

## DEPARTMENT OF ENERGY

## Office of Energy Efficiency and Renewable Energy

## 10 CFR Part 430

[Docket No. EE-RM-93-801]

## Energy Conservation Program for Consumer Products: Energy Conservation Standards for Refrigerators, Refrigerator-Freezers and Freezers

AGENCY: Office of Energy Efficiency and Renewable Energy, DOE.

ACTION: Final rule.

**SUMMARY:** The Department of Energy (DOE or Department) today promulgates revised energy conservation standards for refrigerators, refrigerator-freezers, and freezers. This action is expected to result in substantial energy savings, with consequent benefits to consumers and reductions in emissions of air pollutants.

**EFFECTIVE DATE:** The effective date of the revised standards is July 1, 2001.

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## I. Introduction

## A. General

This final rule concludes a regulatory action, mandated by Part B of Title III of the Energy Policy and Conservation Act, as amended (the Act or EPCA), 42 U.S.C. § 6291-6309, to review and revise the Department's energy conservation standards applicable to refrigerators, refrigerator-freezers, and freezers (refrigerator products). The revised standards will result in reduced energy consumption, reduced consumer costs, and reduced emissions of air pollutants associated with electricity production. The Department estimates that over 30 years the revised standards will save approximately 6.67 quads (7.03 exajoules (EJ)) of primary energy and result in a 465 million metric ton (Mt) (513 million short tons) reduction in emissions of CO<sub>2</sub> and a 1,362 thousand metric ton (kt) (1,501,000 short tons) reduction in emissions of NO<sub>x</sub>.

The regulations published today amend existing standards that were promulgated on November 17, 1989 (hereinafter referred to as the 1989 Final Rule). 54 FR 47916. The Act directs the Department to review the 1989 Final Rule for possible amendment and to issue a final rule based on that review within five years. EPCA, § 325(b)(3)(B), 42 U.S.C. § 6295(b)(3)(B).

In developing today's final regulations, the Department has relied substantially on a joint recommendation negotiated by refrigerator manufacturers and their trade association, energy efficiency advocates, electric utilities, and state energy offices, which was submitted to the Department on November 15, 1994. The Department appreciates their efforts to work out differences and, to the maximum extent practicable, intends to support and

encourage similar efforts with respect to energy conservation standards for other appliances.

## B. Background

DOE published an Advance Notice of Proposed Rulemaking (hereinafter referred to as the 1993 Advance Notice) on standards for refrigerator products as well as other products on September 8, 1993. 58 FR 47326. The 1993 Advance Notice presented the product classes that DOE planned to analyze and provided a detailed discussion of the analytical methodology and models that the Department expected to use in doing the analysis to support this rulemaking. The Department invited comments and data on the accuracy and feasibility of the planned methodology and encouraged interested persons to recommend improvements or alternatives to the approach taken by DOE.

On November 15, 1994, the Department received joint comments from the Association of Home Appliance Manufacturers (AHAM), the Natural Resources Defense Council (NRDC), the American Council for an Energy Efficient Economy (ACEEE), the New York State Energy Office, the California Energy Commission (CEC), Pacific Gas and Electric (PG&E) and Southern California Edison (SCE) (hereinafter referred to as the "Joint Comments"). The AHAM member companies that were active in the negotiations and that supported the agreement were: Amana Refrigeration, Inc. (Amana), Frigidaire Company (Frigidaire), General Electric Appliances (GEA), Marvel Industries (Marvel), Maytag Company (Maytag), Sanyo Company (Sanyo), Sub-Zero Corporation (Sub-Zero), U-Line Corporation (U-Line), W.C. Wood Company and Whirlpool Corporation (Whirlpool).

This group of refrigerator manufacturers, energy efficiency advocates, electric utilities, and state energy offices worked intensively for approximately two and one-half years to develop a common recommendation for revised energy conservation standards for refrigerator products that met the statutory requirements. Although DOE neither organized nor was a member of the group, DOE responded to the group's request to send DOE staff observers to meetings and to make contractors available to provide analytical support. The Department viewed the group effort to reach agreement among representatives of industry, energy efficiency advocates and others as a very constructive development, and the thoughtful Joint

Comments were of great value to the Department in crafting its proposal. On July 20, 1995, DOE published a Notice of Proposed Rulemaking in which the Department proposed amended energy conservation standards

for the refrigerator products (hereinafter referred to as the 1995 Proposed Rule). 60 FR 37388. The standard levels proposed in the 1995 Proposed Rule corresponded closely to the standard

levels recommended in the Joint Comments on the 1993 Advance Notice. Standards proposed in the 1995 Proposed Rule are shown in Table 1-1 and Table 1-2.

TABLE 1-1.—PROPOSED ENERGY STANDARDS FOR REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS WHICH CONTAIN HCFCs

Product class	Energy standards equations (kWh/yr)	
	Effective January 1, 1993	Effective 3 years after publication of final rule
1. Refrigerators and Refrigerator-freezers with manual defrost .....	13.5AV+299 0.48av+299	8.82AV+248.4 0.31av+248.4
2. Refrigerator-Freezers—partial automatic defrost .....	10.4AV+398 0.37av+398	8.82AV+248.4 0.31av+248.4
3. Refrigerator-Freezers—automatic defrost with top-mounted freezer without through-the-door ice service and all-refrigerators—automatic defrost .....	16.0AV+355 0.57av+355	9.80AV+276.0 0.35av+276.0
4. Refrigerator-Freezers—automatic defrost with side-mounted freezer without through-the-door ice service .....	11.8AV+501 0.42av+501	4.91AV+507.5 0.17av+507.5
5. Refrigerator-Freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service .....	16.5AV+367 0.58av+367	4.60AV+459.0 0.16av+459.0
6. Refrigerator-Freezers—automatic defrost with top-mounted freezer with through-the-door ice service .....	17.6AV+391 0.62av+391	10.20AV+356.0 0.36av+356.0
7. Refrigerator-Freezers—automatic defrost with side-mounted freezer with through-the-door ice service .....	16.3AV+527 0.58av+527	10.10AV+406.0 0.36av+406.0
8. Upright Freezers with Manual Defrost .....	10.3AV+264 0.36av+264	7.55AV+258.3 0.27av+258.3
9. Upright Freezers with Automatic Defrost .....	14.9AV+391 0.53av+391	12.43AV+326.1 0.44av+326.1
10. Chest Freezers and all other Freezers except Compact Freezers .....	11.0AV+160 0.39av+160	9.88AV+143.7 0.35av+143.7
11. Compact Refrigerators and Refrigerator-Freezers with Manual Defrost .....	13.5AV+299 0.48av+299	10.70AV+299.0 0.38av+299.0
12. Compact Refrigerator-Freezers—partial automatic defrost .....	10.4AV+398 0.37av+398	7.00AV+398.0 0.25av+398.0
13. Compact Refrigerator-Freezers—automatic defrost with top-mounted freezer and compact all-refrigerators—automatic defrost .....	16.0AV+355 0.57av+355	12.70AV+355.0 0.45av+355.0
14. Compact Refrigerator-Freezers—automatic defrost with side-mounted freezer .....	11.8AV+501 0.42av+501	7.60AV+501.0 0.27av+501.0
15. Compact Refrigerator-Freezers—automatic defrost with bottom-mounted freezer .....	16.5AV+367 0.58av+367	13.10AV+367.0 0.46av+367.0
16. Compact Upright Freezers with Manual Defrost .....	10.3AV+264 0.36av+264	9.78AV+250.8 0.35av+250.8
17. Compact Upright Freezers with Automatic Defrost .....	14.9AV+391 0.53av+391	11.40AV+391.0 0.40av+391.0
18. Compact Chest Freezers .....	11.0AV+160 0.39av+160	10.45AV+152.0 0.37av+152.0

AV=Total adjusted volume, expressed in ft.<sup>3</sup>, as determined in Appendices A1 and B1 of Subpart B of this Part.  
av=Total adjusted volume, expressed in Liters.

TABLE 1-2.—PROPOSED ENERGY STANDARDS FOR HCFC-FREE REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS

Product class	Energy standards equations (kWh/yr) effective dates		
	Effective January 1, 1993	3 years after publication of final rule	9 years after publication of final rule
19. HCFC-Free Refrigerators and Refrigerator-Freezers with Manual Defrost .....	13.5AV+299 0.48av+299	9.70AV+273.2 0.34av+273.2	8.82AV+248.4 0.31av+248.4
20. HCFC-Free Refrigerator-Freezer—partial automatic defrost .....	10.4AV+398 0.37av+398	9.70AV+273.2 0.34av+273.2	8.82AV+248.4 0.31av+248.4

TABLE 1-2.—PROPOSED ENERGY STANDARDS FOR HCFC-FREE REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS—Continued

Product class	Energy standards equations (kWh/yr) effective dates		
	Effective January 1, 1993	3 years after publication of final rule	9 years after publication of final rule
21. HCFC-Free Refrigerator-Freezers—automatic defrost with top-mounted freezer without through-the-door ice service and HCFC-Free all-refrigerators—automatic defrost .....	16.0AV+355 0.57av+355	10.78AV+303.6 0.38av+303.6	9.80AV+276.0 0.35av+276.0
22. HCFC-Free Refrigerator-Freezers—automatic defrost with side-mounted freezer without through-the-door ice service .....	11.8AV+501 0.42av+501	5.40AV+558.3 0.19av+558.3	4.91AV+507.5 0.17av+507.5
23. HCFC-Free Refrigerator-Freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service .....	16.5AV+367 0.58av+367	5.06AV+504.9 0.18av+504.9	4.60AV+459.0 0.16av+459.0
24. HCFC-Free Refrigerator-Freezers—automatic defrost with top-mounted freezer with through-the-door ice service .....	17.6AV+391 0.62av+391	11.22AV+391.6 0.40av+391.6	10.20AV+356.0 0.36av+356.0
25. HCFC-Free Refrigerator-Freezers—automatic defrost with side-mounted freezer with through-the-door ice service .....	16.3AV+527 0.58av+527	11.11AV+446.6 0.39av+446.6	10.10AV+406.0 0.36av+406.0
26. HCFC-Free Upright Freezers with Manual Defrost .....	10.3AV+264 0.36av+264	8.31AV+284.1 0.29av+284.1	7.55AV+258.3 0.27av+258.3
27. HCFC-Free Upright Freezers with Automatic Defrost .....	14.9AV+391 0.53av+391	13.67AV+358.7 0.48av+358.7	12.43AV+326.1 0.44av+326.1
28. HCFC-Free Chest Freezers and All Other Freezers Except Compact Freezers .....	11.0AV+160 0.39av+160	10.87AV+158.1 0.38av+158.1	9.88AV+143.7 0.35av+143.7
29. HCFC-Free Compact Refrigerators and Refrigerator-Freezers with Manual Defrost .....	13.5AV+299 0.48av+299	13.5AV+299.0 0.48av+299	10.70AV+299.0 0.38av+299.0
30. HCFC-Free Compact Refrigerator-Freezer—partial automatic defrost .....	10.4AV+398 0.37av+398	10.4AV+398.0 0.37av+398.0	7.00AV+398.0 0.25av+398.0
31. HCFC-Free Compact Refrigerator-Freezers—automatic defrost with top-mounted freezer and HCFC-free compact all-refrigerators—automatic defrost ....	16.0AV+355 0.57av+355	16.0AV+355.0 0.57av+355.0	12.70AV+355.0 0.45av+355.0
32. HCFC-Free Compact Refrigerator-Freezers—automatic defrost with side-mounted freezer .....	11.8AV+501 0.42av+501	11.8AV+501.0 0.42av+501.0	7.60AV+501.0 0.27av+501.0
33. HCFC-Free Compact Refrigerator-Freezers—automatic defrost with bottom-mounted freezer .....	16.5AV+367 0.58av+367	16.5AV+367.0 0.58av+367.0	13.10AV+367.0 0.46av+367.0
34. HCFC-Free Compact Upright Freezers with Manual defrost .....	10.3AV+264 0.36av+264	10.3AV+264.0 0.36av+264	9.78AV+250.8 0.35av+250.8
35. HCFC-Free Compact Upright Freezers with Automatic defrost .....	14.9AV+391 0.53av+391	14.9AV+391.0 0.53av+391.0	11.40AV+391.0 0.40av+391.0
36. HCFC-Free Compact Chest Freezers .....	11.0AV+160 0.39av+160	11.0AV+160.0 0.39av+160.0	10.45AV+152.0 0.37av+152.0

AV = Total adjusted volume, expressed in ft.<sup>3</sup>, as determined in Appendices A1 and B1 of Subpart B of this Part.  
av = Total adjusted volume, expressed in Liters.

The proposed standards were designed to reduce product energy use by up to 30 percent relative to current standards (Tier 1).<sup>1</sup> For products manufactured without HCFC blowing agents, there was a second-tier standard applicable for six years designed to reduce energy use by up to 23 percent (Tier 2). The percentage reduction in energy use varied from class to class.

<sup>1</sup> The largest two classes, top mount auto defrost refrigerator-freezer without through-the-door features and side-by-side refrigerator freezers with through-the-door features, have efficiency improvements of 29.6 and 29.3 percent, respectively. These two classes account for 78 percent of the energy used by refrigerators and refrigerator/freezers and 57 percent of all refrigerator products including freezers.

The proposed standards would take effect three years from the date of publication of the final rule. The second tier transition standard for HCFC-free products was designed to address concerns about uncertainty relating to the energy penalty associated with substitutes for HCFC-141b, the blowing agent used for refrigerator insulation. The manufacture and import of HCFC-141b, a stratospheric ozone-depleting chemical, will be banned effective January 1, 2003, pursuant to regulations of the Environmental Protection Agency (EPA). 40 CFR 82.4 (l), (m).

The 1989 Final Rule divided refrigerator products into 10 classes based on various product characteristics

(e.g., freezer location). As was proposed in the 1995 Proposed Rule, today's rule establishes new classes for eight different compact refrigerator configurations.

The comment period on the 1995 Proposed Rule, extended by 30 days from its original date, ended on November 2, 1995. 60 FR 47497 (September 13, 1995). A public hearing was held in Washington, D.C. on October 26, 1995. In September and October of 1995, some manufacturers indicated that they no longer supported the imposition of updated standards prior to 2003 because of uncertainty surrounding the thermal efficiency characteristics and cost of insulation

using a blowing agent other than HCFC-141b and safety concerns relating to use of hydrocarbon blowing agents.

In September 1995, the Department announced a formal effort to improve the process it uses to develop appliance efficiency standards. Energy efficiency advocates, product manufacturers, trade associations, state agencies, utilities and other interested parties were asked to provide substantial input into the Department's work, which resulted in the publication of a rule institutionalizing procedural enhancements. 61 FR 36973 (July 15, 1996) (hereinafter referred to as the Process Rule). The enhanced process for considering new or revised appliance efficiency standards includes earlier input from stakeholders, increased predictability of the rulemaking timetable, an improved analysis of impacts, and the encouragement of consensus agreements when possible. For further details, see the Process Rule. 61 FR 36973 (July 15, 1996).

The Department of the Interior and Related Agencies Appropriations Act for Fiscal Year 1996 included a moratorium on proposing or issuing new or amended appliance energy conservation standards during Fiscal Year 1996. Pub. L. 104-134.

In keeping with elements of the Process Rule and to inform the development of a final rule on revised refrigerator standards, DOE reopened the comment period on the Proposal Rule until September 11, 1996 (hereinafter referred to as the 1996 Reopening Notice). 61 FR 41748 (August 12, 1996). DOE sought further comment on issues relating to the relationship between revised DOE efficiency standards and the EPA regulation of HCFC-141b. In the 1996 Reopening Notice, DOE described a number of options under consideration, including the approach in the Proposed Rule, and requested comment and supporting data. In the Reopening Notice, the Department identified a "preferred option," which would have established that standard levels would be set in the range bounded by the proposed Tier 1 and Tier 2 standard levels effective January 1, 2003, with the final standard level to be set in 1999, based on a narrow determination of the energy penalty of the substitute blowing agent. The options identified for comment focused on standard levels in the range bounded by the proposed Tier 1 and Tier 2 standard levels, and on effective dates from 2000 through 2003.

## II. Discussion of Criteria and Comments

The Act requires that any new or amended conservation standard

prescribed by the Secretary shall achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. EPCA § 325(o)(2)(A), 42 U.S.C. § 6295(o)(2)(A).

The Department conducted engineering and economic analyses of those classes of refrigerator products for which performance and cost data could be obtained. The classes analyzed were: top-mounted refrigerator-freezer with auto defrost; top-mounted refrigerator-freezer with auto defrost and through-the-door features; side-by-side refrigerator-freezer with auto defrost; side-by-side refrigerator-freezer with auto defrost and through-the-door features; bottom-mounted refrigerator-freezer with auto defrost; upright freezer with auto defrost; upright freezer with manual defrost; chest freezer with manual defrost; and compact refrigerator-freezer with manual defrost. Data was collected by surveys of the industry, extensive literature review and discussions with experts. This information was used as the basis for determining the improvement in performance and the manufacturer cost for each design option added to the baseline unit. The engineering analysis determined the annual energy use, life cycle costs, and pay back periods for each combination of design options. Proposed standards for classes which could not be analyzed due to the lack of data have been based on the percentage performance improvement over current standards determined for a similar class that was analyzed. No new data on engineering or economic analysis was provided in the comments to the 1995 Proposed Rule.

Revised national impact analyses were performed for today's final rule using the 1997 *Annual Energy Outlook* (AEO) energy price forecast. These results are presented in the updated Chapter 5, "National Energy and Economic Impacts" of the Technical Support Document (TSD), DOE/EE-0064. Chapter 4, "Life-Cycle Costs and Payback Period," was also revised using the 1997 AEO energy price forecast. The TSD is the same as the one that accompanied the 1995 Proposed Rule for these products, with the exception of Chapter 4, Chapter 5 and Table R.5, "Expected Impacts of Program Alternatives," which have been updated. Copies of the TSD and the updated chapters and table are available at the DOE Freedom of Information Reading Room, U.S. Department of Energy, Forrestal Building, Room 1E-190, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586-6020, between the hours of 9 a.m. and 4 p.m.

Monday through Friday except Federal holidays.

The Department has received over 200 comments from Members of Congress, manufacturers, states, environmental and energy efficiency organizations, trade associations, utilities and the public over the course of nearly two years beginning with the publication of the 1995 Proposed Rule. The significant issues raised by the public comments are addressed below. The Department has recently received comments from a diverse group of stakeholders indicating support for the approach taken in this final rule. (Frigidaire, No. 316; GEA, No. 317; Maytag, No. 318; Whirlpool, No. 319; Amana, No. 320; NRDC, Alliance to Save Energy (ASE), ACEEE, CEC, Florida Energy Office, SCE, and Oregon Office of Energy, PG&E, No. 321).

### A. Technological Feasibility

#### 1. General

For those products and classes of products discussed in today's final rule, DOE believes that all of the efficiency levels analyzed in the 1995 Proposed Rule, while not necessarily realized in current production, are technologically feasible. The technological feasibility of the design options is addressed in Chapter 3 of the TSD. The Department considers a design option technologically feasible if that design option is incorporated in commercial products or in working prototypes.

The Department received no public comments regarding the efficiency levels achievable by the design options presented in the 1995 Proposed Rule and accompanying TSD.

#### 2. Maximum Technologically Feasible Levels

To meet the requirement set forth in the Act that any new or amended standard be technologically feasible, the Department conducted engineering analyses of those classes of refrigerator products for which performance and cost data could be obtained. Accordingly, for each class of product under consideration in this rulemaking, a maximum technologically feasible design option (max tech) was identified. The max tech levels were derived by adding energy-conserving engineering design options to the baseline units for each of the respective classes in order of increasing consumer payback periods. A brief discussion of the max tech level for each class analyzed is found in the "Analysis" section of the 1995 Proposed Rule. 60 FR at 37407-8 (July 20, 1995). A complete discussion of each max tech level and the design options included in

each is found in the Engineering Analysis in Chapter 3 of the TSD.

### B. Economic Justification

Section 325 of the Act provides seven factors to be evaluated in determining whether a conservation standard is economically justified: economic impact on manufacturers and consumers, net consumer savings, energy savings, impacts on product utility, impact on competition, need for energy conservation, and other relevant factors. EPCA § 325(o)(2)(B)(i), 42 U.S.C. § 6295(o)(2)(B)(i). Each of these is discussed below.

#### 1. Economic Impact on Manufacturers

a. Approach to Modeling. The Engineering Analysis identified design options for improvements in efficiency along with the associated costs to manufacturers for each class of product. For each design option, these costs constitute the increased per-unit cost to manufacturers to achieve the indicated energy efficiency levels. Manufacturer, wholesaler, and retailer markups will result in a consumer purchase price higher than the manufacturer cost.

In the analysis which supported the 1995 Proposed Rule, the Department used a computer model that simulated a hypothetical company to assess the likely impacts of standards on manufacturers and to determine the effects of standards on the industry at large. This model, the Manufacturer Analysis Model (MAM), is described in the TSD. (See TSD, Appendix C.) It provides a broad array of outputs, including shipments, price, revenue, net income and short- and long-run returns on equity. An "Output Table" lists values for all these outputs for the base case and for each of the standards cases under consideration. (See Tables 6-4 through 6-7 of Chapter 6 in the TSD.) The base case represents the forecasts of outputs with the range of energy efficiencies expected if there are no new or amended standards. A "Sensitivity Chart" shows how returns on equity would be affected by a change in any one of the nine control variables of the model. (TSD, Appendix C.) The Manufacturer Analysis Model consists of 13 modules. The module which estimates the impact of standards on total industry net present value is version 1.2 of the Government Regulatory Impact Model (GRIM), dated March 1, 1993, which was developed by the Arthur D. Little Consulting Company (ADL) under contract to AHAM, the Gas Appliance Manufacturers Association (GAMA), and the Air-Conditioning and

Refrigeration Institute (ARI). (See TSD, Appendix C for more details.)

Commenting on the 1995 Proposed Rule, AHAM, Sub-Zero and GEA criticized the methodology and analytical models used to assess standards. These comments raised concerns about the determination of the impact of standards on manufacturers, particularly the way the Department used the GRIM developed by industry, and the failure to consider the impact of multiple DOE and other agency regulations. Sub-Zero requested that DOE reassess the method used to determine the burdens that future standards will place on small companies. (AHAM, No. 207 at 2-4; Sub-Zero, No. 209 at 3, 4; and GEA, No. 212 at 1, 2).

In implementing the Process Rule, the Department is now undertaking a review of the manufacturing impact analysis model and methodologies. In developing its new methodology, the Department will take into account the comments received concerning its methodology. However, while DOE is committed to improving these analytical tools, DOE believes the results of the Department's manufacturer impact analysis on the 1995 Proposed Rule reasonably reflect the likely impact of new refrigerator standards. The analysis shows, for example, significant drops in short-run return on equity for the higher standard levels, which is consistent with manufacturers' claims. Moreover, notwithstanding their comments concerning the manufacturer impact analytical method, manufacturers, in the Joint Comments, concluded that the proposed standard levels were economically justified and, in more recent comments, expressed support for the approach taken in this final rule. (Joint Comments, No. 49 at 22; Frigidaire, No. 316; GEA, No. 317; Maytag, No. 318; Whirlpool, No. 319; Amana, No. 320).

Other than on issues relating to the status of alternative blowing agents, there have been neither significant technological changes nor significant changes in the market since the Joint Comments were received and the 1995 Proposed Rule was published. Therefore, the Department believes the analysis found in the 1995 Proposed Rule, the TSD for the Proposed Rule (with updated chapters) and the Joint Comments are a sound basis for promulgating this final rule. Developments relating to substitute blowing agents, and the impact of these developments on manufacturer costs are discussed below.

b. Phaseout of HCFC-141b. Many of the manufacturers' written or oral

comments on the 1995 Proposed Rule asked that the Department take into account the cumulative burden of DOE's new energy efficiency standards and EPA's regulations banning, as of January 1, 2003, the manufacture and import of HCFC-141b, the blowing agent currently used in the production of the insulation in refrigerators. In the preamble to the Process Rule, with respect to refrigerators, DOE stated that it "expects to consult further with interested parties to determine whether it is appropriate to make alterations to the proposed standards to take into account the interaction between the revised efficiency standards and Clean Air Act and Montreal Protocol on Substances that Deplete the Ozone Layer regulations relating to the manufacture of HCFCs." 61 FR at 36980. The 1996 Reopening Notice expressly sought comment on the interrelationship between these two regulatory actions, the resulting impact on manufacturers, and the possible means for mitigating any adverse impacts. There are three major areas of concern regarding the phaseout of HCFC-141b: the thermal performance of the replacements; the date by which sufficient quantities of the replacement would be available; and the impact of both regulations on the development and manufacture of new refrigerators.

i. Thermal Performance of HCFC-141b Replacements. Based on a recommendation in the Joint Comments, the Department's 1995 Proposed Rule proposed new product classes for refrigerator products made without HCFCs. To allow for the presumed energy penalty of replacements for HCFC-141b, DOE proposed a 10 percent relaxation of the otherwise applicable standards for HCFC-free products for a period of six years after the effective date of the new standards. The Joint Comments, which were developed in 1994 and reflect information on blowing agents available at the time, stated that: "all non-chlorinated substitutes available to replace HCFC-141b are expected to be a minimum 10% less energy efficient." (Joint Comments, No. 49 at 12).

In the 1996 Reopening Notice, the Department sought additional information on replacement blowing agents because of the relevance of such information to the rulemaking effective date and standard levels. AHAM submitted a report summarizing the research of the Appliance Research Consortium (ARC) on foam blowing agents which indicates that a foam blowing agent, hydrofluorocarbon (HFC)-245fa (1,1,1,3,3-pentafluoropropane), is able to produce

insulating foams with a thermal efficiency comparable to HCFC-141b. The ARC report included the results of refrigerator cabinet tests which found that units using HFC-245fa insulation averaged only 0.9 percent more energy usage than comparable units using HCFC-141b. (AHAM, No. 237, Attachment 3).

ii. HFC-245fa Availability. HFC-245fa cannot be used in refrigerators until the blowing agent is added to EPA's Significant New Alternatives Policy (SNAP) list. This inclusion is dependent on the results of several toxicity tests and could occur during 1997. A 90-day toxicity test ended in August 1996 and the results raised no significant concerns. Based on these results and results of other tests, the likely producer of the chemical, AlliedSignal, will decide whether to petition EPA to have HFC-245fa added to the SNAP list. EPA has indicated that it is prepared to initiate the necessary regulatory process to determine whether to allow commercialization of HFC-245fa as soon as a manufacturer petitions the Agency. Based on early information about the physical and toxicological performance of HFC-245fa, EPA believes regulatory approval will be granted. (EPA, No. 301 at 1, 2).

In addition to the toxicity tests, AlliedSignal also has performed a gas migration test using foam board insulation made with HFC-245fa. Comparatively little migration has occurred (less than the migration of HCFC-141b under similar conditions). An AHAM-sponsored food transfer test performed by an independent laboratory (Hazelton) should begin in the summer of 1997, with refrigerator results available in the fall of 1997, and freezer results due toward the end of 1997.

Although the chemical will not require Food and Drug Administration (FDA) approval, these studies are likely to be reviewed by an independent panel of experts to decide whether the chemical would likely meet the FDA's Generally Regarded As Safe (GRAS) requirements. This process should be completed by the end of 1997. (AlliedSignal, No. 266 at 1).

While there are still some uncertainties associated with HFC-245fa, AlliedSignal has indicated, based on favorable test results, that it expects to begin commercial production of HFC-245fa in 1999 and to expand its availability in early 2000 by starting production at a new facility. As of February 1997, AlliedSignal expected appliance manufacturers to begin converting to HFC-245fa as early as 1999 and to complete their conversion

before the end of 2000. (AlliedSignal, No. 314, at 4).

iii. Cumulative Burden from Multiple Government Regulations. During 1995 and 1996, prior to the availability of the positive test results on HFC-245fa, many manufacturers expressed concern about the cumulative regulatory burden of revised efficiency regulations and EPA's ban on the production of HCFC-141b as of 2003. They argued that imposing new efficiency standards in 2000 would force manufacturers to redesign their products and processes twice, once in 1999, in order to meet the new efficiency standard, and a second time in 2002, to accommodate a new insulation blowing agent. Manufacturers believed then that the replacement for HCFC-141b was likely to have significant impacts on thermal efficiency and product design, and could also involve significant manufacturing process changes.

Maytag, GEA and Frigidaire expressed concerns about the availability of HCFC-free foams. GEA stated that it appeared unlikely that HFC-245fa would be proven safe and made available in sufficient quantities before 2002. (GEA, No. 212 at 2). AHAM stated that even if the commercial sale of HFC-245fa began in 1999 or 2000, there might not be sufficient production for the entire refrigerator (and building insulation) industry. (AHAM, No. 268 at 3).

As a result of these concerns, the Department carefully considered the interrelationship between these two regulatory actions. To try to mitigate the effects of new energy efficiency standards for refrigerator products and the phaseout of HCFC-141b, the Department evaluated a number of different combinations of effective dates and standard levels for HCFC-141b products and for HCFC-free products. In the 1995 Proposed Rule, the Department proposed separate classes for HCFC and HCFC-free products with 10 percent less stringent standards for the HCFC-free products. In the 1996 Reopening Notice, the Department presented for comment seven possible adjustments to the standards levels and effective date, including the two-tier option proposed in the 1995 Proposed Rule. In the Reopening Notice, the Department specifically requested input on the question of whether significant cost savings would result from having standards take effect at the same time as the EPA ban on the manufacture of HCFC-141b. The Department also requested more information on the candidate substitutes for HCFC-141b.

Public comment on these various proposals was split, with Whirlpool, Marvel Industries, the Northwest Power

Planning Council (NPPC), U-Line, CEC, NASEO, ACEEE, NRDC and other commenters expressing continued strong support for the standards as proposed in the 1995 Proposed Rule. (Whirlpool, No. 208 at 3; Marvel Industries, No. 261 at 1; NPPC, No. 210 at 1; U-Line, No. 211 at 2; ACEEE and NRDC, No. 214 at 2; CEC, No. 215 at 1; and NASEO, No. 216 at 1). Amana, Frigidaire, GEA and Maytag supported a new standard in 2003, in order to allow them to make the product and process changes necessary for meeting a new standard simultaneously with introducing a substitute for HCFC-141b. (Amana, Frigidaire, GEA, and Maytag, No. 290, at 1).

In response to the 1996 Reopening Notice, manufacturers, energy efficiency advocates, the EPA and others provided additional information. The Department received comments which more specifically addressed the growing likelihood that HFC-245fa would be the chosen substitute for HCFC-141b. ACEEE and NRDC claimed that there was now evidence that by the 2003 phaseout date for the manufacture of HCFC-141b, alternative blowing agents would be available with no energy penalty. If the Department were significantly delayed in publishing a final rule, ACEEE and NRDC recommended reconsidering the issue of less stringent standards for HCFC-free products. (ACEEE and NRDC, No. 206 at 7-9). Several commenters stated that current information indicated that the next generation HFC's being tested will be viable alternatives with minimal impact on energy consumption and cost. (EPA, No. 250 at 4; GEA, No. 317; Whirlpool, No. 319).

Amana, Frigidaire, Maytag and GEA stated that switching to HCFC substitutes as early as 2000 was not technically feasible, given what is known about the time line for testing and production of HFC-245fa. They asserted that toxicity testing might not be completed until 2001, that the transition of manufacturing facilities to produce the substitute would take additional time, and that chemical manufacturers might not be able to provide adequate supplies of the substitute product to all appliance companies on a timely basis. (Amana, Frigidaire, Maytag and GEA, No. 265 at 1).

These manufacturers commented that the HCFC substitute could affect the fundamental design and manufacture of refrigerators. In particular, if the substitute is not a "drop-in," an additional redesign of refrigerator products may be required. They further commented that while the largest

manufacturers may be able to accommodate the investment in multiple redesigns, other manufacturers cannot afford the added costs associated with over-designing, under-designing or mis-designing for double digit efficiency improvements without first knowing what the HCFC replacement will be. (Amana, Frigidaire, Maytag and GEA, No. 265 at 1).

Information submitted by manufacturers reflected varying views on the likely incremental costs if products needed to be redesigned twice in a three year period (once in 2000 and again in 2003). Maytag stated that when the HCFC-141b ban and the imposition of new energy efficiency standards are separated in time, engineering changes will occur at each stage, requiring considerable resources each time, and the possibility of major capital investments. (Maytag, No. 233, at 2). Frigidaire stated that the incremental cost of two redesigns versus a single redesign between the present time and 2003 is substantial for smaller manufacturers. (Frigidaire, No. 232 at 5). Whirlpool stated that if HFC-245fa or a comparable blowing agent with no significant energy penalty is available, then the degree of redesign needed will be minimal. No product changes would be required, although some companies might choose to make minor design changes and/or change liner material to obtain competitive cost advantages. Whirlpool commented that the factory investments for conversion to HFC-245fa will be zero to a few hundred thousand dollars. (Whirlpool, No. 244, at 3).

Based on the positive results of recent toxicology tests, and the statements of Allied Signal, the EPA and others, DOE has concluded that it is likely that the chosen substitute for HCFC-141b will be HFC-245fa, or another blowing agent with comparable characteristics, and that such a substitute will be available for use in the manufacture of refrigerators prior to the 2003 phase out date for the production of HCFC-141b. (Allied Signal, No. 314; EPA, No. 250). Furthermore, the results of recent tests conducted by ARC show that there is likely to be little or no energy penalty associated with the use of HFC-245fa. (AHAM, No. 237, Attachment 3 at 9). Allied Signal reported that foams produced with HFC-245fa age at a slower rate than foams produced with HCFC-141b at all temperatures tested. Therefore, the thermal conductivity of HFC-245fa blown foams is superior to that of HCFC-141b foams after several weeks of aging. (Allied Signal, No. 267 at 8-9). As noted by Whirlpool, HFC-245fa is less corrosive than HCFC-141b

which may result in some cost savings to the industry because manufacturers will not need to use an inner liner or may be able to use a lower cost liner material. (Whirlpool, No. 244 at 3). Because of the comparability of HFC-245fa to HCFC-141b, the Department believes that only minor changes in refrigerator design, not a complete redesign, will be required to convert to the new blowing agent.

DOE has carefully considered all comments on the impact of amended energy efficiency standard levels on manufacturers. Based on the information in the record about the characteristics of HFC-245fa and its likely schedule of availability, DOE believes it is no longer necessary to retain the second tier standard for HCFC-free product classes, as proposed in the 1995 Proposed Rule. Consequently, this rule establishes a single tier of efficiency standards at the levels corresponding to the Tier 1 standards in the 1995 Proposed Rule. This approach is supported by recent comments from Frigidaire, GEA, Maytag, Whirlpool, Amana, energy conservation advocates, states and utilities. (Frigidaire, No. 316; GEA, No. 317, Maytag, No. 318, Whirlpool, No. 319; Amana, No. 320; NRDC, ASE, ACEEE, CEC, Florida Energy Office, SCE, and Oregon Office of Energy, PG&E, No. 321).

The Department recognizes that there will be considerable costs associated with the product redesign necessary to meet the new efficiency standards, as well as some additional costs associated with the conversion to a new insulation blowing agent, even assuming that agent is HFC-245fa or another chemical with comparable characteristics. In addition, the redesign for meeting revised efficiency standards can be done with greater confidence if the substitute blowing agent is known at the time of the redesign. For these reasons, the Department has decided to give manufacturers 14 months more than the minimum of three years from the date of publication until the standard becomes effective. This will allow more time for the development of HCFC-141b substitutes, and for manufacturers to make design changes and obtain the capital necessary to complete the required changes. Furthermore, because of the comparability of HCFC-141b and HFC-245fa, DOE believes that manufacturers could choose to delay their conversion to HFC-245fa until sometime after July 1, 2001, without incurring substantial additional costs.

In April 1997, a number of parties filed comments with the Department supporting this approach of setting an

effective date of July 1, 2001, and eliminating the second tier transition standard for HCFC-free products. (Frigidaire, No. 316; GEA, No. 317, Maytag, No. 318, Whirlpool, No. 319; Amana, No. 320; NRDC, ASE, ACEEE, CEC, Florida Energy Office, SCE, and Oregon Office of Energy, PG&E, No. 321). This approach is founded on the best current information about substitutes for HCFC-141b, i.e., that HFC-245fa will receive the necessary regulatory approvals, and that Allied Signal will make it available in sufficient quantities for all manufacturers to use prior to 2003. However, given that all testing on HFC-245fa has not been completed, some commenters urged the Department to provide for appropriate exception relief for manufacturers in the event that HFC-245fa or comparable products do not become available to all manufacturers on a timely basis.

DOE recognizes that some uncertainty still exists about the ultimate acceptability of HFC-245fa or other comparable blowing agents, as well as some uncertainty regarding the timing of commercial production of such a product. The results, to date, of HFC-245fa toxicology tests have generally been positive, but the testing process is not likely to be completed until late 1997. Consequently, it is still possible that subsequent tests will identify unacceptable risks associated with the use of this product or that its commercial availability will be delayed beyond 2003. Under such conditions, DOE may grant manufacturers exception relief. Section 504 of the Department of Energy Organization Act authorizes DOE to make adjustments of any rule or order issued under the Energy Policy and Conservation Act, consistent with the other purposes of the Act, if necessary to prevent special hardship, inequity, or unfair distribution of burdens. 42 U.S.C. § 7194(a).

The process established by DOE for receiving and acting on applications for exception is set forth in 10 CFR part 1003, subpart B. Applicants for an exception are required to serve their application on persons who might be adversely affected by the granting of an exception, and DOE may require or provide additional notice of the application. 10 CFR 1003.23. The notices to potentially affected parties would include an invitation to submit comments regarding the application to DOE and any comments would be served on the other identified parties in the proceeding. The applicant would be provided an opportunity to respond to any submissions by third parties relevant to the application. 10 CFR

1003.25(a)(1). After considering the entire record, DOE would render a final decision and order. In exercising its authority under section 504, DOE may grant an exception from an efficiency standard for a limited time, and may place other conditions on the grant of an exception.

DOE will require any application for an exception to provide specific facts and information relevant to the claim that compliance would cause special hardship, inequity or the unfair distribution of burdens. Joint applications would be permitted. Compliance with the terms of this rule could constitute special hardship for the refrigerator manufacturing industry in the unexpected event that it was shown that HFC-245fa or a comparable product would not be available as a timely replacement for HCFC-141b and the unavailability of HFC-245fa or comparable products prior to the imposition of the ban on the further production of HCFC-141b would substantially increase the expected manufacturer costs associated with complying with this revised standard. In such circumstances, appropriate transition relief, as may be needed to address the special hardship, would be considered. Any relief would be crafted with due consideration for the effects of such relief on competition in the affected markets.

## 2. Economic Impact on Consumers Including Life-Cycle Costs and Payback Periods

In determining whether a standard is economically justified, EPCA directs the Secretary to consider the economic impact on consumers. In response to the 1996 Reopening Notice, over 100 consumers urged the adoption of the standards as proposed in the Proposed Rule. These comments supported the reduction in pollution which would result from the standards as well as the benefits to American households. (Public Comments, No. 305).

To evaluate the expected economic impact on consumers, the Department calculates the total life-cycle costs of alternate standard levels as well as the expected time required to pay back any increase in the product's initial costs. The expected payback period of a standard is calculated and often referenced because it is a commonly used measure and also is the basis for the rebuttable presumption created by section 325(o)(2)(B)(iii) of EPCA, 42 U.S.C. 6295(o)(2)(B)(iii).

The life-cycle cost to consumers is the sum of the purchase price and the operating expense discounted over the lifetime of the appliance. Installation

and maintenance costs are elements of life-cycle cost but are not significant for refrigerator products. The change in life-cycle costs resulting from any new standards is considered by the Department to be the best measure of the effect of proposed standards on consumers. This is quantified by the difference in the life-cycle costs for the average consumer with and without revised standards for the analyzed refrigerator classes.

The life-cycle cost was calculated for each class for the range of efficiencies considered in the Engineering Analysis, using a real consumer discount rate of 6 percent. The purchase price is based on the factory costs in the Engineering Analysis and includes a factory markup plus distributor and retailer markups. The Department believes that its analysis represents the worst case scenario for consumers in that it assumes an incremental increase in the purchase price based on the costs associated with improving efficiency. In the marketplace, manufacturers may offset some or all of this cost increase by, for example, making material substitutions or increasing productivity. (Whirlpool, No. 208 at 2,3). DOE does not attempt to predict the consumer benefits of such non-energy changes which are part of an on-going product improvement process.

Energy Market & Policy Analysis, Inc. (EM&PA) commented that the economic analysis issued by DOE in its TSD is based on outdated and invalid assumptions about potential energy costs. EM&PA commented that all calculations of life-cycle costs, payback periods, and consumer energy cost savings in the TSD are based on unrealistically high estimates of future energy (particularly electricity) prices. (EM&PA, No. 229 at 3).

The purchase price and operating energy expense of each standard level based on the 1994 AEO are presented in Chapter 4 (Consumer Impacts) of the original TSD. The Department is committed to using the most recent available AEO forecasts. The annual operating cost for standard level 1 has been updated based on the lower 1997 AEO energy prices.<sup>2</sup> (See updated Chapter 4 of the TSD.) The 1997 AEO forecast of electricity prices in 2000 is 12.7 percent lower than the 1994 forecast.

Moreover, DOE has analyzed life-cycle costs, payback periods, cost of conserved energy, energy savings, and

other metrics using a range of energy prices. Life-cycle costs for the standard level of today's final rule were calculated for the following sensitivity cases: low state electricity prices, high state electricity prices, high equipment prices, low equipment prices, the combination of low state electricity prices and high equipment prices, and the combination of high state electricity prices and low equipment prices. Results are shown in updated TSD Chapter 4. The Department is committed to using such analyses in future rulemakings. (Section 11(e) of the Process Rule).

As a complement to energy price sensitivities, the Department calculates the cost of conserved energy (CCE) for standards under consideration. The CCE is the increase in purchase price amortized over the lifetime energy savings of the appliance. The advantage of the CCE approach is that it does not require assumptions about future energy prices because it uses only the purchase expense of the efficiency measure and the expected energy savings. The consumer will benefit whenever the cost of conserved energy is less than the energy price paid by the consumer for that end use. (TSD, Sec. 4.4, p. 4-23)

AHAM commented, "The DOE/LBNL energy analysis indicates that standard levels approximating those proposed have paybacks in the 3-4 year category. In fact, analysis undertaken by AHAM, with the same data LBNL used, indicates that for the proposed standards levels the payback is in the 7-8 year period for refrigerator/freezers and 11-12 years for freezers." (AHAM, No. 207 at 2).

The payback period reported in the TSD, using 1997 AEO energy price forecasts, is 4.1 years for the top mount auto defrost refrigerator-freezer class without through-the-door features, the most popular class of refrigerators, and ranged from 0.6 to 11.9 years for other classes of refrigerator products. (See TSD, Chapter 4). AHAM provided no explanation for the discrepancy in payback forecasts, claimed no specific errors in the Department's analysis and provided insufficient data to enable the Department to determine why the payback periods do not agree. The Department calculated payback periods using both AEO 1994 and 1997 energy prices and both sets of payback periods are shorter than AHAM claims.

ACEEE and NRDC noted that the 1995 Proposed Rule rejected standard level 2 in part because the payback period at this level may be as long as 19 years, the expected life of the product. (ACEEE and NRDC, No. 206 at 6). Standard level 2 was not rejected solely on the basis of

<sup>2</sup> Annual energy cost is the product of annual energy use times \$0.0858/kWh. This electricity price comes from the 1997 AEO price projection. (Sec. 5.1.4, "Residential Energy Prices," of updated TSD Chapter 5).



the payback period. The Department also considered the adverse impact on manufacturers short-run return on equity.

### 3. Energy Savings

The Act requires DOE to consider the total projected energy savings that result from revised standards. The Department used the Lawrence Berkeley National Laboratory Residential Energy Model (LBNL-REM) results in its consideration of total projected savings.

a. Forecast of Savings. The Department forecasts energy consumption by using the LBNL-REM, which forecasts energy consumption over the period of the analysis for candidate standards and the base case. (See TSD, Appendix B for a detailed discussion of the LBNL-REM.) The LBNL-REM projections depend on estimated values, the most significant of which are the responsiveness of household appliance purchasers to changes in residential energy prices and consumer income, future energy prices, future levels of housing construction, and options that exist for improving the energy efficiency of appliances.

The Department's estimate of the energy savings attributable to a standard is the difference between the projected energy consumption, assuming compliance with the candidate standard, and projected energy consumption under the base case. The calculation of the forecast energy savings for today's rule differs in two significant ways from the original TSD presentation which was the basis for the numbers in the 1995 Proposed Rule. First, the effective date of the standards has been changed from January 1, 1998, to July 1, 2001. Second, the Department is now using the AEO 1997 energy price forecasts instead of the AEO 1994 energy price forecasts which were used in the 1995 TSD. The cumulative energy savings of this final rule, as shown in updated chapter 5, is 6.67 quads over the period 2000 through 2030. The Department did not receive any comments on the calculation of energy savings.

b. Significance of Savings. Under section 325(o)(3)(B) of the Act, 42 U.S.C. § 6295(o)(3)(B), the Department is prohibited from adopting a standard for a product if that standard would not result in "significant conservation of energy." While the term "significant" is not defined in the Act, the U.S. Court of Appeals for the D.C. Circuit concluded that Congress intended the word "significant" to mean "non-trivial." *Natural Resources Defense Council v. Herrington*, 768 F.2d 1355, 1373 (D.C. Cir. 1985). DOE has

determined that the energy savings from this final rule are significant.

### 4. Lessening of Utility or Performance of Products

In establishing classes of products and design options, the Department tried to eliminate any degradation of utility or performance in the products under consideration in this rulemaking. That is, to the extent that comments or research showed that a product included a utility or performance-related feature that inherently lowers energy efficiency, a separate class with a different efficiency standard was created for that product. This is consistent with the Joint Comments which stated that "these standards were chosen at a level that provides for no significant lessening of utility or performance." (Joint Comments, No. 49 at 23). No other comment was received on this subject.

### 5. Impact of Lessening of Competition

The Act directs the Department to consider the impact of any lessening of competition that is likely to result from the imposition of the standards. It further directs the Attorney General to make a determination of the impact, if any, of any lessening of competition and to provide that determination to DOE within 60 days of the publication of a proposed rule.

In its letter of April 19, 1996, the Department of Justice (DOJ) provided its analysis of the standards proposed in the 1995 Proposed Rule. (A copy of the letter containing the DOJ findings is published in its entirety in Section V.) DOJ stated, "we cannot conclude that promulgation of the proposed rules is likely to have a substantial adverse effect on competition in the market for those products. While the rules may result in some changes in the product mix offered by some manufacturers, and may result in the discontinuation of certain models of each of the products, the available evidence does not demonstrate that competition in these markets likely would be substantially affected by the proposed rules."

DOJ expressed some concern regarding the cumulative effect of the proposed energy conservation standards and EPA's ban on the manufacture and import of HCFC-141b. DOE reopened the comment period on August 12, 1996, in order to obtain additional information and views on these issues. As a result of the reopening, DOE obtained information about the availability of substitutes for HCFC blowing agents which shows there is likely to be less economic impact on manufacturers from the conversion to

HCFC-141b substitutes than anticipated at the time of the DOJ analysis. As discussed in Section II.B.1.b. of this Supplementary Information section, research conducted by a consortium of refrigerator manufacturers shows that HFC-245fa (or a similar substance) is a likely substitute for HCFC-141b, and that use of HFC-245fa is not expected to require major product redesign. Moreover, the change in effective date further addresses the DOJ concerns about the proposed rule.

Representatives of several manufacturers argued that DOE is required to seek a new determination from DOJ of the impact on competition of options raised in the Reopening Notice before promulgating any final rule. The Assistant Attorney General's letter of April 19, 1996, fully satisfied DOJ's obligations under EPCA. The Act only requires the Attorney General to make a determination of the impact on competition of a proposed rule. 42 U.S.C. 6295(o)(2)(B)(ii). No provision of EPCA requires DOJ to convey its views on DOE notices of reopening of the comment period or on final rules, nor does EPCA require DOE to solicit views from DOJ on those actions. DOE acknowledges that there may be circumstances in which it would be advisable, as a matter of policy, for DOE to solicit supplemental views from DOJ, but DOE sees no need to do that in this proceeding. Moreover, DOJ was aware of the reopening of the comment period but submitted no additional views on the impact on competition of the various options presented for comment. The DOJ views in this proceeding are contained in its original April 19, 1996, analysis.

### 6. Need of the Nation to Conserve Energy

Enhanced energy efficiency improves the Nation's energy security, strengthens the economy and reduces the environmental impacts of energy production. The Department estimates that over 30 years, the revised standards will save approximately 6.67 quads (7.03 exajoules (EJ)) of primary energy.

### 7. Other Factors

EPCA allows the Secretary of Energy, in determining whether a standard is economically justified, to consider any other factors that the Secretary deems relevant. The estimated environmental benefits from today's final rule (based on the 1997 AEO fuel prices) are, over the period from 2000 to 2030, a reduction in emissions of NO<sub>x</sub> by 1,362 thousand tons (1,501 thousand short tons), a reduction in emissions of CO<sub>2</sub> by 465 Mt (513 million short tons) and

a reduction in the cost of the emission controls roughly equivalent to the cost of reducing SO<sub>2</sub> emissions by 1,545 kt (1,703 thousand short tons). (TSD, updated Chapter 5).

### C. Rebuttable Presumption of Economic Justification

Section 325(o)(2)(B)(iii) of EPCA, 42 U.S.C. § 6925 (o)(2)(B)(iii), states:

"If the Secretary finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy savings during the first year, there shall be a rebuttable presumption that such standard level is economically justified."

If the increase in the initial price of an appliance due to a conservation standard would repay itself to the consumer in energy savings in less than 3 years, then it is presumed that such standard is economically justified. This presumption of economic justification can be rebutted upon a proper showing.

The pay back period for today's final rule for manual defrost upright freezers is less than 3 years. The estimated pay back period for the top mounted automatic defrost refrigerator-freezer class, which accounts for more than 50 percent of the sales of all refrigerator-freezer products, is 4.1 years. The longest payback period for any of the product classes is 11.9 years (this is for refrigerators with a top-mount freezer and through-the-door features, the least popular of the full-size refrigerator classes), which is substantially shorter than the product life. (Updated TSD Chapter 4, Sec. 4.2.2).

## III. Analysis

### A. Product Classes

The Department is adding new product classes for compact refrigerators, refrigerator-freezers and freezers. Formerly, the Department made no class distinctions by size of refrigerator, so compact refrigerators were governed by the same standards (which include adjustments for volume) as full-size refrigerators. The Department is now adding new product classes for compact refrigerators, refrigerator-freezers and freezers, which includes products with a total volume of less than 7.75 cubic feet (Federal Trade Commission/AHAM rated volume) and 36 inches or less in height. The total energy consumption of all compact refrigerator products in the U.S. is about 2.5 percent of the total energy consumed by all refrigerator products. There are only three or four energy savings options expected to be

available for these products by the year 2001. Because of small production volumes, the impact of new standards on these manufacturers is relatively severe. The Department calculates a 5-year payback period is required to recoup the consumer cost of improvements in efficiency at levels only 2 to 3 percent more stringent than the 1993 levels. Given that the compact products have a distinct utility (i.e., they serve a variety of applications not served by full sized units) and the limited efficiency improvement potential because of the limited number of design options available, the Department has concluded that compact refrigerator products should be treated differently from full sized models.

The proposal to create new product classes for HCFC-free products has been dropped, based on information about the likely availability of HFC-245fa as a substitute blowing agent.

### B. Standard Levels

Section 325(o)(2)(A) of the Act specifies that any new or amended standard the Department prescribes must be designed to "achieve the maximum improvement in energy efficiency \* \* \* which the Secretary determines is technologically feasible and economically justified."

The figures cited in this section are found in the TSD prepared for the 1995 Proposed Rule and the updated TSD chapters 4 and 5, which are supplements to the TSD. The updated TSD chapters reflect two major changes from the original TSD: effective date and updated electricity price forecasts. The original TSD was prepared using energy price forecasts from the 1994 AEO. The 1997 AEO, which forecasts lower energy prices, recently became available. The impact of lower energy prices is to reduce somewhat the economic benefits of standards, which is reflected in increased consumer payback periods and reduced life-cycle-cost savings and national benefits. Standard Levels 4, 3, and 2 were rejected in the 1995 Proposed Rule using the 1994 AEO price forecasts and the lower 1997 AEO price forecasts would show somewhat smaller energy cost savings for the rejected standard levels. The Department did not rerun the TSD analysis for the rejected standard levels based on the 1997 AEO energy price forecasts. The calculations for Standard Levels 4, 3, and 2 below are derived from the TSD, and reflect AEO 94 predictions and an effective date in 1998. For Standard Level 1, the Department did prepare revised TSD chapters using the 1997 AEO energy

price forecasts and the July 1, 2001, effective date of the standards.<sup>3</sup>

#### 1. Standard Level 4

The Department first considered the max tech level of efficiency. Standard Level 4, max tech, would save the most energy: 10.0 quads (10.55 EJ) for refrigerators (including refrigerator-freezers) and 2.0 quads (2.11 EJ) for freezers between 1998 and 2030. In order to meet this standard, the Department assumes that all refrigerator products would incorporate vacuum panel insulation. The use of vacuum panel insulation accounts for 30 percent of total energy savings, with increased wall thickness as the only alternative. Vacuum panel technology has progressed, but there remain concerns about manufacturability, availability, reliability, and performance. Vacuum panels are 6 to 10 times heavier than foam. The increase in door weight may cause the appliance to tip over when the door is opened. Also, current production capability for vacuum panels is far too small for the projected demand. A 1-inch increase in wall and door thickness (a 2-inch increase in the side-to-side dimension) is not a viable option. Some larger products already are constrained by the need to fit into existing spaces and through doors and passageways. Decreasing interior volume would sacrifice product utility. In addition, there are likely to be some groups of consumers who would experience net life-cycle cost increases compared to the units they would have otherwise purchased. Based upon a consideration of these factors, the Department therefore concludes that the burdens of Standard Level 4 for refrigerators, refrigerator-freezers and freezers outweigh the benefits, and rejects the standard level as not economically justified.

#### 2. Standard Level 3

This standard level is projected to save 8.6 quads (9.1 EJ) of energy for refrigerators and refrigerator-freezers and 1.7 quads (1.8 EJ) for freezers. While this level does not use vacuum panels, about 40 percent of the energy savings for most of the classes is obtained by increasing the insulation values. There is general agreement that an increase in the wall thickness is not acceptable for many of the larger models in each class. This level has payback periods as high as 25.5 years (longer than the typical 19-year product life) and reduces estimated

<sup>3</sup>Note that the analysis of Standard Level 1 in the Proposed Rule assumed that all products met the proposed Tier 1 standards, thus no adjustment to reflect the elimination of the HCFC-free classes and their Tier 2 standards is needed.

refrigerator manufacturer short-run return on equity from 7.3 percent to 5.8 percent, a reduction of 20 percent. For freezer manufacturers, the estimated short-run return on equity (ROE) drops from 7.3 percent to 4.7 percent, a reduction of more than 35 percent. Based on these considerations, the Department concludes that the burdens of Standard Level 3 for refrigerators, refrigerator-freezers and freezers outweigh the benefits, and rejects the standard level as not economically justified.

3. Standard Level 2

This standard level is projected to save 7.8 quads (8.2 EJ) of energy for refrigerators and refrigerator-freezers, and 1.3 quads (1.4 EJ) for freezers. However, this level also requires an increase in insulation with a corresponding increase in the wall thickness. Furthermore, the payback period may be as long as 19.0 years, the expected life of these products. The initial burden on the manufacturers is also high: short-run return on equity for manufacturers of both refrigerators and freezers is estimated to decrease from 7.3 percent to 6.2 percent, a reduction of 16 percent. The Department concludes that the burdens of Standard Level 2 for refrigerators, refrigerator-freezers and freezers outweigh the benefits, and rejects the standard level as not economically justified.

4. Standard Level 1

The Department concludes that Standard Level 1 for refrigerator

products, effective in July 2001, and without the special transition standards for HCFC-free products contained in the 1995 Proposed Rule, is technologically feasible and economically justified. Over the period from July 1, 2001–2030, Standard Level 1 is projected to save 6.18 quads (6.52 EJ) for refrigerators and refrigerator freezers and 0.49 quads (0.51EJ) for freezers. Technologies necessary to meet this standard level are presently available. The consumer payback of this standard level is 4.1 years for the largest-selling class (top mount auto-defrost refrigerator, without through-the-door features) and no more than 11.9 years for any class. The cost of conserved energy is 3.7 cent/kWh for the largest selling class, meaning that this standard level will benefit purchasers of this refrigerator class who pay more than 3.7 cent/kWh for electricity. Standard Level 1 is at or near the lowest life-cycle cost for all classes and is expected to result in a reduction in life-cycle cost of approximately \$117 or 9.3 percent for the largest class. For the largest selling refrigerator class, if the lowest state energy price is analyzed, the minimum life-cycle cost point is still at Standard Level 1, and consumers would still benefit. Consumers who pay the high state electricity price would benefit from an even higher standard. (See updated TSD Chapter 4).

According to the TSD analysis, manufacturers' short-run return on equity is estimated to drop from 7.31 percent in the base case to 6.92 percent for Standard Level 1. The long-run ROE

at Standard Level 1 is 7.36 percent, a slight improvement from the base ROE of 7.31 percent. In the Joint Comments, the manufacturers and others recommended this standard level to DOE. In the Joint Comments, the parties commented that the negotiation process allowed for a cumulative assessment of impact which, in turn, led to adjustments among various product standard levels in order to better balance the economic impact among manufacturers. (Joint Comments, No. 49 at 14). The major manufacturers have supported this standard level with a July 2001 effective date in their recent comments. (Frigidaire, No. 316; GEA, No. 317, Maytag, No. 318, Whirlpool, No. 319; Amana, No. 320).

This final rule will save approximately the same amount of energy as would promulgation of the rule proposed in the 1995 Proposed Rule. The energy savings lost by setting a July 1, 2001, effective date are offset by the elimination of the less stringent proposed standards for HCFC-free products. Energy savings from the 1995 Proposed Rule and this final rule are presented in Table 2. The proposed rule would have established a two-tiered standard effective three years from the date of publication (May 2000); the final rule is a single tier standard effective in July 2001. Two proposed rule scenarios are shown: the first scenario assumes there are no HCFC-free products until 2003; the second scenario assumes all products qualify for the Tier 2 HCFC-free standard level from 2000–2005.

TABLE 2.—CUMULATIVE ENERGY SAVINGS (QUADS)

Years	Two-tiered Proposed Rule (Tier 2 from 2003–2005)	Two-tiered Proposed Rule (Tier 2 from 2000–2005)	Single tier Final Rule (Effective July 1, 2001)
2000–2010 .....	0.87	0.73	0.81
2000–2020 .....	3.31	3.06	3.26
2000–2030 .....	6.67	6.41	6.67

For all these reasons, DOE concludes that Standard Level 1 is economically justified. The public comments support this conclusion. Standard Level 1 corresponds to the efficiency levels in the Joint Comments submitted on the 1993 Advance Notice. Furthermore, it has been supported by a diverse group of parties in recent comments. (Frigidaire, No. 316; GEA, No. 317; Maytag, No. 318; Whirlpool, No. 319; Amana, No. 320; NRDC, ASE, ACEEE, CEC, Florida Energy Office, SCE, and Oregon Office of Energy, PG&E, No. 321).

C. Effective Date

As discussed above, the Department concludes that the rule based on Standard Level 1 should take effect for all classes of refrigerators on July 1, 2001. This date, combined with the elimination of the HCFC-free classes, mitigates concerns about adverse manufacturer impacts while preserving energy and consumer savings comparable to those of the 1995 Proposed Rule.

IV. Procedural Requirements

A. Environmental Review

A Draft Environmental Assessment for Proposed Energy Conservation Standards for Refrigerators, Refrigerator-Freezers, and Freezers was prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321 et seq., the regulations of the Council on Environmental Quality, 40 CFR parts 1500–1508, the Department's regulations for compliance with NEPA, 10 CFR part 1021, and the Secretarial Policy on the National Environmental

Policy Act (June 1994). Section V.B.2. of the Secretarial Policy encourages the Department to provide an opportunity for interested parties to review environmental assessments prior to the Department's formal approval of such assessments.

No comments were received on the Draft Environmental Assessment that was published within the TSD that accompanied the 1995 Proposed Rule. The Department finalized the Environmental Assessment in January, 1996. (DOE/EA-1138). The standards in today's final rule differ slightly from the Proposed Rule's Standard Level 1, resulting in slightly less energy savings in the early years of the standards. The AEO 1997 emission factors are different, and, therefore, emission reductions are correspondingly changed from the 1995 Proposed Rule. Updated tables of emission reductions were prepared for today's final rule and will be available in the Freedom of Information Reading Room. The environmental effects of this final rule were deemed to be not significant for NEPA purposes, so the Department today is issuing a Finding of No Significant Impact (FONSI), published elsewhere in this issue.

#### B. Regulatory Planning and Review

Today's regulatory action has been determined to be an "economically significant regulatory action" under Executive Order 12866, "Regulatory Planning and Review." 58 FR 51735 (October 4, 1993). Accordingly, today's action was subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) of the Office of Management and Budget.

Pursuant to E.O. 12866, DOE prepared a draft Regulatory Analysis. Six major alternatives were identified by DOE as representing feasible policy alternatives for achieving consumer product energy efficiency. Each alternative has been evaluated in terms of its ability to achieve significant energy savings at reasonable costs and has been compared to the effectiveness of the rule. 60 FR 37388, 37411 (July 20, 1995). No new data has been received concerning this review. The draft Regulatory Analysis, which was published as a part of the TSD, is incorporated herein as final. Table R-5 "Expected Impacts of Program Alternatives," was updated for this rule and included with the updated portions of the TSD.

AHAM stated that the Department needs to improve the evaluation of non-regulatory means of achieving energy savings. (AHAM, No. 207 at 7). Whirlpool commented that with the reduction in rebate programs, Whirlpool

feels that there will be no improvement, and probably some backsliding in efficiency without mandatory standards improvement: "Standards are a key driver for innovation for improved energy efficiency. Innovating for improved efficiency does require resources. However, as manufacturers develop and retool for energy-efficient products (especially 'clean sheet' designs) they will routinely include other benefits beyond energy efficiency (such as innovative features, cost reductions, and quality improvements) in order to maximize the return from their investment." (Whirlpool, No. 208 at 2, 3).

NPPC stated, "The level of standards proposed meets the department's criteria for setting standards. In addition, we analyzed the level of proposed standards from the perspective of whether the energy savings represented a cost-effective resource for the Northwest region, instead of buying power from the electricity market or building a combustion turbine. We found that the resource represented by making these appliances more efficient was indeed cost-effective and represents over 100 average megawatts of electricity savings over the next 20 years. By far, the best way to secure these savings is to adopt Federal standards. Federal standards give a uniform signal to manufacturers across their entire national market, and eliminate administrative costs that would be incurred if utilities tried to secure the savings through local programs." (NPPC, No. 210 at 1).

ACEEE and NRDC provided data to support the position that for refrigerator products, "alternative means such as labeling and rebate programs are a useful complement to standards, but are not a replacement for standards." One study found that refrigerator labeling produces an average of 1.5 percent savings in energy use. Similarly, utilities have found that rebate programs can influence only 40 to 60 percent of purchases. Market trends "support the conclusion that standards will have a much greater impact on new product efficiency and energy savings than non-regulatory approaches." (ACEEE and NRDC, No. 214 at 10-11).

Under the Process Rule policies, the Department is committed to exploring non-regulatory alternatives to standards. A full discussion of the Department's consideration of non-regulatory alternatives is presented in the "Regulatory Impact Analysis" section of the TSD. The Department concluded that for this rulemaking, the energy savings from a regulatory approach greatly exceeded the savings from any

non-regulatory alternative. (See updated Table R.5 "Expected Impacts of Program Alternatives" of the Regulatory Impact Analysis.) The updated analysis shows energy savings from voluntary efficiency targets (the most effective of the non-regulatory alternatives) to be 3.49 quads from 2000-2030, which is significantly less than the 6.67 quads of energy savings predicted for today's rule.

#### C. Unfunded Mandates Review

With respect to a proposed regulatory action that may result in the expenditure by the private sector of \$100 million or more (adjusted annually for inflation), section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires a Federal agency to publish estimates of the resulting costs, benefits and other effects on the national economy. 2 U.S.C. 1532 (a), (b). Section 202 of UMRA authorizes an agency to respond to the content requirements of UMRA in any other statement or analysis that accompanies the proposed rule. 2 U.S.C. 1532(c).

The content requirements of section 202(b) of UMRA relevant to a private sector mandate substantially overlap the economic analysis requirements that apply under section 325(o) of EPCA and Executive Order 12866. The Supplementary Information section of the notice of proposed rulemaking and "Regulatory Impact Analysis" section of the TSD responded to those requirements.

DOE is obligated by section 205 of UMRA, 2 U.S.C. 1535, to identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a written statement is required under section 202. From those alternatives, DOE must select the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule unless DOE publishes an explanation of why a different alternative is selected. As required by section 325(o) of the Energy Policy and Conservation Act, this final rule establishes energy conservation standards for refrigerator products that are designed to achieve the maximum improvement in energy efficiency which DOE has determined to be technologically feasible and economically justified. 42 U.S.C. 6295(o). A full discussion of the alternatives considered by DOE is presented in the "Regulatory Impact Analysis" section of the final TSD and updated Table R.5 "Expected Impacts of Program Alternatives."

#### D. Regulatory Flexibility Act Review

The Regulatory Flexibility Act (5 U.S.C. 601–612) requires that an agency prepare an initial regulatory flexibility analysis and publish the analysis (or a summary thereof) in the **Federal Register** when it publishes a general notice of proposed rulemaking required by law. 5 U.S.C. 603. The Act also requires an agency to prepare a final regulatory flexibility analysis and publish the analysis (or a summary thereof) in the **Federal Register** when it publishes a final rule. 5 U.S.C. 604. These requirements do not apply if the agency certifies, when it publishes a proposed or final rule, that the rule if promulgated would not have a significant economic impact on a substantial number of small entities. 5 U.S.C. 605(b). In the 1995 Proposed Rule, the Department certified that the proposed standard levels would not, if promulgated, have a significant economic impact on a substantial number of small entities. No written comments specifically addressed that certification.

Although DOE did not prepare an initial regulatory flexibility analysis, it considered the potential economic impact of the rule on small businesses and included provisions in the 1995 Proposed Rule and this final rule designed to minimize the burden on manufacturers of refrigerator products who are small businesses.

The Regulatory Flexibility Act defines “small business” by incorporating the definition of “small business concern” in the Small Business Act. 5 U.S.C. 601(3). The Department used the small business size standards published by the Small Business Administration to estimate the number of small businesses that would be required to comply with this rule. Small Business Administration, Final Rule on “Small Business Size Standards,” 61 FR 3280 (January 31, 1996). The size standards are listed by Standard Industrial Classification (SIC) code and industry description. To be considered a small business, a manufacturer of home refrigerators or freezers, together with its affiliates, may employ no more than 1,000 employees. SIC Category 3632 (61 FR at 3291).

DOE examined the structure of the industries that would be affected by this rulemaking to determine the likely impact of the rule on that structure. Both the home refrigerator and freezer industries are highly concentrated. Five firms, none of which is a small business, account for approximately 95 percent of all non-compact refrigerator sales in the U.S. Two firms account for at least 90

percent of freezer sales in the U.S., and neither firm is a small business. Three firms, none of which is a small business, account for approximately 84 percent of the sales of compact refrigerators.<sup>4</sup> U-Line and Marvel, which are small businesses, account for 6 percent and 3 percent, respectively, of compact refrigerator sales. Other small businesses, such as Sun Frost and Sub-Zero, produce refrigerators for niche markets.

In the July 1995 Proposed Rule, DOE proposed new classes of standards for compact refrigerators, refrigerator-freezers and freezers after considering the relatively small size of the compact refrigerator manufacturers and the technological limitations on improving the energy efficiency of compacts. As discussed in the 1995 Proposed Rule (60 FR at 37405–06), this approach was recommended by the Joint Comments based on several factors, including technological constraints and the limited research and development funding and capital resources available to small companies. The standards for compact refrigerator products proposed in the 1995 Proposed Rule would have required five percent less energy use than the 1993 standards. The compact refrigerator products standards in this final rule retain the 1995 Proposed Rule requirement for five percent less energy use.

DOE continues to believe that promulgation of this rule will not have a significant economic impact on a substantial number of small entities. However, if after the rule becomes effective DOE learns that such an impact would occur, the Department may exercise its authority under section 325(t) of EPCA, 42 U.S.C. 6295(t), or section 504(a) of the DOE Organization Act, 42 U.S.C. 7194(a), to grant appropriate relief to small manufacturers.

#### E. Federalism Review

Executive Order 12612 requires that regulations or rules be reviewed for any substantial direct effects on states, on the relationship between the Federal Government and the states, or on the distribution of power among various levels of government. 52 FR 41685 (October 30, 1987). If there are sufficient substantial direct effects, the Executive Order requires the preparation of a Federalism assessment to be used in decisions by senior policy makers in promulgating or implementing the regulation.

<sup>4</sup> Appliance Magazine, September 1996. 1995 sales figures.

The Act provides that Federal energy efficiency standards established by the Act or regulations promulgated pursuant to the Act preempt state standards for such products. 42 U.S.C. § 6297. This final rule does not expand the scope of preemption beyond that resulting from the existing regulations. Thus, DOE has concluded that there is no net effect sufficient to warrant preparation of a Federalism assessment. Moreover, if any such state regulations are adopted, the Act provides for subsequent state petitions for waiver of Federal preemption.

#### F. “Takings” Assessment Review

DOE has determined pursuant to Executive Order 12630, 53 FR 8859 (March 18, 1988), that this regulation would not result in any takings which might require compensation under the Fifth Amendment to the U.S. Constitution.

#### G. Paperwork Reduction Act Review

No new information or recordkeeping requirements are imposed by this rulemaking. Accordingly, no Office of Management and Budget clearance is required under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*).

#### H. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (February 7, 1996), imposes on Executive agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. With regard to the review required by section 3(a), section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to

determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final rule meets the relevant standards of Executive Order 12988.

*I. Review Under Small Business Regulatory Enforcement Fairness Act of 1996*

Consistent with Subtitle E of the Small Business Regulatory Enforcement Fairness Act of 1996, 5 U.S.C. 801–808, DOE will submit to Congress a report regarding the issuance of today’s final rule prior to the effective date set forth at the outset of this notice. The report will identify the final rule as a “major rule” for purposes of Congressional review. The Department also will submit to the Comptroller General, and make available to each House of Congress, the TSD and other relevant information as required by 5 U.S.C. 801.

**V. Department of Justice Views on Proposed Rule**

Reproduced below is the letter provided by the Department of Justice to DOE pursuant to EPCA § 325 (o)(2)(B)(ii), 42 U.S.C. § 6295 (o)(2)(B)(ii):  
April 19, 1996.

The Honorable Christine A. Ervin, Assistant Secretary for Energy Efficiency and Renewable Energy, United States Department of Energy, Forrestal Building, 1000 Independence Ave., SW, Washington, DC 20585.

Dear Ms. Ervin:

The Department of Energy (“DOE”) has issued a Notice of Proposed Rulemaking amending the energy conservation standards for refrigerators, refrigerator-freezers and freezers (60 FR 37368 (the “proposed rules”). Section 325 of the Energy Policy and Conservation Act, as amended in 1992 (42 U.S.C. 6295) (“the Act”), requires the Attorney General “\* \* \* to determine the impact, if any, of any lessening of competition likely to result from the proposed standards.” This letter constitutes the competitive impact determination of the Department of Justice (the “Department”).

The proposed rules would establish more stringent energy efficiency standards for three types of household appliances—refrigerator-freezers (“refrigerators”), compact refrigerators and household freezers. The proposed rules would require greater percentage increases in energy efficiency for refrigerators than for the other products. If promulgated, the new energy standards will take effect less than five years before regulations promulgated by the Environmental Protection Agency prohibiting the use of HCFCs take effect on January 1, 2003. Because it may be harder to meet the new energy efficiency standards without HCFCs, the rules contain a separate set of

standards for non-HCFC products that would permit somewhat greater energy use.

In order to assess the likely impact of the proposed rules on competition in the sale of refrigerators, compact refrigerators, and freezers, the Department examined the structure of the affected industries and interviewed manufacturers and others to determine the likely impact of the rules on that structure. All three industries are highly concentrated. Only five firms account for 95 percent of all refrigerator sales in the U.S.; two firms account for at least 90 percent of freezer sales in the U.S.; and four firms account for most sales of compact refrigerators. With the possible exception of compact refrigerators, substantial new entry into these markets in the near future is unlikely.

In assessing the likely impact of the rules on competition the Department attempted to determine whether the rules would likely lead to an increase in concentration in any of the markets. They could do so in two ways: first, by raising the cost of appliances and reducing design and feature choices, standards may lower demand. Second, if standards impose costs on manufacturers that cannot be passed on to consumers, they can lower manufacturers’ rates of return. Either or both of these effects could cause manufacturers to exit the market, or to stop making certain types of products, thereby lessening competition and raising prices.

The proposed rules are largely identical to the proposals (“the Joint Comments”) which were formally submitted to DOE on November 15, 1994. The Joint Comments were the product of two years of negotiations involving most of the major manufacturers of these appliances, the Association of Home Appliance Manufacturers and a group of public utilities and environmental organizations. The parties stated in the Joint Comments that it was their belief that the standards would not “lead to a likelihood of reduced competition.”

Some manufacturers, however, now tell the Department their prior conclusion that the rules would not reduce competition was based on an assumption that the proposed standards would be enacted soon after the Joint Comments were submitted. They contend that the unanticipated delay has changed the way that the rules will affect them. Because the rules relating to products that utilize HCFCs will be relevant only until HCFCs are phased out in 2003, the costs of redesign and retooling needed to bring these products into compliance cannot be amortized over as long a product life as anticipated. Thus, some manufacturers have stated that compliance with the standard will add substantially to their costs and could lead one or more of them to consider discontinuing the manufacture of certain sizes or types of refrigerators.

Based upon information available to the Department in this proceeding, however, we cannot conclude that promulgation of the proposed rules is likely to have a substantial adverse effect on competition in the markets for these products. While the rules may result in some changes in the product mix offered by some manufacturers, and may result in the discontinuation of certain models of each of

the products, the available evidence does not demonstrate that competition in these markets likely would be substantially affected by the proposed rules.

The Department notes, however, that it does have some concerns about the cumulative effects of these and other energy efficiency regulations on the markets for refrigerators and freezers. Manufacturers will be required to comply both with the proposed rules and the requirement for a phaseout of the use of HCFCs by January 1, 2003. There is some evidence suggesting the previous round of energy efficiency rules for freezers were a significant factor in the decisions of two firms to cease manufacture of those products, leaving an extremely concentrated market dominated by the two remaining firms. The cumulative effect of the costs of compliance with both DOE and EPA regulations, together with the diversion of corporate attention and resources from marketing efforts, could ultimately have an adverse impact on the ability of some firms to compete.

Sincerely,  
Anne K. Bingaman,  
Assistant Attorney General.

**List of Subjects in 10 CFR Part 430**

Administrative practice and procedure, Energy conservation, Household appliances.

Issued in Washington, D.C., on April 23, 1997.

**Christine A. Ervin,**  
Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, part 430 of chapter II of title 10, Code of Federal Regulations, is amended as set forth below.

**PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS**

1. The authority citation for part 430 continues to read as follows:

**Authority:** 42 U.S.C. 6291–6309.

2. Section 430.2 is amended by adding a definition for *compact refrigerator/refrigerator-freezer/freezer* to read as follows:

**§ 430.2 Definitions.**

\* \* \* \* \*

*Compact refrigerator/refrigerator-freezer/freezer* means any refrigerator, refrigerator-freezer or freezer with total volume less than 7.75 cubic feet (220 liters)(rated volume as determined in Appendix A1 and B1 of subpart B of this part) and 36 inches (0.91 meters) or less in height.

\* \* \* \* \*

3. Section 430.32 is amended by revising paragraph (a) to read as follows:

**§ 430.32 Energy conservation standards and effective dates.**

\* \* \* \* \*

(a) *Refrigerators/refrigerator-freezers/freezers.* These standards do not apply to refrigerators and refrigerator-freezers with total refrigerated volume exceeding

39 cubic feet (1104 liters) or freezers with total refrigerated volume exceeding 30 cubic feet (850 liters).

Product class	Energy standards equations for maximum energy use (kWh/yr)	
	Effective January 1, 1993	Effective July 1, 2001
1. Refrigerators and Refrigerator-freezers with manual defrost .....	13.5AV+299 0.48av+299	8.82AV+248.4 0.31av+248.4
2. Refrigerator-Freezer—partial automatic defrost .....	10.4AV+398 0.37av+398	8.82AV+248.4 0.31av+248.4
3. Refrigerator-Freezers—automatic defrost with top-mounted freezer without through-the-door ice service and all-refrigerators—automatic defrost .....	16.0AV+355 0.57av+355	9.80AV+276.0 0.35av+276.0
4. Refrigerator-Freezers—automatic defrost with side-mounted freezer without through-the-door ice service .....	11.8AV+501 0.42AV+501	4.91AV+507.5 0.17av+507.5
5. Refrigerator-Freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service .....	16.5AV+367 0.58av+367	4.60AV+459.0 0.16av+459.0
6. Refrigerator-Freezers—automatic defrost with top-mounted freezer with through-the-door ice service .....	17.6AV+391 0.62av+391	10.20AV+356.0 0.36av+356.0
7. Refrigerator-Freezers—automatic defrost with side-mounted freezer with through-the-door ice service .....	16.3AV+527 0.58av+527	10.10AV+406.0 0.36av+406.0
8. Upright Freezers with Manual Defrost .....	10.3AV+264 0.36av+264	7.55AV+258.3 0.27av+258.3
9. Upright Freezers with Automatic Defrost .....	14.9AV+391 0.53av+391	12.43AV+326.1 0.44av+326.1
10. Chest Freezers and all other Freezers except Compact Freezers .....	11.0AV+160 0.39av+160	9.88AV+143.7 0.35av+143.7
11. Compact Refrigerators and Refrigerator-Freezers with Manual Defrost .....	13.5AV+299 <sup>a</sup> 0.48av+299 <sup>a</sup>	10.70AV+299.0 0.38av+299.0
12. Compact Refrigerator-Freezer—partial automatic defrost .....	10.4AV+398 <sup>a</sup> 0.37av+398 <sup>a</sup>	7.00AV+398.0 0.25av+398.0
13. Compact Refrigerator-Freezers—automatic defrost with top-mounted freezer and compact all-refrigerators—automatic defrost .....	16.0AV+355 <sup>a</sup> 0.57av+355 <sup>a</sup>	12.70AV+355.0 0.45av+355.0
14. Compact Refrigerator-Freezers—automatic defrost with side-mounted freezer .....	11.8AV+501 <sup>a</sup> 0.42 <sup>av</sup> +501 <sup>a</sup>	7.60AV+501.0 0.27av+501.0
15. Compact Refrigerator-Freezers—automatic defrost with bottom-mounted freezer .....	16.5AV+367 <sup>a</sup> 0.58av+367 <sup>a</sup>	13.10AV+367.0 0.46av+367.0
16. Compact Upright Freezers with Manual Defrost .....	10.3AV+264 <sup>a</sup> 0.36av+264 <sup>a</sup>	9.78AV+250.8 0.35av+250.8
17. Compact Upright Freezers with Automatic Defrost .....	14.9AV+391 <sup>a</sup> 0.53av+391 <sup>a</sup>	11.40AV+391.0 0.40av+391.0
18. Compact Chest Freezers .....	11.0AV+160 <sup>a</sup> 0.39av+160 <sup>a</sup>	10.45AV+152.0 0.37av+152.0

AV=Total adjusted volume, expressed in ft.<sup>3</sup>, as determined in Appendices A1 and B1 of subpart B of this part.

av=Total adjusted volume, expressed in Liters.

<sup>a</sup>Applicable standards for compact refrigerator products manufactured before July 1, 2001. Compact refrigerator products are not separate product categories under the standards effective January 1, 1993.

\* \* \* \* \*