

# Guidance on the DOE Facility Phaseout of Ozone-Depleting Substances



U.S. Department of Energy  
Assistant Secretary for Environment, Safety and Health  
Office of Environmental Policy and Assistance  
October 1995

# memorandum

**DATE:** November 8, 1995

**REPLY TO**  
**ATTN OF:** Office of Environmental Policy and Assistance:Koss:202-586-7964

**SUBJECT:** GUIDANCE ON THE DEPARTMENT OF ENERGY FACILITY PHASEOUT OF OZONE-DEPLETING SUBSTANCES

**TO:** Distribution

The phaseout of ozone-depleting substances substantially affects Department of Energy (DOE) operations associated with refrigeration and air conditioning, fire protection, and solvent usage throughout the complex. Among the more important requirements facing the Department in this area are those associated with Executive Order 12843 ("Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances"), the Environmental Protection Agency (EPA) regulations that implement §613 ("Federal Procurement") of the Clean Air Act, and an interim rule ("Federal Acquisition Regulation; Ozone Executive Order") that amends the Federal Acquisition Regulation (FAR). The first two directives require Federal agencies to significantly reduce use, where practicable, of ozone-depleting substances, through cost-effective procurement practices and through the substitution of safe alternative substances, and to provide leadership in their phaseout.

Although many Departmental elements have made progress in reducing their use of these substances, Executive Order 212843 and the §613 regulations call for substantive, Department-wide changes in current procurement and use practices. In light of the production phaseout of Halon in December 1994, and the pending production phaseout of most other class I substances (including chlorofluorocarbons [CFCs]) in December 1995, it is incumbent on DOE user organizations to finalize their class I phaseout plans expeditiously, not only because of global environmental concerns and the above directives, but also because of cost and supply issues associated with acquiring these increasingly-scarce substances.

The attached document provides implementing guidance for the use and phaseout of class I and class II substances to enable responsible DOE organizations to meet the broad and specific provisions of the previously-mentioned directives. The attachment also provides a compilation of ozone-depleting substance requirements and guidelines from a number of other sources<sup>1</sup>, which are relevant to Departmental operations. A draft of this document was widely circulated to program and field offices for review and comment in June 1994, and many of the comments received were incorporated in the final version. The requirements (*i.e.*, the "shall" statements) in the attachment are directly derived from requirements in Executive Order 12843, the §613 regulations, other relevant EPA

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<sup>1</sup> For example, the September 27, 1990, memorandum, "Interim Position on the Installation of New Halon 1301 Fixed Fire Suppression Systems and Halon Portable Fire Extinguishers", from the Acting Deputy Assistant Secretary of Safety and Quality Assurance, and the Acting Director of the Office of Projects and Facilities Management, which prohibited the installation of new fire suppression systems using Halon compounds in DOE facilities.

stratospheric ozone protection regulations, and internal DOE requirements. The guidance is consistent with recognized best-management practices; many of these recommendations have been issued as requirements, and have been successfully implemented, by the Department of Defense and the military services. We believe that the implementation document fully reflects the flexible language in the Executive Order and the §613 rule.

To meet a requirement in the Executive Order for Federal agencies to evaluate their present and future uses of ozone-depleting substances, it should be noted that Section 5(i)(1) of the attached guidance requests that All Departmental Elements that use these chemicals forward Fiscal Year 1995 ozone-depleting substance inventory data, and projected future use estimates, to EH-41 by October 31, 1996. Similarly, to meet an Executive Order requirement to disseminate information on phaseout actions, Section 5(i)(1) also requests that All Departmental Elements forward reports to EH-41 by October 31, 1996 on successful efforts and exemplary practices in eliminating use of these chemicals.

Because the phaseout of ozone-depleting chemicals affects a broad spectrum of Departmental activities, the Office of Environmental Policy and Assistance (EH-41) recommends that the attached document be widely distributed to both DOE and contractor staff involved in procurement of ozone-depleting substances (including persons responsible for substantive purchasing and contract modification decisions), and in the use and phaseout of ozone-depleting refrigerants, Halon compounds used for fire protection, and ozone-depleting solvents. Additional copies of the document may be obtained from DOE's Center for Environmental Management Information (1-800-736-3282). To effectively implement some of this guidance, it may be necessary for staff involved in environmental, fire protection, refrigeration and air conditioning, and solvent applications to coordinate with and provide technical information to procurement personnel.

Please contact Ted Koss of my staff (202-586-7964; internet address: [theodore.koss@hq.doe.gov](mailto:theodore.koss@hq.doe.gov)) if you have questions or comments on this material, or if you need other assistance related to the phaseout.

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## GUIDANCE ON THE DEPARTMENT OF ENERGY FACILITY PHASEOUT OF OZONE-DEPLETING SUBSTANCES

### 1 BACKGROUND

During the past decade, there has been a significant decrease in the detected amount of ozone in the stratosphere. Broad national and international consensus exists that certain man-made halocarbons (including chlorofluorocarbons [CFCs], hydrochlorofluorocarbons [HCFCs], Halon compounds, carbon tetrachloride, and methyl chloroform) must be restricted because of the risk of depletion of the stratospheric ozone layer. This continuing depletion of the ozone layer will lead to increased levels of ultraviolet (UV-B) radiation penetrating to the earth's surface, potentially resulting in health and environmental damage, including increased incidence of certain skin cancers and cataracts, increased formation of ground-level ozone, and damage to crops and aquatic organisms. To address this concern, the United Nations Environment Programme sponsored the successful negotiation of the Montreal Protocol in 1987. The 1990 Clean Air Act Amendments, like the Montreal Protocol, established controls on the production of ozone-depleting substances. The Clean Air Act (CAA) also created additional regulatory programs aimed at reversing the trend in ozone depletion, that affect users of these substances.

Section 613 ("Federal Procurement") of the CAA, the Environmental Protection Agency's (EPA) regulations implementing §613, and Executive Order (E.O.) 12843 ("Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances") place certain mandates on Federal agencies (including the Department of Energy [DOE]). The purpose of these mandates is to significantly reduce Federal use of these substances through affirmative procurement practices, and to provide leadership in the phaseout of these chemicals. Section 613 requires Federal agencies to modify their procurement policies to maximize the use of safe alternatives to these substances and otherwise conform these policies to the CAA's requirements regarding ozone protection. E.O. 12843, issued by President Clinton in April 1993 to accelerate Federal agency actions, requires agencies to revise their procurement practices and implement cost-effective programs to substitute non-ozone-depleting chemicals, to the extent economically practicable. Because most Federal procurement (including DOE procurement) is governed by the Federal Acquisition Regulation (FAR), the §613 regulations and E.O. 12843 also required that the FAR be amended to reflect the ozone-depleting substance acquisition policy in these two directives. An interim rule ("Federal Acquisition Regulation; Ozone Executive Order") that included these FAR amendments was published in the May 31, 1995, Federal Register (60 FR 28500).

Historically, DOE has used substantial quantities of ozone-depleting substances in its operations and currently continues to use these substances in refrigeration and air conditioning, fire protection, solvent cleaning applications, and other miscellaneous uses. Although DOE field elements have made progress in phasing out these chemicals, the §613 regulations and E.O. 12843 call for substantive, Department-wide changes in current procurement and use practices.

## 2 PURPOSE

The purpose of this document is to provide implementing requirements (indicated by use of the word "shall") and guidelines (indicated by use of the word "should") for responsible DOE organizations to meet the broad and specific provisions of 40 CFR Part 82, Subpart D (which implements §613 ["Federal Procurement"] of the CAA), E.O. 12843, and the interim rule amending the FAR. The document also provides a compilation of ozone-depleting substance requirements and guidelines from a number of other sources, which are relevant to DOE operations. Appendix A provides a summarized, pictorial representation of the requirements and guidelines. The requirements in this document are directly derived from requirements in the Subpart D regulations, E.O. 12843, the interim rule amending the FAR, and internal DOE requirements.

## 3 SCOPE

In order to implement the above directives, this document encompasses ozone-depleting substance procurement, use, recycling, and emissions issues for all DOE applications, including fire suppression, refrigeration, solvent, and other miscellaneous uses. The EPA has promulgated a number of regulations applicable to users of these substances to effectuate the provisions of Title VI ("Stratospheric Ozone Protection") of the CAA.<sup>1</sup> Generally, only those provisions of EPA's stratospheric ozone protection regulations relevant to Subpart D and E.O. 12843 are discussed in the document. The requirements and guidelines in the document are, in general terms, consistent with recognized best-management practices.

This guidance is applicable to all DOE organizations that use ozone-depleting substances, except the Naval Nuclear Propulsion Program, a joint Navy-DOE organization, responsible for all matters pertaining to Naval Nuclear Propulsion. In recognition of the Program's joint nature and its uniquely military facilities and activities, the Director, Naval Nuclear Propulsion Program, is responsible for establishing requirements and guidelines for implementing policy for ozone-depleting substances within the Naval Nuclear Propulsion Program.

## 4 DEFINITIONS

All Departmental Elements are organizations under Secretarial Officers and Heads of Field Elements. As used in this document, this term refers to organizations that acquire and use ozone-depleting substances.

Class I ozone-depleting substances are those chemicals that EPA has found cause or contribute significantly to harmful effects on the stratospheric ozone layer, including all chemicals that have an ozone depletion potential of 0.2 or greater.

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<sup>1</sup> A listing of EPA regulations dealing with ozone-depleting substances, of guidance developed by the Office of Environmental Policy and Assistance that analyzes these regulations, and of other DOE policy and guidance implementation documents related to the phaseout of ozone-depleting substances, is provided in Appendix B.

Class II ozone-depleting substances are those chemicals that EPA has found are known, or are reasonably expected, to cause or contribute to harmful effects on the stratospheric ozone layer; at this time the list of class II substances includes all HCFCs. Production of class I substances is being phased out more rapidly than class II substances because they affect the ozone layer more significantly. A listing of class I and class II controlled substances is found in Appendix C of this document. Future additions to the lists of controlled substances can be found in Appendices A and B to 40 CFR Part 82, Subpart A, "Production and Consumption Controls".

DOE mission-critical uses of ozone-depleting substances are those uses required to meet DOE missions for which no safe alternative chemicals or technologies are commercially available.

Heads of Field Elements are managers responsible for Departmental components located outside the Metropolitan Washington area (e.g., Fernald Area Office, Richland Operations Office, Western Area Power Administration).

Secretarial Officers are heads of Departmental elements responsible for first-tier organizations at Headquarters that report to the Office of the Secretary (e.g., the Assistant Secretary for Defense Programs, the Director of Energy Research).

## 5 REQUIREMENTS AND GUIDELINES

### (a) Inventory of Ozone-Depleting Substances

E.O. 12843 requires that Federal agencies assess their present and future uses of ozone-depleting substances, and evaluate their use of and plans for recycling.

(1) All Departmental Elements that use ozone-depleting substances shall identify and inventory present and future uses of class I and class II ozone-depleting substances and assess existing and future needs for these substances. This requirement is applicable to all DOE sites that use ozone-depleting substances, and to all other DOE installations and offices where the Department has environmental, safety and health oversight responsibilities (including administrative offices, such as Headquarters' buildings, if appropriate<sup>2</sup>). The information to be prepared and copied to DOE Headquarters [see 5(i)(1)] shall consist of:

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<sup>2</sup> At some offices, other organizations and Federal agencies, such as the General Services Administration, may have oversight responsibilities.

- the type and total quantity of ozone-depleting substances contained in DOE facility systems (e.g., refrigeration and air conditioning systems, or Halon fire suppression systems) and otherwise stored on site, differentiated by use category (i.e., refrigeration and air conditioning, fire suppression, and solvent use) for fiscal year (FY) 1995<sup>3</sup>;
- the type and quantity of ozone-depleting substances procured by each DOE facility for FY 1995;
- the type and estimated quantity of ozone-depleting substances needed in FY 1997 and FY 2000; and
- current and future use of recovery and recycling equipment: i.e., number of recycling devices in use and planned to be in use; the type of ozone-depleting substance to be recovered or recycled; or whether contractual recovery and recycling services are used, or will be used.

The reporting of these data will meet the Executive Order requirement, and the data will also serve as a benchmark for assessing complex-wide current and future uses of these substances.

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<sup>3</sup> The Office of Environmental Policy and Assistance is requesting copies of the estimates of the total, site-wide stock of each ozone-depleting chemical (e.g., CFC-12) differentiated by use category, and is not asking for submittal of equipment-level inventory (i.e., how much is used in each piece of equipment). However, it should be noted that collection of detailed inventory data is integral to fully identifying DOE facility uses of these substances and to developing site plans to transition away from these substances. In recognition of time and cost constraints, DOE facilities may use *de minimis* cutoffs and extrapolations in developing these estimates, particularly in inventorying a large number of units or uses, with each utilizing small quantities of ozone-depleting substances. However, Departmental elements are encouraged to collect the most accurate information possible to ensure they have adequately planned to meet realistic current and future needs.

(b) Safe Alternatives to Ozone-Depleting Substances

(1) All Departmental Elements shall seek and use safe alternative chemicals and technologies to replace ozone-depleting substances in all existing DOE applications, and in new DOE processes, programs, and procedures, to the maximum extent practicable. However, substitution is not required for class II substances identified as safe alternatives in 40 CFR Part 82, Subpart G, "Significant New Alternatives Policy Program", although All Departmental Elements should be aware of the phaseout schedules for these class II substances when making acquisition decisions. (Appendix D provides the production phaseout schedule for ozone-depleting substances.) DOE staff involved in seeking safe alternative chemicals for particular DOE applications need to carefully evaluate factors such as chemical toxicity, and worker safety and health concerns, before selecting a safe alternative for a particular use.

In accordance with the requirements of 40 CFR Part 82, Subpart G, All Departmental Elements shall select substitutes to ozone-depleting substances that EPA has designated as safe alternatives, and All Departmental Elements shall comply with the Subpart G regulations prohibiting the use of substitutes for specific uses because of adverse effects to human health or the environment.

In addition, when selecting chemical substitutes to ozone-depleting substances, preference should be given to non-ozone-depleting chemicals, if feasible and economically practicable. If no such substitute is available, priority should be given to selecting substitutes with:

- low ozone-depletion potential,
- low global warming potential, and
- low environmental/human health impact.

This information can be provided by the manufacturer, either from a material safety data sheet (MSDS) or other supplemental material. In some instances, EPA may be able to provide this information.<sup>4</sup>

(c) DOE Mission-Critical Uses

DOE mission-critical uses of ozone-depleting substances are defined as those uses required to meet DOE missions for which no safe alternative chemicals or technologies are commercially available.

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<sup>4</sup> The EPA's Stratospheric Ozone Information Hotline can be contacted for further information, at 1-800-296-1996.

The primary purpose of establishing the concept of "DOE mission-critical uses" in Section 5(c) is to allow for the continued procurement of ozone-depleting substances for these uses in Section 5(e), "Procurement", and Section 5(h), "Solvents", and for the continued use of Halon compounds in some fire suppression systems (see Section 5(f), "Fire Suppression"), because substitute chemicals or technologies have not yet been established, and these uses cannot be discontinued.

(1) Secretarial Officers have the responsibility to identify DOE mission-critical uses for the DOE facilities under their responsibility.

(2) By October 31, 1996, Secretarial Officers shall develop a list of DOE mission-critical uses under their responsibility, and estimates of ozone-depleting substance inventory for servicing these uses [see the discussion at 5(i)(1) on reporting requirements].

(3) Secretarial Officers should develop procedures to phase out ozone-depleting substances used for DOE mission-critical uses once safe alternatives are identified.

(4) Secretarial Officers should ensure that adequate supplies of ozone-depleting substances for servicing DOE mission-critical uses are retained by DOE facilities. To minimize procurement of these substances for DOE mission-critical uses from sources outside of DOE, efforts should be made to obtain supplies of these substances from stocks available across the DOE complex.

(d) Specifications

A number of DOE facilities utilize Department of Defense (DoD) military specifications, EPA technical requirements, and other Federal specifications that require the use of ozone-depleting substances.

(1) Heads of Field Elements shall review DoD military specifications, EPA technical requirements, and other Federal specifications in use at DOE facilities and identify those that require ozone-depleting substances. Heads of Field Elements shall implement cost-effective procedures that are consistent with Section 5(b) of this document to modify those specifications which require the use of ozone-depleting substances by substituting non-ozone-depleting substances, to the extent practicable. For uses in which a non-ozone-depleting substitute is not feasible, a safe alternative class II substance designated in 40 CFR Part 82, Subpart G, may be used.

(2) Until DoD military specifications, EPA technical requirements, and other Federal specifications are revised, Heads of Field Elements may continue to use ozone-depleting substances for these specific uses. To minimize procurement of these substances from outside sources, Heads of Field Elements should attempt to obtain supplies from onsite and from surplus stocks stored across the DOE complex. If supplies cannot be secured in this manner, Heads of Field Elements should procure needed quantities from commercial sources; for this situation, preference should be given to procuring previously-used, instead of virgin, ozone-depleting substances.

(3) Heads of Field Elements should develop plans to expedite use of safe alternatives to ozone-depleting substances when DoD military specifications, EPA technical requirements, and other Federal specifications are modified.

(4) Heads of Field Elements should ensure that cognizant DOE staff coordinate with DoD, EPA and other Federal agency staff responsible for preparing, maintaining and modifying DoD military specifications, EPA technical requirements, and other Federal specifications to help identify and alter requirements for ozone-depleting substances.

(e) Procurement

(1) All Departmental Elements shall review existing contracts to identify requirements for use of class I or class II ozone-depleting substances, or of products made with or containing such substances. All Departmental Elements shall modify existing contracts, to the extent permitted by law and where practicable, to require the use of safe alternatives in place of ozone-depleting substances.<sup>5</sup>

Exceptions: Modification of existing contracts that call for the use of ozone-depleting substances to meet DOE mission-critical applications, or to meet DoD Military specifications, EPA technical requirements, or other Federal specifications, is not required, until such time as the specifications are modified or their use is no longer needed to meet DOE mission-critical applications. Also, modification of existing contracts is not required for class II substances identified as safe alternatives under 40 CFR Part 82, Subpart G, nor for products made with or containing such class II substances.

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<sup>5</sup> For procurement of class I and class II refrigerants, see Section 5(g), "Refrigerants".

(2) To the maximum extent practicable, All Departmental Elements shall not award new contracts requiring the use of class I or class II ozone-depleting substances, nor products containing these substances.<sup>5</sup> To the maximum extent practicable, All Departmental Elements shall not award new contracts requiring products manufactured with class I or class II substances.

Exceptions: This does not apply to new contracts requiring these substances, nor products containing or manufactured with these substances, which are needed to meet DOE mission critical uses, or DoD military specifications, EPA technical requirements, or other Federal specifications. Also, this does not apply to new contracts requiring class II substances identified as safe alternatives under 40 CFR Part 82, Subpart G, nor to new contracts for products made with or containing such class II substances.

(3) All Departmental Elements shall ensure that new contracts specify that purchased products containing or manufactured with class I or class II ozone-depleting substances be labeled in accordance with 40 CFR Part 82, Subpart E, "The Labeling of Products Using Ozone-Depleting Substances".

To implement this, contracting officers are required to insert a clause prescribed by the FAR (at 48 CFR Part 52) in solicitations and new contracts for supplies containing or manufactured with class I or class II ozone-depleting substances, or containers of class I or class II ozone-depleting substances.

(4) All Departmental Elements shall ensure that all existing and new contracts involving the performance of any service or activity subject to CAA statutory and regulatory requirements dealing with refrigeration and air conditioning equipment require contractor compliance with the following CAA sections and regulations:

- §608 of the CAA ("National Recycling and Emission Reduction Program");
- the regulations implementing §608 (40 CFR Part 82, Subpart F -- "Recycling and Emissions Reduction");
- §609 of the CAA ("Servicing of Motor Vehicle Air Conditioners"); and
- the regulations implementing §609 (40 CFR Part 82, Subpart B -- "Servicing of Motor Vehicle Air Conditioners").

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<sup>5</sup> For procurement of class I and class II refrigerants, see Section 5(g), "Refrigerants".

To implement this, contracting officers are required to insert a clause prescribed by the FAR (at 48 CFR Part 52) in solicitations and contracts for services, when the contract includes the maintenance, repair, or disposal of any equipment or appliance using class I or class II ozone-depleting substances as a refrigerant, such as air conditioners (including motor vehicle air conditioners), refrigerators, chillers, or freezers.

(5) All Departmental Elements shall not procure:

- small containers of class I or class II substances for servicing motor vehicle air conditioners whose sale is prohibited under §609 of the CAA and the implementing regulations of 40 CFR Part 82, Subpart B, except when they will be used by personnel certified under §609 to service motor vehicles; and
- nonessential products as defined under §610 ("Nonessential Products Containing Chlorofluorocarbons") of the CAA and the implementing regulations of 40 CFR Part 82, Subpart C ("Ban on Nonessential Products Containing Class I Substances and Ban on Nonessential Products Containing or Manufactured With Class II Substances"), except for identified exemptions in Subpart C; and
- class II substances, nor products containing class II substances, for the purpose of any use prohibited by the future EPA regulations to be promulgated by December 31, 1999, to implement §605(c) of the CAA ("Regulations Regarding Production and Consumption of Class II Substances").<sup>6</sup> (This requirement will have the same effective date as the implementing EPA regulations).

(6) All Departmental Elements should modify contracts in the future to incorporate safe alternatives to ozone-depleting substances into contract specifications when safe alternatives become available for specific uses, to the extent permitted by law and where practicable.

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<sup>6</sup> This prohibition only applies to certain uses to be defined by EPA at a later date (as of October 1995, none of these uses have been identified). It should be noted that class II substances identified as safe alternative refrigerants in 40 CFR Part 82, Subpart G may continue to be purchased and used until well after 1999 (unless at some time in the future the Parties to the Montreal Protocol further accelerate the production phaseout dates for class II substances).

(7) All Departmental Elements should review procurement request packages to ensure that, to the extent practicable, they maximize procurement of safe alternatives for class I ozone-depleting substances and for products made with or containing such substances. These procedures should also limit procurement of class II substances, where practicable, to be consistent with §612 of the CAA ("Safe Alternatives Policy").

(8) Secretarial Officers and Heads of Field Elements should develop a metric that would measure yearly progress toward eliminating procurement of ozone-depleting substances within their organizations.

(f) Fire Suppression

Because class I Halon compounds<sup>7</sup> have very high ozone-depletion potential, emissions need to be minimized, and Halon in fire suppression systems that are not DOE mission critical should be removed to minimize the risk of inadvertent Halon discharge.

(1) As required by the September 27, 1990, memorandum, "Interim Position on the Installation of New Halon 1301 Fixed Fire Suppression Systems and Halon Portable Fire Extinguishers", from the Acting Deputy Assistant Secretary of Safety and Quality Assurance, and the Acting Director of the Office of Projects and Facilities Management, no new fire suppression systems using Halon compounds shall be installed in DOE facilities.

In addition, no new fire suppression systems using other class I ozone-depleting substances shall be installed.

(2) All Departmental Elements should prohibit discharge testing of fire suppression systems containing Halon compounds or any other class I ozone-depleting substance.

(3) All Departmental Elements should prohibit release of Halon compounds and other class I ozone-depleting substances during any training activities. Training should be accomplished using simulations or Halon compound substitutes with little or no ozone-depletion potential and the lowest global warming potential possible.

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<sup>7</sup> As used in Section 5(f), "Halon compounds" or "Halon" refer to the class I controlled substances Halon-1211, Halon-1301 and Halon-2402, and all isomers of these chemicals. Any future additions to the list of class I controlled substances can be found in Appendix A to 40 CFR Part 82, Subpart A.

(4) All Departmental Elements should minimize Halon-1301 emissions by following the procedures for the charging and recharging of cylinders referenced in Section A-4-1.4 of Appendix A of the National Fire Protection Association (NFPA) 12A, *Standard on Halon 1301 Fire Extinguishing Systems* (1992 Edition). All Departmental Elements should minimize Halon-1301 emissions during system inspection, testing, training, maintenance, and removal of systems from service, by adhering to the procedures in Chapter 4 of NFPA 12A.

(5) As recommended in the May 5, 1993, memorandum, "Managed Phase Out of Halon Fixed Fire Suppression Systems", from the Director of the Office of Nuclear Safety Policy and Standards, and the Deputy Assistant Secretary for Safety and Quality Assurance, All Departmental Elements should take steps to avoid inadvertent discharge of Halon systems and extinguishers through timely maintenance of fire detection equipment, proper use of recovery/recycling equipment, attention during servicing, and suitable personnel training.

(a) Maintenance work orders on Halon fire suppression systems should be completed expeditiously.

(b) Consideration should be given to converting DOE mission-critical systems using Halon compounds from automatic to manual activation to reduce emissions from false alarms and accidental discharges.

(6) All Departmental Elements should develop and implement plans to remove Halon compounds from all fire suppression systems that are not DOE mission critical.

(a) By January 1, 1999, all Halon compounds in portable fire suppression systems that are not DOE mission critical should be removed before discharge and replaced with safe alternatives identified in 40 CFR Part 82, Subpart G.

(b) By January 1, 2001, all Halon-1301 in fixed fire suppression systems that are not DOE mission critical should be removed before discharge and replaced with safe alternatives identified in 40 CFR Part 82, Subpart G.

(7) All Departmental Elements should implement programs for maintaining and managing Halon compounds in anticipation of future needs, as directed by the May 5, 1993, DOE memorandum, "Managed Phase Out of Halon Fixed Fire Suppression Systems".

(8) All Departmental Elements should conserve Halon compounds removed from deactivated systems. A reserve quantity of Halon should be stored at those DOE facilities with DOE mission-critical systems in anticipation of future needs. Excess supplies of Halon may be shipped to the DOE Halon repository at the Savannah River Site for testing, processing, storage, and reshipment for use in DOE mission-critical applications.<sup>8</sup>

(g) Refrigerants

(1) If air conditioning or refrigeration equipment, or small appliances containing ozone-depleting substances, are to be disposed of, All Departmental Elements shall ensure that any ozone-depleting refrigerant remaining in the system is removed prior to disposal, as required by 40 CFR Part 82, Subpart F.

(2) All Departmental Elements should develop and implement plans for managing refrigerants that provide for an orderly and cost-effective transition to the use of non-class I and non-ozone-depleting refrigerants.<sup>9</sup>

Recovery/Recycle

Recovery and recycling of refrigerants is not only a legal requirement, but it also is a key element in a long-term refrigerant management strategy to reduce the amount of new refrigerant that needs to be procured for use in equipment to be maintained.

(3) All Departmental Elements shall implement recycling and recovery procedures by complying with the requirements of 40 CFR Part 82, Subparts B and F, which include:

- procuring EPA-approved recovery and recycling equipment and complying with EPA service practice requirements, or contracting with outside firms using EPA-approved equipment and service practices, and

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<sup>8</sup> Information on the Savannah River Halon storage and recovery facility can be obtained from the Safety Division, Assistant Manager for Environment, Safety, Health, and Quality (contact: David Boyll, 803-725-1900) of the Savannah River Operations Office.

<sup>9</sup> In the report, "Recommended Approaches to Management of Refrigerants at DOE Facilities", distributed to program and field elements on August 12, 1994, the Office of Environmental Guidance provided guidelines to DOE facilities for identifying and implementing both near-term actions and long-range strategies that need to be considered in preparing sound, cost-effective fluorocarbon refrigerant utilization and phaseout plans.

- ensuring that equipment servicing is performed only by technicians who have been certified by EPA-approved organizations. (This applies to both DOE and contractor personnel from DOE facilities, and technicians from non-DOE firms that are contracted to perform this service.)

(4) All Departmental Elements should ensure that recovery and recycling equipment owned and/or operated by DOE facilities is tested and calibrated at least annually, to ensure the safety of the user and the accuracy of the equipment. Recovery and recycling equipment that is used frequently should be tested and calibrated more than once a year.

Tests should be conducted in accordance with the procedures provided in the owner's manual for the equipment. If there is uncertainty regarding testing procedures for the equipment, the manufacturer should be contacted for detailed information and instructions.

#### Procurement of Class I and Class II Refrigerants, and Equipment Using Class I and Class II Refrigerants

(5) All Departmental Elements shall not procure new refrigeration and air conditioning equipment that requires class I refrigerants. This also applies to newly-leased or newly-rented air conditioning and refrigeration equipment used in non-vehicular applications.

(6) For new or retrofitted equipment, All Departmental Elements shall utilize safe alternative refrigerants identified in 40 CFR Part 82, Subpart G. These refrigerants need to be selected in accordance with Section 5(b) of this document.

(7) To minimize procurement of replacement class I refrigerants for existing equipment and motor vehicle air conditioners from outside sources, All Departmental Elements should attempt to obtain supplies from onsite, recycled refrigerant, and from surplus stocks stored across the DOE complex. If supplies cannot be secured in this manner, All Departmental Elements should procure needed quantities from commercial sources; for this situation, preference should be given to procuring previously-used, instead of virgin, refrigerants.<sup>10</sup>

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<sup>10</sup> A DOE-wide computerized database on reserve refrigerant supplies has been developed, using the Facility Information Management System (FIMS). FIMS is a real property inventory system developed by the Office of the Associate Deputy Secretary for Field Management to consolidate several existing databases. Each DOE facility is able to input data and query the refrigerant database for site-specific, refrigerant-specific, or complex-wide refrigerant data, which may be potential sources of supply. Further information on this system can be obtained from Gene Gilstrap of the Office of Infrastructure Support Services, the FIMS coordinator (202-586-6125).

## Leakage/Emission Reduction

(8) All Departmental Elements shall ensure that class I and class II refrigerants are not knowingly vented into the atmosphere from DOE facilities during the maintenance, service, repair, or disposal of air conditioning or refrigeration equipment, in accordance with §608 of the CAA and 40 CFR Part 82, Subpart F.

(9) All Departmental Elements should implement a program of proactive leak detection and maintenance to reduce CFC and HCFC emissions. Procedures such as regular leak detection checks, preventive maintenance of equipment to ensure lowest possible emissions, installation of leak detection systems, and retrofit of low-pressure systems with high-efficiency purges should be initiated, to the extent practicable.

### (h) Solvents

(1) Heads of Field Elements should not procure class I ozone-depleting solvents, except for DOE mission-critical uses, and as required by DoD military specifications, Federal specifications, or EPA technical requirements. Efforts should be made to acquire class I solvents for these exempted uses from other DOE facilities across the complex.

(2) Heads of Field Elements should develop and implement plans for phasing out the use of ozone-depleting solvents.

Exception: This does not apply to uses involving DoD military specifications, EPA technical requirements, or other Federal specifications. For these uses, the ozone-depleting solvent use should be phased out when the specifications are changed.

(3) Heads of Field Elements should use engineering best management practices to reduce class I and class II ozone-depleting substance emissions, where economically practicable. These practices include, but are not limited to:

- improving efficiency of cleaning operations,
- eliminating processes that use ozone-depleting substances,
- using new technologies and existing, alternative processes that minimize or eliminate emissions, and
- recovering and recycling ozone-depleting solvents.

### (i) Reporting

(1) All Departmental Elements that use ozone-depleting substances shall prepare the inventory data on ozone-depleting substances discussed in Section 5(a) and Section 5(c)(2) of this document, and forward a copy to the Director of the Office of Environmental Policy and Assistance by October 31, 1996.

In addition, Secretarial Officers shall forward to the Director of the Office of Environmental Policy and Assistance copies of listings identifying DOE mission-critical uses under their responsibility and estimates of ozone-depleting substance inventory for servicing these uses, as required by Section 5(c)(2) of this document, by October 31, 1996.

Also, to meet requirements on the Department in E.O. 12843, All Departmental Elements that use ozone-depleting substances shall by October 31, 1996, concurrently forward reports on successful efforts in eliminating use of these substances, and on exemplary phaseout practices that might be suitable for emulation by other DOE organizations.

(2) Within 6 months following receipt of all information, the Office of Environmental Policy and Assistance shall prepare a summary report on the DOE complex inventory of ozone-depleting substances for distribution to All Departmental Elements. In addition, the Office of Environmental Policy and Assistance shall disseminate information on successful efforts in eliminating use of these substances, and on exemplary phaseout practices that might be suitable for emulation by other DOE organizations.

(3) The Office of Environmental Policy and Assistance should evaluate the need to further monitor progress on DOE-wide ozone-depleting substance phaseout efforts and determine if further updates are needed.

October 1995

APPENDIX A

GUIDANCE ON THE DEPARTMENT OF ENERGY FACILITY PHASEOUT OF  
OZONE-DEPLETING SUBSTANCES (ODSs) AT-A-GLANCE

**ALL  
DEPARTMENTAL  
ELEMENTS  
SHALL:\***

## Safe Alternatives

- ✓ Seek, select, and use safe alternative chemicals and technologies, with exceptions. [5(b)(1) & 5(g)(6)]

## Fire Suppression

- ✓ Prohibit installing new fire suppression systems using class I ODSs. [5(f)(1)]

## Inventory

- ✓ Identify, inventory, assess and report existing and future uses of class I/II ODSs by 10/31/96. [5(a)(1) and 5(i)(1)]

## Reporting

- ✓ Report successful ODS elimination efforts and exemplary phaseout practices by 10/31/96. [5(i)(1)]

## Procurement

- ✓ Identify ODSs required by present contracts and, when feasible, substitute safe alternatives, with exceptions. [5(e)(1)]
- ✓ Prohibit new contract awards requiring class I/II ODSs, to the maximum extent practicable, with exceptions. [5(e)(2)]
- ✓ Specify labeling in contracts for products containing or manufactured with class I/II ODSs. [5(e)(3)]
- ✓ Require compliance with Clean Air Act (CAA) §608-609 and Federal Acquisition Regulations Amendment. [5(e)(4)]
- ✓ Prohibit procuring small containers of class I/II ODSs for vehicle air conditioners, with exceptions. [5(e)(5)]
- ✓ Prohibit procuring nonessential products containing class I/II ODSs, with exceptions. [5(e)(5)]
- ✓ Prohibit procuring class II ODSs to be regulated in future under CAA §605(c). (This does not include class II refrigerants.) [5(e)(5)]
- ✓ Prohibit procuring new equipment requiring class I refrigerants. [5(g)(5)]

## Refrigerants

- ✓ Recover ozone-depleting substances (ODSs) from equipment prior to disposal. [5(g)(1)]
- ✓ Implement refrigerant recovery and recycling programs. [5(g)(3)]
- ✓ Ensure equipment is serviced by only certified technicians. [5(g)(3)]
- ✓ Prohibit venting class I/II ODSs during servicing and disposal, with exceptions. [5(g)(8)]

\* The term "shall" indicates that the action is required.

**ALL  
DEPARTMENTAL  
ELEMENTS  
SHOULD:\***

## Safe Alternatives

- ✓ Give preference to selecting non-ozone-depleting substitutes, if feasible and economically practicable. [5(b)(1)]

## Fire Suppression

- ✓ Prohibit discharging Halon systems for testing or training. [5(f)(2) & (3)]
- ✓ Minimize other Halon 1301 releases. [5(f)(4)]
- ✓ Take steps to avoid inadvertent Halon discharge. [5(f)(5)]
- ✓ Remove Halon from all systems that are not DOE mission critical. [5(f)(6)]
- ✓ Manage Halon in anticipation of future needs. [5(f)(7)]
- ✓ Store Halon from deactivated systems on site for DOE mission-critical uses. [5(f)(8)]
- ✓ Ship excess Halon to Savannah River Site. [5(f)(8)]

## Procurement

- ✓ Incorporate safe alternatives into contract specifications, when safe alternatives become available. [5(e)(6)]
- ✓ Review procurement requests for ODSs. [5(e)(7)]

## Refrigerants

- ✓ Develop and implement plans to manage transition to low- and non-ODSs. [5(g)(2)]
- ✓ Ensure recovery/recycling equipment is tested and calibrated. [5(g)(4)]
- ✓ Give preference to obtaining class I ODSs from DOE stocks whenever possible. [5(g)(7)]
- ✓ Implement leak detection and maintenance programs. [5(g)(9)]

\* The term "should" indicates that the action is recommended.

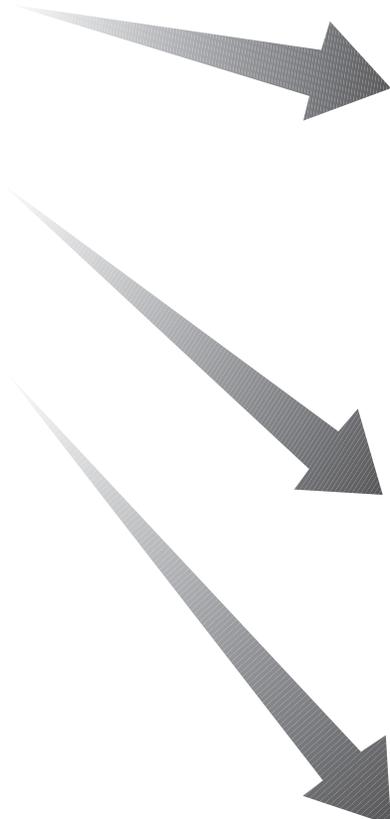
**HEADS OF  
FIELD  
ELEMENTS  
SHALL:**



## Safe Alternatives

- ✓ Modify Federal specifications to substitute safe alternatives for ODS uses, when feasible. [5(d)(1)]

**HEADS OF  
FIELD  
ELEMENTS  
SHOULD:**



## Safe Alternatives

- ✓ Give preference to obtaining ODSs to meet Federal specifications from DOE stocks. [5(d)(2)]
- ✓ Expedite use of safe alternatives when Federal specifications are modified. [5(d)(3)]
- ✓ Develop and implement plans to phase out use of ozone-depleting solvents. [5(h)(2)]

## Procurement

- ✓ Prohibit procuring class I ODS solvents, with exceptions. [5(h)(1)]

## Miscellaneous

- ✓ Coordinate with other agencies to modify Federal specifications. [5(d)(4)]
- ✓ Develop a metric to measure annual progress towards phasing out ODS procurement. [5(e)(8)]
- ✓ Reduce ozone-depleting solvent emissions. [5(h)(3)]

**SECRETARIAL  
OFFICERS  
SHALL:**



## DOE Mission-Critical Uses

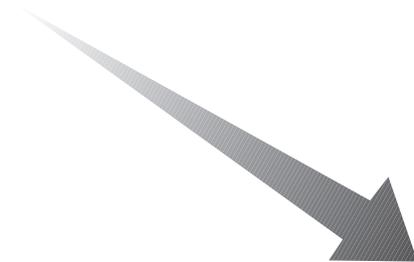
- ✓ Identify mission-critical uses. [5(c)(1)]
- ✓ Develop and forward a list of mission-critical uses and ODS quantities needed by 12/31/96. [5(c)(2) and 5(f)(1)]

**SECRETARIAL  
OFFICERS  
SHOULD:**



## DOE Mission Critical Uses

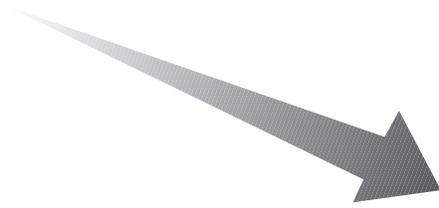
- ✓ Develop procedures to phase out ODSs once safe alternatives are identified. [5(c)(3)]
- ✓ Ensure ODS supply is retained by DOE facilities for mission-critical uses. [5(c)(4)]



## Miscellaneous

- ✓ Develop a metric to measure annual progress towards phasing out ODS procurement. [5(e)(8)]

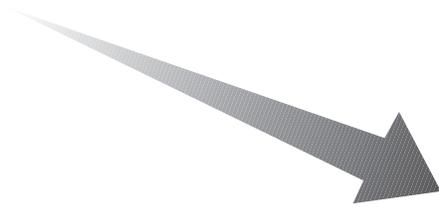
THE OFFICE OF  
ENVIRONMENTAL  
POLICY AND  
ASSISTANCE  
**SHALL:**



## Reporting

- ✓ Report on DOE ODS inventory within 6 months of receipt of all information. [5(i)(2)]
- ✓ Disseminate information on successful ODS elimination efforts and exemplary phaseout practices. [5(i)(2)]

THE OFFICE OF  
ENVIRONMENTAL  
POLICY AND  
ASSISTANCE  
**SHOULD:**



## Miscellaneous

- ✓ Evaluate need to further monitor progress towards the phase-out of ODSs. [5(i)(3)]

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APPENDIX B

RELEVANT EPA REGULATIONS, AND OTHER DOE DIRECTIVES RELATED TO OZONE-DEPLETING SUBSTANCES

APPENDIX B

RELEVANT EPA REGULATIONS, AND OTHER DOE DIRECTIVES RELATED TO OZONE-DEPLETING SUBSTANCES

EPA Regulations or DOE Directive	Citation	EH Guidance Document <sup>1,2</sup>
Order DOE 6430.1A, "General Design Criteria" <sup>3</sup>	Order DOE 6430.1A (April 6, 1989)	-----
"Interim Position on the Installation of New Halon 1301 Fixed Fire Suppression Systems and Halon Portable Fire Extinguishers"	DOE memorandum from the Acting Deputy Assistant Secretary of Safety and Quality Assurance, and the Acting Director of the Office of Projects and Facilities Management, September 27, 1990	-----
"Protection of Stratospheric Ozone; Final Rule" Servicing of Motor Vehicle Air Conditioners	40 <u>CFR</u> Part 82, Subpart B 57 <u>FR</u> 31242 (July 14, 1992)	"Clean Air Act Final Rule - Servicing of Motor Vehicle Air Conditioners," (memorandum, copy of final rule, and guidance), September 9, 1992
"Protection of Stratospheric Ozone; Final Rule" Production and Consumption Controls	40 <u>CFR</u> Part 82, Subpart A 57 <u>FR</u> 33754 (July 30, 1992)	-----

EPA Regulations or DOE Directive	Citation	EH Guidance Document <sup>1,2</sup>
"Protection of Stratospheric Ozone; Final Rule" Ban on Nonessential Products Containing Class I Substances	40 <u>CFR</u> Part 82, Subpart C 58 <u>FR</u> 4768 (January 15, 1993)	Guidance in Preparation
"Protection of Stratospheric Ozone; Labeling; Final Rule"	40 <u>CFR</u> Part 82, Subpart E 58 <u>FR</u> 8135 (February 11, 1993)	<p>"Information - Clean Air Act Final Labeling Regulations for the Protection of Stratospheric Ozone," (memorandum and copy of final rule), March 3, 1993</p> <p>"Guidance Concerning the Application of Clean Air Act Section 611 Labeling Requirements to Department of Energy Activities," (memorandum and guidance), August 19, 1993</p> <p>"Information - Analysis of the Clean Air Final Rule Relating to Stratospheric Ozone Protection - Labeling Requirements", (memorandum and guidance), May 11, 1994</p>
"Procurement Requirements for Federal Agencies for Ozone-Depleting Substances"	Executive Order 12843 <sup>4</sup> 58 <u>FR</u> 21881 (April 23, 1993)	"Information - Executive Order on Procurement Requirements and Policies for Ozone-Depleting Substances", (memorandum and copy of Executive Order), April 27, 1993
"Managed Phase Out of Halon Fixed Fire Suppression Systems"	DOE memorandum from the Director of the Office of Nuclear Safety Policy and Standards, and the Deputy Assistant Secretary for Safety and Quality Assurance, May 5, 1993	-----

EPA Regulations or DOE Directive	Citation	EH Guidance Document <sup>1,2</sup>
"Protection of Stratospheric Ozone; Refrigerant Recycling; Final Rule"	40 <u>CFR</u> Part 82, Subpart F 58 <u>FR</u> 28660 (May 14, 1993)	"Clean Air Act Final Refrigerant Recycling Regulations for the Protection of Stratospheric Ozone," (memorandum, copy of final rule and guidance), June 14, 1993  "Information - Analysis of the Final Clean Air Act Refrigerant Recycling Rule Relating to Stratospheric Ozone Protection," (memorandum and guidance), March 25, 1994
"Protection of Stratospheric Ozone; Final Rule" Federal Procurement	40 <u>CFR</u> Part 82, Subpart D 58 <u>FR</u> 54892 (October 22, 1993)	"Information - Federal Procurement of Non-Ozone-Depleting Substances," (memorandum and copy of final rule), December 29, 1993
"Protection of Stratospheric Ozone; Accelerated Phaseout; Final Rule"	40 <u>CFR</u> Part 82, Subpart A 58 <u>FR</u> 65018 (December 10, 1993)	"Information - Analysis of the EPA Final Rule Relating to Stratospheric Ozone Protection, Accelerated Phaseout Schedule," (memorandum and copy of final rule), May 27, 1994
"Protection of Stratospheric Ozone; Final Rule" Ban on Nonessential Products Containing Class II Substances	40 <u>CFR</u> Part 82, Subpart C 58 <u>FR</u> 69638 (December 30, 1993)	Guidance in Preparation
"Protection of Stratospheric Ozone; Final Rule" Ban on Nonessential Products Containing Class I Substances (amended final rule)	40 <u>CFR</u> Part 82, Subpart C 58 <u>FR</u> 69672 (December 30, 1993)	Guidance in Preparation

EPA Regulations or DOE Directive	Citation	EH Guidance Document <sup>1,2</sup>
"Protection of Stratospheric Ozone; Final Rule" Significant New Alternatives Policy (SNAP) Program	40 <u>CFR</u> Part 82, Subpart G 59 <u>FR</u> 13044 (March 18, 1994)	"Information - Final Clean Air Act Rule on Significant New Alternatives Policy (SNAP) Program," (memorandum, copy of final rule, and EPA summary), March 30, 1994  "Information--Analysis of the EPA Final Rule Related to the Significant New Alternatives Policy (SNAP) Program," (memorandum and guidance), September 23, 1994
"Protection of Stratospheric Ozone; Refrigerant Recycling" (Direct Final Rule)	40 <u>CFR</u> Part 82, Subpart F 50 <u>FR</u> 42950 (August 19, 1994)	"Additional Clean Air Act Information Related to Protection of Stratospheric Ozone -- Refrigerant Recycling," (memorandum and guidance), July 19, 1995
"Defense Programs Policy on Alternative Refrigerant for Chillers"	DOE Memorandum from the Acting Director of the Office of Construction and Capital Projects, Office of the Assistance Secretary for Defense Programs, November 2, 1994	-----
"Protection of Stratospheric Ozone; Refrigerant Recycling; Final Rule" (Grandfathering of Technician Certification Programs)	40 <u>CFR</u> Part 82, Subpart F 59 <u>FR</u> 55912 (November 9, 1994)	"Additional Clean Air Act Information Related to Protection of Stratospheric Ozone -- Refrigerant Recycling," (memorandum and guidance), July 19, 1995

EPA Regulations or DOE Directive	Citation	EH Guidance Document <sup>1,2</sup>
National Emission Standards for Hazardous Air Pollutants, Halogenated Solvent Cleaning" Final Rule	40 <u>CFR</u> Parts 9 and 63 59 <u>FR</u> 61801 (December 2, 1994)	"Analysis--EPA Clean Air Act (CAA) Final National Emission Standards for Hazardous Air Pollutants (NESHAPs)--Halogenated Solvent Cleaners," (memorandum, copy of final rule, and guidance), June 16, 1995
"Protection of Stratospheric Ozone; Labeling Supplemental Rulemaking; Final Rule"	40 <u>CFR</u> Part 82, Subpart E 60 <u>FR</u> 4010 (January 19, 1995)	Guidance in Preparation
"Motor Vehicle Air Conditioners and Protection of Stratospheric Ozone; Final Rule"	40 <u>CFR</u> Part 82, Subpart B 60 <u>FR</u> 21682 (May 2, 1995)	Guidance in Preparation
"Protection of Stratospheric Ozone: Administrative Changes to Final Rule to Phase Out Ozone-Depleting Chemicals"	40 <u>CFR</u> Part 82, Subpart A 60 <u>FR</u> 24970 (May 10, 1995)	Guidance in Preparation
"Protection of Stratospheric Ozone: Supplemental Rule to Amend Leak Repair Provisions Under Section 608 of the Clean Air Act; Final Rule"	40 <u>CFR</u> Part 82, Subpart F 60 <u>FR</u> 40420 (August 8, 1995)	"Notice: Promulgation of Final Rule to Amend Leak Repair Provisions of the Clean Air Refrigerant Recycling Regulations," (memorandum and copy of final rule), September 18, 1995  Guidance in Preparation

1. For an overview of stratospheric ozone protection requirements affecting DOE facilities see, "Information - Summary of Stratospheric Ozone Protection Requirements Affecting Department of Energy Operations and Field Facilities," (memorandum and guidance), April 6, 1993.
2. The Office of Construction and Capital Projects in the Office of the Assistant Secretary for Defense Programs has also issued guidance to Defense Program facilities on a number of technical and regulatory refrigerant issues, and on management strategies for ozone-depleting refrigerants. Information on Defense Program activities associated with the phaseout of class I ozone-depleting refrigerants can be obtained from Roger Snyder of DP-32 (301-903-4047).

3. Order DOE 6430.1A will be consolidated into the Life Cycle Asset Management Order and will be phased out upon the development and inclusion of appropriate performance measures into DOE contracts.

4. Executive Order 12856 also deals with ozone-depleting substances. E.O. 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements" requires Federal agencies, including DOE, to establish a goal of reducing total releases of toxic chemicals to the environment by 50 percent by December 31, 1999. Some of the ozone-depleting substances used at DOE facilities may be subject to this goal. Guidance on this E.O., entitled "Clarification of Executive Order 12856 and 40 CFR, Subpart F, Issues Relevant to Defense Programs Chlorofluorocarbon Mitigation Issues," was issued by the Office for Defense Programs on January 5, 1995.

October 1995

APPENDIX C

LIST OF CLASS I AND CLASS II OZONE-DEPLETING SUBSTANCES

APPENDIX C

LIST OF CLASS I AND CLASS II OZONE-DEPLETING SUBSTANCES  
REGULATED BY THE EPA IN TITLE VI, "STRATOSPHERIC OZONE PROTECTION"  
OF THE CLEAN AIR ACT

**Class I Substances**

Common Trade Name <sup>1</sup>	Chemical Formula	Chemical Name
CFC-11	CCl <sub>3</sub> F	Trichlorofluoromethane
CFC-12	CCl <sub>2</sub> F <sub>2</sub>	Dichlorodifluoromethane
CFC-13	CClF <sub>3</sub>	Chlorotrifluoromethane
CFC-111	C <sub>2</sub> Cl <sub>5</sub> F	Pentachlorofluoroethane
CFC-112	C <sub>2</sub> Cl <sub>4</sub> F <sub>2</sub>	Tetrachlorodifluoroethane
CFC-113	C <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub>	Trichlorotrifluoroethane
CFC-114	C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	Dichlorotetrafluoroethane
CFC-115	C <sub>2</sub> ClF <sub>5</sub>	Chloropentafluoroethane
CFC-211	C <sub>3</sub> Cl <sub>7</sub> F	Heptachlorofluoropropane
CFC-212	C <sub>3</sub> Cl <sub>6</sub> F <sub>2</sub>	Hexachlorodifluoropropane
CFC-213	C <sub>3</sub> Cl <sub>5</sub> F <sub>3</sub>	Pentachlorotrifluoropropane
CFC-214	C <sub>3</sub> Cl <sub>4</sub> F <sub>4</sub>	Tetrachlorotetrafluoropropane
CFC-215	C <sub>3</sub> Cl <sub>3</sub> F <sub>5</sub>	Trichloropentafluoropropane
CFC-216	C <sub>3</sub> Cl <sub>2</sub> F <sub>6</sub>	Dichlorohexafluoropropane
CFC-217	C <sub>3</sub> ClF <sub>7</sub>	Chloroheptafluoropropane
Carbon tetrachloride	CCl <sub>4</sub>	Tetrachloromethane
Methyl bromide	CH <sub>3</sub> Br	Methyl bromide
Methyl chloroform	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	1,1,1-trichloroethane
Halon-1211	CBrClF <sub>2</sub>	Bromochlorodifluoromethane
Halon-1301	CBrF <sub>3</sub>	Bromotrifluoromethane
Halon-2402	C <sub>2</sub> F <sub>4</sub> Br <sub>2</sub>	Dibromotetrafluoroethane
N/A	CHBr <sub>2</sub>	Dibromofluoromethane
HBFC-22B1	CHF <sub>2</sub> Br	Bromodifluoromethane

Common Trade Name <sup>1</sup>	Chemical Formula	Chemical Name
N/A	CH <sub>2</sub> FBr	Bromofluoromethane
N/A	C <sub>2</sub> HFBr <sub>4</sub>	Tetrabromofluoroethane
N/A	C <sub>2</sub> HF <sub>2</sub> Br <sub>3</sub>	Tribromodifluoroethane
N/A	C <sub>2</sub> HF <sub>3</sub> Br <sub>2</sub>	Dibromotrifluoroethane
N/A	C <sub>2</sub> HF <sub>4</sub> Br	Bromotetrafluoroethane
N/A	C <sub>2</sub> H <sub>2</sub> FBr <sub>3</sub>	Tribromofluoroethane
N/A	C <sub>2</sub> H <sub>2</sub> F <sub>2</sub> Br <sub>2</sub>	Dibromodifluoroethane
N/A	C <sub>2</sub> H <sub>2</sub> F <sub>3</sub> Br	Bromotrifluoroethane
N/A	C <sub>2</sub> H <sub>3</sub> FBr <sub>2</sub>	Dibromofluoroethane
N/A	C <sub>2</sub> H <sub>3</sub> F <sub>2</sub> Br	Bromodifluoroethane
N/A	C <sub>2</sub> H <sub>4</sub> FBr	Bromofluoroethane
N/A	C <sub>3</sub> HFBr <sub>6</sub>	Hexabromofluoropropane
N/A	C <sub>3</sub> HF <sub>2</sub> Br <sub>5</sub>	Pentabromodifluoropropane
N/A	C <sub>3</sub> HF <sub>3</sub> Br <sub>4</sub>	Tetrabromotrifluoropropane
N/A	C <sub>3</sub> HF <sub>4</sub> Br <sub>3</sub>	Tribromotetrafluoropropane
N/A	C <sub>3</sub> HF <sub>5</sub> Br <sub>2</sub>	Dibromopentafluoropropane
N/A	C <sub>3</sub> HF <sub>6</sub> Br	Bromohexafluoropropane
N/A	C <sub>3</sub> H <sub>2</sub> FBr <sub>5</sub>	Pentabromofluoropropane
N/A	C <sub>3</sub> H <sub>2</sub> F <sub>2</sub> Br <sub>4</sub>	Tetrabromodifluoropropane
N/A	C <sub>3</sub> H <sub>2</sub> F <sub>3</sub> Br <sub>3</sub>	Tribromotrifluoropropane
N/A	C <sub>3</sub> H <sub>2</sub> F <sub>4</sub> Br <sub>2</sub>	Dibromotetrafluoropropane
N/A	C <sub>3</sub> H <sub>2</sub> F <sub>5</sub> Br	Bromopentafluoropropane
N/A	C <sub>3</sub> H <sub>3</sub> FBr <sub>4</sub>	Tetrabromofluoropropane
N/A	C <sub>3</sub> H <sub>3</sub> F <sub>2</sub> Br <sub>3</sub>	Tribromodifluoropropane
N/A	C <sub>3</sub> H <sub>3</sub> F <sub>3</sub> Br <sub>2</sub>	Dibromotrifluoropropane
N/A	C <sub>3</sub> H <sub>3</sub> F <sub>4</sub> Br	Bromotetrafluoropropane
N/A	C <sub>3</sub> H <sub>4</sub> FBr <sub>3</sub>	Tribromofluoropropane
N/A	C <sub>3</sub> H <sub>4</sub> F <sub>2</sub> Br <sub>2</sub>	Dibromodifluoropropane

<b>Common Trade Name<sup>1</sup></b>	<b>Chemical Formula</b>	<b>Chemical Name</b>
N/A	$C_3H_4F_3Br$	Bromotrifluoropropane
N/A	$C_3H_5FBr_2$	Dibromofluoropropane
N/A	$C_3H_5F_2Br$	Bromodifluoropropane
N/A	$C_3H_6FBr$	Bromofluoropropane

**Class II Substances**

<b>Common Trade Name</b>	<b>Chemical Formula</b>	<b>Chemical Name</b>
HCFC-21	CHCl <sub>2</sub> F	Dichlorofluoromethane
HCFC-22	CHClF <sub>2</sub>	Chlorodifluoromethane
HCFC-31	CH <sub>2</sub> FCl	Chlorofluoromethane
HCFC-121	C <sub>2</sub> HCl <sub>4</sub> F	Tetrachlorofluoroethane
HCFC-122	C <sub>2</sub> HCl <sub>3</sub> F <sub>2</sub>	Trichlorodifluoroethane
HCFC-123	C <sub>2</sub> HCl <sub>2</sub> F <sub>3</sub>	Dichlorotrifluoroethane
HCFC-124	C <sub>2</sub> HClF <sub>4</sub>	Chlorotetrafluoroethane
HCFC-131	C <sub>2</sub> H <sub>2</sub> Cl <sub>3</sub> F	Trichlorofluoroethane
HCFC-132B	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>2</sub>	Dichlorodifluoroethane
HCFC-133A	C <sub>2</sub> H <sub>2</sub> ClF <sub>3</sub>	Chlorotrifluoroethane
HCFC-141B	C <sub>2</sub> H <sub>3</sub> Cl <sub>2</sub> F	Dichlorofluoroethane
HCFC-142B	C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub>	Chlorodifluoroethane
HCFC-221	C <sub>3</sub> HCl <sub>6</sub> F	Hexachlorofluoropropane
HCFC-222	C <sub>3</sub> HCl <sub>5</sub> F <sub>2</sub>	Pentachlorodifluoropropane
HCFC-223	C <sub>3</sub> HCl <sub>4</sub> F <sub>3</sub>	Tetrachlorotrifluoropropane
HCFC-224	C <sub>3</sub> HCl <sub>3</sub> F <sub>4</sub>	Trichlorotetrafluoropropane
HCFC-225CA	C <sub>3</sub> HCl <sub>2</sub> F <sub>5</sub>	Dichloropentafluoropropane
HCFC-225CB	C <sub>3</sub> HCl <sub>2</sub> F <sub>5</sub>	Dichloropentafluoropropane
HCFC-226	C <sub>3</sub> HClF <sub>6</sub>	Chlorohexafluoropropane
HCFC-231	C <sub>3</sub> H <sub>2</sub> Cl <sub>5</sub> F	Pentachlorofluoropropane
HCFC-232	C <sub>3</sub> H <sub>2</sub> Cl <sub>4</sub> F <sub>2</sub>	Tetrachlorodifluoropropane
HCFC-233	C <sub>3</sub> H <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub>	Trichlorotrifluoropropane
HCFC-234	C <sub>3</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	Dichlorotetrafluoropropane
HCFC-235	C <sub>3</sub> H <sub>2</sub> ClF <sub>5</sub>	Chloropentafluoropropane
HCFC-241	C <sub>3</sub> H <sub>3</sub> Cl <sub>4</sub> F	Tetrachlorofluoropropane
HCFC-242	C <sub>3</sub> H <sub>3</sub> Cl <sub>3</sub> F <sub>2</sub>	Trichlorodifluoropropane
HCFC-243	C <sub>3</sub> H <sub>3</sub> Cl <sub>2</sub> F <sub>3</sub>	Dichlorotrifluoropropane

<b>Common Trade Name</b>	<b>Chemical Formula</b>	<b>Chemical Name</b>
HCFC-244	$C_3H_3ClF_4$	Chlorotetrafluoropropane
HCFC-251	$C_3H_4Cl_3F$	Trichlorofluoropropane
HCFC-252	$C_3H_4Cl_2F_2$	Dichlorodifluoropropane
HCFC-253	$C_3H_4ClF_3$	Chlorotrifluoropropane
HCFC-261	$C_3H_5Cl_2F$	Dichlorofluoropropane
HCFC-262	$C_3H_5ClF_2$	Chlorodifluoropropane
HCFC-271	$C_3H_6ClF$	Chlorofluoropropane

1. Some notations may replace "CFC" and "HCFC" with an "R" (designating the substance as a refrigerant), or with "Freon" (which is a trade name).

October 1995

APPENDIX D

PRODUCTION PHASEOUT DATES FOR OZONE-DEPLETING SUBSTANCES  
REGULATED BY THE CLEAN AIR ACT

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PRODUCTION PHASEOUT DATES FOR OZONE-DEPLETING SUBSTANCES  
REGULATED BY THE CLEAN AIR ACT

<b>Ozone-Depleting Substance</b>	<b>Production Phaseout Date</b>
Carbon tetrachloride	January 1, 1996
Chlorofluorocarbons (CFCs)	January 1, 1996
Halons	January 1, 1994
Methyl bromide	January 1, 2001
Methyl chloroform	January 1, 1996
Hydrobromofluorocarbons (HBFCs)	January 1, 1996
Hydrochlorofluorocarbon-22 (HCFC-22)	January 1, 2020
All other HCFCs	January 1, 2030

### Class II Substances

Common Trade Name	Chemical Formula	Chemical Name
HCFC-21	CHCl <sub>2</sub> F	Dichlorofluoromethane
HCFC-22	CHClF <sub>2</sub>	Chlorodifluoromethane
HCFC-31	CH <sub>2</sub> FCI	Chlorofluoromethane
HCFC-121	C <sub>2</sub> HCl <sub>4</sub> F	Tetrachlorofluoroethane
HCFC-122	C <sub>2</sub> HCl <sub>3</sub> F <sub>2</sub>	Trichlorodifluoroethane
HCFC-123	C <sub>2</sub> HCl <sub>2</sub> F <sub>3</sub>	Dichlorotrifluoroethane
HCFC-124	C <sub>2</sub> HCIF <sub>4</sub>	Chlorotetrafluoroethane
HCFC-131	C <sub>2</sub> H <sub>2</sub> Cl <sub>3</sub> F	Trichlorofluoroethane
HCFC-132B	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>2</sub>	Dichlorodifluoroethane
HCFC-133A	C <sub>2</sub> H <sub>2</sub> ClF <sub>3</sub>	Chlorotrifluoroethane
HCFC-141B	C <sub>2</sub> H <sub>3</sub> Cl <sub>2</sub> F	Dichlorofluoroethane
HCFC-142B	C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub>	Chlorodifluoroethane
HCFC-221	C <sub>3</sub> HCl <sub>6</sub> F	Hexachlorofluoropropane
HCFC-222	C <sub>3</sub> HCl <sub>5</sub> F <sub>2</sub>	Pentachlorodifluoropropane
HCFC-223	C <sub>3</sub> HCl <sub>4</sub> F <sub>3</sub>	Tetrachlorotrifluoropropane
HCFC-224	C <sub>3</sub> HCl <sub>3</sub> F <sub>4</sub>	Trichlorotetrafluoropropane
HCFC-225CA	C <sub>3</sub> HCl <sub>2</sub> F <sub>5</sub>	Dichloropentafluoropropane
HCFC-225CB	C <sub>3</sub> HCl <sub>2</sub> F <sub>5</sub>	Dichloropentafluoropropane
HCFC-226	C <sub>3</sub> HCIF <sub>6</sub>	Chlorohexafluoropropane
HCFC-231	C <sub>3</sub> H <sub>2</sub> Cl <sub>5</sub> F	Pentachlorofluoropropane
HCFC-232	C <sub>3</sub> H <sub>2</sub> Cl <sub>4</sub> F <sub>2</sub>	Tetrachlorodifluoropropane
HCFC-233	C <sub>3</sub> H <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub>	Trichlorotrifluoropropane
HCFC-234	C <sub>3</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	Dichlorotetrafluoropropane
HCFC-235	C <sub>3</sub> H <sub>2</sub> ClF <sub>5</sub>	Chloropentafluoropropane
HCFC-241	C <sub>3</sub> H <sub>3</sub> Cl <sub>4</sub> F	Tetrachlorofluoropropane
HCFC-242	C <sub>3</sub> H <sub>3</sub> Cl <sub>3</sub> F <sub>2</sub>	Trichlorodifluoropropane
HCFC-243	C <sub>3</sub> H <sub>3</sub> Cl <sub>2</sub> F <sub>3</sub>	Dichlorotrifluoropropane
HCFC-244	C <sub>3</sub> H <sub>3</sub> ClF <sub>4</sub>	Chlorotetrafluoropropane

Common Trade Name	Chemical Formula	Chemical Name
HCFC-251	$C_3H_4Cl_3F$	Trichlorofluoropropane
HCFC-252	$C_3H_4Cl_2F_2$	Dichlorodifluoropropane
HCFC-253	$C_3H_4ClF_3$	Chlorotrifluoropropane
HCFC-261	$C_3H_5Cl_2F$	Dichlorofluoropropane
HCFC-262	$C_3H_5ClF_2$	Chlorodifluoropropane
HCFC-271	$C_3H_6ClF$	Chlorofluoropropane

1. Some notations may replace "CFC" and "HCFC" with an "R" (designating the substance as a refrigerant), or with "Freon" (which is a trade name).