerant charge means a reverification test conducted after the initial verification test and usually within 30 days of normal operating conditions. Where an appliance is not evacuated, it is only necessary to conclude any required changes in pressure, temperature or other conditions to return the appliance to normal operating characteristics and conditions.

Full charge means, for the purpose of §82.156(i), the amount of refrigerant required for normal operating characteristics and conditions of the appliance as determined by using one of the following four methods or a combination of one of the following four methods:

(1) The equipment manufacturers' determination of the correct full charge for the equipment.

(2) Determining the full charge by appropriate calculations based on component sizes, density of refrigerant, volume of piping, and all other relevant consideration;

(3) The use of actual measurements of the amount of refrigerant added or evacuated from the appliance; and/or

(4) The use of an established range based on the best available data, regarding the normal operating characteristics and conditions for the appliance, where the mid-point of the range will serve as the full charge, and where records are maintained in accordance with §82.166(q).

High-pressure appliance means an appliance that uses a refrigerant with a boiling point between -50 and 10 degrees Centigrade at atmospheric

pressure (29.9 inches of mercury). This definition includes but is not limited to appliances using refrigerants -12, -22, -114, -500, or -502.

Industrial process refrigeration means, for the purposes of §82.156(i), complex customized appliances used in the chemical, pharmaceutical, petrochemical, and manufacturing industries. These appliances are directly linked to the industrial process. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it will be considered industrial process refrigeration equipment if 50 percent or more of its operating capacity is used for industrial process refrigeration.

Industrial process shutdown means, for the purposes of §82.156(i), that an industrial process or facility temporarily ceases to operate or manufacture whatever is being produced at that facility.

Initial verification test means, for the purposes of §82.156(i), those leak tests that are conducted as soon as practicable after the repair is completed. An initial verification test, with regard to the leak repairs that require the evacuation of the appliance or portion of the appliance, means a test conducted prior to the replacement of full refrigerant charge and before the appliance or portion of the appliance has reached operation at normal operating characteristics and conditions of temperature and pressure. An initial verification test with regard to repairs conducted without the evacuation of the refrigerant charge means a test conducted as soon as practicable after the conclusion of the repair work.

Low-loss fitting means any device that is intended to establish a connection between hoses, appliances, or recovery or recycling machines and that is designed to close automatically or to be closed manually when disconnected, minimizing the release of refrigerant from hoses, appliances, and recovery or recycling machines.

Low-pressure appliance means an appliance that uses a refrigerant with a boiling point above 10 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to equipment utilizing refrigerants -11, -113, and -123.

Major maintenance, service, or repair means any maintenance, service, or repair involving the removal of any or all of the following appliance components: compressor, condenser, evaporator, or auxiliary heat exchanger coil.

Motor vehicle air conditioner (MVAC) means any appliance that is a motor vehicle air conditioner as defined in 40 CFR Part 82, Subpart B.

MVAC-like appliance means mechanical vapor compression, open-drive compressor appliances used to cool the driver's or passenger's compartment of a non-road motor vehicle. This includes the air conditioning equipment found on agricultural or construction vehicles. This definition is not intended to cover appliances using HCFC-22 refrigerant.

Normal operating characteristics or conditions means, for the purposes of

§82.156(i), temperatures, pressures, fluid flows, speeds and other characteristics that would normally be expected for a given process load and ambient condition during operation. Normal operating characteristics and conditions are marked by the absence of atypical conditions affecting the operation of the refrigeration appliance.

Normally containing a quantity of refrigerant means containing the quantity of refrigerant within the appliance or appliance component when the appliance is operating with a full charge of refrigerant.

Opening an appliance means any service, maintenance, or repair on an appliance that would release class I or class II refrigerant from the appliance to the atmosphere unless the refrigerant were recovered previously from the appliance. Connecting and disconnecting hoses and gauges to and from the appliance to measure pressures within the appliance and to add refrigerant to or recover refrigerant from the appliance shall not be considered "opening."

Person means any individual or legal entity, including an individual, corporation, partnership, association, state, municipality, political subdivision of a state, Indian tribe, and any agency, department, or instrumentality of the United States, and any officer, agent, or employee thereof.

Process stub means a length of tubing that provides access to the refrigerant inside a small appliance or room air conditioner and that can be resealed at the conclusion of repair or service.

Reclaim refrigerant means to reprocess refrigerant to at least the purity specified in appendix A to 40 CFR Part 82, Subpart F (based on ARI Standard 700-1993, *Specifications for Fluorocarbon and Other Refrigerants)* and to verify this purity using the analytical methodology prescribed in appendix A. In general, reclamation involves the use of processes or procedures available only at a reprocessing or manufacturing facility.

Recover refrigerant means to remove refrigerant in any condition from an appliance and to store it in an external container without necessarily testing or processing it in any way.

Recovery efficient means the percentage of refrigerant in an appliance that is recovered by a piece of recycling or recovery equipment.

Recycle refrigerant means to extract refrigerant from an appliance and clean refrigerant for reuse without meeting all of the requirements for reclamation. In general, recycled refrigerant is refrigerant that is cleaned using oil separation and single or multiple passes through devices, such as replaceable core filter-dryers, which reduce moisture, acidity, and particulate matter. These procedures are usually implemented at the field job site.

Refrigerant circuit means the parts of an appliance that are normally connected to each other (or are separated only by internal valves) and are designed to contain refrigerant.

Self-contained recovery equipment means refrigerant recovery or recycling equipment that is capable of removing

the refrigerant from an appliance without the assistance of components contained in the appliance.

Small appliance means any of the following products that are fully manufactured, charged, and hermetically sealed in a factory with five (5) pounds or less of refrigerant: refrigerators and freezers designed for home use, room air conditioners (including window air conditioners and packaged terminal air conditioners), packaged terminal heat pumps, dehumidifiers, under-the-counter ice makers, vending machines, and drinking water coolers.

Suitable replacement refrigerant means, for the purposes of §82.156(i)(7)(i), a refrigerant that is acceptable under section 612(c) of the Clean Air Act Amendments of 1990 and all regulations promulgated under that section, compatible with other materials with which it may come into contact, and be able to achieve the temperatures required for the affected industrial process in a technically feasible manner.

System mothballing means the intentional shutting down of a refrigeration appliance undertaken for an extended period of time by the owners or operators of that facility, where the refrigerant has been evacuated from the appliance or the affected isolated section of the appliance, at least to atmospheric pressure.

System-dependent recovery equipment means refrigerant recovery equipment that requires the assistance of components contained in an appliance to remove the refrigerant from the appliance.

Technician means any person who performs maintenance, service, or repair that could be reasonably expected to release class I or class II refrigerants from appliances, except for MVACs, into the atmosphere. Technician also means any person who performs disposal of appliances, except for small appliances, MVACs, and MVAC-like appliances, that could be reasonably expected to release class I or class II refrigerants from the appliances into the atmosphere. Performing maintenance, service, repair, or disposal could be reasonably expected to release refrigerants only if the activity is reasonably expected to violate the integrity of the refrigerant circuit. Activities reasonably expected to violate the integrity of the refrigerant circuit include activities such as attaching and detaching hoses and gauges to and from the appliance to add or remove refrigerant or to measure pressure and adding refrigerant to and removing refrigerant from the appliance. Activities such as painting the appliance, rewiring an external electrical circuit, replacing insulation on a length of pipe, or tightening nuts and bolts on the appliance are not reasonably expected to violate the integrity of the refrigerant circuit. Performing maintenance, service, repair, or disposal of appliances that have been evacuated pursuant to §82.156 could not be reasonably expected to release refrigerants from the appliance unless the maintenance, service, or repair consists of adding refrigerant to the appliance. Technician includes but is not limited to installers, contractor employees, in-house service personnel, and in some cases, owners.

Very high-pressure appliance means an appliance that uses a refrigerant with a

boiling point below -50 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to equipment utilizing refrigerants -13 and -503.

Voluntary certification program means a technician testing program operated by a person before that person obtained approval of a technician certification program pursuant to §82.161(c).

Section 82.154 Prohibitions

(a) Effective June 14, 1993, no person maintaining, servicing, or disposing of appliances may knowingly vent or otherwise release into the environment any class I or class II substance used as refrigerant in such equipment. *De minimis* releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition. Releases shall be considered *de minimis* if they occur when:

(1) the required practices set forth in §82.156 are observed and recovery or recycling machines that meet the requirements set forth in §82.158 are used; or

(2) the requirements set forth in 40 CFR Part 82, Subpart B are observed. The knowing release of refrigerant subsequent to its recovery from an appliance shall be considered a violation of this prohibition.

(b) Effective July 13, 1993, no person may open appliances except MVACs for maintenance, service, or repair, and no person may dispose of appliances except for small appliances, MVACs, and MVAC-like appliances:

(1) without observing the required practices set forth in §82.156; and

(2) without using equipment that is certified for that type of appliance pursuant to §82.158.

(c) Effective Nov. 15, 1993, no person may manufacture or import recycling or recovery equipment for use during the maintenance service, or repair of appliances except MVACs, and no person may manufacture or import recycling or recovery equipment for use during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances, unless the equipment is certified pursuant to §82.158(b), (d), or (f), as applicable.

(d) Effective June 14, 1993, no person shall alter the design of certified refrigerant recycling or recovery equipment in a way that would affect the equipment's ability to meet the certification standards set forth in §82.158 without resubmitting the altered design for certification testing. Until it is tested and shown to meet the certification standards set forth in §82.158, equipment so altered will be considered uncertified for the purposes of §82.158.

(e) Effective Aug. 12, 1993, no person may open appliances except MVACs for maintenance, service, or repair, and no person may dispose of appliances except for small appliances, MVACs, and MVAC-like appliances, unless such person has certified to the Administrator pursuant to §82.162 that such person has acquired certified recovery or recycling equipment and is complying with the applicable requirements of this subpart.

(f) Effective Aug. 12, 1993, no person may recover refrigerant from small appliances, MVACs, and MVAC-like appliances for purposes of disposal of these appliances unless each person had certified to the Administrator pursuant to §82.162 that such person has acquired recovery equipment that meets the standards set forth in §82.158(l) and/or (m), as applicable, and that such person is complying with the applicable requirements for this subpart.

(g) Effective until December 31, 1996, no person may sell or offer for sale for use as a refrigerant any class I or class II substance consisting wholly or in part of used refrigerant unless:

(1) the class I or class II substance has been reclaimed as defined at §82.152(r);

(2) the class I or class II substance was used only in an MVAC or MVAC-like appliance and is to be used only in an MVAC or MVAC-like appliance; or

(3) the class I or class II substance is contained in an appliance that is sold or offered for sale together with the class I or class II substance

(h) Effective until December 31, 1996, no person may sell or offer for sale for use as a refrigerant any class I or class II substance consisting wholly or in part of used refrigerant unless:

(1) the class I or class II substance has been reclaimed by a person who has been certified as a reclaimer pursuant to §82.164;

(2) the class I or class II substance was used only in an MVAC or MVAC-like appliance and is to be used only in an MVAC or MVAC-like appliance; or

(3) the class I or class II substance is contained in an appliance that is sold or offered for sale together with the class I or class II substance.

(i) Effective Aug. 12, 1993, no person reclaiming refrigerant may release more than 1.5% of the refrigerant received by them.

(j) Effective Nov. 15, 1993, no person may sell or distribute, or offer for sale or distribution, any appliances, except small appliances, unless such equipment is equipped with a servicing aperture to facilitate the removal of refrigerant at servicing and disposal.

(k) Effective Nov. 15, 1993, no person may sell or distribute, or offer for sale or distribution any small appliance unless such equipment is equipped with a process stub to facilitate the removal of refrigerant at servicing and disposal.

(l) No technician training or testing program may issue certificates pursuant to §82.161 unless the program complies with all of the standards of §82.161 and appendix D, and has been granted approval.

(m) Effective Nov. 14, 1994, no person may sell or distribute, or offer for sale or distribution, any class I or class II substance for use as a refrigerant to any person unless:

(1) the buyer has been certified as a Type I, Type II, Type III, or Universal technician pursuant to §82.161;

(2) the buyer has successfully completed a voluntary certification program requesting approval under §82.161(g) by Dec. 9, 1994. This paragraph (m)(2) expires on May 15, 1995;

(3) the buyer has been certified pursuant to 40 CFR Part 82, Subpart B;

(4) the refrigerant is sold only for eventual resale to certified technicians or to appliance manufacturers (*e.g.*, sold by a manufacturer to a wholesaler, sold by a technician to a reclaimer);

(5) the refrigerant is sold to an appliance manufacturer;

(6) the refrigerant is contained in an appliance, and after Jan. 9, 1995, the refrigerant is contained in an appliance with a fully assembled refrigerant circuit;

(7) the refrigerant is charged into an appliance by a certified technician or an apprentice during maintenance, service, or repair; or

(8) the refrigerant is charged into an appliance by a technician who successfully completed a voluntary certification program requesting approval under §82.161(g) by Dec. 9, 1994. This paragraph (m)(8) expires on May 15, 1995.

(9) rules stayed for reconsideration. Notwithstanding any other provisions of this subpart, the effectiveness of 40 CFR §82.154(m), only as it applies to refrigerant contained in appliances without fully assembled refrigerant circuits, is stayed from April 27, 1995, until EPA takes final action on its reconsideration of these provisions. EPA will publish any such final action in the *Federal Register*.

(n) It is a violation of this subpart to accept a signed statement pursuant to §82.156(f)(2) if the person knew or had reason to know that such a signed statement is false.

Section 82.156 Required Practices

(a) Effective July 13, 1993, all persons disposing of appliances, except for small appliances, MVACs, and MVAC-like appliances must evacuate the refrigerant in the entire unit to a recovery or recycling machine certified pursuant to §82.158. All persons opening appliances except for MVACs for maintenance, service, or repair must evacuate the refrigerant in either the entire unit or the part to be serviced (if the latter can be isolated) to a system receiver or a recovery or recycling machine certified pursuant to §82.158. Effective Jan. 9, 1995, certified technicians must verify that the applicable level of evacuation has been reached in the appliance or the part before it is opened.

(1) Persons opening appliances except for small appliances, MVACs, and MVAC-like appliances for maintenance, service, or repair must evacuate to the levels in Table 1 before opening the appliance, unless:

(i) evacuation of the appliance to the atmosphere is not to be performed

after completion of the maintenance, service, or repair, and the maintenance, service, or repair is not major as defined at §82.152(k); or

(ii) due to leaks in the appliance, evacuation to the levels in Table 1 is not attainable, or would substantially contaminate the refrigerant being recovered; or

(iii) the recycling or recovery equipment was certified pursuant to §82.158(b)(2). In any of these cases, the requirements of §82.156(a)(2) must be followed.

(2)(i) If evacuation of the appliance to the atmosphere is not to be performed after completion of the maintenance, service, or repair, and if the maintenance, service, or repair is not major as defined at §82.152(k), the appliance must:

(A) be evacuated to a pressure no higher than 0 psig before it is opened if it is a high- or very high-pressure appliance;

(B) be pressurized to 0 psig before it is opened if it is a low-pressure appliance. Persons pressurizing low-pressure appliances that use refrigerants with boiling points at or below 85 degrees Fahrenheit at 29.9 inches of mercury (standard atmospheric pressure), (*e.g.*, CFC-11 and HCFC-123), must not use methods such as nitrogen, that require subsequent purging. Persons pressurizing low-pressure appliances that use refrigerants with boiling points above 85 degrees Fahrenheit at 29.9 inches of mercury, *e.g.*, CFC-113, must use heat to raise the internal pressure of the appliance as much as possible, but may use nitrogen to raise the internal pressure of the appliance from the level attainable through use of heat to atmospheric pressure; or

(C) for the purposes of oil changes, be evacuated or pressurized to the pressure no higher than 5 psig, before it is opened; or drain the oil into a system receiver to be evacuated or pressurized to a pressure of no higher than 5 psig.

(ii) If, due to leaks in the appliance, evacuation to the levels in Table 1 is not attainable, or would substantially contaminate the refrigerant being recovered, persons opening the appliance must:

(A) isolate leaking from non-leaking components wherever possible;

(B) evacuate non-leaking components to be opened to the levels specified in Table 1; and

(C) evacuate leaking components to be opened to the lowest level that can be attained without substantially contaminating the refrigerant. In no case shall this level exceed 0 psig.

(iii) If the recycling or recovery equipment was certified pursuant to §82.158(b)(2), technicians, must follow the manufacturer's directions for achieving the required recovery efficiency.

(3) Persons disposing of appliances except for small appliances, MVACs, and MVAC-like appliances, must evacuate to the levels in Table 1 unless, due to leaks in the appliance, evacuation to the levels in Table 1 is not attainable, or would substantially contaminate the refrigerant being recovered. If, due to leaks in the appliance, evacuation to the levels in Table 1 is not attainable, or would substantially contaminate the refrigerant being recovered, persons disposing of the appliance must:

(i) isolate leaking from non-leaking components wherever possible;

(ii) evacuate non-leaking components to the levels specified in Table 1; and

(iii) evacuate leaking components to the lowest level that can be attained without substantially contaminating the refrigerant. In no case shall this level exceed 0 psig. (4) Persons opening small appliance for maintenance, service, or repair must:

(i) when using recycling and recovery equipment manufactured before Nov. 15, 1993, recover 80% of the refrigerant in the small appliance; or

(ii) when using recycling or recovery equipment manufactured on or after Nov. 15, 1993, recover 90% of the refrigerant in the appliance is operating, or 80% of the refrigerant in the appliance when the compressor in the appliance is not operating; or

(iii) evacuate the small appliance to four inches of mercury vacuum.

(5) Persons opening MVAC-like appliances for maintenance, service, or repair may do so only while properly using, as defined at §82.32(e), recycling or recovery equipment certified pursuant to §82.158(f) or (g), as applicable.

(b) Effective Oct. 18, 1994, all persons opening appliances except for small appliances and MVACs for maintenance, service, or repair and all persons disposing of appliances except small appliances, MVACs, and MVAC-like appliances must have at least one piece of certified, self-contained recovery or recycling equipment available at their place of business. Persons who maintain, service, repair, or dispose of only appliances that they own and that contain pump-out units are exempt from this requirement. This exemption does not relieve such persons from other applicable requirements of §82.156.

Table 1

Required Levels of Evacuation for Appliances
[Except for Small Appliances, MVACs, and MVAC-like Appliances]
Inches of Hg Vacuum
(Relative to Standard Atmospheric Pressure of 29.9 Inches Hg)

Type of Appliance	Using Recovery or Recycling Equipment Manufacture or Imported Before Nov. 15, 1993	Using Recovery or Recycling Equipment Manufactured or Imported On or After Nov. 15, 1993
HCFC-22 appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant	0	0
HCFC-22 appliance, or isolated component of such appliance, normally containing 200 pounds or more of refrigerant	4	10
Other high-pressure appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant	4	10
Other high-pressure appliance, or isolated component of such appliance, normally containing 200 pounds or more of refrigerant	4	15
Very high-pressure appliance	0	0
Low-pressure appliance	25	25 mm Hg absolute

(c) System-dependent equipment shall not be used with appliances normally containing more than 15 pounds of refrigerant, unless the system-dependent equipment is permanently attached to the appliance as a pump-out unit.

(d) All recovery or recycling equipment shall be used in accordance with the manufacturer's directions unless such directions conflict with the requirements of this subpart.

(e) Refrigerant may be returned to the appliance from which it is recovered or to another appliance owned by the same person without being recycled or reclaimed, unless the appliance is an MVAC or MVAC-like appliance.

(f) Effective July 13, 1993, persons who take the final step in the disposal process (including but not limited to scrap recyclers and landfill operators) of a small appliance, room air conditioning, MVACs, or MVAC-like appliances must either:

(1) recover any remaining refrigerant from the appliance in accordance with paragraph (g) or (h) or this section, as applicable; or

(2) verify that the refrigerant has been evacuated from the appliance or shipment of appliances previously. Such verification must include a signed statement from the person from whom the appliance or shipment of appliances is obtained that all refrigerant that had not leaked previously has been recovered from the appliance or shipment of appliances in accordance with paragraph (g) or (h) or this section, as applicable. This statement must include the name and address of the person who recovered the refrigerant and the date the refrigerant was recovered or a contract that refrigerant will be removed prior to delivery.

(3) Persons complying with (f)(2) of this section must notify suppliers of appliances that refrigerant must be properly removed before delivery of the items to the facility. The form of this notification may be warning signs, letters to suppliers, or other equivalent means.

(g) All persons recovering refrigerant from MVACs and MVAC-like appliances for purposes of disposal of these appliances must reduce the system pressure to or below 102 mm of mercury vacuum, using equipment that meets the standards set forth in §82.158(l).

(h) All persons recovering the refrigerant from small appliances for purposes of disposal of these appliances must either:

(1) recover 90% of the refrigerant in the appliance when the compressor in the appliance is operating, or 80% of the refrigerant in the appliance when the compressor in the appliance is not operating; or

(2) evacuate the small appliance to four inches of mercury vacuum.

(i) (1) Owners or operators of commercial refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired in accordance with paragraph (i)(9) of this section, if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the

total charge during a 12-month period, except as described in paragraphs (i)(6), (i)(8), and (i)(10) of this section and paragraphs (i)(1)(i), (i)(1)(ii), and (i)(1)(iii) of this section. Repairs must bring the annual leak rate to below 35 percent.

(i) If the owners or operators of the federally-owned commercial refrigerant appliances determine that the leaks cannot be repaired in accordance with paragraph (i)(9) of this section and that an extension in accordance with the requirements discussed in this paragraph (i)(1)(i) of this section apply, they must document all repair efforts, and notify EPA of their inability to comply within the 30-day repair requirement, and the reason for the inability must be submitted to EPA in accordance with §82.166(n). Such notification must be made within 30 days of discovering the leaks. EPA will determine if the extension requested in accordance with the requirements discussed in paragraph (i)(1)(i) of this section is justified. If the extension is not justified, EPA will notify the owner/operator within 30 days of receipt of the notification

(ii) Owners or operators of federally-owned commercial refrigeration equipment may have more than 30 days to repair leaks if the refrigeration appliance is located in an area subject to radiological contamination or where the shutting down of the appliance will directly lead to radiological contamination. Only the additional time needed to conduct and complete repairs in a safe working environment will be permitted.

(iii) Owners or operators of federally-owned commercial refrigeration equipment requesting or who are granted time extensions under this paragraph must comply with paragraphs (i)(3) and (i)(4) of this section.

(2) The owners or operators of industrial process refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period in accordance with paragraph (i)(9) of this section, except as described in paragraphs (i)(6), (i)(7) and (i)(10) of this section, and paragraphs (i)(2)(i) and (i)(2)(ii) of this section. Repairs must bring annual leak rates to below 35 percent during a 12-month period. If the owners or operators of the industrial process refrigeration equipment determine that the leak rate cannot be brought to below 35 percent during a 12-month period within 30 days (or 120 days, where an industrial process shutdown in accordance with paragraph (i)(2)(ii) of this section is required) and in accordance with paragraph (i)(9) of this section, and that an extension in accordance with the requirements discussed in this paragraph apply, the owners or operators of the appliance must document all repair

efforts, and notify EPA of the reason for the inability in accordance with §82.166(n) within 30 days of making this determination. Owners or operators who obtain an extension pursuant to this section or elect to utilize the additional time provided in paragraph (i)(2)(i) of this section, must conduct all necessary leak repairs, if any, that do not require any additional time beyond the initial 30 or 120 days.

(i) The owners or operators of industrial process refrigeration equipment are permitted more than 30 days (or 120 days where an industrial process shutdown in accordance with paragraph (i)(2)(ii) of this section is required) to repair leaks, if the necessary parts are unavailable or if requirements of other applicable federal, state, or local regulations make a repair within 30 or 120 days impossible. Only the additional time needed to receive delivery of the necessary parts or to comply with the pertinent regulations will be permitted.

(ii) Owners or operators of industrial process refrigeration equipment will have a 120-day repair period, rather than a 30-day repair period, to repair leaks in instances where an industrial process shutdown is needed to repair a leak or leaks from industrial process refrigeration equipment.

(3) The owners or operators of industrial process refrigeration equipment who are granted additional time under paragraphs (i)(1), (i)(2), and (i)(5) of this section must ensure that the repair efforts performed be those that sound professional judgment indicate will be sufficient to bring the leak rates below the applicable allowable annual rate. When an industrial process shutdown has occurred or when repairs have been made while an appliance is mothballed, an initial verification test shall be conducted at the conclusion of the repairs and a follow-up verification test shall be conducted within 30 days of completing the repairs or within 30 days of bringing the appliance back on-line, if taken off-line, but no sooner than when the system has achieved normal operating characteristics and conditions. When repairs have been conducted without an industrial process shutdown or system mothballing, an initial verification test shall be conducted at the conclusion of the repair efforts and a follow-up verification test shall be conducted within 30 days after the initial follow-up verification test. In all cases, the follow-up verification test shall be conducted at normal operating characteristics and conditions unless sound professional judgment indicates that tests performed at normal operating characteristics and conditions will produce less reliable results, in which case the follow-up verification test shall be conducted at or near the normal operating pressure where practicable, and at or near the normal operating temperature if practicable, and within 30 days of completing the repair efforts.

(i) If industrial process refrigeration equipment is taken off line, it cannot be brought back on-line until an initial verification test indicates that the repairs undertaken in accordance with paragraphs (i)(1)(i), (ii), and (iii), or (i)(2)(i) and (ii), or (5)(i), (ii) and (iii) of this section, have been successfully completed, demonstrating the leak or leaks are repaired or where the owners or operators of the industrial process refrigeration equipment will retrofit/replace/retire the industrial process refrigeration equipment in accordance with paragraph (i)(6) of this section.

(ii) If the follow-up verification test indicates that the repairs to industrial process refrigeration equipment have not been successfully completed, the owner must retrofit or replace the equipment in accordance with paragraph (i)(6) of this section within one year after the failure to verify that the repairs had been successfully completed or such longer time period as may apply in accordance with paragraphs (i)(7)(i), (ii) and (iii) or (i(8)(i) and (ii) of this section. The owners and operators of industrial process refrigeration equipment are relieved of this requirement if the conditions of paragraphs (i)(3)(iv) and/or (i)(3)(v) of this section are met.

(iii) The owner or operator of industrial process refrigeration equipment that fails a follow-up verification test must notify EPA within 30 days of the failed follow-up verification test in accordance with §82.166(n).

(iv) The owner or operator is relieved of the obligation to retrofit or replace the industrial process refrigeration equipment as discussed in paragraph (i)(6) of this section if second repair efforts to fix the same leaks that were the subject of the first repair efforts are successfully completed within 30 days or 120 days where an industrial process shutdown is required, after the initial failed follow-up verification test. The second repair efforts are subject to the same verification requirements of paragraphs (i)(3), (i)(3)(i) and (ii) of this section. The owner or operator is required to notify EPA within 30 days of the successful follow-up verification test in accordance with §82.166(n) and the owner or operator is no longer subject to the obligation to retrofit or replace the appliance that arose as a consequence of the initial failure to verify that the leak repair efforts were successful.

(v) The owner or operator of industrial process refrigeration equipment is relieved of the obligation to retrofit or replace the equipment in accordance with paragraph (i)(6) of this section if within 180 days of the initial failed follow-up verification test, the owner or operator establishes that the appliance's annual leak rate does not exceed the applicable allowable annual leak rate, in

accordance with paragraph (i)(4) of this section. If the appliance's owner or operator establishes that the appliance's annual leak rate does not exceed the applicable allowable annual leak rate, the owner or operator is required to notify EPA within 30 days of that determination in accordance with §82.166(n) and the owner or operator would no longer be subject to the obligation to retrofit or replace the equipment that arose as a consequence of the initial failure to verify that the leak repair efforts were successful.

(4) In the case of a failed follow-up determination test subject to paragraph (i)(3)(v) of this section, the determination of whether industrial process refrigeration equipment has an annual leak rate that exceeds the applicable allowable annual leak rate will be made in accordance with parameters identified by the owner or operator in its notice to EPA regarding the failure of the initial follow-up verification test, if those parameters are acceptable to EPA; otherwise by parameters selected by EPA. The determination must be based on the full charge for the affected industrial process refrigeration equipment. The leak rate determination parameters in the owner's or operator's notice will be considered acceptable unless EPA notifies the owners or operators within 30 days of receipt of the notice. Where EPA does not accept the parameters identified by the owner or operator in its notice, EPA will not provide additional time beyond the additional time permitted in paragraph (i)(3)(v) of this section unless specifically stated in the parameters selected by EPA.

(5) Owners or operators of appliances normally containing more than 50 pounds of refrigerant and not covered by paragraph (i)(1) or (i)(2) of this section must have leaks repaired in accordance with paragraph (i)(9) of this section if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period, except as described in paragraphs (i)(6), (i)(8) and (i)(10) of this section and paragraphs (i)(5)(i), (i)(5)(ii) and (i)(5)(iii) of this section. Repairs must bring the annual leak rate to below 15 percent.

(i) If the owners or operators of federally-owned comfort-cooling appliances determine that the leaks cannot be repaired in accordance with paragraph (i)(9) of this section and that an extension in accordance with the requirements discussed in paragraph (i)(5) of this section apply, they must document all repair efforts, and notify EPA of their inability to comply within the 30-day repair requirement, and the reason for the inability must be submitted to EPA in accordance with §82.166(n). Such notification must be made within 30 days of discovering that leak repair efforts cannot be completed within 30 days.

(ii) Owners or operators of federally-owned comfort-cooling

appliances may have more than 30 days to repair leaks where the refrigeration appliance is located in an area subject to radiological contamination or where the shutting down of the appliance will directly lead to radiological contamination. Only the additional time needed to conduct and complete work in a safe environment will be permitted.

(iii) Owners or operators of federally-owned comfort-cooling appliances requesting, or who are granted, time extensions under this paragraph must comply with paragraphs (i)(3) and (i)(4) of this section.

(6) Owners or operators are not required to repair the leaks defined in paragraphs (i)(1), (i)(2) and (i)(5) of this section if, within 30 days of discovering the exceedance of the applicable leak rate or within 30 days of a failed follow-up verification test in accordance with paragraph (i)(3)(ii) of this section, they develop a one-year retrofit or retirement plan for the leaking appliance. This plan (or a legible copy) must be kept at the site of the appliance. The original must be made available for EPA inspection upon request. The plan must be dated and all work under the plan must be completed within one year of the pan's date, except as described in paragraphs (i)(7) and (i)(8) of this section. Owners are temporarily relieved of this obligation if the appliance has undergone system mothballing as defined in §82.152.

(i) If the owner or operator has made good faith efforts to repair leaks in accordance with paragraphs (i)(1), (i)(2), or (i)(5) of this section, and has determined to proceed with a plan to retrofit or retire the appliance in accordance with paragraph (i)(6) of this section, the owner or operator must develop a retrofit or retirement plan within 30 days of the determination to retrofit or retire the appliance, to be completed within one year of when the owner or operator discovered that the leak rate exceeded the applicable allowable leak rate, except as provided i paragraphs (i)(7) and (i)(8) of this section.

(ii) In all cases, subject to paragraph (i)(6)(i) of this section, the written plan shall be prepared no later than 30 days after the owner or operator has determined to proceed with retrofitting or retiring the appliance. All reports required under §82.166(o) shall be due at the time specified in the paragraph imposing the specific reporting requirement, or no later than 30 days after the decision to retrofit or retire the appliance, whichever is later.

(iii) In cases where the owner or operator of industrial process refrigeration equipment has made good faith efforts to retrofit or retire industrial process refrigeration equipment prior to Aug. 8, 1995, and where these efforts are not complete, the owner or operator must develop a

retrofit or retirement plan that will complete the retrofit or retirement of the affected appliance by Aug. 8, 1996. This plan (or a legible copy) must be kept at the site of the appliance. The original must be made available for EPA inspection upon request. Where the conditions of paragraphs (i)(7) and (i)(8) of this section apply, and where the length of time necessary to complete the work is beyond Aug. 8, 1996, all records must be submitted to EPA in accordance with §82.166(o), as well as maintained on-site.

(7) The owners or operators of industrial process refrigeration equipment will be allowed additional time to complete the retrofit or retirement of industrial process refrigeration equipment if the conditions described in paragraphs (i)(7)(i) or (i)(7)(ii) of this section are met. The owners or operators of industrial process refrigeration equipment will be allowed additional time beyond the additional time provided in paragraph (i)(7)(ii) of this section if the conditions described in paragraph (i)(7)(ii) of this section are met.

(i) Additional time, to the extent reasonably necessary will be allowed for retrofitting or retiring industrial process refrigeration equipment due to delays occasioned by the requirements of other applicable federal, state, or local laws or regulations, or due to the unavailability of a suitable replacement refrigerant with a lower ozone depletion potential. If these circumstances apply, the owner or operator of the facility must notify EPA within six months after the 30-day period following the discovery of an exceedance of the 35 percent leak rate. Records necessary to allow EPA to determine that these provisions apply and the length of time necessary to complete the work must be submitted to EPA in accordance with §82.166(o), as well as maintained on-site. EPA will notify the owner or operator of its determination within 60 days of receipt the submittal.

(ii) An additional one-year period beyond the initial one-year retrofit period is allowed for industrial process refrigeration equipment where the following criteria are met:

(A) the new or the retrofitted industrial process refrigerant equipment is custom-built;

(B) the supplier of the appliance or one or more of its critical components has quoted a delivery time of more than 30 weeks from when the order is placed;

(C) the owner or operator notifies EPA within six months of the expiration of the 30-day period following the discovery of an exceedance of the 35 percent leak rate to identify the owner or operator, describe the appliance involved,

explain why more than one year is needed, and demonstrate that the first two criteria are met in accordance with §82.166(o); and

(D) the owner or operator maintains records that are adequate to allow a determination that the criteria are met.

(iii) The owners or operators of industrial process refrigeration equipment may request additional time to complete retrofitting or retiring industrial process refrigeration equipment beyond the additional one-year period if needed and where the initial additional one year was granted in accordance with paragraph (i)(7)(ii) of this section. The request shall be submitted to EPA before the end of the ninth month of the first additional year and shall include revisions of information required under §82.166(o). Unless EPA objects to this request submitted in accordance with §82.166(o) within 30 days of receipt, it shall be deemed approved.

(8) Owners or operators of federally-owned commercial or comfort-cooling appliances will be allowed an additional year to complete the retrofit or retirement of the appliances if the conditions described in paragraph (i)(8)(i) of this section are met, and will be allowed one year beyond the additional year if the conditions in paragraph (i)(8)(ii) of this section are met.

(i) Up to one additional one-year period beyond the initial one-year retrofit period is allowed for such equipment where the following criteria are met:

(A) due to complications presented by the federal agency appropriations and/or procurement process, a delivery time of more than 30 weeks from the beginning of the official procurement process is quoted, or where the appliance is located in an area subject to radiological contamination and creating a safe working environment will require more than 30 weeks;

(B) the operator notifies EPA within six months of the expiration of the 30-day period following the discovery of an exceedance of the applicable allowable annual leak rate to identify the operator, describe the appliance involved, explain why more than one year is needed, and demonstrate that the first criterion is met in accordance with §82.166(o); and

(C) the operator maintains records adequate to allow a determination that the criteria are met.

(ii) The owners or operators of federally-owned commercial or comfort-cooling appliances may request additional time to

complete retrofitting, replacement or retiring such appliances beyond the additional one-year period if needed and where the initial additional one year was granted in accordance with paragraph (i)(8)(i) of this section. The request shall be submitted to EPA before the end of the ninth month of the first additional year and shall include revisions of information earlier submitted as required under §82.166(o). Unless EPA objects to this request submitted in accordance with §82.166(o) within 30 days of receipt, it shall be deemed approved.

(9) Owners or operators must repair leaks pursuant to paragraphs (i)(1), (i)(2) and (i)(5) of this section within 30 days after discovery, or within 30 days after when the leaks should have been discovered if the owners intentionally shielded themselves from information which would have revealed a leak, unless granted additional time pursuant to §82.156(i)

(10) The amount of time for owners and operators to complete repairs, retrofit plans or retrofits/replacements/retirements under paragraphs (i)(1), (i)(2), (i)(5), (i)(6), (i)(7), (i)(8), and (i)(9) of this section is temporarily suspended at the time an appliance is mothballed as defined in §82.152. The time for owners and operators to complete repairs, retrofit plans, or retrofits/replacements will resume on the day the appliance is brought back on-line and is not longer considered mothballed. All initial and follow-up verification tests must be performed in accordance with paragraphs (i)(3), (i)(3)(i), and (i)(3)(ii) of this section.

(11) In calculating annual leak rates, purged refrigerant that is destroyed at a verifiable destruction efficiency of 98 percent or greater will not be counted toward the leak rate. Owners or operators destroying purged refrigerants must maintain information as set forth in §82.166(p)(1) and submit to EPA, within 60 days after the first time such exclusion is used by that facility, information se forth in §82.166(p)(2).

Section 82.158 Standards for Recycling and Recovery Equipment

(a) Effective Nov. 15, 1993, all manufacturers and importers of recycling and recovery equipment intended for use during the maintenance, service, or repair of appliances except MVACs and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances, shall have had such equipment certified by an approved equipment testing organization to meet the applicable requirements in (b) or (d) of this section. All manufacturers and importers of recycling and recovery equipment intended for use during the maintenance, service, or repair of MVAC-like appliances shall have had such equipment certified pursuant to §82.36(a).

(b) Equipment manufactured or imported on or after Nov. 15, 1993, for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like

appliances must be certified by an approved equipment testing organization to meet the following requirements:

(1) In order to be certified, the equipment must be capable of achieving the level of evacuation specified in Table 2 of this section under the conditions of the ARI Standard 740-1993, *Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment* (ARI 740-1993)(Appendix B): The vacuums specified in inches of Hg vacuum must be achieved relative to an atmospheric pressure of 29.9 inches of Hg absolute.

(2) Recovery or recycling equipment whose recovery efficiency cannot be tested according to the procedures in ARI 740-1993 may be certified if an approved third-party testing organization adopts and performs a test that demonstrates, to the satisfaction of the Administrator, that the recovery efficiency of that equipment is equal to or better than that of equipment that:

(i) is intended for use with the same type of appliance; and
(ii) achieves the level of evacuation in Table 2. The manufacturer's instructions must specify how to achieve the required recovery efficiency, and the equipment must be tested when used according to these instructions.

(3) The equipment must meet the minimum requirements for ARI certification under ARI 740-1993.

(4) If the equipment is equipped with a noncondensables purge device:

(i) the equipment must not release more than five percent of the quantity of refrigerant being recycled through noncondensables purging under the conditions of ARI 740-1993; and

(ii) effective May 14, 1995, the equipment must not release more than three percent of the quantity of refrigerant being recycled through noncondensables purging under the conditions of ARI 740-1993.

(5) The equipment must be equipped with low-loss fittings on all hoses.
(6) The equipment must have its liquid recovery rate and its vapor recovery rate measured under the conditions of ARI 740-1993, unless the equipment has no inherent liquid or vapor recovery rate.

Table 2
Levels of Evacuation Which Must Be Achieved by Recovery or Recycling Equipment Intended for Use With Appliances (Except for Small Appliances, MVACs, and MVAC-like Appliances)
Manufactured On or After Nov. 15, 1993

Type of Appliance with which Recovery or Recycling Machine is Intended to be Used	Inches of Hg Vacuum
HCFC-22 appliances, or isolated component of such appliances, normally containing less than 200 pounds of refrigerant	0
HCFC-22 appliances, or isolated components of such appliances, normally containing 200 pounds or more of refrigerant	10
Very high-pressure appliances	0
Other high-pressure appliances, or isolated component of such appliances, normally containing less than 200 pounds of refrigerant	10
Other high-pressure appliances, or isolated component of such appliances, normally containing 200 pounds or more of refrigerant	15
Low-pressure appliances	25 mm Hg absolute

(c) Equipment manufactured or imported before Nov. 15, 1993, for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances will be considered certified if it is capable of achieving the level of evacuation specified in Table 3 of this section when tested using a properly calibrated pressure gauge:

(d) Equipment manufactured or imported on or after Nov. 15, 1993, for use during the maintenance, service, or repair of small appliances must be certified by an approved equipment testing organization to be capable of either:

(1) recovering 90% of the refrigerant in the test stand when the compressor of the test stand is operating and 80% of the refrigerant when the compressor of the test stand is not operating when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or
(2) achieving a four-inch vacuum under the conditions of appendix B, ARI 740-1993.

(e) Equipment manufactured or imported before Nov. 15, 1993, for use with small appliances will be considered certified if it is capable of either:

(1) recovering 80% of the refrigerant in the system, whether or not the compressor of the test stand is operating, when used in accordance with the manufacturer's instructions under the conditions of Appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or

(2) achieving a four-inch vacuum when tested using a properly calibrated pressure gauge.

(f) Equipment manufactured or imported on or after Nov. 15, 1993, for use during the maintenance, service, or repair of MVAC-like appliances must be certified in accordance with §82.36(a).

(g) Equipment manufactured or imported before Nov. 15, 1993, for use during the maintenance, service, or repair of MVAC-like appliances must be capable of reducing the system pressure to 102 mm of mercury vacuum under the conditions of the SAE Standard, SAE J1990 (appendix A to 40 CFR Part 82, Subpart B). (h) Manufacturers and importers of equipment certified under paragraphs (b) and (d) of this section must place a label on each piece of equipment stating the following:

THIS EQUIPMENT HAS BEEN CERTIFIED BY [APPROVED EQUIPMENT TESTING ORGANIZATION] TO MEET EPA'S MINIMUM REQUIREMENTS FOR RECYCLING OR RECOVERY EQUIPMENT INTENDED FOR USE WITH [APPROPRIATE CATEGORY OF APPLIANCE].

This label shall also show the date of manufacture and the serial number (if applicable) of the equipment. The label shall be affixed in a readily visible or accessible location, be made of a material expected to last the lifetime of the equipment, present required information in a manner so that it is likely to remain legible for the lifetime of the equipment, and be affixed in such a manner that it cannot be removed from the equipment without damage to the label.

(i) The Administrator will maintain a list of equipment certified pursuant to paragraphs (b), (d), and (f) of this section by manufacturer and model. Persons interested in obtaining a copy of the list should send written inquiries to the address in §82.160(a).

Table 3

Levels of Evacuation which Must Be Achieved by Recovery or Recycling Machines Intended for Use With Appliances (Except for Small Appliances, MVACs, and MVAC-like Appliances)
Manufactured Before Nov. 15, 1993

Type of Air-conditioning or Refrigeration Equipment with which Recovery or Recycling Machine is intended to be Used	Inches of Vacuum (Relative to Standard Atmospheric Pressure of 29.9 Inches Hg)
HCFC-22 equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	0
HCFC-22 equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Very high-pressure equipment	0
Other high-pressure equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	4
Other high-pressure equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Low-pressure equipment	25

(j) Manufacturers or importers of recycling or recovery equipment intended for use during the maintenance, service, or repair of appliances except MVACs or MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances must periodically have approved equipment testing organizations conduct either:

(1) retests of certified recycling or recovery equipment; or

(2) inspections of recycling or recovery equipment at manufacturing facilities to ensure that each equipment model line that has been certified under this section continues to meet the certification criteria.

Such retests or inspections must be conducted at least once every three years after the equipment is first certified.

(k) An equipment model line that has been certified under this section may have its certification revoked if it is subsequently determined to fail to meet the certification criteria. In such cases, the Administrator or her or his designated representative shall give notice to the manufacturer or importer setting forth the basis for her or his determination.

(l) Equipment used to evacuate refrigerant from MVACs and MVAC-like appliances before they are disposed of must be capable of reducing the system pressure to 102 mm of mercury vacuum under the conditions of the SAE Standard, SAE J1990 (appendix A to 40 CFR Part 82, Subpart B).

(m) Equipment used to evacuate refrigerant from small appliances before they are disposed of must be capable of either:

(1) removing 90% of the refrigerant when the compressor of the small appliance is operating and 80% of the refrigerant when the compressor of the small appliance is not operating, when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or

(2) evacuating the small appliance to four inches of vacuum when tested using a properly calibrated pressure gauge.

Section 82.160 Approved Equipment Testing Organizations

(a) Any equipment testing organization may apply for approval by the Administrator to certify equipment pursuant to the standards in §82.158 and appendices B or C of this subpart. The application shall be sent to: Section 608 Recycling Program Manager, Stratospheric Protection Division, 6205-J, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C., 20460.

(b) Applications for approval must include written information verifying the following:

(1) The list of equipment present at the organization that will be used for equipment testing.

(2) Expertise in equipment testing and the technical experience of the organization's personnel.

(3) Thorough knowledge of the standards as they appear in §82.158 and appendices B and/or C (as applicable) of this subpart.

(4) The organization must describe its program for verifying the performance of certified recycling and recovery equipment manufactured over the long term, specifying whether retests of equipment or inspections of equipment at manufacturing facilities will be used.

(5) The organization must have no conflict of interest and receive no direct or indirect financial benefit from the outcome of certification testing.

(6) The organization must agree to allow the Administrator access to records and personnel to verify the information contained in the application.

(c) Organizations may not certify equipment prior to receiving approval from EPA. If approval is denied under this section, the Administrator or her or his designated representative shall give written notice to the organization setting forth the basis for her or his determination.

(d) If at any time an approved testing organization is found to be conducting certification tests for the purposes of this subpart in a manner not consistent with the representations made in its application for approval under this section, the Administrator reserves the right to revoke approval. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

(e) Testing organizations seeking approval of an equipment certification program may also seek approval to certify equipment tested previously under the program. Interested organizations may submit to the Administrator at the address in §82.160(a) verification that the program met all of the standards in §82.160(b) and that equipment to be certified was tested to and met the applicable standards in §82.158(b) or (d). Upon EPA approval, the previously tested equipment may be certified without being retested (except insofar as such retesting is part of the testing organization's program for verifying the performance of equipment manufactured over the long term, pursuant to §82.160(b)(4).

Section 82.161 Technician Certification

(a) Effective Nov. 14, 1994, technicians, except technicians who successfully completed voluntary certification programs that apply for approval under §82.161(g) by Dec. 9, 1994, must be certified by an approved technician certification program under the requirements of this paragraph (a). Effective May 15, 1995, all technicians must be certified by an approved technician certification program under the requirements of this paragraph (a).

(1) Technicians who maintain, service, or repair small appliances as defined in §82.152(x) must be

properly certified as Type I technicians.

(2) Technicians who maintain, service, or repair high or very high-pressure appliances, except small appliances and MVACs, or dispose of high or very high-pressure appliances, except small appliances and MVACs, must be properly certified as Type II technicians.

(3) Technicians who maintain, service, or repair low-pressure appliances or dispose of low-pressure appliances must be properly certified as Type III technicians.

(4) Technicians who maintain, service, or repair low- and high-pressure equipment as described in §82.161(a)(1), (2) and (3) must be properly certified as Universal technicians.

(5) Technicians who maintain, service, or repair MVAC-like appliances must either be properly certified as Type II technicians or complete the training and certification test offered by a training and certification program approved under §82.40.

(6) Apprentices are exempt from this requirement provided the apprentice is closely and continually supervised by a certified technician while performing any maintenance, service, repair, or disposal that could reasonably be expected to release refrigerant from appliances into the environment. The supervising certified technician is responsible for ensuring that the apprentice complies with this subpart.

(b) *Test Subject Material.* The Administrator shall maintain a bank of test questions divided into four groups, including a core group and three technical groups. The Administrator shall release this bank of questions only to approved technician certification programs. Tests for each type of certification shall include a minimum of 25 questions drawn from the core group and a minimum of 25 questions drawn from each relevant technical group. These questions shall address the subject areas listed in appendix D.

(c) *Program Approval.* Persons may seek approval of any technician certification program (program), in accordance with the provisions of this paragraph, by submitting to the Administrator at the address in §82.160(a) verification that the program meets all of the standards listed in appendix D and the following standards:

(1) *Alternative Examinations.* Programs are encouraged to make provisions for non-speaking technicians by providing tests in other languages or allowing the use of a translator when taking the test. If a translator is used, the certificate received must indicate that translator assistance was required. A test may be administered orally to any person who makes this request, in writing, to the program at least 30 days before the scheduled date for the examination. The letter must explain why the request is being made.

(2) *Recertification.* The Administrator reserves the right to specify the need for technician recertification at some future date, if

necessary, by placing a notice in the *Federal Register*.

(3) *Proof of Certification.* Programs must issue individuals a wallet-sized card to be used as proof of certification, upon successful completion of the test. Programs must issue an identification card to technicians that receive a score of 70 percent or higher on the closed-book certification exam, within 30 days. Programs providing Type I certification using the mail-in format, must issue a permanent identification card to technicians that receive a score of 84 percent or higher on the certification exam, no later than 30 days after the program has received the exam and any additional required material. Each card must include, at minimum, the name of the certifying program, and the date the organization became a certifying program, the name of the person certified, the type of certification, a unique number for the certified person, and the following text:

[Name of person] has been certified as a [Type I, Type II, Type III, and/or Universal, as appropriate] technician as required by 40 CFR Part 82, Subpart F.

(4) The Administrator reserves the right to consider other factors deemed relevant to ensure the effectiveness of certification programs.

(d) If approval is denied under this section, the Administrator shall give written notice to the program setting forth the basis for her or his determination.

(e) If at any time an approved program violates any of the above requirements, the Administrator reserves the right to revoke approval. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

(f) Authorized representatives of the Administrator may require technicians to demonstrate on the business entity's premises their ability to perform proper procedures for recovering and/or recycling refrigerant. failure to demonstrate or failure to properly use the equipment may result in revocation of the certificate. Failure to abide by any of the provisions of this subpart may also result in revocation or suspension of the certificate. If a technician's certificate is revoked, the technician would need to recertify before maintaining, servicing, repairing or disposing of any appliances.

(g) (1) Any person seeking approval of a technician certification program may also seek approval to certify technicians who successfully completed a voluntary certification program operated previously by that person. Interested persons must submit to the Administrator at the address in §82.160(a) verification that the voluntary certification program substantially complied with most of the standards of §82.161(c) and appendix D of Subpart F of this part. If the program did not test or train participants on some elements of the test subject material, the person must submit supplementary

information on the omitted material to the Administrator for approval and verify that the approved information will be provided to technicians pursuant to section j of appendix D of Subpart F of this part. In this case, the person may not issue a certification card to a technician until he or she has received a signed statement from the technician indicating that the technician has read the supplementary information. Approval may be granted for Type I, Type II, or Type III certification, or some combination of these, depending upon the coverage in the voluntary certification program of the information in each Type. In order to have their voluntary programs considered for approval, persons must submit applications both for approval as a technician certification program and for approval as a voluntary program by Dec. 9, 1994.

(2) (i) Persons who are approved to certify technicians who successfully completed their voluntary programs pursuant to §82.161(g)(1) must:

(A) notify technicians who successfully completed their voluntary programs of the Administrator's decision within 60 days of that decision;

(B) send any supplementary materials required pursuant to §82.161(g)(1) to technicians who successfully completed their voluntary programs within 60 days of the Administrator's decision; and

(C) send certification cards to technicians who successfully completed their voluntary programs within 60 days of receipt of signed statements from the technicians indicating that the technicians have read the supplementary information.

(ii) Persons who are disapproved to certify technicians who successfully completed their voluntary programs pursuant to §82.161(g)(1) must notify technicians who successfully completed their voluntary programs of the Administrator's decision within 30 days of that decision.

(iii) Persons who withdraw applications for voluntary program approval submitted pursuant to §82.161(g)(1) must inform technicians who successfully completed their voluntary programs of the withdrawal by the later of 30 days after the withdrawal or Dec. 9, 1994.

(3) Technicians who successfully completed voluntary certification programs may receive certification in a given Type through that program only if:

(i) the voluntary certification program successfully completed by the technician is approved for that Type pursuant to §82.161(g)(1);

(ii) the technician successfully completed the portions of the voluntary certification program that correspond to that Type; and

(iii) the technician reads any supplementary materials required by the Administrator pursuant to §82.161(g)(1) and section j of appendix D of Subpart F of this part, and returns the signed statement required by §82.161(g)(1).

Section 82.162 Certification by Owners of Recovery and Recycling Equipment

(a) No later than Aug. 12, 1993, or within 20 days of commencing business for those persons not in business at the time of promulgation, persons maintaining, servicing, or repairing appliances except for MVACs, and persons disposing of appliances except for small appliances and MVACs, must certify to the Administrator that such person has acquired certified recovery or recycling equipment and is complying with the applicable requirements of this subpart. Such equipment may include system-dependent equipment but must include self-contained equipment, if the equipment is to be used in the maintenance, service, or repair of appliances except for small appliances. The owner or lessee of the recovery or recycling equipment may perform this certification for his or her employees. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(1) the name and address of the purchaser of the equipment, including the county name;

(2) the name and address of the establishment where each piece of equipment is or will be located;

(3) the number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites and the field;

(4) the manufacturer name, the date of manufacture, and if applicable, the model and serial number of the equipment; and

(5) the certification must also include a statement that the equipment will be properly used in servicing or disposing of appliances and that the information given is true and correct.

Owners or lessees of recycling or recovery equipment having their places of business in:

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region I, Mail Code APC, JFK Federal Building, One Congress Street, Boston, MA 02203.

Owners or lessees of recycling or recovery equipment having their places of business in:

New York
New Jersey
Puerto Rico

Virgin Islands

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region II, Jacob K. Javits Federal Building, 26 Federal Plaza, Room 5000, New York, NY 10278.

Owners or lessees of recycling or recovery equipment having their places of business in:

Delaware
District of Columbia
Maryland
Pennsylvania
Virginia
West Virginia

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region III, Mail Code 3AT21, 841 Chestnut Building, Philadelphia, PA 19107.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alabama
Florida
Georgia
Kentucky
Mississippi
North Carolina
South Carolina
Tennessee

must send their certification to:

CAA §608 Enforcement Contact, EPA Region IV, 345 Courtland Street, N.E., Mail Code APT-AE, Atlanta, GA 30365.

Owners or lessees of recycling or recovery equipment having their places of business in:

Illinois
Indiana
Michigan
Minnesota
Ohio
Wisconsin

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region V, Mail Code AT18J, 77 W. Jackson Blvd., Chicago, IL 60604-3507.

Owners or lessees of recycling or recovery equipment having their places of business in:

Arkansas
Louisiana
New Mexico
Oklahoma
Texas

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region VI, Mail Code 6T-EC, First Interstate Tower at Fountain Place, 1445 Ross Ave., Suite 1200, Dallas, TX 75202-2733.

Owners or lessees of recycling or recovery equipment having their places of business in:

Iowa
Kansas
Missouri
Nebraska

must send their certification to:

CAA §608 Enforcement Contact, EPA Region VII, Mail Code ARTX/ARBR,

726 Minnesota Ave., Kansas City, KS 66101.

Owners or lessees of recycling or recovery equipment having their places of business in:

Colorado
Montana
North Dakota
South Dakota
Utah
Wyoming

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region VIII, Mail Code 8AT-AP, 999 18th Street, Suite 500, Denver, CO 80202-2405.

Owners or lessees of recycling or recovery equipment having their places of business in:

American Samoa
Arizona
California
Guam
Hawaii
Nevada

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region IX, Mail Code A-3, 75 Hawthorne Street, San Francisco, CA 94105.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alaska
Idaho
Oregon
Washington

must send their certifications to:

CAA §608 Enforcement Contact, EPA Region X, Mail Code AT-082, 1200 Sixth Ave., Seattle, WA 98101.

(b) Certificates under paragraph (a) of this section are not transferable. In the event of a change of ownership of an entity that maintains, services, or repairs appliances except MVACs, or that disposes of appliances except small appliances, MVACs, and MVAC-like appliances, the new owner of the entity shall certify within 30 days of the change of ownership pursuant too paragraph (a) of this section.

(c) No later than Aug. 12, 1993, persons recovering refrigerant from small appliances, MVACs, and MVAC-like appliances for purposes of disposal of these appliances must certify to the Administrator that such person has acquired recovery equipment that meets the standards set forth in §82.158(l) and/or (m), as applicable, and that such person is complying with the applicable requirements of this subpart. Such equipment may include system-dependent equipment but must include self-contained equipment, if the equipment is to be used in the disposal of appliances except for small appliances. The owner or lessee of the recovery or recycling equipment may perform this certification for his or her employees. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(1) the name and address of the purchaser of the equipment, including the county name;

(2) the name and address of the establishment where each piece of equipment is or will be located;

(3) the number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites and the field;

(4) the manufacturer's name, the date of manufacture, and if applicable, the model and serial number of the equipment; and

(5) the certification must also include a statement that the equipment will be properly used in recovering refrigerant from appliances and that the information given is true and correct. The certification shall be sent to the appropriate address in paragraph (a).

(d) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of certification under paragraphs (a) or (c) of this section. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

Section 82.164 Reclaimer Certification

Effective Oct. 18, 1994, all persons reclaiming used refrigerant for sale to a new owner, except for persons who properly certified under this section prior to Oct. 18, 1994, must certify to the Administrator that such person will:

(a) return refrigerant to at least the standard of purity set forth in appendix A (based on ARI Standard 700-1993, *Specifications for Fluorocarbon and Other Refrigerants*);

(b) verify this purity using the methods set forth in appendix A;

(c) release no more than 1.5 percent of the refrigerant during the reclamation process; and

(d) dispose of wastes from the reclamation process in accordance with all applicable laws and regulations.

(e) The data elements for certification are as follows:

(1) the name and address of the reclaimer;

(2) a list of equipment used to reprocess and to analyze the refrigerant; and

(3) the owner or a responsible officer of the reclaimer must sign the certification stating that the refrigerant will be returned to at least the standard of purity set forth in appendix A, that the purity of the refrigerant will be verified using the methods set forth in appendix A, that no more than 1.5 percent of the refrigerant will be released during the reclamation process, that wastes from the reclamation process will be properly disposed of, and that the information given is true and correct. The certification should be sent to the following address: Section 608 Recycling Program Manager, Stratospheric Protection Division (6205-J), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

(f) Certificates are not transferable. In the event of a change in ownership of an entity which reclaims refrigerant, the new owner of the entity shall certify within 30 days of the change of ownership pursuant to this section.

(g) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of the certification of the reclaimer. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

Section 82.166 Reporting and Recordkeeping Requirements

(a) Effective Nov. 14, 1994, all persons who sell or distribute any class I or class II substance for use as a refrigerant must retain invoices that indicate the name of the purchaser, the date of sale, and the quantity of refrigerant purchased.

(b) Purchasers of any class I or class II refrigerants who employ certified technicians may provide evidence that at least one technician is properly certified to the wholesaler who sells them refrigerant; the wholesaler will then keep this information on file and may sell refrigerant to the purchaser or his authorized representative even if such purchaser or authorized representative is not a properly certified technician. In such cases, the purchaser must notify the wholesaler in the event that the purchaser no longer employs at least one properly certified technician. The wholesaler is then prohibited from selling class I or class II refrigerants to the purchaser until such time as the purchaser employs at least one properly certified technician. At that time, the purchaser must provide new evidence that at least one technician is properly certified.

(c) Approved equipment testing organizations must maintain records of equipment testing and performance and a list of equipment that meets EPA requirements. A list of all certified equipment shall be submitted to EPA within 30 days of the organization's approval by EPA and annually at the end of each calendar year thereafter.

(d) Approved equipment testing organizations shall submit to EPA within 30 days of the certification of a new model line of recycling or recovery equipment the name of the manufacturer and the name and/or serial number of the model line.

(e) Approved equipment testing organizations shall notify EPA if retests of equipment or inspections of manufacturing facilities conducted pursuant to §82.158(j) show that a previously certified model line fails to meet EPA requirements. Such notification must be received within thirty days of the retest or inspection.

(f) Programs certifying technicians must maintain records in accordance with section g of appendix D of this subpart.

(g) Reclaimers must maintain records of the names and addresses of persons sending them material for reclamation and the quantity of the material (the combined mass of refrigerant and contaminants) sent to them for reclamation. Such records shall be maintained on a transactional basis.

(h) Reclaimers must maintain records of the quantity of material sent to them for

reclamation, the mass of refrigerant reclaimed, and the mass of waste products. Reclaimers must report this information to the Administrator annually within 30 days of the end of the calendar year.

(i) Persons disposing of small appliances, MVACs, and MVAC-like appliances must maintain copies of signed statements obtained pursuant to §82.156(f)(2).

(j) Persons servicing appliances normally containing 50 or more pounds of refrigerant must provide the owner/operator of such appliances with an invoice or other documentation, which indicates the amount of refrigerant added to the appliance.

(k) Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep servicing records documenting the date and type of service, as well as the quantity of refrigerant added. The owner/operator must keep records of refrigerant purchased and added to such appliances in cases where owners add their own refrigerant. Such records should indicate the date(s) when refrigerant is added.

(l) Technicians certified under §82.161 must keep a copy of their certificate at their place of business.

(m) All records required to be maintained pursuant to this section must be kept for a minimum of three years unless otherwise indicated. Entities that dispose of appliances must keep these records on-site.

(n) The owners or operators of appliances must maintain on-site and report to EPA at the address listed in §82.160 the following information, where such reporting and recordkeeping is required and within the timelines specified under §82.156(i)(1), (i)(2), (i)(3) and (i)(5). This information must be relevant to the affected appliance and must include: identification of the facility ; the leak rate; the method used to determine the leak rate and full charge; the date a leak rate of greater than the allowable annual leak rate was discovered; the location of leak(s) to the extent determined to date; and any repair work that has been completed thus far and the date that work was completed.

(1) The reasons why more than 30 days are needed to complete the work and an estimate of when repair work will be completed must be submitted with the initial information submitted with the information listed in paragraph (n) of this section. If changes from the original estimate of when work will be completed result in moving the completion date forward from the date submitted to EPA, the reasons for these changes must be documented and submitted to EPA within 30 days of discovering the need for such a change.

(2) If the owners or operators intend to establish that the appliance's annual leak rate does not exceed the applicable allowable annual leak rate in accordance with §82.156(i)(3)(v), the owner or operator is required to submit a plan to fix other outstanding leaks for which repairs are planned but not yet completed to achieve a rate below the applicable

allowable leak rate with the information listed in paragraph (n) of this section. Identification of the facility and date the original information regarding additional time beyond the initial 30 days was filed, and notification of the determination that the leak rate no longer exceeds the allowable annual leak rate must be included within 30 days of making such determination.

(3) The dates and types of all initial and follow-up verification tests performed and the test results for all initial and follow-up verification tests must be maintained and submitted to EPA within 30 days after conducting each test where recordkeeping and reporting is required within the timelines specified under §82.156(i)(1), (i)(2), (i)(3) and (i)(5).

(o) The owners or operators of appliances must maintain on-site and report to EPA at the address specified in §82.160 the following information where such reporting and recordkeeping is required and in the timelines specified in §82.156(i)(7) and (i)(8), in accordance with §82.156(i)(7) and (i)(8). This information must be relevant to the affected appliance and must include:

(1) the identification of the industrial process facility;

(2) the leak rate;

(3) the method used to determine the leak rate and full charge;

(4) the date a leak rate of 35 percent or greater was discovered;

(5) the location of leak(s) to the extent determined to date;

(6) any repair work that has been completed thus far and the date that work was completed;

(7) a plan to complete the retrofit or replacement of the system;

(8) the reasons why more than one year is necessary to retrofit to replace the system;

(9) the date of notification to EPA; and

(10) an estimate of when retrofit or replacement work will be completed.

(i) If the estimated date of completion changes from the original estimate and results in moving the date of completion forward, documentation of the reason for these changes must be submitted with 30 days of occurring.

(ii) If the estimated date of completion changes form the original estimate and results in moving the date of completion forward, the date of notification to EPA regarding this change and the estimate of when the work will be completed must be maintained and submitted.

(p) (1) Owners or operators who wish to exclude purged refrigerants that are destroyed from annual leak rate calculations must maintain records on-site to support the amount of refrigerant claimed as sent for destruction. Records shall be based

on a monitoring strategy that provides reliable data to demonstrate that the amount of refrigerant actually purged and destroyed and that the 98 percent or greater destruction efficiency is met. Records shall include flow rate, quantity or concentration of the refrigerant in the vent stream, and periods of purge flow.

(2) Owners or operators who wish to exclude purged refrigerants that are destroyed from annual leak rate calculations must maintain on-site and make available to EPA upon request the following information after the first time the exclusion is utilized by the facility:

(i) the identification of the facility and a contact person, including the address and telephone number;

(ii) a general description of the refrigerant appliance, focusing on aspects of the appliance relevant to the purging of refrigerant and subsequent destruction;

(iii) a description of the methods used to determine the quantity of refrigerant sent for destruction and type of records that are being kept by the owners or operators where the appliance is located;

(iv) the frequency of monitoring and data-recording; and

(v) a description of the control device, and its destruction efficiency.

This information must also be included, where applicable, in any reporting requirements required for compliance with the leak repair and retrofit requirements for industrial process refrigeration equipment, as set forth in paragraphs (n) and (o) of this section.

(q) Owners or operators choosing to determine the full charge as defined in §82.152 of an affected appliance by using an established range or using that methodology in combination with other methods for determining the full charge defined in the following information:

(1) the identification of the owner or operator of the appliance;

(2) the location of the appliance;

(3) the original range for the full charge of the appliance, its midpoint, and how the range was determined;

(4) any and all revisions of the full charge range and how they were determined; and

(5) the dates such revisions occurred.

[Approved by the Office of Management and Budget under the control number 2060-0256]

Appendix A to Subpart F - Specifications for Fluorocarbon Refrigerants

This appendix is based on Air-Conditioning and Refrigeration Institute Standard 700-93:

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to evaluate and accept/reject refrigerants regardless of source (new, reclaimed and/or repackaged) for use in new and existing refrigeration and air-conditioning products.

1.1.1 This standard is intended for the guidance of the industry including manufacturers, refrigerant reclaimers, repackagers, distributors, installers, servicemen, contractors and for consumers.

1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances. The dynamics of this technology is advancing so rapidly that changes to this standard must be frequent.

Section 2. Scope

2.1 *Scope.* This standard specifies acceptable levels of contaminants (purity requirements) for various fluorocarbon refrigerants regardless of source and lists acceptable test methods. These refrigerants are R-11; R-12; R-13; R-22; R-113; R-114; R-123; R-124; R-500; R-502 and R-503 as referenced in the ANSI/ASHRAE Standard Number Designation and Safety Classification of Refrigerants (American Society of Heating, Refrigerating and Air Conditioning Engineers Inc., Standard 34-1992). Copies may be obtained from ASHRAE Publications Sales, 1791 Tullie Circle, N.E., Atlanta, GA 30329. Copies may also be inspected at Public Docket No. A-92-01, Waterside Mall (Ground Floor), Environmental Protection Agency, 401 M Street, S. W., Washington, D.C., Room M-1500. In addition the following blends are listed: R-22/-152a/-124 (53/13/34); R-22/-152a/-124 (61/11/28); R-125/-290/-22 (60/2/38); R-125/-290/-22 (38/2/60).

Section 3. Definitions

3.1 *"Shall," "Should," "Recommended,"* or *"It Is Recommended."* "Shall," "should," "recommended" or "it is recommended" shall be interpreted as follows:
3.1.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.1.2 *Should, Recommended,* or *It is Recommended.* "Should," "recommended," or "it is recommended" is used to indicate provisions which are not mandatory but which are desirable as good practice.

Section 4. Characterization of refrigerants and Contaminants

4.1 *Characterization.* Characterization of refrigerants and contaminants addressed are listed in the following general classifications:

4.1.1 *Characterization:*
a. Gas Chromatography
b. Boiling point and boiling point range

4.1.2 *Contaminants:*
a. Water
b. Chloride
c. Acidity
d. High boiling residue

e. Particulates/solids
f. Non-condensables
g. Impurities including other refrigerants

Section 5. Sampling, Summary of Test Methods and Maximum Permissible Contaminant Levels

5.1 *Referee Test.* The referee test methods for the various contaminants are summarized in the following paragraphs. Detailed test procedures are included in Parts 1 through 9, 12 through 15, and 19 through 23 of Appendix-93 to ARI Standard 700: *Analytical Procedures of ARI Standard* 700-93, 1994, the Air-Conditioning and Refrigeration Institute. These parts of Appendix-93 to ARI 700 are incorporated by reference. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Air-Conditioning and Refrigeration Institute, 4301 North Fairfax Drive, Arlington, VA 22203. Copies also may be inspected at Public Docket No. A-92-01, Waterside Mall (Ground Floor), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington D.C. 20460, Room M-1500 or at the Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, D.C. If alternate test methods are employed, the user must be able to demonstrate that they produce results equivalent to the specified referee method.

5.2 *Refrigerant Sampling*

5.2.1 Sampling Precautions. Special precautions should be taken to assure that representative samples are obtained for analysis. Sampling shall be done by trained laboratory personnel following accepted sampling and safety procedures.

5.2.2 Gas Phase Sample. A gas phase sample shall be obtained for determining the non-condensables. Since non-condensable gases, if present, will concentrate in the vapor phase of the refrigerant, care must be exercised to eliminate introduction of air during the sample transfer. Purging is not an acceptable procedure for a gas phase sample since it may introduce a foreign product. Since R-11, R-113, and R-123 have normal boiling points at or above room temperature, non-condensable determination is not required for these refrigerants.

5.2.2.1 Connection. The sample cylinder shall be connected to an evacuated gas sampling bulb by means of a manifold. The manifold should have a valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling bulb.

5.2.2.2 Equalizing Pressures. After the manifold has been evacuated, close the valve to the pump and open the valve on the system. Allow the pressure to equilibrate and close valves.

5.2.3.1 Preparation. Place an empty sample cylinder with the valve open in an oven at 230 degrees Fahrenheit [110 degrees Centigrade] for one hour. Remove it from the oven while hot, immediately connect to an evacuation system and evacuate to less than 1 mm mercury (1,000 microns). Close the valve and allow it to cool.

5.2.3.2 Manifolding. The valve and lines from the unit to be sampled shall be clean and dry. The cylinder shall be connected to an evacuated gas sampling cylinder by means of a manifold. The manifold should have a

valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling cylinder.

5.2.3.3 Liquid Sampling. After the manifold has been evacuated, close the valve to the pump and open the valve on the system. Take the sample as a liquid by chilling the sample cylinder slightly. Accurate analysis requires that the sample container be filled to at least 60 percent by volume, however under no circumstances should the cylinder be filled to more than 80 percent by volume. This can be accomplished by weighing the empty cylinder and then the cylinder with refrigerant. When the desired amount of refrigerant has been collected, close the valve(s) and disconnect the sample cylinder immediately.

5.2.3.4 Record Weight. Check the sample cylinder for leaks and record the gross weight.

5.3 Refrigerant Purity Characterization

5.3.1 Primary Method. The primary method shall be gas chromatography (GC) as described in Appendix-93 to ARI Standard 700. The chromatogram of the sample shall be compared to known standards.

5.3.2 Alternative Method. Determination of the boiling point and boiling point range is an acceptable alternative test method which can be used to characterize refrigerants. The test method shall be that described in the Federal Specification for "Fluorocarbon Refrigerants," BB-F-1421B, dated March 5, 1982, section 4.4.3 which is incorporated by reference. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, D.C. 20402-9328. Copies also may be inspected at Public Docket No. !-92-01, Waterside Mall (Ground Floor), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, Room M-1500 or at the Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, D.C.

5.3.3 Required Values. The required values for boiling point and boiling point range are given in Table 1, *Physical Properties of Fluorocarbon Refrigerants and Maximum Contaminant Levels.*

5.4 Water Content

5.4.1 Method. The Coulometric Karl Fischer Titration shall be the primary test method for determining the water content of refrigerants. This method is described in Appendix-93 to ARI Standard 700. This method can be used for refrigerants that are either a liquid or a gas at room temperature, including refrigerants-11 and -113, and -123. For all refrigerants, the sample for water analysis shall be taken from the liquid phase of the container to be tested. Proper operation of the analytical method requires special equipment and an experienced operator. The precision of the results is excellent if proper sampling and handling procedures are followed. Refrigerants containing a colored dye can be successfully analyzed for water using this method.

5.4.2 Alternative Method. The Karl Fischer Test Method is an acceptable alternative test method to the Coulometric Karl Fischer Titration for determining the water content of

refrigerants. This method is described in ASTM E700-79, (Reapproved 1990), Standard Test Method for Water in Gases Using Karl Fischer Reagent (American Society for Testing and Materials, Philadelphia, PA), which is incorporated by reference. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American Society for Testing and Materials, Philadelphia, PA. Copies also may be inspected at Public Docket No. A-92-01, Waterside Mall (Ground Floor), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, Room M-1500 or at the Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, D.C.

5.4.3 Limits. The value for water content shall be expressed as parts per million by weight and shall not exceed the maximum specified (see Tables 1 and 1a).

5.5 Chloride. The refrigerant shall be tested for chloride as an indication of the presence of hydrochloric acid and/or metal chlorides. The recommended procedure is intended for use with new or reclaimed refrigerants. Significant amounts of oil may interfere with the results by indicating a failure in the absence of chloride.

5.5.1 Method. The test method shall be that described in Appendix-93 to ARI Standard 700. The test will show noticeable turbidity at chloride levels of about 3 ppm by weight or higher.

5.5.2 Turbidity. The results of the test shall not exhibit any sign of turbidity. Report the results as "pass" or "fail."

5.6 Acidity.

5.6.1 Method. The acidity test uses the titration principle to detect any compound that is highly soluble in water and ionizes as an acid. The test method shall be that described in Appendix-93 to ARI Standard 700. This test may not be suitable for determination of high molecular weight organic acids; however these acids will be found in the high boiling residue test outlined in 5.7. The test requires a 100 to 120 gram sample and has a detection limit of 0.1 ppm by weight calculated as HCI.

5.6.2 Limits. The maximum permissible acidity is 1 ppm by weight as HCI.

5.7 High Boiling Residue.

5.7.1 Method. High boiling residue shall be determined by measuring the residue of a standard volume of refrigerant after evaporation. The refrigerant sample shall be evaporated at room temperature or at a temperature 50 degrees Fahrenheit [28K], above the boiling point of the sample using a Goetz bulb as specified in Appendix-93 to ARI Standard 700. Oils and or organic acids will be captured by this method.

5.7.2 Limits. The value for high boiling residue shall be expressed as a percentage by volume and shall not exceed the maximum percent specified (see Tables 1 and 1a).

5.8 Particulates/Solids.

5.8.1 Method. A measured amount of sample is evaporated from a Goetz bulb under controlled temperature conditions. The particulates/solids shall be determined by visual examination of

the Goetz bulb prior to the evaporation of refrigerant. Presence of dirt, rust or other particulate contamination is reported as "fail." For details of this test method, refer to Appendix-93 to ARI Standard 700.

5.9 Non-Condensables.

5.9.1 Sample. A vapor phase sample shall be used for determination of non-condensables. Non-condensable gases consist primarily of air accumulated in the vapor phase of refrigerants. The solubility of air in the refrigerants liquid phase is extremely low and air is not significant as a liquid phase contaminant. The presence of non-condensable gases may reflect poor quality control in transferring refrigerants to storage tanks and cylinders.

5.9.2 Method. The test method shall be gas chromatography with a thermal conductivity detector as described in Appendix-93 to ARI Standard 700.

5.9.3 Limit. The maximum level of non-condensables in the vapor phase of a refrigerant in a container shall not exceed 1.5 percent by volume (see Table 1 and 1a).

5.10 Impurities, Including Other Refrigerants.

5.10.1 Method. The amount of other impurities including other refrigerants in the subject refrigerant shall be determined by gas chromatography as described in Appendix-93 to ARI Standard 700.

5.10.2 Limit. he subject refrigerant shall not contain more than 0.50 percent by weight of impurities including other refrigerants (see Table 1 and 1a).

Section 6 Reporting Procedure

6.1 *Reporting Procedure.* The source (manufacturer, reclaimer or repackager) of the packaged refrigerant shall be identified. The refrigerant shall be identified by its accepted refrigerant number and/or its chemical name. Maximum permissible levels of contaminants are shown in Table 1. Test results shall be tabulated in a like manner.

Table 1

Characteristics of Refrigerants and Maximum Contaminant Levels

	Reporting Units	Reference (subclause)	R11	R12	R13	R22	R113	R114	R123	R124
Characteristics[*]:										
Boiling Point [*]	F @ 1.00 atm °C @ 1.00 atm		74.9 23.8	-21.6 -29.8	-114.6 -81.4	-41.4 -40.8	117.6 47.6	38.8 3.8	82.6 27.9	12.2 -11.0
Boiling Point Range [*]	K		0.3	0.3	0.5	0.3	0.3	0.3	0.3	0.3
Typical Isomer Content	By weight						0-1% R113a	0-30% R114a	0-8% R123a	0-5% R124a
Vapor phase contaminants:										
Air and other non-condensables	% by volume @ 25 °C	5.9	N/A [**]	1.5	1.5	1.5	N/A [**]	1.5	N/A [**]	1.5
Liquid phase contaminants:										
Water	ppm by weight	5.4	20	10	10	10	20	10	20	10
All other impurities including refrigerants	% by weight	5.10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
High boiling residue	% by volume	5.7	0.01	0.01	0.05	0.01	0.03	0.01	0.01	0.01
Particulates/solids	Visually clean to pass	5.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Acidity	ppm by weight	5.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Chlorides [***]	No visible turbidity	5.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

[8] Boiling points and boiling point ranges, although not required, are provided for informational purposes. [88] Since R11, R113 and R123 have normal boiling points at or above room temperature, non-condensable determinations are not required for these refrigerants.

[888] Recognized Chloride level for pass/fail is 3 ppm.

Table 1A

Characteristics of Refrigerants and Maximum Contaminant Levels

	Reporting Units	Reference (subclause)	R401A	R401B	R402A	R402B	R500
Characteristics*:							
Refrigerant Components	.....	.....	R22/152a/124	R22/152a/124	R/125/290/22	R125/290/22	R12/152A
Nominal Comp. weight %	.....		53/13/34	61/11/28	60/2/38	38/2/60	73.8/26.2
Allowable Comp. weight %	.....	.....	51-55/11.5-13.5/33-35	59-63/9.5-11.5/27-29	58-62/1-3/36-40	6-40/1-3/58-62	72.8-74.8/25.2-27.2
Boiling Point *	F @ 1.00 atm	.....	-27.6 to -16.0	-30.4 to -18.5	-56.5 to -52.9	-53.3 to -49.0	
	C @ 1.00 atm	.....	-33.4 to -26.6	-34.7 to -28.6	-49.1 to -47.2	47.4 to -45.0	-33.5
Boiling Point Range *	K	.....	.....	.....	.....	.....	0.5
Vapor Phase Contaminants:							
Air and other non-condensables	% by volume @ 25°C	5.9	1.5	1.5	1.5	1.5	1.5
Liquid Phase Contaminants:							
Water	ppm by weight	5.4	10	10	10	10	10
All other impurities including refrigerants	% by weight	5.10	0.50	0.50	0.50	0.50	0.50
High boiling residue	% by volume	5.7	0.01	0.01	0.01	0.01	0.05
Particulates/ solids	Visually clean to pass	5.8	Pass	Pass	Pass	Pass	Pass
Acidity	ppm by weight	5.6	1.0	1.0	1.0	1.0	1.0
Chlorides **	No visible turbidity	5.5	Pass	Pass	Pass	Pass	Pass

8 Boiling points and boiling point ranges, although not required, are provided for informational purposes.

88 Recognized Chloride level for pass/fail is 3 ppm.

APPENDIX E-3

40 CFR PART 82, SUBPART G -
SIGNIFICANT NEW ALTERNATIVES POLICY (SNAP) PROGRAM

Appendix E-3:

40 CFR Part 82, Subpart G-Significant New Alternative Policy (SNAP) Program

Summary: This final rule promulgates the U. S. Environmental Protections Agency's (EPA) program for evaluating and regulating substitutes for ozone-depleting chemicals being phased out under the stratospheric ozone protections provisions of the Clean Air Act (CAA). In section 612 of the CAA, the Agency is authorized to identify and restrict the use of substitutes for class I and II ozone-depleting substances where the Administrator has determined that other alternatives exist that reduce overall risk to human health and the environment. EPA is referring the program that provides these determinations as the Significant New Alternatives Policy (SNAP) program. The intended effect of this final rule is to expedite movement away from ozone-depleting compounds by identifying substitutes that offer lower overall risks to human health and the environment.

In this final rule, EPA is both issuing decisions on the acceptability and unacceptability of substitutes and promulgating its plan for administering the SNAP program. To arrive at determinations on the acceptability of substitutes, the Agency completed a cross-media analysis of risks to human health and the environment from the use of various substitutes in different industrial end-uses. Results of this analysis are summarized in this final rule, which covers substitutes in the following sectors: refrigeration and air conditioning, foam blowing, solvents cleaning, fire suppression and explosion protection, tobacco expansion, adhesives, coatings and inks, aerosols, and sterilants. Analysis of substitutes in a ninth sector, pesticides, will be completed, and the resulting decisions will be added to future SNAP determinations published in the *Federal Register*. These sectors comprise the principal United States industrial sectors that historically consumed large volumes of ozone-depleting compounds.

Effective Date: This rule is effective on April 18, 1994.

For Further Information Contact: The Stratospheric Ozone Information Hotline at 1-800-296-1996 can be contacted for information on weekdays from 10:00 a.m. to 4:00 p. m. Eastern Time or contact Sally Rand at (202) 233-9739, Substitutes Analysis and Review Branch, Stratospheric Protection Division, Office of Atmospheric Programs, Office of Air and Radiation (6205-J), 401 M Street, S. W., Washington, D. C. 20460

Subpart G - Significant New Alternatives Policy Program

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§82.170 Purpose and scope.

(a) The purpose of these regulations is to implement section 612 of the Clean Air Act, as amended, regarding the safe alternatives policy on the acceptability of substitutes for ozone-depleting compounds. This program will henceforth be referred to as the "Significant New Alternatives Policy" (SNAP) program. The objectives of this program are to identify substitutes for ozone-depleting compounds, to evaluate the acceptability of those substitutes, to promote the use of those substitutes believed to present lower overall risks to human health and the environment, relative to the class I and class II compounds being replaced, as well as to other substitutes for the same end-use, and to prohibit the use of those substitutes found, based on the same comparisons, to increase overall risks.

(b) The regulations in this subpart describe persons and substitutes subject to reporting requirements under the SNAP program and explain preparation and submission of notices and petitions on substitutes. The regulations also establish Agency procedures for reviewing and processing EPA's determinations regarding notices and petitions on substitutes. Finally, the regulations prohibit the use of alternatives which EPA has determined may have adverse effects on human health or the environment where EPA has identified alternatives in particular industrial use sectors that on an overall basis, reduce risk to human health and the environment and are currently or potentially available. EPA will only prohibit substitutes where it has identified other substitutes for a specific application that are acceptable and are currently or potentially available.

(c) Notifications, petitions and other materials requested shall be sent to: SNAP Document Control Officer, U. S. Environmental Protection Agency (6205-J), 401 M Street, S. W., Washington, D. C. 20460

§82.172 Definitions.

Act means the Clean Air Act, as amended, 42 U. S. C. 7401 et seq.

Agency means the U. S. Environmental Protection Agency.

Application means a specific use within a major industrial sector end-use.

Class I or class II means the specific ozone-depleting compounds described in section 602 of the Act.

Decision means any final determination made by the Agency under section 612 of the Act on the acceptability or unacceptability of a substitute for a class I or II compound.

EPA means the U. S. Environmental Protection Agency.

End-use means processes or classes of specific applications within major industrial sectors where a substitute is used to replace an ozone-depleting substance.

Formulator means any person engaged in the preparation or formulation of a substitute, after chemical manufacture of the substitute or its components, for distribution or use in commerce.

Health and safety study or study means any study of any effect of a substitute or its components on health

and safety, or the environment or both, including underlying date and epidemiological studies, studies of occupation., ambient, and consumer exposure to a substitute, toxicological, clinical, and ecological, or other studies of a substitute and its components, and any other pertinent test. Chemical identity is always part of a health and safety study.

Information which arises as a result of a formal, disciplined study is included in t he definition. Also included is information relating to the effects of a substitute or its components on health or the environment. Any available data that bear on the effects of a substitute or its components on health or the environment would be included. Examples include:

(i) Long- and short-term tests of mutagenicity, carcinogencity, or teratogenicity; data on behavioral disorders, dermatoxicity; pharmacological effects; mammalian absorption, distribution, metabolism, and excretion; cumulative, additive, and synergistic effects; acute, subchronic, and chronic effects, and structure/activity analyses;

(ii) Tests for ecological or other environmental effects on invertebrates, fish, or other animals, and plants, including; acute toxicity tests, chronic toxicity tests, critical life stage tests, behavioral tests, algal growth tests, seed germination tests, microbial function tests, bioconcentration or bioaccumulation tests, and model ecosystem (microcosm) studies;

(iii) Assessments of human and environmental exposure, including workplace exposure, and effects of a particular substitute on the environment, including surveys, tests, and studies of: biological, photochemical, and chemical degradation, air, water and soil transport; biomagnification and bioconcentration; and chemical and physical properties, e. g., atmospheric lifetime, boiling point, vapor pressure, evaporation rates from soil and water, octanol/water partition coefficient, and water solubility;

(iv) Monitoring data, when they have been aggregated and analyzed to measure the exposure of humans or the environment to a substitute;

(v) Any assessments of risk to health or the environment resulting from the manufacture, processing, distribution in commerce, use, or disposal of the substitute or its components.

Importer means any person who imports a chemical substitute into the United States. :Importer" includes the person primarily liable for the payment of any duties on the he merchandise or an authorized agent acting on his or her behalf. The term also includes, as appropriate:

(I) The consignee;

(ii) The importer or record;

(iii) The actual owner;

(iv) The transferee, if the right to draw merchandise in a bonded warehouse has been transferred.

Major Industrial Use Sector or Sector means an industrial category which EPA has reviewed under the SNAP program with historically high consumption patterns of ozone-depleting substances, including: refrigeration and air conditioning; foam-blowing, fire suppression and explosion protection, solvents cleaning; aerosols, sterilants; tobacco expansion; pesticides; and adhesives, coating and inks sectors.

Manufacturing means any person engaged in the direct manufacture of a substitute.

Mixture means any mixture or blend of two or more compounds.

Person includes an individual, corporation, partnership, association, state, municipality, political subdivision of a state, and any agency, department, or instrumentality of the United States and any officer, agent, or employee of such entities.

Pesticide has the meaning contained in the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. 136 *et seq* and the regulations issued under it.

Potentially available is defined as any alternative for which adequate health, safety, and environmental data, as required for the SNAP notification process, exist to make a determination of acceptability, and which the Agency reasonably believes to be technically feasible, even if not all testing has yet been completed and the alternative is not yet produced or sold.

Premanufacture Notice (PMN) Program has the meaning described in 40 CFR Part 720 Subpart A promulgated under the Toxic Substances Control Act, 15 U.S.C. 3601 *et seq*,

Producer means any person who manufactures, formulates or otherwise creates a substitute in its final form for distribution or use in interstate commerce.

Research and development means quantities of a substitute manufactured, imported, or processed or proposed to be manufactured, imported, or processed solely for research and development.

Residential use means use by a private individual of a chemical substance or any product containing the chemical substance in or around a permanent or temporary household, during recreation, or for any personal use or enjoyment. Use within a household for commercial or medical applications is not included in this definition, nor is use in automobiles, watercraft, or aircraft.

Significant new use means use of a new or existing substitute in a major industrial use sector as a result of the phaseout of ozone-depleting compounds.

Small uses means any use of a substitute in a sector other than a major industrial use sector, or production by any producer for use of a substitute in a major industrial sector of 10,000 lbs. or less per year.

Substitute or alternative means any chemical, product substitute, or alternative manufacturing process, whether existing or new, intended for use as a replacement for a class I or II compound.

Test marketing means the distribution in interstate commerce of a substitute to no more than a limited, defined number of potential customers to explore market viability in a competitive situation. testing must be restricted to a defined testing period before the broader distribution of that substitute in interstate commerce.

Use means any use of a substitute for a Class I or Class II ozone-depleting compound, including but not limited to use in a manufacturing process or product, in consumption by the end-user, or in intermediate uses, such as formulation or packaging for other subsequent uses.

Use Restrictions means restrictions on the use of a substitute imposing either conditions on how the substitute can be used across a sector end-use or limits on the end-uses or specific applications where it can be used within a sector.

§82.174 Prohibitions

(a) No person may introduce a new substitute into interstate commerce before the expiration of 90 days after a notice is initially submitted to EPA under §82.176(a).

(b) No person may use a substitute which a person knows or has reason to know was manufactured, processed or imported in violation of regulations in this subpart, or knows or has reason to know was manufactured; processed or imported in violation of any use restriction in the acceptability determination, after the effective date of any rulemaking imposing such restrictions.

(c) No person may use a substitute without adhering to any use restrictions set by the acceptability decision, after the effective date of any rulemaking imposing such restrictions.

(d) No person may use a substitute after the effective date of any rulemaking adding such substitute to the list of unacceptable substitutes.

§82.176 Applicability.

(a) Any producer of a new substitute must submit a notice of intent to introduce a substitute into interstate commerce 90 days prior to such introduction. Any producer of an existing substitute already in interstate commerce must submit a notice of July 18, 1994, if such substitute has not already been reviewed and approved by the Agency.

(b) With respect to the following substitutes, producers are exempt from notification requirements.

(1) *Substitutes already listed as acceptable.* Producers need not submit notices on substitutes that are already listed as acceptable under SNAP.

(2) *Small Sectors.* Persons using substitutes in sectors other than the nine principal sectors reviewed under this program are exempt from

the notification requirements. This exemption shall not be construed to nullify an unacceptability determination or to allow use of an otherwise unacceptable substitute.

(3) *Small Volume Use Within SNAP Sectors.* Within the nine principal SNAP sectors, persons introducing a substitute whose expected volume of use amounts to less than 10,000 lbs. per year within a SNAP sector are exempt from notification requirements. This exemption shall not be construed to allow use of an otherwise unacceptable substitute in any quantity. Persons taking advantage of this exemption for small uses must maintain documentation for each substitute describing how the substitute meets this small use definition. This documentation must include annual production and safes information by sector.

(4) *Research and development.* Production of substitutes for the sole purpose of research and development is exempt from reporting requirements.

(5) *Test marketing.* Use of substitutes for the sole purpose of test marketing is exempt form SNAP notification requirements until 90 days prior to the introduction of such substitutes for full-scale commercial sale in interstate commerce. Persons taking advantage of this exemption are, however, required to notify the Agency in writing that they are conducting test marketing 30 days prior to the commencement of such marketing. Notification shall include the name of the substitute, the volume used in the test marketing intended sector end-uses, and expected duration of the test marketing period.

(6) *Formulation changes.* In cases where replacement of class I or II compounds causes formulators to change other components in a product, formulators are exempt from reporting with respect to these auxiliary formulation changes. However, the SNAP submitter is required to notify the Agency if such changes are expected to significantly increase the environmental and human health risk associated with the sue of any class I or class Iii substitute.

(7) *Substitutes used as feedstocks*. Producers of substitutes used as feedstocks which are largely or entirely consumed, transformed or destroyed in the manufacturing or use process are exempt from reporting requirements concerning such substitutes.

(c) Use of a substitute in the possession of an end-user as of March 18, 1994, listed as unacceptable or acceptable subject to narrowed use limits may continue until the individual end-users' existing supply, as of that date, of the substitute is exhausted. Use of substitutes after March 18, 1994, is not permitted subsequent to April 18, 1994.

§82.178 Information Required to be Submitted.

(a) Persons whose substitutes are subject to reporting requirements pursuant to section 82.176 must provide the following information:

(1) *Name and description of the substitute.* The substitute should be identified by its (i) chemical name, (ii) trade name(s), (iii) identification numbers, (iv) chemical formula, and (v) chemical structure.

(2) *Physical and chemical information.* The substitute should be characterized by its key properties including but not limited to: molecular weight; physical state, melting point; boiling point; density; taste and/or odor threshold; solubility; partition coefficients (Log $K_{ow'}$, Log K_{oc}); atmospheric lifetime and vapor pressure.

(3) *Substitute applications.* Identification of the applications within each sector end-use in which the substitutes are likely to be used.

(4) *Process description.* For each application identified, descriptive data on processing, including in-place pollution controls.

(5) *Ozone depletion potential.* The predicted 100-year ozone depletion potential (ODP) of substitute chemicals. The submitter must also provide supporting documentation or references.

(6) *Global warming impacts.* Data on the total global warming potential of the substitute, including information on the GWP index and the indirect contributions to global warming caused by the production or use of the substitute (e.g., changes in energy efficiency). GWP must be calculated over a 100, 500 and 1000 year integrated time horizon.

(7) *Toxicity data.* Health and safety studies on the effects of a substitute, its components, its impurities, and its degradation products on any organism (e. g., humans, mammals, fish, wildlife, and plants). For tests on mammals, the Agency requires a minimum submission of the following tests to characterize substitute risks: a range-finding study that considers the appropriate exposure pathway for the specific use (e. g., oral ingestion, inhalation, etc.), and a 90-day subchronic repeated dose study in an appropriate rodent species. For certain substitutes, a cariotoxicity study is also required. Additional mammalian toxicity tests may be identified based on the substitute and application in question. To sufficiently characterize aquatic toxicity concerns, both acute and chronic toxicity For this purpose, the Agency requires a minimum data set as described in "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses," which is available throughout the National Technical Information Service (#PB 85-227049). Other relevant information and data summaries, such as the Material safety Data Sheets (MSDS) should also be submitted. To assist in locating any studies previously submitted to EPA and referred to, but not included in a SNAP submission, the submitter must provide citations for the date, type of submission, and EPA Office to which they were submitted, to help EPA locate these quickly.

(8) *Environmental Fate and Transport.* Where available, information must be submitted on the environmental fate and transport of substitutes. Such data shall include information on biaccumulation, biodegradation, adsorption, volatility, transformation, and other data necessary to characterize movement and reaction of substitutes in the environment.

(9) *Flammability.* Data on the flammability of a substitute chemical or mixture are required. Specifically, the flash point and flammability limits are needed, as well as information on the procedures used for determining the flammability limits. Testing of blends should identify the compositions for which the blend itself is flammable and include fractionation data on changes in the composition of the blend during various leak scenarios. For substitutes that will be used in consumer applications, documentation of testing results conducted by independent laboratories should be submitted, where available. If a substitute is flammable, the submitter must analyze the risk of ire resulting from the use of such a substitute and assess the effectiveness of measures to minimize such risk.

(10) *Exposure data.* Available modeling or monitoring data on exposures associated with the manufacture, formulation, transport, use and disposal of a substitute. Descriptive process information for each substitute application, as described above, will be used to develop exposure estimates where exposure data are not readily available. depending on the application, exposure profiles may be needed for workers, consumers, and the general population.

(11) *Environmental release data.* Data on emissions from the substitute application and equipment, as well as on pollutant releases or discharge to all environmental media. Submitters should provide information on release locations, and data on the quantities, including volume, of anticipated waste associated with the use of the substitute. In addition, information on anticipated waste management practices associated with the use of the substitute. Any available information on any pollution controls used or that could be used in association with the substitute (e. g., emissions reduction technologies, wastewater treatment, treatment of hazardous waste) and the costs of such technology must be submitted.

(12) *Replacement ratio for a chemical substitute.* Information on the replacement ratio for a chemical substitute versus the class I or II substances being replaced. The term "replacement ratio" means how much of a substitute must be used to replace a given quantity of the class I or Ii substance being replaced.

(13) *Required changes in use technology.* Detail on the changes in technology needed to use the alternative. Such information should include a description of whether the substitute can be used in existing equipment-with or without some

retrofit-or only in new equipment. Data on the cost (capital and operating expenditures) and estimated life of any technology modifications should also be submitted.

(14) C*ost of Substitute.* Data on the expected average cost of the alternative. In addition, information is needed on the expected equipment lifetime for an alternative technology. Other critical cost considerations should be identified, as appropriate.

(15) *Availability of substitute.* If the substitute is not currently available, the timing of availability of a substitute should be provided.

(16) *Anticipated market share.* Data on the anticipated near-term and long-term nationwide substitute sales.

(17) *Applicable regulations under other environmental statutes.* Information on whether the substitute is regulated under other statutory authorities, in particular the Clean Water Act, Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Toxic Substances Control Act, the Comprehensive Environmental Response, Compensation and Liability Act, the Emergency Planning and Community Right-to-Know Act, or other titles under the Clean Air Act.

(18) *Information already submitted to the Agency.* Information requested in the SNAP program notice that has been previously submitted to the Agency as part of past regulatory and information-gathering activities may be referenced rather than resubmitted. Submitters who cannot provide accurate references to data sent previously to the Agency should include all requested information in the SNAP notice.

(19) *Information already available in the literature.* If any of the data needed to complete the SNAP program notice are available in the public literature, complete references for such information should be provided

(b) The Significant New Alternatives Policy (SNAP) Information Notice is designed to provide the Agency with the information necessary to reach a decision on the acceptability of a substitute.

(1) Submitters requesting review under the SNAP program should send the completed SNAP notice to: SNAP Document Control Officer, U. S. Environmental Protection Agency (6205-J), 401 M Street, S. W., Washington, D. C. 20460.

(2) Submitters filing jointly under SNAP and the Premanufacture Notice Program (PMN) should send the SNAP addendum along with the PMN form to : PMN Document Control Officer, U. S. Environmental Protection Agency (7407), 401 M Street, S. W., Washington, D. C. 20460. Submitters must also send both documents to the SNAP program, with a reference to indicate

the notice has been furnished to the Agency under the PMN program. Submitters providing information on new chemicals for joint review under the TSCA and SNAP programs may be required to supply additional toxicity data under TSCA section 5.

(3) Submitters filing jointly under SNAP and under the Federal Insecticide, Fungicide, and Rodenticide Act should send the SNAP form to the Office of Pesticide Programs, Registration Division, (7505C) 401 M Street, S. W. Washington, D. C. 20460, as well as to the SNAP Document Control Officer.

§82.180 Agency Review of SNAP Submission.

(a) Process of SNAP Notices.

(1) *90-Day Review Process.* The 90-day review process will begin once EPA receives a submission and determines that such submission includes data on the substitute that are complete and adequate, as described in §82.178 above. The Agency may suspend or extend the review period to allow for submission of additional data needed to complete the review of the notice.

(2) *Initial Review of Notice.* The SNAP Document Control Officer will review the notice to ensure that basic information necessary to process the submission is present (i. e., name of company, identification of substitute, etc.). The SNAP Document Control Officer will also review substantiation of any claim of confidentiality.

(3) *Determination of Data Adequacy.* Upon receipt of the SNAP submission, the Agency will review the completeness of the information supporting the application. If additional data are needed, the submitter will be contacted following completion of this review. The 90-day review period will not commence until EPA has received data it judges adequate to support analysis of the submission.

(4) *Letter of Receipt.* The SNAP Document Control Officer will send a letter of receipt to the submitter to confirm the date of notification and the beginning of EPA's 90-day review period. The SNAP Document Control Officer will also assign the SNAP notice a tracking number, which will be identified in the letter or receipt.

(5) *Availability of New Information.* During Review Period. If critical new information becomes available during the review period that my influence the Agency's evaluation of a substitute, the submitter must notify the Agency about the existence of such information within 10 days of learning of such data. The submitter must also inform the Agency of new studies underway, even if the results will not be available within the 90-day review period. The Agency may contact the submitter to explore extending or suspending the review period depending on the type of information received and the stage of review.

(6) *Completion of Detailed Review.* Once the initial data review, described in steps (2) and (3) above, has been completed, the Agency will complete a detailed evaluation of the notices. If during any time the Agency perceives a lack of information necessary to reach a SNAP determination, it will contact the submitter and request the mission data.

(7) *Criteria for Review.* To determine whether a substitute is acceptable or unacceptable as a replacement for class I or II compounds, the Agency will evaluate:

(i) Atmospheric effects and related health and environmental impacts;

(ii) General population risks from ambient exposure to compounds with direct toxicity and to increased ground-level ozone;

(iii) Ecosystem risks;

(iv) Occupational risks;

(v) Consumer risks;

(vi) Flammability; and

(vii) Cost and availability of the substitute.

(8) Communication of Decision.

(i) *Communication of Decision to the Submitter*. Once the SNAP program review has been completed, the Agency will notify the submitter in writing of the decision. Safe or manufacture of new substitutes may commence after the initial 90-day notification period expires even if the Agency fails to reach a decision within the 90-day review period or fails to communicate that decision or the need for additional data to the submitter. Sale or manufacture of existing substitutes may continue throughout the Agency's 90-day review.

(ii) *Communication of Decision to the Public.* The Agency will publish in the Federal Register on a quarterly basis a complete list of the acceptable and unacceptable alternatives that have been reviewed to date. In the case of substitutes proposed as acceptable with use restrictions, proposed as unacceptable or proposed for removal from either list, a rulemaking process will ensue. Upon completion of such rulemaking, EPA will publish revised lists of substitutes acceptable subject to use conditions or narrowed use limits and unacceptable substitutes to be incorporated into the Code of Federal Regulations. (see Appendix A to this subpart).

(b) *Types of Listing Decisions.* Then reviewing substitutes, the Agency will list substitutes in one of five categories:

(1) *Acceptable.* Where the Agency has reviewed a substitute and found no reason to prohibit its use, it will list the alternative

as acceptable for the end-uses listed in the notice.

(2) *Acceptable Subject to the Conditions.* After reviewing a notice, the Agency may make a determination that a substitute is acceptable only if conditions of use are met to minimize risks to human health and the environment. Where users intending to adopt a substitute acceptable subject to use conditions must make reasonable efforts to ascertain that other alternatives are not feasible due to safety, performance or technical reasons, documentation of this assessment must be retained on file for the purpose of demonstrating compliance. This documentation shall include descriptions of substitutes examined and rejected, processes or products in which the substitute is needed, reason for rejection of other alternatives, e. g., performance, technical or safety standards. Use of such substitutes in ways that are inconsistent with such use conditions renders them unacceptable.

(3) *Acceptable Subject of Narrowed Use Limits.* Even though the Agency can restrict the use of a substitute based not he potential for adverse effects, it may be necessary to permit a narrowed range of use within a sector end-use because of the lack of alternatives for specialized applications. Users intending to adopt a substitute acceptable with narrowed use limits must ascertain that other alternatives are not technically feasible. Companies must document the results of their evaluation, and retain the results on file for the purpose of demonstrating compliance. This documentation shall include descriptions of substitutes examined and rejected, processes or products in which the substitute is needed, reason for rejection of other alternatives, e. g., performance, technical or safety standards, and the anticipated date other substitutes will be available and projected time for switching to other available substitutes. Use of such substitutes in applications and end-uses which are not specified as acceptable in the narrowed use limit renders them unacceptable.

(4) *Unacceptable.* This designation will apply to substitutes where the Agency's review indicates that the substitute poses risk of adverse effects to human health and the environment and that other alternatives exist that reduce overall risk.

(5) *Pending.* Submissions for which the Agency has not reached a determination will be described as pending. For all substitutes in this category, the Agency will work with the submitter to obtain any missing information and to determine a schedule for providing the missing information if the Agency wishes to extend the 90-

day review period. EPA will use the authority under section 114 of the Clean Air Act to gather this information, if necessary. In some instances, the Agency may also explore using additional statutory provisions (e.g., section 5 of TSCA) to collect the needed data.

(c) *Joint processing under SNAP and TSCA.* The Agency will coordinate reviews of substitutes submitted for evaluation under both the TSCA PMN program and the CAA.

(d) *Joint processing under SNAP and FIFRA.* The Agency will coordinate reviews of substitutes submitted for evaluation under both FIFRA and the CAA.

§82,182 Confidentiality of Data

(a) *Clean Air Act Provisions.* Anyone submitting information must assert a claim of confidentiality at the time of submission for any data they wish to have treated as confidential business information (CBI) under 40 CFR Part 2, Subpart B. Failure to assert a claim of confidentiality at the time of submission may result in disclosure of the information by the Agency without further notice to the submitter. The submitter should also be aware that under section 114(c) emissions data may not be claimed as confidential.

(b) *Substantiation of Confidentiality Claims.* At the time of submission, EPA requires substantiation of any confidentiality claims made. Failure to provide any substantiation may result in disclosure of information without further notice by the Agency. All submissions must include adequate substantiation in order for an acceptability determination on a substitute to be published. Moreover, under 40 CFR Part 2, Subpart B, there are further instances in which confidentiality assertions may later be reviewed even when confidentiality claims are initially received. The submitter will also be contacted as part of such an evaluation process.

(c) *Confidentiality Provisions for Toxicity Data.* In the event that toxicity or health and safety studies are listed as confidential, this information cannot be maintained as confidential where such data are also submitted under TSCA or FIFRA, to the extent that confidential treatment is prohibited under those statues. However, information contained in a toxicity study that is not health and safety data and is not relevant to the effects of a substance on human health and the environment (e. g., discussion of process information, proprietary blends) can be maintained as confidential subject to 40 CFR Prt 2, Subpart B.

(d) *Joint Submission under Other Statutes.* Information submitted as part of a joint submission to either SNAP/TSCA or SNAP/FIFRA must adhere to the security provisions of the program offices implementing these statutes. For such submissions, the SNAP handling of such notices will follow the security provision under these statutes.

§82.184 Petitions.

(a) *Who may petition.* Any person may petition the Agency to amend existing listing decisions under the SNAP program, or to add a new substance to any of the SNAP lists.

(b) *Types of Petitions.* Five types of petitions exist:

(1) Petitions to add a substitute not previously reviewed under the SNAP program to the acceptable list. This type of petition is comparable to the 90-day notifications, except that it would generally be initiated by entities other than the companies that manufacture, formulate, or otherwise use the substitute. Companies that manufacture, formulate, or use substitutes that want to have their substitutes added to the acceptable list should submit information on the substitute under the 90-day review program;

(2) Petitions to add a substitute not previously reviewed under the SNAP program to the unacceptable list;

(3) Petitions to delete a substitute from the acceptable list and add it to the unacceptable list or to delete a substitute from the unacceptable and add it to the acceptable list;

(4) Petitions to add or delete use restrictions on an acceptability listing.

(5) Petitions to grandfather use of a substitute listed as unacceptable or acceptable subject to use restrictions.

(c) *Content of the Petition.* The Agency requires that the petitioner submit information on the type of action requested and the rationale for the petition. Petitions (1) and (2) above must contain the information described in section 82.178 of this subpart, which lists the items to be submitted in a 90-day notification. For petitions that request the re-examination of a substitute previously reviewed under the SNAP program, the submitter must also reference the prior submittal or existing listing.

Petitions to grandfather use of an unacceptable substitute must describe the applicability of the test to judge the appropriateness of Agency grandfathering as established by the United States District Court of Columbia Circuit (see *Sierra Club v. EPA*, 719 F.2d 436 (D. C. Cir. 1983)). This test includes whether the new rule represents an abrupt departure from previously established practice, the extent to which a party relied on the previous rule, the degree of burden which application of the new rule would impose on the party, and the statutory interest in applying the new rule immediately.

(d) Petition Process.

(1) *Notification of Affected Companies.* If the petition concerns a substitute previously either approved or restricted under the SNAP program, the Agency will contact the original submitter of that substitute.

(2) *Review for Data Adequacy.* The Agency will review the petition for adequacy of data. As with a 90-day notice, the Agency may suspend review until the petitioner submits the information necessary to evaluate

the petition. To reach a timely decision on substitutes, EPA may use collection authorities such as those contained in section 114 of the Clean Air Act as amended, as well as information collection provisions of other environmental statutes.

(3) *Review Procedures.* To evaluate the petition, the Agency may submit the petition for review to appropriate experts inside and outside of the Agency.

(4) *Timing of Determinations.* If data are adequate, as described in section 82.180 above, the Agency will respond to the petition within 90 days of receiving a complete petition. If the petition is inadequately supported, the Agency will query the petitioner to fill any data gaps before the 90-day review period begins, or may deny the petition because data are inadequate.

(5) *Rulemaking Procedures.* EPA will initiate rulemaking whenever EPA grants a petition to add a substance to the list of unacceptable substitutes, remove a substance from any list, or change or create an acceptable listing by imposing or deleting use conditions or use limits.

(6) *Communication of Decision.* The Agency will inform petitioners within 90 days of receiving a complete petition whether their request has been granted or denied. If a petition is denied, the Agency will publish in the Federal Register an explanation of the determination. If a petition is granted, the Agency will publish the revised SNAP list incorporating the final petition decision within 6 months of reaching a determination or in the next scheduled update, if sooner, provided any required rulemaking has been completed within the shorter period.

APPENDIX F

REFRIGERANT LEAK DETECTION IN MECHANICAL ROOMS

THE FOLLOWING ARTICLE IS FROM THE AUGUST 1996 ASHRAE JOURNAL
The article is provided for information only. The U.S. Navy does not endorse the purchase of any brand or manufacturer called out in the article.

Refrigerant Leak Detection in Mechanical Rooms

By Thomas C. Sorensen

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Current regulations for commercial mechanical rooms present new challenges and opportunities for engineers, refrigeration contractors, and building owners. This article explores the issues governing refrigerant leak monitor selection and installation.

Virtually all of the estimated 65,000 low-pressure chillers installed in the U.S. today will be replaced or converted to run on non-ozone depleting refrigerants within the next decade. As part of the package, these must be accompanied by a refrigerant leak monitoring and detection system.

The various technologies used for refrigerant leak monitors have different costs (first cost and attendance), sensitivity, selectivity and speed of response. Understanding the trade-off between these issues is important for making the proper selection.

Background

ASHRAE has promulgated the ANSI/ASHRAE Standard 15-1994, Safety Code for Mechanical
Refrigeration and the ANSI/ASHRAE Standard 34-1992, Number Designation and Safety
Classification of Refrigerants. These two standards classify refrigerants into six categories based on toxicity and flammability and establish monitoring levels for machine room refrigerant leaks.

The latest version of ASHRAE Standard 15 requires that "each indoor machine room shall contain a detector, located in an area where refrigerant from a leak will concentrate, which shall actuate an alarm and mechanical ventilation..... at a value not greater than the corresponding TLV-TWA (or toxicity measure consistent therewith)" In addition, the current standard requires isolation of open flame combustion devices (such as boilers)

from refrigerant containing machinery unless the room is equipped with a refrigerant vapor detector to automatically shut-down the combustion process in the event of a refrigerant leak.

The ACGIH (American Conference of Governmental Industrial Hygienists) establishes TLV-TWAs and STELs. TLV-TWA stands for Threshold Limit Value-Time Weighted Average, it is the maximum average level a person should be exposed to in an 8-hour day, 40-hour week. The Short Term Exposure Limit (STEL) refers to a 15 minute exposure and is typically much greater than the TLV-TWA. In general, STELs have not been established for refrigerants. ACGIH
recommends that in lieu of an established STEL that the short-term exposure should not exceed 3-5 times the TLV-TWA for more than 30 minutes per day.

The ANSI/ASHRAE standards and ACGIH are primarily concerned with health and safety rather than refrigerant conservation. The basic control strategy for safety purposes is to dilute the refrigerant in the air of the machine room by introduction of clean air through mechanical ventilation. The basic control strategy for conservation is to contain the refrigerant in the system.

Refrigerant Management

In addition to safety, most engineers and building owners are interested in conserving refrigerant. Ultimately all chillers presently using CFCs will be converted, replaced or abandoned; but in the interim period, many building owners have elected to manage their existing refrigerants to defer the conversion/replacement decision. Containment can extend the life of existing systems with minimal risk and investment.

Exposure levels when monitoring for safety are well defined by code and regulation. When monitoring for containment, the main criteria is generally the lowest reliable leak detection level consistent with total cost. With most current technologies and most refrigerants the minimum reliable detection level is much less than the minimum exposure level.

To correctly apply leak monitors, whether for safety or refrigerant conservation, it is necessary for the facility manager, installer, and instrument supplier to have an adequate exchange of information regarding the site and monitoring objectives. The facility manager must determine the
overall objective. For example, is the installation to simply meet safety standards, or is it part of an overall containment plan to minimize refrigerant loss? The facility manager should also determine installation interfaces, such as the requirement for remote notification and integration
with existing building automation systems or ventilation equipment. The instrument supplier needs to know approximate room dimensions and configuration, particularly equipment arrangement, low lying areas, storage areas and the presence/absence of combustion devices. If a ventilation

system already exists, the sensor location relative to potential leak sources and ventilation air flow patterns is important. Obviously, refrigerant type and approximate quantities at risk of loss are important.

Technologies Applied

The two most widely applied technologies for refrigerant leak monitoring are IR (infrared) and CMOS (ceramic metal oxide semiconductor). Infrared technology is based on the absorption of a specific wavelength of IR light by the refrigerant molecule. CMOS technology is based on the change in conductivity of sensitized metal oxides upon exposure to refrigerant gases. Major detection technology issues include the requirements for selectivity, sensitivity and speed of response. There are trade-offs between these issues and instrument cost-effectiveness.

Single-point monitors with CMOS technology sensors are in the $1500-$2000 price range and $2500-$3000 range for multiple-point systems. IR technology systems are generally in the $4000-$5000 range for single point and $6000-$7000 range for multiple-point systems. There are major performance differences between these two technologies. However, when properly applied, each will be cost-effective under the appropriate circumstances.

Sensitivity

Both technologies deliver adequate sensitivity to meet safety standards which call for an alarm, remote notification and ventilation at the TLV-TWA (AEL-TWA). Generally, this is 1,000 ppm for Group A1 refrigerants (R11, 12, 22, 134a and azeotopes) and 30 ppm for R-123 (a common B1 refrigerant). It is important to note that these are 8-hour average exposure levels and not
instantaneous exposure levels. Typically, an instantaneous alarm should be set at no more than 3-5 times the TLV-TWA.

A typical alarm sequence might be to start ventilation at the TLV-TWA and to provide both local and remote notification at less than 3-5 times the TLV-TWA (on an instantaneous basis). When monitoring for conservation, alarms should be set at a level greater than 3-4 times the LDL (lower
detection limit). It is important to provide notification of the condition but not to begin ventilation as this will dilute the leak.

Lower detection limits for highly selective IR instruments are in the 1-5 ppm range; for CMOS instruments the lower detection limit is 20-30 ppm for HCFCs and HFCs, and 40-50 ppm for most common CFCs. To put these numbers in perspective, 1 lb. of refrigerant will evaporate to occupy about 3-4 cubic feet of volume. Assuming perfect mixing and no dilution, this would raise
the concentration of a 30,000-40,000 ft3 (850 to 1133 m3) room to 100 ppm.

Selectivity

The second major issue concerning technology is selectively. Selectivity is the ability of the instrument to differentiate between refrigerants. IR technology can be highly selective (compound specific); CMOS technology is generally regarded as non-selective. However, the buyer should be aware that not all IR technology instruments are highly selective.

When there is only one refrigerant present in the machine room and the likelihood of interfering vapors is remote, selectivity may not be an important issue. This rational may also apply when both refrigerants are of Safety Group A1, and monitoring is provided for personnel safety alone.

On the other hand, selectivity can be very important when both Group A1 and non-Group A1 refrigerants are present in the same space, or when other halocarbons or volatile hydrocarbons may also be present. When monitors with multiple remote sensors are used, physical separation of potential leak sources decreases the importance of selectivity even when two or more
refrigerants are present.

Speed of Response, Sensor Numbers

A third major issue is the speed of response and number of sensors/sensing points. A good rule of thumb is that there should be one sensor or sensing point for each 20-40,000 ft3 (566 to 1133 m3) of room volume, or one sensor/sensing point fewer than the total number of chillers, whichever is less. If there is a continuous draft in the room, a sensor/sensing point
should be located downstream from the last potential leak source.

Sensors are typically located 18 to 24 in. (457 to 610 mm) off the floor since refrigerants tend to concentrate near the floor. Sensors should be located in low-lying areas for safety or near the potential leak sources for conservation.

In multiple sensor installations, different methods are used for IR and CMOS instruments. Since CMOS sensors are low-cost electronic transducers they can be remotely located, and a gas concentration signal transmitted electrically to a central monitor panel. Because of their high cost, IR instruments traditionally use pneumatic scanners or sequencers to transport a sample
through tubing to a central location for analysis. Care must be exercised when using pneumatic sequencers as transport distance, tubing size, and number of sample points can have a drastic effect on speed of response.

It has been demonstrated that gases tend to travel faster by diffusion than through sample tubes. The main advantage of pneumatic scanners (sequencers) is that they increase the coverage; that is, a more concentrated sample will be delivered to the analyzer than by gas diffusion transport, assuming the sample point is near the leak source.

To overcome this limitation one manufacturer separates the controller and the IR analyzer cell into two separate components. In this design, gas concentration signals are transmitted electrically between the IR sensing module, located near the leak source, and a remote central controller. In
addition, this method can provide the benefits of highly selective IR analysis of different refrigerant gases in a single central monitor panel.

Specifying the Monitor

The basic requirements of a refrigerant leak monitor are that it:

Be designed for continuous unattended operation during the 3, 6 or 12 month periodic maintenance cycle of the associated equipment;

Provide a display and signal proportional to the concentration of refrigerant in the atmosphere since 100 ppm might be cause for investigation while 1000 ppm might be cause for evacuation;

Have the ability to stand alone or interface with other building systems since machine rooms are not always occupied;

Have the ability to quickly initiate an action when an alarm condition is reached, such as opening a damper and turning a fan ON or activating remote visual or audible alarms;

Have the sensing point remote from the central controller to take advantage of proximity to leak sources and concentration of vapors in low lying areas;

Have a failure/fault alarm; and,

Respond to an alarm condition within a few minutes.

If the leak monitor is to be used for safety purposes it should include multiple alarm levels consistent with TLV-TWA and STEL levels and other code/regulation exposure limits. Desirable accessories include local and remote audible and visual alarm capability and battery back-up or access to an uninterruptible power supply (UPS). Depending on site specific criteria,
additional features may be indicated or required such as multiple sensor capabilities, field adjustable alarm levels, high selectively to a specific refrigerant, and automatic calibration.

It is important that instruments be equipped with auto-calibration to be effective for low level leak detection and notification. Both detection technologies exhibit some degree of "drift," a result of imperfections which cause a reading to appear when no gas is present. Typically the amount of drift is small, a few ppm, at the most. In addition, both detection technologies are influenced to a certain extent by changes in temperature, pressure, or humidity.

To counter these effects, various auto-calibration (re-zeroing) techniques are used. Essentially all do the same thing, which is to reduce the apparent drift and transient responses by electronically modifying the signal of the transducer.

Site Selection

Manufacturers are usually diligent in their efforts to make their instruments easy to install and set-up. At the site, select a location for the instrument with good visibility, access to single phase power, in an area free from vibration, temperature and humidity extremes.

Make sure that the area is not subject to flooding, potential impact, or severe ambient changes (such as boiler blow-down or close proximity to a roll-up door).

Sensors are typically located 18-24 in. (457 to 610 mm) off the floor and should be close to sources of potential leakage and in low lying areas. Keep instrument cable or pneumatic tubing runs as short as possible and free of kinks.

Pneumatic tubing should always have a sample inlet filter. With IR instruments, make sure that the IR source (typically a hot wire filament) is located away from combustibles, flammables or explosives. The area should have adequate air movement and clearance for inlet/exhaust ports and access doors.

Instruments should be shut down and protected when installed before building construction is complete.

Calibration

Although most manufacturers gas test their instruments before shipment a variety of circumstances such as rough handling in transport or installation, dissimilar operating conditions from test conditions, etc. require that both CMOS and IR instruments be re-calibrated to "zero"
initially and periodically to assure best performance. Instruments typically require a 30-minute to 24-hour warm up before calibration. Details of performing the zero calibration vary by the manufacturer. While specially prepared zero calibration standards are sometimes recommended, a simple exposure to clean outdoor air is usually sufficient; provided that temperature and RH
conditions are similar.

Most manufacturers offer NIST traceable, specially prepared span gases for their instruments. While these are quite expensive and span calibration tests are somewhat cumbersome, in the hands of the experienced calibrator they offer the ultimate in accuracy. Quite often purchasers specify span gases when what they really desire is to observe a qualitative gas response. Qualitative gas responses can be observed by simply exposing the sensor to a small quantity of the refrigerant on a Q-tip in a large plastic trash bag (make sure that evaporation is complete).

Setting the Alarms

Alarms are normally user adjustable, with two to four dry contact relays rated 3 amps or more. While these are sufficient for switching a light or remote audible alarm, they are not sufficient for dampers or fans which must be activated through an intermediate power relay.

A typical alarm sequence for a highly selective IR instrument (LDL=1-5 ppm) monitoring R-123 (a Group B1 refrigerant) might be to provide local notification at 10-20 ppm, start ventilation at the AEL-TWA (30 ppm) and to provide both local and remote audible and visual notification at 100-150 ppm (on an instantaneous basis).

A typical alarm sequence for a CMOS technology instrument (LDL for HFCs=20-30 ppm)
monitoring R-134a (a Group A1 refrigerant) might be to provide local notification at 80-100 ppm, start ventilation at the TLV-TWA (1000 ppm), and to provide both local and remote audible and visual notification at less than 3000-5000 ppm (on an instantaneous basis).

Service after Installation

Most refrigerant leak monitors require periodic checks and testing. Usually, this takes the form of a visual observation and periodic re-zeroing against a known clean air source. It can include qualitative response testing by exposure to refrigerant vapor. Nuisance alarms, although not a common occurrence, do happen.

Provided that the instruments have been properly installed and set-up, ventilation of the area will begin long before any personnel are at risk on a short term basis. If a nuisance alarm is suspected, first determine the level of the alarm and take any indicated precautions for safety.

Second, expose the sensor to a known fresh air source. If the indicated concentration quickly drops, then begin searching for the leak source. If on exposure to a known clean air source the alarm stays high and the indicated ppm continues at a high level, there is a likely instrument malfunction.

Some of the more sophisticated instruments will assist in the diagnosis of potential problem areas through code or plain language messages on the LCD display screen.

With the exception of periodic replacement of the filters, there is very little maintenance or repair that can or should be done in the field on refrigerant leak monitoring instruments. These instruments generally require sophisticated diagnostic instruments and experienced technicians.

Summary

In the next decade, rapid price increases and supply uncertainties can be expected for all halocarbon based refrigerants. All refrigerants pose some health and safety risks. ASHRAE has promulgated standards which establish monitoring limits. As ASHRAE standards become local codes and regulation, continuous monitoring in machine rooms will become a way of life. Leak detection by continuous monitoring has been demonstrated to provide not only an increased margin of safety but also the economic benefit of conserving increasingly precious refrigerants.

References

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APPENDIX G

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

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¢/kWh	cents per kilowatts hour
°F	degree Fahrenheit
ACM	asbestos containing materials
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASTM	American Society of Testing Materials
BAM	basic assessment memorandum
BOA	basic ordering agreement
BTU	British thermal unit
CAA	Clean Air Act
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CNO	Chief of Naval Operations
CO_2	carbon dioxide
COP	coefficient of performance
DOE	Department of Energy
DX	Direct Extension
e.g.	for example
EFA	Engineering Field Activity
EFD	Engineering Field Division
EFLH	equivalent full load hours
EPA	Environmental Protection Agency
etc.	et cetera
g	gram
GSA	General Service Administration
HCFCs	hydrochlorofluorocarbons
HVAC&R	heating, ventilation, air-conditioning, and refrigeration
IEEA	integrated energy efficient analysis
IG	Inergen™
kW/ton	kilowatts per ton
LCCA	life cycle cost analysis
MIL-HDBK	military handbook
MVAC	motor vehicle air conditioner
N_2	nitrogen
NAVFAC	Naval Facilities Engineering Command
NECA	Navy Environmental Compliance Account
No.	Number
NOAEL	no adverse observed effect level
O_2	oxygen
ODS	ozone depleting substances

ODS	ozone depleting substances
OEM	original equipment manufacturer
OSHA	Occupational Safety and Health Administration
POM	program objective memorandum
PWC	Public Works Center
SAE	Society of Automotive Engineers
SNAP	Significant New Alternatives Policy
UV	ultraviolet
UV-B	ultraviolet radiation-B (wavelength between 400 and 300 nanometers)
yr.	year