Environmental Standard Operating Procedures (ESOP)	
Stationary Refrigerant and Halon Operations (REF)	
Environmental Affairs: Air Resources (760)830-8480	Revised: 1 October 2023

Subj: STATIONARY REFRIGERANT AND HALON SYSTEM OPERATIONS AND MANAGEMENT

Ref: (a) 40 CFR 82, Subpart F and H
(b) Clean Air Act (CAA), Title VI, Section 604, 605, and 608
(c) 17 CCR (California Code of Regulations) Division 3, Chapter 1, Subchapter 10, Article 4, § 95371 to 95398

1. Purpose. This document provides environmental protection guidelines for stationary refrigerant and halon systems operations and management aboard the Marine Air Ground Task Force Command, Marine Corps Air Ground Combat Center (MAGTFTC, MCAGCC). For further references to MAGTFTC, MCAGCC in this document, the term installation will be used.

2. Application. This guidance applies to those individuals who work with refrigerant systems aboard the installation. This includes any person who installs, repairs, maintains, services, replaces, recycles, or disposes of a stationary refrigeration or air-conditioning appliance, or any person who reclaims refrigerants from any heating, ventilation, air-conditioning, and refrigeration (HVAC&R) appliance.

The installation uses HVAC&R systems to support its mission of national defense. Typical uses include comfort cooling, refrigeration, freezers, ice machines, drinking fountains, beverage dispensers, and chillers. Many of these systems use refrigerants that, upon release, contribute to ozone depletion and/or global warming. Because of this, refrigerants and halon are regulated as hazardous materials by the United States Environmental Protection Agency (USEPA) and California Air Resources Board.

The regulations apply to stationary, non-residential refrigerant systems containing more than 50 pounds of a high global warming potential refrigerant or ozone depleting substance. They require owners and operators of HVAC&R systems that contain ozone depleting substances and high global warming potential refrigerants to perform leak detection tests, leak rate calculations, recordkeeping, equipment registration, and repair/retrofit.

3. Procedures. Refrigerant and halon operations must be managed in accordance with the references. This ESOP identifies management, inspections, tracking, and reporting measures that must be implemented by personnel aboard the installation to restrict release of refrigerants identified as ozone depleting substances and substitute refrigerants, such as halons, R-22, R-134A, R-410A, and more.

4. Operational Controls. The following controls apply:

a. **Registration Requirements**: All systems with a full charge greater than or equal to 50 pounds (excluding those used solely for comfort cooling) must be registered in the Refrigerant Registration and Reporting System (R3). R3 is a web-based tool that is used to track refrigerant information, including system maintenance, inspections, leak testing and disposal. All commands managing HVAC&R systems in California must use the R3 to manage their program. R3 link: https://ssl.arb.ca.gov/rmp-r3/

b. **Leak Inspection Requirements:** All stationary systems with a full charge greater than 50 pounds must be regularly inspected for leaks. The frequency of inspection varies by the size of the system:

Small Charged Systems 50 lbs. < Charge < 200 lbs.	**Medium Charged Systems** 200 lbs. ≤ Charge < 2,000 lbs.	**Large Charged Systems** 2,000 lbs. ≤ Charge
Every 365 days or less	Every 90 days or less	Every 90 days or less for systems in a non-enclosed building.
If the refrigerant system is equipped with an automatic leak detection system, a leak inspection is ***not*** required.		All systems enclosed within a building must be equipped with an automatic leak detection system.
Conduct an annual inspection and calibration of any automatic leak detection systems.		

If the following incidents occur, a leak inspection must be conducted:

(1) Within 24 hours of an automatic leak detection system alert.

(2) Anytime 5 or more pounds of refrigerant is added to the system, or anytime more than 1 percent of the full charge is added to the system, whichever is greater; and

(3) Anytime oil residue is observed.

c. **Leak Rate Calculation:** A leak rate calculation is required each time refrigerant is added to a stationary refrigerant system. The leak rate can be calculated using the following formula:

$$\text{Leak Rate (\%/year)} = \frac{\text{lbs. refrigerant added}}{\text{lbs. refrigerant in full charge}} \times \frac{365 \text{ days}}{\text{\# days since last added or 365 days (whichever is smaller)}} \times 100\%$$

d. **Leak Repair and Testing Requirements:**

(1) Timeline: Refrigeration systems that have a refrigerant capacity of more than 50 pounds must have leaks fixed within 14 days of detection.

(2) Initial Verification Test: Conduct an Initial Verification Test upon completion of repairs and before any refrigerant is added or returned to the appliance.

(3) Follow-up Verification Test: After the Initial Verification Test has been conducted, conduct a Follow-up Verification Test when the system is at or has returned to normal operating characteristics and conditions. This must be performed within 10 days of the Initial Verification Test.

(4) Unsuccessful Initial or Follow-up Test: If either an initial verification test or follow-up verification test indicate that a leak is still present, attempt subsequent repair(s)/test(s) within the 14-day window. If the leak cannot be fixed within 14 days of detection, contact the Air Resources Manager, Environmental Affairs, (760)830-8480.

e. **Service Practices.** All appliances, regardless of size, must abide by the following requirements:

(1) Do not add high-GWP refrigerants to any appliance (including comfort cooling) that is known to have a leak, unless adding refrigerant for seasonal adjustment or to continue to operate in order to conduct a leak repair.

(2) Technician Certification: Any person who may perform service, maintenance, repair, or recovery work on refrigerant-containing equipment must be certified. Technicians and contractor technicians may only service equipment for which they are certified.

(a) The type of certification depends on the type of appliance:

Type of Maintenance/Equipment Type		**Certification Required**
Non-Motor Vehicle Air Conditioning (non-MVAC)	Small Appliances (≤5 lbs of refrigerant)	Section 608 - Type I
	Medium, High, or Very-High Pressure	Section 608 - Type II
	Low-Pressure	Section 608 - Type III
MVAC (e.g., passenger cars and trucks)		Section 609
MVAC-like (e.g., military vehicles)		Section 609 or Section 608 - Type II
All types of equipment		Section 608 – Universal

(b) Maintain a copy of the certification at the place of business. This must be kept on-site until 3 years after the technician is no longer working as a technician.

(3) Venting Prohibition: No person shall intentionally release (vent) refrigerants into the atmosphere while maintaining, servicing, repairing, or disposing of HVAC&R equipment.

(4) Evacuation Requirements: Technicians are required to evacuate refrigerant to established vacuum levels prior to opening or disposing of the appliance. Evacuation requirements can be found in the Frequently Asked Questions or in Reference (a).

(5) Recovery and Disposal: All recovery and recycling shall be conducted using certified recovery equipment. Recovered refrigerants as well as the filters used in the recovery process must be collected, stored, and disposed of through the EA Hazardous Waste Program. No sales or contractual exchanges are allowed.

5. Documentation and Record Keeping. Records must be kept for at least 5 years for all stationary appliances with ≥ 50 pounds of refrigerant (including comfort cooling). The following records must be maintained:

a. Technician Certifications

b. Appliance Inventory (for systems with > 50 lbs refrigerant)

c. Refrigerant Inventory, including the following:
   i. Invoices for all refrigerant purchases
   ii. Shipment records for refrigerants

d. Service Records, including the following:
   i. Leak detection, inspection, and repair data
   ii. Leak rate calculations
   iii. Repair extension requests
   iv. Chronically leaking appliance reports (anytime an appliance leaks 125% or more of its full charge in a calendar year, this **must be reported to EPA)**

   NOTE: The attached Refrigeration and Cooling System Maintenance Recordkeeping Form satisfies requirements d(i) and (ii).

e. Retrofit/Retirement plans

6. Training. All affected personnel must be trained in this document and the following:

a. General Environmental Awareness Training

b. CAA Section 608 Certification

c. Refrigerant Management Program | Frequently Asked Questions (FAQ)

7. Emergency Preparedness and Response Procedures. Refer to the spill response procedures listed in the Abatement ESOP.

8. Inspection and Corrective Action. Periodically review records to ensure that the documentation and recordkeeping requirements are satisfied.

Refrigerant Management Program
Frequently Asked Questions

What information do I need on my Appliance Inventory?

The inventory must include the following:

- Date of initial installation.
- Physical location of equipment (Building #).
- Equipment type.
- Manufacturer/Manufactured Year.
- Model Number.
- Serial Number.
- Temperature Classification (low, medium, or other).
- Refrigerant Type; and
- Full charge of each circuit on the appliance.

What records do I need for my Refrigerant Inventory?

The total weight in pounds of each type of refrigerant must be provided for the following:

- Purchased during the calendar year (recommend saving purchase orders).
- Charged into refrigeration system during the calendar year.
- Recovered from refrigeration system during the calendar year.
- Stored in inventory at the facility on the last day of the calendar year; and
- Shipped for reclamation and destruction during the calendar year.

What Service and Leak Repair Records must I maintain?

Each time an appliance is maintained, serviced, repaired, or disposed of, the following must be documented:

- The identity and location of the appliance.
- The date of the maintenance, service, repair, or disposal performed.
- The part(s) of the appliance being maintained, serviced, repaired, or disposed.
- Description of service provided (e.g., leak inspection, leak repair, other).
- The amount in pounds and type of refrigerant added/removed, if any.
- Purpose of adding refrigerant (e.g., leak repair, topping off, initial refrigerant charge, or seasonal adjustment).
- Technician name, certification type and identification number; and
- The full charge of the appliance.

If a leak is detected, the following must also be recorded:

- Date leak detected.
- Date leak repair was completed.
- Cause of leak (e.g., compressor, pipping, condenser, etc.).
- Location of each leak detected.
- The leak rate (include the calculation).
- The leak detection method (e.g., bubble test, leak detection device, electronic/ultrasonic).
  Note that this is not applicable when disposing of the appliance, following a retrofit, installing a new appliance, or if the refrigerant addition qualifies as a seasonal variance.
- Description of leak repair.
- Initial verification test date.
- Follow-up verification test date.
- Type(s) of test used; and
- Results of said test.

The *Refrigeration and Cooling System Maintenance Recordkeeping Form* satisfies the above requirements.

If a system is equipped with an automatic leak detection, the installation, annual audit, and calibration of the system must be recorded and maintained for the life of the system.

Refrigerant Management Program
Frequently Asked Questions

What are the Evacuation Requirements?

Prior to opening or disposing of appliances, technician must first empty equipment to the levels in the table below:

Required Levels of Evacuation for Appliances (40 CFR § 82.156)			
Type of Appliance	Appliance Capacity	Inches of Hg vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)	
		When using recovery and/or recycling equipment manufactured before November 15, 1993	When using recovery and/or recycling equipment manufactured on or after November 15, 1993
Very high-pressure appliance	> 5 lbs	0	0
High-pressure appliance, or isolated component of such appliance	< 200 lbs	0	0
	≥ 200 lbs	4	10
Medium-pressure appliance, or isolated component of such appliance	< 200 lbs	4	10
	≥ 200 lbs	4	15
Low-pressure appliance	> 5 lbs	25 mm Hg absolute	25 mm Hg absolute
Small Appliances (≤ 5 lbs) – all refrigerant types	≤ 5 lbs	80% or 4 mm Hg absolute	90% (if compressor is operating), 80% (if compressor is not operating), or 4 mm Hg absolute

Refrigerant phase-out related questions:

1) Am I allowed to continue using equipment that contains a banned refrigerant (e.g., R-22)?

Yes. The EPA and CARB do not require facilities to replace existing systems prematurely.

2) Can existing equipment containing R-22 (or other banned refrigerants) still be serviced?

Yes, R-22 can be used to service existing equipment. You must use stockpiled, recycled, or reclaimed R-22 to do so. Note that servicing includes replacing failed components.

3) What are the recommended alternatives to banned refrigerants?

The EPA's Significant New Alternatives Program (SNAP) maintains a list of approved alternative refrigerants (this list is consistently updated). The type of substitute alternative refrigerant depends on the equipment end-use (e.g., air conditioning, chillers, refrigeration, etc.).

List of Substitutes based on End-Use: https://www.epa.gov/snap/substitutes-refrigeration-and-air-conditioning
List of Unacceptable Substitutes: https://www.epa.gov/snap/unacceptable-substitute-refrigerants

4) When should I replace the equipment or convert it to an approved refrigerant?

There is no immediate need to change, but banned refrigerant supplies will start to dwindle and prices may rise. When you transition, you will have three options:

1) Continue to operate existing system.
2) Convert the existing system (retrofit it with a SNAP-approved refrigerant). Not all systems can be converted for use with an approved refrigerant; confirm with the equipment manufacturer that it can be done.
3) Retire and replace the system. This is recommended when a system is leaking or approaching the end of its life.

See *Refrigerant Phase-Out Cheat Sheet* for more information.

Refrigerant Phase-Out Cheat Sheet

Refrigerant Phase-out Schedule

The production and import of hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) is slowly being restricted until it is completely banned. This phase-out will not directly impact servicing and maintenance of existing systems; once the Effective Date has been reached, a facility can use recovered, reclaimed, or stockpiled refrigerants in existing systems for as long as necessary. In addition, the EPA/CARB does not require facilities to replace existing systems prematurely. However, it is recommended that facilities gradually replace systems with ones that utilize approved alternative refrigerants.
(Regulation: 40 CFR 82)

Refrigerant	Type	Ozone Depletion Potential	Global Warming Potential[2]	Effective Date for 100% Ban on Production and Import
R-22 (and all blends that contain R-22)	Class II (HCFC)	0.055	1,810	January 1, 2020
R-123	Class II (HCFC)	0.02	77	January 1, 2030
R-134a	HFC (Substitute)	0	1,430	January 1, 2030
R-401a	Blended HFC[1]	0.037	1,182.48	January 1, 2020
R-404a (R-22 substitute)	Blended HFC	0	3,921.60	January 1, 2030
R-407c (R-22 substitute)	Blended HFC	0	2,107	January 1, 2030
R-410a (R-22 substitute) (A.K.A. Freon)	Blended HFC	0	2,087.50	January 1, 2030
R-507a	Blended HFC	0	3,985	January 1, 2030
all HCFCs/HFCs	--	--	--	January 1, 2030

1) Refrigerant blends that contain R-22 are subject to the same rules.
2) Source: https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants

Prohibited Substances in New Stationary HVAC&R Equipment Schedule

Do not sell, lease, rent, install, or use any equipment listed below if it is manufactured after the Effective Date.
(Regulation: 17 CCR 95371-95379)

General End Use	Specific End Use	Prohibited Substances	Effective Date
New Air Conditioning Equipment (residential and nonresidential):	Room/wall/window air conditioning equipment, PTACs, PTHPs, portable air-conditioning eqpt, and residential dehumidifiers	Refrigerants with a GWP of 750 or greater	January 1, 2023
	Other air-conditioning equipment		January 1, 2025
	Variable refrigerant flow system		January 1, 2026
New Chillers	Air conditioning	Refrigerants with a GWP of 750 or greater	January 1, 2024
	Designed for chilled fluid leaving the chiller at temps > 35°F		
	Designed for chilled fluid leaving the chiller at temps > -10°F and < 35°F	Refrigerants with a GWP of 1,500 or greater	
	Designed for chilled fluid leaving the chiller at temps > -58°F and < 10°F	Refrigerants with a GWP of 2,200 or greater	
New Refrigeration Equipment	Refrigerant systems with > 50 lbs refrigerant	Refrigerants with a GWP of 150 or greater	January 1, 2022

REFRIGERATION AND COOLING SYSTEM MAINTENANCE RECORDKEEPING FORM

Please complete all applicable sections whenever ***refrigerant is added to a refrigeration or cooling system with over 50 lbs of refrigerants, a leak inspection is conducted, or refrigerant of 5 lbs or greater is disposed.***
Return completed form to Refrigerant Program Manager (Air Resources Program, Environmental Affairs) as applicable.

SECTION I - TECHNICIAN INFORMATION

Company/Organization: _____ **Tech. EPA Cert. #:** _____
Name of Technician: _____ **Certification Type:**
Name of Apprentice: _____ Universal Type I Type II Type III (circle one)
Work Order #: _____ **Phone Number:** _____

SECTION II - UNIT INFORMATION

Date of Service: _____ **Building Number:** _____
Unit Serial Number: _____ **Full Charge of Appliance:** _____ lbs oz (circle units)

Type
☐ **Industrial** - N/A to MCAGCC — E.g.: Manufacturers of food products, agricultural, medical, chemical
☐ **Commercial** — E.g.: Refrigerated warehouses or storage facilities
☐ **Comfort Cooling** — E.g.: Air conditioning, chillers
☐ **Other**

SECTION III - TYPE OF SERVICE

Type of Service: ☐ **Preventative Leak Maintenance** ☐ **Leak Repair** ☐ **Other:** _____

New Refrigerant Added: Y ☐ N ☐ *If yes (and equipt. has more than 50 lbs refrigerant), leak rate must be calculated in SECTION IV*
Amount (lb): _____ Purpose: _____

Refrigerant Recovered: Y ☐ N ☐ Refrigerant Type: _____
Amount (lb): _____

Recovery System, if used: Manufacturer: _____ Model: _____

Periodic Leak Test:
☐ **Quarterly** (every 90 days or less) — Required if Full Charge is 200-1999 lb, or if Leak Rate for Commercial > 500 lbs
☐ **Annual** (every 365 days or less) — Required if Full Charge is 50-199 lbs, or if Leak Rate for Comfort Cooling ≥ 50 lbs
☐ **N/A** — Not required if equipment is equipped w/an Automatic Leak Detection System

Leak Test Method: ☐ Leak Detector ☐ Bubble Test ☐ Other: _____

Leak Detected? Y ☐ N ☐ *If yes, leak must be repaired within 14 days and SECTION V must be filled out*

Refrigeration System Disposed ☐ **Disposal Location:** _____

SECTION IV - LEAK RATE

This section **MUST** be filled out every time refrigerant is added

(_____ **Refrigerant Added (lbs)** ÷ _____ **Full Charge (lbs)**) × (365 **days / year** ÷ _____ **# of days since last added refrigerant**) × 100% = _____ **% / year**

Does the Leak Rate exceed the Chronic Leak Rate (125%)? Y ☐ N ☐

If yes, date reported to Environmental Affairs: _____

Federal Leak Rates:
Industrial - 30%
Commercial - 20%
Comfort Cooling/Other - 10%

SECTION V - LEAK TESTING

This section **MUST** be filled out if leak was detected and fixed

Date Leak Fixed: _____ *Leak must be fixed within 14 days of detection*

Initial Leak Verification Test: ☐ **Pass** ☐ **Fail** ☐ **N/A**

Follow-Up Test Date: _____ *Schedule within 10 days after system is at normal operating conditions*

Follow-Up Leak Verification Test: ☐ **Pass** ☐ **Fail** ☐ **N/A**

SECTION VI - DESCRIPTION OF SERVICE & COMMENTS

Date of leak detection, location and cause of leak, description of repairs, or any additional comments: