

IN THE MATTER OF

NATIONAL ELECTRICAL) PROHIBITION ON SALE OF MERCURY
MANUFACTURERS ASSOCIATION) THERMOSTATS
)
) DENIAL OF EXEMPTION REQUEST

Pursuant to Title 38, section 1661-C, subsection 5, of the Maine Revised Statutes Annotated, the Department of Environmental Protection (herein "department") has considered the application of the National Electrical Manufacturers Association (herein "NEMA") and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

NEMA has applied for exemption from 38 MRSA § 1661-C, sub-§ 5. This provision of Maine law prohibits the sale of most mercury-added thermostats after January 1, 2006 unless an exemption is obtained from the commissioner.

NEMA filed the exemption application on behalf of thermostat manufacturers General Electric, Honeywell and White Rodgers. NEMA is a national trade association representing manufacturers of thermostats, batteries, lamps and other electrical products. The association is headquartered in Rosslyn, Virginia.

NEMA filed the exemption application by letter dated December 16, 2002. Public notice inviting comment on the application was published in the *Kennebec Journal* newspaper on December 18, 2002. On December 20, 2002, the department mailed notice of the application to 31 potentially interested persons. Written comments were received from seven persons.

By letters dated February 5 and February 28, 2003, NEMA supplemented its application in response to department requests for additional information.

By memorandum dated May 23, 2003, the department circulated its draft decision on the exemption application. The decision was sent to 40 potentially interested persons for comment, including NEMA and the thermostat manufacturers represented by NEMA. Written comments on the draft decision were received from NEMA and the Natural Resources Council of Maine.

2. STATUTORY CRITERIA FOR EXEMPTION

38 MRSA § 1661-C, sub-§ 5, reads as follows:

"After January 1, 2006, a person may not sell or offer to sell or distribute for promotional purposes a mercury-added thermostat except for a thermostat used by a blind or visually

impaired person. A manufacturer of mercury-added thermostats may apply to the commissioner prior to January 1, 2003 for an exemption from the provisions of this subsection for one or more specific uses of a mercury-added thermostat. The Commissioner of Environmental Protection may grant an exemption with or without conditions upon finding that:

- A. The manufacturer has demonstrated that a system exists for the proper collection, transportation and processing of the mercury-added thermostat at the end of its life; and
- B. The specific use or uses of the mercury-added thermostat provide a net benefit to the environment, public health or public safety when compared to available nonmercury alternatives.

For the purposes of this subsection, a “mercury-added thermostat” means a product or device that uses a mercury switch to sense and control room temperature through communication with heating, ventilating or air-conditioning equipment. “Mercury-added thermostat” includes thermostats used to sense and control room temperature in residential, commercial, industrial and other buildings but does not include a thermostat used to sense and control temperature as part of a manufacturing process.”

3. ALLEGED BENEFITS OF MERCURY-ADDED THERMOSTATS

NEMA argues that mercury thermostats provide a net benefit to the environment and to public health and safety in that:

- Mercury thermostats are one of the most energy efficient thermostats available;
- Mercury thermostats are available with special faceplates that allow visually handicapped persons to set room temperature; and
- Electronic thermostats cannot be readily installed in existing homes without the need for rewiring, making mercury thermostats the superior choice in retrofit situations.

Each of these alleged benefits is discussed below.

4. THERMOSTAT ENERGY EFFICIENCY

A. NEMA's position.

NEMA claims that mercury thermostats provide a net environmental benefit in the form of reduced pollution from power generation because mercury thermostats are one of the most energy efficient thermostats available. According to NEMA, mercury thermostats and Energy Star electronic programmable thermostats have a temperature drift¹ of plus or

¹ Energy Star is a program run by the U.S. Environmental Protection Agency to identify and promote energy-efficient products. To qualify for the Energy Star label, an electronic programmable thermostat must achieve a

minus (\pm) 2 degrees Fahrenheit from the set point, while other thermostats have a drift ranging from \pm 4 to \pm 6 degrees. Thermostats that have a narrow drift save energy according to NEMA because, based on information from the U.S. Department of Energy, there is a three-percent energy efficiency loss for every additional degree of drift. Because the burning of fossil fuels for space heating and power generation is a significant source of mercury and other air pollutants, NEMA argues that the reduced energy consumption associated with use of mercury thermostats provides a net benefit to the environment and public health.

In support of its energy efficiency claims, NEMA provided test data on select models of mercury-added thermostats and non-mercury thermostats. These data show, for the thermostat models selected, that mercury-added models have the smallest temperature drift and therefore presumably result in the greatest energy savings.

NEMA acknowledges that Energy Star programmable thermostats are more energy efficient than mercury thermostats, but says this advantage is eliminated if the homeowner already manually shifts temperature settings, if the homeowner is incapable of programming the thermostat, or if the programming function is used improperly. Among those identified by NEMA as potentially unable to properly use programmable thermostats are visually impaired persons, physically handicapped persons, and people who cannot read or do not have the owner's manual. NEMA also observes that some people either will not take the time to properly use a programmable thermostat or are unable to deal with the technology. The thermostat industry estimates over 50% of people who own programmable thermostats do not use them properly. In support of this observation, NEMA submitted the following documents:

temperature swing of \pm 2° Fahrenheit or less. Temperature swing (also called temperature drift) is the range between the highest and lowest room temperature attained by a thermostat. Drift is calculated by adding the temperature differential, system lag and system overshoot. For example, a thermostat with a \pm 2° *differential*, a 2° *system lag*, and 2° *system overshoot* has a temperature drift of 8° (\pm 4°). This means that, if the thermostat is set at 70° F, the room temperature will range from 66° to 74°.

- *Differential* is the difference between the cut-in point and the cut-out point. The *cut-in point* is the temperature at which the thermostat initiates action of heating or cooling equipment. The *cut-out point* is the temperature at which the thermostat terminates action of the heating or cooling equipment.
- *System lag* is the temperature drop in a heated room below the cut-in point of the thermostat. System lag reflects the temperature drop in a room that occurs between the time a furnace is turned on until the actual time when heat is delivered to the room.
- *System overshoot* is the temperature rise in a heated room above the cutout point of the thermostat. System overshoot reflects the increase in room temperature that occurs when the residual heat from a furnace reaches the room after the furnace has been shut off.

- An article from the July 30, 2001 issue of *Newsweek*, in which a lawyer from Portland, Oregon describes how he deliberately looks for simple products because of his inability to cope with technology.
- A November 2001 *Thermostat Market Profile Study* in which the Business News Publishing Company reports that 64% of respondents to a contractor survey indicated that their customers find it difficult to use programmable thermostats.
- An article from the May 25, 2002 edition of the *Washington Post* about why people buy sophisticated products but then do not read the owner's manual.
- A report titled *Programmable Thermostats that Go Berserk? Taking a Social Perspective on Space Heating in Wisconsin* in which the authors conclude, based on survey responses, that the aggregate energy savings from installation of programmable thermostats in residential housing is probably quite modest because thermostat-setting behavior is affected by a person's attitude toward energy conservation. The authors hypothesize that installation of a programmable thermostat in a household that does not have a favorable attitude toward energy conservation is not likely to result in a reduction of the average winter thermostat setting. At the same time, installation of a programmable thermostat in a household with a favorable attitude also is unlikely to yield energy savings because the household likely already maintains a low average thermostat setting.
- A May 2000 report titled *North American HVAC Thermostat and Temperature Control Markets* in which Frost & Sullivan, a marketing consulting firm, concludes:

"[Programmable] thermostats are facing a major challenge that is currently restricting them from achieving their full market potential. The challenge is that most people have been opting for a device that is easier to use, as a majority cannot program their thermostats."
- This excerpt from the Oregon Energy Conservation Code:

"For space heating and cooling system controls to reduce heat loss due to unnecessary operation of heating equipment during sleeping hours or periods when the house is unoccupied, [a] timed setback space heating and cooling control thermostat should be added. . . . Timed setback thermostats are not recommended for households that conscientiously practice manual thermostat setback. In such cases, thermostats may not pay for themselves and in fact may be less effective in saving energy."²

² Oregon Administrative Rules, chapter 330, rule 330-062-0045.

B. Review of thermostat energy efficiency by the Lowell Center for Sustainable Production.

To help evaluate NEMA's energy efficiency claims, the department retained the Lowell Center for Sustainable Production (LCSP) from the University of Massachusetts Lowell. LCSP was asked to independently investigate the energy efficiency and pricing of the following thermostat types:

- Electromechanical with mercury switches
- Electromechanical without mercury switches;
- Electronic non-programmable; and
- Electronic programmable.

For each of these four thermostat technologies, LCSP identified numerous models that are energy efficient and commercially available from several manufacturers. The specific models examined, along with their temperature differential rating, control functions and pricing, are listed in the LCSP report *A Review of Thermostat Energy Efficiency and Pricing* (May 2003).

For the purpose of its review, LCSP considered a thermostat to be energy efficient if it has a temperature *differential*³ of ± 2 degrees F or less and has other functions to control drift such as anticipator control⁴ and cycle rate control. NEMA argues this is a new test for energy efficiency, one that "has never been considered that we are aware of let alone approved by any organization that establishes standards and testing requirements for energy efficiency of thermostats." NEMA suggests that the appropriate test is whether the thermostat has a temperature *drift* (also called swing) of ± 2 degrees or less, the standard used by the U.S. Environmental Protection Agency (EPA) under its Energy Star program. To qualify for the Energy Star label, a thermostat must be programmable and must be capable of maintaining room temperature swings within ± 2 degrees of the setpoint temperature.

LCSP agrees that the Energy Star temperature swing standard is an appropriate basis for determining if a thermostat is energy efficient. During its review, however, LCSP found that temperature swing data was largely unavailable from thermostat manufacturers. Manufacturers often publish temperature differential values, but they generally do not make available the system lag,⁵ system overshoot⁶ and resultant temperature swing.

³ See note 1.

⁴ Anticipator control is a feature that improves thermostat performance by turning heating or cooling equipment on or off before the room temperature actually reaches the cut-in and cut-out temperature settings. Anticipator control can reduce the magnitude of the temperature swing.

⁵ See note 1.

⁶ See note 1.

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LCSP therefore used temperature differential and the presence or absence of additional control functions as a surrogate to assess thermostat energy efficiency.

In support of the efficacy of its approach, LCSP observes that NEMA's own exemption application states that "the two key components of efficiency are the switch differential and the anticipation setting." These two factors are key according to NEMA because they affect the cycle rate, the rate at which the thermostat turns equipment on or off. Thermostat efficiency, says NEMA, depends on how well the thermostat cycles heating or cooling equipment. LCSP agrees with the importance of the efficiency factors identified by NEMA, and it is precisely these thermostat features--the ability of the user to control differential, anticipation setting and cycle rate--that LCSP looked at. The presence of these features enables the user to directly control temperature swing. A thermostat that has these features and a reported differential of ± 2 degrees F or less has a reasonable likelihood of meeting the Energy Star temperature swing standard of ± 2 degrees if properly installed and calibrated.

In preparing its report, LCSP relied on energy efficiency data supplied by thermostat manufacturers because standardized, independent testing data were not available. Reliance on energy efficiency data from manufacturers is consistent with EPA's approach under its Energy Star program. The EPA requires manufacturers to perform energy efficiency tests and self-certify the thermostats as meeting the Energy Star guidelines, but does not prescribe a specific test protocol or require manufacturers to submit test results. Moreover, NEMA itself relies on thermostat specifications derived from manufacturer testing in support of its exemption petition.

B. Discussion.

The LCSP report shows that numerous non-mercury thermostat models are available with energy efficiency ratings equal or superior to that asserted by NEMA for mercury-switch thermostats generally. The available non-mercury alternatives are not limited to electronic thermostats. Non-mercury electromechanical thermostats comparable to mercury thermostats in energy efficiency also are available. Thus, a person disinclined or unable to use an electronic thermostat would not have to resort to a mercury thermostat to achieve comparable energy efficiency performance.

NEMA claims that LCSP ignored engineering specifications clearly showing some mercury switch thermostat models have a smaller differential than some non-mercury mechanical thermostat models. This is not the case. Neither LCSP nor the department ignored data submitted by NEMA. We did, however, investigate a wider range of thermostat models than the small sample NEMA selectively provided in support of its petition. LCSP investigated eleven electromechanical thermostats that contained either mercury or non-mercury switches. This investigation revealed that the temperature

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differential varies between 1 and 4 degrees F for both types of thermostats. One can see that for each type of electromechanical thermostat (mercury and non-mercury), different models provide different levels of energy efficiency. It is possible to select energy efficiency thermostat models for each type. Indeed, the relevant engineering specifications for two White Rodgers mechanical thermostats are strikingly similar, except one has a non-mercury switch.

NEMA further suggests that mercury switch thermostats have better anticipator control than their non-mercury counterparts. The LCSP investigation, on the other hand, indicates that electromechanical thermostats with and without mercury switches have similar adjustable anticipator functionality for heating and cooling applications. NEMA provided no evidence to the contrary, offering only the conclusory statement that "non-mercury [mechanical] thermostats do not have a very accurate or effective method to deal with anticipation setting . . .".

NEMA discounts the LCSP report, saying it is fatally flawed in its reliance on manufacturer data without knowing the protocol used to develop the data. NEMA claims that LCSP or the department must conduct independent testing pursuant to the established industry standard to reach a determination on its petition. The department disagrees for the following reasons.

First, NEMA's position is inconsistent with EPA's Energy Star program which specifically addresses the energy efficiency of thermostats and which NEMA supports in its petition.⁷ As noted above, the Energy Star guidelines do not prescribe a specific test protocol, or require manufacturers to submit test results. The department notes NEMA's support of the Energy Star program is not conditional or predicated upon publicly available independent testing results pursuant to an established industry standard.

Second, to the extent independent testing is needed or would be beneficial to validate manufacturer claims regarding thermostat performance, NEMA is the appropriate party to provide such test data. Through its petition, NEMA seeks a blanket exemption for each and every mercury thermostat covered by the sales restriction enacted by the Legislature. As the petitioner seeking an exemption from an otherwise applicable statutory provision, NEMA bears the factual burden for demonstrating a clear net benefit to human health or the environment in this instance. Given the scope of the exemption sought in this case, it is particularly appropriate that NEMA bear this burden.

⁷ According to NEMA, "Energy Star programmable thermostats that are used properly are the most energy efficient thermostat in almost all cases, and their use should be and is encouraged through the Energy Star program." NEMA Exemption Application, December 16, 2002, at 4.

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NEMA and thermostat manufacturer Invensys⁸ did provide test data on twelve electronic thermostats. The data are from Honeywell, one of the manufacturers on behalf of whom NEMA filed its exemption application. Honeywell developed the data using a NEMA-developed standard, one that NEMA characterizes as the "only established industry testing protocol." These data show very wide temperature swings for several electronic thermostat models made by Honeywell's competitors. In some cases, the temperature swing determined by Honeywell testing is much wider than that reported by the thermostat manufacturer, suggesting energy efficiency testing results for a particular thermostat model can vary depending on who is doing the testing.

We find these test data to provide an insufficient basis to grant the requested exemption. They do not include data on mechanical thermostats, they cover a very limited universe of electronic thermostats,⁹ and they were obtained from testing performed by Honeywell and not a certified, independent laboratory. As NEMA itself acknowledges, a manufacturer could reach any conclusion it wants by testing thermostat energy efficiency in various ways. To obtain optimal test results for a particular application, LCSP observes that a thermostat must be set up and adjusted to make proper use of its energy efficient functions such as temperature swing adjustment, differential setting and setpoint. The tests referenced by NEMA used factory settings for these functions, and did not fine-tune these energy efficiency capabilities. The NEMA testing protocol is silent as to how to adjust these functions during testing.

Further, the testing results reported by Honeywell contradict the Energy Star rating for several of the thermostats, and therefore contradict the manufacturer's self-certification that they meet Energy Star requirements. Again, the department notes NEMA's strong endorsement of the Energy Star program, and neither NEMA nor Honeywell suggest that compliance with Energy Star guidelines for these thermostats has been challenged.

Invensys also disputes NEMA's contention that most people cannot or will not properly use their electronic programmable thermostats. Invensys points out that the thermostat industry as a whole has been moving to user friendly owner manuals that are short, simple to follow and bilingual. According to Invensys, even people with no interest in the environment or aptitude for technology can easily use a programmable thermostat. NEMA counters by observing that Invensys, in touting its easy to program thermostat on

⁸ Invensys Climate Controls America, a division of the Robertshaw Controls Corporation, makes both electromechanical and electronic thermostats. In written comments dated January 6, 2003, Invensys recommended that the department deny NEMA's exemption request. The Invensys comments included test results from Honeywell showing that some electronic thermostat models have a temperature drift rating of $\pm 1^\circ$ F or less. According to Invensys, these data suggest that electronic thermostats presumably are more accurate and more energy efficient than mercury-added thermostats, which have a drift of $\pm 2^\circ$ F according to NEMA.

⁹ As documented by LCSP, there are scores of electronic programmable thermostat models that meet the Energy Star guidelines.

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its website, alludes to the fact that many people do not know how to properly use programmable thermostats. However, the Invensys web site states:

"70% of people who own programmable thermostats do not know how to use them We listened. Finally, a programmable thermostat that's easy to program. Similar to a cell phone, the Invensys series of programmable style is so easy, you don't even need a manual. The intuitive menus take programming step by step in plain, easy to understand language."

The Alliance for a Clean and Healthy Maine¹⁰ observes that NEMA's claims as to misuse of programmable thermostats "contradicts the claims of it own members who do a brisk business in digital mercury-free thermostats. Most programmable thermostats are marketed as easy to use and come with default pre-settings that allow energy savings to be realized without special programming."

Finally, the Frost & Sullivan marketing study cited by NEMA for the proposition that programmable thermostats are difficult to use is otherwise optimistic about the ability of the industry to overcome this market restraint. The study is frank in concluding that the biggest issue facing the industry is the learning curve associated with the use of programmable thermostats. However, the authors go on to say that the "essence of the problem lies in both the design and lack of clear instructions."

"The challenge for the industry is to develop better training tools in order to convert electromechanical users to electronic. . . . Developing a thermostat that will guide the consumer through a series of steps when programming their thermostat can provide both a functional and easy to use device. "¹¹

Whether or not manufacturers are successful in these efforts, there is nothing in the record documenting that homeowners invariably pay an energy penalty if they ignore or fail to make effective use of the programming features of their electronic thermostats. As the Oregon Energy Code suggests, programmable thermostats that allow timed setback generally are the best choice for energy conservation reasons. Failure to properly program the thermostat would appear to simply deprive the user of the additional energy savings that the programming features are designed to provide. Assuming arguing some households incur a small energy penalty where programming functions are used

¹⁰ The Alliance for a Clean and Healthy Maine represents health-affected children, parents, workers, doctors, public health professionals, environmentalists and impacted communities in rural and urban Maine. The founding members include the Environmental Health Strategy Center, Learning Disabilities Association of Maine, Maine Labor Group in Health, Maine Peoples Alliance, Maine Public Health Association, Natural Resources Council of Maine, Physicians for Social Responsibility and Toxics Action Center.

¹¹ Frost & Sullivan, *North American HVAC Thermostat and Temperature Control Markets* (May 2000), pp 3-4 and 10-7.

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improperly, NEMA provides no evidence showing the penalty would outweigh the energy savings achieved by households that, as a consequence of the ban on mercury thermostat sales, purchase and properly use programmable thermostats.

5. THERMOSTAT USE BY THE BLIND

A. NEMA's position.

NEMA implies that the sale of mercury-added thermostats to the general public after January 1, 2006 will provide a net public benefit by ensuring the continued availability of a particular Honeywell thermostat model designed specifically for use by visually impaired persons.

Honeywell makes a mercury-added thermostat with a special faceplate that allows temperature to be set by touch. Honeywell is the only manufacturer of this product and sells tens of thousands annually. According to NEMA, there are no electronic thermostats designed specifically for visually impaired persons or other handicapped individuals incapable of using digital controls.¹² Users of the Honeywell thermostat rely on its simplicity and special features to help them through their daily activities.

Although mercury thermostats used by blind or visually impaired persons are explicitly exempt from the prohibition under 38 MRSA §1661-C(5), NEMA states that Honeywell is extremely unlikely to maintain its manufacturing line for this relatively small number of special mercury thermostats if it cannot sell mercury thermostats to the general populace.

B. Discussion.

NEMA concedes that an exemption is not needed for Honeywell to continue to sell its easy-to-read, mercury-added thermostats to blind or visually impaired persons. The Legislature already has exempted these thermostats from the sales prohibition. Instead, NEMA speculates that Honeywell is likely to discontinue this line of specialized thermostats unless all mercury-added thermostats are exempted from Maine's sales prohibition. No evidence was submitted in support of this position. NEMA says it is simple business common sense, but the department is not persuaded that speculation becomes common sense by merely saying it is so.

¹² An Indiana company called Eco Manufacturing has developed a round dial thermostat that does not use mercury, but introduction has been delayed by a Honeywell lawsuit. Honeywell claims its round dial design is protected under U.S. trademark law and has sued to enjoin Eco Manufacturing from distributing its non-mercury alternative. In June, the U.S. District Court of Southern Indiana denied Honeywell's request for a preliminary injunction, thus allowing Eco Manufacturing to proceed with manufacturing and distribution for the time being. See Eco Manufacturing LLC v. Honeywell International, Inc., No. 1: 03-cv-0170-DFH (D. S. Ind. June 20, 2003).

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Even assuming Honeywell stops making these thermostats, information from Invensys and the Iris Network, an organization that assists blind and visually impaired persons in Maine, indicates that mercury-free alternatives are and will continue to be available. Several manufacturers of electronic thermostats already make talking models. Talking thermostats are expensive, but they are not the only mercury-free alternative. Affordable mercury free electromechanical thermostats with round dials also are readily available. These can be easily adapted with large dials, Braille or other markings to facilitate use by visually impaired persons according to information provided by the Iris Network and thermostat manufacturer Invensys. The Alliance for a Clean and Healthy Maine reports that Honeywell itself sells a "digital alternative to its popular round mercury thermostat. This mercury-free round model features an easy to use grippable area on the temperature adjustment dial just like the mercury thermostat."

During Legislative debate on Maine's mercury thermostat ban, Steven Obremski of the Iris Network expressed concern that a ban on the sale of all mercury-added thermostats may leave visually impaired persons without affordable alternatives. In email correspondence shared with the Legislature's Natural Resources Committee, Mr. Obremski said most electronic thermostats use a touch-pad that has no audible or tactile feedback, making it impossible for a blind person to independently use this equipment. He also observed that "talking" electronic thermostats are available but cost prohibitive for blind people, most of who are unemployed or on fixed incomes. These concerns led the committee to amend the legislation to include the exemption for thermostats sold for use by a blind or visually impaired person.

We contacted Mr. Obremski for his views on the impacts to Maine's blind population if Honeywell leaves the market as NEMA speculates. His response is that specially designed or adapted thermostats would still be available through catalogs, specialty stores or the Iris Network itself. This suggests that the removal of mercury-added thermostats from traditional retail outlets will not hamper access to specialized thermostats for the blind.

6. HEAT PUMP APPLICATIONS

A. NEMA's position.

According to NEMA, there are no available non-mercury mechanical thermostats that can be used with heat pumps and other multistage equipment. Banning mercury-switch thermostats therefore would require homeowners that have such equipment to use electronic thermostats.

B. Discussion.

LCSP's research confirms NEMA's observation. LCSP identified a non-mercury mechanical thermostat that can be used in a single stage heat pump application but, as NEMA observes, none are suitable for multistage applications. However, there are numerous, commercially available electronic thermostats that can be used with multistage equipment. For consumers who wish to avoid the need to program their thermostat, several electronic non-programmable thermostats also are available at costs comparable to mercury thermostats.

7. THERMOSTAT REPLACEMENT

A. NEMA's position.

NEMA contends that rewiring may be required in order to replace a mercury thermostat with an electronic thermostat. This is because mercury thermostats need only four wires for installation while electronic thermostats require five wires unless battery powered or power-stealing models are used. The vast majority of homes currently only have four wires to the thermostat due to the large installed base of mercury thermostats and past contractor behavior. Thus, in order to hardwire an electronic replacement thermostat, an additional wire may be required in many homes according to NEMA.

NEMA observes that pulling a fifth wire to install an electronic thermostat can be difficult and costly, and may be impossible in some situations. Accordingly, NEMA argues that a four-wire thermostat is the only practical solution for thermostat replacement in the majority of existing homes today. Unless mercury-added thermostats remain available, homeowners who need to replace their thermostat will be faced with the following options, each of which NEMA implies is unsatisfactory or impractical:

- Installation of additional wiring to accommodate an electronic thermostat;
- Installation of a battery-powered or power-stealing electronic thermostat, both of which have significant drawbacks according to NEMA; or
- Installation of a non-mercury electromechanical thermostat, which works with four wires but which NEMA alleges is less energy efficient than a mercury switch thermostat.

B. Discussion.

First, the department does not agree that nonmercury electromechanical thermostats are inherently less energy efficient than their mercury counterparts. Electromechanical thermostats without mercury switches often have similar specifications to

electromechanical thermostats with mercury switches,¹³ and can be used without adverse energy consumption consequences.

Second, the department believes NEMA may be overstating the limitations of battery-powered thermostats. NEMA contends that battery-powered thermostats have a limited market because most contractors are not familiar with them and because of homeowner resistance associated with the need to change batteries. Thermostat manufacturer Invensys, on the other hand, contends that battery-powered electronic thermostats are popular with contractors for the very reason that they work with 4-wire systems. Invensys also says the "majority of thermostats available at retail are battery operated." According to Invensys, well-designed models have a battery life of 3 to 4 years and give a warning 2 to 6 months in advance of when the battery needs replacement. Honeywell and White Rodgers are among the manufacturers that make battery-powered electronic thermostats.

We further note that the Frost & Sullivan market study submitted in support of NEMA's exemption application contradicts NEMA's implication that mercury switch thermostats are the superior choice in retrofit situations. Frost & Sullivan notes that replacement is the second most import driver creating demand for electronic thermostats, and that consumers are choosing to retrofit electronic thermostats to achieve performance and energy conservation benefits.¹⁴ The Frost & Sullivan study also predicts the eventual discontinuation of mercury thermostats because of concerns about mercury and the greater energy efficiency afforded by electronic devices.¹⁵

8. COLLECTION OF MERCURY THERMOSTATS

A. TRC program.

General Electric, Honeywell and White Rodgers have established the Thermostat Recycling Corporation (TRC) to recover and recycle used mercury thermostats. The program began operation in January 1998 and expanded into Maine in 2000. Under this program, thermostat wholesalers can sign up to receive a special container for collection of the thermostats. Heating, ventilation and air conditioning (HVAC) contractors then can drop off thermostats with participating wholesalers. When a container is filled, the wholesaler ships it at TRC expense to a facility where the mercury switch is clipped from the thermostat and sent for mercury recovery.

¹³ Lowell Center for Sustainable Production, *A Review of Thermostat Energy Efficiency and Pricing* (May 2003), p 28.

¹⁴ Frost & Sullivan, *North American HVAC Thermostat and Temperature Control Markets* (May 2000), p 7-5.

¹⁵ Frost & Sullivan, p 5-7.

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The program focuses on the HVAC distribution system because HVAC contractors install the majority of thermostats and purchase them from wholesalers. Participation is voluntary. Wholesalers are not required to offer the collection service as a condition of selling mercury thermostats made by TRC manufacturers, nor are wholesalers generally offered financial incentives or otherwise compensated for their participation. Wholesalers who choose to participate are charged \$15 to cover the initial cost of the storage and shipping container. There is no charge to HVAC contractors for dropping off a mercury thermostat with a participating wholesaler.

To encourage participation, NEMA publicizes the TRC program within the HVAC community through national trade publications and trade association web sites. NEMA also maintains a web site from which interested parties can download a flier on the TRC program. In Maine, NEMA has made direct mailings to HVAC wholesalers asking them to participate and offering signs and collection buckets. It has arranged for information about the program to be published in the newsletter of the Independent Electrical Contractors Association and it has faxed information to the Home Builders and Remodelers Association of Maine. NEMA also has stated its willingness to mail information on the program to HVAC contractors if the department can provide a targeted mailing list.

The department has worked with NEMA to help publicize the program and increase the number of participating wholesalers. The department has identified thermostat wholesalers for TRC's targeted mailings, issued press releases on the program, purchased collection bins from TRC and delivered the bins to wholesalers enlisted by the department. Six of the 11 wholesalers now participating in the TRC program were enlisted through the department's efforts.

B. Adequacy of the TRC program.

As is clear from the discussion under sections 4 through 7 of this decision, NEMA has failed to show that mercury thermostats provide a net benefit to either the environment or public health and safety when compared to available non-mercury alternatives, including electromechanical, electronic non-programmable and electronic programmable thermostats. Accordingly, the request for exemption must be denied on that basis alone. Nevertheless, we make the following findings regarding collection of mercury-added thermostats under the TRC program.

- (1) The Maine Land and Water Resources Council estimates that mercury thermostats currently in use in Maine collectively contain over 4,000 pounds of mercury.¹⁶

¹⁶ Land & Water Resources Council, *Labeling and Collection of Mercury-Added Products: Report to the Joint Standing Committee on Natural Resources, 119th Maine Legislature* (January 1999), p 2-12.

Assuming these thermostats have an effective life of 20 years on average,¹⁷ thermostat replacement would expect to account for about 200 pounds of mercury per year.

- (2) The department has identified 38 HVAC wholesalers in Maine. Six participated in the TRC program in 2001; eleven in 2002. This low level of participation means that many contractors do not have access to the TRC collection program through the wholesalers with whom they regularly do business.
- (3) In 2001, the TRC program participants in Maine collected and recycled 233 thermostats containing a total of about 1.5 pounds of mercury. In 2002, about 1.8 pounds of mercury were collected. Another 1.4 pounds had been collected in 2003 as of late May. The total amount of mercury recovered to date represents less than 1% of the estimated amount expected from replacement of mercury thermostats in Maine.¹⁸
- (4) Several interested parties submitted comments urging denial of NEMA's exemption application based on low thermostat capture rate of the TRC collection program.
- (5) In its *2003 Report to the Maine Legislature*, the Mercury Products Advisory Committee¹⁹ found that the TRC collection rate is quite low. The committee observed that TRC has taken "a few steps to promote the program, but they do not appear to have been particularly effective." This has left most contractors without easy access to the program according to the committee. The committee also observes that "do-it-yourselfers," homeowners who replace their mercury thermostat on their own, do not patronize HVAC wholesalers and therefore are unlikely to participate in the program.
- (6) In a report dated November 2001, the Northeast Waste Management Officials Association (NEWMOA) observed that a significant number of electrical wholesale firms do not participate in the TRC program. NEWMOA estimated that, in 2001, the TRC program collected between 1.3 and 4.9 percent of the mercury thermostats available for collection in the northeast states. NEWMOA further observed that

¹⁷ NEMA claims that mercury-added thermostats last anywhere from 20 to 50 years and are more durable than electronic thermostats. These claims are contradicted by the Frost and Sullivan market survey, *supra* note 5. Frost and Sullivan at page 4-7 reports that the average life span of all thermostats is between 10 and 15 years, and states that electronic thermostats last longer because, unlike mercury thermostats, they do not contain moving parts that wear out.

¹⁸ NEMA suggests that the actual mercury recovery rate is somewhat higher because some collected thermostats remain in the wholesalers' possession. Wholesalers only ship the thermostats to TRC when the collection bin is full. NEMA also speculates that the low capture may in part reflect the fact that some homeowners choose to keep their old mercury thermostats when they are replaced.

¹⁹ The 13 member Mercury Products Advisory Committee was established to advise the department and the Legislature on actions to prevent and reduce environmental releases of mercury from consumer products.

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many national and regional electrical wholesale chains have not signed on to the program and represent a large untapped opportunity to increase participation. The NEWMOA report concludes with a number of recommendations to improve the TRC program including:

- Continuous communication and outreach to maintain the involvement of wholesalers currently participating in the program;
- Continued efforts to increase participation by other wholesalers;
- Improved outreach to contractors to increase their awareness of and participation in the program;
- Expansion of the program to retail outlets that sell mercury thermostats; and
- Placement of collection bins at municipal transfer stations and household hazardous waste collection facilities.

(7) In May 2003, the Governor of Maine signed into law *An Act to Reduce Mercury Use in Measuring Devices and Switches*. Section 5 of the bill directs the department to develop a plan by January 15, 2004 to significantly improve collection of mercury thermostats.²⁰ The Legislature's Committee on Natural Resources added this directive to the bill after being presented with a copy of the Mercury Product Advisory Committee's findings on the TRC collection program and hearing public testimony that the program "is broke and needs to be fixed."²¹

In establishing TRC, thermostat manufacturers deservedly have been praised for recognizing the importance of collecting mercury thermostats and creating a program that attempts to meet this need. The question before the department, however, is whether the program currently is capturing a significant number of thermostats and therefore constitutes a "system for the proper collection, transportation and processing of mercury-added thermostats" within the meaning of 38 MRSA § 1661-C(5)(A). In this matter, we concur with one commenter who stated:

"It stands to reason that a system for 'proper collection, transportation and processing' of mercury-added thermostats must be workable and effective at accomplishing the stated purpose. This means at minimum that the system must actually result in recovery of a substantial quantity of the mercury capsules from old thermostats removed each year in Maine. . . . The record shows that for whatever reason, the system for recovery of mercury from thermostats does not work."

²⁰ PL 2003, c. 221, § 4.

²¹ Michael Belliveau, Executive Director of the Environmental Health Strategy Center, in testimony supporting LD 1159 before the Joint Standing Committee of Natural Resources, 121st Maine Legislature, March 27, 2003.

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) DENIAL

The obvious purpose of the collection system requirement is to provide some assurance that the mercury in any thermostats exempted from the sales ban will not end up in Maine's environment. The TRC program as currently operated does not provide this assurance.

In its application for exemption, NEMA states that "TRC is committed to working with states to grow the program and increase mercury thermostat collections." NEMA elaborated on this commitment in response to the department's May 23 draft denial of its application, saying the success of the TRC program depends not only on NEMA's efforts but on Maine's efforts as well. In this regard, NEMA says that Maine has lagged behind other states and suggests that, to the extent there is dissatisfaction with the program results in Maine, the problem may rest with the department rather than TRC.

Specifically, NEMA contends the department is in a better position than TRC to interact with the affected community because of the department's location and solid waste management responsibilities. For example, NEMA suggests that the department could promote the TRC program by using the offices of the Governor and the commissioner to hold press events, and by enforcing Maine laws that prohibit disposal of mercury thermostats products in the waste stream.²²

As discussed above, the burden is on NEMA to show that a working collection system currently is in place. Simply claiming the fault for TRC's low capture rate lies with the department cannot circumvent this burden, particularly when the data published by NEWMOA and collected by TRC itself indicate the low capture rates in the TRC program are not limited to Maine. Moreover, we do not agree that the department is in all ways better positioned to promote the program. Thermostat manufacturers, as exemplified by the ongoing sale and distribution of their products, have a longer and more continuous relationship with wholesalers than does the department.

Finally, NEMA has not provided any evidence that it attempted to identify the principal causes of the low thermostat capture rate in Maine or the options for addressing those causes. This problem will be explored in detail over the next six months as the department and stakeholders prepare the legislatively required plan for improving thermostat collection. This review will examine the structure and elements of the current TRC program, as well as the DEP's role and responsibilities. Even with the prohibition on new mercury thermostat sales in place, there is a need to significantly improve the collection of these thermostats at the end of their useful life because of the large number that remain in use.

²² See 38 MRSA §1663 [prohibiting disposal of mercury-added products in solid waste]; see also 38 MRSA §1666 [exempting homeowners from the disposal ban under section 1663 until January 1, 2005].

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BASED on the above Findings of Fact, the Department CONCLUDES:

1. The use of mercury-added thermostats does not provide a net benefit to the environment, public health or public safety when compared to available nonmercury alternatives; and
2. NEMA has failed to demonstrate that a system exists for the proper collection, transportation and processing of mercury-added thermostats at end of life.

THEREFORE, the commissioner denies the application by the National Electrical Manufacturers Association for exemption from the sales prohibition under 38 MRSA §1661-C, sub-§5.

DONE AND DATED AT AUGUSTA, MAINE, THIS 8th DAY OF AUGUST 2003.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
Dawn R. Gallagher, Commissioner

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

Date of initial receipt of application: December 16, 2002

Date application accepted for processing: February 28, 2003