CRITERION 408

EPA COMPLIANCE FOR REFRIGERATION EQUIPMENT

SIGNATURES

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RECORD OF REVISIONS

Revision No.	Date	Description
0	1/21/1999	Initial Issue
1	5/19/2003	Reformatting following O&M Criterion 101, "Writer's Guide"

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1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for EPA Compliance while maintaining Refrigeration Equipment at LANL. Title VI of the Clean Air Act mandates the phased out elimination of ozone depleting chemicals and requires controls on operations, maintenance, and disposal to prevent venting ozone depleting refrigerants to atmosphere. This criterion establishes the necessary maintenance practices to meet regulatory requirements.

This document addresses the requirements of LIR 230-05-01(Ref 10.1), "Operations and Maintenance Manual."

Implementation of this Criterion satisfies DOE Order 430.1A (Ref 10.2) for the subject equipment / system. DOE Order 430.1A (Ref 10.2) "Life Cycle Asset Management," Attachment 2 "Contractor Requirements Document," Paragraph 2, Sections A through C, which in part requires UC to "…maintain physical assets in a condition suitable for their intended purpose," and employ "preventive, predictive, and corrective maintenance to ensure physical asset availability for planned use and/or proper disposition." Compliance with DOE Order 430.1A is required by Appendix G of the UC Contract.

2.0 SCOPE

The scope of this Criterion includes all LANL appliances, which contain and use a Class I or II substance as a refrigerant. This Criterion does not address corrective maintenance actions required to repair or replace equipment. This criterion does not apply to motor vehicle air conditioners.

3.0 ACRONYMS AND DEFINITIONS

3.1 Acronyms

ACIS	Automated Chemical Inventory System
CFR	Code of Federal Regulations
DOE	Department of Energy
EPA	Environmental Protection Agency
LIG	Laboratory Implementing Guidance
LIR	Laboratory Implementing Requirement

LPR	Laboratory Performance Requirement
O&M	Operations and Maintenance
PPE	Personal Protective Equipment
PP&PE	Personal Property and Programmatic Equipment
RP&IE	Real Property and Installed Equipment
SSC	Structures, Systems, and Components
UC	University of California

3.2 Definitions

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

Approved Equipment Testing Organization. Any organization, which has applied for and received approval from the EPA Administrator to test recycling and recovery equipment.

Certified Refrigerant Recovery or Recycling Equipment. Equipment manufactured on or after November 15, 1993, certified by an approved equipment testing organization to meet EPA's standards, equipment certified pursuant to 40 CFR 82 Subpart B, or equipment manufactured before November 15, 1993 that meet's EPA's performance requirements.

Class I Substance. Any ozone-depleting substance designated as Class I in 40 CFR Part 82, "Stratospheric Ozone Protection," Subpart A, "Production and Consumption Controls" Appendices A & B, including chloroflourocarbons, halons, hydrobromoflourcarbons, and any other substance designated by EPA at a later date.

Class II Substance. Any ozone-depleting substance designated as Class II in 40 CFR Part 82, Subpart A, Appendices A & B, including hydrochloroflourocarbons and any other substance designated by EPA at a later date.

Disposal. The process leading to and including:

- The discharge, deposit, dumping or placing of any discarded appliance into or on any land or water.

- The disassembly of any appliance for discharge, deposit, dumping or placing of its discarded component parts into or on any land or water; or
- The disassembly of any appliance for reuse of its component parts.

High-Pressure Appliance. Means an appliance that uses a refrigerant with a boiling point between minus 50 and 10 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes, but is not limited to, appliances using refrigerant R-12, R-22, R-114, R-500, or R-502.

Low-Pressure Appliance. An appliance that uses a refrigerant with a boiling point above 10 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to equipment using refrigerant R-11, R-113, or R-123.

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

MVAC-Like. Any appliance used in a mechanical vapor compression, open-drive compressor appliance used to cool the drivers or passenger's compartment of a non-road vehicle.

Ozone Depleting Substance (ODS). Substances controlled under Title VI of the Clean Air Act Amendments, whether existing alone or in a mixture. For the purpose of phasing out these materials, these substances are divided into two classes, Class I and Class II, according to their ozone-depleting potential. Note: Class I substances have a higher ozone-depleting potential than Class II substances and, therefore, will be phased out more quickly.

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

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

Suitable Replacement Refrigerant. A refrigerant that is acceptable under 40 CFR 82 Subpart G, compatible with other materials with which it may come into contact, and able to achieve the temperatures required for the affected industrial process in a technically feasible manner.

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

Very High-Pressure Appliance. An appliance that uses a refrigerant with a boiling point below minus 50 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to equipment utilizing refrigerants R-13 or R-503.

4.0 RESPONSIBILITIES

4.1 FWO- Maintenance and Systems Engineering (MSE)

4.1.1 FWO-MSE is responsible for the technical content of this Criterion and monitoring the applicability and the implementation status of this Criteria and either assisting the organizations that are not applying or meeting the implementation expectations contained herein or elevating their concerns to the director(s).

Basis: LIR 301-00-01.11; Issuing and Managing Laboratory Operations Implementation Requirements and Guidance, Section 5.4, OIC Implementation Requirements.

4.1.2 FWO-MSE shall provide technical assistance to support implementation of this Criterion.

4.2 Facility Manager

4.2.1 Responsible for operations and maintenance of institutional, or Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

4.2.2 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document that may be assigned to the FM in accordance with the FMU-specific Facility/Tenant Agreement.

4.3 Group Leader

4.3.1 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document, which are under their jurisdiction.

4.3.2 Responsible for system performance analysis and subsequent replacement or refurbishment of assigned PP&PE.

4.4 Authority Having Jurisdiction (AHJ) – Mechanical POC for LANL Engineering Manual

4.4.1 The AHJ is responsible for providing a decision on a specific technical question regarding national, state and local codes and DOE orders.

4.5 RRES-MAQ – Risk Authorization and Environmental Stewardship – Meteorology and Air Quality

4.5.1 Provide technical support to Facility Managers, Group Leaders, and F-9. Maintain the air-operating permit with the State of New Mexico.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. A compilation of all applicable precautions shall be contained in the implementing procedure(s) or work control authorization documents. The following precautions are intended only to assist the author of a procedure or work control document in the identification of hazards/precautions that may not be immediately obvious.

5.1.1 Penalties and sanctions for Clean Air Act violations can be severe. In addition to fines and/or imprisonment, the EPA (Environmental Protection Agency) may exclude violating companies from receiving Federal Government contracts.

5.1.2 No person maintaining, servicing, repairing, or disposing of equipment may knowingly vent or otherwise release into the environment any class I or class II substance used as refrigerant in such equipment. De-minimus releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition.

5.1.3 Ensure safe maintenance and operations with refrigerants by following applicable codes, standards, and regulations. ANSI/ASHRAE 15, Safety Code for Mechanical Refrigeration, and Material Safety Data Sheets (MSDS) are the principal sources of hazard information.

5.2 Limitations

The intent of this Criterion is to identify the minimum generic requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.).

Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities shall implement the requirements of DOE Order 4330.4B (Ref. 10.3) (or 10 CFR 830.340, Maintenance Management, when issued) as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order or CFR identified above.

6.0 REQUIREMENTS

Minimum requirements that Criterion users shall follow are specified in this section. Requested variances to these requirements shall be prepared and submitted to FWO-MSE in accordance with LIR 301-00-02 (Ref. 10.4), "Variances and Exceptions to Laboratory Operations Requirements," for review and approval. The Criterion users are responsible for analysis of operational performance and SSC replacement or refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgement, safety matters, and operations and maintenance experience drive the requirements contained in this section.

6.1 Operations Requirements

6.1.1 Refrigerants shall be purchased through either JIT, the Gas Plant or offsite vendors and entered into the Automated Chemical Inventory System. Refrigerants shall be controlled so that they are available only to certified technicians.

Basis: LIR 402-510-01.0, Section 5.1.2 Chemical Management

6.1.2 Equipment owners shall develop an accurate inventory of equipment containing Class I or Class II refrigerants. This inventory shall include the appliance identification number, refrigerant type (e.g., R-11, R-12, etc.), the full charge capacity of the system, and the appliance duty type (industrial process, comfort cooling, or commercial). Use RRES-MAQ procedure RRES-MAQ-311 R4, Refrigeration Equipment Inventory, to perform your inventory. Available from the RRES-MAQ web site at: http://www.airquality.lanl.gov/QA.htm)

6.2 Maintenance Requirements

6.2.1 Technicians servicing air conditioning and refrigeration equipment shall be certified for the type of work performed.

6.2.2 Maintaining, servicing, repairing or disposing of refrigeration appliances must be performed and documented in accordance with 40 CFR 82 Subpart F. These requirements are contained in RRES-MAQ procedures RRES-MAQ-312 R5, Addressing Air Quality Requirements during Maintenance, Service, Repair, and Disposal of Refrigeration Appliances. Available at: http://www.airquality.lanl.gov/QA.htm .

Basis: 40 CFR82, Subpart F

6.2.3 All refrigerant recovery and/or recycling equipment must be certified by an EPA-approved testing organization if manufactured on or after November 15, 1993. Equipment manufactured before this date must meet EPA criteria.

6.2.4 Equipment containing 50 or more pounds of Class I or Class II refrigerant must have leaks repaired when:

- Annual leak rate exceeds 15% of full charge capacity for comfort cooling appliances.
- Annual leak rate exceeds 35% of full charge capacity for industrial process and commercial cooling appliances.

Leaks must be repaired within 30 days for comfort/commercial cooling, and 120 days for industrial process cooling when an industrial process shutdown must occur.

If leaks cannot be repaired, a dated retrofit / retirement plan must be developed. This plan must be in place within 30 days of discovering the leak and the system must be retired / retrofitted within one year.

With prior EPA approval, additional time may be available to repair leaks or to retire/retrofit systems. Contact RRES-MAQ for further guidance.

New and/or replacement refrigerants must be on EPA's list of acceptable substitutes for their intended use. EPA maintains a list of acceptable refrigerants on their web site at: http://www.epa.gov/ozone/title6

Basis: 40 CFR 82 Subpart F

6.2.5 Records of accidental refrigerant releases must be maintained:

- Record date, facility, equipment ID, and facility owner
- Provide general description of how and why accidental release occurred
- Record type of refrigerant released and estimate amount
- Sign and date the accidental refrigerant release record.

Basis: 40 CFR 82 Subpart F, RRES-MAQ - 312, R5

7.0 RECOMMENDATIONS AND GOOD PRACTICES

The information provided in this section is recommended based on acceptable industry practices and should be implemented by each user based on his/her unique application and operating history of the subject systems/equipment.

7.1 Operations Recommendations

7.1.1 Obtain type IV (Universal) certification for maintenance personnel. This allows service for all types of equipment.

7.1.2 Facility Managers and their designees responsible for Maintenance and Operations of refrigeration equipment should be familiar with 40 CFR 82, Subpart F.

7.1.3 Good operating chillers will leak less than 5% of refrigerant charge per year. Purging will consume about 10% of refrigerant charge per year.

7.2 Maintenance Recommendations

7.2.1 Obtain state of the art leak detection equipment and make routine leak detection part of the Facility Inspection Program.

Basis: 40 CFR 82 Subpart E

8.0 GUIDANCE

8.1 Operations Guidance

8.1.1 RRES-MAQ-311, R4 (Refrigeration Equipment Inventory) provides Guidance for establishing a refrigerant inventory.

8.2 Maintenance Guidance

8.2.1 RRES-MAQ-312, R5 (Addressing Air Quality Requirements during maintenance, service, repair, and disposal of refrigeration appliances/equipment provides guidance for refrigerant maintenance programs.

8.2.2 Provided it has been reviewed and approved by FWO-MSE, an acceptable program for air conditioning and refrigeration systems can be found in KSL PMI 40-40-001 (Ref. 10.11)

9.0 REQUIRED DOCUMENTATION

Maintenance History, Refrigerant Inventories and equipment disposal records shall be maintained, as a minimum, according to the parameters listed in the Table 9-1 below:

Table 9-1 Documentation Parameters

MAINTENANCE HISTORY DOCUMENTATION PARAMETERS				
PARAMETER	**ML 1**	**ML 2**	**ML 3**	**ML 4**
Refrigerant Equipment/Appliance Inventory (Appendix A)	**X**	**X**	**X**	**X**
Refrigerant Equipment Service Records (Appendix B)	**X**	**X**	**X**	**X**
Refrigeration Appliance Salvage/Disposal Log (Appendix C)	**X**	**X**	**X**	**X**

Basis: Documentation of the parameters listed in Table 9-1 above satisfies the requirements of LPR 230-07-00, Criteria 2, (Ref. 10.5) which states; “Maintenance activities, equipment problems, and inspection and test results are documented.”

NOTE: RRES-MAQ-312, R5 and RRES-MAQ-311, R4 provides instructions on filling out the forms.

10.0 REFERENCES

The following references, and associated revisions, were used in the development of this document.

10.1 LIR 230-05-01.0, Operation and Maintenance Manual.

10.2 DOE O 430.1A, Attachment 2 "Contractor Requirements Document" (Paragraph 2, Sections A through C), a requirement of Appendix G of the UC Contract.

10.3 DOE Order 4330.4B, Maintenance Management Program, Section 3.4.9.

10.4 LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.

10.5 LPR 230-07-00, Maintenance History, Performance Criteria [2].

10.6 RRES-MAQ-311, Refrigeration Equipment Inventory

10.7 RRES-MAQ-312, Addressing Air Quality Requirements during Maintenance,

10.8 Service, Repair, and Disposal of Refrigeration Appliances

10.9 RRES-MAQ-313, Addressing Air Quality Requirements during Maintenance,

10.10 Service, Repair, and Disposal of Small Refrigeration Appliances

10.11 KSL PMI 40-40-001, Air Conditioning and Refrigeration Systems

11.0 APPENDICES

Appendix A:
Appendix B:
Appendix C:

APPENDIX A

Meteorology and Air Quality Group, MAQ

Refrigeration Appliance/ Equipment Inventory Form

This form is from RRES-MAQ-311

Complete ALL sections of the form. If a section is not applicable, enter "N/A" or provide additional information as to why information cannot be provided.

Facility Owner:	**Division:**	**FMU:**	**Refrigerant Type:**	
Facility (TA-Bldg-Room):			**Method Used to Determine Charge:** ☐ The appliance manufacturer's determination of the correct full charge for the appliance. ☐ By appropriate calculations based on component sizes, density of refrigerant, volume of piping, and all other relevant considerations. ☐ By the use of actual measurements of the amount of refrigerant added or evacuated from the appliance (certified refrigerant tech only).	
Appliance/Equipment ID: (E.g., CWR-001, RUA-009, etc.)				
Programmatic Equipment? (not owned or operated by FMU)	☐ **Yes** ☐ **No**			
Circuits and refrigerant charges:	**1: lbs:** _____ **oz:** _____	**2: lbs:** _____ **oz:** _____	**3: lbs:** _____ **oz:** _____	**4: lbs:** _____ **oz:** _____
Location: (E.g., basement, computer room, etc.)			**Comment:**	
Appliance Type: (E.g., split system, chiller, HVAC, etc.)			**Date Installed:**	**By:**
Manufacturer:			**Status:** ☐ **Operational** ☐ **Non-Operational**	
Model:				
Serial Number:			**Required Certification Level:** ☐ **I** ☐ **II** ☐ **III**	
Duty Type: (see definitions in procedure)	☐ **Comfort Cooling** ☐ **Industrial Process** ☐ **Commercial** ☐ **Other**		**General Notes:**	
Refrigerant Charge Range:	☐ **≥50 lbs** ☐ **>5 to 49 lbs** ☐ **≤5 lbs**			
Cooling Capacity:	☐ **BTUH** ☐ **Tons**		**Upgrade and Retrofit Notes:**	
Lubricant: (E.g., mineral oil, Oil 22, etc.)				
Volts/Phase/Hz:				

_____ Signature

_____ Printed name

_____ Z-Number

____/____/____ Date

Forward completed form to RRES-MAQ Meteorology and Air Quality Group.

APPENDIX B

Meteorology and Air Quality Group, MAQ

Refrigerant Support Services Subcontractor Service Order Form

This form is from procedure RRES-MAQ-312

Section 1.0 Work Order Information

Work Order #: _____ **Task #:** _____

Begin Work Date: ___/___/____ **Date work completed:** ___/___/___

Section 2.0 Facility Information

Division: _____ **FMU:** _____

TA: _____ **Bldg.:** _____ **Room:** _____

Facility Contact:

Section 3.0 Appliance/Equipment Information

Appliance/equipment ID: _____ **Circuit 1** ☐ **Circuit 2** ☐ **Circuit 3** ☐ **Circuit 4** ☐

Manufacturer: _____

Model No.: _____ **Serial No.:** _____

Refrigerant Type: _____ ☐ **≥50 lbs** ☐ **>5-49 lbs** ☐ **≤5 lbs** **Charge:** _____ **lbs** _____ **oz**

Section 4.0 Service Information

Description of Service: Check appropriate box below. Attach description of work from work package.

☐ Confirm Charge ☐ New installation ☐ Upgrades ☐ Minor Maintenance ☐ Major Maintenance ☐ Preventive Maintenance

☐ Refrigerant/Oil removed for disposal (**evacuation label applied**) ☐ Refrigerant conversion to _____refrigerant

☐ Accidental Release (**Estimated Amount Released:** _____ **lbs** _____ **oz**) ☐ **LEAK REPORT**

Description: ☐ Attached description of work from work package **OR** ☐ describe below ☐ Attached Form 312 to work package

Section 5.0 Leak Information

Leaks

☐ Leak Tested by method: Elec./Soap Bubbles/Visual Other: _____
(circle one)

☐ Leak Found Date: ____/____/_____

Scheduled Date for Repair: ____/____/_____

☐ Leak Repaired Date: ____/____/_____

Days to Repair Leak: _____

☐ Initial Verification Test Date: ____/____/____ Method: _____

☐ Follow-up Test Date: ____/____/_____ Method: _____

☐ Trace Gas Used Type: _____ Cylinder ID: _____ Quantity: _____ lbs _____ oz

Leak Notes:

☐ Attach leak notes in description of work from work package, if NOT, describe below:

Oil Removed: _____ gallons Type of Oil: _____ Put into accumulation drum: _____

Section 6.0 Refrigerant Tracking Information

Cylinder ID/ACIS Barcode Number	Refr. Type	Amount Recovered*	Amount Added: Recovered Amount Added	Amount Added: New Amount Added
		lbs oz	lbs oz	lbs oz
		lbs oz	lbs oz	lbs oz
		lbs oz	lbs oz	lbs oz
		lbs oz	lbs oz	lbs oz
		lbs oz	lbs oz	lbs oz
			Total: lb oz	**Total:** lb oz

***Recovery Unit Information**

Recovery Unit ID: _____ **Vacuum Level:** _____ **inches/microns (circle one) Time Used:** _____ **hr** _____ **min Filter type:** _____

Section 7.0 Technician Certification

I hereby certify that maintenance, service, repair, and/or disposal was performed on the above listed refrigeration appliance/equipment in accordance with the required practices set forth in 40 CFR §82, Subpart F. For disposal, I certify that the refrigerant has been evacuated to the levels required in 40 CFR §82, Subpart F.

Certified Technician's Signature	Printed Name	Z Number	Date
_____	_____	_____	____/____/____

Date Received by Support Services Subcontractor RCC:	***Date Received by RRES-MAQ:***

Forward completed form to RRES-MAQ Meteorology and Air Quality Group.

APPENDIX C

Meteorology and Air Quality Group, MAQ

REFRIGERATION APPLIANCE SALVAGE/DISPOSAL LOG

This form is from procedure RRES-MAQ-312

Date of Disposal	Unit ID or Model Number	Serial Number	Salvage ID Number	Appliance Description	Refrig Type	Refrigerant Extracted lbs	Refrigerant Extracted oz	Recovery cylinder ID used	Recovery/ recycle Equip ID Used	Technician Information Z no.	Technician Information Initials	Date picked up by salvage contractor

I hereby certify that the recovery equipment was used properly and that refrigerant was evacuated to EPA's specified levels as set forth in 40 CFR 82, Subpart F.

Signature *Certified Refrigerant Technician* Print name Date

Forward completed form to RRES-MAQ Meteorology and Air Quality Group.