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August 21, 2023

Air Quality Program
P.O. Box 47600
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RE: Chapter 173-443 WAC Hydrofluorocarbons (HFCs) and Other Fluorinated Greenhouse Gases Rule

On behalf of potato farm families, thank you for the opportunity to comment on Chapter 173-443 WAC Hydrofluorocarbons (HFCs) and Other Fluorinated Greenhouse Gases Rule.

Our family potato farms will produce almost 9 billion pounds of potatoes on 155,000 acres in 2023. That harvested crop is used in minimally processed applications--for example, the production of frozen french fries, potato chips, and dehydrated potato products such as instant mashed potatoes. We also have robust fresh potato production which supports a resilient food security presence, domestically and around the globe. A signification portion of our crop is stored under controlled temperature conditions, safely using Hydrofluorocarbons, so that a potato harvested in October of 2023 can then be packed or processed in June/July 2024.

After reviewing the provided information for the Proposed WAC Revisions, a large portion of our family farms will be impacted. Current wording indicated that cold storage warehouses larger than 50lbs of refrigerant will be affected. All systems currently designed in the current market are of higher value as shown in Table 1.

Table 1 - Approximate Charge Per Horsepower

Compressor HP	Lbs. of Refrigerant
25	200
30	200
35	250
40	250
50	300
60	300
70	350
80	350
90	400

This new ruling would require as of January 1, 2025, all new systems would need to be less than 150 GWP. Currently on the market and coming to the market there are very few options as shown in Table 2.

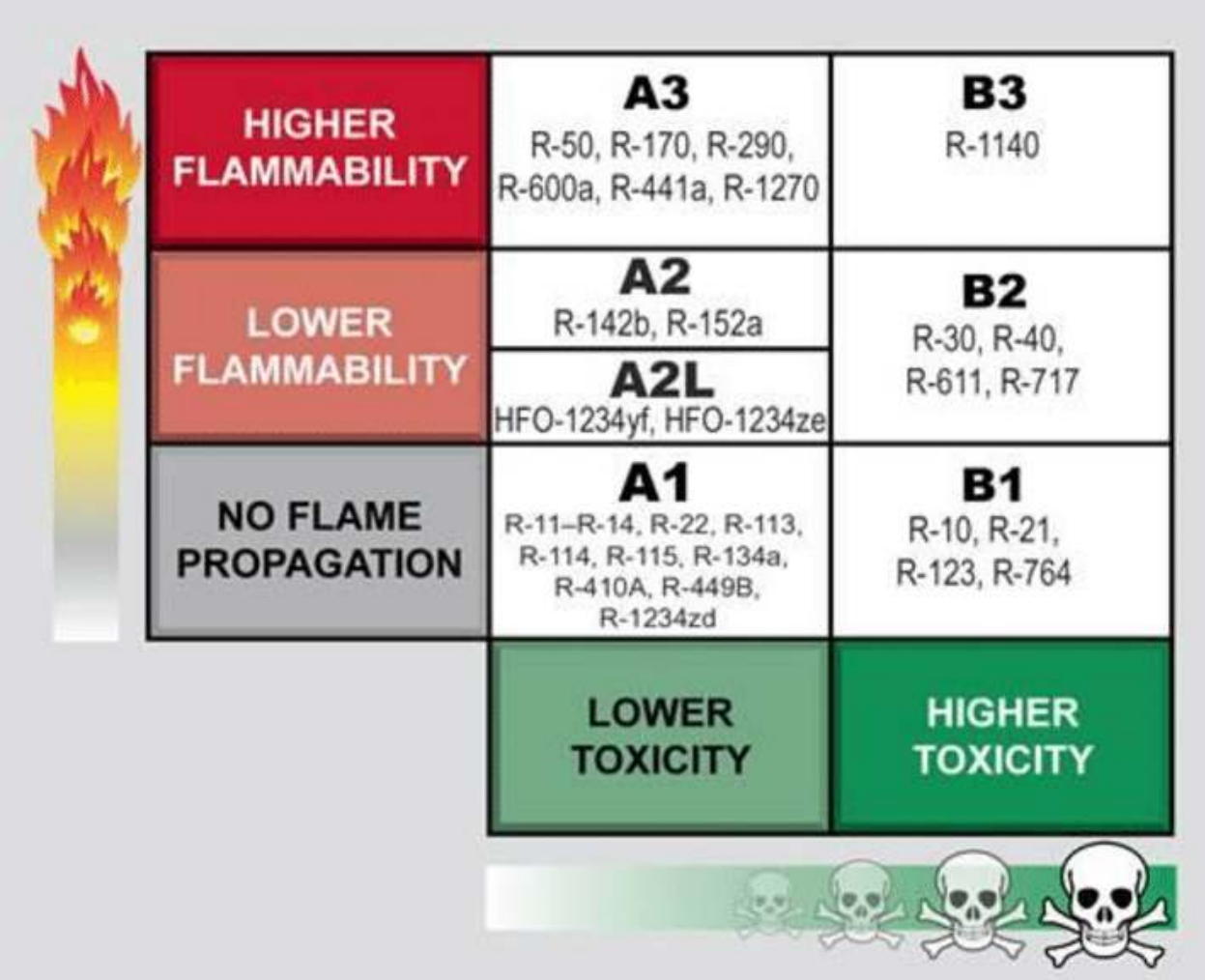
Table 2 – Less than 150 GWP Refrigerants.

Refrigerant Type	Manufacturer	GWP	Refrigerant Classifications	Designed to Replace
Ammonia R-717	Multiple	0	B2L	R-404a and R-22
CO2 (R-744)	Multiple	1	A1	R-404a, R-22, R-134a
R-454c	Chemours	146	A2L	R-404a like systems
R-455A	Honeywell	146	A2L	R-404a like systems
R-471A	Honeywell	148	A1	R-134a like systems

Data according to Compressor Manufacturer Bitzer

There is no official regulation that allows for current code adoptions and certifications from UL body and ASHRAE 15 to allow for A2L refrigerants at large scale use. Current systems must be approved by each individual authority having jurisdiction. Also, there is no ability to retrofit old systems that fall outside the scope of UL 60335-2-89 to the new refrigerants. Past retrofits for refrigerant types such as R-22 or 404a systems have utilized A1 class refrigerants and will no longer be available for new systems. These new A2L types coming available for the 150 GWP threshold are high risk due to the mild flammability, toxicity, or pressure shown in Figure 1.

Figure 1

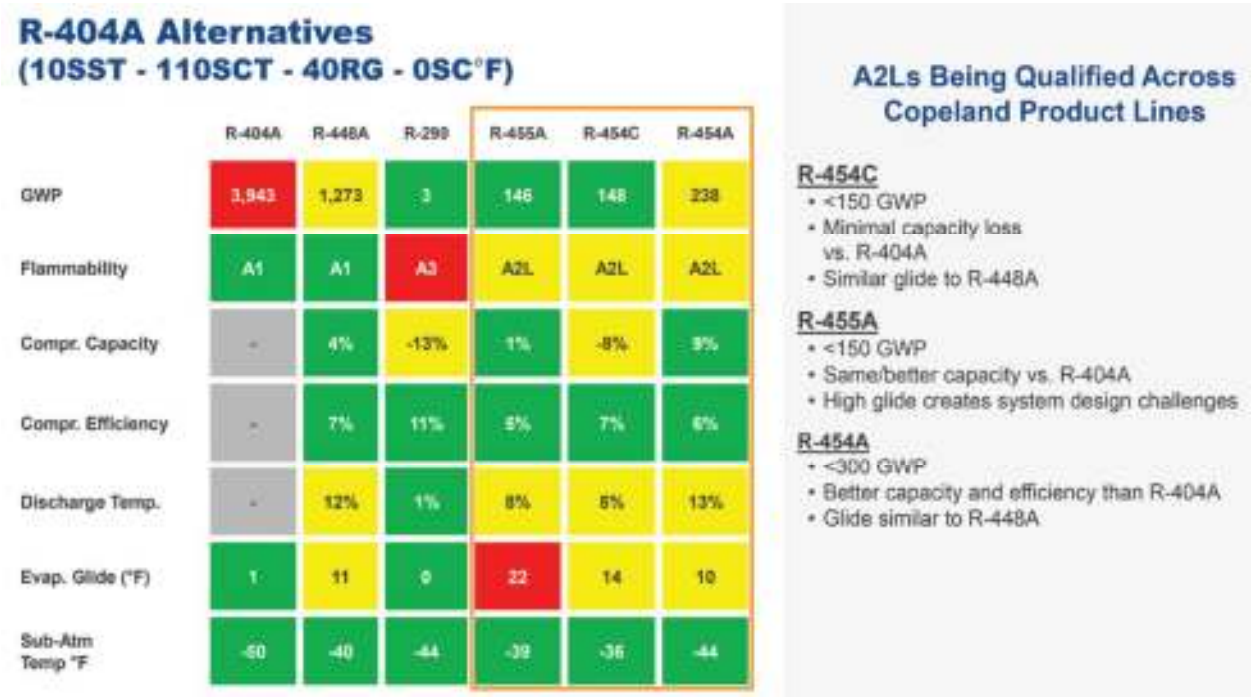


https://www.researchgate.net/figure/Classification-of-Refrigerants_fig4_344663841

Currently out of all the alternative refrigerants that meet the 150 GWP, only ammonia and CO2 are available for commercial purchase. Issues with CO2 are its significantly high pressure which requires thicker wall pipes and higher cost for components. Loss of charge is a high probability if the systems are shut down or there is a power outage. Ammonia is a toxic refrigerant that cannot be used with copper piping with potential hazards to personnel if a leak occurs. Since storage seasons are intermittent in duration an A2L class refrigerant is the best option.

When looking at what has been utilized in the potato industry there are limited options other than CO2 and ammonia. Figure 2 shows the current alternatives which are not yet available commercially on the US market. One note is that R-290 is refrigerant grade propane and is limited to 500grams (1.1lbs) of refrigerant and is not a viable option.

Figure 2 – Alternative refrigerants



https://www.achrnews.com/articles/147293-waiting-for-a2ls-in-commercial-refrigeration-equipment

As for the Refrigerant Management Program, this is like what the State of California already requires. Owners will need to retain all documentation of what refrigerant has been installed and in what quantity. A licensed and certified technician will need to provide how much refrigerant was charged in the system and the type of approved leak testing performed. The main issue for the potato industry is that the system, if not used year around, requires a leak check within 30 days of system start-up. Subsequent leak checks are required every 3 months of operation to verify no leaks until the system is turned off for the season. All records of service work with refrigerant charges and leak checks must be kept for 5 years. In the event of a leak, repairs must be made within 14 days unless a technician or parts are not available then there is a 45-day allowance.

In California, a single refrigeration system is defined by a single refrigerant circuit. This is how they document their fee structure for larger and multi-circuit systems. Washington Chapter 70A.60 RCW only defines a refrigeration system but does not clarify the designation of individual or multiple refrigerant circuits per refrigeration system. This technically could allow for multiple circuits at 200lbs per circuit and keep the system total at 200lbs to 1,499lbs and cost only $170 per system under their fee structure.

Additional impacts not listed in the proposal is the federal AIM act which requires a reduction of refrigerant production by 30% next year for all manufacturers of high GWP refrigerants. This goes into effect January 1, 2024, as shown in the phase down schedule in Figure 3.

Figure 3

We would strongly recommend that the State of Washington delay any decision until the federal rule is finalized in October of 2023.

As the draft rule language is presented it would add an undue burden to our family farms and US food security as we produce 20% of the US supply of potatoes. It would be extremely difficult to adopt these rules and would lead to the demise of our $7.3 billion dollar economic contribution employing over 31,000 jobs to the State.

Sincerely,

Matt Harris
Director of Governmental Affairs
Washington State Potato Commission

Hydrofluorocarbons (HFCs) and Other Fluorinated Greenhouse Gases Proposed WAC Revisions

August 2023

The Washington State Department of Ecology (Ecology) has proposed regulatory amendments to their current HFC regulations. Ecology points to legislation enacted in 2021 (E2SHB 1050) amending the Hydrofluorocarbons — Emissions Reduction law (Chapter 70A.60 RCW) as the driver for the regulatory amendments.

The proposed amendments would make the following changes to Chapter 173-443 WAC, the Hydrofluorocarbons (HFCs) rule.

Prohibitions

Additions to prohibited substances for new products and equipment:

- Adding centrifugal and positive displacement chillers used for heating or for heating and cooling to existing prohibitions on the use of certain refrigerants, effective January 1, 2025. (Note that the prohibitions on centrifugal chillers and positive displacement chillers for cooling were already in regulation, but those prohibitions were (and still are) scheduled to become effective January 1, 2024.)
- Adding prohibitions relating to automatic commercial ice machines - remote condensing units and stand-alone units (new and retrofit), effective January 1, 2025.

Additions to prohibited substances for new refrigeration equipment:

- Adding prohibitions on refrigerants with a Global Warming Potential (GWP) of 150 or more in new refrigeration equipment with a charge capacity of over 50 pounds for the following: retail food refrigeration including chillers; cold storage warehouses; and industrial process refrigeration excluding chillers. Effective January 1, 2025. (Storages are classified as cold storage warehouses. Our commercial potato/onion storages have >50lb refrigerant charge. For prospective each of your potato condensers has ~600lbs of refrigerant. Attached is a table for reference:

Compressor Horsepower	~Lbs. Refrigerant
30	200
40	250
50	300
60	300
70	350
80	350
90	400

This would effectively require all new systems post 1/1/25 to utilize refrigerant with a GWP<150. Currently the only commercially available refrigerants that meet this requirement are ammonia and CO2. Last week our engineers had a meeting with manufacturers that are actively working to bring additional refrigerants to market in the US that will meet the proposed new regulations. The new options are available in Europe; however, they are not currently

allowed in the US. They are R-454c, R-455a, and R-471a. The manufacturers do not currently have a date that they will be available. Attached is a table for reference:

Refrigerant Type	GWP	Classification
Ammonia	0	B2L
CO2	1	A1
R-545c	146	A2L
R-455a	146	A2L
R-471a	148	A1

Ammonia is a toxic refrigerant that comes with additional safety regulations. CO2 operates at a much higher pressure than our current refrigerants requiring a much thicker walled system. The initial cost of both these systems will be significantly higher than the current systems.

R-454c, R-455a, and R-471a are the best fit for our potato/onion storage applications. As discussed, they are not currently commercially available. Additionally, they are listed as mid-level flammable. When evaluating the refrigerants performance, we are estimating ~10%-15% reduction in capacity when comparing to existing refrigerants. This will translate to larger systems and additional energy consumption to achieve desired refrigeration capacities.

- Adding prohibitions on refrigerants with a GWP of 750 or more for new air conditioning equipment for:
    - Room air conditioners and residential dehumidifiers, effective January 1, 2024;
    - Other types of air conditioning equipment used in residential and nonresidential applications, effective January 1, 2028; and

- Adding prohibitions on refrigerants with a GWP of 750 or more in new refrigeration equipment with a charge capacity of over 50 pounds for chillers used for industrial process refrigeration, effective January 1, 2025.
- Adding prohibitions on refrigerants with a GWP of 150 or more for new refrigeration equipment with a charge capacity of over 50 pounds for new ice rinks and refrigerants with a GWP of 750 or more for new refrigeration equipment with a charge capacity of more than 50 pounds for existing ice rinks, effective January 1, 2024.

Additions to prohibited substances for new air conditioning equipment

- Variable refrigerant flow (VRF) or volume system, January 1, 2026.

Additions to prohibited substances for small containers of refrigerant and nonessential consumer products:

- Adding prohibitions on substitutes with a GWP of 150 or more for small containers of refrigerant and nonessential consumer products, effective July 25, 2021. (Note: This is a new prohibition with an effective date in the past.)

Exemptions

Provides specific exemptions for new stationary refrigeration equipment for the following:

- Retail food refrigeration, including chillers;

- Cold storage warehouses; This exemption specifically applies to systems with <50Lbs of refrigerant. This exemption won't apply to our application.
- Industrial process refrigeration, excluding chillers; and
- Chillers used for industrial process refrigeration.

Provides specific exemptions for new stationary air conditioning equipment for the following:

- Room air conditioners and residential dehumidifiers;
- Variable refrigerant flow or volume system; and
- Other types of air conditioning equipment used in residential and nonresidential applications.

Variances

Ecology may issue a variance for prohibited substances for new refrigeration equipment and new air conditioning equipment according to the following criteria if an applicant can meet specific criteria under the following: impossibility; force majeure; or economic hardship.

Labeling and Disclosure

Provides amendments and additions to labeling and disclosure requirements relating to prohibited substances, effective January 10, 2021, or one year from the effective date of the applicable prohibition, whichever is later. (Note: This is an amendment with an effective date in the past.)

Refrigerant Management Program

Establishes a Refrigerant Management Program (RMP) with specific registration requirements applying to:

- Any owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 50 pounds of a high-GWP refrigerant[1]; This will apply to the owner of each potato/onion storage.
- Any person who installs, repairs, maintains, services, or disposes of refrigeration or air conditioning equipment; This will apply to IVI as the service provider.
- Any person who wholesales, distributes, or reclaims any amount of high-GWP refrigerants in Washington.

[1] "High-GWP refrigerant" is defined as "a compound used as a heat transfer fluid or gas that is: (a) A chlorofluorocarbon, hydrochlorofluorocarbon, hydrofluorocarbon, perfluorocarbon, or any compound or blend of compounds with a GWP value equal to or greater than 150; or (b) A regulated refrigerant as defined in this section" (WAC 173-443-030: Definitions and Acronyms). Note that no definition of "regulated refrigerant" is included in that section or in the chapter.

Fees

Each owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 1,500 pounds of a high-GWP refrigerant must pay an initial implementation fee of $150. Each owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 200 pounds of a high-GWP refrigerant must pay an annual implementation fee of $170. We interpret this to mean there will be an annual fee for each system of $170.00/Y beginning 1/1/27. As we interpret a system would be (1) condenser. Typically, each storage has two condensers for a total storage fee of $340.00/Y. (for systems with a full charge of 200 to 1,499 pounds, beginning January 1, 2026) or $370 (for systems with a full charge of 1,500 or more pounds, beginning January 1, 2024). Those annual fees will be set in accordance with new regulations, WAC 173-455-160, beginning January 1, 2025, for systems with a full charge of 1,500 or more pounds, and beginning January 1, 2027, for systems with a full charge of 200 to 1,499 pounds.

Leak Detection, Monitoring, Notification, and Repair

Each owner or operator of a facility that has a refrigeration or air conditioning system with a full charge capacity greater than or equal to 1,500 pounds of a high-GWP refrigerant, that is intended to operate year-round, must comply with new leak detection and monitoring requirements, as follows: Our storage systems should be exempt from this classification do to the seasonal operation of the systems. This would however apply to packing and processing facilities.

- By January 1, 2024, conduct a leak inspection of the full system:
    - Each month using a calibrated refrigerant leak detection device, or bubble test, unless an automatic leak detection system that meets specific requirements is installed and functioning correctly on the system;
    - At the time of verification test or follow-up verification test following a leak repair;
    - Each time refrigerant is added to the system in an amount equal to or greater than five pounds, or one percent of the full charge, whichever is greater; and
    - Each time oil residue is observed on any refrigerant circuit component indicating a refrigerant leak.
- By January 1, 2025, install an automatic leak detection system that meets specific requirements if: the refrigerant circuit is located entirely within an enclosed building or structure; or the compressor, evaporator, condenser, or any other component of the refrigeration system is located inside an enclosed building or structure.

Each owner or operator of a facility that has a refrigeration or air conditioning system with a full charge capacity greater than or equal to 200 pounds but less than 1,500 pounds, that is intended to operate year-round, must comply with new leak inspection requirements, as follows:

- By January 1, 2024, conduct a leak inspection of the full system:
    - At least once every three months using a calibrated refrigerant leak detection device, or bubble test, unless an automatic leak detection system that meets specific requirements is installed and functioning correctly on the system;
    - At the time of verification test or follow-up verification test following a leak re-pair;
    - Each time refrigerant is added to the system in an amount equal to or greater than five pounds, or one percent of the full charge, whichever is greater; and
    - Each time oil residue is observed on any refrigerant circuit component indicating a refrigerant leak.

Each owner or operator of a facility that has a refrigeration or air conditioning system with a full charge capacity greater than or equal to 50 pounds but less than 200 pounds, that is intended to operate year-round, must comply with new leak inspection requirements, as follows:

- By January 1, 2024, conduct a leak inspection of the full system:
    - At least once each year using a calibrated refrigerant leak detection device, or bubble test, unless an automatic leak detection system that meets specific requirements is installed and functioning correctly on the system;
    - At the time of verification test or follow-up verification test following a leak repair;
    - Each time refrigerant is added to the system in an amount equal to or greater than five pounds, or one percent of the full charge, whichever is greater; and
    - Each time oil residue is observed on any refrigerant circuit component indicating a refrigerant leak.

Each owner or operator of a facility that has a refrigeration or air conditioning system that is **not** intended to operate year-round must conduct a leak inspection of the full system within 30 days after starting each operation of the system, and once every three months thereafter until the system is shut down. The leak inspections must be conducted using a calibrated refrigerant detection device or bubble test. This will apply to our existing potato/onion systems and will require a complete leak inspection be performed at season start-up and again every 90 days the system is being operated beginning 1/1/24. I would estimate ~2hrs labor per condenser.

The proposal establishes specific leak rate thresholds, notification requirements, and leak repair requirements for the owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 50 pounds of a high-GWP refrigerant.

The owner or operator of a facility that has a refrigeration or air conditioning system may apply to Ecology for an exemption from the leak repair requirements if the applicant can meet specific criteria under the following: impossibility; force majeure; or economic hardship.

Annual Report

Each owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 200 pounds of a high-GWP refrigerant must submit an annual facility refrigeration or air conditioning report (annual report) to Ecology each year. This will apply to our existing systems and will require a report to be filed with the DOE for each condensing unit.

Recordkeeping

Beginning January 1, 2024, the owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 50 pounds of a high-GWP refrigerant must maintain specified records for a minimum of five years. This will apply to the storage owner.

Installation, Maintenance, Service, Repair, and Disposal

Any person performing an installation, maintenance, service, repair, or disposal of a refrigeration or air conditioning system with a full charge greater than or equal to 50 pounds of a high-GWP refrigerant must comply with specified conditions. This will apply to the service provider.

Wholesaling, Distributing, and Reclaiming

Refrigerant wholesalers, distributors, and reclaimers are subject to newly established reporting and recordkeeping requirements.