PART 10

ENVIRONMENTAL MANAGEMENT

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CHAPTER 1 - ASBESTOS WASTE MANAGEMENT

1-1 INTRODUCTION

This chapter will provide basic guidelines for the removal, waste handling and containerization, cleanup, transport (which includes record keeping and waste handling), and disposal of asbestos.

1-2 REMOVAL OF ASBESTOS IN BUILDINGS

A. REMOVAL OF FRIABLE ASBESTOS PRIOR TO DEMOLITION - A significant quantity of asbestos-containing waste may be generated when removing friable asbestos materials from buildings. The Environmental Protection Agency (EPA) regulations address the removal of friable asbestos materials prior to demolition or renovation of buildings in the Code of Federal Regulations 40 CFR Part 61 Subpart M.

B. REGULATORY REQUIREMENTS - Regulatory requirements of EPA and Occupational Safety and Health Administration (OSHA) include:

(1) Written advance notice of planned removal to the regional **N**ational **E**mission **S**tandards for **H**azardous **A**ir **P**ollutants (NESHAP) coordinators. The telephone numbers for EPA Regional Asbestos NESHAP coordinators can be obtained by calling the Toxic Substance Control Act (TSCA) Hotline at (202) 554-1404.

(2) Posting warning signs.

(3) Providing workers with protective equipment.

(4) Wetting friable asbestos material to prevent emissions.

(5) Monitoring indoor dust levels.

(6) Properly disposing of asbestos-containing wastes.

All of these requirements should be coordinated with the IHS Office of Environmental Health and Engineering.

1-3 WASTE HANDLING AND CONTAINERIZATION

A. CONTAINERIZATION - When the asbestos materials are prepared for removal, they are wetted with a water and surfactant mixture sprayed in a fine mist. Time is allowed between spraying to allow complete penetration. Once the thoroughly wetted asbestos material has been removed from a building component. EPA and OSHA regulations require the wastes to be "containerized" as necessary to avoid creating dust during transport and disposal. The generally recommended containers are 6-mil thick plastic bags

sealed in such a way to make them leak tight. When using plastic bags it is important to minimize the amount of void space or air in the bag. This will help minimize any emissions should the bag burst under pressure.

In situations where pipes or other facility components containing asbestos materials are removed as sections without first removing the asbestos, 6-mil plastic can be used to wrap the section sufficiently to create a leak tight container.

B. TAGGING OF CONTAINERS - Both EPA and OSHA specify that the containers be tagged with a warning label. Either the EPA or OSHA label must be used.

CAUTION
CONTAINS ASBESTOS FIBERS
AVOID OPENING OR BREAKING CONTAINER
BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH

or

CAUTION
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
MAY CAUSE SERIOUS BODILY HARM

C. TIME PERIOD WASTE CAN REMAIN ON SITE - There are currently no regulatory requirements that govern the time period that waste can remain on-site before transport to a disposal site. However recognizing the health risk and potential liabilities associated with accidental exposure waste should be guarded (i.e., protected against public access such as by a fence or in a locked building) and transported as soon as possible.

D. CLEAN UP - After the asbestos-containing materials have been removed, all plastic barriers should be removed and the facility should be thoroughly washed. The plastic used to line the walls, floors, etc., should be treated as asbestos debris. Any asbestos-containing waste collected by the HEPA vacuum cleaner must be appropriately bagged, labeled, and disposed.

All areas of the facility that were potentially exposed to asbestos fibers should be washed down. Several washings should be performed along with air sampling and analysis to assure a low airborne asbestos fiber concentration. Consult with the IHS Office of Environmental Health and Engineering to determine the level of acceptable asbestos fiber concentrations. Targeted asbestos fiber concentrations may fall in the range of 0.001 to 0.0001 fibers cc as an acceptable level in the building air after cleanup. In some cases, it may not be possible to remove all asbestos due to the irregularity or porosity of the subsurface materials. In these situations, it may be necessary to spray an

encapsulating paint over the surface to eliminate the potential for fiber release. For further information on encapsulants call EPA's toll-free TSCA hotline at 1-800-424-9065.

1-4 ALTERNATE HANDLING TECHNIQUES

Alternate techniques for removing asbestos materials from buildings must receive prior approval from EPA. To date, the only alternative technique found to be acceptable by EPA is the vacuum truck which has the capability of removing asbestos materials in wet conditions. The asbestos material contained within the truck, known as slurry, is directly transported to the final disposal site. The air from the vacuum intake is dried and exhausted through a fabric filter located on the truck. Final filtration of exhaust air is through a HEPA filter. This alternative technique of using vacuum trucks will be reviewed by the EPA on a case-by-case basis.

1-5 TRANSPORTING ASBESTOS WASTE

A. TRANSPORT - Defined as all activities from receipt of the containerized asbestos waste at the generation site until it has been unloaded at the disposal site. Current EPA regulations state that there must be no visible emissions to the outside air during waste transport. However, recognizing the potential hazards and subsequent liabilities associated with exposure, the following additional precautions are required.

B. RECORDKEEPING - Before accepting wastes, a transporter should determine if the waste is properly wetted and containerized. The transporter should then require a chain-of-custody form signed by the generator. A chain-of-custody form may include the name and address of the pickup site, the estimated quantity of asbestos waste, types of containers used, and the destination of the waste. The chain-of-custody form should then be signed over to a disposal site operator to transfer responsibility for the asbestos waste. A copy of the form signed by the disposal site operator should be maintained by the transporter as evidence of receipt at the disposal site.

C. WASTE HANDLING - A transporter should ensure that the asbestos waste is properly contained in leak-tight containers with appropriate labels, and that the outside of the containers are not contaminated with asbestos debris adhering to the container. If there is reason to believe that the condition of the asbestos waste may allow significant fiber release, the transporter should not accept the waste. Improper containerization of wastes is a violation of the NESHAP regulation and should be reported to EPA.

D. WASTE TRANSPORT VEHICLE - Although there are no regulatory specifications regarding the transport vehicle, it is recommended that vehicles used for transporting containerized asbestos waste have an enclosed carrying compartment or utilize a canvas

covering sufficient to contain the transported waste, prevent damage to containers, and prevent fiber release. Transport of large quantities of asbestos waste is commonly conducted in a 20-cubic yard "roll-off" box, which should also be covered. Vehicles that use compactors to reduce waste volume should not be used because they could cause the waste containers to rupture. Vacuum trucks used to transport waste slurry must be inspected to ensure that water is not leaking from the truck.

1-6 DISPOSAL OF ASBESTOS WASTES

A. TECHNIQUE - Disposal involves the isolation of asbestos waste material to prevent fiber release. Land-filling is recommended as an environmentally sound isolation method because asbestos fibers are virtually immobile in soil. Other disposal techniques such as incineration or chemical treatment are not feasible due to the unique properties of asbestos. EPA has established asbestos disposal requirements for active and inactive disposal sites under NESHAP (40 CFR Part 61, Subpart M) and specifies general requirements for solid waste disposal under RCRA (40 CFR Part 257). Advance EPA notification of the intended disposal site is required by NESHAP.

B. SELECTING A DISPOSAL FACILITY - An acceptable disposal facility for asbestos wastes must adhere to EPA's requirements of no visible emissions to the air during disposal, or minimizing emissions by covering the waste within 24 hours. The minimum required cover is 6 inches of non-asbestos material which is normally soil or a dust suppressing chemical. In addition to these federal requirements many state or local governing agencies require more stringent handling procedures. These agencies usually supply a list of "approved" or licensed asbestos disposal sites upon request. Solid waste control agencies are listed in local telephone directories under state, county, or city headings. A list of state solid waste agencies may be obtained by calling the RCRA hotline at 1-800-424-9346. Some landfill owners or operators place special requirements on asbestos waste, such as placing all bagged waste into 55-gallon metal drums. Therefore, asbestos removal contractors should contact the intended landfill before arriving with the waste.

C. RECEIVING ASBESTOS WASTE - A landfill approved for receipt of asbestos waste should require notification by the waste hauler that the load contains asbestos. The landfill operator should inspect the loads to verify that asbestos waste is properly contained in leak-tight containers and labeled appropriately. The EPA should be notified if the landfill operator believes that the asbestos waste is in a condition that may cause significant fiber release during disposal. In situations when the wastes are not properly containerized the landfill operator should thoroughly soak the asbestos with a water spray prior to unloading, rinse out the truck, and immediately cover the wastes

with non-asbestos material prior to compacting the waste in the landfill.

1-7 COSTS OF HANDLING ASBESTOS

The costs of handling asbestos waste are highly variable. The overall cost for removing friable asbestos from buildings, including transportation and disposal, generally varies from $2 to $10 per square foot.

1-8 ASBESTOS MANAGEMENT REGULATIONS

A. Emissions of asbestos to the ambient air are controlled under Section 112 of the Clean Air Act which establishes the NESHAP regulations (40 CFR Part 61. Subpart M).

B. The OSHA regulations are established to protect workers handling asbestos or asbestos-containing products. The current OSHA regulations include a maximum workplace airborne asbestos concentrator limit of 2 fibers/cc on an 8 hour time weighted average basis, and a ceiling limit of 10 fibers/cc in any 15 minute period. (29 CFR Part 1910)

C. Wastes containing asbestos are not hazardous wastes under the Resource Conservation and Recovery Act (RCRA). However, because state regulations can be more restrictive than the federal regulations under RCRA, some states may have listed asbestos-containing wastes as hazardous wastes. EPA regulations address the removal of friable asbestos materials prior to demolition or renovation of buildings in the Code of Federal Regulations (40 CFR Part 61 Subpart M).

CHAPTER 2 - PETROLEUM LEAKS

1-1 INTRODUCTION

Proper handling of petroleum leaks is essential due to the potential that it may cause on the environment. The concern for proper management of petroleum tanks is due to:

A. TANKS HAVE THE POTENTIAL TO LEAK - If a tank system is past its prime (over 10 years old), especially if it's not protected against corrosion, the potential for leaking increases dramatically. Newer tank systems (especially the piping) can also leak, and spills can happen anytime.

B. TANK LEAKS ARE COSTLY - Leaking underground storage tanks (UST) sites can be very costly to clean up. Detect and clean up spills or leaks -- before they hurt you financially.

C. LEAKS AND SPILLS CAN HAVE SERIOUS CONSEQUENCES - Petroleum can contaminate soil, drinking water supplies, and air. Petroleum and its resulting vapors can also accumulate in nearby confined spaces, such as septic tanks, sewers, and the basements of homes. These vapors are poisonous and can cause a fire or explosion.

2-2 LEAK ACTION ITEMS

A. INITIAL ACTION WHEN A LEAK HAS BEEN DETECTED

(1) Evacuate the area immediately if there is danger of fire or explosion from leaked or spilled petroleum (or resulting vapors).

(2) **Do not smoke, and extinguish all open flames in the area (but do not use water to do so).** Remember to look around the site for electrical equipment in the area and turn it off. **Any source of heat or sparks can cause an explosion.**

(3) Notofy the Area IHS Office Environmental Health and Engineering (OEHE) office, and the local fire department, and ask officials there to test for explosive conditions. Fire officials have special testing equipment for this purpose, and they can also help you decide what to do next (for example, vent poisonous vapors, remove flammable liquids).

B. REPORTING THE LEAK - The Facilities Manager should report all underground leaks to the Area OEHE at office. Report any amount of petroleum which leads to a visible sheen on a water surface. The IHS environmental specialist should contact State or local officials as soon as possible. Many State governments have toll free (800) telephone numbers for reporting spills.

C. FIND THE SOURCE - Pinpoint the source of the leak or spill. The Facilities Manager should bring in professionals to test for tank or pipe leaks. If there are indications of leaks it may be necessary to excavate pipelines and tanks to determine the source.

D. Stop the Leak or Contain the Spill - The Facilities Manager in coordination with the Area OEHE should call in professionals to safely collect and remove as much petroleum from the leaking tank or piping as necessary to minimize further contamination of the environment. In addition:

(1) Do not put any more petroleum into the tank. If a piping leak is the culprit, do not use the suspect pump!

(2) Do not wash spilled petroleum into the sewer because sewers can ignite as well.

(3) Use an absorbent material (such as cat litter) to stop the leaked petroleum from spreading. Watch out especially for nearby sewer lines, basements, or septic tanks.

E. BEGIN CLEAN UP - The Facilities Manager should first check with the Area OEHE on how to go about cleaning up a leak or spill. If the extent of the contamination is not certain the Facilities Manager, in coordination with the Area OEHE should:

(1) Contact environmental professionals to determine the extent of contamination, prepare a cleanup plan, and clean up the site,

(2) Keep detailed records of the actions taken or planned.

2-3 DETECTING LEAKS

Some leaks and spills can't be overlooked, like the ruptured pipeline that squirts petroleum up to the surface of the ground or into a nearby stream, or the truck hose that spills petroleum onto the ground after filling a tank. However, many leaks and spills are often hidden, occur quietly, and can go unnoticed for long periods of time. The Facilities Manager needs to pinpoint the source.

A. Use Your Own Senses - The most obvious way to discover evidence of leaks or spills is by using your senses.

(1) Can you *see* a petroleum sheen on the surface of water in nearby ponds or streams? Can you see evidence of spills around your fill port, particularly after deliveries are made? Is soil near your underground tank saturated with petroleum?

(2) Can you *smell* an unusually strong petroleum odor coming from soil or water around your tank? Do neighbors complain of a

petroleum odor in or around their home -- such as in nearby sewer lines or basements? (Sometimes these odors become more evident after a major rainfall.)

(3) Has anyone complained of a strange *taste* in the drinking water that could be related to petroleum contamination?

B. CHECK FOR UNUSUAL OPERATING CONDITIONS AT THE PUMP

(1) Do you hear a rattling sound in your suction pump, and is petroleum flowing unevenly from the pump?

(2) Does the pump hesitate more than usual before dispensing petroleum?

(3) Is petroleum dispensing more slowly than normal? Some tank systems have devices (such as Red Jackets) that monitor the pressurized lines connecting tanks and pumps. When these devices detect a loss of pressure in the line (an indication that your line may be leaking), they slow the flow of petroleum to the pump.

(4) Do you have water in your tank? While a small amount of water in a tank is usual due to condensation from the air, a noticeable increase over a period of days or weeks may indicate that water is leaking into your tank. And if water can leak in, petroleum can leak out.

C. CHECK YOUR INVENTORY AND PERFORM A TANK TIGHTNESS TEST

(1) Until you install a leak detection device or have your system tested, the next best way to identify large leaks is to check your product inventory routinely. For this method to work, careful measurements, bookkeeping and inventory procedures are essential. If you do not already check your product inventory, start now. The further back your inventory records go, the more useful they will be.

(2) If your inventory check reveals a difference between the amount of petroleum you thought you had and the amount you actually have, double-check your calculations and keep a close watch on the situation. You should consider a tank test if your inventory control continues to suggest a leak, because the problem could also be explained by factors other than a leak (such as theft, short deliveries, errors in measurement, or faulty calculations). You'll want to make sure the inventory discrepancy truly indicates a leak. If a genuine inventory discrepancy continues, you must use a tank tightness test or another leak detection technique to confirm the leak. Several techniques are commercially available and reliable if conducted by qualified experts and according to the manufacturer's instructions.

D. EXCAVATE PIPELINES OR TANKS - In addition to checking inventory records and performing tank tests you may be required to excavate

the soil surrounding the tank or piping to look for evidence of petroleum -- such as stained or saturated soils or strong odors. High levels of petroleum vapors in the excavation area indicate a leak or spill has occurred recently.

2-4 WHAT TO CLEAN UP

A. Check the site to determine how much petroleum escaped, what damages resulted, and how to proceed with cleanup,

B. Consult with the Area OEHE and, if necessary, hire an experienced professional to conduct this investigation. In addition to the methods for discovering leaks and spills described earlier, contractors may use sophisticated methods to collect and analyze data from soil, soil gas, or ground-water samples. They are also skilled in understanding how site topography, drainage and the location of sewers can affect the movement of the released petroleum. Before proceeding, ask the Area OEHE for advice on reducing potential hazards (such as inhaling vapors from contaminated soils) that may occur during the investigation.

2-5 STARTING THE CLEAN UP

A. If a site check shows that a release of petroleum has occurred, the Facilities Manager must begin cleanup. The Facilities Manager should coordinate his/her effort with the Area OEHE. Many techniques are available for cleaning up leaks and spills -- such as using sorbents (cat litter, for example), removing the soil, and treating the soil and water on site or below ground. More than one of these techniques may be used, especially if soil, air, and water have all been contaminated. Again, use the advice of professionals. The Facilities Manager's job may not be finished after the initial cleanup. Even if the leak has been contained, small amounts of petroleum may be in the soil. Small amounts can be cleaned up fairly easily and inexpensively. However, cleaning up soaked or saturated soils or contaminated ground water will take longer. Use the help of professionals because improper removal can spread contamination, making it harder to clean up soil or ground water.

B. If a site check shows that contaminated soils or petroleum have come in contact with ground water, or if drinking water supplies have been affected, a more extensive investigation will be needed to determine the full extent and location of all contamination. (Again, use professionals to perform this investigation.)

2-6 PREPARING A CLEAN-UP PLAN

A. The Facilities Manager should report to the Area OEHE the initial cleanup actions that have been taken as well as the future

actions to protect people's health and the environment. The cleanup plan must explain how to:

(1) Clean up the soil, ground water, and nearby surface water.

(2) Provide, for as long as necessary, alternative drinking water to individuals whose water supply has been contaminated.

(3) Remove, to the extent possible, any petroleum that migrated through the soil and reached the ground water.

B. Professionals should assist the Facilities Manager in preparing cleanup plans.

2-7 RECORDKEEPING

The Facilities Manager should keep detailed records of all your cleanup actions. The Facilities Manager should keep the Area OEHE informed of all cleanup action.

2-8 OTHER INFORMATION

For general information concerning only the Federal requirements, you can also call the U.S. Environmental Protection Agency's toll-free Resource Conservation and Recovery Act (RCRA)/ Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Hotline (1-800-424-9346).

CHAPTER 3 - REFRIGERANT MANAGEMENT PLAN

3-1 INTRODUCTION

A. An refrigerant management plan is required for each Area to select, recover, recycle, and reclaim refrigerants and to safely handle, store and dispose of them. Refrigerants are categorized as chloro-fluoro-carbons (CFCs), Hydro-chloro-fluoro-carbons (HCFCs), or hydro-fluoro-carbons (HFCs). The concerns relate to their relative ozone-depletion potential, global warming potential, and the atmospheric life or chemical stability. To protect the Earth's upper ozone level and to reduce global warming, a more directed and coordinated management approach is needed for the various and numerous actions required.

B. The breakdown of total refrigerant use in the HVAC and refrigeration industries is about 25 percent CFCs and 75 percent HCFC-22.

(1) Chemical manufacturers will not produce CFC refrigerants after December 31, 1995.

(2) HCFCs are considered as **interim** substitutes for CFCs because their ozone-depleting and global warming effects are substantially less and because there are no readily available "drop-in" alternatives.

(3) HCFC-22 is the refrigerant of choice for reciprocating chillers, most residential and commercial air conditioners, and heat pumps.

(4) HCFC phaseout was also established in the law because of their effects on the environment. HCFCs phaseout dates are subject to be accelerated as more scientific information is developed and substitutes become available.

(5) HFCs are substitutes for existing refrigerants and have no ozone-depletion potential; but, do have varying degrees of global warming potential.

C. The chart below illustrates the Ozone-depletion potentials of refrigerants.

TABLE 1

	ASHRAE NUMBER	FORMULA	OZONE DEPLETION POTENTIAL

CFCs	11	CCl_3F	1.0
	12	CCl_2F_2	1.0
	113	CCl_2FCClF_2	0.9
	114	$CClF_2CClF_2$	0.7
	115	$CClF_2CF_3$	0.4
	500	73.8% 12 / 26.2% 152	0.7
	502	48.8% 22 / 51.2% 115	0.2
HCFCs	22	$CHClF_2$	0.05
	142b	CH_3CClF_2	0.01
	22/142b	40% 22 / 60% 142b	0.03
	123	$CHCl_2CF_3$	0.02
HFCs	134a	CF_3CH_2F	0
	152a	CH_3CHF_2	0

3-2 LEGISLATION AND REGULATIONS

A. GENERAL - Title VI, Stratospheric Ozone Protection of the Clean Air Act amendments of 1990, (P.L. 101-549)", signed November 15, 1991, establishes a phaseout schedule and yearly reduction percentages for ozone-depleting chemicals which was more stringent than the Montreal Protocol. This amendment promotes recycling, bans "the knowing" venting or releasing of refrigerants during maintenance, service, repair, or disposal; restricts emission of refrigerants; and establishes strict control over their use. It includes a variety of requirements intended to reduce the use and emission of ozone-depleting substances. Recycled refrigerants are exempt from the excise tax placed on new CFC refrigerant sales.

The U.S. Environmental protection Agency (EPA) is responsible for developing regulations concerning strict control over the use of refrigerants, require technician certification, establish equipment standards, require certain maintenance and service practices that reduce refrigerant emissions, require strict procedures when reclaiming refrigerants to meet purity standards, and require the keeping of records on the use, sale, and transfer of these substances.

B. REFERENCES

(1) United States Code

a. Title 42, The Public Health and Welfare, Chapter 85 Air Pollution Prevention and Control, Subchapter VI Stratospheric Ozone Protection Para. #7671

b. Title 26, Internal Revenue Code, Chapter 38 Environmental Taxes, Subchapter D Ozone-depleting Chemicals, Para. #4682

(2) Federal Agency Regulations

a. Title 29, Labor, Subtitle B Regulations Relating to Labor, Chapter XVII OSHA, Part 1910/1926, Subpart Z Toxic and Hazardous Substances

b. Title 40 Protection of Environment, Chapter 1 Environmental Protection Agency,

Part 82 Protection of Stratospheric Ozone, Subchapter I Solid Wasted

Part 260, Hazardous Waste Management System: General

Part 261, Identification and Listing of Hazardous Waste

Part 262, Standards Applicable to Generators of Hazardous Waste

Part 266, Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities.

c. Title 49 Transportation, Chapter 1, Research and Special Programs Administration, Subchapter C, Hazardous Materials Regulations, Parts 171-180, (Regulations for shippers, carriers, and packages)

(3) National Standards or Guidelines

a. American Society of Heating, Air Conditioning, and Refrigerating Engineers (ASHRAE),

3-90, Reducing Emissions of Fully Halogenated Chlorofluorocarbon Refrigerants in Refrigeration and Air Conditioning Equipment and Applications

15-92, Safety Code for Mechanical Refrigeration

34-92, Number Designation and Safety Classification of Refrigerants

b. Air-Conditioning & Refrigeration Institute (ARI) Standards

700-88, Specifications for Fluorocarbon Refrigerants

740-91, Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment

K, Containers for Recovered Fluorocarbon Refrigerants

c. Directory of Certified Refrigerant Recover/Recycling Equipment

d. General Electric (GE)

e. Proposed Method for Testing Recovery Devices for Use with Small Equipment

3-3 STRATEGY

A. GENERAL - The strategy is to have an aggressive and proactive refrigerant management program which is flexible and responsive to meet the challenges and opportunities as presented by legislation, regulations, technology, and other requirements that impact IHS's mission of providing quality service to its customers and clients while maintaining the physical plant assets. Consideration should be given to factors such as chiller age and remaining life, hours of usage, maintenance and repair history, refrigerant supply and possible alternatives, energy and capacity trade-offs, equipment enhancements, operational and maintenance practices, and building modernization schedules.

B. ELEMENTS - There are three basic, not mutually exclusive, strategy elements.

These elements are:

(1) Operational Units - Take appropriate action to reduce the usage and risk of loss of ozone-depleting refrigerants. Practices will include improved and expanded testing and inspection procedures, equipment enhancements, and refrigerant reuse.

(2) Units Requiring Repair - Conduct life-cycle cost studies to determine whether to repair existing CFC chillers or to convert to chillers using less environmentally adverse refrigerants such as HCFCs and HFCs which will extend the beneficial life of structurally sound units.

(3) Units Needing Replacement or New Units - No new CFC chillers will be purchased. HCFC and HFC chillers, absorption machines, and purchased chilled water are acceptable alternatives. The GSA's Facilities Standards for the Public Buildings Service (PBS/PQ-100) provides guidance on purchasing new chillers. All existing and emerging technologies that reduce the environmental impact and are cost effective shall be considered. Since the expected life of chillers is typically 25-35 years, the plan is to avoid unnecessary double capital investments in new chillers which would need to be replaced in a few years because of an accelerated phase out of current alternative refrigerants. As cooling technology develops, non ozone-depleting alternatives will be emphasized in procurement. When it has

been demonstrated that new technology is reliable and maintainable under field conditions this equipment will be the prototype and guide for additional installations.

C. COMPLIANCE - To the maximum extent practicable, comply with national codes, standards, and good engineering and operating practices. This compliance will accomplish attaining the "lowest achievable level" of ozone-depleting substances emissions and will maximize the reuse of such substance to meet the legislative and regulatory requirements and attain environmental objectives of reducing the loss of ozone-depleting substances.

D. COORDINATION - The complexity of the program and the impact on various program offices, it is necessary to ensure that there is good coordination in the overall program. While basic engineering and good operating practices are necessary for the program to succeed, knowledge of the applicable laws and regulations subject to change and rapid shifts in policy and requirements are critical to ensure that the program is accomplished in a successful manner. Close coordination of internal program offices and knowledge of external directives is needed to ensure compliance with the environmental objectives and awareness to changes in technology.

E. POLICY AND TECHNOLOGY CHANGES -Expected policy and technology changes during this transition period, it is necessary to keep current in areas such as acceptable refrigerants and potential alternatives, refrigerant phaseout dates, new and reprocessed refrigerant availability and procurement procedures, equipment standards and certifications, personnel training requirements, recycling and reclaiming requirements, chiller inventory, and required records.

F. REFRIGERANT MANAGER - A Facilities Refrigerant Manager is to be designated in each Area office to act as a focal point and coordinator of this program. The manager will act a liaison and provide assistance in program implementation. Coordination is necessary among design and construction, repair and alterations, safety and environment, and operations and maintenance programs.

3-4 MANAGEMENT PLAN

A. GENERAL - The refrigerant management plan is a comprehensive and proactive approach. The plan is designed to be flexible and responsive to meet changing technological developments and environmental concerns while complying with the legislative and regulatory requirements. Implementation of the plan will minimize the effects of ozone-depletion and global warming with respect to the use of building air conditioning equipment and systems. The refrigerant management program is multifaceted and encompasses the following six distinct areas:

(1) Chiller inventory;

(2) Operations and maintenance practices;

(3) Refrigerant containment;

(4) Safety of personnel;

(5) Refrigerant recovery, recycling, and reclamation, and

(6) Chiller repair or new chiller procurement.

The legislative regulation references provide information on the required procedures and actions. The general engineering standards provide the technical information and guidance needed to implement some of the operational and equipment aspects of the plan. Since these documents are subject to revisions and amendments, always use the current version. additional sources are to be added as appropriate. Action items and completion schedule to accomplish the plan are listed below. It is recognized that future laws will affect the plan, that EPA has not issued any regulations, and that new refrigerant developments, knowledge, and technology are rapidly changing during this transition period away from the more adverse ozone-depleting substances.

B. CHILLER INVENTORY

(1) The inventory is the primary information system for the general chiller management and is used to determine the current status and transition from the various refrigerants. Maintain a detailed current inventory and individual listing of each major piece of equipment used. This includes the various types such as centrifugal, screw, reciprocating, and absorption units and where applicable purchased chilled water. Small appliances such as household refrigerators, dehumidifiers, water coolers, window and package units inventories may be kept as aggregate total number, capacity, and by refrigerant type.

(2) Include in the database for the detailed listing information on manufacturer, model, serial number, capacity in tons, year installed, refrigerant type (CFCs, HCFCs AND HFCs) or absorber thermal source (purchased steam, building steam or hot water, or directly fired) or purchased chilled water, building number, and location. Additional data elements will be developed as necessary to provide oversight and program management capabilities. The Area office should maintain a master inventory. The inventory, from an overall program management perspective, will be used to:

a. Assess key chiller population inventory attributes,

b. Assess current refrigerant requirements,

c. Assess potential impact of legislation and regulations,

d. Determine management options and courses of action,

e. Provide policy guidance and technical assistance,

f. Provide budget estimates and replacement schedules

g. Assess the transition from high ozone and global warming refrigerants.

C. OPERATIONS AND MAINTENANCE PRACTICES - The operations and maintenance (O&M) practices are focused towards improvements in general chiller operations, preventive maintenance, material condition assessment inspections, and training which will provide for an efficient and reliable air conditioning service, reduce refrigerant loss, and protect and maintain the asset value of the equipment. General O&M guidance is contained in 40 CFR Part 82 Protection of Stratospheric Ozone, manufacture manuals, GSA guides, and the American Society of Heating, Air Conditioning, and Refrigerating Engineers (ASHRAE) Guideline 3 Reducing Emissions of Fully Halogenated Chlorofluorocarbon refrigerants in Refrigeration and Air Conditioning Equipment and Applications. The essential aspects of O&M practices include the following:

(1) General operations and equipment performance

a. Start-up and shutdown procedures

b. Operating temperature and pressure analysis

c. Operating instructions and manual availability/usage

d. Water treatment adequacy

(2) Preventive maintenance requirements

a. Refrigerant leak testing

b. Oil quality testing/moisture detection

c. Refrigerant quality testing

d. Hermetic electric motor insulation testing

f. Dynamic equipment vibration analysis

g. Non destructive heat exchanger/tube testing

(3) Records 40 CFR Subpart 82, Paragraph F-82.168 Reporting/Recordkeeping

a. Field office refrigerant record

b. Individual chiller usage log

c. Chiller operating log

d. Lubricating oil record

e. Refrigerant purchase, use, transfer, or reclaimed

f. Appliance and materials disposal record

(4) Orientation and training or personnel

a. Field office manager orientation and awareness

b. Mechanical maintenance technician training/awareness

c. Mechanical maintenance inspector training/awareness

d. Technician certification (where required)

(5) Contracted Services

a. Servicing, operations and maintenance, and repair

b. Inspection, testing, and evaluations

c. Recovery, recycling, and reclaiming of refrigerants

d. Disposal of appliances and materials

D. REFRIGERANT CONTAINMENT - Refrigerant containment are those minor modifications which will reduce the loss or the risk of loss of refrigerant during normal operations and maintenance practices and the servicing of the equipment for CFCs and HCFCs. The accomplishment of the modifications prevents the potential situations from occurring or reduces the situations where the conditions for large uncontrolled losses can occur. the refrigerant containment includes installing the equipment, where applicable, which will reduce the venting of refrigerant during normal operations or the loss of refrigerant during abnormal conditions. The essential refrigerant containment aspects include and where appropriate the following items:

(1) High efficiency purge

(2) Purge recovery unit

(3) Prevent vacuum/positive pressure system

(4) Refrigerant recovery/storage system piping and hoses

(5) On-line oil cleaning and filtering system

(6) Electrical power under voltage or loss of phase protection

(7) Mechanical resetting relief valve vice rupture disc

(8) Refrigerant access servicing and recovery apertures

(9) Equipment component refrigerant isolation valves

(10) No/low leak mechanical shaft seals

(11) Microprocessor-based controls and monitoring system

(12) Low loss fittings for hoses in portable equipment

E. PERSONNEL SAFETY - The safety phase relates to the protection of operating personnel. The intent is take those reasonable safeguards which minimize hazards to persons and property. these potential hazards are related to the refrigerant's physical and chemical characteristics such as toxicity and flammability and the equipment's operating pressures and temperatures. the primary applicable standards are Occupational Safety and Administration's Standards (OSHA) 29 CFR 1910 and 1926, and the American Society of Heating, Air Conditioning, and Refrigerating Engineers' (ASHRAE's) Standard 15 Safety code for Mechanical Refrigeration and Standard 34 Number Designation and Safety Classification of Refrigerants. The essential safety phase aspects include and where appropriate the following items:

(1) Material safety data sheets documentation (Posted and available)

(2) Chiller room sensing devices

a. Refrigerant vapor detector

b. Oxygen deprivation sensor

(3) Sensor activated alarm and ventilation system

(4) Self-contained breathing apparatus

(5) Automatic ventilation refrigerant evacuation system

(6) Relief and purge outdoors discharge piping

(7) Safe handling procedures for refrigerants

(8) Safe usage of recovery and reclaiming equipment

(9) General machinery room safety compliance

(10) General O&M safety awareness and practices

F. CHILLER REPAIR OR PROCUREMENT - This phase relates to the repair of existing chiller or the procurement of new chillers. The intent is to maximize the use of the existing physical plant chiller assets that are structurally sound either by remaining on the existing CFC chillers as an interim measure or converting them to less adverse refrigerants. A life-cycle cost analysis is to be performed. For new chillers, the intent is to acquire

energy efficient chillers which will be less environmentally adverse.

Essential aspects for consideration include:

(1) Life-cycle cost analysis to repair existing chillers

a. Repair cost or conversion cost

b. Refrigerant Phaseout schedule

c. Current refrigerant cost and alternative cost

d. Remaining chiller life

e. Scheduled work item or prospectus replacement date

f. Operations and maintenance costs (before and after)

g. Energy costs (before and after)

h. Enhanced chiller equipment costs

i. Chiller room (Sensor/alarm/ventilation) modifications

j. Construction cost (new chiller)

k. Utility company energy rebate if applicable

(2) Existing chiller conversion to alternate refrigerants

a. Computer analysis for energy and capacity trade-offs

b. Metal integrity/structural analysis-erosion/thinning

c. Driveline changes (compressor, motor, and speed gear)

d. Seals and electric motor changes

e. Economizer/orifice plate changes

(3) New Chillers

a. No Chlorofluorocarbon refrigerants (CFC's)

b. Low/no ozone depletion

c. Absorption chillers acceptable

d. Purchased chilled water acceptable

(4) HVAC System Upgrades and Consolidation

a. Chiller load requirements and available sizes

b. Projected building air conditioning growth

c. Other existing chillers (unit coolers or packaged)

d. Chilled and condenser water piping requirements

e. Refrigerant containment and handling requirements

f. Chiller room safety requirements

g. Electrical power requirements

(5) Site specific factors evaluation - Chiller load and duration, electrical power source, equipment space requirements, condenser and chilled water pumping and piping, cooling tower, and monitoring and control system.

EXHIBIT A
AREA SCHEDULE

ACTION ITEM	COMPLETION DATE
A. CHILLER INVENTORY	
(1) Annual update to Area Office	By June 30th
(2) When significant changes occur	As required
B. OPERATIONS AND MAINTENANCE	
(1) Operational Inspections	Ongoing
(2) Preventive maintenance requirements	
a. Develop/modify guide cards	7/3094
b. Implement guide cards	8/30/94
c. Revise craft workload documentation	9/3094
(3) Records and logs	
a. Develop/modify guide cards	7/30/94
b. Implement guide cards	8/30/94
(4) Orientation and training of personnel	
a. Field office manager orientation	1/15/94
b. Maintenance technician training	2/94
c. Mechanical inspector training	2/94
d. Technician Certification	FUTURE
(5) Operations and maintenance contracts	
a. Develop/modify specifications	2/94
b. Incorporate in solicitations	4/94
c. Review existing contracts for changes	3/94
C. REFRIGERANT CONTAINMENT	
(1) Identify containment modifications	2/94
(2) Implement containment modifications	5/94
D. PERSONNEL SAFETY	
(1) Identify safety requirements	1/94
(2) Implement safety requirements	3/94
E. REFRIGERANT RECOVER, RECYCLING, AND RECLAMATION	
(1) Identify requirements	Every 6 months
(2) Implement requirements	Every 2 years

F. CHILLER REPAIR OR PROCUREMENT — As Required

(1) Review building engineering reports, legislation, EPA regulations, and GSA policy.

(2) Evaluate converting when major repairs needed or when extending existing chiller beyond refrigerant phaseout.

(3) Procure new non-CFC chillers only.

G. GENERAL

(1) Designate an Area Refrigerant Coordinator — 1/93

(2) Budget submittal — As Required

a. Recovery equipment, detection equipment, chiller enhancements, and chiller room modifications.

b. Training and certification of employees.

c. Contract services requirements.