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To: Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, California 95814

Online Submission: **https://www.arb.ca.gov/lispub/comm/bcsubform.php?listname=casnap&comm_period=A**

COMMENTS WITH RESPECT TO PROPOSED REGULATION FOR PROHIBITIONS ON USE OF CERTAIN HYDROFLUOROCARBON IN STATIONARY REFRIGERATION AND FOAM END-USES

We submit these comments with respect the proposed regulations to adopt a new Subarticle 5 to Title 17: "Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration and Foam End Uses."

Comments on Appendix A of the Proposed Regulation

Table 1 in the proposed regulatory language contains the key definitions which describe the applicability. Those definitions would be more clear and understandable if the table included a heading for rules affecting the refrigerants used and another for rules affecting foam blowing agents.[1]

We understand CARB to use the term "equipment" to refer to a set of devices, pipes, pumps or other mechanical apparatus as distinct from a material such as a foam or blowing agent which may be used as an intermediate component to manufacture the equipment. For example, "retail food refrigeration" means "equipment designed to store and display chilled or frozen foods for commercial sale." But a "foam system" is a "multipart liquid material that expands when mixed to form a solid or flexible substance in which thin films of material separate pockets of gas". Retail food refrigeration equipment does include foam systems, but HFCs used in foams are not the same as those allowed for refrigerants.

This distinction becomes significant with respect to Table 1 which uses both equipment and foams in describing the categories. Both terms are well understood in the refrigeration business and CARB is wise to regulate~~d~~ each individually.[2] We urge CARB to maintain this distinction.

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[1] *The first 12 categories in Table 1 actually refer to prohibited refrigerants, while the last 5 categories actually refer to prohibited foam blowing agents.*

[2] *For example, under SNAP for blowing agents to produce foams, "XPS Boardstock" is not the same end use as "Polystyrene Extruded Sheet". Further, under the SNAP criteria for foam blowing agents, "Rigid PU Commercial Refrigeration" [a category appropriately excluded from the proposed definition in this proceeding includes uses such as refrigerated transport, garage and entry doors, and HVAC with respect to foams]. Hence, these end uses are also excluded, as we read the proposal.*

Comments on Appendix B - Emissions Estimates

Two data points on Appendix B we believe to be unjustified, or the description provided is not accurate. For Stand-alone Refrigeration units, the Table 4 reports "Average Annual Leak (loss) rate" to be 0.3% and an EOL quantity of 98.5%. Those data points actually understate the known loss rate for F-gas units during operations. The annual loss rate should be much higher -- and as a result the benefit in adopting the proposed rule is larger.

Hydrocarbon (A3 refrigerants) units typically have very low GWP (3-10 GWP) have specific SNAP regulations on construction. F-gas refrigerants do have any such constraints. Restraints on hydrocarbon refrigerants include hermetic compressors, sealed joints, no service ports, very low charge limits and possible damage of lines due to stresses in operation and shipping. These restrictions remove a great deal of possible leaks.

EPA has also established criteria for the best performing stores for minimizing leaks. EPA's GreenChill partnership includes criteria for certifying stores using stand-alone refrigeration. The store must "achieve a store-wide annual HFC refrigerant emission rate of 5% or less…" [3] However, less than 5% of the estimated 37,000 stores in the United States are certified as Green Chill compliant. We do not understand how ARB can identify an <u>average</u> loss rate of 0.3% and we know of no basis for such an average value. The true value is likely multiple times higher than that stated in Appendix B for self-contained refrigeration units.

Based on the experience of True Manufacturing when it was using F-gases as its refrigerants, we can report that larger leak rates should be considered if the following are in the system:

- If Semi-hermetic compressors are used, an 8-10% leak rate is normal due to the compressor gasket face. This was shown in operating history for units which were F-gas (older units).
- If Service ports are installed, the leak rate at the ports ~~is~~ are 3-5% (History of older units).
- Larger change sizes will allow receivers and evaporators to be added to the system. These added components allow increased charge sizes and hide the fact that the units are leaking. As the units leak, the amount of refrigerants in these "refrigerant storage devices" is reduced until the extra refrigerant is all leaked out. When serviced, additional refrigerant must be added.
- Many units use compression fittings rather than sealed joints at the compressor. These add 3-5% leak rates.
- Damage to tubes during shipping can cause some units to arrive with no refrigerant in the system. This is significant and means 100% loss at start-up. (our client tests competitor equipment on a regular basis. Of the last 30 units tested, 7 were empty when they

[3] *GreenChill Store Certification Protocol for Stores Using Self-Contained Refrigerated Cases as a Primary Refrigeration System, which incorporates "GreenChill Store Certification Criteria, at page 2.*
https://www.epa.gov/sites/production/files/documents/gc_storecertprogram08232011.pdf;
https://www.epa.gov/sites/production/files/2017-08/documents/greenchill_store_certification_protocol_self_contained_cases_as_primary_system.pdf

arrived. Most if not all were because the braze joints were broken, due to excessive heating of the copper, causing a stress line and the tube shears off during shipping.)

- Hydrocarbon refrigerants use much smaller tube sizes. Smaller diameter tubing reduces the stresses in the brazed connection points. The HFO refrigerants and HFO blends still use the larger tube sizes.

These potential loss points are a major objective for the GreenChill approach to using best practices, and further support use of a 5% annual loss rate as very good.

A 2015 offset methodology adopted by the American Carbon Registry ["Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse gas Emissions reduction and removals from Certified Reclaimed HFC refrigerants and Advanced Refrigeration systems"] assumed an 8% loss rate from stand-alone units. See Table 8.[4]

We therefore urge ARB correct Appendix B with respect to stand-alone refrigeration units. The loss rate should be at least an order of magnitude higher and take into account that the criteria for GreenChill expects a much higher loss rate than assumed in Appendix B. We would expect this correction will actually ***increase*** the expected reductions from the proposed regulation.

Conclusion

We appreciate the opportunity to submit these comments on the proposed regulations and on the technical support information.

Respectfully,

Susan Wood, Senior Advisor

Jeffrey Fort, Partner

Matthew Adams, Partner

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[4] *That same loss rate is included in the pending revision to this methodology. See Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems, January 2018, Public Comment Draft.*