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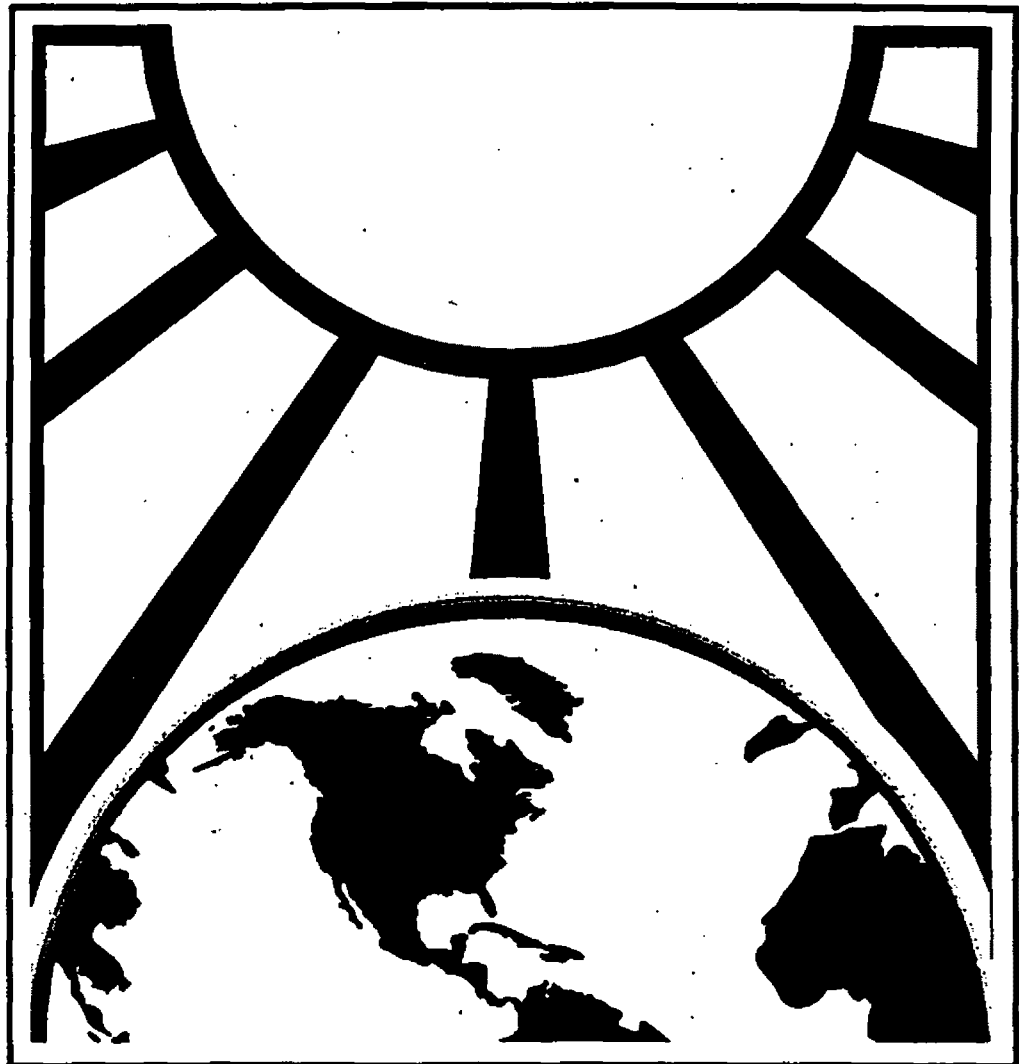
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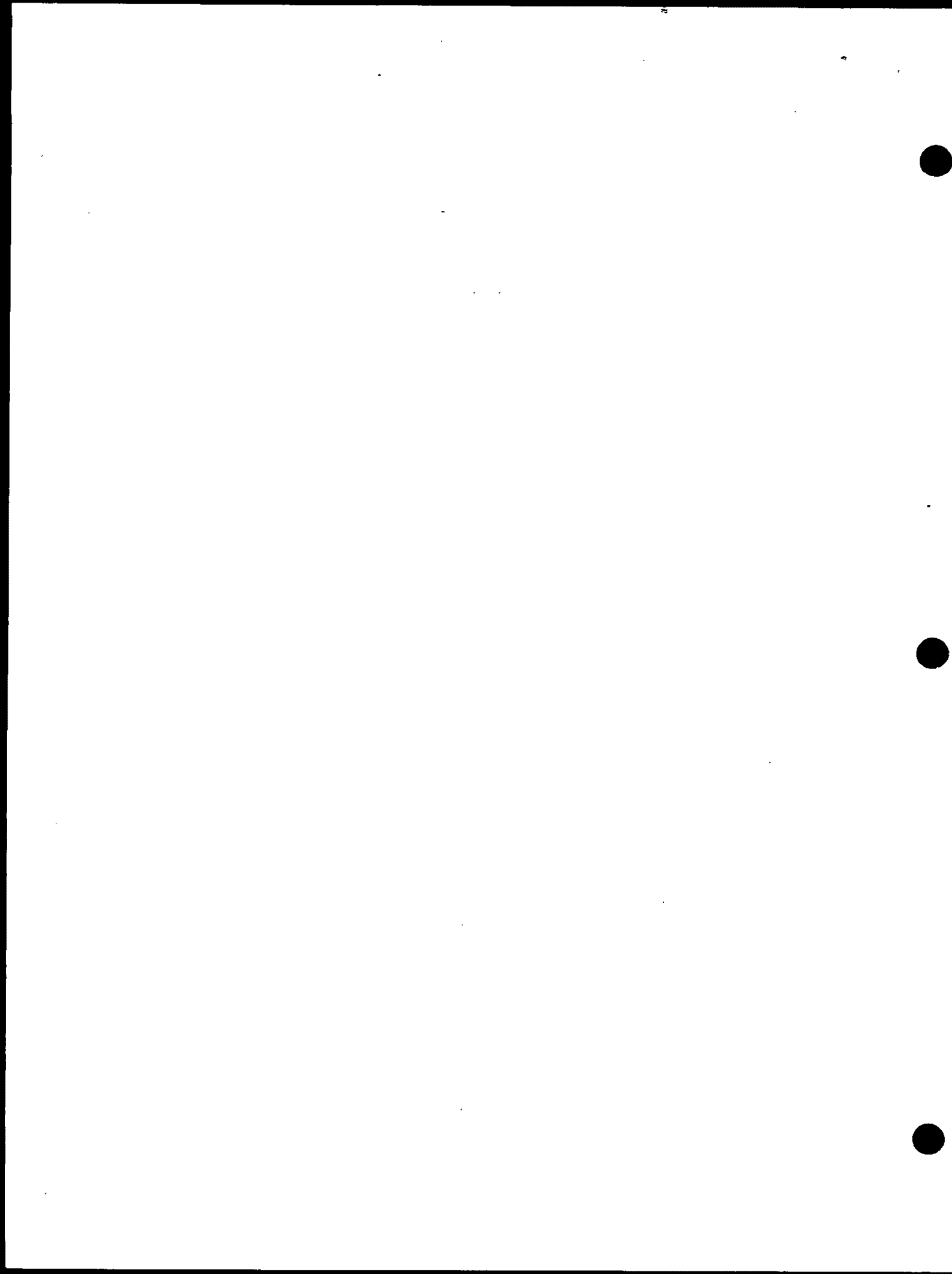


CHEMICAL  
MANUFACTURERS  
ASSOCIATION

# Compliance Guidance For Industrial Process Refrigeration Leak Repair Regulations Under Section 608 Of The Clean Air Act

U.S. EPA (3404)  
ATtn: SW  
Washington, DC 20460





***Compliance Guidance For  
Industrial Process Refrigeration  
Leak Repair Regulations  
Under Section 608  
Of The Clean Air Act***

***Prepared by:***

***The Chemical Manufacturers Association  
and  
The Environmental Protection Agency***

***October 1995***



## ACKNOWLEDGEMENTS

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## **A. OVERVIEW**



## A. OVERVIEW

### Purpose

The purpose of this guidance is to explain portions of the August 8, 1995, amendments to the leak repair provisions of the refrigerant recycling regulations (hereafter referred to as "the amendments") and assist those affected by these amendments in complying with them. The original refrigerant recycling regulations were published on May 14, 1993 (58 FR 28660). The amendments were issued by EPA on August 8, 1995, and became effective on September 7, 1995. The amendments make important changes to the leak repair rules and readers familiar with the original rule should review the amendments and this guidance carefully.

### Intended Audience

This guidance is intended for those persons who are responsible for their company or organization complying with the amendments. This may include plant engineers, maintenance supervisors, or maintenance technicians.

### What the Guidance Covers

This guidance is focused on aspects of the amendments relevant to *industrial process refrigeration* systems. All refrigeration systems, including *industrial process refrigeration*, are subject to various requirements of the refrigerant recycling regulations. Therefore, you should also read the amendments and other pertinent sections of those regulations.

### What the Guidance Does Not Cover

This guidance does not discuss:

- requirements for other types of refrigeration equipment; or
- provisions for federal facilities; or
- other aspects of the refrigerant recycling regulations (for example, equipment certification or rules for recovering or recycling refrigerant); or
- disposal of *appliances* containing ozone-depleting substances.

This guidance does not explain HOW to do everything required or permitted by the amendments, such as how to perform a leak test using an ultrasonic leak detector. The guidance assumes that its readers are properly trained in the various actions it describes.

If you are not sure how to do what the guidance recommends, consult with knowledgeable personnel in your company or organization.

Compliance with the portions of the refrigerant recycling regulations that are not covered by this guidance are very important. Severe penalties can be imposed for violation of these regulations. You should seek appropriate assistance if you have any questions regarding provisions of the regulations not covered here. The guidance contains a list of references, Module K, containing information on those provisions.

## **Compliance**

The policies set out in this document are not final agency action, but are intended solely as interpretive guidance. The guidance should not be used to replace the amendments; rather, it is intended as a supplement to explain their practical requirements. Compliance with this guidance generally should result in compliance with those aspects of the amendments that it covers.

Varying from the guidance does not necessarily mean that you will be in violation of the amendments. If you have any questions about whether or how you can depart from the guidance refer to the amendments, consult with counsel, or call the EPA Stratospheric Ozone Information Hotline (see next page).

## **How To Use the Guidance**

This guidance is organized by modules. Each module is a discrete section that covers an important aspect of the amendments. Although the modules are intended to be free-standing, we recommend that you review the entire document initially to understand the interrelationships of the amendments' various parts. Once you understand the various compliance options that the amendments present, the modules can be used as independent references.

Throughout the guidance, you will find words in italics. The italicized words are defined in the glossary (Module J). In each module, a Question and Answer section is provided to help clarify confusing issues or to answer commonly asked questions.

This guidance contains flow charts that illustrate the compliance options of the amendments. A simplified version follows at the end of this module. A more detailed version is contained in its entirety as an appendix at the end of this guidance document, showing, in detail, all the decision points and possible paths to follow to comply with the amendments.

**You should understand two important issues UP FRONT:**

1. The amendments contain several alternative pathways you can follow. Each one of these pathways has deadlines that are triggered by various actions. Once you start down one pathway, you may not be able to switch to another. **UNDERSTAND** the associated time frames before you choose a course of action.
2. The amendments require you to notify EPA of various events. **UNDERSTAND** these before you start, so you can make the appropriate notification(s) at the required time(s).

**For More Information**

Module K is a list of references containing more information about the amendments and the refrigerant recycling regulations generally.

EPA operates a Stratospheric Ozone Information Hotline that provides information about ozone protection regulations and requirements under Title VI of the Clean Air Act Amendments of 1990. The Hotline also serves as a distribution center and point of referral for an array of information pertaining to other general aspects of stratospheric ozone protection and depletion.

Number: 800-296-1996  
Hours of Operation: 10:00 a.m. - 4 p.m. Eastern time, Mondays to Fridays,  
excluding holidays.

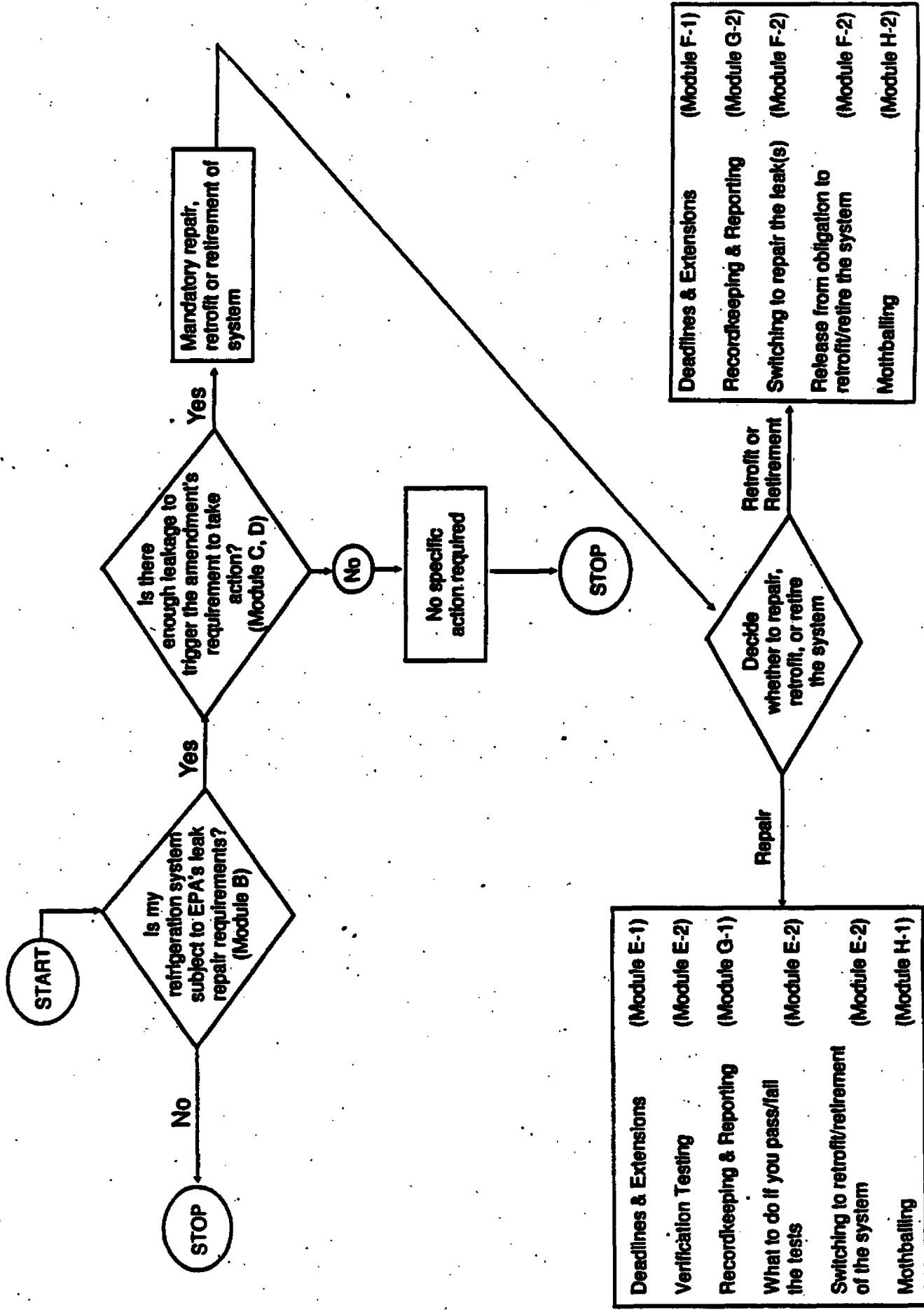
**Background**

The amendments pertain to the leak repair provisions of EPA's refrigerant recycling regulations. The refrigerant recycling regulations were called for by Congress as part of Title VI of the Clean Air Act Amendments of 1990. Title VI, entitled Stratospheric Ozone Protection, is generally directed toward eliminating the threat posed to the earth's protective stratospheric (or high-level) ozone layer by certain ozone-depleting substances (ODSs). Section 608 of the Act calls on EPA to publish rules regarding the use, recycling, and disposal of ODS in various applications, including *industrial process* and *commercial refrigeration* systems.

The original EPA rules on this subject (sometimes referred to within industry as the "no-venting rule") were published on May 14, 1993 (58 CFR. 28660). Several amendments have been made to the rule; please see Module K, References, for a complete list of the current amendments.

# General Summary Flowchart

EPA 300-B-95-010



## **B. APPLICABILITY**





In this guidance document, the term "systems" is used to refer to refrigeration *appliances* and equipment.

### Trigger Rates

For all systems that have a refrigerant charge of more than 50 pounds:

SYSTEM	RATE
commercial refrigeration	35%
industrial process refrigeration	35%
Comfort cooling	15%
All other refrigeration	15%

## B. APPLICABILITY

### Affected Operations

*Industrial process refrigeration* is defined as complex, customized systems used in the chemical, pharmaceutical, petrochemical, and manufacturing industries. These systems are directly linked to the industrial process. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. (see Glossary) The amendments refer to "*appliances*" and "*equipment*," but this guidance refers to "*systems*"—the term more commonly used in the industry.

The refrigerant recycling rule applies to systems that contain and use a class I or class II substance as a refrigerant.

- *Class I refrigerants* are mostly chlorofluorocarbon (CFC) refrigerants or any refrigerant mixture containing a CFC.
- *Class II refrigerants* are hydrochlorofluorocarbon (HCFC) refrigerants or any refrigerant mixture containing an HCFC.

NOTE: If you are not sure whether you have a *class I* or *class II* refrigerant, refer to the lists in 40 CFR, Part 82, Subpart A, Appendices A and B or call your refrigerant supplier.

### Applicability Triggers

The leak repair requirements of this regulation are triggered when an owner or operator of an *industrial process refrigeration* system discovers that refrigerant is leaking at a rate that would exceed 35 percent of the total charge in a 12-month period. (See Module D for more information on leak rates.)

### EXEMPTIONS OR EXCLUSIONS

Leak repair provisions of this regulation do NOT affect systems normally containing 50 pounds or less of refrigerant.

QUESTIONS	ANSWERS
Why does the same refrigerant number begin with different letters; for example, is R-12 the same as CFC-12?	There are many different ways to refer to the same chemical including some trade names. Since this amendment applies to ozone-depleting substances (ODSs) that are refrigerants, you should determine whether or not your refrigerant is or contains an ODS.
Do the leak repair requirements apply to HCFC refrigerants such as R-22?	Yes, the requirements apply to all Class I and Class II ozone-depleting substances. This includes CFCs, HCFCs, and blends that contain CFCs or HCFCs.
The refrigerant recycling amendments refers to " <i>appliances</i> ." I think of <i>appliances</i> as household-type refrigeration equipment, such as refrigerators, freezers, and window air conditioners. Is leak repair required for these <i>appliances</i> ?	No, the refrigerant charges in household <i>appliances</i> are normally less than 50 pounds. As it is used in these regulations, the term " <i>appliance</i> " means any type of refrigeration equipment, no matter how large or small. Systems normally containing 50 pounds or less of refrigerant are excluded from leak repair requirements, even though they are <i>appliances</i> and are subject to other aspects of the refrigerant recycling amendments.
I have an <i>appliance</i> that is used in an <i>industrial process refrigeration</i> application and is used in a cooling application (or is used to cool a control room). Which trigger rate applies to my <i>appliance</i> ?	If at least 50 percent of an <i>appliance's</i> capacity is being used in an <i>industrial process refrigeration</i> application, the <i>appliance</i> is considered an <i>industrial process refrigeration</i> system and a 35 percent leak rate is the trigger. If less than 50 percent of the <i>appliance's</i> capacity is being used in an <i>industrial process refrigeration</i> application, then this system would not be considered <i>industrial process refrigeration</i> . In this specific example, the system would be comfort cooling with a 15 percent trigger rate.
The leak repair requirements apply only if the independent <i>refrigerant circuit</i> has more than 50 pounds of refrigerant. What is an independent refrigerant circuit?	A <i>refrigerant circuit</i> consists of equipment that carries refrigerant (typically in a closed loop) to and from the point of cooling. For example, refrigerant may flow from a compressor to other components, such as heat exchangers and evaporators, and back to the compressor. Most refrigeration systems have only one refrigerant circuit. A minority of systems have two or more refrigerant circuits that are completely isolated from each other (i.e., they are designed to avoid mingling refrigerant from one circuit with refrigerant from another circuit). These are independent refrigerant circuits.

QUESTIONS	ANSWERS
<b>What if my <i>industrial process</i> refrigeration system has two independent refrigeration circuits, one with a <i>full charge</i> greater than 50 pounds, the other with a <i>full charge</i> less than 50 pounds?</b>	<b>The circuit whose <i>full charge</i> is greater than 50 pounds would be subject to leak repair requirements. The circuit whose <i>full charge</i> is less than 50 pounds would not be subject to leak repair requirements.</b>
<b>Many <i>industrial process</i> refrigeration systems are physically integrated into a manufacturing process. How can I tell which equipment is part of the refrigeration system and which is not?</b>	<b>The <i>industrial process</i> refrigeration system consists of only the interconnected equipment that contains, conveys, or otherwise handles the refrigerant. For example, if a single major component has portions that contain refrigerant and portions that contain other fluids (such as process fluids in a heat exchanger or oil in a compressor), the entire component is part of the refrigeration system. Other piping or processing equipment that contains solvents, raw materials, or other nonrefrigerants is not part of the refrigeration system.</b>



**C. FULL CHARGE**



**You MUST know the *full charge* of your refrigeration system.**

**You MUST use an acceptable method.**

If you use method a, b, or c, it is recommended that you document (and are able to show) how you determined the *full charge*, although it is not specifically required.

If you use method d, you are required to document how you determined the *full charge*.

If you use method e, you are not required to keep records unless you incorporate method d.

## C. FULL CHARGE

The *full charge* is the amount of refrigerant necessary for an industrial process refrigeration system to operate at normal operating characteristics and conditions. There are two reasons why you need to know how much refrigerant is in the *full charge* for a system:

1. The leak repair requirements of this law do not apply to any system whose *full charge* is 50 pounds or less of refrigerant in any independent refrigerant circuit.
2. To calculate the leak rate for a system, you need to know the *full charge* (see Module D for more information on leak rates).

**To determine the *full charge*, you must use one of the following methods:**

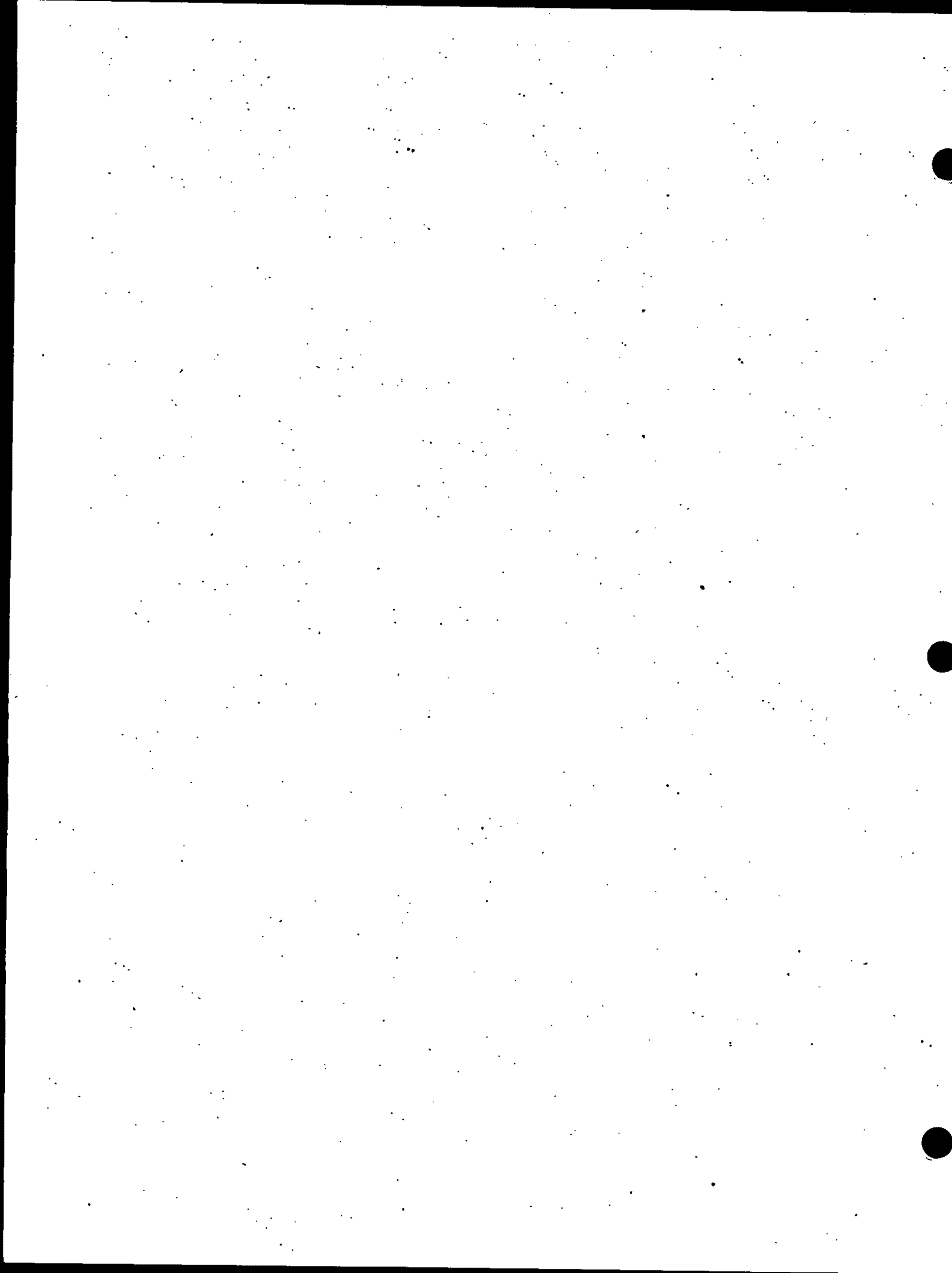
- a. **Measure the refrigerant.** For example, draw the refrigerant from the system and weigh it. Or, you can measure how much refrigerant you put into an empty system to fully charge it.
- b. **Calculate the weight of the refrigerant charge in the system.**
- c. **Use the manufacturer's information.** Some manufacturers specify the amount of refrigerant in the *full charge* for a system, either on a plate attached to the system or in specifications (or vendor literature).
- d. **Establish range.** If you know the system functions properly within a range of refrigerant amounts, use the midpoint of that range. Special recordkeeping requirements apply if this method is used alone or in combination with other methods. (See Module G for more information on recordkeeping).

- e. Combinations of a through d. For example, suppose you have a system that consists of two components connected by pipe or tubing. The length of the pipe or tubing varies from one installation to another. As a result, the manufacturer has specified how much refrigerant is in a *full charge* for the two components, but NOT for the pipe or tubing. You may calculate how much refrigerant is in the length of pipe or tubing for your system, and then add that amount to the manufacturer's estimates for the two components.

QUESTIONS	ANSWERS
Should I be concerned about the margin of error in determining the <i>full charge</i> ?	Yes, but EPA recognizes that there is some margin of error in any determination of the amount of refrigerant in a system. If you have made your determination based on the best information available and <i>sound professional judgment</i> , the <i>full charge</i> number is acceptable.
If the manufacturer's statement of the <i>full charge</i> is wrong, what should I do?	<p>Do not use the manufacturer's statement of the <i>full charge</i> if you know it is incorrect.</p> <p>Sometimes a manufacturer's statement of the <i>full charge</i> is incorrect. For example, a system may have been customized by adding more components. Or additional refrigerant may be used because the system is operating under conditions that the manufacturer did not anticipate. In some cases, the manufacturer may simply have goofed, and it is obvious that the <i>full charge</i> is much larger or smaller than the manufacturer said. If the manufacturer has obviously goofed, choose one of the other acceptable methods to determine the <i>full charge</i>.</p> <p>The manufacturer's information may, however, still have some use. For example, if you have customized a system by adding components, you may be able to calculate the amount of refrigerant in those components and add it to the manufacturer's estimated charge for the original system.</p>
Am I allowed to change the <i>full charge</i> number? If I change it, should I recalculate all my leak rate determinations?	Yes, you may change the <i>full charge</i> number if you obtain new and better information. No, you do not have to recalculate any previously determined leak rates. You would, however, use the new <i>full charge</i> number in calculating any future leak rates.
Do I have to use the same method to determine <i>full charge</i> for all systems at my facility?	No.



## **D. LEAK RATE**



The trigger rate for *industrial process refrigeration* systems is 35 percent.

**REPAIR**  
**RETROFIT**  
**RETIRE**



## D. LEAK RATE

Each time you add refrigerant to a system normally containing 50 pounds or more of refrigerant (see Module C), you should promptly calculate the leak rate. If the leak rate is higher than the trigger rate, you are required to do one of the following:

- Repair leaks (see Module E);
- Retrofit the system (see Module F); or
- Retire the system from service (see Module F).

### Calculating a Leak Rate

Presented below is one way of calculating a leak rate. Facilities can use other methods, e.g., rolling averages.

- Take the number of pounds of refrigerant you added to return the system to a *full charge* and divide it by the number of pounds of refrigerant in the normal *full charge* for the system.

$$\frac{\text{\#lbs refrigerant added}}{\text{\#lbs refrigerant in normal full charge}}$$

- Take the number of days that have passed between charges (that is, how many days between the last time refrigerant was added and this time refrigerant was added) and divide by 365 (the number of days in a year).

$$\frac{\text{\#days since refrigerant last added}}{365 \text{ days}}$$

- Take the number you determined in step 1 and divide it by the number you determined in step 2.
- Multiply the number you determined in step 3 by 100 (to calculate a percentage).

Another way of expressing this is with the following formula:

LEAK RATE % =	$\frac{\text{pounds of refrigerant added}}{\text{pounds of Full charge}}$	x	$\frac{365 \text{ days}}{\text{\#days since refrigerant last added}}$	x 100
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The result is the leak rate, expressed in the percent of *full charge* that would be lost per 12-month period.

In some complicated situations, other calculations may also be appropriate. For example, if a known amount of refrigerant was removed intentionally and put back into the system, then that amount should not be counted as a "leak". The four-step approach described above, however, will give the correct leak rate in ordinary situations.

### Timing

After refrigerant is added, you should calculate the leak rate as soon as you can. If the system is leaking above the trigger rate, the law imposes strict deadlines for repairing the leaks or retrofitting or retiring the system (see Modules E and F). For example, if you wait three days to determine the leak rate, there will be three less days available to solve the problem.

### Purged Refrigerant

In calculating the leak rate, you may exclude purged refrigerant that is destroyed. A destruction efficiency of at least 98 percent is required, and there are monitoring, recordkeeping, and reporting requirements (see Module G for more information on recordkeeping and reporting).

### Recordkeeping/Reporting

Keep records that show:

1. The date and type of service;
2. How much refrigerant was added; and
3. The date when the refrigerant was added.

It may be required and is always advisable to keep records of the *full charge* and leak rate. For additional recordkeeping requirements, see Module G, Recordkeeping and Reporting Requirements.

If you are the  
**OWNER OR OPERATOR:**

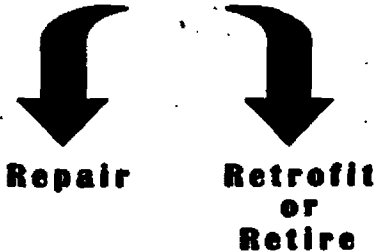
QUESTIONS	ANSWERS
If the leak rate is less than the trigger rate (for example, a leak rate of 5 percent per 12-month period), am I required to fix the leaks?	No, action is required only when the trigger rate is exceeded.
If a system has a 100-pound charge and is allowed a 35 percent leak rate, I don't have to fix leaks until 35 pounds of refrigerant have leaked out, right?	Wrong. What matters is the annual leak rate. The annual leak rate is the amount of refrigerant that would leak out in a 12-month period if you did nothing about it. For example, suppose you know your system lost 4 pounds of refrigerant in January, and you discovered the losses by adding refrigerant on the first day of February. At a leak rate of 4 pounds per month, the system would lose 48 pounds of refrigerant in a 12-month period (48 percent of the <i>full charge</i> ), so you are already under a deadline to promptly repair the leaks or retrofit or retire the system. You do NOT get to wait until 35 pounds of refrigerant have already leaked out before you start figuring out how to solve the problem.
If the leak rate is higher than the trigger rate (for example, a leak rate of 50 percent per 12-month period), am I in violation by either (a) operating the system while it is leaking; or (b) adding refrigerant to keep the system operating?	No. Adding refrigerant or operating a system with a leak rate higher than the trigger rate is allowed temporarily. A violation would only occur if you do not adhere to the timelines and methods required for repairing, retrofitting or retiring the system as described in Modules E and F.
When should I calculate the leak rate?	You should calculate an annual leak rate each time you add refrigerant or any time <i>sound professional judgment</i> indicates the system may be leaking more than the trigger rate.
Do I have to check the leak rate on a routine basis, such as every month?	No.
Should I establish a process to routinely look for leaks?	You are not required to establish such a process, but it may be beneficial as an early detection of leaks. You must repair, retrofit, or retire the system when you are operating above the trigger rate.
If my system starts leaking above the trigger rate, is that a violation?	No. The law does not prohibit leaks, provided you repair, retrofit, or retire the leaking system by applicable deadlines. If a system develops a leak, it is not illegal; the regulations recognize that systems leak.

101

## **E. LEAK REPAIR**





**DECISION POINT!****NOTE:**

In the recycling regulations, "evacuate" means to remove refrigerant from a system. It is comparable to the term "recover," which is a word commonly used in the refrigeration field. Evacuate is not used in these amendments in its technical sense of removing moisture or inerts from a system.

**E. LEAK REPAIR****Leak Repair Requirement**

If a system is leaking above the trigger rate, leak repairs are required within 30 days of discovery. Repairs must bring the annual leak rate below the trigger rate. See Module B, Applicability, for more information on trigger rates. A leak repair timeline is presented on page E-7. Leak repairs are not required if you retrofit or retire the system (see Module F).

Certain activities require a certified *technician*, see page E-6 for more details.

**Situations Where More Than 30 Days Are Allowed**

There are situations where additional time may be permitted as discussed below. Also, see Module H, *System Mothballing*.

**Industrial Process Shutdown**

When an *industrial process shutdown* is needed to repair leaks from *industrial process refrigeration* systems, a 120-day repair period (rather than a 30-day period) is allowed.

**Unavailable Repair Parts or Other Regulations That Require Additional Time**

Additional time (beyond the 30- or 120-day time periods) is allowed to conduct leak repairs if the necessary repair parts are unavailable or if other applicable federal, state, or local regulations make a repair within 30 or 120 days impossible. EPA must be notified per 40 CFR 82.166(n) if repairs cannot be completed within 30 or 120 days of discovery. Only the additional time needed to receive delivery of the necessary parts or comply with the pertinent regulations will be permitted.



## Repair Verification:

A new feature of the amendments is a requirement to verify the success of leak repairs (when leak repairs are required) for *industrial process refrigeration* systems. Two tests, called "*initial*" and "*follow-up*" *verification tests* are required for each repair site. A successful test verifies that a leak has been repaired.

## What are these tests for?

The primary purpose of the *initial verification test* is to verify that a leak or leaks have been repaired before refrigerant is added back to the system. Even when the system is not evacuated to complete repairs, *initial* and *follow-up verification tests* are required. The primary purpose of the *follow-up verification test* is to re-verify that repairs continue to hold after the system is returned to its *normal operating characteristics or conditions*.

## Initial Verification Test

An *initial verification test* must be conducted following any leak repairs. A refrigeration system may not be brought back on line (if it has been taken off line), unless a) an *initial verification test* indicates that repairs have been successfully completed or b) a decision to retrofit or retire is made. The *initial verification test* must be conducted before the replacement of the *full charge* of refrigerant in systems (or isolated portions of systems) from which the refrigerant has been evacuated. In systems that have not been evacuated, the *initial verification test* must be conducted as soon as practicable after the repair work is completed.



## Follow-up Verification Test

A *follow-up verification test* must be conducted:

- within 30 days after the *initial verification test*, where *normal operating characteristics or conditions* have been maintained; or
- within 30 days of bringing the system back on line, if taken off line, and where the system is operating at *normal operating characteristics or conditions*.

**Exception:** In certain cases the results of a *follow-up verification test* may be less reliable if the test is conducted at *normal operating characteristics or conditions*. For example, repairs made to leaks inside heat exchangers would not normally be accessible after the system is operating. In this kind of situation, based on *sound professional judgment*, the *follow-up verification test* may be conducted prior to returning to *normal operating characteristics or conditions*. However, the *follow-up verification test* must be conducted at or near the normal operating pressure where practicable, and at or near the normal operating temperature where practicable.

## Initial and Follow-up Verification Test Methods

*Initial and follow-up verification tests* may use any method that meets *sound professional judgment*. Test examples include, but are not limited to:

- A soap bubble test; or
- Electronic leak detectors; or
- Ultrasonic leak detectors; or
- A pressure test; or
- A vacuum test; or
- A fluorescent dye and black light test; or
- An infrared test; or
- A near infrared (back scatter absorption gas imaging) test; or
- Halon refrigerant gas detection methods.

## EPA Notification

Notify EPA per 40 CFR 82.166(n) within 30 days after completion of any verification test where a time extension is utilized (see Module G).

## Unsuccessful Tests

If you have an unsuccessful *follow-up verification test*, you must notify EPA and develop a retrofit or retirement plan within 30 days of the failed test. If it is going to take you more than one year you must also submit the plan (see Module F). If the *follow-up verification test* indicates that the repairs to the system have not been successfully completed, the owner or operator is required retrofit or retire the system. However, there are some options where the owner or operator is relieved of the obligation to retrofit or retire the system (see Module F).

QUESTIONS	ANSWERS
When am I required to perform <i>initial and follow-up verification tests</i> on <i>industrial process refrigeration</i> ?	<i>Initial and follow-up verification tests</i> are required following leak repairs when the refrigerant leak rate for a system <b>EXCEEDS</b> the trigger rate. <i>Initial and follow-up verification tests</i> are not required for leak repairs on systems leaking less than the trigger rate.
Are <i>initial and follow-up verification tests</i> required for systems other than <i>industrial process refrigeration</i> ?	Yes, but only for federally owned chillers.
What constitutes a successful verification test?	A verification test is successful when it shows that the leak has been successfully repaired.
Are there any EPA-approved leak detection methods I can use?	EPA does not specify any particular method(s). You may use any method that meets <i>sound professional judgment</i> .
Do <i>initial and follow-up verification tests</i> have to verify that you reduced the annual leak rate to zero?	No. The purpose of the verification requirement is to evaluate the success of the particular repair you made.

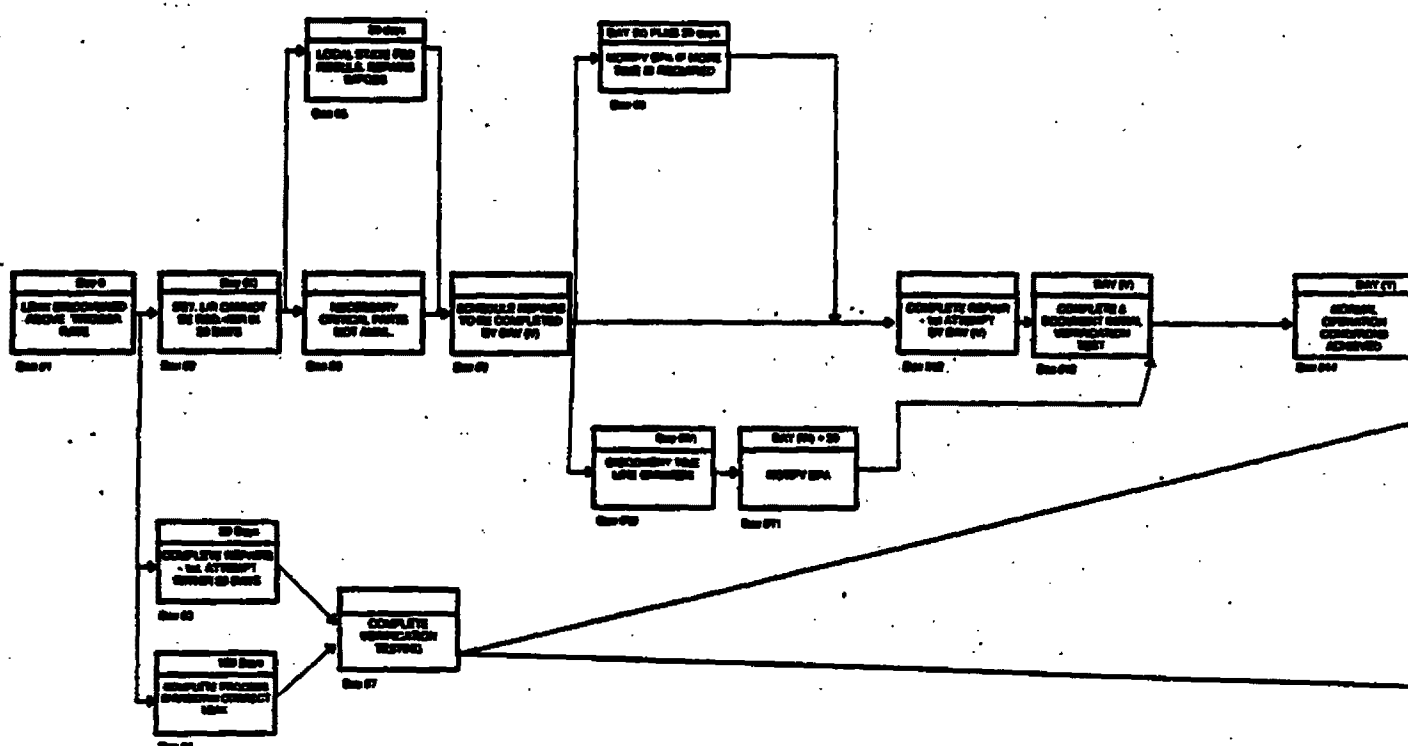
QUESTIONS	ANSWERS
Must I repair all leaks on a system to comply?	Repair efforts must bring leak rates below the trigger rate.
Under what circumstances do I have a 120-day repair period?	A 120-day repair period is allowed when <i>an industrial process shutdown</i> is required to repair a leak(s) from <i>industrial process refrigeration systems</i> . An <i>industrial process shutdown</i> occurs when an industrial process temporarily stops operating or manufacturing what is being produced at the facility.
Do I have an unlimited number of attempts to repair leaks within the allowed time?	Yes, you are allowed to try to repair the leak(s) as many times as you need to within the allowed time period. The last repair attempt within the allowed time and the <i>verification tests</i> on that attempt are what matters. If the repair efforts occur during a time extension, send the results of the <i>last initial</i> and <i>follow-up verification tests</i> performed during the repair period to EPA.
Do all leak repairs have to be performed by a certified technician?	If refrigerant could reasonably be expected to be released, then the procedure must be performed by a certified <i>technician</i> . (See the checklist on page E-5 for more information.)
Do the time extensions for repairing leaks apply to systems other than <i>industrial process refrigeration systems</i> ?	Yes, there may be time extensions available for federally owned chillers. Time extensions are not available for other refrigeration systems except for <i>system mothballing</i> (see Module H).

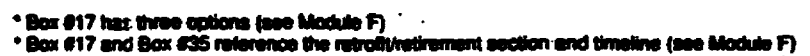
## REFRIGERANT RECYCLING AMENDMENTS

Activity (on ODS refrigeration system)	Is technician <sup>1</sup> certification required?	
	YES <sup>2</sup>	NO
Evacuating the refrigerant	✓	
Adding refrigerant	✓	
Changing the oil	✓	
Adding oil	✓	
Replacing a gauge	✓	
Changing or calibrating a DP cell	✓	
Changing a pressure-relief valve	✓	
Drawing a sample of refrigerant or oil	✓	
Helping dismantle a system for disposal, if that person's work may reasonably result in a release of refrigerant	✓	
Any of the tasks listed above, performed under the direct supervision of a certified technician	✓	
Maintenance that would not reasonably release refrigerant (such as painting; leak-checking; some electrical work; and some insulation work)		✓
Fixing leaks by tightening nuts or bolts, if no specific reason to think the activity may go wrong and increase the rate of release		✓
Any work on the system after the refrigerant has been evacuated to the extent required by § 82.156		✓

<sup>1</sup> Technician Certification Amendment to the National Recycling Program FR 55912 (11/9/93) (see Module K)

<sup>2</sup> A certified technician is required unless the system (or isolated portion) has been evacuated to the level listed in the rule

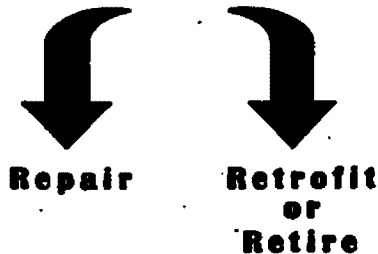






**F. RETROFIT AND RETIREMENT  
OF LEAKING REFRIGERATION SYSTEMS**



**DECISION POINT!****EXCEPTION:**

If you switched from repair to retrofit or retire, you must notify EPA within 30 days from the day you switch. However, you are still under the 12-month period provision from the time the leak was discovered.

**More time may be available.**

## **F. RETROFIT AND RETIREMENT OF LEAKING REFRIGERATION SYSTEMS**

Owners or operators of *commercial refrigeration* equipment, *industrial process refrigeration* systems, and/or all other systems normally containing more than 50 pounds of refrigerant are **not required to repair leaks** if they develop, implement, and complete a 12-month retrofit or retirement plan. Three conditions, however, must be met:

1. The retrofit or retirement plan must be developed within 30 days of detecting the leak and a copy must be kept on site; and
2. The plan must be dated and the original made available for EPA inspection upon request; and
3. Retrofit or retirement activities must be completed within a 12-month period of the plan's date.

### **Time Extensions for Retrofit or Retirement of Industrial Process Refrigeration Systems**

Additional time beyond the initial 12-month period to complete retrofit or retirement activities is available to owners or operators of *industrial process refrigeration* systems if any of the following circumstances occur:

- a. A delay is caused by the requirements of other applicable federal, state, or local regulations. In this case, additional time to the extent reasonably necessary will be allowed; or
- b. A *suitable replacement refrigerant* is not available. In this case, additional time to the extent reasonably necessary will be allowed; or
- c. The unit is *custom-built* and the supplier of the system or a *critical component* has quoted a delivery time of more than 30 weeks from when the order is placed. In this case, an additional 12-month period is allowed. To receive this

**An industrial process shutdown does not extend the deadline for notification to EPA if more time is needed.**

**Even MORE TIME may be available!**

**If you think the situation in bullet #2 will apply, you will need to tell EPA how you will make the determination in your submission to EPA notifying them of the failed *follow-up verification test*. (The amendment refers to this as providing parameters.) The parameters you submit will be considered acceptable unless EPA notifies you within 30 days. Otherwise, you must use parameters that EPA provides.**

extension, you must notify EPA within six months of the expiration of the 30-day period.

If the owner or operator of a *custom-built industrial process refrigeration* system has received an additional 12-month period for retrofit or retirement activities, but still requires more time to complete the retrofit or retirement (beyond the additional time already allowed), then a request for additional time may be submitted to EPA.

**If you think you qualify for additional time, you must notify EPA. See Module G, Recordkeeping and Reporting, for more information.**

### **Relief From Obligation to Retrofit or Retire**

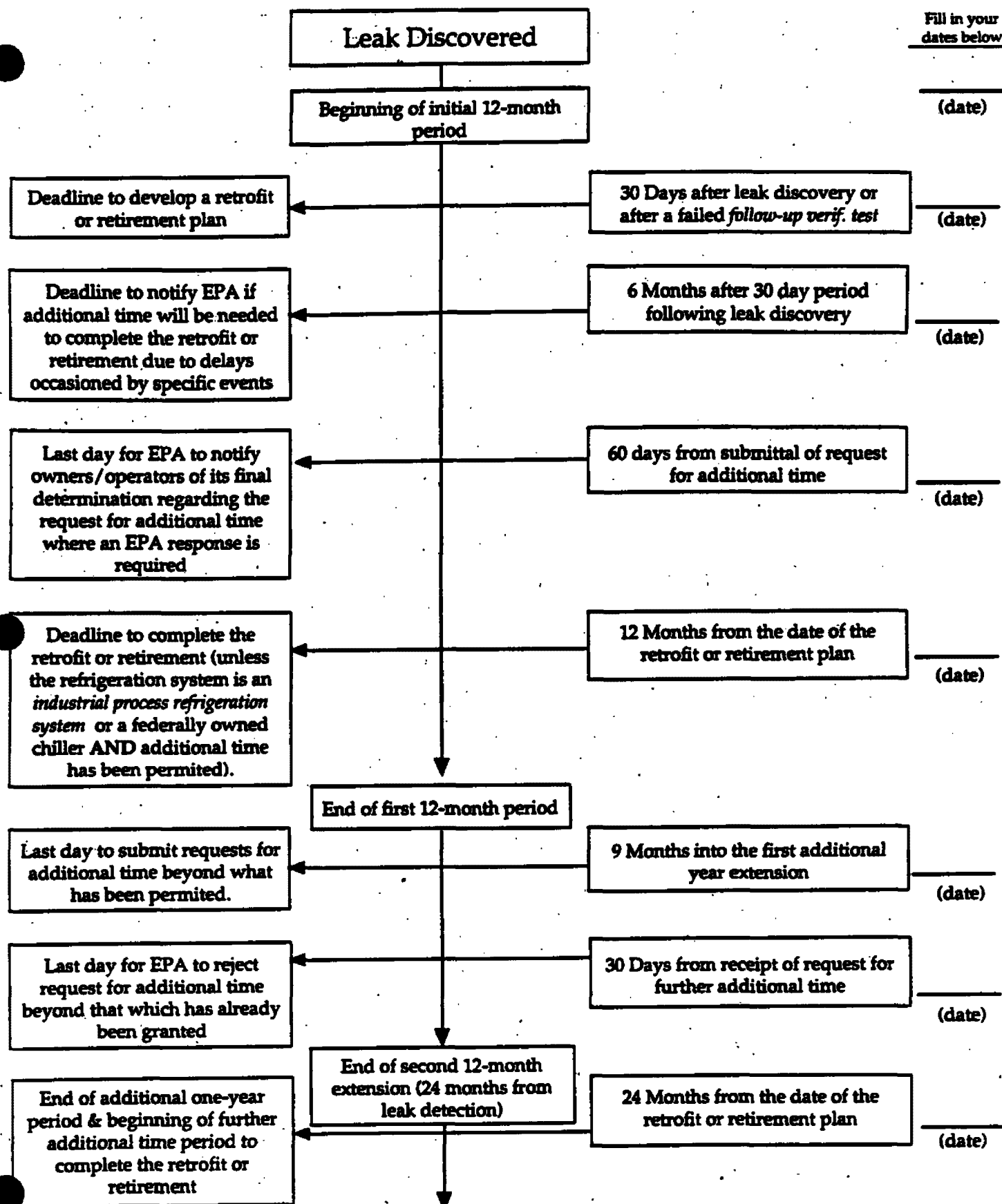
As mentioned in the leak repair module, sometimes a failed *follow-up verification test* can result in a requirement to retrofit or retire a system. You may be relieved of this requirement if either of the following efforts is successful:

1. Make second efforts to repair the same leaks that were the subject of the first repair attempt. Repairs must be completed within 30 days of the failed test (120 days where the repair requires an *industrial process shutdown*). Second repairs are subject to the same verification requirements as the first efforts (i.e., *initial* and *follow-up verification tests*). If the second *follow-up verification test* is successful, EPA must be notified per 40 CFR 82.166(n) within 30 days of its completion and the owner or operator is no longer required to retire or retrofit the system.
2. Within 180 days of a failed *follow-up verification test* associated with the initial repair efforts, establish that the leak rate is below the trigger rate. Within 30 days after that determination, send a new notification telling EPA that you are now below the trigger rate (see Module G).

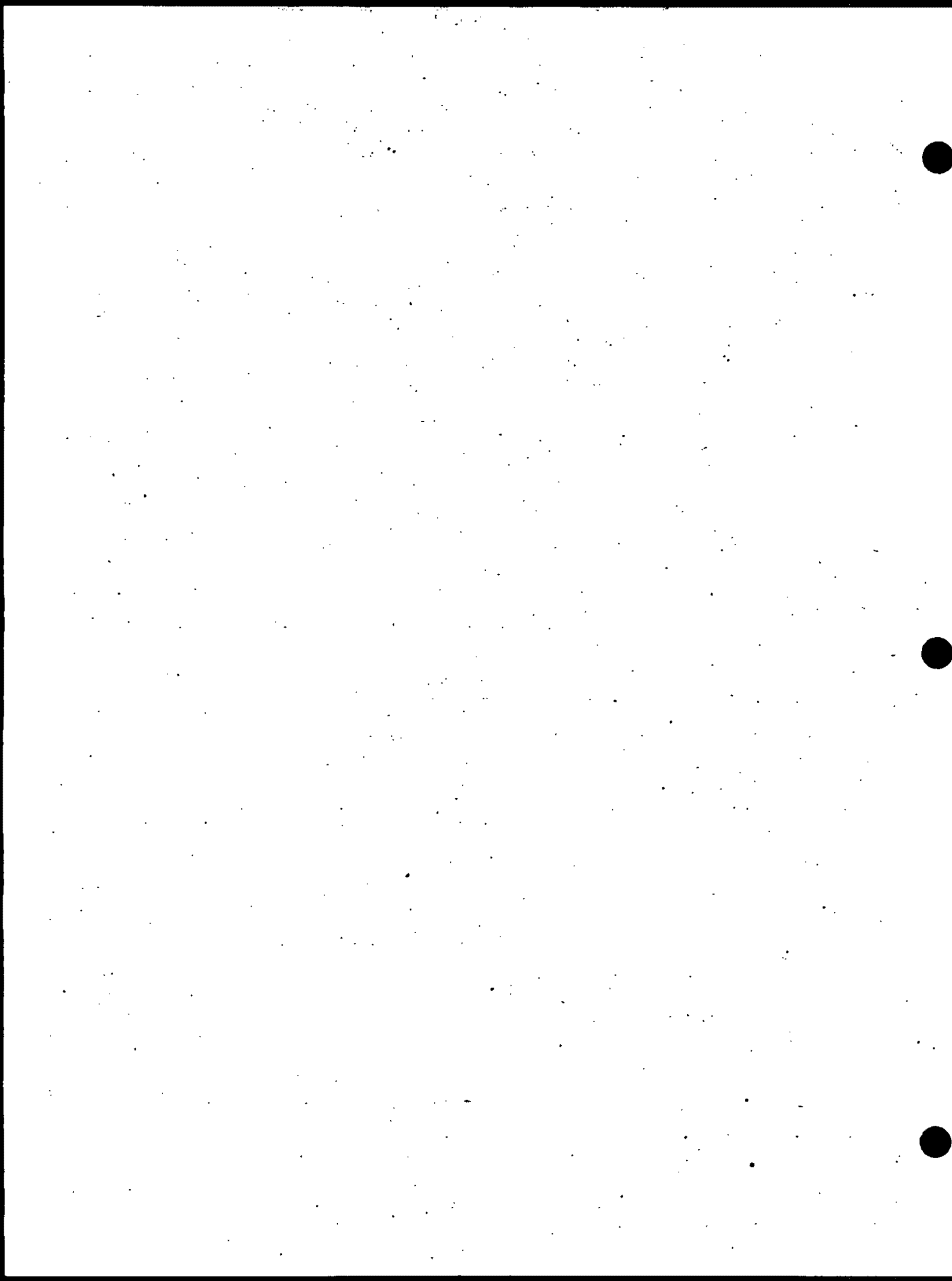
QUESTIONS	ANSWERS
<p>I have a <i>custom-built industrial process refrigeration system</i> leaking R-22 at over 35 percent per 12-month period. I know that the leaks cannot be repaired. In developing the retrofit or retirement plan for this refrigeration system, I will need more than a 12-month period because a <i>critical component</i> (the compressor) requires more than 30 weeks delivery time. How do I obtain more time to retrofit or retire the system?</p>	<p>Within six months of 30 days after discovery of the leak, notify EPA that you need the second 12-month period and why and include the estimate for completion of the work. (See Module G for recordkeeping or reporting information.)</p>
<p>I followed the procedures for obtaining the second 12-month period to complete my retrofit or retirement. Several months later, I was notified by the manufacturer of the <i>critical component</i> that my original completion date will take 60 days longer than originally quoted. What do I do?</p>	<p>Notify EPA within 30 days of discovery of the new completion date.</p>
<p>What happens if I follow the procedures for obtaining a second 12-month period to perform a retrofit or retirement, and then I am told by the manufacturer of a <i>critical component</i> that the delivery will not allow me to complete my retrofit within two 12-month periods?</p>	<p>You have until the end of the ninth month of the second 12-month period to submit a request to EPA for additional time.</p>

QUESTIONS	ANSWERS
<p>I have developed a retrofit plan and notified EPA of a failed <i>follow-up verification test</i>. During the second repair effort, however, I managed to successfully repair the same leak(s). Must I implement the retrofit plan?</p>	<p>No, you are relieved of the obligation to retrofit but you must notify EPA within 30 days.</p>
<p>According to the amendments, I am relieved of the obligation to retrofit or retire an <i>industrial process refrigeration system</i> if I verify that the leak rate is below the trigger rate within 180 days after the failed <i>follow-up verification test</i>. How is this done?</p>	<ol style="list-style-type: none"> <li>1. Determine the parameters you will use to establish the leak rate. Submit those parameters to EPA for approval (as described in Module G, Recordkeeping and Reporting).</li> <li>2. Take any further action necessary to reduce leaks. Further action to reduce leaks might include repairing smaller leaks that may not have been repaired previously; replacing piping systems (or welding the joints) to eliminate screwed or flanged connectors; or replacing major components for which repair has proven impractical. In some cases, the leak rate may be below the trigger rate without further action, even though one or more of the original repairs did not pass a <i>follow-up verification test</i>.</li> <li>3. Determine the new leak rate, using the approved parameters. For example, this may include filling the system, waiting for a defined period of time, and seeing how much refrigerant is needed to fill the system again.</li> </ol> <p><b>NOTE:</b> If you are unable to verify that the leak rate is below the trigger rate by the deadline, you will have used up a substantial portion of the 12-month period to retrofit or retire the system. You do <u>not</u> get an extra 180 days added to that period.</p>

## Regulatory Timeline &amp; Checklist for Retrofit &amp; Retirement Activities

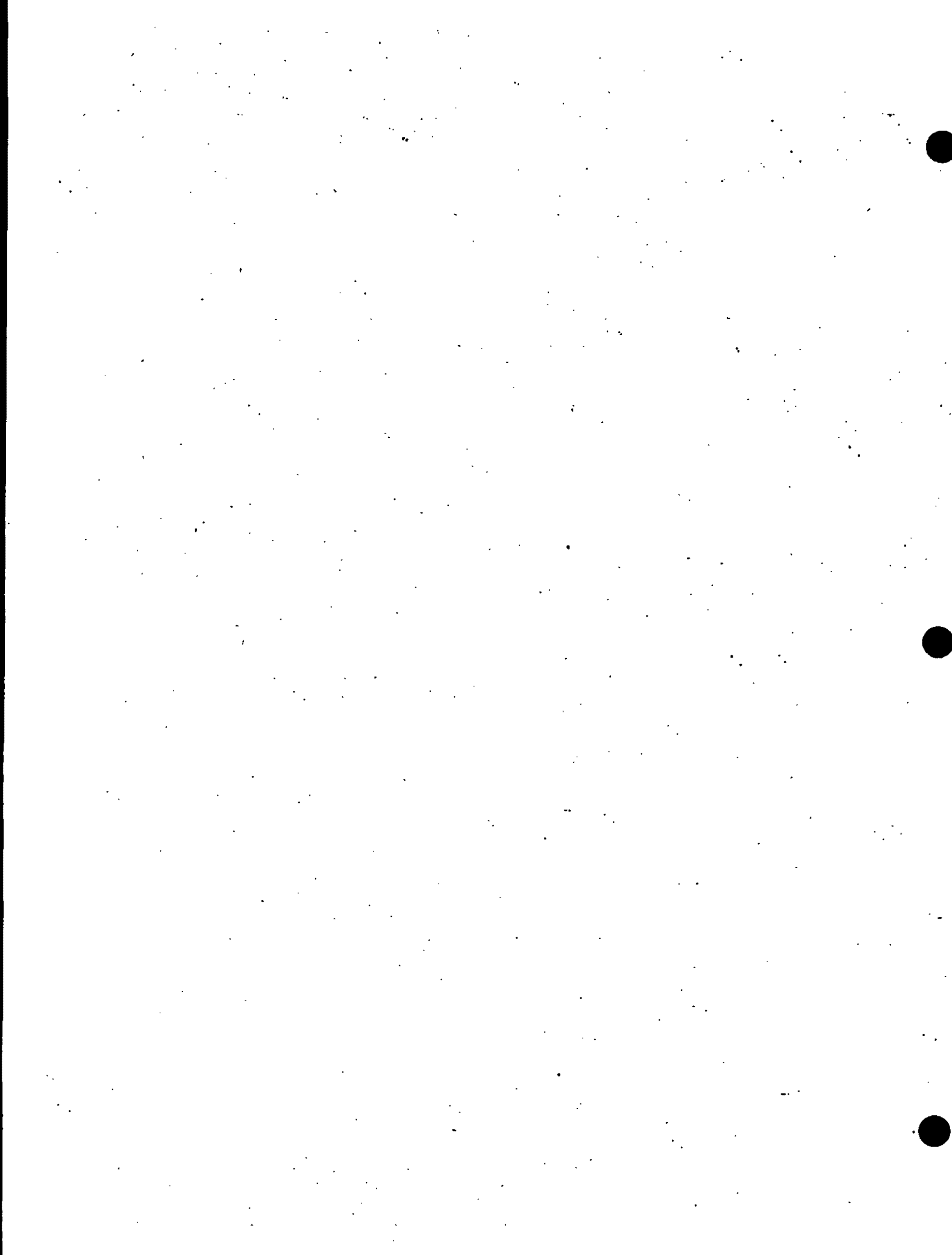


Further additional time period (beyond 2 years) to complete the retrofit or retirement for industrial process refrigeration systems.





**G. RECORDKEEPING AND REPORTING  
REQUIREMENTS**



## G. RECORDKEEPING AND REPORTING REQUIREMENTS

It is advisable in ALL cases to maintain records of the leak rate and full charge.



When servicing systems normally containing 50 pounds or more of refrigerant you are always required to keep the following information:

- date & type of service;
- quantity of refrigerant added;
- when refrigerant purchased;
- when refrigerant added in cases where the owner added their own refrigerant.


Records reportable to EPA must be maintained on site for three years. Any reporting requirements must be submitted to the following address:

608 Recycling Program Manager  
Stratospheric Protection Division  
6205J  
US Environmental Protection Agency  
401 M Street, SW  
Washington, DC 20460

### Leak Repair (Industrial Process Refrigeration)

If you complete all the required repairs successfully without needing additional time, the amendments do not require any new recordkeeping or reporting. This means that no new records or reports are required if the repairs are (1) completed within 30 days (120 days if an *industrial process shutdown* is necessary), and (2) pass *initial* and *follow-up verification tests*. If more time is needed, or if the repairs do not pass *follow-up verification tests*, additional recordkeeping and reporting are required. These requirements are described below.

1. If any of the repairs have failed the *follow-up verification test*:
  - a) You must keep on-site documentation of the following information and report it to EPA within 30 days after the failed *follow-up verification test*:
    - the identification of the facility;
    - the leak rate;
    - the method used to determine the leak rate and *full charge*;
    - the date of discovery that the leak rate was above the trigger rate;
    - the location of leaks to the extent determined to date;

- 
- any repair work that has already been completed; and the date when that work was completed;
  - the date(s), type(s) and results of the failed *follow-up verification test(s)*; and
  - if you intend, or think you could eventually attempt to verify within 180 days that the leak rate is below 35 percent, you must provide EPA the parameters on how the leak rate will be determined. EPA will inform you if they object to your parameters (see Module F).
- b) You must develop a retrofit or retirement plan within 30 days after the failed *follow-up verification test*. You must keep the plan on-site and make the original available to EPA upon request, but you do not have to submit the plan to EPA unless you will need an extension of time to finish the retrofit or retirement (beyond one year from the date you develop your plan).
2. If you need additional time to repair leaks due to other regulatory delays, or because delivery of necessary repair parts will take too long, then:
- a) Within 30 days after making the determination that you need extra time, you must keep on-site, and report to EPA:
- the identification of the facility;
  - the leak rate;
  - the method used to determine the leak rate and *full charge*;
  - the date of discovery that the leak rate was above the trigger rate;
  - the location of leaks to the extent determined to date;
  - any repair work that has already been completed; and the date when that work was completed;
  - documentation of the reasons why more than 30 days (or 120 days, if an *industrial process shutdown* is necessary for repairs) are needed to complete the work; and
  - an estimate of when the repairs will be completed.

**NOTE:** You only get the amount of extra time that is reasonably necessary.

- b) Notify EPA if you discover that the repairs will take longer than you have previously told EPA. Send this notification within 30 days after discovering the need for more time. Include a new estimate of when the work will be completed.

## **Retrofit or Retirement (Industrial Process Refrigeration)**

If you complete successful retrofit or retirement within the normal one-year period, the amendments do not require any new recordkeeping or reporting. However, you are still required to develop and maintain, on-site, a retrofit or retirement plan.

The amendments have some additional requirements for situations where you need an extension of time to complete the retrofit or retirement, and for situations where you are relieved of the duty to retrofit or retire a system. These are described below.

1. If you are completing your retrofit or retirement within the 12-month period, you must:
  - maintain the retrofit or retirement plan on-site; and
  - make the original plan available to EPA upon request.
2. If you will need an extension of time because of delays caused by other regulations, or because there is no *suitable replacement refrigerant*, then:
  - a) Notify EPA within six months after the end of the 30-day period following discovery of the excessive leak rate. The notification must include the following information, which must also be retained on-site. EPA will respond within 60 days, telling you whether they agree that you are entitled to the extra time you have requested.
    - the identification of the facility;
    - the leak rate;
    - the method used to determine the leak rate and *full charge*;

- the date when the excessive leak rate was discovered;
- the location of leaks to the extent determined so far;
- any repair work that has already been completed and the date of completion;
- the reasons why you need an extension of time, and an estimate of when the retrofit or retirement will be completed. Include records sufficient for EPA to determine that extra time is needed and how much time; and
- a copy of your retrofit or retirement plan.

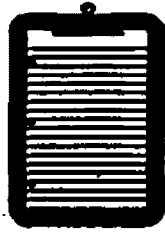
b) If you have already notified EPA, and then you discover that the work will take longer to complete than you have previously told EPA, you must submit documentation with the reasons within 30 days after discovering that more time is needed. Include a new estimate of when the work will be completed and the date of your original notification to EPA.

3. If you have been required to follow the retrofit or retirement timeline because repairs failed a *follow-up verification test*, then:

- a) If you complete the retrofit or retirement within 12 months after the 30 day period from discovery of the leak, there are no additional reporting requirements;
- b) If you intend to be released from the requirement to retrofit or retire the system by demonstrating (within 180 days after the failed *follow-up verification test*) that you have brought the leak rate below the trigger rate, then you must do three things:
- Within 30 days after the failed test(s), submit a plan to fix other outstanding leaks for which repairs, if any, are planned but not yet completed to achieve an acceptable leak rate; and



- Include, with the plan described above, a description of how you will determine whether the leak rate is below the trigger rate. Your proposed method is acceptable unless EPA objects within 30 days after receiving your plan. If EPA objects and provides a different method, follow that method; and
  - After you have determined the new leak rate, if it is less than the trigger rate notify EPA within 30 days after that determination. Tell them that the leak rate is below the trigger rate, and tell them you are no longer required to retrofit or retire the system. If part of your plan was to complete and test further repairs, or to re-test existing repairs, include the date(s), type(s) and results of the *follow-up verification tests*.
- c) If you are released from the requirement to retrofit or retire the system because the second repair efforts (within 30 or 120 days after the failed test) have passed initial and follow up verification tests, you must notify EPA within 30 days after completion of the successful tests. Notify EPA that your second repair efforts were successful, and that you are no longer required to retrofit or retire the system.
- Include in your notification to EPA:**
- the identification of the facility;
  - a description of the refrigeration system;
  - the date of your original notification to EPA; and
  - the date work was completed on the system.
4. If your system is *custom-built* and you want the one-year extension, then notify EPA (see Module F). The notification is due within six months after the end of the 30 day period following discovery of the excessive leak rate. The notification must include the following information, which must also be retained on-site.
- the identification of the facility and the owner or operator;
  - a description of the refrigeration system;
  - the leak rate;



- the method used to determine the leak rate and *full charge*;
- the date when the excessive leak rate was discovered;
- the location of leaks to the extent determined so far;
- any repair work that has already been completed and the date of completion;
- the reasons why you need an extension of time. Include records sufficient for EPA to determine that you qualify for the extra year. This means you must demonstrate that the new or retrofitted system is *custom-built*, and that a vendor has quoted a delivery time of more than 30 weeks from when an order is placed, for the system or a *critical component*;
- an estimate that the retrofit or retirement will be completed by the end of the one-year extension;
- a copy of your retrofit or retirement plan; and
- the date of your original notification to EPA if any.



5. If your system is *custom-built*, you have already received one extra year, and you discover that you will need more time (beyond a total of two years), then you must request additional time. The request must be sent to EPA before the end of the ninth month of the second year. It must contain relevant revisions of the information you submitted when you sent the notice to get the first extra year. Notify EPA how much more time you will need, and the reasons why. If EPA does not object within 30 days after receiving your request, you are granted the additional time.



## Full Charge

If the *full charge* of an *industrial process refrigeration system* is determined by establishing a range or combining the use of an established range with any other acceptable method (discussed in Module C), records must be maintained.

These records must include:


- Identification of the owner or operator of the system;
- Location of the system;
- Original range for the *full charge* of the system, its midpoint, and how the range was determined;
- Any and all revisions of the *full charge* range and how they were determined; and
- Dates such revisions occurred.

## Purged Refrigerant

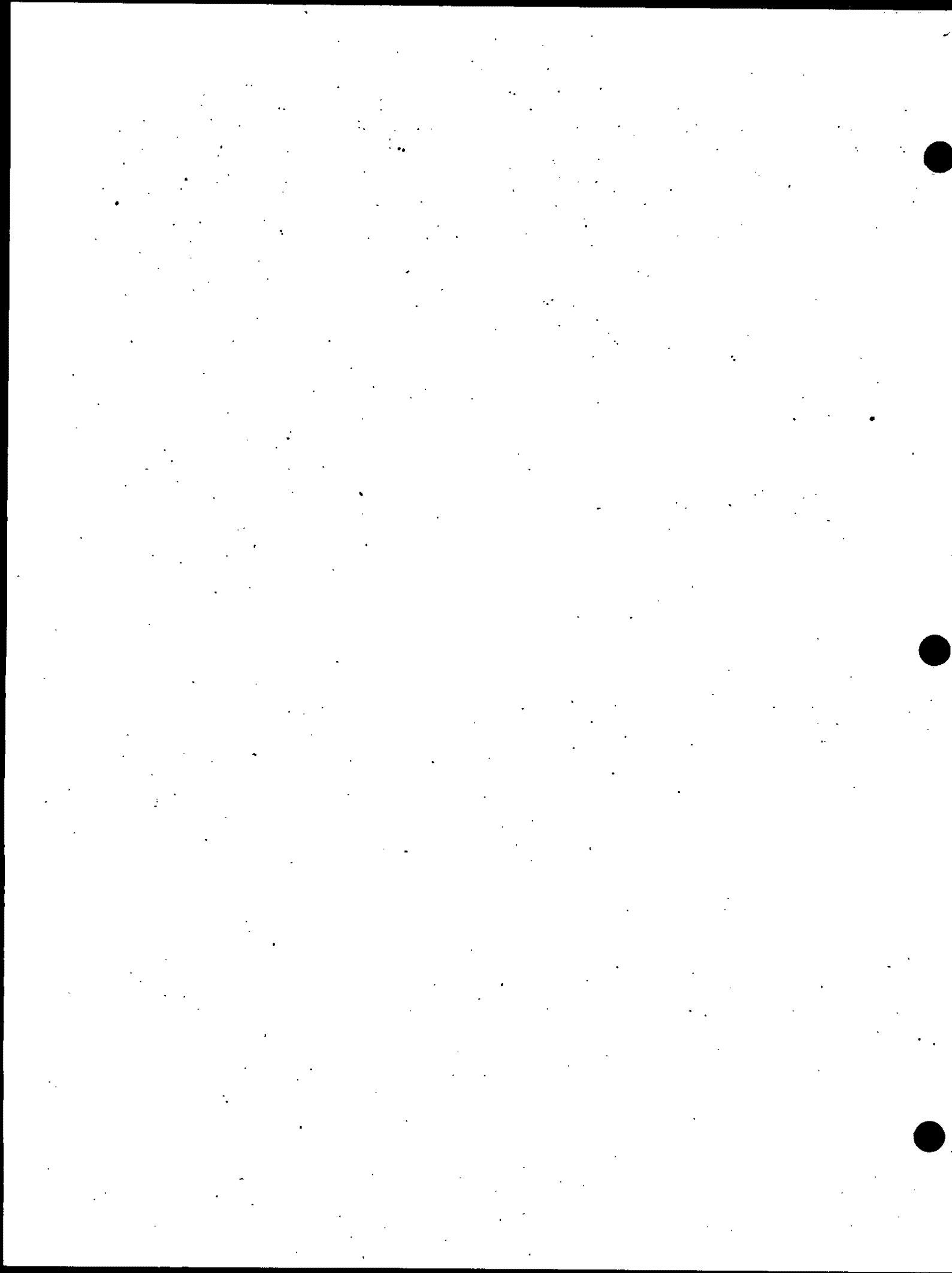
Owners or operators who wish to exclude purged refrigerants that are destroyed from annual leak rate calculations must maintain records to support the amount of refrigerant claimed as sent for destruction. Records must be based on a monitoring strategy that provides reliable data to demonstrate that the amount of refrigerant sent for destruction corresponds with the amount of refrigerant purged. Records must include ALL of the following:

- Flow rate;
- Quantity or concentration of the refrigerant in the vent stream;
- Periods of purge flow;
- Identification of the facility and a contact person, including the address and telephone number;
- General description of the refrigeration system, focusing on aspects of the system relevant to the purging of refrigerant and subsequent destruction;
- Description of the methods used to determine the quantity of refrigerant sent for destruction and type of records that are being kept by the facility;
- Frequency of monitoring and data-recording; and
- Description of the control device and its destruction efficiency.

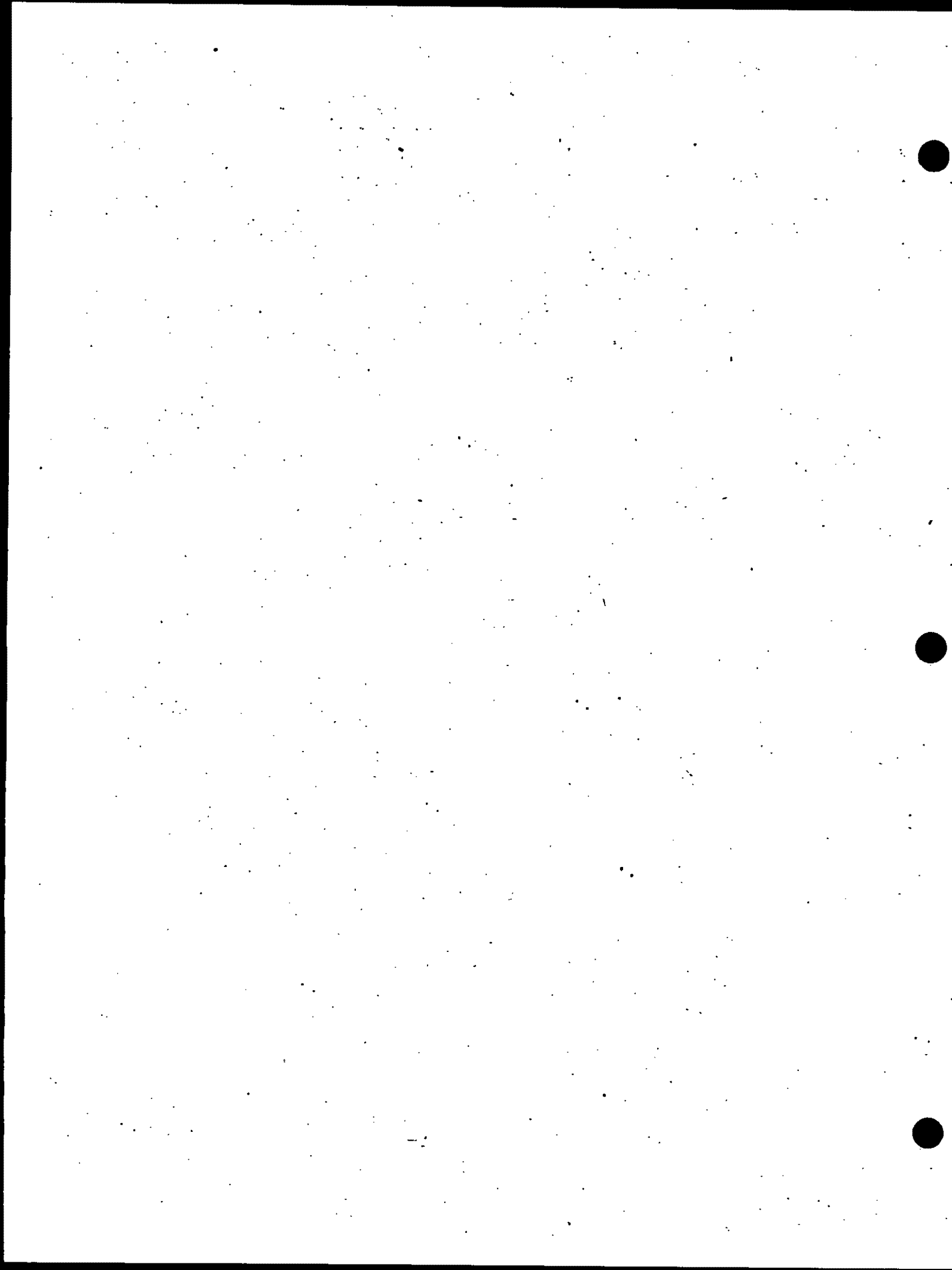


QUESTIONS	ANSWERS
<p>Do I need to maintain records and submit information every time a leak is found and repaired?</p> 	<p>No, the law does not require recordkeeping for the following scenarios:</p> <ul style="list-style-type: none"> <li>• If you are below the trigger rate, you do not need to maintain or submit records (except the normal servicing records required by the original refrigerant recycling regulations).</li> <li>• If you repair a leak within 30 or 120 days (if applicable) of discovery, you are required to perform verification tests but are not required to submit records.</li> </ul> <p>If you are above the trigger rate and require an extension, you must maintain and submit records.</p>
<p>Do I always need to maintain records and submit information to retrofit or retire <i>industrial process refrigeration</i> systems?</p>	<p>Yes and no. If you can retrofit or retire the affected system within a 12-month period, records must be maintained, but information does not need to be submitted to EPA. In this case, the owners or operators must develop a 12-month retrofit or retirement plan within 30 days of discovering a leak rate higher than 35 percent. The plan, or a legible copy of the plan, must be kept at the site of the leaky system. The original must be available for EPA inspection on request. The plan must be dated and all work under the plan must be completed within a 12-month period of the plan's date. If more than a 12-month period is necessary there will be additional recordkeeping and reporting requirements.</p>
<p>How long must I keep the records?</p>	<p>Three years.</p>
<p>Am I allowed to update a pre-existing retrofit or retirement plan if it was developed in advance of my discovering a leak rate above the trigger rate?</p>	<p>Yes.</p>
<p>If I have submitted information indicating that my company would retrofit a leaky <i>industrial process refrigeration</i> system, but the leak was successfully repaired during a second repair effort, what should I do?</p>	<p>You are not required to retrofit or replace the affected system if second efforts to repair the same leaks that were subject to the first repair efforts are successfully completed within the 30- or 120- day period. You must notify EPA within 30 days of the successful <i>follow-up verification test</i>.</p>

QUESTIONS	ANSWERS
<p>Will EPA notify me of the acceptance or denial of a request for additional time to retrofit or retire our <i>industrial process refrigeration</i> system?</p>	<p>The answer depends on why additional time was requested. EPA will notify the owner or operator within 60 days:</p> <ul style="list-style-type: none"> <li>• If additional time was requested because of delays caused by other federal, state, or local regulations; or</li> <li>• If an acceptable alternative refrigerant with a lower ozone-depleting potential is not available.</li> </ul> <p>The extension will be considered granted without notification from EPA when ALL the following criteria are met:</p> <ol style="list-style-type: none"> <li>1. Additional time is requested because the new or the retrofitted <i>industrial process refrigeration system</i> is custom-built; and</li> <li>2. The supplier of the <i>industrial process refrigeration</i> system, or one or more of its crucial components, has quoted a delivery time of more than 30 weeks from when the order was placed; and</li> <li>3. The owner or operator notifies EPA within six months of the 30-day period following the original discovery of a leak rate higher than 35 percent; and</li> <li>4. The owner or operator maintains adequate records to allow a determination that the criteria are met.</li> </ol> <p>In those cases where more than two years are needed and a timely request is made, the request is considered granted unless EPA objects to the request within 30 days.</p>



## **H. SYSTEM MOTHBALLING**



## H. SYSTEM MOTHBALLING

*System mothballing*, for the purposes of these amendments, is the intentional shutdown of a refrigeration system for an extended period of time, where the refrigerant has been evacuated from the system to at least atmospheric pressure.

These amendments recognize that when a refrigeration system is in a mothballed condition, refrigerant leaks that existed when the system was operating have effectively been stopped because the system has been evacuated. Therefore, the amendments allow the time-related requirements for repairing, retrofitting, or retiring a leaking system to be temporarily suspended while the system is mothballed. The time-related requirements resume on the day the system is brought back on line and is no longer considered mothballed. Leak repairs following mothballing on *industrial process refrigeration* systems are still subject to *initial and follow-up verification tests*.

### Applicability

When a system is mothballed, the time suspensions are available for all types of systems, including commercial, industrial process, and any other systems containing more than 50 pounds of refrigerant. Time suspensions under *system mothballing* apply to all time-related requirements for repairing leaks or replacing, retrofitting, or retiring a system, including time extensions that may be allowed in specific circumstances for *industrial process refrigeration* systems.

### Example of System Mothballing

If a comfort-cooling system with over 50 pounds of refrigerant has a leak rate of more than 15 percent per 12-month period, the leak or leaks must be repaired within 30 days of discovery or the system must be retrofitted or retired within a 12-month period. However, if after

#### Important Note:

*System mothballing* requires the refrigerant to be removed from the system to at least atmospheric pressure. If the owner or operator intends to make repairs to the system that require *opening* the system, the refrigerant must be removed to the required evacuation levels for that refrigerant before the system is opened.

discovery of the exceedance of the leak rate, the owner of the system voluntarily mothballs the system for a period of time, the requirement to repair leaks or retrofit or retire the system is suspended for that same time period. For example, if the system operated for five days after discovery of the exceedance of the leak rate and then was shut down and mothballed for two months, when the system returned to operating, the owner would still have 25 days to either repair the leaks or develop a 12-month retrofit or retirement plan.

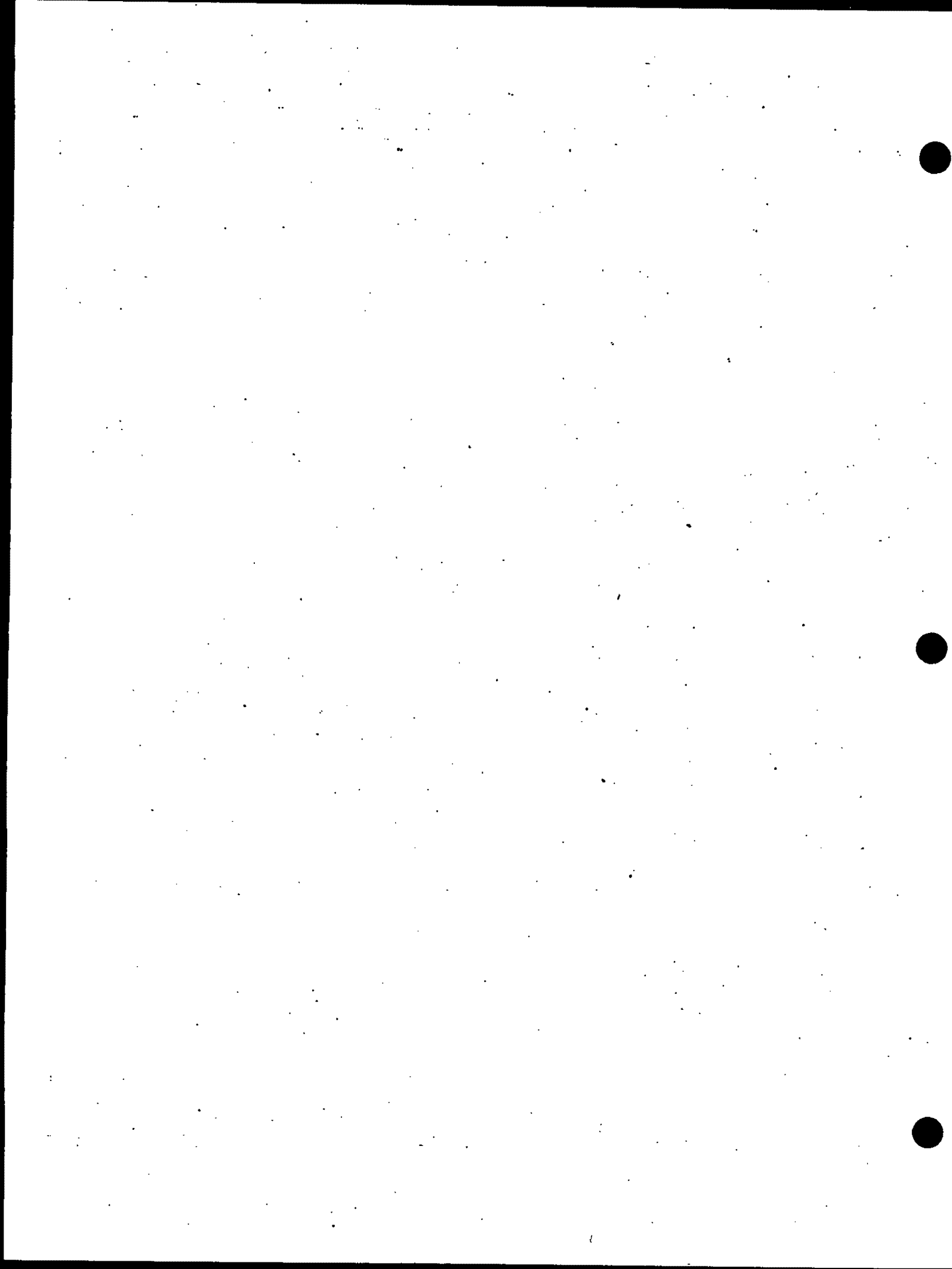
QUESTIONS	ANSWERS
Does mothballing mean I just shut down my system and don't use it for a while?	No. There is an additional requirement that the refrigerant must be evacuated to at least atmospheric pressure. This ensures that there is practically no potential for refrigerant to escape from the system while it is down.
Am I allowed to conduct leak repairs on a system that is mothballed? How long do I have to conduct these repairs?	Yes, repairs may be conducted while a system is mothballed, and there is no time limit to make the repairs. If the system must be opened to conduct the repairs, the refrigerant must be removed to the required evacuation levels first. Also, for <i>industrial process refrigeration</i> systems, applicable verification tests on the leak repairs must be conducted.
Do I have to report to EPA if I'm temporarily mothballing a system that's leaking above the trigger rate?	No, <i>system mothballing</i> does not require a report to EPA. However, the owner or operator will need to report to EPA if the decision to temporarily mothball a system results in delaying an estimated completion date that has previously been submitted to EPA for repairing, retrofitting or retiring the system.
Suppose I write up a 12-month retrofit plan within 30 days of discovering an excessive leak rate on a system, and, during that 12-month period, I mothball the system for a period of three months. When must the retrofit be completed?	If the system was mothballed for three months and no other time extensions apply, the retrofit must be completed within 15 months of the plan's date. If a plan has been submitted to EPA, then you must notify EPA of the extension of the completion date.



QUESTIONS	ANSWERS
<p>Is the deadline for verification testing suspended while a system is mothballed? For example, if I have an <i>industrial process refrigeration</i> system with a leak rate above the trigger rate, and I fix the leaks while the system is mothballed, may I continue to keep the system mothballed for four more months without performing verification tests?</p>	<p>Yes. All deadlines are suspended during mothballing. In the example you have given, <i>initial verification tests</i> could be performed at any time before bringing the system on-line. <i>Follow-up verification tests</i> are not required, and usually are not allowed, while the system is mothballed. If the repairs fail <i>initial verification tests</i>, you are allowed to continue your repair efforts while the system is still mothballed. However, the repairs must pass <i>initial verification tests</i> before the system is brought on-line, unless you plan to retrofit or retire the system. When you bring the system out of a mothballed state, the deadline for performing <i>follow-up verification tests</i> would begin. In the example you have given, you would have up to 30 days to perform those tests.</p> <p>Please remember that, if you have evacuated the system only to atmospheric pressure during mothballing, a deeper vacuum will generally be required before you open the mothballed system to perform repairs.</p>



## **I. OIL CHANGES**



**Why are we talking about oil changes? That has nothing to do with leak repair!**

**Maximum allowable pressure:  
5 psig**

**NOTE:** Changing oil at higher than 5 psig is considered a violation of the prohibition against knowingly venting a refrigerant.

**NOTE:** The refrigerant recycling amendments generally do not permit the use of nitrogen to pressurize low pressure systems or receivers.

## **I. OIL CHANGES**

EPA's recent refrigerant recycling amendments deal with leak repair. However, they also address procedures to minimize emissions of refrigerant during oil changes. Many companies and *technicians* have been interested in this topic, so it is discussed here.

The oil in a refrigeration system may contain large amounts of refrigerant. EPA requires a reduction in pressure prior to an oil change so that the bulk of the refrigerant is recovered. The maximum pressure allowed is 5 psig. This greatly reduces refrigerant emissions while still allowing a slight positive pressure to force the oil from the compressor.

There are two acceptable procedures to assure recovery of refrigerant:

1. Evacuate (or pressurize) the refrigeration system, or isolated portion, to a pressure no higher than 5 psig and then remove the oil; or
2. Drain the oil into a system receiver to be evacuated (or pressurized) to a pressure no higher than 5 psig.

These procedures minimize the loss of refrigerant from: a) the oil, and b) the interior of the refrigeration system as the oil comes out. EPA allows a slight positive pressure to help expel the oil.



## **J. GLOSSARY**





## J. GLOSSARY

The glossary provides important terms used in this guidance.

### *Appliance*

Any device that contains and uses a class I or class II substance as a refrigerant and is used for household, commercial, or industrial purposes, including any air conditioner, refrigerator, chiller, or freezer. Essentially any sort of cooling equipment that uses a class I or class II substance as a refrigerant is an "appliance."

### *Class I refrigerant*

Most Class I substances are usually chlorofluorocarbons (CFCs). A complete listing of class I substances can be found at 40 CFR Part 82, Subpart A, Appendix A.

### *Class II refrigerant*

Class II substances are hydrochlorofluorocarbons (HCFCs). A complete listing of class II substances can be found at 40 CFR Part 82, Subpart A, Appendix B.

### *Commercial refrigeration*

Refrigeration appliances utilized in the retail food and cold storage warehouse sectors. Retail food includes the refrigeration equipment found in supermarkets, convenience stores, restaurants, and other food service establishments. Cold storage includes the equipment used to store meat, produce, dairy products, and other perishable goods.

### *Critical component*

A component without which an industrial process refrigeration system will not function, will be unsafe in its intended environment, and/or will be subject to failures that would cause the industrial process served by the system to be unsafe.

### *Custom-built*

The system or any of its critical components cannot be purchased and/or installed without being uniquely designed, fabricated, and/or assembled to satisfy a specific set of industrial process conditions.

***Follow-up verification test***

Those tests that involve checking the repairs within 30 days of returning the system to normal operating characteristics or conditions. Follow-up verification tests for equipment from which the refrigerant charge has been evacuated means a test conducted after the system or portion of the system has resumed operation at normal operating characteristics or conditions of temperature and pressure, except in cases where sound professional judgment dictates that these tests will be more meaningful if performed prior to the return to normal operating characteristics or conditions. A follow-up verification test for a system that has not been evacuated means a reverification test conducted after the initial verification test and usually within 30 days of normal operating conditions. Where a system is not evacuated, it is only necessary to conclude any required changes in pressure, temperature, or other conditions to return the system to normal operating characteristics or conditions.

***Full charge***

The amount of refrigerant required for normal operating characteristics or conditions of industrial process refrigeration systems and certain federally-owned appliances as determined using one or a combination of the following four methods:

1. Using the system manufacturer's determination of the correct full charge for the system;
2. Determining the full charge by appropriate calculations based on component sizes, density of refrigerant, volume of piping, and all relevant considerations;
3. Using actual measurements of the amount of refrigerant added or evacuated from an industrial process refrigeration system; and/or
4. Using an established range based on the best available data, regarding the normal operating characteristics and conditions for the system, where the midpoint of the range will serve as the full charge and where records are maintained in accordance with 40 CFR 82.166 (g).

***Industrial process refrigeration***

Complex, customized systems used in the chemical, pharmaceutical, petrochemical, and manufacturing industries. These systems are directly linked to the industrial process. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it will be considered an industrial process refrigeration system if 50 percent or more of its operating capacity is used for industrial process refrigeration.

***Industrial process shutdown***

An industrial process or facility temporarily ceases to operate or manufacture whatever is being produced at the facility.

***Initial verification test***

Those leak tests that are conducted as soon as practicable after the repair is completed. If the system or isolated portion is evacuated, it means a test conducted prior to replacing of the full refrigerant charge and before the system or portion of the system has reached operation at normal operating characteristics or conditions of temperature and pressure. An initial verification test conducted without the evacuation of the refrigerant charge means a test conducted as soon as practicable after the completion of the repair work.

***Normal operating characteristics or conditions***

Temperatures, pressures, fluid flows, speeds, and other characteristics that would normally be expected for a given process load and ambient condition during operation. Normal operating characteristics or conditions are marked by the absence of atypical conditions affecting the operation of the refrigeration system.

***Opening***

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

***Reclaim refrigerant***

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

***Recover refrigerant***

To remove refrigerant in any condition from an appliance without necessarily testing or processing it in any way.

***Refrigerant circuit***

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

***Sound professional judgment***

A decision-making process that uses a combination of logic and operational experience, with methods of calculation that are practical, based on training, experience, and education.

***Suitable replacement refrigerant***

A refrigerant acceptable under section 612(c) of the Clean Air Act Amendments of 1990 and all regulations promulgated under that section, and compatible with other materials which it may come into contact. The SNAP-approved refrigerant must also be able to achieve the temperatures required for the affected industrial process in a technically feasible manner.

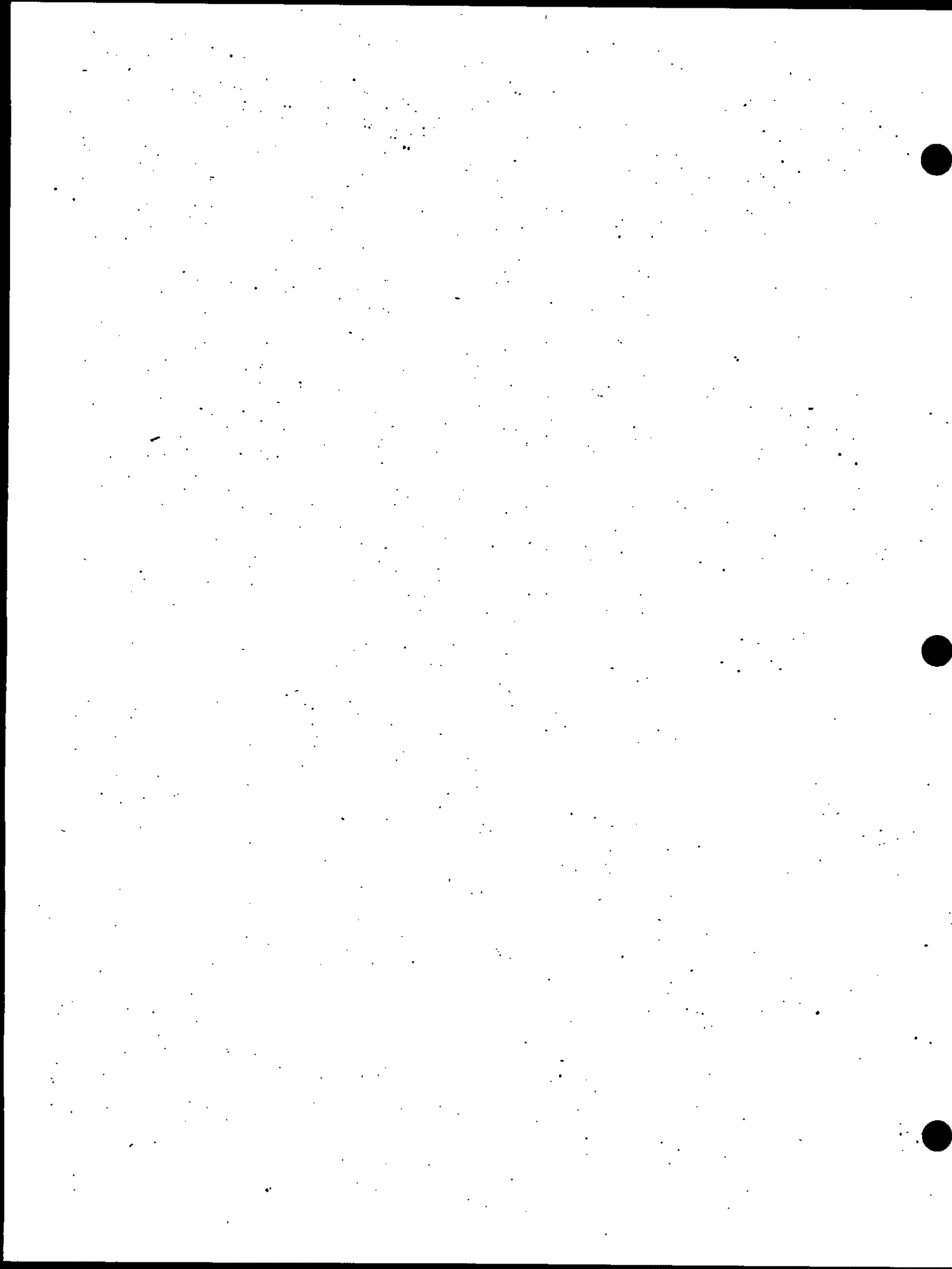
**NOTE:** The Significant New Alternatives Policy (SNAP) program implements section 612 of the amended Clean Air Act of 1990. SNAP requires EPA to evaluate substitutes for ozone-depleting substances and disapprove the use of unacceptable substitutes. SNAP generates lists of acceptable and unacceptable substitutes for each of the major industrial use sectors.

***System mothballing***

Intentional shutdown of a refrigeration system undertaken for an extended period of time by the owners or operators of that facility, where the refrigerant has been evacuated from the appliance, or the affected isolated section of the appliance, at least to atmospheric pressure.

**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, or 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. Such activity includes attaching and detaching hoses and gauges to and from the appliance to add or remove refrigerant or to measure pressure and adding refrigerant to and removing refrigerant from the appliance. Activities such as painting the appliance, rewiring an external electrical circuit, replacing insulation on a length of pipe, or tightening nuts and bolts on the appliance are not reasonably expected to violate the integrity of the refrigerant circuit. Performing maintenance, service, repair, or disposal of appliances that have been evacuated pursuant to 40 CFR 82.156 could not be reasonably expected to release refrigerants from the appliance unless the maintenance, service, or repair consists of adding refrigerant to the appliance. Technician includes but is not limited to installers, contractor employees, in-house service personnel, and in some cases, owners or operators.



## **K. REFERENCES**





## **K. REFERENCES**

### **STRATOSPHERIC OZONE INFORMATION HOTLINE: 800-296-1996**

The hotline is open between 10:00 a.m. and 4:00 p.m. Eastern time.

### **STRATOSPHERIC PROTECTION DIVISION'S INTERNET HOME PAGE:**

**HTTP:\\WWW.EPA.GOV\\DOCS\\OZONE\\INDEX.HTML**

### **STRATOSPHERIC OZONE PROTECTION RULEMAKING SUMMARY**

#### **Section 608 - National Recycling Program**

**58 FR 28660 (5/14/93)**

- 1) Technical Amendments to the National Recycling Program:  
FR 42950 (8/19/94)**
  - Amends the final rule by making clarifications and making technical corrections.
- 2) Technician Certification Amendment to the National Recycling Program: FR 55912 (11/09/94)**
  - Establishes the process by which EPA can review and approve voluntary *technician* certification programs that apply by December 9, 1994 to be "grandfathered."
  - Clarifies the scope of the technician certification requirement and provides a limited exemption from certification for apprentices.

#### **Section 612 - Significant New Alternatives Policy**

**59 FR 13044 (3/18/94)**

Establishes a process for continuing review of substitutes to determine their acceptability and provides a petition process to add and delete substances from published lists. Includes initial lists of acceptable and unacceptable substitutes.

### **STRATOSPHERIC OZONE PROTECTION FINAL RULE SUMMARY**

**EPA-430-f-93-010**

A fact sheet that provides an overview of the refrigerant recycling requirements of section 608 of the Clean Air Act, 1990, as amended, including final regulations published on May 14, 1993 (58 FR 28660) and the prohibition on venting that became effective on July 1, 1992.

**NOTE:** Additional fact sheets on individual rules are also available through the Hotline.

## **EPA APPLICABILITY DETERMINATIONS**

Guidance prepared by the regulatory agency at the request of an outside party regarding the applicability of a regulation to a specific facility/unit/process. Applicability determinations are made available through either the Technology Transfer Network (TTN) or the Stratospheric Ozone Information Hotline. The TTN can be accessed via computer modem at (919) 541-5742; for more information regarding the TTN, call (919) 541-5384 between 1:00 p.m. and 5:00 p.m. Eastern time.

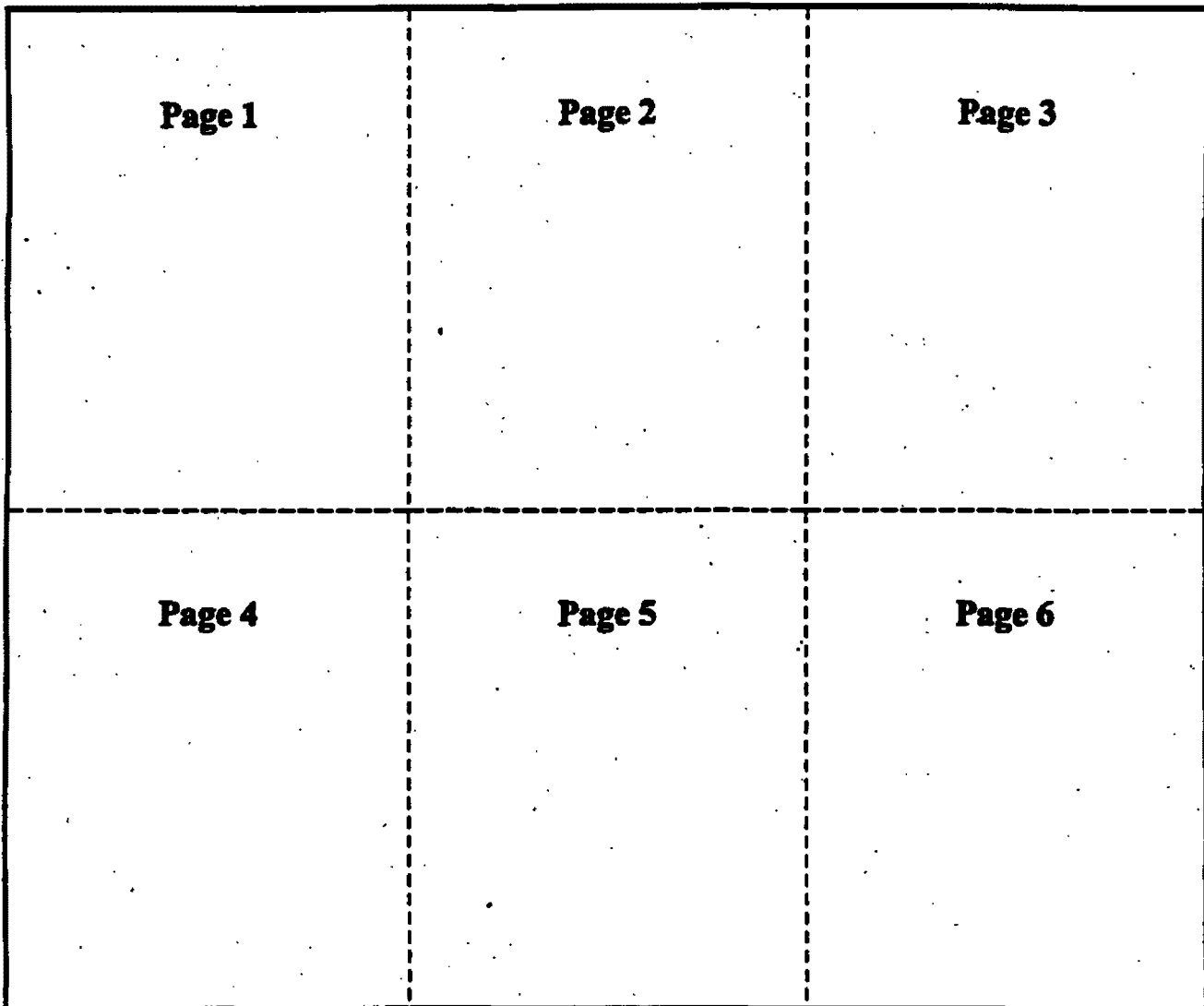
**APPENDIX:**

**REFRIGERANT LEAK REPAIR  
FLOW CHART**



## Refrigerant Leak Repair Flow Chart

The following flow chart is divided into six pages, and is constructed so that it may be viewed as a whole by placing the pages in the arrangement shown below.

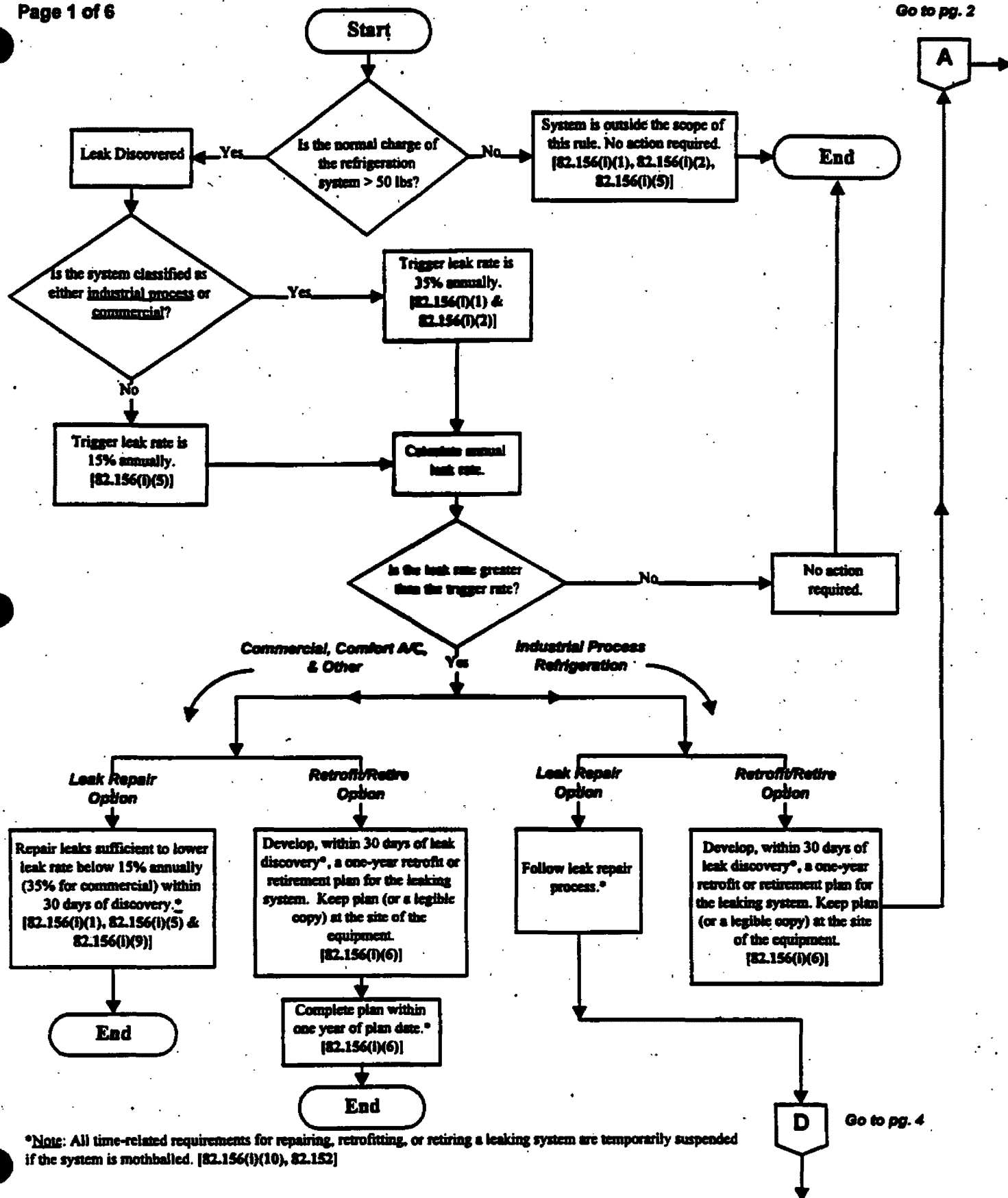


Where appropriate, the flow chart includes references to 40 CFR from which the statements in the boxes are derived.

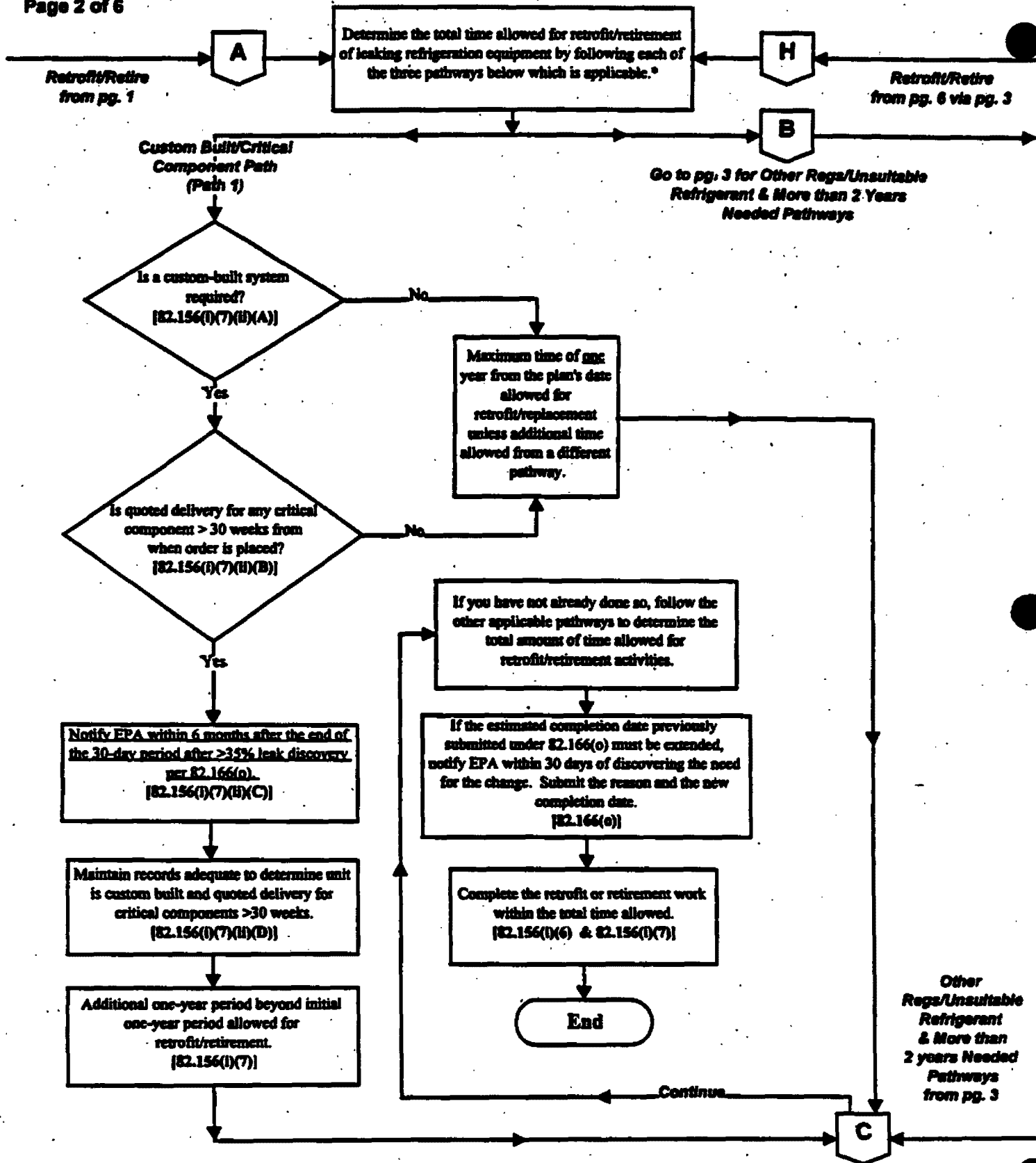


# Refrigerant Leak Repair Flow Chart

Page 1 of 6

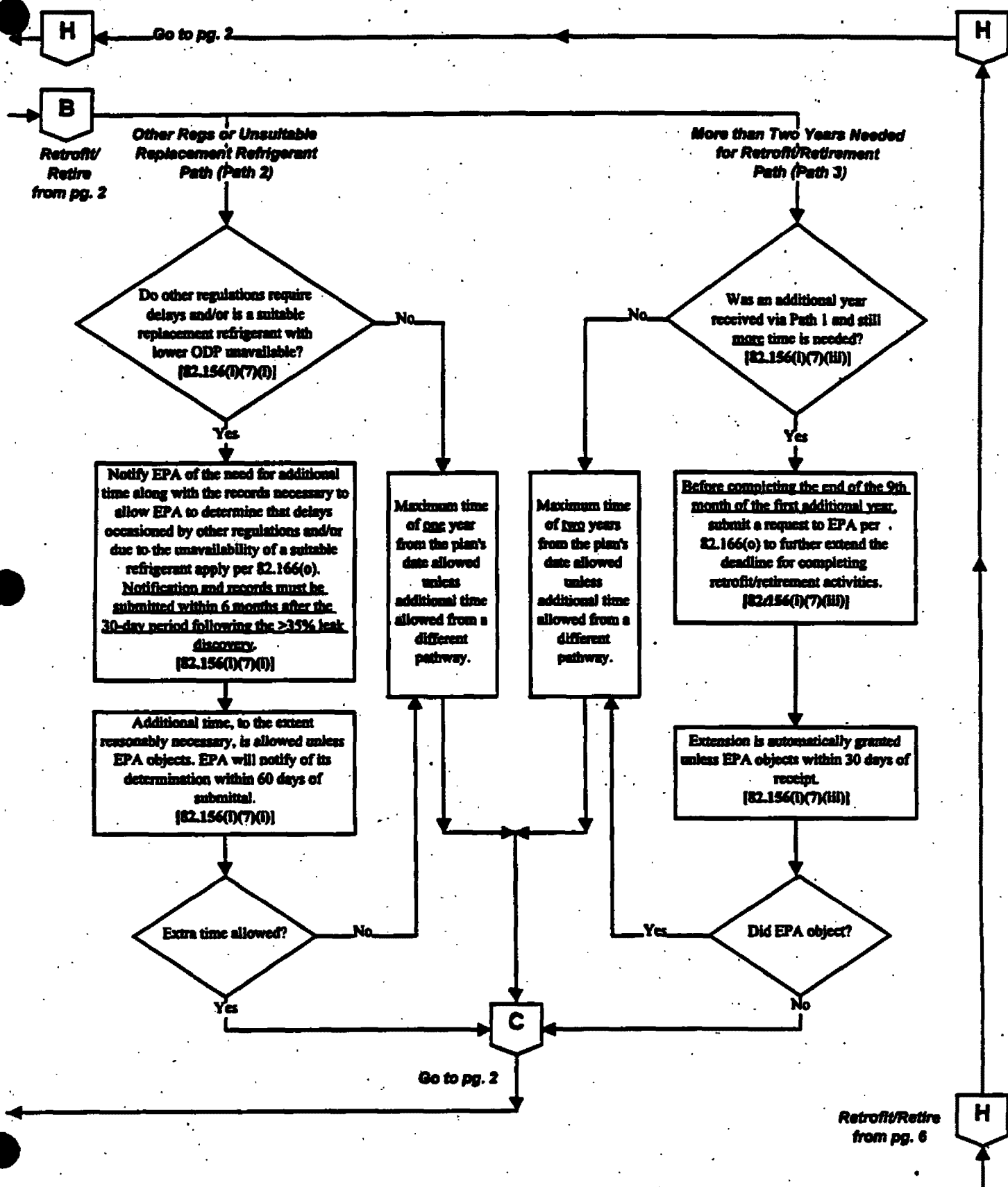


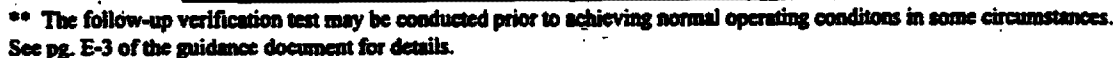
\*Note: All time-related requirements for repairing, retrofitting, or retiring a leaking system are temporarily suspended if the system is mothballed. [82.156(I)(10), 82.152]



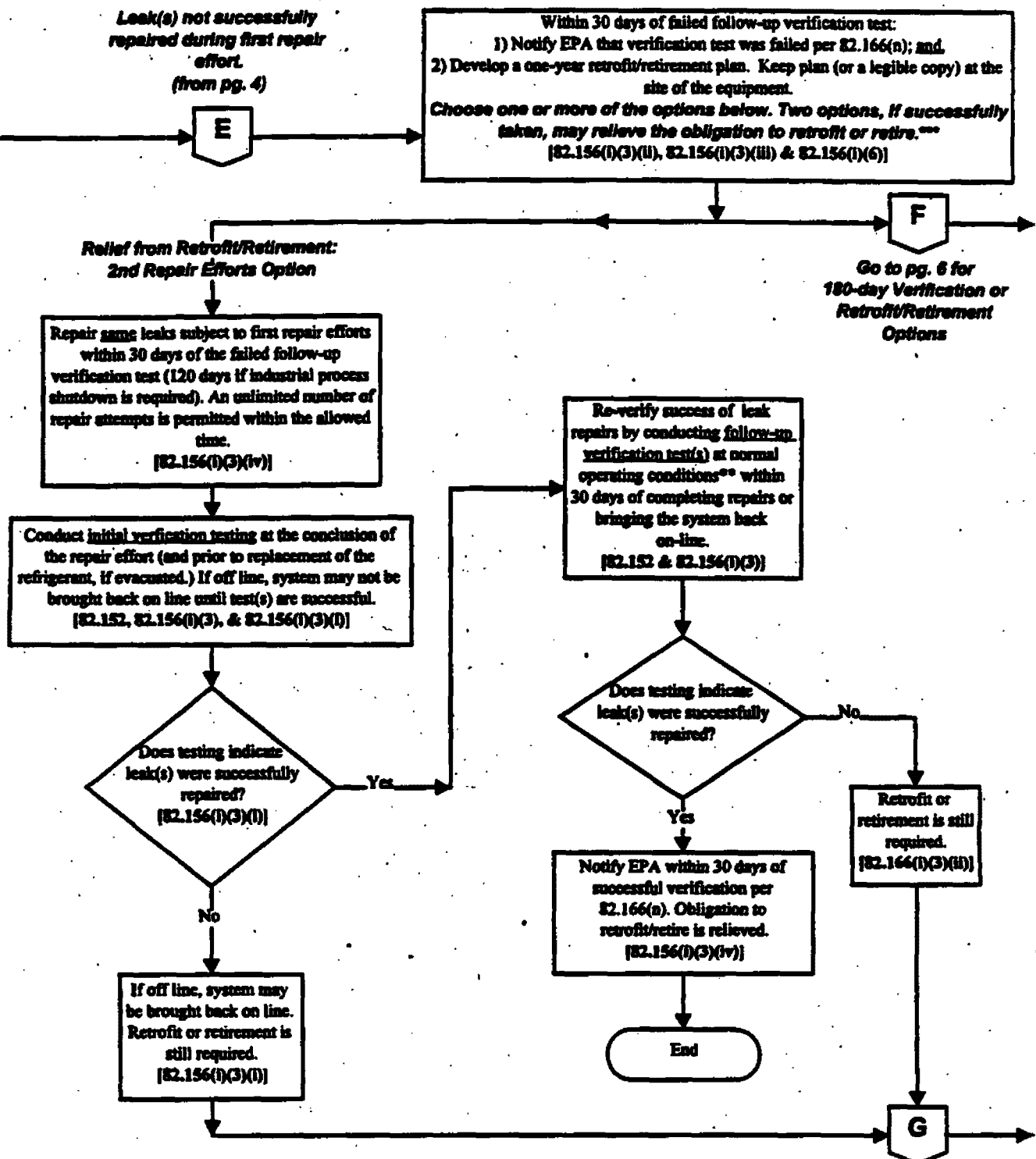
\*Note: All time-related requirements for repairing, retrofitting, or retiring a leaking system are temporarily suspended if the system is mothballed. [82.156(i)(10), 82.152]







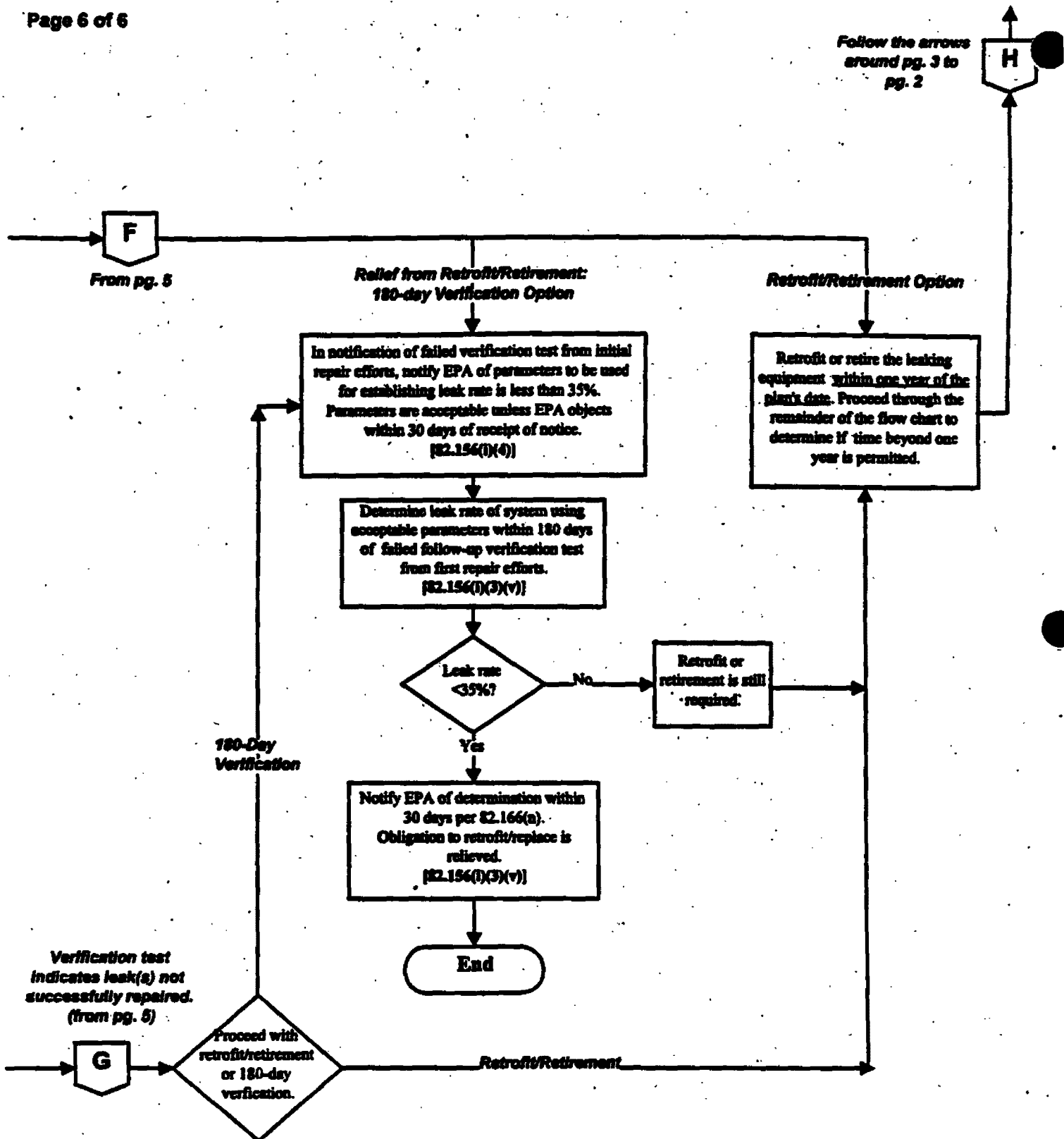
**\*\* The follow-up verification test may be conducted prior to achieving normal operating conditions in some circumstances. See pg. E-3 of the guidance document for details.**



\*\* The follow-up verification test may be conducted prior to achieving normal operating conditions in some circumstances. See pg. E-3 of the guidance document for details.

**\*\*\* IMPORTANT NOTE:** The deadline for completing a retrofit or retirement and the deadline for requesting an extension if more than one year is needed to retrofit or retire are both based on the date of the failed verification test from the initial repair efforts. You should be aware of these deadlines and make appropriate provisions if you intend to attempt one or both of the options to be relieved of the obligation to retrofit or retire and are ultimately unsuccessful.

Follow the arrows  
around pg. 3 to  
pg. 2



# **Compliance Guidance for the Amendments to the Leak Repair Rule Provisions of §608** **Questionnaire**

Please help us gauge the usefulness of this guidance by completing this short form. Your response will be kept confidential. Aggregated response data will be published, but only to illustrate whether this guidance was beneficial to its users. Your judgment of the document's utility will help, CMA and EPA to decide how to improve it, or whether they should even develop future compliance tools together. We appreciate you taking time to complete the following questions.

## **DEMOGRAPHICS**

1. What type of business do you work for? (check one of the following)

Chemical \_\_\_\_\_ Refining \_\_\_\_\_ Recycling \_\_\_\_\_ Refrigeration Service \_\_\_\_\_

Other manufacturing (please identify): \_\_\_\_\_

Other non-manufacturing (please identify): \_\_\_\_\_

2. How many people does your facility employ (including contractors)? (check one of the following)

<50 Employees \_\_\_\_\_ 51-100 Employees \_\_\_\_\_ 101-500 Employees \_\_\_\_\_

501-1000 Employees \_\_\_\_\_ 1001-5000 Employees \_\_\_\_\_ 5001-10,000 Employees \_\_\_\_\_

>10,000 Employees \_\_\_\_\_

3. What are your job responsibilities? (check any of the following that apply)

Support Engineer \_\_\_\_\_ Compliance Staff \_\_\_\_\_ Environmental Engineer \_\_\_\_\_

Corporate Management \_\_\_\_\_ Plant Management \_\_\_\_\_ Operator \_\_\_\_\_

Technician \_\_\_\_\_ Maintenance \_\_\_\_\_ Other: \_\_\_\_\_

4. How did you hear about this guidance? (circle one of the following)

CMA \_\_\_\_\_ EPA's Stratospheric Protection Hotline \_\_\_\_\_ Trade Press \_\_\_\_\_

Other: \_\_\_\_\_

## **ASSESSMENT**

Please indicate your agreement with the following statements from

1=Strongly Agree to 5=Strongly Disagree

Statement	1	2	3	4	5	N/A to my job
The guidance provides a good overview of the amendments to the leak repair provisions of §608.						
The guidance helped my facility/company comply.						
The guidance was timely.						
The guidance helped my facility/company get into compliance quicker than it would have if I had to develop our own guidance.						
The guidance saved my facility/company resources/time that would have been spent developing our own guidance.						
If so, how many hours were saved? _____						
In addition to this guidance, a training package would be useful.						
In addition to this guidance, a self-auditing package would be useful.						
I would like similar guidance to be developed for other rules. If so, which ones?						
Additional Comments: (Please indicate any addition comments on the back page, or attach them on a separate page).						

Return survey to the Chemical Manufacturers Association, c/o Compliance Assistance Manager at the following address:

Prior to January 7, 1996, to: 2501 M St., NW, Washington, DC 20037 (or fax to 202/887-5426)

After January 7, 1996, to: 1300 Wilson Boulevard, Arlington, Virginia 22209 (or fax to 703/741-6531)





