Refrigerant Rule Revisions: Is Your Facility Prepared?

AWMA NFS Annual Enrichment Seminar
Buffalo, NY - January 24, 2019

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Manager of Consulting Services
Agenda

> Summary of refrigerant rules and basic refrigerant types
> Refrigerant phase out or phase down
  ❖ EPA’s Significant New Alternatives Policy (SNAP) Program
  ❖ Montreal Protocol
> Appliance servicing requirements
  ❖ EPA’s 11/18/2016 rule revisions
  ❖ EPA’s 10/01/2018 proposal
> Tips for facilities and HVAC/R contractors
> Refrigerant Management Tools
> Q&A
International treaty - established in 1987 in response to hole in ozone layer that forms over Antarctica each year

- Targets ODS, including CFCs and HCFCs
- Amended several times using “worst first” approach; recently amended to target HFCs

U.S. law or statute - gives EPA authority to develop rules to implement requirements in Montreal Protocol

EPA rule - what you have to comply with on day-to-day basis
Basic Refrigerant Types (1 of 2)
(Ozone Depleting Substances)

> CFCs - chlorofluorocarbons (e.g., R-11, R-12)
  ✤ 1st generation refrigerants
  ✤ Class I ozone depleting substances (ODSs) with ozone depletion potential (ODP) > 0.2
  ✤ Production phased out since 1996

> HCFCs - hydrochlorofluorocarbons (e.g., R-22, R-141b, R-142b)
  ✤ 2nd generation refrigerants
  ✤ Class II ODSs with ODP < 0.2
  ✤ Production being phased out by 2020 (R-22 phase out started in 2010)
Basic Refrigerant Types (2 of 2)  
(Non-exempt Substitutes)

> HFCs - hydrofluorocarbons  
  (e.g., R-134a, R-407C, R-410A)
  ❖ 3rd generation refrigerants
  ❖ Non-ODS, but several have high global warming potential (GWP)
  ❖ Production targeted for future phase down

> Next generation refrigerants
  ❖ Non-ODS and low GWP
  ❖ Hydrocarbons - e.g., R-290 (propane), R-600a (isobutane)
  ❖ Hydrofluoroolefins (HFOs) - e.g., R-1234yf
  ❖ HFC/HFO blends - e.g., R-448A, R-449A
How Do EPA’s Refrigerant Rules Impact Facilities and HVAC/R Technicians/Contractors?

1. Phase Out of Specific Refrigerants (Subparts A, C, G, & I)
   - CFCs phased out of production in 1996 (e.g., R-11, R-12)
   - HCFCs being phased out of production (e.g., R-22) by 2020
   - HFCs now targeted for phase down
   - SNAP Program approves/disapproves substitutes
   - Reduces supply and increases cost

2. Required Practices When Working on AC Units (Subparts B & F)*
   - Technician certifications
   - Evacuation & recovery (no venting)
   - Disposal requirements
   - Sales restrictions
   - Leak repair provisions for units with full charge ≥ 50 lbs
   - Promotes recovery, recycling, & reclamation

*Commonly referred to as Clean Air Act Section 609 (mobile) and Section 608 (stationary) provisions
1. Developments in Refrigerant Phase Out Schedules
HCFC (R-22) Phase Out is Here

> HCFC production phase out schedule
  ✤ 2015 = 90%
  ✤ 2020 = 99.5% overall and 100% for R-22 & R-142b
  ✤ 2030 = 100%

> R-22 quandary
  ✤ EPA production allocations:
    ♦ 13 million lbs (2017)
    ♦ 9 million lbs (2018)
    ♦ 4 million lbs (2019)
    ♦ 0 million lbs (2020)
  ✤ Recycle/reclamation:
    < 10 million lbs/year
    (2016 EPA estimate)
  ✤ ~200 million lb/year service need in the U.S.

> Costs for R-22 have already risen 10x since 2006
HFCs are the New Target - Kigali Amendment

> HFC phase down within Kigali Amendment to Montreal Protocol, 10/15/2016
  ❖ 2019 - 10%
  ❖ 2024 - 40%
  ❖ 2029 - 70%
  ❖ 2034 - 80%
  ❖ 2036 - 85%
  ❖ Relative to 2011-2013 HFC baseline + 15% of HCFC/CFC baseline

> Trump Administration quiet on ratification
HFCs are the New Target

- HFCs (e.g., R-134a, R410A), which are the most common replacement for HCFCs, are the new target since they are potent GHGs
- HFC targeting mechanisms
  - EPA’s SNAP Program
  - Kigali Amendment to Montreal Protocol
  - Expansion of 40 CFR 82, Subpart F (i.e., CAA Section 608) provisions to non-ODS substitutes
  - Will be covered in next section
Significant New Alternatives Policy (SNAP)

> The SNAP program is intended to:
  - Identify and evaluate substitutes in end-uses that have historically used ozone-depleting substances (ODS)
  - Look at overall risk to human health and the environment of both existing and new substitutes
  - Publish lists of acceptable and unacceptable substitutes by end-use.

> EPA authorizes alternatives by industry sectors and end uses
  - **Industry Sectors:** Refrigeration/air conditioning, fire suppression, & others.
  - **End Uses:** Chillers (centrifugal, reciprocating, ...) Cold Storage Warehouse, Retail Food Refrigeration, etc.
HFCs are the New Target - SNAP Program

- Stems from former President Obama’s Climate Action Plan, 6/2013
  - Obtained significant private sector commitments to reduce reliance on HFCs from HFC producers, appliance manufacturers, and other end-users
  - Avoids >700MM metric tons of CO₂e emissions
- EPA removed SNAP approval of several HFCs in specific end-uses
  - Court vacated Rule 20 on 8/8/2017
    - DC Circuit denied Chemours/Honeywell appeal on 1/27/2018
NYSDEC Plans to Adopt SNAP Rules

- Federal SNAP Rules 20 & 21 (2015-2016) focus on refrigerants that are GHGs rather than ODS’s
- Governor Cuomo announced intent for New York to adopt regulations similar to Rules 20 & 21
- NYSDEC undergoing stakeholder input process and held pre-proposal webinar in November 2018
- Early plans are to adopt Rules 20 & 21 directly, with implementation as soon as 2020

Impacts to Regulated Community

- No changes to Part 82 Leak Repair Requirements
- No requirement to replace existing units covered by Rules 20 & 21
- Restriction on use of HFCs in specific new / retrofit applications
How Should Facilities Prepare for Impending Refrigerant Phase Outs?

> Facility managers should develop inventory of appliances (age, size, refrigerant type) to quantify exposure to expected rise in refrigerant costs

> Watch for availability of next generation refrigerants (e.g., HCs, HFOs, HFO/HFC blends)
  - Obtain input from appliance manufacturers and HVAC/R contractors

> Analyze new AC/R unit installations and retrofits based on available cost data and unit lifetimes
  - If R-410A is facing an impending phase down, does it make sense to switch your R-22 unit to R-410A?
2. Developments in Required Work Practices when Servicing Refrigerant Containing Appliances
Leak Rate Provisions for Comfort Cooling Appliances - Overview (prior to rule revision)

> Applicable to units with full charge \( \geq 50 \text{ lbs} \) ODS-containing refrigerant
  - Applicability determined on a circuit-by-circuit basis
> If the leak rate \( \geq \) applicable “trigger rate”
  (15% for comfort cooling appliances)
  - The leak should be repaired within 30 days*, or
  - The system should be retrofitted (within 1 year), or
  - The system should be retired from service (within 1 year)
> *One option to extend repair window - mothballing (evacuation & shutdown)
> Servicing records required
  - Date & type of service
  - Amount of refrigerant added
  - Date & amount of refrigerant purchased (if add own refrigerant)
Leak Rate Calculation - It’s a Projection of Amount Lost if Not Repaired for a Year

**EPA Leak Rate Calculation for Appliances with Full Charge ≥ 50 lbs – Annualizing Method**

**Step 1.** Take the pounds of refrigerant added to bring the unit to a full charge, and divide that by the number of pounds the unit holds at full charge.

**Step 2.** Take the shorter of:
- A) the number of days that have passed since the last day refrigerant was added
- B) 365 days

and divide that number into 365 days/year.

**Step 3.** Multiply the result from Step 1 by the result from Step 2.

**Step 4.** Multiply the number calculated in Step 3 by 100 to calculate a percentage.

*Leak Rate (% per year) = \( \frac{\text{Refrigerant Added (lbs)}}{\text{Full Charge (lbs)}} \times \frac{365 \text{ (days)}}{A \text{ or } B \text{ (days)}} \times 100 \)*

Rule also allows for use of the rolling average method, but the annualizing method is, by far, the most commonly used method. Note also that only one leak rate calculation method can be used per facility.
Leak Rate Calculation Example

> Determines the amount of refrigerant that **would** leak out in a year if nothing done

> Example (using “Annualizing Method”):
  Day 1 - Unit fully charged with 250 lbs of R-22
  Day 8 - Unit found to have lost 2 lbs of R-22

Leak Rate = 41.7% =

\[
\frac{2 \text{ lbs refrigerant added}}{250 \text{ lbs refrigerant in full charge}} \times \frac{365 \text{ day/yr}}{7 \text{ days since refrigerant last added}} \times 100
\]
Revisions to Refrigerant Rule
Refrigerant Servicing Rule Revisions

> Rule represents overhaul of 40 CFR 82, Subpart F

> Finalized on 11/18/2016 (81 FR 82272)

> Includes 3 primary categories of changes
  - Extension to non-ODS containing substitutes
  - Revised appliance disposal requirements
  - Revised leak repair provisions for appliances with full charge ≥ 50 lbs

> Staggered compliance dates of 1/1/2017, 1/1/2018 & 1/1/2019
Substitutes are defined as refrigerants, with the following subcategories:

- Non-exempt substitutes - subject to all provisions of rule, including sales restrictions, evacuation, recovery/recycling equipment, technician certification, leak repair, and reclamation provisions

- Exempt substitutes - exempt from all provisions of rule when used in approved applications
Extension to Non-ODS Substitutes - Highlights

- Newly manufactured recovery/recycling equipment must be certified, **1/1/2017** (82.158)
- Restriction on sale of refrigerant, **1/1/2017 & 1/1/2018** [82.154(c)-(d)]
- Technicians must be certified, **1/1/2018** [82.161(a)]
- Evacuation requirements for disposal or opening of appliances, **1/1/2018** [82.155 & 82.156(a)-(d)]
- Leak repair provisions as they apply to appliances with full charge ≥ 50 lbs refrigerant, **1/1/2019** (82.157)
Extension to Non-ODS Substitutes

*October 2018 Proposed Changes*

> Proposed to be rescinded
  - Leak repair provisions as they apply to appliances with full charge ≥ 50 lbs refrigerant, 1/1/2019 requirements
  - No change to 2017 or 2018 requirements

> Alternative proposal
  - EPA requesting comment to rescind Subpart F extension to non-exempt substitutes in its entirety

> As of right now... Full 2016 Rule is in Effect
Revisions to Leak Repair Provisions for ≥ 50 lb Units - Leak Rate, 1/1/2019

> Extends applicability to appliances that contain non-exempt substitutes (e.g., HFCs)
  ❖ Proposed rule revisited this portion of the new rule
> Lowers allowable leak (or repair “trigger”) rates [82.157(c)(2)]
  ❖ Comfort cooling & other units 15% to 10%
  ❖ Commercial refrigeration 35% to 20%
  ❖ Industrial process refrigeration 35% to 30%
Revisions to Leak Repair Provisions for ≥ 50 lb Units - Testing & Repair, 1/1/2019

> Initial and follow-up verification testing
  ❖ Now required for all appliance types, including comfort cooling and commercial refrigeration (was only req’d for industrial units previously)
  ❖ Shortens window for performing follow-up verification test from 30 days to 10 days of initial verification test or of the appliance achieving normal operating characteristics and conditions

> Standard list of extensions to 30-day repair window for all appliance types
  ❖ Mothballing, necessary parts unavailable, radiological contamination issues, & other rules make repair within window impossible
  ❖ 120-day repair window if industrial process shutdown (IPS) required to make repair still reserved for IPRAs
Revisions to Leak Repair Provisions for ≥ 50 lb Units - Leak Inspections, 1/1/2019

> Establishes leak inspection requirements if exceed allowable leak rates [82.157(g)]
  ❖ Commercial/industrial process refrigeration ≥ 500 lbs - quarterly, until 4 consecutive quarters w/ no leaks above allowable leak rate
  ❖ All other units ≥ 50 lbs - once per calendar year, until 1 year w/ no leaks above allowable leak rate
  ❖ Must be performed by certified technicians
  ❖ Not required if equipped with automatic leak detection system
Revisions to Leak Repair Provisions for ≥ 50 lb Units - Chronic Leaker, 1/1/2019

> Reporting required for appliances ≥ 50 lbs that leak more than 125% of their full charge in calendar year [82.157(j)]

❖ “Chronic leaker” provision
❖ Calculation = amount added / full charge (do not use standard leak rate calculation methods for this purpose)
❖ Due 3/1 of following year
   ◆ First report due 3/1/2020
Revisions to Leak Repair Provisions for ≥ 50 lb Units - Recordkeeping [82.157(l)], 1/1/2019

- Expanded servicing records (ID/location of appliance, date of service, parts of appliance serviced and type of service made to each part, name of person performing the service, amount and type of refrigerant added to or removed, full charge, leak rate, leak rate method used)
- Expanded full charge records (full charge, method used, revisions, and date of revisions) for all full charge methods
- Expanded verification test records (location of repairs tested, date, type, and results)
- Adds explicit records for mothballing (date and return to service)
- Adds explicit records for seasonal variance (dates of removal and corresponding addition)
- Adds records of leak inspections (date, method used, leak locations, and certification that all visible parts inspected)
- Adds records for automatic leak detection systems (installation, annual audit and calibration, and date/location of leaks detected)
- Purged refrigerant records (when exempting from leak rate calculations)
- Copies of reports and requests submitted to EPA
- Copies of retrofit/retirement plans

Red = New
Revisions to Leak Repair Provisions for ≥ 50 lb Units - Clarifies Who is Responsible for Servicing Records [82.157(l)(2)], 1/1/2019

(2) Owners or operators must maintain a record including the following information for each time an appliance with a full charge of 50 or more pounds is maintained, serviced, repaired, or disposed of, when applicable. If the maintenance, service, repair, or disposal is done by someone other than the owner or operator, that person must provide a record containing the following information, with the exception of (l)(2)(vii) and (viii) of this section, to the owner or operator:

> Similar language in leak inspection (l)(3) and verification testing (l)(5) recordkeeping provisions
Revisions to Leak Repair Provisions - Notifications & Reporting

- Eliminates one-time notification of acquisition of certified recovery/recycling equipment (effective date = 1/1/2017)
- Requires notifications/reports to be submitted electronically to 608reports@epa.gov [82.157(m)] (effective date = 1/1/2019)
  - E.g., repair window extension requests, chronic leaker reports
Disposal Requirements
Revised Small Appliance Disposal Requirements

> Two options for final processors (e.g., scrap recyclers, landfills) when disposing of small (≤ 5 lb) appliances*
  ❖ Option 1 - evacuate and recover refrigerant
  ❖ Option 2 - verify that refrigerant has been evacuated previously via A) signed statements or B) contract

> 2016 rule
  ❖ Relocates these provisions from 82.156(f) & 82.166(i) to 82.155
  ❖ Under Option 2, adds requirement to obtain signed statement when all refrigerant in an appliance has “leaked out” prior to delivery due to unavoidable occurrences
  ❖ Effective date = 1/1/2017 for ODS-containing refrigerants and 1/1/2018 for non-exempt substitutes

*Also applies to disposal of MVACs and MVAC-like appliances
New Medium Appliance Disposal Requirements, 1/1/2018

> 2016 rule adds explicit technician recordkeeping requirements for disposal of appliances with full charge > 5 lbs and < 50 lbs [82.156(a)(3)]
  ❖ Company name
  ❖ Location of the appliance
  ❖ Date of recovery
  ❖ Type of refrigerant recovered for each appliance
  ❖ The quantity of refrigerant, by type, recovered from all disposed appliances in each calendar month
  ❖ The quantity of refrigerant, by type, transferred for reclamation and/or destruction
  ❖ The person to whom it was transferred
  ❖ The date of transfer

> Owners/operators only required to maintain these records if directly employ technicians
Summary and Tips for Compliance
## Subpart F Matrix by Appliance & Refrigerant Type (after rule revision)

<table>
<thead>
<tr>
<th>Category</th>
<th>Venting Prohibition</th>
<th>Sales Restrictions</th>
<th>Evacuation Req’s</th>
<th>Technician Certs</th>
<th>Disposal Req’s</th>
<th>Leak Repair Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliances w/ Exempt Substitutes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Small Appliances (≤ 5 lbs ODS or Non-Exempt Substitute)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (specific)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Medium Appliances (&gt; 5 lbs &amp; &lt; 50 lbs ODS or Non-Exempt Substitute)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Large Appliances (≥ 50 lbs ODS or Non-Exempt Substitute)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

- **Applies to Non-Exempt Subs on:**
  - 1/1/17 – Used Ref
  - 1/1/17 – Appliances
  - 1/1/18 – New Ref

- **Explicit Records Req’d on:**
  - 1/1/18 – ODS
  - 1/1/18 – Non-Exempt Subs

- **82.156(i) Applies thru:**
  - 12/31/18 – ODS

- **82.157 Applies starting:**
  - 1/1/19 – ODS
  - 1/1/19 – Non-Exempt Subs

- **Leaked out” Records Req’d on:**
  - 1/1/17 – ODS
  - 1/1/18 – Non-Exempt Subs
How Should Facilities Comply with Subpart F Revisions?

> Use EPA required work practices previously reserved for ODS-containing refrigerants (e.g., R-12, R-22) on non-ODS substitutes (e.g., R-134a, R-410A)
  - Certified technicians
  - Certified recovery/recycling equipment
  - Required refrigerant evacuation levels

> Implement changes to appliance disposal recordkeeping system

> Prepare for new leak repair provisions on ≥ 50 lb units
  - Conduct initial and follow-up verification testing for all leaks
  - Implement system to maintain new records

> Coordinate with Refrigerant Contractors/Vendors to confirm compliance
Key Components of Refrigerant Compliance Program

> High-level procedure/policy
> Accurate appliance inventory
  ❖ Focus on large (≥ 50 lb) appliances
> Comprehensive service/repair form
> Comprehensive appliance disposal form
> Leak repair/inspection tracking tool
  ❖ Retrofit/retirement tracking
  ❖ Chronic leaker tracking
> Refrigerant transfer tracking tool
Refrigerant Tracking Tools

> Off-the-shelf software options
  ✤ TrakRef v2 (TrakRef)
    ◆ Only proven option for mobile access
  ✤ Refrigerant Compliance Manager (Sphera)
  ✤ Verisae vx Sustain (Accruent)
  ✤ ODS Sentinel (GenSuite)
  ✤ Refrigerant Management Module (Intelex)
## Trinity Service/Repair Form

### Part B. General Preventive Maintenance or Service Call Information (complete for all appliance types)

<table>
<thead>
<tr>
<th>B1. PM or service call</th>
<th>Service call</th>
<th>PM check</th>
<th>Periodic leak inspection</th>
</tr>
</thead>
</table>

|----------------------|-----------------------------|----------------------------------|

### B3. Periodic Leak Inspection Results (required if appliance w/ full refrigerant charge ≥ 50 lbs has leak above applicable leak threshold):

<table>
<thead>
<tr>
<th>B3a. Date of inspection:</th>
<th>B3b. All visible/accessible parts inspected (Y/N)?</th>
<th>B3c. Method(s) used:</th>
</tr>
</thead>
</table>

### B4. General Description of Service or Maintenance Performed (include leak location & repair info for appliances with full charge < 50 lbs of refrigerant):

<table>
<thead>
<tr>
<th>B5. Leak identified (Y/N)?</th>
</tr>
</thead>
</table>

#### If Leak Identified, Complete the Following:

<table>
<thead>
<tr>
<th>B6. Major or minor service/repair</th>
<th>Major service/repair - involves removal of compressor, condenser, evaporator, or auxiliary heat exchange coil of an appliance; or any repair that involves uncovering an opening of &gt; 4 square inches of &quot;flow area&quot; for &gt; 15 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6. Minor service/repair</td>
<td></td>
</tr>
</tbody>
</table>

### B7. EPA technician certification required for appliance type/refrigerant type:

<table>
<thead>
<tr>
<th>B7a. Was technician used EPA certified for appliance type/refrigerant type (Y/N)?</th>
</tr>
</thead>
</table>

### B8. EPA recovery/recycle (R/R) equipment certification required for refrigerant type:

<table>
<thead>
<tr>
<th>B8a. Was recovery/recycle (R/R) equipment used EPA certified for refrigerant type (Y/N)?</th>
</tr>
</thead>
</table>

### B9. Standard EPA required evacuation level:

<table>
<thead>
<tr>
<th>B9a. Alternative evacuation option required (Y/N):</th>
<th>B9b. Alternative evacuation option used:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>B9c. Was required evacuation level achieved prior to repair/service (Y/N)?</th>
</tr>
</thead>
</table>

### B10. Amount of refrigerant recovered during service/repair:

<table>
<thead>
<tr>
<th>lbs</th>
<th>oz</th>
</tr>
</thead>
</table>

### B11. Amount of additional refrigerant added during service/repair:

| lbs | oz |

<table>
<thead>
<tr>
<th>B12. Date refrigerant added after repair: (indicates when repair complete)</th>
</tr>
</thead>
</table>

### B13. Leak Rate Calculation (Only Applicable if New Refrigerant Added During Service):

\[
\text{Annualized Leak Rate (\% per yr):} = \frac{0.0 (\text{lbs refrigerant added}) \times 365 \text{ (days/yr)}}{\text{365 (days since last charge)}}
\]
Refrigerant Tracking Tools

> Primary considerations when evaluating spreadsheet vs. off-the-shelf software

- Number of appliances and/or sites that have to be managed
- Need for technicians to have mobile access (which eliminates need to manually enter data from forms into tracking tool)
- Cost
- Implementation
Questions
PDH Credit Questions

> What is driving the price increase for common refrigerants like R-22?
> What are some of the significant changes to the Refrigerant Management rules that have already gone into effect?
> What are some of the significant changes to Refrigerant Management rules that will go into effect in 2019?
> What are some Key components of a Refrigerant Management Program?
> What requirements may be affected if the 10/1/18 Proposal is finalized
> Do Technician Certifications expire?
Questions?

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bnoel@trinityconsultants.com

EQ article provided at:
Web Search: “Trinity EQ Refrigerants Ready or Not”, or

ODS / Refrigerant Training Opportunities (Webinar and In-person):
Web Search: “Compliance Workshop for Refrigerants”, or
https://www.trinityconsultants.com/training/1130/compliance-workshop-for-refrigerants-ozone-depleting-substances
Summary of 2016 Changes
Changes to Subpart F Sections

Old Rule
> 82.152 - Definitions
> 82.154 - Prohibitions
> 82.156 - Required practices; (i) includes leak repair provisions
> 82.158 - Standards for recycling & recovery equipment
> 82.160 - Approved equipment testing organizations
> 82.161 - Technician certification
> 82.162 - Certification by owners of recovery & recycling equipment
> 82.164 - Reclaimer certification
> 82.166 - Reporting & recordkeeping requirements

New Rule
> 82.152 - same
> 82.154 - same
> 82.155 - Safe disposal of appliances
> 82.156 - Proper evacuation of refrigerant from appliances; (i) applies until 1/1/2019
> 82.157 - Appliance maintenance & leak repair (applies staring 1/1/2019)
> 82.158 - Standards for recovery and/or recycling equipment
> 82.160 - same
> 82.161 - same
> 82.162 - deleted
> 82.164 - same
> 82.166 - Reporting & recordkeeping requirements for leak repair (until 1/1/2019)

Blue = new
Red = revised
Green = deleted
<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Rule Provision/Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/01/2017</td>
<td>Sales restriction on used non-exempt substitutes, 82.154(d)</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Sales restriction on appliances with non-exempt substitutes (servicing aperture/process stub), 82.154(e)</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Certification of new manufactured/imported recovery/recycling equipment for use with non-exempt substitutes, 82.158</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Non-exempt substitute reclaimer certification, 82.164</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Elimination of one-time notification of acquisition of certified recovery/recycling equipment, 82.162 of old rule</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>New definition of comfort cooling, 82.152</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Modified definition of disposal to cover vandalism and intentional cutting of refrigerant lines, 82.152</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Approved equipment testing organizations must publish online list of certified recovery/recycling equipment, 82.160(e)(1)</td>
</tr>
</tbody>
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### Summary of Changes by Effective Date (2 of 3)

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<thead>
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<th>Rule Provision/Citation</th>
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<tr>
<td>01/01/2017</td>
<td>Signed statement requirement in event all ODS-containing refrigerant leaked out prior to delivery of small appliances, MVACs, and MVAC-like appliances for disposal, 82.155</td>
</tr>
<tr>
<td>01/01/2018</td>
<td>Signed statement requirement in event all non-exempt substitutes leaked out prior to delivery of small appliances, MVACs, and MVAC-like appliances for disposal, 82.155</td>
</tr>
<tr>
<td>01/01/2018</td>
<td>Sales restriction on new non-exempt substitutes, 82.154(c)(1)</td>
</tr>
<tr>
<td>01/01/2018</td>
<td>Small (≤ 2 lb) cans of non-exempt substitutes for MVACs must be equipped with self-sealing valves, 82.154(c)(2)</td>
</tr>
<tr>
<td>01/01/2018</td>
<td>Technicians must be certified to maintain, service, repair, or dispose* of appliances containing non-exempt substitutes, 82.161(a)</td>
</tr>
<tr>
<td>01/01/2018</td>
<td>Approved technician certification programs must publish online list of technicians they have certified on or after 01/01/2017, 82.161(b)(6)</td>
</tr>
</tbody>
</table>

*Consistent with previous rule, technicians do not have to be certified to dispose of small appliances, MVACs, and MVAC-like appliances.
<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Rule Provision/Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/01/2018</td>
<td>Evacuation requirements for disposal and/or opening of appliances containing non-exempt substitutes, 82.155 &amp; 82.156(a)-(d)</td>
</tr>
<tr>
<td>01/01/2018</td>
<td>Recordkeeping requirements for disposal of appliances with full charge &gt; 5 lbs and &lt; 50 lbs, 82.156(a)(3)</td>
</tr>
<tr>
<td>01/01/2019</td>
<td>Revised leak rate provisions for appliances with full charge ≥ 50 lbs refrigerant, 82.157</td>
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