~~12112~~

REPORT BY THE U.S.

110927

General Accounting Office

Federal Efforts To Ensure The Effectiveness And Safety Of Thermal Insulation Can Be Improved

Federal energy conservation programs give considerable emphasis to the benefits of insulating existing homes. However, in 1977 and 1978, questions arose as to the availability, effectiveness, and safety of insulation materials being installed.

This report assesses the nature of these problems and recommends actions which the Federal Government could take to alleviate them and thus encourage more homeowners to add thermal insulation.

007883

EMD-80-4
NOVEMBER 26, 1979

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

ENERGY AND MINERALS
DIVISION

B-178205

To The Secretary of Energy and the
Chairman of the Federal Trade Commission

Federal energy conservation programs give considerable emphasis to the installation of thermal insulation material in residences. In 1977 and 1978, questions were raised as to the availability, effectiveness, and safety of insulation material installed in homes. This report presents our evaluation of these problems and of actions being taken by Federal agencies to alleviate them.

The report contains recommendations to you on pages 32 and 33. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Secretary of Commerce; the Chairman, Consumer Product Safety Commission; the President, National Institute of Building Sciences; the four committees mentioned above; and to the chairmen of energy related congressional committees.

Sincerely yours,

J. Dexter Peach
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY OF
ENERGY AND THE CHAIRMAN,
FEDERAL TRADE COMMISSION

FEDERAL EFFORTS TO ENSURE THE EFFECTIVENESS AND SAFETY OF THERMAL INSULATION CAN BE IMPROVED

D I G E S T

ID

One of the primary energy goals of the National Energy Plan is to weatherize 90 percent of existing homes by 1985. Essential to this plan is the proper insulation of as many homes as possible as soon as possible.

Proper addition of insulation to a previously uninsulated home can save as much as 50 percent of the energy being used to heat or cool. And, if all homes in the Nation were properly insulated, it would save at least 18 percent of the residential sector's annual energy consumption, the equivalent of over 350 million barrels of oil. (See p. 2.)

Currently, three major Federal programs encourage consumers to install insulation in existing homes:

--The energy tax credit provides for up to a $300 tax credit for anyone who insulates his home.

--Another program requires utilities and home fuel suppliers to arrange for insulation installation and financing for customers' homes.

--The low-income weatherization program, operated by local agencies and designed to weatherize the homes of lower-income and elderly people who cannot participate in the other two programs.

GAO reviewed the insulation situation to (1) assess the probabilities of achieving national goals and (2) try to determine if Federal agencies could do anything to avoid problems similar to those encountered in 1977-79 concerning insulation material availability, safety, and installation.

POSSIBLE PROBLEM WITH MATERIAL AVAILABILITY

In 1977 a shortage of fiberglass insulation, the primary insulation material used to retrofit homes, occurred because of an unexpected boom in housing

starts and an accompanying upsurge in demand for retrofits. Fiberglass manufacturers could not meet this demand on a timely basis. (See p. 8.) This shortage was eliminated, however, by early 1978 because cellulose insulation, an acceptable substitute, became more available and because insulation demand declined. (See pp. 9 and 10.)

BRIEF SHORTAGE MAY RECUR

If demand rises sharply to 1977 levels, and new Federal safety regulations cause cellulose to be in short supply, GAO believes there may be another insulation shortage in early 1980. Drastic increases in the cost of energy brought on by such factors as the Iranian oil situation, and the recent OPEC crude oil price increases could cause substantial increases in demand for insulation. Concurrently, new safety regulations for cellulose require greater use of boric acid, which is not in sufficient abundance to meet 1977 demand. Increased fiberglass and boric acid production are not expected to be on line until mid- to late 1980. Should these supply/demand circumstances occur, the situation would not be in balance again until the increased capacities come into play. (See pp. 10 to 12.)

IMPROVEMENTS NEEDED TO ASSURE INSULATION IS PROPERLY INSTALLED

Utility and contractor officials told GAO that in some instances, improper installation reduced the effectiveness of the insulation. They and the Federal Trade Commission also cited instances of unsubstantiated energy savings claims. Both of these actions resulted in inadequate levels of insulation in homes. (See pp. 13 to 19.)

Faulty installation subjected many homeowners to safety hazards, according to information furnished GAO. Improperly treated insulation material resulted in fires, structural corrosion, and release of noxious fumes. (See pp. 20 to 24.)

The Department of Energy has acted to eliminate these problems, under its Residential Conservation Service Program, by proposing installation rules which include provisions for inspection of completed installations. (See pp. 25 to 28.) GAO reviewed the proposed rules and found them

very comprehensive. Should they be put into effect and properly enforced, most installation problem areas would be alleviated. GAO believes, however, the post-installation inspection issue needs further clarification as to (1) who will be responsible for the inspections, (2) how long they will be a requirement, and (3) to whom they will be available.

NEED FOR UNIFORM LABELING

There has been much discussion about the information that should be included on insulation material packages. The Federal Trade Commission, Consumer Product Safety Commission, Department of Housing and Urban Development, Department of Commerce, and Department of Energy all proposed some labeling requirements to help insure that only quality insulation is sold. (See pp. 27 to 29.) GAO believes that the multiplicity of requirements places an unreasonable burden on manufacturers to comply.

NEED FOR TESTING
LABORATORY ACCREDITATION

The Federal Trade Commission, Consumer Product Safety Commission, Department of Energy, and the General Services Administration all have proposed similar testing requirements for insulation material. However, none of these agencies has suggested a way to certify laboratory competence. (See pp. 29 and 30.) GAO believes that such certification is necessary to assure quality control and uniformity of testing methods.

RECOMMENDATIONS

GAO recommends that:

--The Department of Energy amend its proposed rules for the Residential Conservation Service Program by specifying that utilities be responsible for randomly conducted post-installation inspections for the life of the program and for any extensions thereof, and that the utilities make such inspections available to all customers at customer expense.

GAO also recommends that:

--The Federal Trade Commission take the lead role in coordinating insulation material labeling

requirements of all Federal agencies. In this role, the Federal Trade Commission should stress the need for a single label to satisfy all the agencies' requirements.

--The Federal Trade Commission adopt, as part of its Trade Regulation Rule, a requirement that insulation-testing laboratories be accredited by the Department of Commerce's "National Voluntary Laboratory Accreditation Program."

AGENCY COMMENTS AND OUR EVALUATION

GAO provided a draft of this report to the National Institute of Building Sciences, the Department of Energy, and to the Federal Trade Commission for their comments.

National Institute of Building Sciences officials, although they agreed in principal on the need for installation standards, questioned the timeliness of such standards promulgated under the Residential Conservation Service program.

GAO believes that the Residential Conservation Service program affords the best opportunity to implement installation standards on a national level. (See p. 33.)

Department of Energy and Federal Trade Commission officials disagreed with the recommendation that utility companies provide post-installation inspections. They believe there may be better qualified inspectors than those of utility companies.

GAO's findings clearly indicate that, at this time, utility companies possess the greatest experience in home energy audits. (See p. 33.)

Also, Federal Trade Commission officials pointed out a conflict of interest possibility if utilities do the insulating and perform the post-installation inspections.

GAO believes, however, that the Residential Conservation Service Program regulations adequately deal with possible conflicts of interest. (See p. 34.)

Federal Trade Commission and National Institute of Building Sciences officials disagreed with GAO's recommendation to incorporate a mandatory laboratory accreditation program in the Commission's proposed rule.

GAO believes, however, that a required certification will provide added insurance that all laboratories perform properly, and will alleviate an extra enforcement burden on the Federal Trade Commission. (See p. 34.)

Contents

ABBREVIATIONS

CPSC	Consumer Product Safety Commission
DOC	Department of Commerce
DOE	Department of Energy
FTC	Federal Trade Commission
GAO	General Accounting Office
GSA	General Services Administration
HUD	Department of Housing and Urban Development
NBS	National Bureau of Standards
NECPA	National Energy Conservation Policy Act
NEP	National Energy Plan
NFCPA	National Fire Prevention and Control Administration
NIBS	National Institute of Building Sciences
NVLAP	National Voluntary Laboratory Accreditation Program
RCS	Residential Conservation Service

CHAPTER 1

INTRODUCTION

Many existing U.S. homes were not designed to save energy because they were built when energy was cheap. Hence, an objective of the National Energy Plan (NEP) is to bring 90 percent of existing homes in the United States up to minimum energy efficiency standards by 1985. The legislative proposals which came out of the NEP included three major programs for accomplishing that objective:

--A utility-run residential conservation program.

--An extended Department of Energy (DOE) weatherization grants program for lower income homeowners.

--A residential insulation and conservation tax credit program.

These programs were included in the Energy Tax Act of 1978 and the National Energy Conservation Policy Act (NECPA), 1/ which were enacted by the Congress on October 14, 1978.

The utility conservation program requires all larger utilities to participate. They are to offer their residential customers energy audits which should identify appropriate energy conservation and solar energy measures, and estimate their likely costs and savings. Utilities also are required to offer arrangements for installing and financing any such measures.

The weatherization program is an ongoing DOE program designed to help low income and elderly persons weatherize their homes. Using DOE funding, local agencies conduct the program.

The residential insulation and conservation tax credit program allows taxpayers, beginning with the 1978 tax year, 2/ to take up to a $300 tax credit for certain weatherization actions. The credit is geared to stimulate residential energy conservation.

1/Public Laws 95-618 and 95-619, respectively.

2/This credit is retroactive to April 20, 1977.

The utility program should reach a large number of consumers; many of the larger utilities have already implemented similar programs. The weatherization program should cover a smaller but significant number of consumers, and the tax credit should reach the great majority of the remaining homeowners. In short, such comprehensive market coverage should affect most homes retrofitted with insulation during 1977-85.

BENEFITS OF HOME INSULATION

Energy conservation is the least costly and most immediate source of additional energy supplies. These additional energy supplies are in the form of energy not consumed; therefore, the supplies saved are available for consumption in the future. The residential energy market, which accounts for approximately 20 percent of the Nation's annual energy consumption, is a primary target for energy conservation. About 60 percent of annual residential energy consumption is used for space heating and cooling. Thus, there is a large potential for energy conservation through retrofitting existing houses with thermal insulation.

A homeowner's ability to save energy depends on many factors, including the type of dwelling; its size, age, or structural design; and the size and life styles of the family. However, most experts agree that properly insulating ceilings can save as much as 50 percent of the energy being consumed to heat or cool. For example, customers surveyed by a southwestern utility company reported savings ranging from 27 percent to over 40 percent in the first year after installing insulation.

The Department of Housing and Urban Development (HUD) estimated in one study that properly insulating existing single-family homes would reduce heating and cooling energy use by 30 percent and total home energy use by 17.5 percent, or the energy equivalent of about 350 million barrels of oil annually.

INSULATION TYPES

The following are short descriptions of the major types of home insulation--how they are made, their best uses, and their associated R-value. 1/ Generally, the higher the R-value, the better the material will insulate.

1/R-value is a measure of how well the material itself can insulate.

Fiberglass insulation is made by subjecting molten glass to a strong blast of air, which blows the material into long thin threads. These threads then solidify into a wool like mass that traps small pockets of air. Fiberglass insulation comes in the form of either batts and blankets or blowing wool (loose fiber). The batts and blankets normally range from 3 to 12 inches thick. The thermal resistance value of fiberglass is approximately 3.2 per inch of thickness for batts and blankets and 2.2 for loose fiber.

Rock wool insulation is made by melting steel, copper, or lead slag. The molten slag is then spun and stretched in a steam process to make it thin. A binder is applied for the manufacture of batts and blankets, and these products are then cured in an oven. Loose fiber rock wool has a special oil added to it to make it less brittle thereby allowing it to be blown into attics. The thermal resistance of rock wool building insulation is about 3.4 per inch of thickness for batts and blankets and 2.0 for loose fiber.

Cellulose insulation is made by reducing used newsprint, paperboard stock, or virgin wood fiber to the original fiber form and then impregnating the fibers with fire-retardant chemicals such as borax, boric acid, or aluminum or ammonium sulphate. The resulting product is a fluffy and light material that can be either poured or blown into place. The insulative quality of cellulose insulation is provided by air spaces between the fibers, air cells within the fibers, and the fiber wall itself, all of which resist the flow of heat. The thermal resistance of cellulose insulation is about 3.7 per inch of thickness.

Plastics offer a significant potential for thermal insulation since many polymer products can be expanded into low-density foams with low levels of heat transmission. The plastics used for building insulation are polystyrene, polyurethane, polyisocyanurate, and urea-formaldehyde foams. The latter is becoming more important in home sidewall insulation. Urea-formaldehyde foam is produced on site by mixing a urea-formaldehyde resin, a foaming agent, and compressed air in a foaming or mixing gun. The mixture is foamed into place and is primarily used to insulate wall cavities in existing houses. The thermal resistance of this foam plastic is about 4.2 per inch of thickness.

ISSUES INVOLVED

During 1977-79, issues came to the public's attention concerning insulation which could significantly affect the success of the NEP programs mentioned earlier. First of all, nationwide shortages of fiberglass insulation occurred during 1977. Second, allegations that inferior quality cellulose insulation was being produced which presented a serious fire hazard were formally made as early as October 1976 but came to national attention in congressional hearings in February 1978. Third, there have been reports of noxious fumes and odor in homes which were retrofitted with urea-formaldehyde foam. These fumes reportedly have been so severe as to force some residents to vacate their homes temporarily or permanently. Finally, some members of the insulation industry have allegedly made inaccurate or misleading claims about the thermal effectiveness of their products.

All of these issues can affect the number of homes insulated between now and 1985 and the energy savings realized realized in these homes. The success of the administration's programs depends on consumer response, which in turn depends on availability of material, and the performance and safety of insulation retrofits.

SCOPE OF OUR REVIEW

To assess the probability of achieving NEP goals, we primarily tried to determine (1) the extent of current or anticipated shortages of insulation material, (2) what actions are being taken to ensure insulation safety, (3) what actions are being taken to ensure insulation performance, and (4) what actions are necessary to correct problems which we identified.

We concentrated on three major areas: insulation supply and demand, insulation material quality, and insulation installation quality. We reviewed activities in these areas by the Federal Trade Commission (FTC), Consumer Product Safety Commission (CPSC), General Services Administration (GSA), Department of Commerce (DOC), HUD, and DOE.

We also visited three State governments and sent letters of inquiry to the remaining States and territories. Thirty-two responses to these inquiries were received. We met with officials of three State public utility commissions and 12 public utilities. We also contacted two of the three major

producers of fiberglass insulation; numerous cellulose manufacturers; two producers of boric acid; one urea-formaldehyde foam insulation manufacturer; several installation contractors; and national associations representing insulation manufacturers, dealers, and installers, and the building industry.

CHAPTER 2

MATERIAL AVAILABILITY

An upsurge in demand caused nationwide shortages of insulation material in 1977, seriously jeopardizing achievement of NEP goals. The shortages subsided during 1978 primarily due to the emergence of substitute materials and decrease in demand. Should insulation material shortages recur, the Nation will not attain NEP goals in terms of energy saved and percentage of homes insulated by 1985.

SUPPLY SHORTAGES IN 1977

An insulation material shortage existed during the fall and winter of 1977. Consumers and building contractors alike experienced 2- to 3-month delays in obtaining insulation supplies in some areas of the country. Manufacturers refused to take on new customers and placed old customers on allocation.

WHY SHORTAGES OCCURRED

The primary reason for shortages in 1977 was an upsurge in demand for residential conservation devices and materials. Fiberglass manufacturers, who at the time controlled 80 to 90 percent of the insulation market, were already responding to an unexpected boom in new housing starts and were selling their products almost as fast as they could produce them. But then a boom in retrofits created too great a demand on the entire insulation industry. Delays of up to 3 months occurred for contractors and distributors in receiving material.

Reasons for increased demand

Three factors accounted for the increased demand for home insulation material. The first factor was the upsurge in housing starts which occurred with the recovery from the 1974-75 recession. In 1975 there were only 1.2 million new housing starts, the lowest rate for more than 12 years. In 1976 housing starts reached 1.5 million, a 25-percent increase over 1975. The first 9 months of 1977 experience slightly over 2 million housing starts, a 67-percent increase over the number of starts in all of 1975.

The second factor contributing to the growth in insulation demand was the rising use of insulation in new homes. DOC officials estimated that builders installed 700 pounds of insulation in each new house started in 1977; whereas, they had installed 500 pounds in new houses built 10 years earlier. DOC estimates that by 1980, newly constructed houses will probably have 900 pounds of insulation.

The third factor was the sudden growth in adding insulation to existing homes. DOC estimated that almost 8 to 9 million housing units had additional insulation installed between 1973 and 1978. It attributed this primarily to rapidly rising residential energy costs. For example, between 1974 and 1978, the price of electricity, natural gas, and fuel oil increased 40, 114, and 35 percent, respectively.

There are other underlying reasons for the increased demand for insulation. Several States either passed their own insulation tax credit laws or at the time of our review were considering such legislation. Over 75 percent, or 24 of the States we covered in our nationwide survey, currently have programs which encourage insulation through their energy offices' weatherization programs. 2/ In 84 percent of the 32 states that responded to our letters of inquiry, utility companies are encouraging attic insulation through mass media advertising or direct sales of insulation for their regular customers.

Such encouragement has so increased consumer awareness that a great number of homeowners have insulated their attics for the first time or added to the insulation already there. For example, DOC reported that 3 million homes were insulated in the first half of 1977, up from 750,000 homes in the first half of 1976. This surge, plus the increase in housing starts, created the unprecedented high level of demand.

1/"A Simulation Analysis of U.S. Energy Demand, Supply and Prices," September 1974, Kent P. Anderson.

2/These are public awareness programs apart from the federally assisted low-income weatherization programs currently existing in 56 of the States and territories.

Manufacturing output based on traditional market forecasts

Traditionally, production-oriented companies, such as fiberglass or plastics makers, align product output on a quarterly, semiannual, or even annual basis with sales forecasts. Sales volumes experienced in 1977, however, had not been predicted. Not only were large insulation producers unprepared for the surge in demand, but good business practices did not suggest vastly shifting manufacturing schedules or rapidly expanding facilities to accommodate the demand.

For these reasons, one major fiberglass manufacturer maintained, in testimony before the Congress in late 1977, that the shortage was uncommon, and probably short-lived and that the situation was well in hand. 1/ Those hearings revealed that fiberglass industry members had based lower levels of production on the depressed state of the new housing market in 1975 and 1976, and on the absence of a retrofit market. Standard & Poor's confirmed the low production levels with its estimate that, during the 1975-76 period, several fiberglass plants were operating at only 50 percent to 60 percent of capacity. 2/ Industry officials pointed our that, once they became aware of the great surge in demand, and their inability to meet it promptly, they were still reluctant to expand because of the uncertainties of future economic conditions.

Lack of substitute materials

As pointed out earlier, fiberglass manufacturers control as much as 90 percent of insulation sales. When a run on a product depletes its supply, consumers usually turn to substitutes. At the time of the demand surge in 1977, however, no large supplies of substitutes, such as cellulose, existed.

1/Owens-Corning Fiberglass Corp., Statement Before the Senate Subcommittee on Inter-Governmental Relations, Nov. 2, 1977.

2/Standard & Poor's Industry Surveys. Building Basic Analysis. Standard & Poor's Corp., 1976: p. B127.

SHORTAGES WERE OVERCOME

By early 1978, the shortage had abated. Utility officials informed us that by February 1978, the market had improved to where the longest delivery delay was about 2 to 3 weeks for a fiberglass order. In fact, insulation materials were on the shelves of major retail outlets, and contractors had some type of material available for day-to-day use within any 1- or 2-day period. This improved situation was caused primarily by the emergence of large quantities of cellulose and reduced demand for insulation.

Increased availability of cellulose

Since 1976, cellulose insulation manufacturing has grown with the demand for insulation. In 1976 there were approximately 100 firms with 125 plants; by February 1978, there were over 350 firms with more than 500 plants. The exact number at present is unknown because expansion has been so rapid, but industry association officials believe there were over 500 firms by late summer 1978. Quantities produced and the value of this production are also not available. However, DOC estimated that annual sales grew from $8 million in 1969 to $50 to 65 million in 1976. The following chart shows cellulose insulation shipments. 1/

Cellulose Insulation Shipments

(in millions)

	1969	1970	1971	1972	1973	1974	1975	1976
Quantity (lbs.)	200	220	250	290	380	350	420	600
Value ($)	8	10	12	15	28	26	40	65

Some of the larger, and older cellulose insulation firms estimated that, although the industry was operating at levels as low as 75 percent of capacity in 1976, by June 1977 capacity utilization had grown to over 90 percent. This large growth in cellulose supplies combined with an easing demand to improve the shortage situation early 1978.

1/National Cellulose Insulation Manufacturers Association and Producers; DOE study by ICF Inc, June 6, 1977.

Reduced insulation demand

Not long after the tremendous increases began in the manufacture of cellulose, demand for insulation declined. Several authorities attributed the declining demand to homeowners becoming increasingly concerned about controversies centering on the safety and performance of the insulation materials.

A DOE official said insulation sales seemed to be stronger in the fourth quarter of 1978 than in the first three quarters, but they still lagged substantially behind 1977 levels. A CPSC official told us that, in December 1978, insulation warehouses were "bursting at the seams." He believed that the big boom was over. CPSC economists were predicting a long-term downward trend in sales.

Contractors gave us figures showing that 1978 sales were down approximately 70 percent from a similar period in 1977. One result has been shorter waits for installation. For example, in Washington, D.C., customers sometimes had to wait 16 weeks to get attic insulation installed during the winter of 1977; in December 1978, 10 days was the normal wait.

BRIEF SHORTAGE MAY RECUR

Although the increased supply of cellulose insulation and the overall reduction in insulation demand virtually eliminated national shortages, this situation could change. Cellulose may be in short supply if demand increases and new regulations cause an imbalance in the supply/demand scheme for key additives of cellulose material. Fiberglass manufacturers could take up the slack of a cellulose shortage, but their planned expansion is not expected to be online until mid- to late 1980. If demand greatly increases before then, the Nation would again have an insulation shortage.

Demand may increase

The demand for insulation may rise toward 1977 levels as energy costs continue to go up and as Government incentives increase. Energy costs for homeowners are continuing to rise. Although the price of electricity increased only 5 percent from 1978 to 1979, natural gas prices increased 24 percent, and the price of home heating oil has skyrocketed. Because of recent jumps in world oil prices, the price of home heating oil increased 67 percent (from 48 to 80 cents

a gallon) between 1978 and 1979. The event that precipitated the increase in world prices--the loss of Iranian oil production early in 1979--clearly illustrates the unstable nature of foreign oil supplies. Similar supply disruptions and price increases could occur at any time, driving energy costs up even more in this country.

Recent action by the Congress may also bring about a surge in the demand for insulation. Legislation has been introduced which would give direct payments to homeowners as reimbursement for part of the cost of installing insulation in their homes.

Stricter Federal standards may affect supply

Recent changes in Federal specifications requiring increased amounts of boric acid in the manufacture of cellulose insulation may restrict the production of such insulation. Boric acid is the primary fire retardant used in cellulose insulation. In June 1978, legislation 1/ was enacted which requires the use of the Federal specification as a mandatory material quality standard for the manufacture of all cellulose insulation. CPSC was given enforcement responsibility.

Prior to the passage of the new law, most of cellulose manufacturers used boric acid as a flame retardant in their products. A smaller, but significant percentage used other chemical flame retardants, such as ammonium or aluminum sulfates. The new law prescribes both stricter flame retardancy and stricter corrosion specifications, which should have two effects on demand for boric acid. First, the flame retardancy will cause greater use of boric acid by those producers that used it before. Second, the new corrosion standards make it almost mandatory for all manufacturers to use boric acid since the other chemicals some producers were using are highly corrosive and will not meet specifications. This should add even more demand for boric acid.

1/Emergency Interim Consumer Product Safety Standard Act of 1978 (Public Law 95-319, July 11, 1978).

The specific demand effects of those manufacturers who will be forced to switch to boric acid are difficult to predict, although it is obvious there will be some effects. However, DOE projected some of the additional demand of just those manufacturers that have always used boric acid. Originally, in order for manufacturers to meet the requirements of the Federal specification, they would have to use approximately a 5 percent boric acid content in cellulose insulation. Because there are no firm data on U. S. production of cellulose insulation, the amount of boric acid required as a fire retardant is not specifically known. However, DOC estimated that approximately 77,000 tons of boric acid would be available to the cellulose industry in 1978. Based on this figure, DOE officials calculated that this amount of boric acid, at the 5 percent level, would support the production of about 1.5 million tons of cellulose.

In July 1978, a more stringent Federal specification was adopted which, in order to be met, calls for approximately a 10 percent boric acid content in cellulose. This would support the production of about only 770,000 tons of cellulose.

The capacity of the cellulose industry on January 1, 1978, at the end of the shortage, was estimated by DOC at about 2 million tons. Should demand again rise to the 1977 level, boric acid supplies would be inadequate. Boric acid manufacturers told us they were currently expanding their production facilities, but increased supplies would probably not be available until mid to late 1980.

CHAPTER 3

THERMAL EFFECTIVENESS OF INSULATION

Energy savings that can be attributed to insulation depend on the thermal performance achieved once the insulation is in place; that is, the resulting R-value in an attic or wall after the installation. A homeowner who purchases R-19 material, for instance, should be confident that once the job is complete, his attic has a thermal resistancy rating of R-19. We found, however, that such confidence was not always warranted.

We believe (1) there have been many incidents where improper installation of insulation in many residences resulted in lower R-values than anticipated and (2) unsubstantiated R-value and energy savings claims resulted in lower thermal resistancy than was needed. Some governmental agencies have taken corrective actions, but more improvement is still necessary.

IMPROPER INSTALLATION

Thermal performance depends on the quality of installation. We found, however, that the thermal performance anticipated by consumers whose residences had been insulated was not achieved due to faulty installation, which caused moisture buildup, air infiltration, or insulation-material settling.

Moisture-eroded performance

Moisture is a heat conductor rather than an insulator. Because the conductivity of moisture is greater than the gas it displaces in insulation, its presence may reduce thermal performance. Depending upon the moisture content, the insulation can become significantly less effective.

An unskilled or uninformed installer can contribute to moisture buildup. As a result of wet conditions or leaks from household appliances, moisture may enter the ceiling or rafters near an area about to be insulated. If this moisture is not removed by the installer beforehand, it will eventually reach the insulation itself and diminish its effectiveness. Another moisture-related problem may arise

if adequate provision is not made for the escape of moisture during the installation of certain plastic insulations. For example, National Bureau of Standards (NBS) experiments show that when urea-formaldehyde foam is used in woodframe walls, the water in the foam will transfer into the wood siding. Then, if the exterior surface is covered with any kind of low permeable covering such as an oil base paint, the moisture in the walls may not be able to escape. This causes a loss in the effectiveness of the installation.

We found many examples where moisture had been blamed for thermal efficiency degradation. As an illustration, one large western public utility company audited a selected number of homes that had been insulated under a program it had sponsored. Consumers had been promised a R-19 resistance rating for their attics. However, in about 25 percent of the residences, the ratings ranged from R-11 to R-13, far short of the desired level. Poor equality installation was listed in many of these cases as the cause.

A utility official told us that inspection reports from the post-audits listed moisture content in the insulation material as one of the causes for the poor thermal performance. Apparently, installers had not properly prepared attics being insulated before installing the material. The moisture from the walls had not been removed, and the installed material had absorbed the wetness, thereby reducing its own thermal integrity.

In another instance, a utility official told us about several insulation contractors that had experienced moisture problems after installation. He said that the contractors had discovered degradation of the material effectiveness in their routine checks for settling. In fact, in one case the contractor had to remove the insulation, properly dry the attic, and reinstall new material. Several other examples of moisture buildup were pointed out to us by State officials.

Air infiltration neutralized insulation performance

Air infiltration is air leakage into a residence through cracks around doors and windows, through or around insulation materials, and through floors, walls,

and ventilation systems. The extent of air infiltration depends on the type and quality of building construction, the quality of insulation installation, and the condition of the residence.

Utility officials told us about numerous instances where air infiltration greatly reduced the thermal resistance of insulated homes. For example, under its energy audit program, a southwestern utility company found recently insulated attics that were not as thermally efficient as they should have been because of improper installation. Part of the audit included comparing the R-values residents thought they had and the actual R-values. In many cases, the consumers had purchased R-30 insulation and were only achieving approximately R-22 because installers had not taken proper care in preparing the attic prior to installation. Utility officials explained that most of the reduced ratings resulted from leaks and spaces between roof and wall joints not being properly sealed, thereby allowing air to flow through and around the insulation. Other problems included improper spacing of the insulation itself or inappropriate application so that the insulation had shifted. Therefore, in spite of the probable high quality integrity of the insulation material itself, installation errors resulted in lower performance ratings.

Settled insulation reduced resistance levels

Material particles of all loose-fill insulation will usually settle after being installed in attics. Any settling of loose-fill insulation reduces its thermal effectiveness.

An installation contractor official and several utility company executives informed us they had seen instances in which unskilled installers had failed to compensate for the natural settling of loose-fill insulation.

One such case related to us was discovered during a post inspection performed by an installation contractor. An official of this company told us that he was conducting the usual post inspection of jobs that his company does when he found a large percentage of homes that did not meet the R-19 resistance level contracted for. Apparently, one team of installers had been negligent in performance of standard company procedures.

Company procedures, we were told, included a return trip to homes where insulation had been blown into the attics. After a specified waiting period to allow for natural settling, installers were to return and blow in additional insulation to bring the thermal resistancy to the desired level. In this particular instance, there had been no return trips and the thermal resistancy levels varied between R-13 and R-19. Although we were informed that the situation was eventually corrected, lack of post inspection can allow many poor installations to go undetected.

UNSUBSTANTIATED R-VALUE AND ENERGY SAVINGS CLAIMS

Although consumers have a general awareness of insulation and of the energy-saving benefits it can provide, they are largely uninformed about insulation effectiveness. Consumers also cannot determine how a material will actually perform simply by making a personal inspection of it. For instance, a consumer cannot examine an insulation material and know whether its R-value as represented is accurate. As a result, in order for consumers to be able to evaluate their insulation needs before making a purchase, they must receive accurate information about the material's R-value, thickness, weight per square foot, and coverage area.

As a result of this confusion, the thermal effectiveness anticipated from insulation installations was not always achieved. The primary reasons for this situation were that manufacturers or installation contractors overstated the R-values of their insulation material, and the energy savings that could be attributed to insulation.

Overstated R-values

Insulation manufacturers and installers have made exaggerated claims for the R-value of insulation material, and few controls exist to rectify this situation. Since R-value is the only existing measurement that allows the consumer to compare the thermal properties of various insulation materials, exaggeration of these values results in achieving less thermal efficiency than expected.

An FTC study on labeling and advertising of home insulation reported that many insulation manufacturers were advertising incorrect R-values. For example, one foam insulation manufacturer claimed an R-value of 4.88 for its product and another gave its similar product an R-value of 5 in summer and 5.5 in winter. Yet, as FTC pointed out, it is generally agreed that the foam product each was selling has a design R-value of only 4.2.

In the cellulose insulation market, FTC pointed out that one firm claimed an R-6.25 in ceilings and an R-7 in walls for its insulation. Another producer reported R-values of 5.6 and 7.6, and still another reported an R-5.2 for its cellulose product. However, FTC maintains that thermal engineers generally agreed that R-values of more than 3.8 for cellulose were "virtually impossible" to achieve.

State government and utility officials told us that although there are regulatory mechanisms available at all levels of government, lack of resources devoted to these problems results in little or no control over R-value claims by the manufacturers or installation contractors. Consequently, even though certain R-values were being claimed, in numerous instances, the thermal performances fell short of the claims.

In addition, FTC reported, while consumers may have heard of R-value, as few as 25 percent of them comprehend its meaning. For example, consumers often misconstrue R-value to be "additive"--that is, they think the second inch of insulation saves as much as the first. This general lack of comprehension is not surprising, FTC officials maintain, since almost no insulation advertisements or labels include a statement which explains what R-value means.

Exaggerated savings claims

During our review, we were told about numerous insulation advertisements which claimed wide-ranging money and energy savings. Consumers were often told about tremendous savings specific products would bring them. Although we did not substantiate claims, we did rely on evaluations done by other agencies. For example, one official of the Metropolitan Denver District Attorney's Office agreed with an FTC conclusion that disclosure of fuel savings as advertised can be misleading. He noted:

> Statements of energy savings claims 'up to XX%' are very common. Such claims are typically meaningless as the methods of calculating them are absent or incomplete. Unscrupulous businesses have often sold their products for excessive prices based on inflated energy savings claims."

Similarly, an FTC study pointed out that an official from the Georgia Governor's Office of Consumer Affairs had stated that misrepresentations in the home insulation field were "serious and widespread." His office had asked 35 home insulation companies to substantiate their energy savings claims, and almost one-third of them were unable to do so. He had also reported that three large urea-formaldehyde wall insulation installers in the Atlanta area were claiming "up to 50% savings on utility bills." After examining materials submitted by these companies, his office had concluded that the "evidence used in attempting to substantiate claims was ludicrous."

Utility company and contractor officials told us about numerous examples of exaggerated and unqualified savings claims that consumers could not possibly evaluate in a meaningful way. The FTC, in performing a similar survey of savings claims, identified several instances of questionable advertisements. For example, one company's advertisement for insulation promised to "cut fuel costs up to 50%" and "save up to $320.00 a year." Another firm claimed that its product "saved 30% to 50% on fuel bills." Yet another company said that a homeowner could save "1/3 off and more on fuel bills." Contractor and State officials told us that such claims were virtually impossible to meet.

We documented one such case where a contractor promised savings up to 50 percent of current monthly usage by filling a homeowner's attic with cellulose insulation. We compared this estimate with an estimate from the local natural gas utility and found the contractor's bid to be extremely overstated and unreasonably expensive. In fact, the utility company did not even recommend doing the job. Their decision was based on the fact that since savings would be much less than 50 percent, the payback period would probably be somewhere over 9 years, an unreasonably long period.

FTC worked extensively on this subject and identified many cases like the one above. On the basis of FTC's and our findings, we believe consumers are getting misleading and unsubstantiated claims about the savings they will receive from residential insulation. Manufacturers are continuously reminding consumers of the many energy and and monetary savings benefits to be derived from home insulation. At the same time, they generally do not disclose, or inadequately disclose, the many important variables that are capable of substantially limiting energy savings from insulation.

CHAPTER 4

SAFETY HAZARDS ASSOCIATED WITH INSULATION

Certain potential safety hazards have been identified which are associated with home insulation. We found many situations where these hazards were reported to, in fact, exist. They resulted from improper installation or from using unsafe insulation material. Such hazards have discouraged residential consumers from insulating their homes, thereby jeopardizing achievement of Federal goals.

Government agencies have acted to protect consumers from safety hazards, but more action is needed to assure consumers that insulating their homes will not create a risk to their health or property.

SAFETY HAZARDS FROM IMPROPER INSTALLATION

Our review showed that two primary safety hazards have been associated with improper installation of insulation. Fires have been reported to have resulted from poor insulation installation. Also, escape of noxious fumes has been a problem with certain insulation material resulting from improper care being taken in installation.

Fires caused by improper installation

Information on fires involving insulation is sketchy and often incomplete. Many reports of fires do not specify the type of insulation involved. However, fire data compiled by CPSC indicates that cellulose insulation installed over recessed lighting fixtures was involved in a large percentage of insulation fires. In a report on insulation CPSC stated that its investigation of 43 fires involving cellulose insulation showed that 28 started because of recessed electrical lighting fixtures. Other ignition sources cited were heat-producing appliances and faulty wiring.

State fire officials, however, told us that little data was available directly linking fires to improper installation. This is due to (1) the difficulties in determining the source (first material ignited) of a fire and (2) the contribution of

other materials to the severity of the fire. Nevertheless, these officials generally agreed that insulation, especially cellulose, creates a significant fire risk when installed over or near heat sources. One State official wrote in a letter to CPSC, that his experience indicated that cellulose insulation, when subjected to an ignition source, will "flashover" and ignite other building material. He cited heating unit vents, covered recessed light fixtures and electrical shorts as ignition sources. Officials in another State concluded that while improper installation was only one of several possible causes of fires involving insulation, it was the most probable cause.

We found very few examples where insulation materials other than cellulose posed fire hazards. However, we did compile some information that suggests potential fire hazards can exist with certain mineral wool and plastics insulation. For example, representatives of Underwriters Laboratories, Inc., informed us that, although most reported fires from insulation involved cellulose, improperly installed fiberglass batt insulation can also pose dangers. If these batts are applied with the backing exposed instead of being placed directly on the attic floor, a significant fire risk results, since the backing on most fiberglass insulation is flammable.

We also identified information on fire reports involving polyurethane insulation. Although this material is primarily used in new construction and is usually applied as wall insulation, it can be hazardous if proper care is not taken in installing it. It must be properly protected from heat generating sources. Our review did not go into this area in detail, however, since we were concerned almost exclusively with retrofits. Also, polyurethane insulation is currently the subject of extensive ongoing study by CPSC, DOE and NBS.

Noxious fumes caused by improper installation

Urea-formaldehyde foam insulation is the only plastic insulation commonly used for retrofits. One characteristic of urea-formaldehyde foam is that it must be prepared on-site by the installer as it is being installed. Therefore, the quality of this insulation installed in a home is dependent on the installer's performance.

Improper installation of urea-formaldehyde foam can result in the release of formaldehyde gas into the home. CPSC has investigated the risk of injury due to irritation and poisoning associated with the use of urea-formaldehyde foam insulation, and has stated, at least preliminarily, that formaldehyde vapor can be highly irritating and toxic. According to CPSC, the consensus of urea-formaldehyde foam manufacturers is that installer error is the major cause of the release of formaldehyde gas.

CPSC has collected data on incidents involving the release of formaldehyde gas. It documented 195 such incidents from such sources as CPSC investigations, newspaper clippings, consumer complaints, and State health departments. Symptoms reported included eye and skin irritation, headaches, nausea, dizziness, and respiratory difficulties. In several incidents, residents were forced to move out of their homes temporarily or permanently due to the presence of the vapor from the insulation.

UNSAFE INSULATION MATERIAL

We identified instances in which insulation materials were found to pose safety hazards or potential safety hazards. These materials were improperly treated or not treated at all, thereby making them potentially dangerous. The primary hazards are fire and corrosion.

Fires caused by poor quality material

All of the major types of thermal insulation used in retrofits have some flammability risks associated with them. A report 1/ published by DOE in June 1978, assessed current knowledge about thermal insulation materials. It stated that, of the major types of insulation, only mineral fiber insulation (fiberglass and rock wool) is considered noncombustible. However, the report pointed out, mineral fiber insulation contains organic binders which are flammable, and batts or blankets commonly have facings (vapor barriers) which are flammable. Most attention recently has been given, however, to the flammability of cellulose insulation material. Federal

---

1/"An Assessment of Thermal Insulation Materials and Systems for Building Applications," Brookhaven National Laboratory and Dynatech R/D Company, prepared for DOE, June 1978.

and State agencies believe that the greatest risk of fire is due to cellulose insulation that has been improperly treated with fire retardant chemicals or has not been treated at all.

CPSC began investigating insulation fire hazards in 1977. The investigation was promoted by a petition filed by the Metropolitan Denver District Attorney's Consumer Office with CPSC on October 20, 1976. The petition requested that CPSC issue a consumer product safety rule for manufacturing and installing home insulation.

To respond to the petition, CPSC officials reviewed fire data, consumer complaints, newspaper articles and files, and State fire marshals' reports, and conducted its own analysis. CPSC investigators used data provided by the National Fire Prevention and Control Administration (NFPCA) from five States for various time periods, 1975 to 1977. From this data, they identified 467 residential fires in which fire department personnel believed insulation made of wood or paper was the first to ignite. The NFPCA data did not specify the type of insulation in these fires. However, in 9 of the 10 fires CPSC itself investigated, it had found that cellulose was involved.

The majority of State energy officials, utility executives and fire marshals we interviewed told us that, where insulation has been named as a cause of a fire, cellulose was the material every time.

An April 1978 report by the Subcommittee on Oversight and Investigations, House Committee on Interstate and Foreign Commerce, concluded that an unknown, but significant percentage of cellulose insulation presented an unreasonable fire risk. The report was published following the subcommittee's February 1978 hearings on home insulation. The testimony led the subcommittee to propose a mandatory Federal safety standard. In July 1978, the Emergency Interim Consumer Product Safety Standard Act of 1978 was enacted (Public Law 95-319). The law required CPSC to adopt the flame resistance requirement set out in the Federal specification for cellulose insulation as a mandatory national standard.
(See p. 11.)

Hazards due to corrosion caused by the material

Corrosion is the wearing away or destruction of a material, usually by the action of some chemicals. The use

of some fire-retardant chemicals in cellulose insulation can cause corrosion of surrounding metallic sustances such as aluminum, copper, and steel.

In its investigation of home insulation, the Subcommittee on Oversight and Investigations collected and addressed information concerning corrosion damage caused by insulation. It concluded that "corrosion-causing insulation can * * * present a hazardous situation in the event of corroded electrical wiring or junction boxes" and that "* * * improperly treated cellulose insulation can cause building damage sufficant to pose a safety hazard."

Cellulose fiber must be treated with chemical fire retardants to produce an acceptable flame resistant insulating material. The primary fire retardant chemical used is boric acid. However, boric acid shortages in 1977 resulted in some manufacturers using substitute fire retardants, such as aluminum or ammonium sulfates. Under certain circumstances, a combination of moisture and such sulfates can produce sulfuric acid, which can severely corrode building materials. Fire safety officials told us that continued use of these substitutes could cause much structural damage to homes. They said they would like to see better control over the use of and safety certification of chemically treated insulation.

CHAPTER 5

IMPROVEMENTS NEEDED IN GOVERNMENT EFFORTS

Most Federal and State government actions to date have been directed at formulating standards for reducing the hazards from unsafe material. But efforts to assure proper installation, coordinate labeling requirements, and provide for standard testing methods have been limited. Improvements are needed at all levels of government in addressing propriety of installation, labeling requirements, and testing laboratory certification in order to assure homeowners that insulation products purchased will perform as claimed.

NEED FOR INSTALLATION CERTIFICATION

In chapters 3 and 4, we noted numerous situations where improper installation resulted in reduced thermal effectiveness and safety hazards. Our examples highlighted the problem areas and emphasized that the problems do exist. Utility, State, and Federal officials, told us that improper installations continue to occur every day, and the overwhelming majority are going undetected. State officials pointed out that, since few State or local, and no Federal, requirements for installation or post-installation inspection exist, improper installations will continue to occur.

Many States do not have statewide building codes that govern quality of materials and installation. Although the vast majority of U.S. homes are subject to local building codes, we found no State or local codes that set standards for installation. Many codes do require minimum levels of insulation, and some specify generic classifications of materials that can be used, but we did not find any that spell out installation methods to be followed to assure thermal integrity or safety.

At the Federal level, there are also no specific installation regulations. Several agencies have addressed installation in connection with production labeling requirements, but no specific installation guidelines have been established. DOE has taken positive steps to rectify

this situation by developing proposed rules to be used in carrying out the Residential Conservation Service (RCS) Program pursuant to part I, title II of the NECPA.

The purpose of the RCS program is to have utilities and home heating suppliers encourage their residential customers to install energy conservation measures. DOE has proposed that States submit plans for carrying out the RCS program. The State plans would require regulated utilities to participate and could include nonregulated utilities and/or home heating suppliers. Nonregulated utilities not included in State plans would be required to submit their own plans to DOE.

DOE's proposed rules set out the requirements for State plans and nonregulated utility plans. In addition, they address certain prohibitions, and exceptions thereto, concerning utilities supply, installation, and financing of energy conservation measures, including insulation application. We found the proposed rules to be very comprehensive. Should they be put into effect and properly enforced, most installation problem areas would be alleviated. There are some areas, however, needing additional clarification.

DOE proposes that a random sample of each insulation contractor's work be evaluated to ensure that no contractor is installing material in a manner which may lead to the creation of hazards and to ensure that insulation is installed effectively. Although the random inspection schedule proposed seems acceptable, the regulations are silent as to who will be responsible for the inspections. Utility officials have raised questions about the possibility that they may be required to perform the inspections and they believe this would place them in an unacceptable legal liability position. On the other hand, while we recognize that there may be better qualified inspectors, at this time, we believe utilities have the most experience in home energy audits.

DOE proposed that, initially, a random inspection program for insulation is necessary, but has given the States the option to reduce this requirement after a period of time if they can show the inspections are no longer necessary. DOE officials stated that they are considering removing this State option. In light of the rapidly changing nature of the insulation marketplace, and the easy entry for some manufacturers, it appears that inspections should be continued for the life of the RCS program.

DOE has considered requiring that utilities and fuel suppliers give a post-installation inspection to any customer who requests one. DOE officials believe that many customers would be willing to pay for this type of service. Although the law does not require the utilities to offer such a program, many have the capability to do so. Consumers we interviewed seemed to favor this inspection availability, particularly because it would give the self-installers and the consumers who insulated outside the formal program some assurance that their installation was safe and effective.

NEED FOR UNIFORM LABELING

As pointed out in chapters 3 and 4 there has been much discussion about what information should be placed on insulation material labels. Several Federal agencies have been independently involved in the labeling issue.

FTC has proposed a rule that would impose new labeling requirements on manufacturers. The rule would require manufacturers to affix a label to all packages of insulation and to provide copies of a printed information sheet for distribution by installers to consumers. The label would clearly and conspicuously disclose

--R-values;

--the area each package will cover in square feet;

--the statement: "the higher the R-value, the more fuel savings;" and

--for loose-fill insulation, the thickness to which R-value and area correspond.

The rule also includes specifications and required tests that each insulation material must pass before sale.

On December 14, 1977, DOC published a "Finding of Need to Label Thermal Insulation for Homes" in accordance with the procedures for a Voluntary Consumer Product Information Labeling Program. This program was intended to provide consumers, at the point of sale, with the performance characteristics of residential insulation. According to the DOC notice:

"For the types of thermal insulation under consideration, the performance characteristics of primary interest to consumers include the thermal insulation properties of the material, the amount of quantity of material in a package, the area that can be insulated with the material, in a package, and the fire properties of the material. The Specifications cover these performance characteristics and may cover other characteristics which upon further investigation, prove to be of value to consumers and amenable to listing on labels."

However, on March 6, 1979, DOC suspended this program indefinitely because of a "government-wide" effort to limit expenditures.

CPSC has also proposed a regulation which will require specific details to appear on the label of insulation material packages. The CPSC regulation would require manufacturers of cellulose insulation to certify compliance with its standards. The labels would be considered certificates of compliance with the CPSC-mandated specification discussed on page 23. The label would include

--a statement that the product complies with the CPSC standard,

--the name of the manufacturer,

--the date of manufacture, and

--the place of manufacture.

HUD has already adopted minimum property standards for one- and two-family dwellings. These standards impose conditions for for installation of some insulation materials and state maximum performance needed for ceilings and walls. Specific labeling requirements were set out for batts and blankets, reflective insulation, blown or poured insulation for attics, and all other insulation materials. Information required is very similar to that required by the FTC and DOC proposals.

We attended several meetings of a special Insulation Task Force established by the National Institute of Building Sciences (NIBS) to

> "* * *investigate the insulation situation and make recommendations that would lead to an orderly development of standards, testing procedures, installation procedures and for information for use of the building community and consumers."

The task force is made up of representatives from insulation manufacturing contractors, industry associations, university faculties, Government agencies, research and testing laboratories, and consumer groups. It has been meeting periodically since April 1978, to consider and attempt to resolve significant problem areas. These meetings provided a useful forum for expression of ideas and cross-cultivation of industry and regulatory policies and practices.

Among topics dealt with by the task force was the labeling issue. Many agreements were reached about the information to be required on insulation labels, but we did not find any decision on what agency would take the lead in development of a single label which would satisfy each agency's requirements.

In its proposed RCS program rules, DOE recognizes the related efforts of the other Federal agencies, and the rules reflect their contributions. It is apparent by the content of the various agency proposals discussed previously, that agency officials generally agree on specific needs for protecting consumers with respect to insulation. Each agency agency has expressed the necessity for some type of labeling requirement, and they have each generally agreed on the tests that should be performed to certify insulation products. However, the multiplicity of requirements will cause a great burden on the manufacturers for compliance. Coordination of Federal agency efforts is necessary to alleviate this burden.

NEED FOR TESTING LABORATORY ACCREDITATION

At present, no program certifies that the personnel, equipment, and procedures used by thermal testing laboratories provide reliable test results for insulation materials.

Although industry and the Federal Government generally agree that consumers need to be protected by clear labeling and accurate advertising, little has been done to assure the credibility of the information on the labels. FTC, DOC, and CPSC have proposed requirements for testing, but none has proposed, in its regulations, specific requirements for certifying the tests performed on the insulation material.

DOC, however, recently instituted a National Voluntary Laboratory Accreditation Program (NVLAP) to certify laboratories capable of performing specific tests of thermal insulation material. The goal of NVLAP is to foster and promote a uniformly acceptable base of professional and technical competence in testing laboratories.

The procedure for accrediting a testing laboratory consists of three phases. Once a laboratory formally requests accreditation, a detailed questionnaire is sent to the laboratory. The completed questionnaire is then returned to DOC and evaluated by a technical examiner. Once this has been completed, the laboratory is inspected. The inspection verifies the submitted information and compares the laboratory's capabilities with the requirements of the test methods. Finally, proficiency sample testing is required. The decision to accredit a laboratory is made on the basis of all three evaluations.

As pointed out, this program is voluntary. As such, participation could be sparse. A mandatory membership in the NVLAP by insulation testing laboratories would provide a seemingly necessary safeguard.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Insulation availability, safety, and performance are key factors in the Federal Government's efforts to weatherize the majority of U.S. dwellings. Although at this time it does not appear that stated goals will be reached, we believe the 90-percent weatherization objective of the NEP and the administration is worthwhile even if it is not accomplished within the 1985 timeframe. The following factors should be considered regarding the goal's realization.

Insulation material availability

Two factors could cause insulation material to become scarce again. Because of rapidly rising fuel costs, more consumers will begin finding insulation of their homes to be a beneficial weatherization action. Also, new Federal safety regulations covering cellulose insulation will cause cellulose manufacturers to use greater amounts of boric acid, which is not available in plentiful supply. The combination of these two factors could cause another shortage.

However, any such shortage will probably be brief. If it occurs, it will probably be in early 1980 and only if demand does rise. However, fiberglass manufacturers are expected to bring new capacity on line by mid-1980, which would compensate for any shortage of cellulose. Therefore, a brief shortage will probably not further effect national energy conservation goals.

Improper installation

Improper installation of insulation results in lower thermal resistancy and potential safety hazards. DOE has taken action to alleviate these problems by proposing various installation and inspection standards for its RCS program. We believe the DOE-proposed rules are comprehensive and address the key issues. However, there are several provisions we believe should be strengthened or amended.

Safety hazards from material

There are certain potential safety hazards associated with home insulation. Safety problems we found to be prevalent were fire, structural corrosion, and noxious fumes. DOE, FTC, CPSC, and DOC have all proposed certain labeling requirements and accompanying tests to alleviate the safety problem. But the numerous labeling requirements will cause unreasonable burdens on manufacturers and contractors. Therefore, these efforts need to be coordinated.

Certification of testing laboratories

The tests that various Federal agencies proposed to safeguard against inferior insulation materials being sold should keep them off the market, but only if proper and uniform testing is performed. Assuring that testing laboratories are competent is needed, i.e., a mandatory laboratory certification program is needed.

RECOMMENDATION TO
THE SECRETARY OF ENERGY

We recommend that the Department of Energy amend its proposed rules for the RCS program as follows:

--Post-installation inspections should be performed by qualified utility company inspectors.

--Random post-installation inspections should be mandatory for the life of the RCS program, and for any extensions thereof.

--Utilities should be required by the State plans to make post-installation inspection services available to any customer at customer expense.

RECOMMENDATIONS TO THE FEDERAL
TRADE COMMISSION

We recommend that the Federal Trade Commission adopt, as part of its Trade Regulation Rule, a provision requiring insulation manufacturers to have their products tested and certified for their safety and thermal resistancy by a testing laboratory accredited under the DOC "National Voluntary Laboratory Accreditation Program."

We also recommend that the Federal Trade Commission, in consultation with the Secretary of Energy, take the lead in coordinating FTC, DOD, HUD, CPSC, GSA, and DOE insulation material labeling requirements. In this role, FTC should stress the need for a single label to satisfy all the agencies' requirements. The Congress has given FTC primary responsibility for prevention of unfair and deceptive practices. This responsibility gives rise to the Commission's proposed rule on labeling. Since FTC is already empowered with the responsibility, we believe it should also be responsible for coordinating all Federal insulation-labeling efforts. A taskforce approach should alleviate the potential burden on manufacturers of having to conform to multi-agency requirements.

AGENCY COMMENTS AND OUR EVALUATION

NIBS, DOE, and FTC reviewed and commented on a draft of this report. NIBS officials gave us a number of editorial comments which we considered and incorporated in the report where appropriate. They generally agreed on the need for installation standards, and they supported a laboratory accreditation system. However, they expressed reservations about (1) the timeliness of installation standards promulgated under the RCS program and (2) mandatory participation in a laboratory accreditation program. While we recognize that it will be some months before installation standards are in place under the RCS program, we believe that the RCS program affords the best opportunity to implement such standards on a national scale. With regard to laboratory accreditation, we believe that all laboratories must paticipate in order to ensure the proper and uniform testing of all insulation material placed on the market.

DOE and FTC took exception to our recommendation that qualified utility company personnel conduct post-installation inspections under the RCS program. They suggested that inspectors from either Federal, State, or local governments might be better qualified to perform this enforcement function. During our review, we dealt with State governments, municipal leaders, Federal agency officials, contractors, and utility companies. While we recognize that, in some areas of the country, local inspectors may be better qualified than utility personnel, we believe that, at this time, utilities have more experience in home energy audits.

FTC also expressed the view that, in instances where the utility company is the installer, a conflict of interest may be created if the utility also performs the post-installation inspection. The proposed regulations, however, in most cases, prohibit utilities from being the installer. The proposed regulations state that, "Except as provided in this subpart, no covered utility may supply, install, or finance the supply or installation of any energy conservation or renewable resource measure."

Finally, FTC officials disagreed with our recommendation to incorporate a laboratory accreditation program in their proposed rule because they believe that civil penalties for violating testing requirements will provide laboratories with sufficient incentive to perform in a competent manner. They maintain that they will scrutinize all claims by manufacturers who fail to use accredited laboratories. We believe a required certification, however, will provide for added assurance that all laboratories perform properly, and will alleviate an extra enforcement burden on FTC.

(003280)

AN EQUAL OPPORTUNITY EMPLOYER

UNITED STATES
GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U. S. GENERAL ACCOUNTING OFFICE

THIRD CLASS