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OFFICE OF
AIR AND RADIATION

Summary of Rationale for ENERGY STAR® Ice Machine Specification
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I. Introduction and Background

This memorandum provides a summary of the rationale and key inputs that culminated in the ENERGY STAR ice machine specification. It contains the following information:

- Summary of the ENERGY STAR specification
- Summary of key milestones in the development of the ENERGY STAR specification
- Summary of key comments provided by stakeholders
- EPA's rationale for deciding on key elements of the final ENERGY STAR specification

II. Summary of ENERGY STAR Specification

The ENERGY STAR ice machine specification was finalized on July 25, 2007. Key elements of the new ENERGY STAR specification are provided below:

- The following product types are eligible for ENERGY STAR: ice making head (IMH); remote condensing unit (RCU) or split system unit; and self contained unit (SCU).

- Specification requirements are limited to air-cooled, cube-type machines. Water-cooled ice machines and flake and nugget ice machines are explicitly excluded.

- Qualifying models must meet energy use (kWh/100 lbs ice) and potable water (gal/100 lbs ice) limits based on product type (i.e., IMH, RCU, SCU) and Harvest rate (lbs ice/day).

- Manufacturers are required to use the Air-Conditioning and Refrigeration Institute (ARI) *Standard 810-2006 for Performance Rating of Automatic Commercial Ice Makers* to test and qualify equipment.

- The specification went into effect on January 1, 2008.

III. Key Milestones of Specification Development

EPA first announced its intention to develop a new specification for ice machines on November 17, 2006. This process spanned 8 months and included the following key milestones:

- **Draft and Final Specifications**

  - Draft 1 released March 28, 2007 – Energy and potable water limits were proposed based on requirements of the 2005 Energy Policy Act, specifications developed by the Consortium for Energy Efficiency (CEE), and the ARI Directory of Certified Automatic Commercial Ice-Cube Machines. Water-cooled machines were excluded from the specification primarily due to concerns regarding the prevalence of open loop installations, which are substantially more water consumptive than closed loop installations. Flake and nugget machines do not have a standard test by which energy consumption can be measured and were therefore also excluded. An effective date of October 11, 2007 was proposed to coincide with the North American Association of Food Equipment Manufacturers (NAFEM) Show.

  - Final Draft released June 18, 2007 – EPA proposed a new effective date of January 1, 2008 in response to requests to coincide with the effective date for California and other state minimum standards. Language was added to the specification (Section 6: Future Specification Revisions) regarding EPA's plans to include flake and nugget machines once standard rating procedures are available for these product types.

  - Final Specification released July 25, 2007 – No changes were made to the requirements as proposed in the Final Draft version of the document.

- **Industry Stakeholder Meetings, Correspondence, and Events**

  - EPA met with several ice machine manufacturers during the NRA Show May 20-22, 2007 to discuss levels and requirements proposed in the Draft 1 specification.

  - EPA launched the new ENERGY STAR ice machine specification during the NAFEM Show held in Atlanta, GA, October 11-13, 2007.

IV. Summary of Stakeholder Input

EPA received several comments on the draft specifications from a variety of industry stakeholders including: ARI, City of Austin, Follett Corporation, CEE, East Bay Municipal Utility District, Ice-O-Matic, Manitowoc Foodservice Group, Natural Resources Canada, Scotsman, Steering Committee for Water Efficient Products, and Tampa Bay Water – Florida Section American Water Works Association.

Provided below is a summary of key stakeholder comments and EPA responses. More detailed comments and responses are provided in note boxes included within the draft specifications available in the ENERGY STAR Product Development Archives located at: www.energystar.gov/productdevelopment.

Comment: One stakeholder urged EPA to include flake and nugget machines in the specification, claiming that flake and nugget machines are inherently more efficient than cube-type machines.

EPA Response: The ARI 810-2006 Standard which references ASHRAE *Standard 29 Methods of Testing Automatic Ice Makers*, currently only applies to cube-type ice machines. According to industry sources, cubes consist of 100% ice while flake and nuggets are approximately 80% ice and 20% water. Based on these differences in composition, it is inappropriate to simply apply the ARI 810-2006 standard, as written, to flake and nugget machines. In addition, EPA recognized that ongoing revisions to ASHRAE Standard 29 could result in a standard method by which flake and nugget machines may be tested, and therefore also impact the ARI 810 Standard. Based on this information EPA decided to temporarily exclude flake and nugget machines until the ASHRAE and ARI revision efforts are complete. Once available, EPA will work with manufacturers of these product types to collect and analyze performance data for purposes of a draft specification proposal.

Comment: One stakeholder expressed concern that the performance requirements proposed for larger capacity machines were too stringent.

EPA Response: When setting the specification levels EPA strives to identify top performers within each category (i.e., IMH, RCU, and SCU) and capacity bin, representing more than one manufacturer and taking cost-effectiveness and other performance issues into account (typically the top 25% of models). Under the proposed energy and water use limits, more than one manufacturer and several models could qualify as ENERGY STAR within each capacity bin, indicating that these levels are both feasible and achievable using several technologies and product designs.

Comment: Several stakeholders agreed with EPA's proposal to exclude water cooled machines from the specification.

Comment: Several stakeholders requested that EPA change the proposed Draft 1 October 11, 2007 effective date to coincide with California and other minimum state standards, effective January 1, 2008.

EPA Response: To align qualification timelines and thus reduce manufacturer burden, EPA revised the effective date as requested. To take advantage of the October NAFEM Show, EPA offered manufacturers support regarding how to best to use the event to announce the final specification and promote ENERGY STAR partnership in lieu of being able to use the certification mark on qualifying products.

Comment: One stakeholder expressed concerns regarding the annual shipment data reporting requirement, specifically about sharing proprietary data.

EPA Response: The submission of unit shipment data is a program requirement for all ENERGY STAR partners (50+ product categories) and has been in place for several years. Collecting this data helps EPA determine market penetration of ENERGY STAR qualified products as a measurement of program success. Neither EPA nor its contractor publishes any individual manufacturer data. EPA also allows for aggregation of data through a third-party.

V. EPA Rationale for Specification

EPA uses a consistent set of criteria in the development and revision of specifications for ENERGY STAR qualified products. These criteria guide EPA in its decision making and help to ensure that the ENERGY STAR mark will continue to be a trustworthy symbol for consumers to

rely upon as they purchase products for the home or business and their purchases will deliver substantial environmental protection. These criteria include:

- Significant energy savings and environmental protection potential on a national basis;
- Efficiency level is technically feasible while product performance is maintained or enhanced;
- Labeled products will be cost-effective to the buyer;
- Efficiency can be achieved with several technology options;
- Product differentiation and testing are feasible; and
- Labeling would be effective and recognizable in the market.

Below EPA addresses the ENERGY STAR ice machine specification relative to each of these criteria:

- Expected Energy Savings and Environmental Benefits on a National Basis. The ENERGY STAR qualified ice machine specification offers end users both energy and water savings. Ice Machines that have earned the ENERGY STAR are 15% more energy efficient and 10% more water efficient than standard machines. Each ENERGY STAR qualified commercial ice machine can save businesses energy about 1,160 kWh annually, or an average of $100/year on utility bills, and an additional 2,700 gallons/year, or $10/year, due to reduced water usage. Within its first year, the ENERGY STAR ice machine specification is projected to save approximately 8 million kWh in energy and reduce 12 million pounds of CO^2 emissions.

- Technical Feasibility/Impact on Product Performance/Functionality. The ENERGY STAR performance levels are aligned with CEE Tier 2 requirements, which have been in place since 2006, were vetted with industry members, and have been adopted by several utilities. The specification is approximately 7 – 10% more stringent than the minimum Federal standards, which go into effect January 1, 2010. At the time of drafting, several manufacturers were already in the process of redesigning equipment to be more efficient in response to these upcoming minimum Federal standards. Product performance or functionality is not negatively impacted by increased efficiency.

- Cost-Effectiveness to the Purchaser. The price range between standard and high efficiency ice machines is typically between 5 and 15%. As with other products, the incremental costs for energy-efficient designs are often associated with improved materials and advanced controls. But in some cases, the improvement in efficiency may be achieved through optimized design and component selection with very little increase in the actual manufacturing cost. Purchasing ENERGY STAR qualified ice machines offers end users significant energy and water savings resulting in a payback ranging from 1 – 4 years, depending on product type and fuel prices.

- Achieve Efficiency With Several Technology Options. EPA designs its ENERGY STAR specifications to be performance-based. This means that it strives to recognize the better performing products on the market in terms of energy and water efficiency regardless of technology. In the case of ice machines, EPA did explicitly exclude one technology, water-cooled machines, because of the significant water use associated with open loop systems and because of the significant incremental cost coupled with minimal energy savings leading to unacceptably long payback periods.

  The ENERGY STAR ice machine specification applies to air-cooled, cube-type machines and requires products to meet maximum energy and water consumption levels to qualify.

Levels are specified based on differences in size (lbs of ice/day) and functionality (i.e., IMH, RCU, and SCU). An end user will choose a certain size and type of ice machine based on their ice making needs and the type and location of their facility. For example, while a remote condensing unit is more efficient at making ice and reduces the cooling load to the conditioned space by rejecting waste heat out of the building, its installed cost is higher and is only available to facilities with the ability to locate condensing units on the roof (where they are typically installed).

Manufacturers have several options to reduce water and energy consumption. Energy consumption can be reduced through the use of more efficient components (e.g., compressors, fan motors, waste chill recovery heat exchangers) and through more efficient harvesting of ice. Reducing the harvest time will potentially reduce both the amount of purge water used and the compressor energy consumption.

- Testing Procedure. The ENERGY STAR specification references ARI 810-2006, *Performance Rating of Automatic Commercial Ice-Makers*, which is the industry accepted standard for measuring energy and water consumption in ice machines. The standard requires all ice machines to be tested in accordance with ASHRAE 29, *Methods of Testing Automatic Ice-Makers*.

- Product Differentiation and Effectiveness of Labeling. EPA believes the ENERGY STAR mark serves an important role in the marketplace due to the absence of any other objective basis for end users to identify and manufacturers to promote highly efficient ice machines. All of the major ice machine manufacturers were actively involved in the development of the specification and eager to use ENERGY STAR to promote and sell their high efficiency machines. At the time the specification became effective, four of the five major ice machine manufacturers became ENERGY STAR Partners offering more than 100 qualified models. Furthermore, several utilities and customers have expressed interest in rebating and purchasing ENERGY STAR qualified ice machines. Lastly, the addition of ice machines helps to expand the number of energy and water saving opportunities in the growing suite of ENERGY STAR commercial foodservice equipment.