address both the cumulative economic impact of individual design options, and the varying severity of that impact upon different product classes and manufacturers. The negotiation process allowed for a cumulative assessment of impact, adjustments among various product standard levels, and better balance of the economic impact among manufacturers. The Joint Comments stated that * * *

'Impacts on manufacturers are different for different product classes. For product classes representing discretionary purchases, such as some compact refrigerators and most freezers, cost increases due to standards may result in much greater reductions in sales compared to the refrigeratorfreezer classes, whose purchase is essentially necessary when a new house is constructed or when an existing product fails. Some design options with perceived consumer or marketing disadvantages, such as increasing wall thickness, are more troublesome for these more discretionary classes of products.

'The consumer cost-effectiveness of increasing levels of energy efficiency, as well as the impact of these levels on manufacturers, also depends on the scale on which the product is produced. For those products with the highest production volumes, capital cost increases can be amortized over a larger number of units, resulting in fewer impacts. In contrast, for products with smallest sales volumes capital cost increases will be spread over fewer models and will have a larger impact on product cost. These effects will operate differently for different manufacturers, depending on the mix of their sales.' (Joint Comments, No. 49 at 14).

As a result, the Joint Comments final agreement "concentrates the largest energy savings on the five automatic defrost categories (refrigerator-freezers with: top-mounted freezer nondispenser, top-mounted freezer dispenser (ice and/or water), sidemounted freezer non-dispenser, sidemounted freezer dispenser, and bottommounted freezer) with the very largest percentage reduction in the two classes with the highest sales volumes. These five classes represent more than twothirds of the total energy consumed by all refrigerators/freezers. These five product classes represent 85 percent of the total energy savings generated from the (proposed) standards.

"The parties agreed that in the interest of conserving engineering and capital resources while maximizing energy savings, the greatest changes in design should be concentrated on the largest two product classes of the five automatic defrost refrigerator-freezer classes—top mounted, non-dispenser, and side by side with dispensers—and not other refrigerator-freezers, freezers or compacts." (Joint Comments, No. 49 at 14).

"Dispensers for ice and/or water through the door affect the performance of top-mounted freezer models in which the dispenser is normally in the fresh food door and side-mounted freezer models in which the dispenser is normally in the freezer door, in significantly different ways. Because of this difference, the energy consumption of a side-mounted freezer dispenser can be higher than a top-mounted freezer dispenser. This is due to the greater amount of heat transferred through a freezer door dispenser." (Joint Comments, No. 49 at 15).

"Most manufacturers do not build all product classes or all sizes within a product class. This fact emphasizes the need to maximize the total energy savings while considering the resultant economic impacts to each company." (Joint Comments, No. 49 at 15).

The Department estimated both the long term and short term return on investment (ROI) for a typical small and a typical large company for each energy efficiency trial standard level considered and found that this evaluation tends to support the Joint Comments position that requiring the largest improvement in energy savings for the largest selling classes of products will maximize the energy savings.

b. Compact Refrigerators, Refrigerator-Freezers, and Freezers. This new set of classes (Nos. 11–18) includes all refrigerator products less than 7.75 cubic feet and 36 inches or less in height. The total energy consumption of all compact refrigerator products in the U.S. is less than 2.6 percent of the total energy consumed by all sizes of refrigerator products.

The only design options for compact refrigerator-freezers that were identified by industry as feasible from a design and marketing aspect were: improved gaskets, improved compressor efficiency and improved fan motor efficiency. Compact refrigerator manufacturers indicated that the other design options have extremely low design feasibility or marketing utility when applied to their products (not buildable or not saleable).

The Joint Comments stated "The five compact refrigerator/freezer manufacturers supplying data for life cycle cost and payback analysis identified a "max tech" limitation to their products of approximately 15 percent below 1993 levels. This level did not take into account economic justification (consumer and manufacturer) or safe harbor issues." (Joint Comments, No. 49 at 16). This assessment took into account the following:

"• High efficiency compressors of 5.5 Energy Efficiency Ratio (EER) are not realistic for compact refrigerator/ freezers. Low capacity compressors available for compact refrigerator/ freezers in the 1998 time frame are expected to have efficiencies of approximately 3.6 EER.

"• Most compact refrigerator-freezer manufacturers are small companies with limited research and development funding and capital resources.

"• High efficiency foams require high pressure impingement systems that are only economically viable for very large manufacturers. Most compact manufacturers use what is known as an auto froth foaming system (low pressure) that cannot produce high efficiency foam insulation. Non-CFC auto froth formulations are also limited to moderately energy efficient replacements.

"• In most cases, compact refrigerator/freezers and freezers do not employ fan motors, mullions, autodefrost or through-the-door features. As a result, design strategies which relate to these components or technologies are not available for improvement.

"• The need for high efficiency components by compact refrigerator/ freezer and freezer manufacturers carries a low priority with component suppliers. Motor and compressor manufacturers apply their engineering resources to larger volume manufacturers leaving the low volume niche type compact products to the tail end of their design cycles. For example, there are compact manufacturers that still have not been provided with sample non-CFC-12 compressors that provide acceptable energy efficiency for household appliance applications. (Joint Comments, No. 49 at 16, 17).

"Because of the special design constraints and limited number of options applicable to compact refrigerator-freezers and freezers, it was difficult to develop life-cycle cost analyses that reflected the real marketing situation for these products. An LBL assessment using inputs from AHAM compact manufacturers showed that an energy savings level of 2 to 3 percent below the 1993 standards would result in a minimum five-year payback for consumers. This assessment did not take into consideration unique marketing restrictions of individual compact refrigerator-freezer and freezer manufacturers." (Joint Comments, No. 49 at 17).