George Parsons
Vice President, Engineering

January 25, 2017

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

Re: SLCP Strategy and Revised Draft EA

Dear Sir or Madam:

Mile High Equipment LLC., located in Denver, Colorado, manufactures automatic commercial ice machines under the Ice-O-Matic brand for customers all around the world including the state of California. We pride ourselves on making high quality equipment that meets our customer's needs and at the same time is energy efficient and environmentally friendly. We support the current state, federal and global efforts to reduce the impact of HFC refrigerants on our environment. We also believe these improvements must be made wisely and carefully so these changes do not create another set of problems in the future. The proposed refrigerant phase-outs need to also have minimum impact on the purchaser and operator of the ice machine as to not change buying behavior. One example of a change in buying behavior can be movement from purchasing new equipment to repairing existing, aging equipment due to upfront cost. In reviewing the draft proposal put forth by the Air Resources Board of California, Ice-O-Matic submits for your consideration the input listed below:

1. HFC's only harm the environment when they are released from the equipment. In the second paragraph of page 83 in your draft it states "The majority of HFC emissions come from fugitive emissions of refrigerants used in refrigeration and air conditioning systems ". We encourage the Air Resource Board to put greater emphasis on these fugitive leaks to the atmosphere. Ice-O-Matic has invested significant resources into eliminating refrigerant leaks in our units through better equipment, improved manufacturing techniques and new leak detection systems. We believe more emphasis needs to be put in place to focus on leak reduction, refrigerant venting and refrigerant recovery. These types of improvements can be made with little or no cost impact on the unit.
2. The United States Environmental Protection Agency under the SNAP legislation has approved for use and removed from use many refrigerants. The changes are introduced and implemented by sub-categories of a larger group, commercial refrigeration. While CARB is proposing a 150 GWP limit for commercial refrigeration, the U.S. EPA is implementing phased in changes by each sub-category. Commercial refrigeration is broken into automatic commercial ice makers, supermarket refrigeration, condensing units, stand-alone refrigeration, cold storage warehouses, etc. Not all commercial refrigeration operates in the same way and these breaks into sub-categories recognizes this difference. Certain equipment types are able to incorporate the use of new low GWP refrigerants more quickly and effectively than other types. In the case of automatic commercial ice makers the usage of new refrigerants which have a high "glide factor" make it difficult to produce high quality, consistent ice cubes. Supermarket refrigeration is a sub-category that is one of the largest in commercial refrigeration, which has an issue with fugitive emissions, and has technologies today to eliminate high GWP HFC usage very quickly.

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We encourage CARB to adopt the same sub-categories of commercial refrigeration adopted by the U.S. EPA so that plans for HFC phase out can be completed in a process that allows for the greatest impact possible on the environment with as little impact to consumers as possible.

3. Consumer safety must always be at the forefront of any decision that is made. R290 (propane) is a very good refrigerant but is also an example of the need for safety. It is classified as an A3 (highly flammable) refrigerant. It has a number of usage conditions including a limit on system charge (150grams) and identification requirements. U.S. EPA under the SNAP legislation has only approved the use of R290 in under counter self-contained ice machines. This type of ice machine has a maximum ice production rate of 300 pounds in 24 hours due to the R290 charge limitation. Most locations in California that require ice and purchase commercial ice makers use equipment that produces from 800 pounds per day up to 1400 pounds per day to meet their business needs. To use R290 as a refrigerant would require these consumers to purchase multiple machines which significantly raises the upfront purchase cost and the lifetime operating cost. The required system identification to use an A3 refrigerant will increase the cost of the overall system which in the end the consumer must bear. The charge limitation on R290 results in it only being usable in small self-contained equipment. One issue with self-contained machines is that the condenser coil is located on the back of the unit and dumps its warm exhaust air in the space where the unit is located. Many retailers of today use a remote condenser system with the condenser on the roof. This results in the exhaust of its warm air being moved to the roof. If a retailer is trying to achieve a LEED certification for the store, the use of a remote system is virtually a requirement. This has resulted in an increase in the use of remote systems on automatic commercial ice makers. Because of its A3 rating and charge limitation, R290 will most likely never be approved for remote system usage. Many of the new low GWP refrigerants in development by Honeywell, Chemours and Arkema today are listed as A2L (lightly flammable with low flame propagation). From an OSHA safety standpoint, A2L refrigerants are treated the same as A3 class refrigerants. A2L refrigerants have usage conditions that includes charge limitation that if not increased could make the use of these refrigerants difficult to use in remote systems. We encourage CARB to fully research and understand each sub-category of commercial refrigeration in terms of the type of equipment used by customers. Stand-alone commercial refrigerators and freezers are almost always self-contained systems that make the use of R290 or R600 a very viable option versus automatic commercial ice makers or walk in coolers or freezers which can, and many times do, run on remote condenser systems making a change to R290 impossible.
4. On page 21, the third bullet item, the draft states “Switching to low-GWP refrigerants can also improve energy efficiency of refrigeration and air conditioning equipment which can help cut electricity bills throughout the state.” The key point in this phrase is the word “can”. With the list of low GWP refrigerants, this improvement in energy efficiency is very dependent on the application and may result in higher upfront equipment cost. For each sub-category refrigeration application, the result of using a new refrigerant can be different. Each refrigerant in its application has three important factors
    a. Refrigerant pressure which determines refrigerant mass flow rate and velocity
    b. Capacity which is the amount of potential heat output per a given volume of refrigerant
    c. Efficiency is the ratio of work (heat) output divided by work input (KW-Hr)

Per early information from the refrigerant manufacturers, the new low GWP refrigerants do have improved efficiency but have lower capacity with different operating pressures and conditions. The improvement in efficiency just means lower energy input at a given output level. In many cases, the output level is reduced because of the lower refrigerant capacity, resulting in the use of larger components. In an automatic commercial ice maker, reduced refrigerant capacity results in lower ice production. To increase the units output back to original levels, a larger compressor, condenser coil assembly and evaporator may be required causing a dramatic increase in the upfront cost of the unit. Another issue that must be considered for an automatic commercial ice maker is the type of standard equation used for energy efficiency under the United States Department of Energy standards. This energy standard is not based on a traditional efficiency formula of work input and work output but is a ratio of input energy used (Kw-Hr's) per 100 pounds of ice produced. When a new refrigerant is applied and even though it may have better efficiency reducing the power consumed, if the reduction in ice production is greater than the reduced energy used the ratio of energy consumed to ice produced can get worse. This example further supports the need for sub-categories for commercial refrigeration and that plans for changes in approved refrigerant applications need to be closely examined for long term impact.

5. The life cycle cost of ownership for each sub-category inside of commercial refrigeration should be closely examined. Many of the current low-GWP refrigerants, while being more efficient, will result in lower ice production thus requiring larger components resulting in a higher upfront purchase cost. There is only subjective evidence showing that this higher equipment cost will be offset by lower energy consumption. Another unknown is buyer behavior. What is the required timing of payback due to reduced operational cost for the higher purchase to keep consumers from repairing old, inefficient equipment versus buying new equipment?

In summary, Ice-O-Matic is fully in support of designing and manufacturing the most energy efficient, environmentally friendly ice making equipment on the market for our customers. We also believe that a transition plan for reducing HFC being released to the atmosphere in the state of California should be made only after a thorough review by each area of application in commercial refrigeration versus an across the board implementation by 2021. The continued implementation of this broad brush solution could have severe implications for both California's residents and California's economy.

Best Regards,

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Ice-O-Matic / Mile High Equipment, LLC.
Denver. CO