# The Massachusetts Program for Reducing the Risk of Formaldehyde Exposure

BAILUS WALKER, Jr., PhD, MPH
PRISCILLA FOX, JD
VIVIEN LI, MPA
GERALD PARKER, SM, PE

The authors are with the Massachusetts Department of Public Health. Dr. Walker is Commissioner, Dr. Fox is Deputy General Counsel, Ms. Li is Special Assistant to the Commissioner, and Mr. Parker is Assistant Commissioner for Environmental Health.

Tearsheet requests to Ms. Vivien Li, Massachusetts Department of Public Health, 150 Tremont Street, Boston, MA 02111.

*In 1979, following hundreds of complaints of adverse health effects from occupants of dwellings insulated with urea formaldehyde foam insulation (UFFI), the Massachusetts Department of Public Health issued regulations banning the new installation of UFFI in Massachusetts. New State legislation was adopted in 1986 which reformulated UFFI policy. The law established a minimum concentration of formaldehyde of 0.1 parts per million (ppm) below which removal of the insulation is not required or encouraged. A trust fund financed by industry was established to pay for air testing and for the removal of UFFI from homes if the formaldehyde level exceeds the statutory minimum of 0.1 ppm or if an occupant experiences adverse health effects attributable to the insulation.*

## Synopsis

*Urea formaldehyde foam insulation in homes has caused increasing concerns about the adverse health effects associated with residential exposure to formaldehyde emissions. These health effects cover a broad spectrum of symptoms, including neurophysiological effects, respiratory irritations, and eye and skin irritations. Recent studies have also suggested a possible correlation between exposure to formaldehyde vapors and cancer.*

*Based on the Massachusetts experience, these requirements have been identified: the need for flexibility and midcourse corrections in the development of health policy to allow for the incorporation of new scientific information or changes in the economic or political environment, the need for close coordination with all affected parties, and the need for scientific and technical policy development to be joined with economic and political perspectives to ensure smooth implementation of health policies.*

SINCE THE UREA FORMALDEHYDE FOAM process was introduced a few years ago for insulating dwellings, there have been intense concerns about adverse health effects associated with residential exposure to formaldehyde. These concerns were underscored as new evidence suggested that excess formaldehyde in some types of foam insulation can be released over long periods. Release rates are higher for new materials and are directly influenced by certain physical and chemical factors such as temperature and humidity. Indoor sampling in Danish homes found average formaldehyde concentrations ranging from 0.07 to 1.9 parts per million (ppm). Studies of 200 mobile homes in Washington State reported concentrations ranging from 0.03 to 2.4 ppm. Similar levels were recorded in mobile homes in Minnesota and Wisconsin. In conventional homes, concentrations of 0.1 to 0.5 ppm have been measured, while concentrations in excess of 0.1 ppm are common in homes insulated with urea formaldehyde foam (*1*).

Epidemiologic evidence indicates that adverse health effects associated with residential exposure to formaldehyde cover a wide range of signs and symptoms, including neurophysiological effects, eye and skin irritations, upper and lower respiratory irritations, pulmonary edema, and headaches.

More recently, animal studies have shown that rats exposed to 15 ppm of formaldehyde developed squamous cell carcinoma in the nasal cavity (*2*). Formaldehyde-induced mutagenic activities in microorganisms have been reported. Additional studies funded by the Environmental Protection Agency found no relationship between cancer and work-related formaldehyde exposure but did find a correlation between nasopharyngeal cancer and living in a mobile home (*3*).

In addition to concerns about health effects,

consumers are also confronted with economic and social issues such as the cost of removing the insulation to reduce the risks and the enormous cost associated with lawsuits over adverse reactions to formaldehyde.

Another ongoing concern for owners of homes insulated with urea formaldehyde foam is the difficulty of selling their homes. Buyers either shun homes with urea formaldehyde foam insulation (UFFI) or refuse to pay prices close to what the market value would be without UFFI. Real estate brokers refuse to accept listings of homes with UFFI or accept them only at reduced asking prices, and many lenders refuse to finance the homes even when there are buyers willing to purchase them.

These complexities also create administrative, economic, and political concerns for the UFFI industry and for policymakers who are grappling with the problem.

In this report, we describe Massachusetts' first response to this problem, outline changes that recently occurred to improve the initial policy and the risk reduction program, and conclude with a synthesis of considerations which, based on our experience, may determine the success or failure of health policy formulation and implementation in other communities.

## Initial Policy

In 1978 and early 1979, the Massachusetts Department of Public Health (DPH) and the Massachusetts Office of Consumer Affairs received more than 350 complaints of adverse health effects from occupants of dwellings insulated with UFFI.

To better define the problem, DPH held public hearings for 2 days in March 1979 on a proposal to ban UFFI. Fifty-one people testified at the hearings, and a total of 322 written exhibits were introduced. These included reports of animal studies, workplace studies, Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH) standards, human exposure studies, and surveys conducted by health departments in other States of people with health complaints associated with exposure to formaldehyde vapor. After reviewing these data, DPH concluded that formaldehyde concentrations in homes should be reduced to the lowest practical level to minimize the risk of unnecessary exposure to this toxic substance (*4*).

Through the appropriate administrative procedures, DPH banned new installation of UFFI in Massachusetts in November 1979 (*5*) and issued the first UFFI repurchase regulations the following November. Under the provisions of the repurchase regulations, the insulation industry was required to repurchase (remove from the home) UFFI from consumers who had experienced health effects from formaldehyde emitted by the insulation. Homeowners were required to request repurchase within 18 months after the date the regulations went into effect. The request was to be accompanied by a statement from the occupant indicating the health problems experienced since the insulation was installed. If the request was not challenged by the industry, DPH would issue the consumer a "certificate of right to repurchase" to be presented to the UFFI manufacturer, distributor, or installer for a refund of the purchase price and for removal of the insulation from the dwelling.

If, on the other hand, industry challenged the occupant's statement on health effects, a detailed written report of signs, symptoms, and diagnosis by a physician was required. Industry representatives also could review any written medical records from which the physician's statement was developed. A disagreement between the consumer and the industry over claims for repurchase was to be arbitrated by a DPH-selected lawyer and physician.

Several problems arose during the implementation of the policy. Both the ban and the repurchase regulations were challenged in several lawsuits by UFFI manufacturers and installers. The lower court—the Massachusetts Superior Court—decided in favor of the plaintiffs. On appeal, the Massachusetts Supreme Judicial Court (SJC) upheld the State's ban. However, the SJC directed DPH to provide an opportunity in individual repurchase cases for UFFI suppliers to challenge whether they had actually supplied the UFFI in question.

The existing regulations were amended to include the court's directive (*6*). Another change also was made: the new regulations did not require any report of adverse health effects, doctor's statement, or the like. The repurchase process became available to any owner of a UFFI home. These amended regulations were immediately challenged, this time in Federal District Court by a major UFFI manufacturer and the formaldehyde trade association, the Formaldehyde Institute.

There were other problems. Many of the initial distributors and installers could not be identified or were out of business because of the time lapse

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since the insulation was installed. This difficulty made the repurchase process virtually useless for many homeowners. Homeowners who wished to pay for removing the UFFI faced costs of $15,000 to $20,000 or more.

The difficulties in selling homes with UFFI intensified as information spread about buyers avoiding homes with the insulation and lending agencies refusing to finance the homes even when there were willing buyers.

Consumers and their legislative representatives became increasingly concerned about an apparent lack of significant progress in the repurchase and removal of the insulation from the affected dwellings.

## Revised Policy

In such an environment, repeated calls by homeowners, consumer advocates, and other opinion leaders for reformulation of the policy gained widespread attention. These calls, coupled with the DPH's assessment of the program, suggested the need to change the initial policy.

It became evident that it was necessary to collect and analyze more social and economic data than were available when the initial policy was developed to ensure having the appropriate data base on which to revise the policy. Accordingly, DPH conducted a survey of approximately 700 homes with UFFI to calculate the average cost of UFFI removal. The department also consulted with experts from Canada, who had had experience with the Canadian government's UFFI program, on such matters as alternative methods of formaldehyde control and certification of removal contractors. In addition, it was clear that a reexamination of the initial policy should involve persons of diverse perspectives who had comparable investment in the issues.

At the outset, DPH held extensive meetings with all interested parties including homeowners, lending institutions, legislators, and industry representatives. These meetings focused on issues and problems of implementing the initial policy, including an examination of some participants' contention that the economic impact of UFFI on individual homeowners was more significant than had been expected.

Later, an advisory committee was established that crossed traditional institutional and disciplinary boundaries and drew experts from such areas as epidemiology, risk assessment, risk management, consumer protection, law, real estate financing, housing construction and maintenance, and decisionmaking and analysis. The committee deliberated for approximately 6 months, compiling current knowledge of the known effects of formaldehyde and the local social, economic, and political dimensions of the UFFI problem, and it made recommendations for revising the existing policy. The recommendations were translated into a bill which reformulated UFFI policy (*7*). The bill was passed into law and became effective July 1, 1986.

The new law accomplished several objectives. In a major reversal of State policy, the law established a minimum concentration of formaldehyde of 0.1 ppm below which removal of the insulation is not required or encouraged. Controlled studies on humans formed the epidemiologic basis for the standard. These studies measured primary irritancy in test populations and provide dose-response data at various airborne concentrations of formaldehyde. Although the extent of irritancy has not been investigated in controlled human studies at concentrations below 0.25 ppm, the National Academy of Sciences' Committee on Toxicology estimates that less than 20 percent of an exposed population would react to such formaldehyde exposure with slight irritation of the eyes, nose, and throat and possibly a slight decrease in nasal flow (*8*).

Given the importance of quality control, the UFFI regulations included procedures for the safe removal of UFFI consistent with current scientific and technical knowledge (*9*). Only those firms certified by the State government can be reimbursed by the State for UFFI removal services, and a list of such firms is published periodically by DPH.

The new law addresses the economic issue in several ways. It establishes a trust fund financed with contributions from companies that manufactured or distributed the insulation. These funds

will pay for air testing and for the removal of UFFI from homes if the formaldehyde level exceeds the statutory minimum of 0.1 ppm or if an occupant has experienced adverse health effects attributable to the insulation.

The law specifies that the trust fund become operative upon receipt of $75,000 from industry members. This amount actually represents but a portion of a larger amount pledged by just one industry member. Some other industry members have contributed to the fund, and still others should be induced to contribute by the provisions of the law, which specify that any company that contributes a "reasonable amount" to the trust fund (as determined by the Commissioner of Health with the advice of a UFFI advisory council) is relieved from liability for damages incurred by a homeowner who has received payment for removal of UFFI from the trust fund. In other words, a homeowner who chooses to receive payment from the fund will sign a waiver of private rights of legal action against contributing companies. There is an exception for private rights of action for latent (presently undiscoverable) health effects, which are preserved.

Furthermore, realtors, bankers, landlords, and homeowners are not liable for health effects if appropriate disclosure is made by the seller to the buyer and by the landlord to the tenant. Sellers and landlords have obligations to determine whether the house contains UFFI before entering into a sale or rental agreement.

To address the past difficulties of selling homes with UFFI, the law prohibits real estate agents, brokers, and salespersons from refusing to offer for sale or otherwise discriminating in the sale, lease, or purchase of a residential dwelling with UFFI where the indoor formaldehyde level is 0.1 ppm or below. It further prohibits lending institutions and mortgagees from discriminating in any manner against the financing of dwellings which are at or below the prescribed standard for indoor formaldehyde.

It was recognized that successful implementation of the new law would require the transfer of reliable information to consumers from the regulatory agency as well as feedback from consumers to program planners and managers. Accordingly, a toll-free hotline was established.

In addition, a UFFI advisory council consisting of the Massachusetts Commissioner of Public Health and four members appointed by the Governor, one of whom must be a homeowner and one a representative of the UFFI industry, was established. Members advise DPH on implementation of the revised policy, including the maintenance of the UFFI trust fund, the drafting of appropriate regulations, and the efficacy of the new law and the removal program.

Although the success of this level of consumer involvement is subjective and difficult to evaluate, such participation can ideally result in

- keeping in touch with consumers, legislators, and industry concerns about the program's progress;
- changing negative consumer attitudes about the industry and the regulatory process; and
- producing new allies in consumers, legislators, and industry representatives who might join in support of a broader spectrum of health promotion and disease prevention services.

In this case, the creation of the advisory council should enable DPH to keep abreast of any problems that develop in implementing the law and the program. For example, any ongoing difficulties concerning banks shunning homes with UFFI may be expected to be raised immediately by the homeowner's representative. The responsiveness of DPH and its willingness in appropriate circumstances to engage other parties in solving problems or to change inhouse practices in implementing the program should, in turn, bolster consumer confidence in the regulatory process. Such confidence should produce new allies in consumers and their legislators who perceive that a government program can work effectively.

## Conclusion

Three important lessons came out of our experience with the UFFI program: First, it is difficult to develop far-reaching public health policies and programs, with their social, economic, and political ramifications, that will not require study and midcourse corrections. Pressures to correct may result from new scientific information, major changes in the economic and political environment, or an evolution in the substance and implementation of the policy or programs, or all of these.

Midcourse corrections can be expedited if appropriate systems are in place for maintaining a long-range overview of specific aspects of policy implementation. A useful format might be an advisory group that continues to monitor and evaluate policy issues. Such a group could provide the timely analyses that policymakers need in

formulating new policies and programs. Too often, indepth analyses of policy issues have been tedious exercises that hamper early resolution of problems because the analyses become too deeply embedded in the political process.

Second, changes in policy cannot proceed in an uncoordinated way with parts of the policy modified piecemeal through the political process. Far-reaching health protection policies are rarely simple, and a perturbation in one provision may have serious repercussions in another. In addition, policy reformulation made in this way too often depends on political pressure rather than on dispassionate reasons.

In this case, the convening of an advisory committee representing all the various interests ensured that no one point of view would prevail to the detriment of others. For example, an early draft of the trust fund bill had established a presumably safe level of 0.1 ppm formaldehyde in residential dwellings but made no provision for relief for those homeowners who might be adversely affected at lower levels.

Similarly, the early bill did not require disclosure of the presence of UFFI to prospective home buyers in most cases. The final bill, which emerged after the committee's deliberations, corrected these imbalances by providing funds for the removal of UFFI if either the air level is above 0.1 ppm or an occupant has experienced adverse health effects and requiring disclosure of the presence of UFFI to prospective buyers, together with air test results and other information that serves to put the results in perspective. As of early September 1986, over 2,000 homeowners had applied for air testing or remedial relief, or both, under the program.

Third, the magnitude of the tasks in developing health policy and implementation requires that responsibility for these activities be shared by all who are affected by them. Joining of these forces often creates a fundamental political and adversarial environment that does not provide the ideal setting in which to pool and examine objectively relevant data from diverse sources.

In many instances, the time pressure set by statutes, court decisions, and other factors such as consumer anxiety do not allow for the orderly resolution of the types of scientific, social, and economic conflicts outlined previously. As a result, regulatory decisions are an excellent example of issues in which scientific and technological knowledge must be effectively joined with economic and political perspectives in reaching policy conclusions.

In Massachusetts, we used all available sources of expertise and information, relying particularly on the views of experienced persons in the academic and business community. For example, the advisory committee brought economic, social, political, and technical insight, risk assessment and risk management experience, and a more objective attitude toward policy discussions. Group meetings with homeowners, lending institutions, and the construction industry helped to air all sides of the complex issue and promoted a reasoned assessment of the problem and the appropriate solutions.

From a policy viewpoint, these collaborative activities were viewed as an investment which would yield considerable dividends, including an improvement in the technical basis for and the credibility of government policy decisions that lead to an ultimate reduction in human exposure to formaldehyde.

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