

Asbestos Strategies *Lessons Learned About Management and Use of Asbestos*



Report of Findings and Recommendations On the Use and Management of Asbestos

May 16, 2003

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ON THE USE AND MANAGEMENT OF ASBESTOS**

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1.0 EXECUTIVE SUMMARY

Many Americans are under the impression that asbestos has been banned for years. Even though consumer use of asbestos and asbestos-containing products has dropped dramatically over the past 30 years, the U.S. Geological Survey (USGS) estimates that more than 29 million pounds of asbestos were used in product manufacturing in the U.S. during 2001.¹ Despite this trend, asbestos remains a major environmental and public health concern. Various federal and state agencies and private sector organizations continue to grapple with ongoing asbestos-related public health concerns, such as the legacy of the Libby, Montana vermiculite mine, possible asbestos risks from the World Trade Center collapse, and other similar issues.

USGS calls asbestos “a commercial designation for any mineral products composed of strong and flexible fibers, resistant to heat, corrosion, abrasion, and that can be woven.” Potential exposure to asbestos can result from products manufactured in the past as well as from those made or imported today. Over the past 30 years, billions of dollars have been invested in controlling exposure to asbestos. It is crucial for regulatory and advisory agencies to have the best available information in order to make the most effective use of limited resources in addressing these risks. Agency budgets for asbestos oversight, outreach, and education are relatively small compared to the sums involved in control and abatement. However, a modest investment in effective oversight, outreach, and education can have a significant effect in reducing exposure and avoiding needless expenses later.

The following report identifies twenty-one key actions that the public and private sectors can take to reduce the risk from asbestos in the future. The report offers a fresh look at the current asbestos situation, a review of recent research, and the views of numerous stakeholders with significant asbestos experience on actions that need to be taken. This summary provides an overview of the ten leading recommendations from the stakeholder group.

It should be noted that asbestos has likely been studied more than any other hazardous material over the past 100 years. Scientific and medical literature contains thousands of articles addressing hundreds of issues surrounding asbestos. Major scientific conferences on the substance have been held on every continent but Antarctica. Yet there remains disagreement on many fundamental issues regarding asbestos. It is unlikely these disagreements will be resolved in the immediate future. There is agreement, however, on a number of issues identified by the stakeholder group where policymakers can have a positive impact. The recommendations outlined in this report can serve agencies and interested institutions as a basis for action or targeted further inquiry. Public concerns about remaining risk can be mitigated by clarifying information and enhancing coordination among key federal and state agencies. With clearer information and rules, experts may determine that some questions require further research or

¹ Virta, R., *USGS 2003 Mineral Commodity Summary: Asbestos*, online at <http://minerals.er.usgs.gov/minerals/pubs/commodity/asbestos/070303.pdf>. This does not include manufactured products imported into the U.S.

regulatory action. Quality information can also reduce the costs associated with asbestos use and management.

It was with this in mind that the Global Environment & Technology Foundation (GETF) engaged more than 100 technical and policy experts and other key stakeholders from government, academia, and the private sector to take stock of recent experiences with potential solutions and options regarding the use and management of asbestos. GETF utilized a variety of means to gather information and interact with stakeholders, including interviews and focus groups. This process – entitled *Asbestos Strategies* – was not intended to build consensus, but rather to focus on how oversight, outreach, and education can help to identify priorities and promote innovative approaches and best management practices. This information can enable stakeholders to effectively address and better manage costs and exposure risks associated with asbestos use and management issues. GETF is a 501(c)(3) not-for-profit organization with expertise in stakeholder facilitation. A more detailed description of the process, with a complete listing of invited and participating stakeholder groups, is contained in Appendix A, entitled “The Asbestos Strategies Process.”

Summarized below are the ten leading recommendations for policymakers suggested by key stakeholders to address issues surrounding asbestos. These recommendations primarily focus on the use of oversight, outreach, and education to achieve results. The recommendations are not ranked and are intended to be implemented concurrently, if possible. They are divided into short term recommendations, which may be implemented rapidly, and longer term recommendations, which may require additional time and resources to implement.

The full report summarizes the process used to identify current asbestos issues. A number of scientific issues – including analytical methods, medical studies, mineralogical definitions, and risk assessment – remain to be addressed. A brief history of the science and regulation of asbestos is described in Appendix B, entitled “Background.” Areas needing further research are highlighted in Appendix C, entitled “Research Priorities by Issue Area,” which are grouped and prioritized by topic area. Due to a limited scope, the *Asbestos Strategies* process does not attempt to review the science of asbestos nor is it a comprehensive evaluation of the risk and risk mitigation issues associated with asbestos.

The stakeholders identified seven major categories for discussion: asbestos in buildings; asbestos in products; naturally occurring asbestos as a product contaminant; regulations and enforcement; medical/health issues; risk assessment and analysis; and analytical issues. Each category contains a brief background discussion and identifies the remaining issues, areas of needed future research, and recommendations to address many of the issues. The complete list of recommendations is contained in Appendix D, entitled “All Recommendations.”

Ten Leading Recommendations from *Asbestos Strategies* Process (not ranked)
Table 1.1: Leading Short Term Recommendations

Action 1:	Update Existing Asbestos-in-Buildings Guidance		
Description:	Guidance documents provide workers with processes to follow in order to protect their health, protect the health of building occupants, and comply with regulations. EPA should update the “purple book” guidance document to make it the premier technical resource for managing asbestos in buildings and facilities, including industrial settings. The revised resource should include updated “green book” (operations and maintenance) information, and should be consistent with current federal regulations and good practices that have evolved since its release in 1985. The resulting resource, in a form such as an online integrated database of all relevant documents, will facilitate compliance with existing regulations, reducing asbestos exposure among contractors working in buildings.		
Lead Agency:	EPA	Supporting Agency:	Occupational Safety and Health Administration (OSHA)
Action 2:	Encourage Compliance with Existing Regulations		
Description:	Regulatory agencies should encourage compliance with existing regulations and good practices for managing asbestos in buildings and conducting response actions. In some cases, businesses do not fully comply with existing regulations because they are not aware of the regulations. In other cases, they do not understand why it is important that the regulations be followed. Both may be addressed through a series of asbestos awareness seminars directed at the regulated community (building owners, contractors, and consultants). The seminars should be sponsored by EPA and OSHA, and hosted by the resident state asbestos authority. Joint sponsorship would be extremely valuable. Seminars should be held in conjunction with national or regional meetings of professional/trade associations, such as the Environmental Information Association (EIA), the International Facility Managers Association (IFMA), the Building Owners Management Association (BOMA), and the American Institute of Architects (AIA), to encourage participation by the target audience. Regulatory compliance will increase worker and building occupant safety, reduce asbestos exposure, and decrease costs associated with liability. This action should be undertaken in the context of a long-term effort to enforce existing regulations and improve consistency among agencies, as noted in Action 7 in Table 1.2.		
Lead Agency:	EPA	Supporting Groups:	OSHA, EIA, State Regulators
Action 3:	Clarify the Asbestos Definition to Address Asbestos Contamination in Vermiculite and Other Minerals		
Description:	Some of the asbestiform amphiboles found in the vermiculite from Libby, Montana were not among the six minerals currently regulated as asbestos. Nevertheless, they were similar enough to regulated forms as to present dangerous health risks. The Libby vermiculite situation should be considered an important lesson, but not be treated as a typical case. A federal process should be undertaken promptly to clarify the definition of “asbestos.” Many parties recommended that the definition should include all asbestiform amphiboles, in addition to currently regulated amphiboles and chrysotile. EPA, OSHA, and Mine Safety and Health Administration (MSHA) will need to evaluate how such a clarification should be accomplished and what consequences, if any, it would have on other industries. If adopted, this definition would enable federal agencies to address the risk of exposure from minerals such as winchite and richterite. USGS, trade associations, and other organizations can serve as resources for clarifying and understanding the science associated with creating a new definition.		
Lead Agency:	EPA	Supporting Agencies:	MSHA, OSHA, USGS

Action 4:	Advance a Federal Legislative Ban on Asbestos		
Description:	<p>Asbestos continues to be used in products manufactured in the U.S. and in products imported into the U.S. This may present risk to workers or members of the public, and it increases the cost of regulatory compliance for building owners. A clearly defined legislative ban on the production, manufacture, distribution, and importation of products with commercially-added asbestos is the most direct means to address concerns about remaining health risk and reduce future costs for facility owners and managers. Such a ban should be proposed by the Congress, promptly debated, and conclusively resolved. Enabling legislation would eliminate remaining products by a specified date, and installation of those products by a later date. Jurisdictional issues could be addressed in Congressional legislation that might not be achievable by individual agency rule-makings. Exceptions may be necessary for a small number of applications for which substitutes may not be available, and for research purposes. Implementing regulations, and perhaps the enabling legislation itself, could be challenged in the courts. A regulatory ban is within EPA's authority and is also an option. Many see a ban on asbestos, enacted to prevent future exposure, as a complementary action to a litigation resolution process that fairly compensates injuries resulting from past exposure.</p>		
Lead Group:	Congress	Supporting Agencies:	EPA, OSHA, U.S. Department of Commerce
Action 5:	Develop A National Mesothelioma Registry		
Description:	<p>A national mesothelioma registry is necessary to facilitate epidemiological studies to evaluate the effects of asbestos exposure and enable public health officials to identify and respond to hazards. Many countries and some states have established mesothelioma registries. The establishment of such a registry would likely be performed by agencies within the Centers for Disease Control (CDC), including the National Center for Health Statistics, National Institute for Occupational Safety and Health, and the National Center for Environmental Health, in conjunction with Agency for Toxic Substances and Disease Registry (ATSDR) and state public health departments. An accompanying effort to connect interested parties with the best experts and data would improve research and treatment of asbestos-related disease.</p>		
Lead Agency:	CDC	Supporting Agencies:	State Public Health Departments, ATSDR

Table 1.2: Leading Long Term Recommendations

Action 6:	Update Asbestos Model Training Curricula		
Description:	<p>There have been substantial changes to federal regulations and standards since the model training curricula was developed. It is important to ensure that workers understand current regulations and understand why it is important to follow these regulations. EPA should update the model training curricula to ensure that all relevant agencies' priorities are reflected. Updating the training will make the curricula consistent with existing regulations and increase worker safety. The updated versions should cover the revised OSHA asbestos standards, revised EPA asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) standards, the EPA Worker Protection Rule, new respirator designations/regulations, and other topics. The training providers should also be permitted to vary the course content in refresher courses.</p>		
Lead Agency:	EPA	Supporting Agencies:	State Regulators, OSHA
Action 7:	Enforce Existing Asbestos Regulations		
Description:	<p>Existing asbestos regulations have been designed to reduce the adverse effects from asbestos exposure on the health of the public and of workers. Inconsistent interpretation leads to confusion; lax enforcement allows substandard practices. Both can lead to increased health risk as regulations are ignored. EPA, OSHA, Consumer Product Safety Commission (CPSC), and state regulators should focus on more stringent, predictable, and consistent enforcement of these existing regulations, which may offer greater benefit than committing scarce resources to new rule-making efforts. This recommendation can be implemented immediately; however, such an effort must continue for the long term. Consistent interpretations and streamlining across agencies will lead to increased compliance and potential reduced liability for businesses. Any step that EPA and OSHA can take to encourage the enforcement of existing regulations at the local level will likely prove most effective. To this end, consideration should be given to the use of a form such as the one created by EIA to assure compliance with existing regulations at the time applications are made for building, renovation, or demolition permits. This action ties into Action 2 in Table 1.1.</p>		
Lead Agency:	EPA	Supporting Agencies:	OSHA, CPSC, State Regulators
Action 8:	Reduce the Occurrence of Unintended Asbestos in Products		
Description:	<p>Accidental contamination of mineral products with asbestos can increase risks to the users of these products or the workers who process them, and in turn can result in major liability losses affecting the mineral product companies. Assisting companies in avoiding asbestos in the first place is in the best interest of all parties. Reduction of naturally occurring asbestos in products could be achieved by a program set up by a consortium of mining concerns to develop a sampling and analytical protocol to analyze bulk materials at the mining stage for chrysotile and all asbestiform amphibole forms of asbestos. Oversight of such a program may be provided by EPA and MSHA, with technical assistance by the National Institute for Occupational Safety and Health (NIOSH), the National Institute for Standards and Technology (NIST), and USGS. This program would assist the mining and quarrying industries in avoiding unwanted asbestos in their products. The program would provide a degree of assurance to users of these raw materials that they are not contaminated with asbestos.</p>		
Lead Agency:	EPA	Supporting Groups:	Mining Industry, MSHA, NIOSH, NIST, USGS

Action 9:	Address Asbestos-Containing Products in Commerce		
Description:	Consumers, employers, and building owners are in many cases unaware of the inclusion of asbestos in products. Without this knowledge, they cannot take appropriate steps to protect their health. A coordinated effort to educate consumers, employers, and building owners about products with commercially-added asbestos is necessary. Such a program would assist the target audience in making an informed decision about which products are legally available with commercially added asbestos. This education and outreach effort would be performed by EPA, OSHA, and CPSC. These agencies would need to perform research to determine which products actually have commercially added asbestos, which do not, and which are to be phased out voluntarily by manufacturers. Congress should consider amending the Asbestos Information Act of 1988 to require manufacturers and importers to update information on their asbestos-containing products to EPA.		
Lead Agency:	EPA	Supporting Agencies:	CPSC, OSHA, Congress, Bureau of Customs and Border Protection

Action 10:	Partner with State Agencies in Support of Asbestos Training		
Description:	Training requirements for contractors must be enforced. Training fraud does exist and is a real concern, particularly with some contractors producing fraudulent certification. If untrained contractors perform asbestos abatement, they put themselves and building occupants at risk. Training providers under the EPA model accreditation plan (MAP) and corresponding state plans should be audited with sufficient frequency to ensure that training is provided, tests are conducted, records are maintained, and certificates are issued. This action, conducted in concert with Action 6, will increase worker safety and the effectiveness of abatement efforts. Reducing the incidence of training fraud will provide greater security to building occupants and owners. Partnering with state agencies will provide better coordination.		
Lead Agency:	EPA	Support Groups:	State Regulators, Training Providers, OSHA

2.0 INTRODUCTION

2.1 Project Purpose

The purpose of the *Asbestos Strategies* project was to take stock of recent experiences with potential solutions and options regarding the use and management of asbestos. The first major objective was to offer recommendations and options on effective asbestos oversight, outreach and education approaches. The second major objective was to provide an opportunity for key stakeholders to share their knowledge on barriers, incentives, lessons learned, and best practices as they relate to the use and management of asbestos.

3.0 ISSUES IDENTIFIED

Several major categories of issues were identified in interviews prior to the stakeholder focus group meeting (see Appendix E for a summary of interview findings). Other issue categories were identified during the focus group meeting (see Appendix F for a meeting summary). The categories then provided the framework for an ongoing dialogue with stakeholders. The following discussion of issues, best practices, solutions, recommendations, and additional research needs is based on the views received throughout the entire process. These views come from three major sources: 1) the stakeholder focus group meeting and subsequent dialogue with participants and other technical and policy experts; 2) prior and subsequent interviews; and, 3) research. There are many additional issues concerning asbestos that were not raised as priorities during this process.

For each major category, a brief background is provided and significant issues are identified. Where additional research is needed to further define or address an issue, it is listed. (A compilation of research needs is contained in Appendix C.) Specific recommendations for actions are provided for many of the issues identified. These recommendations appear consistent with views expressed across a wide range of sectors and appear consistent with agency and marketplace experience. Thus, the recommendations focus primarily on the value of reliable information, consistently delivered, and generally do not attempt to resolve contentious technical issues. In each section, recommendations are listed in order of priority; those having the highest priority are those identified by stakeholders as having the greatest impact for the resources expended, although no formal cost-benefit analysis was performed.

3.1 Asbestos in Buildings

Background: The 1984 EPA national survey of asbestos in buildings estimated 733,000 buildings with friable Asbestos Containing Materials (ACM). This study also estimated there is 2.7 billion square feet of exposed asbestos-containing floor tile in 1.526 million buildings.² These estimates did not include schools, industrial facilities, and residences with fewer than 10 dwelling units.³ Most non-residential buildings are subject to the Occupational Safety and Health Administration (OSHA) asbestos standards, the EPA National Emissions Standards for Hazardous Air Pollutants (NESHAP) standard for asbestos, and various state regulations.

² EPA, *Asbestos in Buildings Technical Bulletin: Use of Asbestos-Containing Friable Materials and Vinyl-Asbestos Floor Tiles in Public and Commercial Buildings* (1984).

³ EPA, *Asbestos in Buildings: A National Survey of Asbestos-Containing Friable Materials*, EPA Publication No. 560/5-84-006 (October 1984) pp. ix-x.

The OSHA asbestos standard requires building owners to presume that Thermal System Insulation (TSI) and surfacing ACM found in buildings constructed before 1981, and floor tile installed in buildings through 1981, are asbestos containing, unless demonstrated to be one percent or less asbestos through sampling.⁴ The rule does not permit the assumption that materials used in buildings constructed after 1980 are asbestos-free. This has led to some confusion among building owners regarding the need for labeling, training and inspections.

The EPA asbestos NESHAP standard categorizes asbestos-containing material according to its friability.⁵ Materials greater than one percent asbestos are Regulated Asbestos-Containing Materials (RACM) if they are (1) friable asbestos material; (2) category I non-friable ACM that has become friable; (3) category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or, (4) category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.⁶

Almost all states have regulations addressing asbestos. Many states have been approved by EPA to enforce the asbestos NESHAP in their states. In some states, the regulations are enforced at a local level. For example, California has separate air quality control districts, Florida has multiple districts, Allegany County, Pennsylvania enforces the regulations in the Pittsburgh area, and the cities of New York and Chicago have their own rules.⁷

Elementary and secondary schools are covered by the EPA Asbestos Hazard Emergency Response Act (AHERA) regulations, asbestos NESHAP regulations, OSHA asbestos standards, the EPA Worker Protection Rule (some jurisdictions), and state asbestos regulations. These regulations provide a framework for the management of asbestos in school buildings. The AHERA regulations apply to commercial, industrial, and other public buildings for accreditation and training in all Model Accreditation Plan disciplines except management planner.⁸ Even though the rules do not apply to these buildings for inspection, abatement and other aspects, many building owners and consultants look to AHERA as a guide when addressing asbestos in non-school buildings. This appears to have been largely successful for sophisticated office building owners, knowledgeable consultants, and some government entities.⁹ Industrial facilities, such as power plants and oil refineries, may find much of AHERA difficult to implement, even when looked at as a guideline.¹⁰ Since the AHERA regulations were designed for schools many of the procedures, such as the clearance protocol, do not work well in industrial settings.

⁴ 29 CFR 1926.1101 (OSHA Asbestos Standard for the Construction Industry).

⁵ 40 CFR 61, Subpart M (EPA Asbestos NESHAP).

⁶ 40 CFR 61.141.

⁷ For information regarding specific state or local regulations contact each regulatory agency. Summaries are available, but dated in: Bureau of National Affairs, *Asbestos Abatement: Risks and Responsibilities*, Rockville, MD (1987); and, National Conference of State Legislators, *State Asbestos Programs Related to The Asbestos Hazard Emergency Response Act*, NCSL, 1050 17th Street, Suite 2100, Denver, CO 80265 (November 1987, and updates).

⁸ ASHARA – Asbestos School Hazard Abatement Reauthorization Act of 1990.

⁹ Opinions based on interviews with Environmental Information Association (EIA) members and focus group discussion of October 10, 2002.

¹⁰ Opinion based on interviews with asbestos consultants, EIA, and focus group discussion of October 10, 2002.

The primary motivations for building owners to effectively manage asbestos in buildings are health, regulatory compliance, liability concerns, and financial considerations. The need to limit exposures and prevent future asbestos-related disease focuses on these considerations. The many regulations provide direction if understood and a “stick” if enforced. The financial considerations can either detract from or promote proper management of asbestos in buildings. The cost of asbestos inspections, management programs, and response actions provides little tangible reward and acts as an incentive to consistently take the least-cost approach. Negative publicity, tenant complaints, and insurance issues may promote effective asbestos management. Ultimately, the aggregate cost to remove asbestos from buildings may range from \$50 to \$150 billion, according to one widely quoted estimate from the journal *Science*.¹¹

Issues Remaining: Many issues were raised through interviews and meetings about asbestos in buildings. Some issues are addressed in other sections of this report. The list of issues below is not exhaustive but captures many of the significant issues raised, which are reflected in the views of several stakeholders.

1. The quality of work performed by people conducting response actions and managing asbestos in buildings may have declined during the past decade. This fact may not be universal across the country, or consistent by the types of facilities involved. Reasons expressed included less frequent enforcement of existing regulations; quality of training for asbestos workers, consultants, and regulatory personnel; misunderstanding of existing regulations; lack of independent oversight of projects in some states; and, conflicts among federal and state regulations.
2. The EPA and OSHA regulations are quite lengthy and attempt to address most asbestos issues in buildings. The agencies have issued dozens of letters interpreting various requirements. This approach is seen by some as confusing and inconsistent and may serve as a barrier to implementing innovative approaches to manage asbestos and to developing new technical solutions. EPA AHERA regulations and numerous state regulations make asbestos management options even less flexible in schools.
3. The high cost of liability insurance and the quality of coverage provided to building owners, contractors and consultants influence asbestos management decisions. Financing acquisitions of commercial and industrial facilities also influence asbestos management decisions. These influences need to be better understood to determine whether government policy clarification is warranted.
4. The last comprehensive EPA guidance document for asbestos in buildings, the “purple book,” was issued in 1985. This pre-dates the EPA AHERA regulations for schools, and the latest revisions to the OSHA and EPA asbestos NESHAP standards. The 1990 EPA guidance document for asbestos operations and maintenance (O&M) programs, known as the “green book,” is not entirely consistent with existing regulations.
5. Attitudes about asbestos in buildings are wide-ranging and often inconsistent. Heightened concern about asbestos in the 1980s may have led to some premature asbestos removal projects; perceived complacency about asbestos in the 1990s may have

¹¹ Mossman, B., et al., “Asbestos: Scientific Developments and Implications for Public Policy,” *Science*, Vol. 247, Jan. 19, 1990, pp. 294-301.

resulted in less effective asbestos management programs. According to a number of stakeholders, mixed messages in the media from regulatory agencies may also have affected how asbestos in buildings was managed during the past decade.

6. There is a misconception that asbestos products are no longer permitted to be sold in the U.S. A number of products may continue to be produced with commercially-added asbestos. For example, building products, roofing cements, gaskets and packings with asbestos are available in the U.S. However, most domestic manufacturers have substituted non-asbestos alternatives. This issue is further discussed in section 3.2.
7. The application of risk assessment techniques in managing asbestos in buildings was raised as a remaining issue. One subpart to this issue appears to be perceived risks versus actual risks from in-place ACM; another appears to be potential risks or exposures from in-place ACM versus current risks or exposures.

Recommended Solutions: For each issue raised there could be many solutions. The solutions recommended below are those that could be implemented in the near term. These ideas have emerged from stakeholder input; they are also recommendations that may best employ oversight, outreach, and education to achieve results.

1. EPA should update the “purple book” guidance document¹² to make it the premier technical resource for managing asbestos in buildings and facilities, including industrial settings. The revised resource should include updated “green book” (operations and maintenance) information¹³, and should be consistent with current federal regulations and good practices that have evolved since the release of the “purple book” in 1985. The resulting resource, in a form such as an online integrated database of all relevant documents, will facilitate compliance with existing regulations, reducing asbestos exposure among contractors working in buildings.
2. Regulatory agencies should encourage compliance with existing regulations and good practices for managing asbestos in buildings and conducting response actions. This action may be accomplished through a series of asbestos awareness seminars directed at the regulated community (building owners, contractors and consultants). The seminars should be sponsored by EPA and OSHA, and hosted by the resident state asbestos authority. Joint sponsorship would be extremely valuable. Such seminars should be held in conjunction with national or regional meetings of professional/trade associations, such as the EIA, IFMA, BOMA, and AIA, to encourage participation by the target audience. Regulatory compliance will increase worker and building occupant safety, reduce asbestos exposure, and decrease costs associated with liability. This action should be undertaken in the context of a long-term effort to enforce existing regulations and improve consistency among agencies.
3. EPA, in conjunction with the Consumer Product Safety Commission (CPSC), should revise and update the Asbestos in Homes guidance document. This would help address the gap that currently exists in regulations affecting residential buildings.

¹² The “purple book” is the 1985 EPA publication no. 560/5-85-024, *Guidance for Controlling Asbestos-Containing Materials in Buildings*.

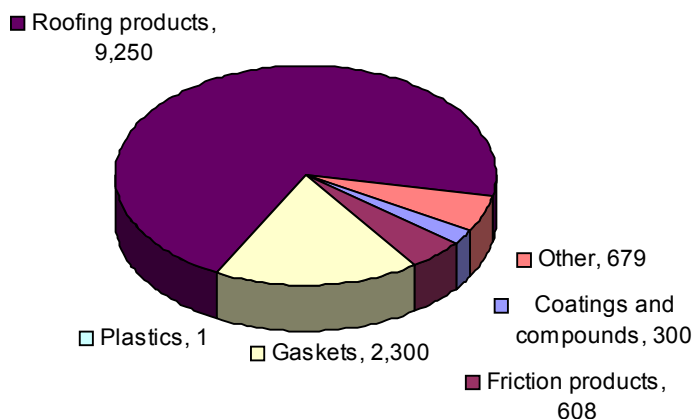
¹³ The “green book” is the 1990 EPA publication no. 20T-2003, *Managing Asbestos in Place: A Building Owner’s Guide to Operations and Maintenance Programs for Asbestos-Containing Materials*.

4. Federal and state agencies should provide additional training to their personnel responsible for asbestos. These personnel would be better equipped to provide guidance and assistance to the regulated community. Agencies should use trained personnel to increase enforcement of existing regulations. Federal agencies could be tasked to ensure that this training is supported by consistent messages from each federal agency of jurisdiction.
5. Federal and state agencies should communicate among themselves before issuing communiqués to the public. This may reduce confusion among building owners and others attempting to comply with regulations. A web-based electronic distribution mechanism for such information should be established to ensure rapid communication. Some of the regional consortiums currently in EPA regions 1-5 may serve as a model for this recommendation.

3.2 Asbestos in Products

Asbestos was commercially added to more than 3,000 products historically. In the U.S., asbestos has been removed or substituted for in all but a small number of products today. In 2001, the USGS stated approximately 13,100 metric tons of asbestos was used in the U.S. Most of the asbestos was imported from Canada. The last asbestos mine in the U.S. ceased operation in 2002.

Uses of Asbestos in 2001 (tons)



The USGS estimated that as of 2001, the major manufacturing uses in the U.S. are asphaltic roofing compounds (9,250 tons), gaskets (2,300 tons), and friction products, such as brake linings and clutch facings (608 tons).¹⁴ These are shown in Figure 3.1, "Use of Asbestos in 2001" (left). In addition to domestic manufacturing, asbestos-containing products are imported into the U.S. A systematic investigation of imported products containing commercially-added asbestos has not been conducted. In addition, not all

imported asbestos-containing products are clearly labeled as such. The Department of Commerce maintains some information on broad product categories, but import data often fail to distinguish between asbestos-containing products and products that use substitutes for asbestos. This may lead to confusion as to whether or not imported products contain asbestos.¹⁵ For example, over 44,000 tons of products of "asbestos-cement, cellulose fiber-cement, or the like" were imported in 2002.¹⁶ A majority of these products are imported from Canada and Mexico,

¹⁴ Estimates from USGS at <http://minerals.usgs.gov/minerals/pubs/commodity/asbestos/070401.pdf>.

¹⁵ The International Trade Administration web site at <http://www.ita.doc.gov/td/industry/otea/Trade-Detail/Latest-Month/Imports/68/index.html> provides a list of categories.

¹⁶ Based on data compiled by Bob Virta, USGS, from the U.S. International Trade Commission.

two countries where asbestos is still used. While the imports from these countries no longer contain asbestos,¹⁷ the International Trade Administration's (ITA) classifications do not make this distinction. Some U.S. companies have promised to phase out the use of asbestos in brakes,¹⁸ but brake pads, linings, and shoes continue to be imported from countries that use large amounts of asbestos.¹⁹ Some automotive industry participants in the *Asbestos Strategies* process believed that asbestos is no longer used in brakes. However, other participants noted that some friction material companies continue to import asbestos-containing products from manufacturing facilities in other countries.²⁰ Imports in 2002 also included well over 100 tons of asbestos yarn, string, cord, thread, fabric, and fabricated fibers, predominately from developing countries. These products are clearly identified as using asbestos and not substitutes.

Substitutes for asbestos in products are available for almost all uses. The health risks for some substitutes are controversial. Many private entities and government agencies have established policies that prohibit the purchase or use of products with commercially added asbestos. However, such policies can only be implemented if the products are clearly labeled. A.A. Hodgson's book, *Alternative to Asbestos - the Pros and Cons* (1989) and other similar publications provide listings of some available alternatives. None of these sources appears to be exhaustive.

On July 12, 1989 the EPA promulgated the Asbestos Ban and Phase Out Rule under authority of the Toxic Substances Control Act (TSCA). Under this rule certain asbestos-containing products were scheduled to be banned at staged intervals over a seven-year period. The U.S. Circuit Court of Appeals vacated most of the rule and remanded it to the EPA in October 1991.²¹ The court left intact the portion of the rule that regulates products that were not being manufactured, produced, or imported when the rule was published on July 12, 1989.

The six asbestos-containing product categories still subject to the rule are corrugated paper, rollboard, commercial paper, specialty paper, flooring felt, and any other new uses of asbestos. Actions by the EPA in the 1970s had previously eliminated the application of friable spray-applied fireproofing and surface treatments as well as friable thermal system insulations, such as pipe and boiler insulation. In the 1970s, the CPSC issued rules prohibiting the sale of consumer patching compounds and fireplace emberizing agents containing respirable free form asbestos. In the 1980s, CPSC issued an enforcement policy under the Federal Hazardous Substances Act

¹⁷ Conversation with the Asbestos Information Association of North America. Mexican manufacturers do export asbestos-cement pipe to Canada through the U.S.

¹⁸ Schneider, A., *Nation's Mechanics at Risk from Asbestos*, Seattle Post-Intelligencer, November 16, 2000. Article quotes an executive of Brake Products, Inc., which makes Raybestos brakes, as promising to eliminate asbestos from their brakes by the end of 2001. Raybestos currently sells some products which are clearly marked as asbestos-free and some which are not. Numerous brake manufacturers offer specific brakes that are identified as asbestos-free and others that are not so identified.

¹⁹ U.S. International Trade Commission data indicate that a majority of imported brake pads (by dollar value), both mounted and unmounted, originate in Canada, Japan, and Brazil, and Mexico.

²⁰ Sources also claimed that FDP Virginia, Inc. manufactures asbestos-containing friction products using prison labor in the Carolinas. This information could not be independently confirmed. In reply to a request for information, the Friction Materials Standards Institute first claimed to have no knowledge of any asbestos in any of its members' products and then stated that it had no comment on the issue.

²¹ *Federal Register*, Vol. 59, No. 123, EPA, 40 CFR 763, Technical Amendment in Response to Court Decision on Asbestos; Manufacture, Importation, Processing and Distribution Prohibitions, (June 28, 1994), p. 33208.

(FHSA) concerning labeling of certain asbestos-containing household products that, under reasonably foreseeable conditions of handling and use, are likely to release asbestos fibers.²² The U.S. Food and Drug Administration (FDA) has prohibited asbestos from use in some drugs, cosmetics and foodstuffs.²³

As a result of a 1991 determination by the Fifth Circuit Court, the following commercial product categories are no longer subject to the EPA rule and it appears permissible that they be manufactured, imported and sold in the U.S.:

TABLE 3.1a: Asbestos-Containing Products Allowed in the U.S.^{24, 25}

• asbestos cement corrugated sheet	• clutch facings
• asbestos cement flat sheet	• friction materials
• asbestos clothing	• disk brake pads
• pipeline wrap	• drum brake lining
• roofing felt	• brake blocks
• vinyl asbestos floor tile	• gaskets
• asbestos cement shingle	• non-roofing coatings
• millboard	• roof coatings
• asbestos cement pipe	• automatic transmission components

The following products were never subject to the EPA’s ban and phase-out rule and are allowed in the U.S. However, some may require labeling under CPSC’s FHSA:

TABLE 3.1b: Asbestos-Containing Products Not Subject to 1989 Ban and Phase-Out

• acetylene cylinders	• arc chutes
• asbestos diaphragms	• battery separators
• high-grade electrical paper	• missile liners
• packings (valves, seals, and other uses)	• reinforced plastic
• sealant tape	• specialty industrial gaskets
• textile products	

Over thirty countries have issued or are considering bans on all forms of asbestos (see Appendix G). The European Commission banned the five forms of amphibole asbestos from the European Union in 1991. Chrysotile asbestos was banned from fourteen categories of product at that time. On July 27, 1999 Annex I of Directive 76/769/EEC extended the ban on chrysotile in asbestos cement products, friction products seals, gaskets, and various specialty uses.

The Directive requires member states to implement the ban by January 1, 2005. An exception is made for using chrysotile asbestos in diaphragms used in chlorine plants for electrolysis, for which no substitute is available. This use is permitted until at least 2008. The European

²² *Federal Register*, Vol. 51, No. 185, CPSC, Labeling of Asbestos-Containing Household Products; Enforcement Policy, (September 24, 1986), p. 33910.

²³ EPA, *Asbestos Fact Book* (February 1985), p.10.

²⁴ EPA, *Asbestos Materials Ban: Clarification* (May 1999), online at www.epa.gov/asbestos/asb-bans2.pdf.

²⁵ Some of these products may require labeling under CPSC’s FHSA.

Commission Directive does not apply to substances used for research or analysis, and special military uses. The ban does not apply to asbestos that is not intentionally added to products. The ban does not require in-place asbestos-containing products to be removed until the end of their service life.

In 2002, U.S. Senator Patty Murray (D-WA) introduced legislation titled the “Ban Asbestos in America Act of 2002.” This bill, S. 2641, would require the EPA to issue regulations prohibiting the manufacture, processing, importation and distribution of asbestos-containing products. The bill also contained provisions for a public education campaign, research on asbestos diseases, a national mesothelioma registry, evaluation of products unintentionally contaminated with asbestos, and the establishment of a blue ribbon panel on asbestos and non-regulated fibers. No action was taken on this legislation during 2002. The bill will be re-introduced this year.

The scope and volume of personal claims and their economic impacts have also prompted Congress to consider the creation of an asbestos victims’ compensation fund.²⁶ The draft proposal, developed by U.S. Senator Orrin Hatch (R-UT), is intended to allow the consideration of asbestos claims by a newly-created judicial body that would then allocate payments from a proposed compensation or trust fund.²⁷ This fund would be funded by asbestos companies and insurers. Senator Hatch’s proposal had not been introduced by the release date of this report. The language is reportedly being actively negotiated by industry and labor groups.

The current OSHA asbestos standard requires products used in the workplace to be labeled if they contain greater than one percent asbestos and are likely to result in exposures above the permissible exposure limits during their foreseeable use. The OSHA Hazard Communications standard requires materials used in the workplace having greater than 0.1% of any known human carcinogen to be labeled. Material Safety Data Sheets (MSDS) are required to be made available to employers from manufacturers upon request. This information must be accessible to employees or their representatives.

Issues Remaining: A number of issues were raised in interviews and meetings about asbestos in new products. The list of issues below is not exhaustive but appeared to represent the major issues discussed by the group.

1. The extent to which products currently on the market contain commercially-added asbestos is not clearly defined. Which products contain asbestos and which do not is often not clearly disclosed on the product labels. It is also unclear the degree of hazard, or risk, posed by some products on the market with commercially-added asbestos. Put another way, the presence of asbestos in products needs to be understood. It may be that the asbestos fibers present no meaningful risk during normal use of certain products whereas in other products asbestos presents a very significant risk. Generally, the risk of asbestos exposure is most critically affected by how the product is handled during and after manufacture and during and after installation.

²⁶ The Rand Institute for Civil Justice, a Santa Monica, California-based research organization, estimates there are now more than 600,000 asbestos claimants and 8,400 defendants. Litigation has cost more than \$54 billion to date and eventually could total over \$200 billion, according to the Institute.

²⁷ Gordon, G., “Deal on asbestos suits may be near,” Minneapolis Star Tribune, April 25, 2003.

2. The definition of an asbestos-containing material under the EPA regulations is a material containing greater than one percent asbestos.²⁸ When this definition was established by EPA, it was rare that manufacturers would add less than this amount to a product. The analytical methods did not permit a reliable measurement of less than one percent asbestos. An issue remains whether one percent is an appropriate definition of an asbestos material with commercially-added asbestos. A related issue is the percentage of naturally occurring asbestos not intentionally added to the product. Products with less than one percent asbestos can also be dangerous if, in handling the product, there is significant fiber release.
3. Interviews, meetings, and field visits to workplaces and home improvement stores found products with asbestos as an ingredient. The word “asbestos” was not used on the label. Rather, the terms “Canadian Mineral Fiber” or “Chrysotile” appeared. The issue is whether such labeling practices are misleading to consumers or employers who do not want to purchase products with commercially-added asbestos.
4. It is unclear if federal agencies have jurisdiction over the monitoring of asbestos in products. Each of the following federal agencies has some jurisdiction:

TABLE 3.2: Agencies Responsible for Monitoring and Controlling Asbestos

Agency	Area of Responsibility
U.S. Environmental Protection Agency	products (TSCA), emissions, buildings
Occupational Safety and Health Administration	workplace products
U.S. Department of Transportation	shipping
Food and Drug Administration	asbestos in foods, drugs and cosmetics
Mine Safety and Health Administration	asbestos (during mining)
U.S. Consumer Product Safety Commission	asbestos in consumer products
U.S. Department of Commerce	import/export, with EPA
Bureau of Customs and Border Protection	importation of products, with CPSC

The many federal agencies with sometimes overlapping jurisdictions may have resulted in a piecemeal or overly compartmentalized approach to regulating asbestos in products.

5. The EPA asbestos NESHAP regulations require building owners or operators to inspect buildings for asbestos prior to certain renovations and all demolitions. If asbestos products were no longer available for construction, the EPA could establish a firm date after which building owners could assume asbestos products are not present. This would provide an economic benefit, since building owners would not need to hire accredited building inspectors to sample and analyze building materials in newly constructed buildings and facilities. Under current regulations, with no outright asbestos ban, NESHAP inspections of buildings must continue even in buildings being built today.
6. Stakeholders observed that most asbestos uses have been or will be eliminated. A small number of defined necessary uses remain for national security and where no effective substitute is available. They noted that a legislative (or regulatory) ban may be an effective way to help ensure clarity and certainty for the future. While focusing on the merits of claims for past liability is beyond the scope of this report, it can be said that the

²⁸ OSHA uses 1% in their definition for the asbestos standards affecting general industry, construction and shipbuilding, but 0.1% for any carcinogen in the hazard communication standard.

information, education and ban concepts discussed here can provide a measure of certainty about the future which complements the certainty about past claims that the compensation proposal currently under review by Congress seeks to provide. The proposals here can thus help to mitigate the health and economic impacts of past and future exposure.

Recommended Solutions: Several recommended solutions to issues raised about commercially-added asbestos in new products are described below.

1. A clearly defined legislative ban on the production, manufacture, distribution and importation of products with commercially-added asbestos is the most direct means to address concerns about remaining health risk and reduce future costs for facility owners and managers. Such a ban should be proposed by the Congress, promptly debated, and conclusively resolved. Enabling legislation would eliminate remaining products by a specified date, and installation of those products by a later date. Jurisdictional issues could be addressed in Congressional legislation that might not be achievable by individual agency rule-makings. Exceptions may be necessary for a small number of applications for which substitutes may not be available, and for research purposes. Implementing regulations, and perhaps the enabling legislation itself, could be challenged in the courts. A regulatory ban is within EPA's authority and is also an option. Many see a ban on asbestos, enacted to prevent future exposure, as a complementary action to a litigation resolution process that fairly compensates injuries resulting from past exposure.
2. A uniform labeling requirement for all products with commercially-added asbestos should be established through rule making. Labels should include the word asbestos and should be a specified minimum size, and should be consistent with the labeling requirements of CPSC's FHSA. The Bureau of Customs and Border Protection would ensure that imported asbestos-containing products are properly labeled in accordance with this requirement. EPA would likely be the lead agency for such rule making, but would need to coordinate its efforts with other agencies having jurisdiction over products with commercially-added asbestos. This option would need to be implemented with the following recommendation as well.
3. A coordinated effort to educate consumers, employers and building owners about products with commercially-added asbestos is necessary. Such a program would assist the target audience in making an informed decision about which products are legally available with commercially-added asbestos. This education and outreach effort would be performed by EPA, OSHA and CPSC, as resources permit. These agencies would need to perform research into which products actually have commercially-added asbestos, which do not, and which are to be phased out voluntarily by manufacturers. Congress should consider amending the Asbestos Information Act of 1988 requiring manufacturers and importers to update information on their asbestos-containing products to EPA. Non-governmental organizations such as EIA are able to assist with the education and dissemination of information.

3.3 Naturally Occurring Asbestos as a Product Contaminant

Background: Naturally-occurring minerals known collectively as “asbestos” are occasionally found as an unintended contaminant in some products.²⁹ Depending on the nature and use of the products, asbestos exposures to workers, consumers and others can occur.³⁰ The amphibole forms of asbestos known as tremolite and actinolite are perhaps the most common asbestos contaminants. Asbestos contamination may be often found in metamorphic rock with high magnesium content.³¹

The issue of asbestos contamination in products has surfaced repeatedly during the past 25 years. Incidences of asbestos contamination in talc, vermiculite, play sand, crayons, and art supplies have arisen. Educational efforts by the EPA and CPSC, along with voluntary efforts by some manufacturers, have traditionally been relied on to address each incident. Manufacturers have generally employed alternate materials whenever concerns arose regarding the safety of their products. The perception of risk among consumers, rather than regulatory action, was the major motivator in many of these cases.

In recent years, much attention has focused on the vermiculite-mining district near Libby, Montana.³² Concerns have also been expressed about exposures to users of products consisting of vermiculite from this location.³³ The Libby vermiculite deposits have been reported to be significantly contaminated with asbestiform amphiboles including some closely resembling fibrous tremolite and actinolite.³⁴

The names of minerals found at the Libby site are winchite and richterite, which are not listed by regulatory agencies as forms of asbestos. The differences between these mineral forms and the listed tremolite and actinolite forms appear to be minor.³⁵ Some workers who mined and milled the Libby vermiculite appear to have developed the same asbestos-related diseases as workers exposed to the listed forms of asbestos.

EPA, USGS, and ATSDR are conducting studies to determine exposures from Libby vermiculite products, and the resultant health effects. The Libby vermiculite deposit was originally developed as an asbestos deposit. In this sense, the Libby vermiculite deposit is unique, and not likely to be representative of vermiculite deposits in the U.S., or elsewhere.³⁶

²⁹ Schreier, H., *Asbestos in the Natural Environment*, Elsevier Publishers, New York (1989).

³⁰ National Research Council, *Asbestiform Fibers: Nonoccupational Health Risks*, National Academy Press, Washington, DC (1984).

³¹ Information based on telephone interview with Dr. Ann Wylie, Professor of Geology, University of Maryland.

³² Lybarger, J.A., et al., “The Community Environmental Health Project in Libby, Montana,” *Hazardous Substances & Public Health*, Vol. 12, No. 1 (Spring 2002), pp. 1-2.

³³ Walker, T., “Asbestos-Contaminated Vermiculite: A National Issue,” *Hazardous Substances & Public Health*, Vol. 12, No. 1 (Spring 2002), pp. 4-5.

³⁴ Fibrous tremolite and actinolite forms of asbestos are also present at this location.

³⁵ For a detailed description of this topic see, Meeker, G.P., et al., *The Chemical Composition and Physical Properties of Amphibole from Libby, Montana: A Progress Report*, U.S. Geological Survey, Presented at the EPA Health Effects of Asbestos Conference, Oakland, CA (May 24-25, 2001).

³⁶ Perry, E.S., *Talc, Graphite, Vermiculite and Asbestos Deposits in Montana* (Memoir No. 27), State of Montana, Bureau of Mines and Geology, Montana School of Mines, Butte, MT (1948), pp. 23-44.

The issue of asbestos contamination in mining and quarrying operations is not limited to just vermiculite and talc. MSHA is currently revising their asbestos standard. The current MSHA standard of 2 f/cc is expected to be reduced. The current OSHA standard of .1 f/cc has been suggested and is one option under consideration.³⁷ The dusty nature of mining operations and the non-specific nature of the air sampling method currently used to measure worker exposures has prompted MSHA to consider transmission electron microscopy (TEM) as the analytical method of choice.

Interviews with some representatives from mining and quarrying industries indicate efforts are being made to avoid mining deposits and seams likely to have substantial quantities of asbestos. Knowledge of the geology of the area, visual inspections of the working face, and sample analyses are used to avoid encountering significant asbestos deposits.

Issues Remaining: The following issues related to naturally occurring asbestos as a contaminant were identified during the asbestos strategy process. The list of issues below is not exhaustive but appeared to represent the major issues discussed by the group.

1. How should mining concerns, product manufacturers, distributors, and users respond to the issue of natural asbestos in ore and products as unintentional contaminants? How should regulators respond to the same concern?
2. Current producers of vermiculite and vermiculite products expressed concern that all vermiculite has been tainted due to the publicity surrounding the Libby vermiculite. It is noted that vermiculite from the Libby deposit has not been mined for approximately 10 years. Since these current mining deposits appear not to be equally risky, an effective way of communicating on this topic appears essential.
3. What information should be provided to homeowners who may have Libby vermiculite (Zonolite) as insulation in their homes?
4. Do the existing polarized light microscopy (PLM) analytical method for measuring asbestos in bulk materials and the commercial laboratories performing these analyses provide reliable results for measuring asbestos as a natural contaminant at the one percent level or below?

Recommended Solutions: The following possible initial solutions were considered as means to address some of the issues raised.

1. Reduction of naturally occurring asbestos in products could be achieved by a program set up by a consortium of mining concerns to develop a sampling and analytical protocol to analyze bulk materials at the mining stage for chrysotile and all asbestiform amphibole forms of asbestos. Oversight of such a program may be provided by EPA and MSHA, with technical assistance by NIOSH, NIST, and USGS. This program would assist the mining and quarrying industries in avoiding unwanted asbestos in their products. The

³⁷ MSHA's Notice of Proposed Rulemaking, Federal Register Vol. 67 No. 61 (March 29, 2002), p. 15136, notes "data indicate that if we adopt OSHA's asbestos PEL, the level of risk of asbestos-related diseases would be reduced substantially." In the March 2001 report *Evaluation Of MSHA's Handling of Inspections at the W.R. Grace & Company Mine In Libby, Montana*, the Department of Labor's Inspector General recommended that MSHA "lower the permissible exposure limit for asbestos to a more protective level.

program would provide a degree of assurance to users of these raw materials that they are not contaminated with asbestos.

2. The Libby vermiculite situation should be considered an important lesson, but not be treated as a typical case. A federal process should be undertaken promptly to clarify the definition of “asbestos.” Many parties recommended that the definition should include all asbestiform amphiboles, in addition to currently regulated amphiboles and chrysotile. EPA, OSHA, and MSHA will need to evaluate how such a clarification should be accomplished and what consequences, if any, it would have on other industries. If adopted, this definition would enable federal agencies to address the risk of exposure from minerals such as winchite and richterite. USGS, trade associations, and other organizations can serve as resources for clarifying and understanding the science associated with creating a new definition.
3. A labeling provision should be considered for products with naturally occurring asbestos as a contaminant. Some products may currently be subject to the labeling requirements of CPSC’s FHSA if, under reasonably foreseeable conditions of handling and use, they are likely to release asbestos fibers. Existing regulations may be sufficient for products found to contain more than one percent asbestos. A label may be appropriate for products containing greater than 0.1 percent asbestos by volume, if feasible. The evidence on this issue should at least be reviewed. Products consistently found to contain asbestos at a level below 0.1 percent through a testing program may be exempt from labeling, or have a label with different wording.

3.4 Regulations and Enforcement

Background: There are over 20 different asbestos rules and regulations at the federal level. At least 40 states have asbestos regulations mostly affecting asbestos in buildings and the qualifications of contractors and others who perform asbestos surveys and response actions. Additionally, many local government agencies (county and city) have promulgated rules affecting asbestos in buildings.

The major regulations affecting asbestos in buildings, the workplace, and products have been summarized elsewhere in this document and highlighted in Table B.1 of Appendix B. Many of the issues concerning regulations were described in sections 3.1– 3.3.

Interview and focus group participants made reference to various innovative approaches at the state and local levels to support enforcement of asbestos regulations. Most of the approaches described focused on existing asbestos in buildings, response action practices, and contractor licensing or certification. For example, Michigan supports asbestos enforcement activities, including the state Occupational Safety and Health Administration, Asbestos Licensing Program, and the Asbestos Accreditation Program, with a surcharge of one percent on most asbestos removal fees. Texas has a new law that requires an asbestos survey in order to obtain a building permit.³⁸ Wisconsin reported an increase in NESHAP notification compliance through an outreach program to fire departments. Maine has developed a “one-stop shop” for asbestos issues within its Department of Environmental Protection. Georgia has demonstrated increased

³⁸ Texas Senate Bill 509, passed September 1, 2001. Details online at www.tdlh.state.tx.us/beh/asbestos/FAQ.doc.

compliance with its asbestos regulations through its STAR program, working cooperatively with the regulated community. Several states in the Southwest employ a simple form developed and distributed by EIA (see Appendix I) that must be completed and submitted along with an application for a building, demolition, or renovation permit. This information alerts building inspectors and building owners of the need to survey buildings for asbestos before a renovation or demolition project is begun. This form encourages compliance with current federal regulations, which require an inspection for asbestos before demolition or renovation.

Issues Remaining: The list of issues below is not exhaustive but appeared to represent the major issues discussed by the group.

1. Building owners, contractors, consultants, and others often are not knowledgeable of applicable federal, state and local regulations governing asbestos in buildings, response actions, and disposal.
2. Existing federal, state and local regulations are often not regularly enforced. Possible reasons include insufficient staffing, funding, and inadequate training among existing staff.
3. Some regulations may benefit by clarifications and revisions. Many stakeholders appear wary of re-opening rule-makings that might allow special interests to weaken certain provisions.

Recommended Solutions: Most proposed solutions affecting asbestos regulations are addressed in sections 3.1 – 3.3. Several additional proposed solutions are offered below.

1. EPA, OSHA, CPSC, and state regulators should focus on more stringent, predictable, and consistent enforcement of existing regulations, which may offer greater benefit than committing scarce resources to new rule-making efforts. This recommendation can be implemented immediately; however, such an effort must continue for the long-term. Consistent interpretations and streamlining across agencies will lead to increased compliance and potential reduced liability for businesses. Any step that EPA and OSHA can take to encourage the enforcement of existing regulations at the local level will likely prove most effective. To this end, consideration should be given to the use of a form such as the one created by EIA to assure compliance with existing regulations at the time applications are made for building, renovation, or demolition permits.
2. EPA should update the model training curricula to ensure that all relevant agencies' priorities are reflected. Updating the training will make the curricula consistent with existing regulations and increase worker safety. The updated versions should cover the revised OSHA asbestos standards, revised EPA asbestos NESHAP standards, EPA Worker Protection Rule, new respirator designations/regulations, and other topics. The training providers should also be permitted to vary the course content in refresher courses.
3. Training providers under the EPA model accreditation plan (MAP) and corresponding state plans should be audited with sufficient frequency to ensure that the training is provided, tests are conducted, records are maintained, and certificates are issued. This action, conducted in concert with the updating of training requirements, will increase worker safety and the effectiveness of abatement efforts. Reducing the incidence of

training fraud will provide greater security to building occupants and owners. Partnering with state agencies will provide better coordination.

4. A summary document of federal asbestos regulations should be prepared. This would be a valuable resource for the regulated community and the regulators. The document would be prepared by EPA and OSHA with input from other federal agencies that maintain asbestos regulations.
5. A companion summary document of state asbestos regulation summaries would also be a valuable education tool. This document could be developed by the National Conference of State Legislatures (NCSL). The NCSL has developed such documents in past years, but these are no longer accurate. The new document should include a list of web sites where state (and local) regulations may be found.
6. EPA should partner with one or more local organizations such as EIA, state agencies, local building code inspectors, fire departments, and other groups to inform stakeholders and to encourage voluntary compliance with both federal and local regulations. Similar efforts with these groups have been successful recently.

3.5 Medical/Health Issues

Background: The early evolution of the health effects related to exposure is summarized in Appendix B. Inconsistent perceptions persist among the public about the health effects associated with asbestos. Frequently references are made in the lay press to “asbestos disease,” rather than the recognition of several different health effects associated with asbestos exposure. While it is beyond the scope of this study to address technical aspects of medical risk assessment issues, comments from participants stressed that more precision and clarity of information is needed to properly identify and convey the health risks.

The risk of developing an asbestos-related disease is controversial in the scientific and medical communities, and is inconsistently perceived by the public. At one extreme, some of the public perceive that exposure to one asbestos fiber is sufficient to cause a fatal disease. While this appears theoretically possible, in reality such a risk is *de minimus*. At the other extreme, some believe that only massive long-term industrial exposures may result in disease.

Depending on the specific disease, a threshold may exist below which symptoms would not be expected. Some diseases exhibit a classic linear dose-response relationship, while others do not. The potency of one form of asbestos may be greater for one disease than for another form. The issue of fiber dimensions, surface characteristics, and other physical properties continue to be studied and debated today. Individual susceptibility is also a variable. It appears unlikely that many of the health issues will be resolved in the near term.

In the U.S., regulatory agencies have always treated all forms of asbestos (chrysotile and amphiboles) the same. The American Conference of Governmental Industrial Hygienists (ACGIH) initially treated them the same for over 20 years, before issuing more restrictive threshold limit values (TLVs) for the amphiboles. However, ACGIH reverted back to one TLV for all forms of asbestos in the 1990s.³⁹ Most European countries treated all asbestos forms the

³⁹ ACGIH, *Documentation of TLVs and BEIs*, Asbestos.

same, then issued more restrictive requirements for the amphiboles, and now returned to treating them equally for regulatory purposes.⁴⁰

The background of medical and health issues would not be complete without mention of the effect litigation may have had on the scientific and medical literature. Recognition of this fact was evident in the Health Effects Institute Asbestos Research (HEI-AR) where a panel of experts felt it was necessary to describe data as “litigation” and “non-litigation” data.⁴¹ On the positive side, litigation has provided financial support for many studies that otherwise may have not been performed. On the negative side, the financial support creates, at a minimum, the perception of a bias by researchers; it also may have prevented distribution of results not in the best interest of the research sponsor. Today, most reputable scientific and medical journals require disclosure of affiliations and funding prior to publication.

The relationship between fiber size and disease is being considered by ATSDR. This agency convened a panel of experts on October 29-30, 2002 to consider the health effects of asbestos and synthetic vitreous fibers: the influence of fiber length. The results of this investigation were unavailable during the drafting of this report. EPA’s Office of Solid Waste and Emergency Response (OSWER) sponsored a workshop on February 25-27, 2003 in San Francisco to discuss a proposed “Protocol to Assess Asbestos-Related Risk.” OSWER will also sponsor a conference entitled “Mechanisms of Asbestos Toxicity” in Chicago on June 12-13, 2003.

Issues Remaining: This *Asbestos Strategies* process was not designed to identify or evaluate the many issues relating to health effects, diagnosis and treatment of disease, and the epidemiology of asbestos-related diseases. The list of issues below is not exhaustive but appeared to represent the major issues discussed by the group. Several issues raised are described below.

1. The need for early recognition and diagnosis of asbestos related diseases was raised as an issue. This issue is not as simple as it may appear. There is controversy over the use of various tests to diagnose disease, such as using Computerized Axial Tomography (CAT) scans. The use of repeated chest x-rays for people with little asbestos exposure is controversial. The question of which branch of the medical profession is best equipped to recognize the asbestos-related diseases is not resolved.
2. The need for epidemiological studies of populations with “low-level” exposures to asbestos was raised as an issue. The studies should include additional examination of workers in the vicinity of others who worked with asbestos, family members of asbestos exposed workers, and persons with short-term high-dose exposures.
3. The necessity for a national mesothelioma registry was raised. Closely related was the issue of clarifying malignant mesothelioma in the International Classification of Diseases (ICD).
4. The obvious issue of compensation for persons with asbestos-related diseases remains today, as it did 50 years ago. The mechanism for compensation, responsible parties, and

⁴⁰ Health and Safety Executive, *HSE Launches Guidance on New Legislation on Managing Asbestos*, HSE Press Release E239:02 (December 16, 2002).

⁴¹ HEI-AR, *Asbestos in Public and Commercial Buildings: Supplementary Analyses of Selected Data Previously Considered by the Literature Review Panel*, Health Effects Institute-Asbestos Research, Cambridge, MA (1992), p. 3-1.

the definition of fair compensation are all significant issues that are beyond the scope of this analysis and have been wrestled with in the courts and legislative bodies in the U.S. and worldwide.

Recommended Solutions: The following proposed solutions address only a fraction of the possible medical/health issues surrounding asbestos-related diseases.

1. A national mesothelioma registry is necessary to facilitate epidemiological studies to evaluate the effects of asbestos exposure. Many countries and some states have established mesothelioma registries. The establishment of such a registry would likely be performed by agencies within CDC, including the National Center for Health Statistics, National Institute for Occupational Safety and Health, and the National Center for Environmental Health, in conjunction with ATSDR and state public health departments. An accompanying effort to connect interested parties with the best experts and data would improve research and treatment of asbestos-related disease.
2. There is a need for an inventory of significant health-related research to ensure that interested parties can access experts wherever they are located. The CDC should lead this effort. In conjunction with the mesothelioma registry, this would improve research and treatment of asbestos-related disease.

3.6 Risk Assessment and Analysis

Background: Risk assessments have been performed by the National Academy of Sciences (NAS), OSHA, CPSC, EPA and ATSDR over the years in support of regulatory activities or research. The risk assessment area is controversial. Much of the controversy may stem from uncertainties in the source data on which the assessments are based. The long latency period between exposure and onset of disease makes linking exposure concentrations, frequency, and duration to disease difficult.

Much of the risk assessment exposure data were generated during asbestos mining, milling and product manufacturing. Most of the data collected from the 1930s through the 1960s were generated using an impinger technique or a thermal precipitator. These methods expressed exposures in millions of particles per cubic foot of air (mppcf).⁴² In the late 1960s, the method of choice changed to measuring fibers visible by an optical microscope, expressing concentrations as fibers per cubic centimeter (f/cc).⁴³ These early exposure measurement techniques assumed that all particles or all fibers were asbestos. In some workplaces, most particles or fibers were likely asbestos; in other workplaces, most were likely not asbestos.

Since the onset of asbestos disease often occurs 30 to 40 years after exposure, it is difficult to estimate how individuals may have been exposed. Compounding the uncertainty are the facts that multiple diseases are associated with asbestos exposure and that in some cases a positive synergistic effect exists. For example, cigarette smoking has a synergistic effect together with asbestos exposure in the risk of developing lung cancer.

⁴² Asbestos Hygienic Standard, *Industrial Hygiene Journal* (April 1958), pp. 161-162.

⁴³ The membrane filter technique was first used in the U.K., and later was adopted in the U.S. and became the optical method of choice published by NIOSH as method P&CAM 239. This method was later revised to the optical method today of NIOSH method 7400.

The degree of risk posed by a substance is always a controversial subject. With substances such as asbestos, factual variables such as the specific form of the material and exposure pathways can vary widely, and oversimplification of risk characterization can be problematic. For example, if it is assumed that any increase in exposure represents some increase in risk, should all exposures be eliminated? Since some low exposure is present in the outside air, should only additional exposure be eliminated? Is there some level of increased exposure, and a corresponding increase in frequency or severity of disease that is considered “acceptable?”

The term “risk assessment” has been used when discussing the management of asbestos in buildings and in considering asbestos in products. Often it is used, perhaps erroneously, interchangeably with “exposure assessment” or “hazard assessment.” Exposure assessments are performed to measure airborne concentrations of asbestos. Hazard assessments look at current exposures and the potential for future exposures. Building owners use this information to develop asbestos management plans to reduce or minimize actual exposures, and hence to reduce or minimize actual risk.

This brief synopsis only begins to suggest the range of risk assessment issues relevant to asbestos. Studies of this subject are ongoing worldwide and are likely to continue for decades to come. Research areas are listed in section 3.1 and 3.5 that are necessary to further define the risks associated with exposure to asbestos, particularly at low-levels. EPA is currently reviewing the need to revise its risk assessment methodology for asbestos. The agency convened a panel of experts to consider whether this methodology can be used to support decisions about asbestos contaminated sites. The panel met February 25-27, 2003 in San Francisco, California. The results of this investigation were unavailable during the drafting of the *Asbestos Strategies* report.

Issues Remaining: There are numerous issues surrounding risk assessments for asbestos. The issues below are a small sample but appear to represent the major issues discussed by the group.

1. One issue identified during this process was the public’s perception of exposure and risk.
2. Another concern is that it may often be important to assess the risk in terms of the potential for exposure, not simply measured air levels.

Recommended Solutions: The following proposed solution addresses only a fraction of the possible risk assessment and analysis issues surrounding potential asbestos exposure.

1. EPA and OSHA should consult with each other and leading scientists to obtain the best sense of the science and then employ education and outreach to provide reliable information about potential risks to the regulated community and to the public. Commentors indicate that following the World Trade Center attacks federal agencies may have underestimated the risks out of concern over a public overreaction to perceived risk. A backlash followed inside and outside some agencies, which may have overstated the actual risks.

3.7 Analytical Issues

Background: For at least 75 years there have been issues relating to how best to measure asbestos in bulk materials, soils, dust, water and air. The methods of analysis have evolved and many have become regulatory requirements.

Polarized light microscopy (PLM) is commonly used to measure asbestos in bulk materials. It is inexpensive (about \$10 per analysis in commercial laboratories) and a quality assurance program administered by NIST is in place. The method can identify asbestos in many bulk materials down to one percent reliably. False negative results (i.e., not finding the asbestos) are common in some bulk materials when the asbestos is very small or concealed in a matrix, such as floor tile or roofing tar. Transmission electron microscopy (TEM) has gained wider acceptance to detect the presence of asbestos in bulk materials at a cost of about \$50-75 per sample. However, the reliability of the quantitative data from this technique has been questioned.

Air samples are generally collected on a filter and analyzed by phase contrast microscopy (PCM) or TEM. The PCM method is inexpensive (about \$15.00 per analysis) but it does not distinguish asbestos from other fibers. PCM also only looks at bundles of fibers longer than 5 micrometers in length since the optical microscope cannot resolve, or “see,” individual fibrils of chrysotile asbestos for example. TEM only counts asbestos fibers and has the ability to detect all sizes of fibers. While TEM remains more expensive than PCM, its cost has come down markedly over the past 15 years from about \$500 per sample to \$100 per sample today.

A large number of dust samples were taken after the World Trade Center collapse and the results were quoted extensively. There are no regulatory standards for dust samples, and the recognized method for dust sampling (ASTM D5755) does not include criteria for interpreting the results. Nonetheless, decisions were made regarding levels of asbestos contamination and the effectiveness of clean-up on the basis of dust sampling results. In the event of large-scale fiber release episodes from deliberate or accidental causes in the future, building owners and local regulatory officials are likely to look to EPA for guidance in using dust sampling and interpreting the results.

Recommended Solutions: Many technical issues surrounding sampling and analytical issues are addressed as they arise by professional associations such as the American Society for Testing and Materials (ASTM) and the American Industrial Hygiene Association (AIHA); and federal agencies such as EPA, NIOSH, OSHA (Salt Lake City, Utah laboratory), and NIST (NVLAP program).

1. Federal agencies should continue to actively participate and support efforts of professional associations in the development, revision, and quality assurance practices relating to sampling and analytical methods for asbestos.

4.0 IMPLEMENTATION OF RECOMMENDED SOLUTIONS

The recommended solutions identified during this process are listed and described in section 3.0. In discussing each recommendation the primary involved parties are identified. For consistency and follow-through it is appropriate one agency take the lead in implementing the

recommendations. EPA is the logical choice in many cases since their role involves most, if not all, of the issues identified.

For the recommended solutions the EPA should establish working groups composed of representatives from government agencies and other stakeholders identified as critical to the success of the project. EPA should call upon a range of organizations to support to this effort. Many of these organizations may be willing to conduct awareness seminars and to assemble panels of experts as necessary to implement the recommendations provided. Listed below are some of the key groups that may be valuable participants:

- Federal government agencies – EPA, OSHA, MSHA, CPSC, NIOSH, NIST, National Institutes of Health (NIH), CDC, ATSDR;
- State government agencies involved with asbestos;
- Local government agencies involved with asbestos;
- Professional associations – EIA, ASTM, AIHA, National Institute of Building Science (NIBS), BOMA, IFMA, AIA, NCSL;
- Current asbestos product manufacturers – Asbestos Information Association/North America (AIA/NA);
- Mining and mineral processing companies and/or associations;
- Representatives of organized labor; and,
- Other groups or individuals having special expertise in the specific recommended proposed solution.

This *Asbestos Strategies* process was an effective mechanism to take stock of the issues surrounding asbestos today. The information gained will be valuable to provide direction for policymakers in the years to come. The direction provided herein recognizes and makes efficient use of limited resources. The emphasis on oversight, outreach, and education as the means to implement the recommendations assures that all concerned persons will have a common base of information, and that the issues identified will be addressed transparently and expeditiously. Even though acknowledged uncertainties and differing views remain, the findings illustrate that the experts in government and non-government institutions can productively address many concerns with information, education and coordinated oversight. This approach allows all stakeholders to focus on those issues that remain concerns of substance.

5.0 APPENDICES

Appendix A: The Asbestos Strategies Process

The key elements and timeline of the *Asbestos Strategies* process are shown in Table A.1. The *Asbestos Strategies* process began with a survey of the asbestos use and management stakeholder community. The GETF team researched related issues and identified affected companies, communities, and organizations. The team then worked to develop a list of contacts that would be able to provide information on the state of asbestos oversight, outreach, and education, as well as other concerns. These contacts represented a range of sectors and perspectives. The timing and scope of this process did not permit GETF to reach 100 percent of the interested persons. However, the GETF team was able to directly involve more than 100 industry participants and experts, as seen in Table A.2.

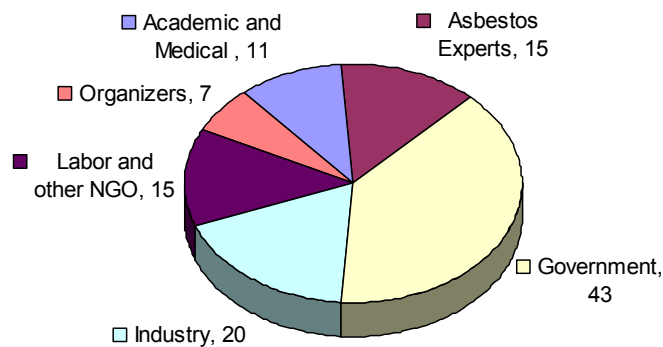
TABLE A.1: *Asbestos Strategies* Timeline

Early May 2002	Research begins – GETF develops background information, identifies contacts, etc.
Mid June 2002	Contacts identified
Late June 2002	Interviews begin
Mid July 2002	Draft research document on asbestos developed
Early September 2002	Interviews conclude
Early September 2002	List of invitees established
Early September 2002	Invitations to meeting sent out
Mid October 2002	Meeting held in Washington, D.C.
Late October 2002	Draft meeting notes distributed
Mid November 2002	GETF meets with EIA
Mid November 2002	List of eight expert stakeholders developed
Early December 2002	Revised meeting notes distributed
Late December 2002	First draft of report developed
January 2003	Report revised
Early February 2003	Draft report circulated to stakeholder group
Late February 2003	Comments received from stakeholder group
Early March 2003	Comments incorporated into report
Late March 2003	Final review by experts
May 2003	Final Report Issued

The GETF team conducted interviews with approximately 50 key stakeholders and experts over a period of two months prior to the focus group meeting. These interviews provided the team with information on current needs in asbestos policy, identified important issues to address in the focus groups, identified areas for further research, and directed the team to additional contacts. GETF employed an interview template tailored to the expertise of the interview subject. This provided consistency in answers and highlighted important points. This methodology is provided in Appendix E.

Following the interviews, team leaders invited experts to participate in the dialogue process. Invitees represented a cross-section of groups dealing with asbestos, as seen below in Figure A.1. For those who could not participate at the meeting in Washington D.C., GETF welcomed participation through the web site (<http://www.getf.org/asbestosstrategies>).

Figure A.1: Invitees to October 10 Meeting



The *Asbestos Strategies* focus group meeting was held on October 10, 2002, in Washington, D.C. Fifty-three attendees discussed a range of topics, starting with the issue categories that had been identified in the interviews. The purpose of the meeting was not to develop consensus on all issues. Areas where consensus existed were noted. On more contentious areas, the GETF team sought to identify the common ground as well as the differing views among the various sectors and groups (See Appendix H).

A summary of this meeting was then compiled and distributed to participants (See Appendix F). Additional interviews and research efforts were conducted after the meeting in order to clarify points of discussion and gain additional perspectives. The Executive Board of the Environmental Information Association was engaged in the process in person in November 2002.

This report has been developed based on the comments from the meeting and interviews in addition to extensive secondary and expert research. The following table represents all of the organizations that were contacted prior to the stakeholder meeting in October 2002. The table indicates the extent of each organization's involvement in the process. In some cases, the team was not able to schedule an interview with a representative from an organization, or the organization elected not to participate. In other cases, multiple representatives from a single organization participated in the process.

TABLE A.2: *Asbestos Strategies* Participating Organizations

Organization	Established contact?	Interviewed or commented?	Attended meeting?
Aeolus, Inc.	Yes	Yes	No
AFL-CIO	Yes	No	No
Agency for Toxic Substances & Disease Registry	Yes	No	No
Alliance of Automobile Manufacturers	Yes	Yes	No
American Association of School Administrators	Yes	Yes	No
American Cancer Society	Yes	No	No
American Chemistry Council	Yes	Yes	No
American Federation of State, County and Municipal Employees	Yes	Yes	Yes
American Federation of Teachers	Yes	No	No
American Industrial Hygiene Association	Yes	Yes	Yes
American Lung Association	Yes	No	No
American Petroleum Institute	Yes	Yes	Yes
Armstrong World Industries	Yes	No	No
Asbestos Information Association	Yes	Yes	Yes
Association of International Automobile Manufacturers	Yes	Yes	No
Automotive Aftermarket Industry Association	Yes	Yes	Yes
Automotive Parts Rebuilders Association	Yes	Yes	No
Babcock & Wilcox	Yes	No	No
Building Owners and Managers Association	No	No	No
California Air Resource Board, Stationary Source Division	Yes	No	No
California Environmental Protection Agency	Yes	Yes	No
Center for Environmental Health Sciences, University of Montana	Yes	Yes	No
Center to Protect Workers' Rights	Yes	No	No
Chatfield Technical Consulting, Ltd.	Yes	No	No
Communication Workers of America	Yes	No	No
Compass Environmental, Inc.	Yes	Yes	Yes
Consumers Union	Yes	No	No
DeLisle Associates, Ltd.	Yes	Yes	Yes
Dow Chemical Company	Yes	Yes	No
Environmental Defense Fund	Yes	No	No
Environmental Information Association	Yes	Yes	Yes
Federal-Mogul Corporation	No	No	No
GAF Materials Corporation	Yes	No	No
Georgia NESHAP Waste Reduction and Abatement Program	Yes	Yes	Yes
Georgia-Pacific Corporation	Yes	Yes	No
Global Environment & Technology Foundation	N/A	N/A	Yes
Gobbell Hayes Partners, Inc.	Yes	Yes	No
Hedman Resources, Limited	Yes	No	No
Herron Enterprises USA, Inc.	Yes	Yes	Yes

Organization	Established contact?	Interviewed or commented?	Attended meeting?
Institute of Applied Sciences, Brooklyn College of the City University of New York	Yes	No	No
Johns Hopkins School of Public Health	Yes	No	No
Johns Manville	Yes	No	No
KCAC, Inc.	Yes	No	No
Laborers Health and Safety Fund	Yes	Yes	Yes
Maine Department of Environmental Protection	Yes	Yes	No
Michigan Department of Consumer & Industry Services	Yes	No	No
Mine Safety and Health Administration, Metal and Nonmetal Mine Safety and Health	Yes	Yes	Yes
Mount Sinai-Irving J. Selikoff Clinical Center for Occupational and Environmental Medicine	Yes	No	No
National Conference of State Legislatures	Yes	Yes	Yes
National Gypsum	No	No	No
National Institute for Environmental Health Science	Yes	No	No
National Institute of Building Science	Yes	No	No
National Institute of Occupational Safety and Health	Yes	Yes	Yes
National Institute of Standards and Technology	Yes	Yes	Yes
National Mining Association	Yes	No	No
National PTA	Yes	Yes	No
National Roofing Contractors Association	Yes	Yes	No
National Stone, Sand, & Gravel Association	Yes	No	Yes
New Hampshire Department of Health and Human Services, Office of Community and Public Health	Yes	Yes	No
New Jersey Department of Health and Senior Services	Yes	No	No
New York State Department of Health	Yes	No	No
North American Insulation Manufacturers Association	Yes	Yes	Yes
Northwestern University	Yes	No	No
Occupational Safety and Health Administration	Yes	Yes	No
Pittsburgh Corning	Yes	No	No
PSI, Inc	Yes	Yes	No
R.T. Vanderbilt	Yes	Yes	No
Raybestos Products Company	Yes	No	No
Raytech Corporation	Yes	No	No
Refractory Ceramic Fiber Coalition	Yes	No	No
Research Triangle Institute, Center for Environmental Measurements and Quality Assurance	Yes	Yes	No
RESOLVE, Inc.	N/A	N/A	Yes
RFM, Inc.	Yes	Yes	No
RJ Lee Group, Inc.	Yes	No	Yes
Sciences International, Inc.	Yes	Yes	No
The Asbestos Institute, Inc.	Yes	Yes	Yes

Organization	Established contact?	Interviewed or commented?	Attended meeting?
The Environmental Consultancy	Yes	Yes	Yes
The Scotts Company	Yes	Yes	No
U.S. Agency for Toxic Substances & Disease Registry	Yes	No	Yes
U.S. Army, Assistant Chief of Staff for Installation Management	Yes	No	Yes
U.S. Army, Center for Health Promotion and Preventive Medicine	Yes	Yes	Yes
U.S. Consumer Product Safety Commission	Yes	Yes	Yes
U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics	Yes	Yes	Yes
U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response	Yes	No	Yes
U.S. Environmental Protection Agency, National Enforcement Investigations Center	Yes	Yes	No
U.S. Environmental Protection Agency, New England	Yes	No	No
U.S. Environmental Protection Agency, Office of Research and Development	Yes	No	No
U.S. Environmental Protection Agency, Region 5	Yes	Yes	Yes
U.S. Environmental Protection Agency, Region 6	Yes	No	Yes
U.S. General Accounting Office	Yes	No	Yes
U.S. Geological Survey Headquarters	Yes	Yes	Yes
U.S. Geological Survey, Denver Research Center	Yes	No	No
U.S. Senate, Office of Senator Patty Murray (D-WA)	Yes	Yes	Yes
United Auto Workers	No	No	No
United Mine Workers of America	No	No	No
United Steelworkers of America	No	No	No
University of California, San Francisco	Yes	No	No
University of Cincinnati College of Medicine	Yes	Yes	No
University of Maryland	Yes	Yes	Yes
Vermiculite Association	Yes	Yes	Yes
Virginia Vermiculite	Yes	Yes	Yes
West Virginia University	Yes	Yes	No
Wisconsin Department of Natural Resources	Yes	Yes	Yes

After the stakeholder meeting, other contacts were identified and contacted:

Organization
American Thoracic Society
U.S. Environmental Protection Agency, Ombudsman's Office
Mesothelioma Applied Research Foundation
Mineral Policy Center
Natural Resources Defense Council
Occupational Health Initiatives, Inc.
Sierra Club

A draft report was completed in December 2002. The draft was revised according to discussions with EPA and a group of eight expert stakeholders. The revised draft report was then circulated to the full stakeholder group for comments in February 2003. These comments were incorporated into the final report.

The report bases its recommendations on the opinions and comments of the stakeholder group and other experts. The goal was not to achieve full consensus, but rather to develop recommendations that appear consistent with views expressed across a wide range of sectors and with agency and marketplace experience. All the stakeholders did not have to agree with every recommendation. Thus, the recommendations focus primarily on the value of reliable information, consistently delivered, and generally do not attempt to resolve contentious technical issues. Specific recommendations suggested by individual stakeholders that did not have broad support among the group of stakeholders are included in Appendix H. These views include those that disagree with the more widely expressed views of stakeholders or are simply not reflected in the leading recommendations. The inclusion of specific comments or recommendations in this category does not necessarily imply that the team rejected or disagreed with them; in many cases, there was simply not enough strong support to actively endorse the recommendation.

The recommendations here do not reflect the unanimous consent of all stakeholders. There were a number of serious issues addressed on which the various stakeholders did not agree. In some cases, further scientific study must be conducted to enable government agencies to make more informed decisions. In many instances, some precautionary action is warranted while further information is developed, even if the action is opposed by some stakeholders consulted for this report. This report highlights areas of concern identified by the participants. In addition, it proposes potential solutions supported by a broad range of sectors engaged in asbestos issues, and seeks to find balance between different approaches. It includes a range of differing views, some expressed by only one participant, some by a few, and some by many. It is hoped that, taken together, these conclusions identify useful steps, not only to clarify and inform but also to create an environment in which the more contentious remaining issues can be effectively and swiftly resolved.

Appendix B: Background on Asbestos Issues

Asbestos is a term used to describe a group of naturally-occurring silicate minerals. Traditionally, regulated asbestos has included a group of five amphibole minerals and one serpentine mineral. The common mineral names for the amphiboles are crocidolite, tremolite, actinolite, amosite, and anthophyllite. The single serpentine variety is chrysotile.⁴⁴ Asbestos has several properties that have made it commercially valuable. Its fibrous nature made it a good thermal and acoustic insulator, and able to be twisted and woven into cloth. Since asbestos is an inorganic mineral, it does not burn. When mixed with other materials it often adds strength, or imparts other desirable qualities.

Asbestos has been exploited sparingly throughout history, but its use became widespread during the later half of the 19th Century.⁴⁵ Initially it was used primarily in making insulation for steam engines, locomotives and pipes. The raw fiber was mixed with plasters and cements, or woven into cloth used to reduce heat loss. After being developed and used in Great Britain, asbestos became widely used in the U.S. and other industrialized nations.

Major deposits of asbestos are mined commercially in South Africa, Russia, and Canada.⁴⁶ The vast majority of asbestos used in the U.S. originated in the chrysotile mines of Quebec. The mining and milling of asbestos was historically a dusty process.

Asbestos regulations and legislation were enacted throughout the 20th Century, as seen in the timeline Table B.1 (located at the end of this section). By the early 1900s, asbestos was recognized as a cause of occupational disease.⁴⁷ The disease initially associated with asbestos was asbestosis, a scarring of the lung tissue that initially results in shortness of breath and can be fatal in advanced cases.⁴⁸ The early association between asbestos exposure and asbestosis in the British asbestos textile factories led to the first regulations. In 1931, the British Parliament passed legislation requiring dust control in asbestos textile factories and making asbestosis a compensable disease.

During the 1930s and 1940s a connection between asbestos exposure and lung cancer emerged. Case reports of mesothelioma among asbestos workers increased in the 1950s. By 1960, the connection between mesothelioma and asbestos exposure was established.⁴⁹ Malignant mesothelioma is a cancer of the mesothelium, a thin lining covering the major organs of the body. If it originates in the chest cavity, it is called pleural malignant mesothelioma. In the abdominal cavity it is known as peritoneal malignant mesothelioma. The 1960s saw considerable interest and research in asbestos-related diseases. The work of Dr. Irving J. Selikoff and his colleagues described the incidence of disease among insulation workers in the

⁴⁴ Michaels, L. and S.S. Chissick, *Asbestos: Properties, Applications and Hazards* (Vol. 1), John Wiley & Sons, Ltd., Chichester, U.K. (1979), pp. 45-46.

⁴⁵ Sinclair, W.E., *Asbestos: Its Origin, Production and Utilization*, Mining Publications, Ltd., London (1955), pp. 258-261.

⁴⁶ Michaels and Chissick (1979), p. 73.

⁴⁷ Selikoff, I.J. and D.H.K. Lee, *Asbestos and Disease*, Academic Press, New York (1978), pp. 20-25.

⁴⁸ Brodeur, P., *The Asbestos Hazard*, New York Academy of Sciences, New York (1980), p. 9.

⁴⁹ Selikoff and Lee (1978), pp. 28-29.

building trades in 1964.⁵⁰ This work was the focus of the international conference, “Biological Effects of Asbestos Exposure,” held that year at the New York Academy of Science.

A common characteristic among asbestos-related diseases is a long latency period between the initial exposure and the onset of the disease. Asbestosis, lung cancer, malignant mesothelioma, and other asbestos-related maladies rarely occur less than 10 years after the first exposure. Neoplasms associated with asbestos often do not manifest themselves for 30 years or longer.

In spite of the recognized adverse health effects associated with asbestos exposure, its use in the U.S. accelerated throughout much of the 20th century. In 1972, 770,000 short tons of chrysotile asbestos were used in the U.S., as well as smaller quantities of other asbestos forms. Asbestos was used in construction (pipe and boiler insulation, asbestos cement pipe and boards, fireproofing, acoustical plaster, and other uses); floor tile; friction materials (brake and clutch linings); asbestos paper; felts; packing and gaskets; textiles; and other uses.

Prior to the enactment of the Occupational Safety and Health Act (OSHA) in 1970 the American Conference of Governmental Industrial Hygienists (ACGIH) had established an exposure limit for asbestos in occupational settings. In 1946, the maximum acceptable concentration (MAC) was 5 million particles per cubic foot (mppcf). In 1948, the 5 mppcf MAC was changed to a threshold limit value (TLV) of an average concentration over an 8-hour day, referred to as an 8-hour, time-weighted average (TWA). The ACGIH retained this TLV of 5 mppcf until 1974 when it was reduced to 5 fibers per cubic centimeter (f/cc) expressed as an 8-hour, TWA. Since that time, the TLV has been reduced repeatedly, until the current level of 0.1 f/cc was established. From 1972 onward, the ACGIH has listed asbestos as a human carcinogen.⁵¹

Many states adopted ACGIH TLVs for regulating occupational exposures in the workplace during the 1950s and 1960s. State asbestos regulations were effectively replaced by federal OSHA regulations in June 1972 with the first permanent OSHA asbestos standard.⁵²

The first regulatory action of the new U.S. Environmental Protection Agency (EPA) under authority of the Clean Air Act was listing asbestos as a hazardous air pollutant. This occurred in March 1971. In April 1973, the EPA issued the National Emission Standard for Hazardous Air Pollutants (NESHAP) for asbestos. This standard required “no visible emissions” for milling and manufacturing asbestos products, and during demolition of buildings. NESHAP had the effect of eliminating the spray application of friable asbestos-containing fireproofing in July 1973. Subsequent revisions to this regulation in 1975 and 1978 effectively eliminated the use of friable pre-molded pipe, boiler, turbine, and duct insulation; and the spray application of friable asbestos-containing materials for all uses in buildings.⁵³

⁵⁰ Selikoff, I.J., Churg, J. and E.C. Hammond, “Asbestos Exposure and Neoplasia,” *JAMA* 148:1 (1964), pp. 142-146.

⁵¹ American Conference of Governmental Industrial Hygienists, *Documentation of Threshold Limit Values and Biological Exposure Indices*, 6th Edition, Vol.1 (Asbestos Documentation, p. 1).

⁵² *Federal Register*, Vol. 37, No. 110, Title 29 – Labor, Part 1910 – Occupational Safety And Health Standards, Standard for Exposure to Asbestos Dust (June 7, 1972), p. 11318.

⁵³ EPA, *Asbestos Fact Book*, Washington, DC (February 1985), p. 10.

The original EPA NESHAP definition of an asbestos material was “asbestos or any material containing asbestos”.⁵⁴ The 1975 asbestos NESHAP regulation redefined friable asbestos-containing material to mean “any material that contains more than one percent asbestos by weight that can be crumbled, pulverized, or reduced to powder, when dry, by hand pressure.”⁵⁵ This definition remained largely unchanged until the 1990 asbestos NESHAP revision.

In buildings, the EPA asbestos NESHAP addressed friable asbestos-containing materials (ACM) in buildings undergoing renovation or demolition operations; non-friable materials were essentially exempt, as were buildings with four or fewer dwelling units. Renovation projects involving less than 160 linear feet or 260 square feet of friable ACM were exempt from the EPA Asbestos NESHAP regulations. Additional revisions to the asbestos NESHAP regulation attempted to clarify some regulatory language. The current revised 1990 version is discussed briefly in section 3.2 of the *Asbestos Strategies* report.

The federal OSHA asbestos standard of 1972 has been revised on several occasions. In 1976, the planned reduction of the 8-hour permissible exposure limit (PEL) from 5 f/cc to 2 f/cc became effective.⁵⁶ In 1986 separate standards for general industry, construction industry, and shipyards became effective with an 8-hour PEL of 0.2 f/cc and an excursion limit of 1 f/cc for 30 minutes.⁵⁷ The 8-hour PEL was again reduced to 0.1 f/cc in 1994.⁵⁸ The current OSHA standards for asbestos are discussed briefly in section 3.2 of the *Asbestos Strategies* report.

The concern over the presence of asbestos in buildings began with friable ACM in elementary and secondary schools. In 1979, the EPA initiated a technical assistance program to help schools identify and control friable ACM.⁵⁹ Under this program a guidance document was produced to assist schools.⁶⁰ Congress passed the Asbestos School Hazard Detection and Control Act of 1980 giving the U.S. Department of Education authority to implement a grant and loan program for schools.⁶¹ Funds for this program were never appropriated.

In 1977, CPSC issued rules prohibiting the sale of consumer patching compounds⁶² and fireplace emberizing agents⁶³ containing respirable free form asbestos. In 1986, CPSC issued an enforcement policy under the Federal Hazardous Substances Act (FHSA) concerning labeling of certain asbestos-containing household products that, under reasonably foreseeable conditions of

⁵⁴ 40 CFR 61.21 (1973).

⁵⁵ FR 40:199, (Oct. 14, 1975), p. 48299.

⁵⁶ 29 CFR 1910.1001 (1976).

⁵⁷ *Federal Register*, Vol. 51, No. 119, Department of Labor (OSHA), Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite – Final Rules (June 20, 1986), p. 22612.

⁵⁸ *Federal Register*, Vol. 59, No. 153, Department of Labor (OSHA), Occupational Exposure to Asbestos – Final Rule (August 10, 1994), p. 40964.

⁵⁹ EPA, *Asbestos Fact Book* (1985), p. 4.

⁶⁰ EPA, *Asbestos-Containing Materials in School Buildings: A Guidance Document* (Parts 1 and 2), Washington, DC (March 1979).

⁶¹ Ewing, W.M., “History, Implementation and Evaluation of the Asbestos School Hazard Detection and Control Act of 1980,” *National Asbestos Council Journal*, Vol. 4, No. 2 (1986).

⁶² *Federal Register*, Vol. 42, CPSC, 16 CFR Part 1304, Ban of Consumer Patching Compounds Containing Respirable Free-Form Asbestos (December 15, 1977), p. 63362.

⁶³ *Federal Register*, Vol. 42, CPSC, 16 CFR Part 1305, Ban of Artificial Emberizing Materials (Ash and Embers) Containing Respirable Free-Form Asbestos (December 15, 1977), p. 63364.

handling and use, are likely to release asbestos fibers.⁶⁴ Public awareness, as well as regulatory action, proved effective in addressing potential risks to public safety. Upon discovery that hair dryers containing asbestos released the fibers into the air, manufacturers promptly took action to remove the material from their products.

In 1982 the EPA promulgated the “Asbestos-in-Schools Rule” requiring schools to identify friable ACM in school buildings and provide notification to parents, teachers, and school employees.⁶⁵ The Asbestos School Hazard Abatement Act (ASHAA) of 1984 set up a loan and grant program to assist schools in eliminating asbestos hazards.⁶⁶ This program was administered by the EPA and reauthorized under the Asbestos School Hazard Abatement Reauthorization Act (ASHARA) of 1990.⁶⁷ In 1983, the EPA revised its primary asbestos guidance document (the “orange book”) to address friable ACM in buildings beyond schools.⁶⁸ This guidance document (the “blue book”) was revised two years later in 1985.⁶⁹ This revision is known as the “purple book,” and it remains today the primary EPA guidance document for controlling friable and non-friable asbestos in schools, public and commercial buildings.

President Reagan signed the Asbestos Hazard Emergency Response Act (AHERA) in 1986.⁷⁰ EPA issued the AHERA regulations in 1987 requiring schools to inspect, assess, and manage asbestos in their buildings.⁷¹ Each school was to produce an asbestos inspection report and a management plan describing how the asbestos would be managed. These regulations did not require asbestos be removed beyond what was already required in the EPA asbestos NESHAP regulations during demolition and renovation projects.⁷²

Other provisions of AHERA required the EPA to investigate what actions should be taken, if any, regarding asbestos in public and commercial buildings. The agency responded in several ways. It evaluated how well the AHERA regulations were implemented by schools.⁷³ It co-sponsored the work by the Health Effects Institute – Asbestos Research on Asbestos in Public and Commercial Buildings culminating in a major published review and synthesis of the literature in 1991.⁷⁴

⁶⁴ *Federal Register*, Vol. 51, No. 185, CPSC, Labeling of Asbestos-Containing Household Products; Enforcement Policy, (September 24, 1986), p. 33910.

⁶⁵ *Federal Register*, Vol. 47, No. 103, EPA, Part 763, Subpart F – Friable Asbestos-Containing Materials in Schools (May 27, 1982), p. 23369.

⁶⁶ Title V – Asbestos School Hazard Abatement Act of 1984 (Congressional Act).

⁶⁷ Letter from Esther M. Tepper of the EPA to William M. Ewing dated Nov. 24, 1992 Re: ASHARA.

⁶⁸ EPA, *Guidance for Controlling Friable Asbestos-Containing Materials in Buildings*, EPA Publication No. 560/5-83-002 (March 1983).

⁶⁹ EPA, *Guidance for Controlling Friable Asbestos-Containing Materials in Buildings*, EPA Publication No. 560/5-85-024 (June 1985).

⁷⁰ *Congressional Record-House*, H 8812, “Asbestos Hazard Emergency Response Act of 1986” (October 1, 1986).

⁷¹ *Federal Register*, Vol. 52, No. 210, EPA, 40 CFR 763, Asbestos-Containing Materials in Schools – Final Rule (October 30, 1987), p. 41826.

⁷² EPA report, *Asbestos in Schools: Evaluation of the Asbestos Hazard Emergency Response Act (AHERA)* released in June 1991 found removal of some ACM was the recommended response action for only 10% of the recommendations issued in the school asbestos management plans.

⁷³ EPA, *Asbestos in Schools: Evaluation of the Asbestos Hazard Emergency Response Act (AHERA): A Summary Report*, EPA Publication No. 560/4-91-012 (June 1991).

⁷⁴ Health Effects Institute – Asbestos Research, *Asbestos in Public and Commercial Buildings: A Literature Review and Synthesis of Current Knowledge*, Cambridge, MA (1991).

AHERA required EPA to study ACM in public and commercial buildings and then report its recommendations to Congress. The February 1988 EPA report to Congress recommended a series of studies and specifically called for delaying a regulatory response.⁷⁵ The purpose for delaying a regulatory response was that the available pool of trained personnel and laboratories might be overwhelmed due to the concurrent work in schools. The research was not conducted.

EPA hosted a policy dialogue with stakeholders (1990) to consider actions relating to asbestos in public and commercial buildings. The agency subsequently issued the “green book” guidance document on the design and implementation of operations and maintenance (O&M) programs for the management of in-place ACM.⁷⁶

In 1989 the EPA issued regulations to ban some asbestos-containing products while phasing out most others over a multi-year period.⁷⁷ The “Ban and Phase-Down” rule was challenged in court and the regulation remanded to the agency. As a result, any asbestos-containing products then “in commerce” would not be banned. Those not in commerce would be banned. Those materials “banned” could not be sold. It did not affect materials already installed, or in use.

AHERA also established the asbestos laboratory accreditation program under the National Institute of Standards and Technology (NIST). This program accredits laboratories that perform bulk sample analyses by polarized light microscopy (PLM) and air sample analyses by transmission electron microscopy (TEM).

AHERA regulations established the requirements for accreditation of individuals who (1) inspect for ACM, (2) develop management plans, (3) supervise response actions and (4) design response actions. There were also requirements for the training and certification of workers who perform asbestos response actions. The accreditation and certification requirements initially only applied to work in schools. These requirements, with the exception of the management planners, were extended to all buildings by ASHARA, effective November 28, 1992.

EPA promulgated the Asbestos Worker Protection Rule in 1987.⁷⁸ The rule was designed to extend coverage found in the OSHA asbestos standards to state and local employees not covered by OSHA. The Asbestos Worker Protection Rule applies to employees performing construction work, custodial work, and automotive brake and clutch work. Revised in November 15, 2000, the Rule adopted the OSHA asbestos standards 29 CFR 1926.1101 and 29 CFR 1910.1001, as well as subsequent revisions to these standards.

⁷⁵ EPA, *EPA Study of Asbestos-Containing Materials in Public Buildings: A Report to Congress*, EPA, Washington, DC (February 1988), at p. 36, letter from Mr. Lee M. Thomas of EPA to Congress dated February 26, 1988.

⁷⁶ EPA, *Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials*, EPA Publication No. 20T-2003 (July 1990).

⁷⁷ *Federal Register*, Vol. 54, No. 132, EPA, 40 CFR Part 763, Asbestos; Manufacture, Importation, Processing, and Distribution in Commerce Prohibitions – Final Rule (July 12, 1989), p. 29460.

⁷⁸ *Federal Register*, Vol. 65, No. 221, EPA, 40 CFR 763, Asbestos Worker Protection – Final Rule (November 15, 2000), p. 69210.

TABLE B.1: Timeline of Asbestos Regulatory and Legislative Activities

1900	Asbestos recognized as a cause of occupational disease (asbestosis) in Charing Cross Hospital, London. A presumptive connection is established.
1918	Insurance companies, including Prudential, refuse to sell insurance to asbestos workers.
1922	U.S. Navy lists asbestos work as hazardous and recommends the use of respirators.
1924	Asbestos is established as a definitive cause of death from lung scarring.
1927	The name “asbestosis” is applied to lung scarring caused by asbestos. Massachusetts awards disability payments to individuals affected by occupational lung disease. Over the next 40 years, other states come to recognize asbestosis as a compensable disease.
1929	Workers begin suing Johns Manville for damages from disability caused by asbestos exposure.
1931	In the UK, Parliament requires dust control measures in asbestos textile factories and allows workers to receive compensation for asbestosis. “Safe” level is established as conditions such that no more than one in three workers will get asbestosis after 15-19 years work exposure.
1946	The American Conference of Governmental Industrial Hygienists (ACGIH) establishes a maximum acceptable concentration (MAC) in 1946 of 5 million particles per cubic foot (mppcf) for occupational exposure.
1948	The 5 mppcf MAC was changed to a threshold limit value (TLV) of an average concentration over an 8-hour day, referred to as an 8-hour, time-weighted average.
1955	Richard Doll publishes paper linking asbestos to lung cancer.
1960	Chris Wagner publishes paper linking asbestos to mesothelioma.
1964	Johns Manville first places warning labels on some asbestos products. Irving J. Selikoff describes the incidence of asbestos-related disease among insulation workers.
1969	First product-liability lawsuit is brought against asbestos manufacturers. Federal contracts over \$10,000 must adhere to a workplace standard of 12 fibers per cubic centimeter of air (f/cc).
1970	OSHA establishes the first federal guidelines for workplace asbestos exposure. These take effect the following year.
1971	OSHA regulations take effect. EPA lists asbestos as a hazardous air pollutant.
1972	ACGIH lists asbestos as a human carcinogen. First permanent asbestos regulations instituted by OSHA. Permissible exposure limit (PEL) is 5 f/cc.
1973	First NESHAP rule enacted. Eliminates spray application of fireproofing containing asbestos. Asbestos consumption in U.S. hits all-time high of over 800,000 tons.
1975	NESHAP revision bans the use of asbestos in many thermal insulation products. EPA defines “friable” asbestos.
1976	OSHA PEL reduced to 2 f/cc.
1977	CPSC issues rules prohibiting the sale of consumer patching compounds and fireplace emberizing agents containing respirable free form asbestos

1978	NESHAP is revised.
1979	EPA begins providing technical assistance to help schools identify and control friable ACM. The primary document is known as the “orange book.”
1982	EPA promulgates “Asbestos in Schools” rule.
1983	EPA “orange book” is revised to provide guidance to manage friable asbestos in non-school buildings. The new document is the “blue book.”
1984	EPA national survey estimates that there are 733,000 buildings with friable ACM. Asbestos School Hazard Abatement Act passed.
1985	The last comprehensive EPA guidance document for asbestos in buildings is issued. This is <i>Guidance for Controlling Asbestos-Containing Materials in Buildings</i> , also known as the “purple book.”
1986	OSHA reduces PEL to .2 f/cc, with an “excursion limit” of 1 f/cc for up to 30 minutes. Asbestos Hazard Emergency Response Act (AHERA) is passed.
1986	CPSC issues an enforcement policy under the Federal Hazardous Substances Act (FHSA) concerning labeling of certain asbestos-containing household products.
1987	EPA issues AHERA regulations. EPA promulgates Asbestos Worker Protection Rule, applying OSHA standards to employees of state and local governments.
1989	EPA promulgates Asbestos Ban and Phase-Out Rule.
1990	NESHAP is revised. Asbestos School Hazard Abatement Reauthorization Act passed. EPA holds policy dialogue with stakeholders regarding asbestos in public and commercial buildings. The “green book,” a guidance document on operations and maintenance programs for the management of in-place ACM, is issued.
1991	Much of the Ban and Phase-Out Rule is vacated by the U.S. Circuit Court of Appeals. The portion prohibiting new uses for asbestos remains intact. Health Effects Institute compiles <i>Asbestos Research on Asbestos in Public and Commercial Buildings</i> , a review and synthesis of the literature.
1991	EU bans amphibole asbestos. Chrysotile is banned for some applications. Chief Justice Rehnquist of the U.S. Supreme Court appoints an ad hoc committee regarding the thousands of court-filed asbestos illness claims.
1992	EPA attempts to work with auto industry to voluntarily phase out asbestos in brakes. Threatened anti-trust action by asbestos industry ends this effort.
1994	OSHA PEL reduced to .1 f/cc. Under this OSHA standard, Thermal System Insulation (TSI) and surfacing materials installed before 1981, and floor tile installed through 1981, are presumed to be asbestos-containing unless demonstrated otherwise through sampling.
1999	EU extends ban on chrysotile to nearly all applications. Member states must enact bans by 2005.
2000	Asbestos Worker Protection Rule is revised.
2002	“Ban Asbestos in America Act” is introduced by U.S. Senator Patty Murray (D-WA).

Appendix C: Research Priorities by Issue Area

The focus of this report has been on asbestos issues and problems where oversight, outreach, and education can quickly have a positive impact. The process clearly indicated that many issues require further research. Research priorities raised in this process are grouped by issue area below; they are not prioritized and should not be considered exhaustive by any means.

Asbestos in Buildings:

1. Complete the studies indicated in the 1988 EPA Report to Congress, “EPA Study of Asbestos-Containing Materials in Public Buildings.” This report described nine studies designed to fill information gaps about asbestos in buildings.⁷⁹ To date, only the first of the nine studies, listed below, has been completed.
 - a. Evaluation of the Implementation of AHERA Schools Rule
 - b. Operations and Maintenance Procedures Efficacy
 - c. Long-term Efficacy of Asbestos Control
 - d. Problem Characterization Studies
 - da. Study 1: “Peak” Exposure Levels
 - db. Study 2: The Incidence of “Peak” Exposure Levels and Their Impact on Average Building Levels
 - e. Management Activities
 - ea. Private Sector Asbestos Management Activities and State and Local Government Programs
 - eb. Evaluate Impact of Private Sector/State and Local Asbestos Management Programs
 - f. Exposure-Risk Interpretation
 - g. Levels of Exposure
 - ga. Prevalent Levels of Airborne Asbestos Fibers in Public and Commercial Buildings
 - gb. Service Workers’ Exposure to Airborne Asbestos in Public and Commercial Buildings
 - gc. Residential Apartment Buildings Exposures
 - gd. Survey of Federally Subsidized Public Housing Units for Asbestos Extent and Air Levels
 - ge. Prevalent Levels of Airborne Asbestos Fibers in Schools
 - h. Population Studies
 - ha. Characterization of Populations Exposed to Airborne Asbestos in Public and Commercial Buildings
 - hb. Survey of Populations Exposed to Airborne Asbestos in Public and Commercial Buildings
 - i. Development of a Decision Tool for Determining Whether a Response Action is Warranted for a Particular Building

⁷⁹ EPA Report to Congress (February 1988), Appendix 7.

2. Determine the reliability of measuring asbestos in various types of bulk materials at concentrations less than one percent by volume.
3. Evaluate the effectiveness of training provided to asbestos response action workers and building service workers, including those who do not speak English.
4. Evaluate the effectiveness of asbestos management programs in industrial settings. Based on this evaluation, prepare a guidance document for managing asbestos in industrial facilities.

Asbestos in Products:

1. A study should be conducted to determine the extent to which asbestos-containing products are actually being manufactured, imported, exported, and distributed in the U.S. The study should identify the end users of the products and the disposition of those products after use. The study should address the extent to which these products are available to consumers and local education agencies (schools). The study should be performed by the EPA, in conjunction with CPSC, OSHA and the Department of Commerce. Subsequently, necessary risk-related analyses should be conducted.
2. A study should be conducted to determine the extent to which substitutes for asbestos exist in certain product categories. The study should consider the findings from the European Commission's Scientific Committee on Toxicology, Ecotoxicity and the Environment on the health risks of chrysotile asbestos and its substitutes. This study would be an adjunct to the one listed above.

Naturally Occurring Asbestos:

1. The extent to which individuals are exposed and experience adverse health effects from the mining, milling, manufacture, distribution, and use of materials and products with less than one percent asbestos should be investigated. This study should also include workers performing road cuts and road building operations. In addition, the study may include other durable naturally occurring fibrous minerals or work that produces cleavage fragments of respirable size and similar composition and shape as asbestos minerals. This study would be conducted by the National Institute for Occupational Safety and Health (NIOSH) in conjunction with EPA, MSHA, OSHA and CPSC. A panel of experts could be engaged to provide peer review on this topic.
2. A study is necessary to develop an analytical protocol that will reliably measure naturally occurring asbestos in bulk materials at concentrations below one percent. Traditionally polarized light microscopy (PLM) has been used, but it is generally limited to providing reliable results at one percent or greater. This study would likely be conducted by NIST, in conjunction with EPA, USGS and MSHA.
3. A study led by the USGS, in conjunction with mining interests, could map likely locations of asbestos deposits. Much of the necessary research for this effort has been accomplished by various federal and state geological surveys. The information would be useful for the mining and quarrying industries, as well as road planning and construction.

Medical and Health Issues: There are many areas of additional research related to the health effects of asbestos. Many research studies are in progress worldwide. Listing additional research needs is far beyond the scope of this project, but may be an appropriate focus for a neutral scientific review of the state of analysis in this area.

Analytical Methods:

1. The application of PLM and/or TEM microscopy for determining asbestos in bulk materials at one percent or less. This research should include building materials, products, and asbestos as a contaminant. This research should be directed by EPA in conjunction with NIST and laboratories knowledgeable of such applications.
2. The use of TEM for exposure measurements as a supplement, or in place of PCM should be evaluated. Obtaining reliable measurements of low fiber concentrations in dusty atmospheres should be included. MSHA is considering TEM in their asbestos standard revision. The Health Effects Institute – Asbestos Research (HEI-AR) recommended OSHA consider TEM in the early 1990s. EPA and NIOSH should lead this research effort, in conjunction with NIST.
3. Improve the accuracy and precision of methods using light microscopy.

Appendix D: All Recommendations

The *Asbestos Strategies* process led to the development of a list of recommendations. These are not necessarily consensus opinions, but rather a collection of ideas gathered from the range of stakeholders and selected by GETF and industry experts. Many of these action items enjoy considerable support across the range of stakeholders. Some recommendations – such as revisiting a ban on asbestos – would be opposed by some stakeholders.

These recommendations are primarily for short-term action items. They are grouped by the issue that they address, and are ranked by priority within each category. Undertaking the research items in Appendix C can highlight areas that require more focused action.

Develop and Provide Updated Information that is Consistent within and among Agencies

1. EPA should update the “purple book” guidance document to make it the premier technical resource for managing asbestos in buildings and facilities, including industrial settings. The revised resource should include updated “green book” (operations and maintenance) information, and should be consistent with current federal regulations and good practices that have evolved since the release of the “purple book” in 1985. The resulting resource, in a form such as an online integrated database of all relevant documents, will facilitate compliance with existing regulations, reducing asbestos exposure among contractors working in buildings. [Leading Action #1]
2. EPA should update the model training curricula to ensure that all relevant agencies’ priorities are reflected. Updating the training will make the curricula consistent with existing regulations and increase worker safety. The updated versions should cover the revised OSHA asbestos standards, revised EPA asbestos NESHAP standards, EPA Worker Protection Rule, new respirator designations/regulations, and other topics. The training providers should also be permitted to vary the course content in refresher courses. [Leading Action #6]
3. Training providers under the EPA model accreditation plan (MAP) and corresponding state plans should be audited with sufficient frequency to ensure that the training is provided, tests are conducted, records are maintained, and certificates are issued. This action, conducted in concert with the updating of training requirements, will increase worker safety and the effectiveness of abatement efforts. Reducing the incidence of training fraud will provide greater security to building occupants and owners. Partnering with state agencies will provide better coordination. [Leading Action #10]
4. Federal agencies should continue to actively participate and support the efforts of professional associations in the development, revision, and quality assurance practices relating to sampling and analytical methods for asbestos. EPA, NIST and NIOSH should work together to accomplish this goal.
5. EPA, in conjunction with the Consumer Product Safety Commission (CPSC), should revise and update the Asbestos in Homes guidance document. This would help address the gap that currently exists in regulations affecting residential buildings.
6. A summary document of federal asbestos regulations should be prepared. This would be a valuable resource for the regulated community and the regulators. The document would be

prepared by EPA and OSHA with input from other federal agencies that maintain asbestos regulations.

7. A companion summary document of state asbestos regulation summaries would also be a valuable education tool. This document could be developed by the National Conference of State Legislatures (NCSL). The NCSL has developed such documents in past years, but these are no longer accurate. The new document should include a list of web sites where state (and local) regulations may be found.
8. EPA and OSHA should consult with each other and leading scientists to obtain the best sense of the science and then employ education and outreach to provide reliable risk communication to the regulated community and the public. Commentors indicate that following the World Trade Center attacks federal agencies may have underestimated the risks out of concern to control the public's perceived risk. A backlash followed inside and outside some agencies, which may have overstated the risks.

Support State Enforcement and Encourage Voluntary Compliance

1. Regulatory agencies should encourage compliance with existing regulations and good practices for managing asbestos in buildings and conducting response actions. This may be accomplished through a series of asbestos awareness seminars directed at the regulated community (building owners, contractors and consultants). The seminars should be sponsored by EPA and OSHA, and hosted by the resident state asbestos authority. Joint sponsorship would be extremely valuable. Such seminars should be held in conjunction with national or regional meetings of professional/trade associations, such as EIA, IFMA, BOMA, and AIA, to encourage participation by the target audience. Voluntary compliance will increase worker and building occupant safety, reduce asbestos exposure, and decrease costs associated with liability. [Leading Action #2]
2. EPA should partner with one or more local organizations to inform stakeholders and to encourage voluntary compliance with both federal and local regulations. Similar efforts appear to have been successful with groups such as the EIA, individual state agencies, local building code inspectors, fire departments, and other groups. This recommendation would be implemented in concert with the above recommendation.
3. EPA and OSHA should focus on more stringent, predictable, and consistent enforcement of existing regulations, which may be more beneficial than committing scarce resources to new rule-making efforts. Consistent interpretations across agencies will lead to increased compliance and reduced liability for businesses. [Leading Action #7]
4. Federal and state agencies should provide additional training to their personnel responsible for asbestos. These personnel would be better equipped to provide guidance and assistance to the regulated community. Agencies should use trained personnel to increase enforcement of existing regulations. Federal agencies could be tasked to ensure that this training is supported by consistent messages from each federal agency of jurisdiction.
5. Federal and state agencies should communicate among themselves before issuing communiqués to the public. This may reduce confusion among building owners and others attempting to comply with regulations. A web-based electronic distribution mechanism for such information should be established to ensure rapid communication.

Address Products in Commerce with Commercially Added Asbestos

1. A clearly defined legislative ban on the production, manufacture, distribution and importation of products with commercially-added asbestos is the most direct means to address concerns about remaining health risk and reduce future costs for facility owners and managers. Such a ban should be proposed by the Congress, promptly debated, and conclusively resolved. Enabling legislation would eliminate remaining products by a specified date, and installation of those products by a later date. Jurisdictional issues could be addressed in Congressional legislation that might not be achievable by rule-making within individual agencies. Exceptions may be necessary for a small number of applications for which substitutes may not be available, and for research purposes. Implementing regulations, and perhaps the enabling legislation itself, could be challenged in the courts. A regulatory ban is within EPA's authority and is also an option. Many see a ban on asbestos, enacted to prevent future exposure, as a complementary action to a litigation resolution process that fairly compensates injuries resulting from past exposure. [Leading Action #4]
2. A uniform labeling requirement for all products with commercially-added asbestos should be established through rule making. Labels should include the word "asbestos," should be a specified minimum size, and should be consistent with the labeling requirements of CPSC's FHSA. EPA would likely be the lead agency for such rule making, but would need to coordinate their efforts with other agencies having jurisdiction over products with commercially-added asbestos. This option would need to be implemented with the following recommendation.
3. A coordinated effort to educate consumers, employers and building owners about products with commercially-added asbestos is necessary. Such a program would assist the target audience in making an informed decision about which products are legally available with commercially added asbestos. This education and outreach effort would be performed by EPA, OSHA and CPSC, as resources permit. These agencies would need study which products actually have commercially added asbestos, which do not, and which are to be phased out voluntarily by manufacturers. [Leading Action #9]

Address Naturally Occurring Asbestos in Products

1. Reduction of naturally occurring asbestos in products could be achieved by a program set up by a consortium of mining concerns. The program would develop a sampling and analytical protocol to analyze bulk materials at the mining stage for chrysotile and all asbestiform amphibole forms of asbestos. Oversight of such a program may be provided by EPA and MSHA, with technical assistance by NIOSH, NIST, and USGS. This program would assist the mining and quarrying industries in avoiding unwanted asbestos in their products. The program would provide a degree of assurance to users of these raw materials that they are not contaminated with asbestos. [Leading Action #8]
2. The Libby vermiculite situation should be considered an important lesson, but not be treated as a typical case. A federal process should be undertaken promptly to clarify the definition of "asbestos." Many parties recommended that the definition should include all asbestiform amphiboles, in addition to currently regulated amphiboles and chrysotile. EPA, OSHA, and MSHA will need to evaluate how such a clarification should be accomplished and what consequences, if any, it would have on other industries. If adopted, this definition would

enable federal agencies to address the risk of exposure from minerals such as winchite and richterite. USGS, trade associations, and other organizations can serve as resources for clarifying and understanding the science associated with creating a new definition. [Leading Action #3]

3. A labeling provision should be considered for products with naturally occurring asbestos as a contaminant. Some products may currently be subject to the labeling requirements of CPSC's FHSA if, under reasonably foreseeable conditions of handling and use, they are likely to release asbestos fibers. Existing regulations may be sufficient for products found to contain more than one percent asbestos. A label may be appropriate for products containing greater than 0.1 percent asbestos by volume, if feasible. The evidence on this should at least be reviewed. Products consistently found to contain asbestos at a level below 0.1 percent through a testing program may be exempt from labeling, or have a label with different wording.

Support the Medical Community

1. A national mesothelioma registry is necessary to facilitate epidemiological studies to evaluate the effects of asbestos exposure. Many countries and some states have established mesothelioma registries. The establishment of such a registry would likely be performed by agencies within the Centers for Disease Control (CDC), including the National Center for Health Statistics, National Institute for Occupational Safety and Health, and the National Center for Environmental Health, in conjunction with state public health departments. An accompanying effort to connect interested parties with the best experts and data would improve research and treatment of asbestos-related disease. [Leading Action #5]
2. There is a need for an inventory of significant health-related research to ensure that interested parties can access experts wherever they are located. The CDC should lead this effort. In conjunction with the mesothelioma registry, this would improve research and treatment of asbestos-related disease.

Implementation

For the recommended options, the EPA should establish working groups composed of representatives from government agencies and other stakeholders identified as critical to the success of the project. These key groups, among others, may be valuable participants:

- Federal government agencies (EPA, OSHA, MSHA, CPSC, NIOSH, NIST, NIH, CDC, ATSDR, USGS);
- State and local government agencies involved with asbestos;
- Professional associations (EIA, ASTM, AIHA, NIBS, BOMA, NCSL);
- Current asbestos product manufacturers (Asbestos Information Association/North America);
- Mining and mineral processing companies and/or associations;
- Representatives of organized labor; and,
- Other groups or individuals having special expertise in the specific recommended solution.

Appendix E: Asbestos Strategies Stakeholder Interview Findings Outline

Purpose

The purpose of this document is to summarize as fairly as possible the primary comments emerging from a series of one-on-one discussions with key public and private stakeholders with an interest and expertise in asbestos policy and related issues. These findings provided data points to guide the development of the agenda for the *Asbestos Strategies* focus group meeting.

Summary of Findings

In general, the findings are as follows:

- Regulatory approaches across agencies need to be more consistent.
- Communication and cooperation will be important:
 1. Within federal agencies;
 2. Among different federal agencies;
 3. Between federal and state agencies; and,
 4. Between the public and private sectors.
- Setting guidelines, definitions, and standards is most appropriately done at the federal level; enforcement and cleanup may be done at the federal or state level; education and outreach can be a joint project of federal and state agencies and NGOs. Respondents had different opinions as to precisely how these tasks would be broken down.
- Education is a critical need. The federal government is seen as the best source for information on health risks. Uninformed actions in response to a perceived risk (e.g., ripping out in-place asbestos) may have greater health risks and economic costs; education can prevent this.
- Risk assessment and cost-benefit analysis are important components of a federal strategy. Health risks from asbestos need to be considered at the population level and in the context of other health risks. The risks of alternatives needs to be considered and the potential benefits from using asbestos, if any, need to be weighed.
- Formally approved analytical methods for asbestos are important and will provide a sound scientific basis for further action.
- Some respondents suggested that different forms of asbestos have varying levels of health risks. Others suggested that minerals and materials not classified as asbestos may have similar risks. It may or may not be useful to develop different standards for different materials, but this is an issue worth considering. The definition of asbestos may need some adjustment.
- Voluntary programs may or may not be effective. The NAIMA/OSHA agreement is seen by some as a good example of such a program.
- Among the scientific community, there is a need for better cross-discipline communication.

Background

Asbestos is a major issue in environmental policy, as various federal and state agencies and private sector organizations continue to grapple with ongoing asbestos-related public health concerns, such as the legacy of the Libby, Montana vermiculite mine, possible asbestos risks from the World Trade Center collapse and other similar issues. Under the Clean Air Act and

Toxics Substance Control Act, the U.S. Environmental Protection Agency (EPA) has certain oversight responsibilities over the manufacture, management and use of asbestos to address such public health concerns. The Occupational Safety and Health Administration (OSHA) also has oversight authority relating to an estimated 1.3 million employees in construction and general industry who face significant asbestos exposure on the job.

The Global Environment & Technology Foundation (GETF) – a 501(c)(3) not-for-profit organization with a proven track record in stakeholder facilitation – engaged interested parties to compile innovative approaches, best management practices, and lessons learned relevant to the use and management of asbestos. This process was designed to facilitate a coordinated approach among federal agencies, other policy leaders and private sector organizations based on input from key stakeholders. The GETF team developed a series of initial recommendations and options provided by a focus group and stakeholder input.

Objectives

This process was designed to take stock of recent experiences with potential solutions and options regarding the continued and future use of asbestos. Therefore, the objectives were to:

- Offer recommendations and options on effective asbestos oversight, outreach and education approaches; and,
- Provide an opportunity for key stakeholders to share their knowledge on barriers, incentives, lessons learned, and best practices as they relate to asbestos use and management.

In achieving these objectives, GETF sought to:

- Bring diverse stakeholders together around a common environmental objective;
- Showcase solutions; and,
- Facilitate a dialogue to discuss policy and regulatory issues and the need to communicate about stakeholder responsibilities and what roles solutions play in improving the current policy environment.

The Interview Process

GETF conducted interviews with key stakeholders and experts over a period of two months. These interviews were designed to provide GETF with information on the current needs in asbestos policy, to identify important issues to address in the focus groups, to identify areas for further research, and to direct GETF to additional contacts.

GETF followed the interviews with invitations to participate in the dialogue process. For those who could not participate at the meeting in Washington DC, GETF welcomed participation through a web site, at www.getf.org/asbestosstrategies.

Methodology

GETF employed an interview template tailored to the expertise of the interview subject. This provided consistency in answers and highlighted important points. The questions were:

1. What is the history of your organization's involvement with asbestos?
2. Have you been involved with asbestos oversight, outreach and education? If yes, who provided the oversight, outreach and education?
3. What role do you think federal and state agencies and private sector organizations ought to play with oversight, outreach and education?
 - a. Do you think the federal government should develop a targeted strategy for asbestos oversight, outreach and education?
 - b. What should the elements of the strategy include (e.g., policy, legislation, voluntary programs, alternatives to asbestos use, partnerships, incentives, new regulation, new or improved opportunities for information exchange on asbestos issues)?
 - c. Of these ideas, if given limited resources, where should federal and state agencies and private organizations invest their resources in oversight, outreach and education? Why?
 - d. What obstacles do you think federal and state agencies or private sector organizations would find in implementing these suggestions?
 - e. Are there issues we should be aware of regarding the current or potential actions for oversight, outreach and education?
4. Do you have any examples of successful asbestos approaches, technologies, management, lessons learned, substitutes, oversight, outreach and education efforts or programs?
5. Who else should be interviewed? Who is a resource?
6. Who ought to be at the focus group meetings for direct dialogue and discussion on asbestos use, policies, education and outreach?
 - a. Who should be invited to the *cross-sector issues meeting* that will convene a senior level advisory group from all the identified sectors (e.g., manufacturers, associations, users, federal, state and local government, etc.)? The purpose of this group is to help identify who ought to be invited to subsequent meetings and to promote the outcome of the process.
 - b. Who should be invited to the meeting on *products in commerce* (e.g., representatives of asbestos products manufacturing, distribution and importation communities such as roofing and insulation manufacturers, brake manufacturers, etc.)?
 - c. Who should be invited to the meeting on *products in use*, including stakeholders who currently use asbestos-containing products (e.g., truck manufacturers, nurseries) and those with a legacy of asbestos use (e.g., schools, construction and commercial building community and others)?
7. What suggestions do you have to make this process a success?

Findings from the Interviews

Industry

Individual businesses were generally reluctant to participate in the process. In many cases, their lawyers advised them not to participate in interviews or meetings due to ongoing litigation. Trade associations were more likely to participate in interviews and some were willing to participate in meetings. Some businesses were willing to recommend academic experts for us to contact; in some cases, the research work of these experts may be financially supported by a business or trade association. Industry frequently cited a need for consistency of regulations, risk assessment, cost-benefit analysis, and a consistent mineralogical definition of asbestos. Developing and communicating accurate scientific information was seen as a key federal role.

Businesses are, of course, concerned with asbestos liability. One concern expressed was the extent to which asbestos liability rests with retailers of asbestos-containing products and how much with manufacturers. Conflicting accounts dispute the use of asbestos in brakes (whether new or remanufactured) and its health impacts on mechanics.

Academic, Medical, and Research

Academic experts were very willing to contribute to this process and some were able to attend the meeting. These experts have specific areas of focus on which they are extremely well-informed. Some suggested developing a more specific mineralogical definition of asbestos, while others suggested expanding the focus to include all fibers with similar properties. Some experts suggested developing different exposure standards for different forms of asbestos, while others believed that to be unimportant. Some experts focused on risk assessment and considered it a priority area; others focused on naturally occurring asbestos as a priority area. Epidemiologists, toxicologists, geologists, and microscopists were all seen as important categories of academic experts to contact.

One academic expert did not consider there to be a significant health risk from asbestos anymore. In this expert's opinion, asbestos was no longer used in products (so replacements were not a need), naturally occurring asbestos would be avoided by miners, and adequate regulatory mechanisms were already in place.

Federal and State Agencies

Representatives from federal and state agencies were willing to contribute to the process, but in many cases were not able to attend due to a lack of funding. These contacts expressed a range of views on past and current EPA activities regarding asbestos. Most representatives agreed on the need for a consistent federal policy and that EPA needs to partner with the states during implementation. Each state had very different approaches to addressing the asbestos issue and cited a range of possible best practices, including Maine's "One-Stop" system or Wisconsin's outreach to the fire department and building industries. Education/outreach and monitoring were seen as key needs, in particular with regard to appropriately managing asbestos in place. Funding is a major barrier to further state action.

Appendix F: Meeting Summary – October 10, 2002, Washington, DC

This document was sent to Asbestos Strategies participants on December 9, 2002.

Purpose and Direction of This Process

The Global Environment & Technology Foundation (GETF) convened a cross-sector focus group to discuss innovative approaches, technologies, best management practices, lessons learned and substitutes associated with the use of asbestos. The focus group brought together interested parties from federal and state regulatory agencies, industry, trade associations, unions and other key private sector organizations.

The meeting opened with a review of the background, purpose, and direction of this dialogue process. GETF emphasized that the goal of this meeting was to understand views and identify priorities today, not reach consensus or make definitive recommendations. GETF conveyed a desire to ensure that all views are heard. Additional interviews with key stakeholders, small meetings of key stakeholders or additional focus groups (of this group or a subset of this group) were identified as possible next steps.

GETF will be collecting and working with various stakeholders to develop the draft findings/recommendations document. When complete, this document will take stock of the recent experience with potential solutions and options regarding the continued and future use of asbestos. The report will develop a sense of issues potentially warranting further analysis and will be based primarily on stakeholder input. Specifically, the report will:

- Offer recommendations and options on effective asbestos oversight, outreach and education approaches;
- Provide an overview on barriers, lessons learned, incentives, and best practices as they relate to asbestos use and management;
- Develop for policymakers views regarding information gaps to help them determine where further analysis would add value; and,
- Offer examples of innovative approaches, best management practices, and lessons learned for asbestos-containing products currently sold and existing products in use that contain asbestos.

The report will be drafted by the end of February, and all stakeholders who participated in this process will have an opportunity to review the report. All issues brought forward by stakeholders through the *Asbestos Strategies* process will be noted and included as part of the final report.

Comments on the Dialogue Process

Concern was expressed that the dialogue on asbestos is often affected by an emotional perception of asbestos risk and by gaps in accessible and reliable information. A number of participants suggested that regulation be based on quantified risk.

Participants noted that, while it is generally good to foster discussion and get more information, such processes are often used to prevent moving forward. Some participants expressed concern over revisiting and undermining issues that have been settled.

Many participants expressed interest in hearing about the innovative approaches used by other agencies, whether federal or state.

Discussion of the Issues

Based upon a number of interviews and other research, the team identified categories of current issues relevant to asbestos management. Set forth below are the categories and issues addressed by the focus group.

Abatement, Management, and Response Actions

The following were the key issues discussed during the focus group related to asbestos response alternatives:

- Participants discussed several options for the title of this category. “Abatement” was seen to be often interpreted as meaning “removal” in exclusion of other options. “Hazard control” includes both removal and also management in place, and “response alternatives” is also an inclusive term.
- Participants expressed the opinion that, although management in place is often seen as the safer and cheaper alternative, this is not necessarily true due to the costs of operations and maintenance over a building’s lifetime including demolition and the hazards presented by demolition. It was suggested that, in some situations, management in place may be the more costly alternative. Participants suggested that in each case facility owners should have information regarding the economics of a good oversight and management program.
- It was noted that the Asbestos Hazard Emergency Response Act (AHERA) spells out the required actions for schools, but that more flexibility exists when managing asbestos in other buildings. Building owners have flexibility in how they choose to manage asbestos in non-school buildings as long as they comply with the National Emissions Standards for Hazardous Air Pollutants (NESHAP), the regulations of the Occupational Safety and Health Administration (OSHA), state and/or local regulations, and the accreditation provisions of the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). Participants explained that since no agency has the money to treat every building as a school, they focus on the hazards. Participants also suggested that the management approach embodied by AHERA is inadequate for many facilities such as industrial plants. For non-school buildings, it is important and possible to employ risk assessment that is more cost-effective than AHERA, focusing on hazards. There was some disagreement on this, since AHERA only requires sampling to determine that a material is *not* asbestos.
- It was noted that, in a prior lawsuit, regulations were sought to extend the inspection requirement to public and commercial workplaces, and a series of cross-sector policy dialogue meetings took place. Participants noted that a settlement was reached, and new regulations enacted, but that enforcing these regulations remains an area of concern. [Clarification: the policy dialogue meetings did not produce an agreement. The settlement between the plaintiffs and the U.S. Environmental Protection Agency (EPA) was addressed through OSHA rule making. The new rule promulgated was that, although inspections would not be required for every workplace, there would be a presumption that certain categories of surfacing material, thermal insulation and flooring material are presumed to contain asbestos and must be handled as such, unless the employer conducts a bulk sample to determine that the material does not contain asbestos. This was included in the 1994 updates to the OSHA construction and general

industry standards. Some time later, the same provision was extended to public-sector workplaces by inclusion in the EPA Worker Protection rule.]

- It was suggested that, to prevent the disturbing of asbestos in place, EPA and OSHA should require labeling every instance of in-place asbestos. Participants asked if this was already an OSHA requirement. Others suggest that in part, it is, but is not enforced. [Clarification: OSHA currently requires all asbestos-containing materials, or certain materials presumed to contain asbestos to be labeled, if feasible; in some applications, labeling is not considered to be feasible.]
- Participants expressed concern that public agencies are constrained by the legal obligation to accept low bids and even commercial owners find it difficult to justify placing quality above cost.

Asbestos in Products

The following were the key issues discussed during the focus group related to asbestos in products:

- Participants expressed concern that EPA and OSHA do not provide sufficiently clear and accessible information about what kinds of building materials and other products may contain asbestos. Some participants noted that a significant number of products in the marketplace still contain asbestos and may not adequately disclose that fact. Other participants disagreed with this statement. The question was raised whether any agency has reliable information on where asbestos exists in commerce and how one could define which products are hazards. In response to this, participants noted that there had been some work at EPA in tracking the usage of asbestos-containing materials (ACM), but that this effort had been largely abandoned as its findings were not replicated elsewhere.
- Questions were raised about what is an appropriate threshold for “asbestos-containing material” and what that threshold means in terms of corresponding risk. Several participants asked if the 1% limit was reasonable. It was noted that products that contain less than 1% asbestos can still create a significant airborne exposure hazard.
- Some participants disputed the statement that asbestos is no longer used in consumer products. It was claimed that asbestos is still used in products, which may be mislabeled or misleading. A need for more information was identified, and it was suggested that the information should be made public regarding which products contain asbestos.
- Participants asked whether any federal agency had direct jurisdiction over the monitoring of asbestos in products, and if asbestos-containing materials are being imported.
- It was suggested that workers and members of the public are unknowingly buying products that contain asbestos. The question was raised, how can workers safely deal with the product if they don’t know it contains asbestos? There was some discussion about whether a threshold level of asbestos content can or should be set.
- Several participants suggested that the North American Free Trade Agreement (NAFTA) is part of the reason that asbestos-containing products are coming back into the U.S., due to the provisions by which industries can file suit against environmental regulations and laws that they feel are unreasonable restrictions on free trade. Other participants suggested that products are not being reintroduced, but simply never were removed from the U.S. market in the first place.

- The use of “chrysotile” on labels was identified as an example of misleading or inadequate labeling, since most consumers don’t know that chrysotile is a form of asbestos. There seemed to be broad support for more clarity on labels.
- The U.S. Consumer Product Safety Commission (CPSC) was identified as having responsibility for enforcement of labeling requirements for certain asbestos-containing products. It was noted that CPSC has a list of banned products and works with the U.S. Customs Service [now the Bureau of Customs and Border Protection] to control imports of hazardous products.
- It was noted that some uses of asbestos have been banned and that others have not. Statistics cited indicate that even the legal uses are declining, down to 9000 tons (down from 800,000 tons). Of that, 90% is roof coatings, brakes (for another 2 years), and gaskets (primarily for petrochemical industry).
- Some participants suggested that the “unintentional” products (those to which asbestos has not been added by design) should be considered a separate class from the “intentional” products and that to lump those products in with traditional asbestos-containing materials is probably not appropriate.
- Some participants questioned if, given the decline in the use of asbestos in domestically-manufactured products, EPA should revisit the ban. This would have a tremendous positive economic impact since the NESHAP rule could be changed: if asbestos were banned, it was said, agencies and private building owners could be more certain that new buildings would not have ACM, and could save money on inspections for asbestos.

Education, Outreach, and Oversight

The following were the key issues discussed during the focus group related to education, outreach, and oversight:

- Many participants agreed that one goal of this process should be to provide immediate advice for EPA on how to use their limited resources regarding education, outreach, and oversight.
- It was noted that workers who renovate, repair or demolish buildings are not given proper training, and that owners, contractors and workers need education. Several participants also noted that some of these workers are immigrants, and education/outreach is needed to inform the workers of their rights. Participants stressed the need for this education as well as product labels to be available in the native languages of immigrant workers.
- Comments indicated that the Environmental Information Association (EIA) has conducted a cooperative effort among the agencies, educators, and regulated community over the past seven years. This process, including ongoing seminars, has kept a lot of owners out of trouble and regulators in compliance. It was suggested that EPA can support efforts like this – not necessarily through funding, as the abatement contractors benefit enough that they are willing to support it – but through participation. EIA has employed this process through local partners in Florida, New Mexico, Utah and Arizona.
- Participants observed that training fraud is an issue, especially worker training fraud. Solutions suggested included more prosecutions and more training record audits.
- Insurance companies and lending agencies were identified as key stakeholders able to influence the behavior of building owners. Compliance with existing regulations could be encouraged through a cooperative agreement with insurers and lenders.

- Most participants agreed that the existing guidance material needs to be updated by EPA, since the most recent guidance material is now over 12 years old.

Enforcement and State Actions

The following were the key issues discussed during the focus group related to needed state actions:

- It was stressed that every state has NESHAP-designated agencies. Participants suggested that EPA ought to support those agencies in oversight and enforcement of AHERA and the Model Accreditation Plan (MAP). [Clarification: States can apply for authority over AHERA and MAP, and if they do not, these programs are enforced by federal agencies. So far, thirty-nine states have MAP authority and nine have AHERA authority. Authority over these programs is not usually vested in the NESHAP-designated agency. The comment was directed at including AHERA and MAP authority under the NESHAP agency and not under a separate agency.]
- It was noted that NESHAP neither establishes a numerical risk threshold nor sets a specific air standard. NESHAP deals with work practices and how abatement is actually done. Participants identified the need for inspections, enforcement, outreach, and communication, as well as for adequate workers doing an adequate job. [Clarification: NESHAP does require “no visible emissions” during building demolition and renovation operations. A risk assessment was performed before the standard was promulgated, and during the various revisions. Since the standard is promulgated under the authority of the Clean Air Act and the Toxic Substances Control Act there must be a showing of significant risk, and the agency is permitted to regulate both the outside air (no visible emissions) and work practices (wet methods, etc.).]
- It was suggested that owners have to take more responsibility over who they hire, and that owners need incentive to support oversight. It was suggested that EPA and/or the states should start taking NESHAP enforcement actions against building owners, to encourage building owners to be more involved in the demolition and renovation process. To date, it has been EPA’s policy to take action only against contractors.
- Some participants expressed the view that NESHAP rules are relatively well-designed and effective, but they are not enforced at a federal or state level. The EIA effort described above is aimed at encouraging compliance with NESHAP, and aiding enforcement. Participants noted that some areas of the NESHAP rules still need modification. Rules regarding demolition were seen as one example of an area for improvement.
- Inadequate or questionable enforcement of existing training rules was identified as an area of concern, with increased enforcement as a possible solution.
- Participants discussed innovative approaches in various states and regions:
 - It was noted that, in the Southwest, EIA has served as a platform that is independent of the regulating and regulated communities. In this seven-year cooperative effort among the agencies, educators, and the regulated community, ongoing seminars and education efforts have worked to keep facility owners, contractors, and state regulators in compliance with federal requirements. This effort is funded by local asbestos abatement contractors.

- Participants spoke positively of the NESHAP program in Michigan. This program provides outreach, oversight, and education, and is entirely funded by a 1% surcharge on asbestos removal fees.
- Participants also cited the NESHAP program in Wisconsin as a positive case. It was noted that, in the last five years, fire departments were not complying with the requirements regarding asbestos. The NESHAP agency explained the rule to them and held statewide meetings on asbestos, bringing in the contractors, building inspectors, fire departments, and others. The result has been an increase in notifications of asbestos hazards.

Federal Actions

The following were the key issues discussed during the focus group related to needed federal actions:

- Aggressive enforcement of existing laws and regulations was seen as important. This was highlighted as one of the most important issues for worker protection.
- Voluntary consensus standards were seen as an effective complement to regulation.
- Some participants advocated filling definitional and other gaps in existing regulations. This would involve clarifying the definition sections of NESHAP, AHERA, OSHA, according to already published letters of intent. Others cautioned against “clarifying” the regulations in such a way as to weaken them.
- Concern was expressed over the fact that OSHA was not present at the meeting. It was clarified that OSHA had participated in earlier interviews. Their absence was still noted as significant, and there was strong support for federal initiatives to visibly demonstrate coordination across all relevant agencies.
- The question was raised as to whether or not the various federal agencies should employ different standards since they regulate different environments (i.e., mines, workplaces, schools).
- It was also noted that resources are very limited and must be focused on activities offering the greatest public benefit.
- Education and outreach is seen by most participants as lacking, although most believe this is where federal agencies can get the most “bang for the buck.”

Forms of Asbestos and Definitional Issues

The following were the key issues discussed during the focus group related to the forms of asbestos:

- Participants discussed whether or not it was appropriate to treat the various forms of asbestos differently due to the varying levels of health risks posed. Some suggested that the best solution may be to do nothing – creating several sets of standards might not be worth the cost and complication. Others recommended further research into the toxicity of different forms and of different fiber shapes within each mineral type.
- It was asked if there should be a more inclusive definition of hazardous durable fibers. Concerns were again raised about whether change would exacerbate rather than reduce confusion. This was countered by the comment that the durable fibers involved in the Libby situation were arguably not covered by existing official definitions of asbestos.

Medical Issues

The following were the key discussion points during the focus group related to medical issues:

- Participants supported the idea that early recognition of illness is a problem that must continue to be addressed. A need was seen to be able to assess the disease both in individuals and in populations.
- It was noted that the medical community does not always know if they can achieve early detection of mesothelioma or asbestosis with Computerized Axial Tomography (CAT) scans. Needs were identified for determining if early detections can be achieved, if there are effective medical options such that early detection can benefit the workers, and if early detection leads to workplace interventions. Needs were also seen for conducting more epidemiological studies, and developing a better medical monitoring program, including clarification of mesothelioma in International Classification of Diseases (ICD) codes. A clearinghouse for medical information was suggested, possibly a mesothelioma registry as exists in other countries.
- It was recommended that OSHA should require a licensed physician certified in occupational disability medicine to sign off on the workers' physicals.

Naturally Occurring and Contaminant Asbestos

The following were the key issues discussed during the focus group related to naturally occurring and contaminant asbestos:

- Participants generally agreed that current regulations do not sufficiently address most of the asbestos in Libby, Montana. This was seen as a matter of definitions or semantics – comments indicated that the minerals present in Libby are closely related to regulated forms of asbestos (tremolite).
- It was stated that a range of unresolved issues exist with naturally occurring asbestos or asbestos as a contaminant in other mineral products. For example, it is not possible to manage 20% of the state of California because it has naturally occurring asbestos – another approach is needed. The question was raised if there were examples of the issue being successfully addressed. Some said that there is no mechanism to handle naturally occurring asbestos in large geographic areas; others noted that California has in fact addressed this, but some did not feel the solution in that case was a good model to replicate. The California approach needs further evaluation.
- Many participants agreed that asbestos in building materials should not be the sole focus of this process.
- It was noted that mineral industries such as the vermiculite industry often include many small companies. These companies are affected by the perception that their output contains asbestos, and are in the difficult and costly position of trying to prove a negative. Further, it was noted that the vermiculite industry would look for some level of certainty as to how agencies or legislation will ultimately require assessment and control of the presence of fibrous structures. Participants noted that there are six types of federally-regulated asbestos; beyond these, they noted, many other substances can be present in a mineral ore, and the level of risk from those other structures is not quantified. A need for more data on this was recognized, as the unknowns have a profound economic effect on the whole minerals industry.

- Participants asked if it would be possible and reasonable to expand the list of materials that are assumed to be non-asbestos-containing. A question exists regarding the cost of obtaining the evidence to support such an expansion and whether the reported problems created by the status quo justify those costs.
- It was stated that existing methods were developed for commercial asbestos products, and that agencies do not really have adequate methods to analyze naturally occurring asbestos. Naturally occurring asbestos was cited as being harder to manage, as it is in soils or large-scale areas. More information was seen as necessary to understand the hazards and what kind of response is indicated.
- Participants noted that secondary exposure (e.g., clothing taken home) and dust from uncontrolled demolitions remain other possible pathways for asbestos exposure.
- Participants were interested in the assertion that asbestos as a contaminant is not a problem because mining companies will avoid asbestos deposits. This was seen as positive if it signals a willingness to consciously and diligently avoid asbestos deposits.

Risk Assessment and Analysis

The following were the key issues discussed during the focus group related to risk assessment:

- Participants suggested that risk is a factor not only of fiber type (whether it is classified as one of the six or another mineral) but also of fiber shape, size, and solubility.
- Some commented that the presence of asbestos cannot be eliminated and that it is necessary to identify some level of acceptable risk. Other participants questioned the feasibility of doing this.
- Other participants expressed the view that the risk of asbestos can be entirely eliminated, by substitution of new materials or completing the ban on asbestos.
- There was considerable discussion as to whether we should consider the actual exposure (based upon fiber count in the air) or the potential risk (based on the condition of the material and asbestos content of the material). This appears to be a fundamental question to be addressed.
- Participants suggested that if there is a potential for exposure, it is important to deal with this issue before it becomes an airborne measurable amount and presents an actual risk, but others noted that asbestos content within a material does not necessarily correspond to asbestos exposure.
- Participants noted that risk assessment presupposes that we have good data, and questioned if this is a valid assumption. To aid in the discussion, participants were asked if there are important uncertainties that should still be addressed.
- It was noted that background levels of asbestos exist, and Japanese studies were cited for more information. Therefore, there has to be an unreasonable risk level established in order for us to take action. It was noted that we cannot have an “everything is asbestos” definition, nor can we have a “one particle is too many” standard.
- Participants explained that risk assessment can be conducted in terms of health risk; or rate of exposure; or hazard assessment; or the rate of disease among exposed individuals.
- Some saw the public as generally unable to judge risk accurately, and advocated increased education about what the risk is in cases where there is potential asbestos exposure.
- The question was raised as to what should be said regarding risk when scientific certainty is lacking. In particular, the obligation of federal agencies was questioned. Participants

noted that resolving this question should be considered a long-term goal, but that thinking about it should shape our decisions.

- Participants questioned the need for determining precise risk relationships. The opinion was expressed that if we had more accurate data and could determine exactly what level of exposure was associated with what risk, better decisions could be made related to risk management. Several participants, however, cautioned that given that people are still being exposed to asbestos, it is irrelevant to try to figure out exactly what the safe level is.
- One question raised that may require some discussion is “What mineralogical characteristics are associated with risk?”
- Some indicated that there may be merit in convening a neutral panel of scientific experts simply to review the state of the science on asbestos risk and identify priority issues for further analysis.

Techniques for Fiber Counting and Identification

The following were the key issues discussed during the focus group related to various analytical techniques:

- There was considerable discussion over the proper analytical techniques to use – Phase Contrast Microscopy (PCM) and Transmission Electron Microscopy (TEM) will give different results in fiber counts. [Clarification: With the Proficiency Analytical Testing Program and the Asbestos Analysts’ Registry this source of variation can be estimated for PCM; and the NIST National Voluntary Laboratory Accreditation Program (NVLAP) provides information regarding inter-laboratory variability as well.]
- Participants generally accepted that the quality of the analysis varies considerably from lab to lab, according to the skills of the analyst.
- It was noted that different methods may be applied for examination of bulk materials versus examination of air samples.
- Participants noted that different federal agencies employ different fiber counting criteria.
- Participants suggested that agencies may want to require PLM point counting in some circumstances. Participants recommended examining where point counting is required and where it might be used. [Clarification: EPA NESHAP regulations require point counting for materials where asbestos is detected at a level of less than ten percent. In practice, point counting is done for materials where asbestos is detected, but less than one percent. For most materials where asbestos is detected at greater than one percent, but less than ten percent, building owners accept the material as ACM and treat it accordingly.]

Appendix G: Nations with Existing or Pending Bans on Asbestos⁸⁰

1. Argentina (2001)
2. Australia (2003)
3. Austria (1990)
4. Belgium (1998)
5. Chile (2001)
6. Croatia (2005)
7. Czech Republic (prior to 2001)
8. Denmark (1986)
9. European Union (Amphiboles banned; limited exceptions for chrysotile, but these do not include mastics, sealants, joint compounds, or mortars. Member states must implement this ban by 2005.)
10. Finland (1993)
11. France (1996)
12. Germany (1993)
13. Greece (2005)
14. Hungary (2005)
15. Iceland (1983)
16. Ireland (2000)
17. Italy (1992)
18. Latvia (2001)
19. Luxembourg (2002)
20. Netherlands (1991)
21. New Zealand (timeframe unknown)
22. Norway (1984)
23. Poland (1997)
24. Portugal (2005)
25. Saudi Arabia (1998)
26. Slovak Republic (2002)
27. Slovenia (prior to 2001)
28. Spain (2002)
29. Sweden (1986)
30. Switzerland (1989)
31. United Kingdom (1999)

Most of the above nations outlined exemptions for specific uses (such as defense-related applications). Some applied sunset provisions to these exemptions. Some countries have had earlier bans on amphiboles, and are now expanding the bans to include chrysotile. All European Union countries will ban asbestos by 2005.

⁸⁰ Most data from Laurie Kazan-Allen, International Ban Asbestos Secretariat page at http://www.ibas.btinternet.co.uk/Frames/f_asbestos_ban_list.htm.

Appendix H: Additional Opinions and Views

As previously set forth, the *Asbestos Strategies* process was designed to elicit, in a relatively short period, a sense of significant issues regarding asbestos and ideas for going forward. It is not an official government document and does not purport to be based on a perfect sample of opinions. Views were solicited across a very wide spectrum of industry, academic, non-governmental organizations, and government leaders; not all chose to participate. The recommendations herein do not reflect a consensus or the results of a vote; rather, they reflect judgments based upon:

- 1) The frequency and persuasiveness with which views were expressed;
- 2) The extent to which views expressed are consistent with other data and experience; and,
- 3) The prospects that ideas expressed can be implemented in a reasonable time frame and can contribute positive outcomes.

In keeping with the spirit and commitments established at the beginning of this process, views have been reported without attribution. To be as fair as possible we also relate here, in summary form, all views expressed in the process that are not reflected in the primary report. Participants are welcome to publicly express more fully any separate and/or additional views that they have. Since this is neither a consensus-building exercise nor an official government process, the authors hope that they have been as fair to the participants as the timing and scope of this project permitted.

Comments listed here include responses to the content of the report as well as additional opinions relating to the focus of the *Asbestos Strategies* process on oversight, outreach, and education. Comments on issues significantly beyond the scope of the process, although important in their own right, could not be included here.

Action 1: Update the Existing Asbestos-in-Buildings Guidance Documents

- **Recommendation:** The U.S. Environmental Protection Agency (EPA) should update the “purple book” guidance document to make it the premier technical resource for managing asbestos in buildings and facilities, including industrial settings. The revised resource should include updated “green book” information, and should be consistent with current federal regulations and good practices that have evolved since the release of the “purple book” in 1985. The resulting resource, in a form such as an online integrated database of all relevant documents, will facilitate compliance with existing regulations, reducing asbestos exposure among contractors working in buildings.
- **Comment:** Participants did not agree with the recommendation to update the guidance documents in the absence of identification of specific areas where the guidance documents are inadequate.
- **Comment:** Participants suggested that the needed areas of improvement are known, and that a project committee formed by the National Institute of Building Sciences (NIBS) could address this issue very well. Such a committee, it was suggested, should include members of the Environmental Information Association (EIA).
- **Comment:** While recognizing the need to balance the opinions from a wide range of affected constituents, participants expressed concern that revisions to the “purple book” could open the

revised document up to current pressures to soften the requirements. Participants emphasized that the revised document must not allow the dilution of the expressed message to detect and control asbestos containing materials.

- **Comment:** Participants specifically requested changes to the NESHAP regulations in order to clarify the definition of a facility. It was noted that private homes of four or fewer units are exempt from NESHAP, even if they are part of a larger project, installation or for institutional use. This regulation apparently supersedes any state interpretations or applicability determination.
- **Comment:** Participants recommended that the regulations be changed to allow states to accept electronic notifications in addition to the currently acceptable methods of delivery.

Action 2: Encourage Compliance with Existing Regulations

- **Recommendation:** Regulatory agencies should encourage compliance with existing regulations and good practices for managing asbestos in buildings and conducting response actions. This may be accomplished through a series of asbestos awareness seminars directed at the regulated community (building owners, contractors and consultants). The seminars should be sponsored by EPA and the Occupational Safety and Health Administration (OSHA), and hosted by the resident state asbestos authority. Joint sponsorship would be extremely valuable. The seminars should be held in conjunction with national or regional meetings of professional/trade associations, such as EIA, IFMA, BOMA, and AIA, to encourage participation by the target audience. Regulatory compliance will increase worker and building occupant safety, reduce asbestos exposure, and decrease costs associated with liability. This action should be undertaken in the context of a long-term effort to enforce existing regulations and improve consistency among agencies.
- **Comment:** Participants suggested that education, outreach, and voluntary compliance are not as useful as enforcement. These participants suggested that “voluntary” programs need consequences in order to be effective, and that more resources and emphasis be devoted to enforcement at the state and federal level.
- **Comment:** Participants noted that to be effective, rather than just punitive, enhanced enforcement will still require education and outreach.
- **Comment:** Participants suggested that forums sponsored by industry associations would provide better results than forums sponsored and organized by federal agencies.
- **Comment:** Participants suggested that NIBS would be the best organization to convene a forum. Participants noted that NIBS has excellent connections to BOMA, AIA, National Society of Professional Engineers (NSPE), and many other organizations related to the built environment, and also has an excellent staff skilled in organizing forums.
- **Comment:** Participants expressed the opinion that a critical factor in encouraging compliance is to explain to the regulated community why the regulations are important.
- **Comment:** Participants noted that one successful approach involves designing seminars around the belief that regulated constituents would not comply with asbestos rules unless they knew the basic requirements and the reasons behind them.
- **Comment:** Participants suggested guidelines for seminars, including the following:
 - The seminar content and presentations must include state/local requirements and violation findings;
 - The seminar content and presentations must be balanced and convincing, but not radical;

- The presenters must be effective lecturers. Many state and local regulators are not effective lecturers;
- It can be effective to include seminar attendance, including multiple attendees per regulated constituent, as a part of enforcement settlements;
- There must be benefits for attending, such as earning a training certificate;
- The seminars must be short enough to be affordable in terms of total costs, but long enough to present the “what and why” content;
- There should be a small registration fee. Free is often perceived as having little or no value. Too high a fee is often perceived as being presented for the financial benefit of the sponsoring organization;
- Requiring advanced registration is an impediment to attendance; and,
- Other regulated issues can be introduced at these seminars, such as lead-based paint requirements.

Action 3: Clarify the Asbestos Definition to Address Asbestos Contamination in Vermiculite and Other Minerals

- **Recommendation:** The Libby vermiculite situation should be considered an important lesson, but not be treated as a typical case. A federal process should be undertaken promptly to clarify the definition of “asbestos.” Many parties recommend that the definition should include all asbestiform amphiboles, in addition to currently regulated amphiboles and chrysotile. An evaluation by EPA, OSHA and the Mine Safety and Health Administration (MSHA) will be needed to determine procedurally how this should be accomplished, and what consequences such a clarification might have, if any, on other industries. This definition, if adopted, would enable federal agencies to address the risk of exposure from minerals such as winchite and richterite. The U.S. Geological Survey (USGS), trade associations, and other organizations will be able to serve as resources for clarifying and understanding the science associated with creating a new definition.
- **Comment:** Participants suggested that the definition of asbestos should be based on chemical properties and should not be extended to all fibers based on shape.
- **Comment:** Participants felt that the current definition is inaccurate, too broad and is not useful or protective of public health. These participants felt that a consistent mineralogical definition was needed.
- **Comment:** Participants suggested expanding the definition of asbestos, not only to include winchite and richterite (the forms found at Libby) but also asbestiform incidences of minerals such as talc, mica, and taconite.
- **Comment:** Participants suggested that a more effective solution would be to regulate all amphibole asbestos while leaving out specific mineral names.
- **Comment:** Participants suggested that the definition of asbestos should be expanded to include more minerals, focusing on those that form longer and thinner fibers. Others suggested focusing on the range of hazardous durable fibers.
- **Comment:** Participants suggested that, if the range of minerals addressed by asbestos regulations is to be expanded, refractory ceramic fibers (RCF) should be subject to similar regulations. RCF, often used as an asbestos substitute (for example, in high-temperature insulation), appears to have similar hazardous effects to asbestos. Participants noted that this would require a literature review of RCF health effects data.

- **Comment:** Participants emphasized that lack of research should not be construed to suggest that a material is potentially safe.
- **Comment:** Participants expressed the opinion that it is not appropriate to use the term “asbestos free” or zero asbestos level. Because asbestos is ubiquitous in the air at low levels, it is a natural part of the background environment.
- **Comment:** Participants expressed concern that any regulation of asbestiform amphiboles take care to exclude non-asbestiform shapes such as cleavage fragments, scrolls, shards, and other forms.

Action 4: Advance a Federal Legislative Ban on Asbestos

- **Recommendation:** A clearly defined legislative ban on the production, manufacture, distribution and importation of products with commercially-added asbestos is the most direct means to address concerns about remaining health risk and reduce future costs for facility owners and managers. Such a ban should be proposed by the Congress, promptly debated, and conclusively resolved. Enabling legislation would eliminate remaining products by a specified date, and installation of those products by a later date. Jurisdictional issues could be addressed in Congressional legislation that might not be achievable by individual agency rule-makings. Exceptions may be necessary for a small number of applications for which substitutes may not be available, and for research purposes. Implementing regulations, and perhaps the enabling legislation itself, could be challenged in the courts. A regulatory ban is within EPA’s authority and is also an option.
 - *Declining to Support or Oppose*
- **Comment:** Some stakeholders took no position on this recommendation, on the grounds that it is not their role to tell anyone they may or may not manufacture, sell or use a product.
 - *Opposing a Ban*
- **Comment:** The original recommendation called for Congress to “consider a ban on asbestos.” Some participants expressed concern that this recommendation was not warranted and should be removed. Participants also expressed concern that the report does not provide detailed justification for a ban, and that the *Asbestos Strategies* process did not conduct an investigation or study of the remaining uses of asbestos. These participants indicated their opposition to the revised recommendation by highlighting the negligible risk from asbestos in roofing compounds, noting the 1997 U.S. Fifth Circuit Court of Appeals ruling regarding the recent OSHA asbestos standard rulemaking. This ruling indicated that OSHA offered no evidence of exposures due to the permanent encapsulation of the fibers in asphalt. In addition, participants suggested that the resources that are necessary to assess asbestos toxicity and exposures and the toxicity, efficacy and exposures of substitutes for asbestos are unlikely to improve the health and safety of any American citizen. The participants noted that only chrysotile asbestos is used in the U.S., and that chrysotile is less hazardous than amphiboles.
- **Comment:** Participants noted that, while some applications should be banned, an absolute ban would prohibit some applications for which the benefits outweigh the risks and for which there are no good substitutes. In such cases, a ban would not be protective of public health. Participants expressed concern that this recommendation was not based on a risk/benefit analysis for each remaining application and its substitutes.

➤ *Supporting the Proposal of a Ban*

- **Comment:** Participants noted that this recommendation should focus on a process that involves considering the evidence for and against a ban. While an overwhelming majority of participants supported a ban, and while a ban appears to be feasible and could provide specific benefits, the *Asbestos Strategies* process did not conduct a thorough investigation of all the issues associated with enacting a ban.
- **Comment:** A large number of participants from a wide range of sectors expressed support for the final wording of the recommendation. Most of these participants support a ban on asbestos, but recognize the need for a deliberative process.

➤ *Supporting the Enactment of a Ban*

- **Comment:** Many participants expressed concern that the original recommendation to consider a ban on asbestos was too weak and that a recommendation to enact a ban was necessary and appropriate. Some of these supported the revision, while others felt that the final wording of the recommendation should have specifically advised the Congress to “conclusively resolve” the process by enacting a ban.
- **Comment:** Participants saw a ban on asbestos as feasible due to the dramatic decline of asbestos use in products and the success of asbestos bans in many other countries. It was seen as desirable due in part to the assurance it would provide to building owners and facility managers that new asbestos-containing materials would no longer be installed.
- **Comment:** Some participants suggested that this report be used to support the reintroduction of the “Ban Asbestos in America Act.”
- **Comment:** Participants noted that it is not logical to expect Congress to act on the litigation issue, and yet allow asbestos to remain in commerce.

➤ *Asbestos in Place*

- **Comment:** Of those advocating a ban, none suggested that such a ban should require the removal of all in-place asbestos.
- **Comment:** Some recommended that the ban *not* require the removal of in-place asbestos-containing materials beyond the removal requirements already in current rules and regulations. The purpose of this is to ensure that the ban focuses on production, manufacture, distribution and importation of asbestos; while future removal requirements are possible, such regulations should be made explicitly for that purpose.

➤ *Implementation*

- **Comment:** Participants noted that a ban would probably take many years (possibly 10-15) to draft, debate, finalize, and implement, and that it is likely to be tied up with litigation at the federal and international levels. These participants suggested that such caution does not mean that a ban is not worthy of trying again, but rather that it is important to anticipate the nature and extent of problems that will likely be encountered. Other participants expressed the opinion that a ban could take effect much sooner, suggesting that two years was a more accurate timeframe.
- **Comment:** Participants suggested that, if authorized through an Act of Congress, a ban would not likely be challenged in the courts since the only recourse would be to argue that a ban was unconstitutional. It was suggested that, using lessons learned from previous efforts such as the

ban on polychlorinated biphenyls, a legislative ban could be drafted that would narrow the grounds for challenging EPA's implementing regulations.

- **Comment:** Participants recommended that a complete ban be preceded by a phase-out period over a number of years (possibly five years). A gradual phase-out will enable regulatory agencies to develop the implementing process, and will give businesses the necessary time to adjust their purchasing decisions.
- **Comment:** Participants recommended that the legislative ban approach be linked to the proposal currently being debated in Congress to develop an asbestos compensation fund that would authorize more than \$100 billion to compensate asbestos victims, cap liability and reduce the numbers of court cases. The participants suggested that eliminating any future environmental loadings of asbestos would reduce future exposure, numbers of victims and claims, and also reduce future economic uncertainty of the business and insurance communities. National security and other essential uses for which no viable substitutes exist would be exempt.

➤ *Addition of a Labeling Requirement*

- **Comment:** Participants suggested that the recommendation for a ban should include a recommendation for a specific and enforced labeling requirement for all products containing one percent or more asbestos. The labeling requirement would rapidly lead to asbestos being taken out of most remaining materials which contain greater than one percent asbestos, even before the ban went into effect.
- **Comment:** Participants noted that labeling requirements for asbestos-containing materials already exist. The requirements referred to were: 1) any product that contains greater than one percent commercially-added asbestos is required to be labeled (with additional hazard warnings) that the product is an Asbestos Containing Material; and 2) if the product contains greater than 0.1% asbestos then it must be disclosed within the Material Safety Data Sheet (MSDS) for the product that asbestos at this level exists or may exist.

➤ *Naturally Occurring Asbestos Versus Commercially-Added Asbestos*

- **Report:** The report provided separate recommendations to address asbestos as a contaminant in products, focusing on clarifying the definition of asbestos, enforcing existing regulations, and implementing labeling requirements and other processes to safeguard the public health against naturally-occurring asbestos in mineral products. A ban on commercially-added asbestos was suggested as one tool among many to address the inclusion of asbestos in the manufacture of products.
- **Comment:** Participants expressed concern that prohibiting only commercially-added asbestos could allow the unintentional addition of enough asbestos fibers to yield a product containing more than one percent asbestos. There was concern that such a ban would allow future occurrences of disasters such as Libby.
- **Comment:** Many participants suggested that the ban apply to products with naturally occurring asbestos, specifying a non-zero allowable maximum (that is, a level above which the ban takes effect and below which a product is considered to be asbestos-free). Specified levels suggested included .1%, .05%, and .01%. A wide range of alternative language was proposed.
- **Comment:** Participants noted that a blanket prohibition on “commercially-added asbestos” could be interpreted as a ban on the addition of any mineral products which contain a single fiber of asbestos.

- **Comment:** Participants suggested that “commercially-added asbestos” should be clearly defined as asbestos intentionally added to a product – not asbestos unintentionally added to commercial products as a contaminant.
- **Comment:** Participants referred to the *Consultative Document for the Proposal to Amend the Asbestos (Prohibition) Regulations (1992)*, issued by the United Kingdom Health and Safety Executive, as a document that addresses many of the issues surrounding a ban on intentionally-added asbestos.
- **Comment:** Participants noted that, even in countries which have banned asbestos, a non-zero allowable maximum level has been established (such as .01% in Denmark).
 - *Health-Based Standards*
- **Comment:** Participants advocated the use of health-based standards for a ban. Participants expressed concerns that: a ban based on the current definition of asbestos-containing products will reduce exposure, but will not eliminate harmful asbestos products from commerce; it is not possible to effectively ban asbestos products until it is known which products that contain asbestos are truly harmful; only health-based asbestos hazard standards can determine which products are truly harmful; and, a legislative ban based on current standards would be beneficial, but it should allow for adjustments based on future standards development, including the development of health-based standards.
 - *Asbestos Fireproofing*
- **Report:** Neither the *Asbestos Strategies* meeting nor the report discussed the risks and benefits of asbestos fireproofing nor its effectiveness compared to alternatives. The report noted that the spray form of fireproofing is prohibited by regulation. A ban on asbestos would naturally preclude the further use of asbestos fireproofing.
- **Comment:** Participants suggested that fireproofing for buildings may be one instance where the benefits of asbestos use may outweigh the risks.
- **Comment:** The application of asbestos for fireproofing was widely seen as one of the most dangerous uses of asbestos by a number of participants. Participants vehemently disagreed with the assertion that the benefits outweighed the risks.

Action 5: Develop a National Mesothelioma Registry

- **Recommendation:** A national mesothelioma registry is necessary to facilitate epidemiological studies to evaluate the effects of asbestos exposure. Many countries and some states have established mesothelioma registries. The establishment of such a registry would likely be performed by agencies within the Centers for Disease Control (CDC), including the National Center for Health Statistics, National Institute for Occupational Safety and Health (NIOSH), and the National Center for Environmental Health, in conjunction with the Agency for Toxic Substances and Disease Registry and state public health departments. An accompanying effort to connect interested parties with the best experts and data would improve research and treatment of asbestos-related disease.
- **Comment:** Participants felt that a mesothelioma registry would not facilitate epidemiological studies to evaluate the effects of asbestos exposure, because it would include a large percentage of cases with causal pathways other than asbestos exposure. It was suggested instead to establish exposure registries of asbestos workers and persons living in communities with high asbestos exposure.

- **Comment:** Participants suggested that an international registry would gather more cases for study versus a national registry. Such an international registry reportedly already exists.
- **Comment:** Participants noted that a national registry was proposed in the “Ban Asbestos in America Act” (S 2641). It was suggested that additional epidemiological studies focus on exposure to durable synthetic fibers such as Refractory Ceramic Fiber.
- **Comment:** Participants suggested a medical surveillance program for at-risk individuals.
- **Comment:** Participants advised that concerns regarding patient confidentiality must be addressed, and that this could be accomplished by limiting access to the registry to medical researchers.
- **Comment:** Participants advised that existing cancer registries provide a good basis for this effort, and that it is not appropriate to divert resources from the existing registries to create a new one. The existing cancer registries currently do not include information on asbestos exposure, either occupation or environmental, and should be expanded to include that information.

Actions 6: Update Asbestos Model Training Criteria

- **Recommendation:** EPA should update the model training curricula to ensure that all relevant agencies’ priorities are reflected. Updating the training will make the curricula consistent with existing regulations and increase worker safety. The updated versions should cover the revised OSHA asbestos standards, revised EPA asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) standards, EPA Worker Protection Rule, new respirator designations/regulations, and other topics. The training providers should also be permitted to vary the course content in refresher courses.
- **Comment:** Participants advised that, in states with asbestos licensing, the course content is specified in the state regulations, which would have to be changed in order to conform to a revised Model Accreditation Plan.
- **Comment:** Participants noted that the training curricula met the needs of the Asbestos Hazard Emergency Response Act (AHERA) laws back in 1986, but that it is barely adequate in 2003 and is extremely inadequate with regard to industrial situations.
- **Comment:** Participants noted that it is also important to evaluate what is a necessary frequency for asbestos refresher training among professionals with different levels of experience with asbestos in their work.

Action 7: Enforce Existing Asbestos Regulations

- **Recommendation:** EPA, OSHA, and Consumer Product Safety Commission (CPSC) should focus on more stringent, predictable, and consistent enforcement of existing regulations, which may offer greater benefit than committing scarce resources to new rule-making efforts. This recommendation can be implemented immediately; however, such an effort must continue for the long-term. Consistent interpretations and streamlining across agencies will lead to increased compliance and potential reduced liability for businesses.
- **Comment:** Participants expressed the view that voluntary compliance and outreach and education were not sufficient by themselves to address the risks from asbestos. Many participants suggested increasing enforcement activities.
- **Comment:** Participants advocated specific enforcement actions. These include:
 - Increasing the number of audits of training records and prosecutions for training fraud;

- Improving pre-inspection of facilities before beginning a renovation or demolition project;
- Allocating more resources to enforcement at the state level; and,
- Focusing on occupational exposure.

Action 8: Reduce Unintended Asbestos in Products

- **Recommendation:** Reduction of naturally occurring asbestos in products could be achieved by a program set up by a consortium of mining concerns to develop a sampling and analytical protocol to analyze bulk materials at the mining stage for chrysotile and all asbestiform amphibole forms of asbestos. Oversight of such a program may be provided by EPA and MSHA, with technical assistance by NIOSH, the National Institute of Standards and Technology (NIST), and the U.S. Geological Survey (USGS). This program would assist the mining and quarrying industries in avoiding unwanted asbestos in their products. The program would provide a degree of assurance to users of these raw materials that they are not contaminated with asbestos.
- **Comment:** Participants suggested establishing a maximum allowable level for asbestos content, above zero, noting that no mined product can ever be assumed to be entirely free of asbestos. Participants noted that it was unfair to ask a mineral industry to prove the absence of asbestos in its products.
- **Comment:** Participants suggested that methods developed for the analysis of commercial asbestos products are, in fact, adequate for naturally occurring materials.
- **Comment:** Participants expressed concern that the report did not convey the full magnitude of the public health disaster at Libby, Montana. According to ATSDR, between 1979 and 1998, asbestosis mortality in Libby was 40 to 80 times higher than the national average, lung cancer mortality was 20% to 30% higher, and mortality from mesothelioma and other causes was elevated.

Action 9: Address Asbestos-Containing Products in Commerce

- **Recommendation:** A coordinated effort to educate consumers, employers and building owners about products with commercially-added asbestos is necessary. Such a program would assist the target audience in making an informed decision about which products are legally available with commercially added asbestos. This education and outreach effort would be performed by EPA, OSHA and CPSC. These agencies would need to perform research into which products actually have commercially added asbestos, which do not, and which are to be phased out voluntarily by manufacturers.
- **Comment:** Participants suggested that OSHA discard the existing Presumed Asbestos-Containing Materials (PACM) rule. It was recommended that the “one percent” definition be eliminated and replaced with a stricter standard.
- **Comment:** Participants noted that, although some products present a nearly non-existent risk in use, health hazards may still be associated with mining and milling the fiber; product manufacturing, installation, deterioration during use; and product abuse during maintenance and repair. Other participants noted that these actions do constitute “use” and it is not accurate to say that such products present a nearly non-existent risk in use.
- **Comment:** Participants suggested that International Trade Commission statistics should differentiate between asbestos-containing products and similar non-asbestos-containing products (such as asbestos-containing cement and cellulose-containing cement).

- **Comment:** Participants disagreed with the assertion that asbestos is used in new products that are not labeled as asbestos-containing.
- **Comment:** Participants noted that there is no control over the manufacture and sale of products from other countries that contain asbestos and are sold in the U.S.

Action 10: Partner with State Agencies in Support of Asbestos Training

- **Recommendation:** Training providers under the EPA model accreditation plan (MAP) and corresponding state plans should be audited with sufficient frequency to ensure that the training is provided, tests are conducted, records are maintained, and certificates are issued. This action, conducted in concert with Action 6 (Update Asbestos Model Training Criteria), will increase worker safety and the effectiveness of abatement efforts. Reducing the incidence of training fraud will provide greater security to building occupants and owners. Such partnerships will provide better coordination among federal and state agencies.
- **Comment:** Participants expressed the opinion that enforcing current training course regulations (as in this recommendation) is more important than improving asbestos training courses (as in Action 6).

Participants also commented on several additional topics that were not the subject of leading recommendations.

Topic: Risk Assessment and Communication

- **Report:** Risk assessment is incorporated as a component of many other recommendations. The report acknowledges the frequent misperceptions of risk among the public and notes that “public concerns about remaining risk can be mitigated by clarification of information, and coordination among key federal and state agencies.” It also noted that “while it is beyond the scope of this study to address technical aspects of medical risk assessment issues, comments from participants stressed that more precision and clarity of information is needed to properly identify and convey the health risks.” The recommendations were: 1) support existing efforts evaluating the adequacy of current risk assessment methodology; and 2) have EPA and OSHA employ education and outreach to provide reliable risk communication to the regulated community and the public.
- **Comment:** Participants noted that risk may not be accurately quantified by measured air levels. In some instances, risk is assessed by occupant accessibility levels and potential for exposure.
- **Comment:** Participants expressed the opinion that risk assessment should be based on air levels, reflecting actual exposure rather than potential exposure or asbestos content in a material.
- **Comment:** Participants suggested that, since resources for public health are limited, it is important to educate the public about the relative magnitude of health risks from asbestos compared to other hazards.
- **Comment:** One participant noted that risks must guide the regulatory process if changes in the definitions of asbestos are contemplated. This participant suggested that risks must be based on properly conducted animal studies of inhalation and developed cancers of the proposed regulated materials.

Topic: Considering the Effect of Fiber Shape, Type, and Size

- **Report:** The report recommended studying the health effects of other durable naturally occurring fibrous minerals or work that produces cleavage fragments of respirable size and similar composition and shape as asbestos minerals. It recommended support of efforts such as the Agency for Toxic Substances and Disease Registry (ATSDR) panel evaluating the health effects of asbestos and synthetic vitreous fibers and the influence of fiber length. It did not make a recommendation either for or against the establishment of varying exposure levels based on fiber shape, type, or size.
- **Comment:** Participants thought that investigations into the relationship of fiber size (or fiber type) to disease were not necessary since these issues had been settled in previous rounds of policymaking. The European example was highlighted. In Europe, standards were at one time based on fiber type, but this approach was discarded. Participants questioned the value of creating several different classes of toxicity.
- **Comment:** Participants felt that it is appropriate to establish varying safe exposure levels according to the type and size of fiber.
- **Comment:** Participants emphasized that distinctions based on fiber type (i.e. mineral name) are insufficient, since shape and size are more important in determining health risks. Participants expressed the view that EPA overstates the toxicity of some forms of asbestos and understates the toxicity of others.

Topic: Regulatory Policy Changes

- **Report:** The report identified a number of areas where regulatory policy could be strengthened to better protect public health.
- **Comment:** Participants suggested that a committee could be formed to identify the most pervasive regulatory issues that vary across states and make recommendations to eliminate these inconsistencies – perhaps focusing on the ten most common inconsistencies.
- **Comment:** Participants suggested mandating asbestos surveys in all public and commercial buildings.

Topic: Analytical Methods

- **Report:** The report discussed the various methods of testing air samples and bulk materials for asbestos. It noted that the National Institute of Standards and Testing (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP).
- **Comment:** Participants expressed the opinion that current testing laboratories have a very high level of false positives at or near current standards, especially when testing minerals such as vermiculite, talc, taconite, marble, and dolomite. Participants suggested that NIST establish, administer, and monitor a more vigorous testing/training and certification program for contract laboratories to prevent mis-identification of asbestos fibers.
- **Comment:** Participants expressed the opinion that polarized light microscopy (for bulk materials) and phase contrast microscopy (for air analysis) may not be effective at distinguishing potentially hazardous fibers from those that are benign.
- **Comment:** Participants suggested that transmission electron microscopy analysis is extremely reliable if sample preparation is performed correctly.
- **Comment:** Participants expressed the concern that the current regulations regarding analytical methods are sometimes inconsistent, excessively costly, and are not always protective of public health.

- **Comment:** Participants suggested that there is no direct relationship between mass estimates of asbestos concentrations and risk, and that fiber counts are a more useful metric. Therefore, analytical methods that report asbestos concentrations in terms of mass percent should be de-emphasized in favor of other methods that report fiber number concentrations. Moreover, methods that are capable of determining the complete range of sizes of potentially hazardous fibers should be emphasized over methods that are incapable of characterizing the entire range.

Topic: Dust Sampling

- **Report:** The report noted that there are no regulatory standards for dust samples, and the recognized method for dust sampling (ASTM D5755) does not include criteria for interpreting the results.
- **Comment:** Participants expressed the opinion that dust sampling was not discussed in sufficient detail.

Topic: Report Structure

- **Comment:** One participant urged GETF to include the written comments of every *Asbestos Strategies* participant as an appendix to ensure that the recipients of the final report have access to the identity as well as the actual comments submitted. GETF instead included only summarized comments consistent with the policy of non-attribution that was established with all stakeholders at the beginning of this process.

Appendix I: Asbestos Survey Notification Record

001189

**ASBESTOS SURVEY NOTIFICATION RECORD
Verification of Inspection**

AHERA CERTIFIED BUILDING INSPECTOR	1a. Work Site Name, Address, City, County, State		1b. Owner's Name and Mailing Address				
	2. Name & Mailing Address of Company or Individual Conducting Asbestos Survey		3. Analytical Laboratory Name and Address				
	4a. Asbestos NESHAP Regulatory Agency Name & Address for Work Site		4b. OSHA Regulatory Agency Name and Address for Work Site				
	5. APPROXIMATE AMOUNT OF ASBESTOS, INCLUDING:		Amount of RACM to be Removed or Generated	Amount of Nonfriable ACM			
				To Be Removed		Not To Be Removed	
				CAT I	CAT II	CAT I	CAT II
On Facility Components; Pipes (Linear Feet)							
On Facility Components; Surface Area (Sq. Ft.)							
Off Facility Components; Volume (Cubic Feet)							
6. AHERA Building Inspector Certificate No. & Expiration Date							
7. Training Provider Name & Phone No.							
8a. Number of samples analyzed & date of analysis							
8b. <input type="checkbox"/> TSI <input type="checkbox"/> Ceiling Texture <input type="checkbox"/> Duct/Seam Tape <input type="checkbox"/> A/C Pipe <input type="checkbox"/> A/C Siding/Shingles <input type="checkbox"/> VAT/Mastic							
<input type="checkbox"/> Asphaltic Roofing <input type="checkbox"/> Add-on Surfacing Texture on wall systems <input type="checkbox"/> Other please specify:							
9. INSPECTOR'S CERTIFICATION: I hereby declare that the contents of this Asbestos Survey Notification are fully and accurately described above, are classified in all respects to applicable regulations found in title 40, EPA Code of Federal Regulations, Part 61, Subpart M, Asbestos NESHAP, Sec. 61.145(a).							
NOTE: The AHERA Building Inspector must retain a copy of this form.							
Printed / Typed Name & Title		Signature		MO	DAY	YR	
ASBESTOS ABATEMENT AND DEMOLITION CONTRACTORS	10. Asbestos Removal Contractor / Operator acknowledges receipt of this form.						
	Printed / Typed Name, Title, Address & Telephone No.		Signature		MO	DAY	YR
	11. Demolition Contractor / Operator acknowledges receipt of this form.						
Printed / Typed Name, Title, Address & Telephone No.		Signature		MO	DAY	YR	
BUILDING PERMIT AGENCY	12. Renovation/Demolition Permit Number, date of issuance		Parcel Number				
	13. Building Permit Agency acknowledges receipt of this form.		Printed / Typed Name & Title		MO	DAY	YR
		Signature					

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OWNER

- Additional copies of this form are distributed to:**
- Asbestos Abatement Contractor/Operator
 - Demolition Contractor/Operator
 - Building Permit Agency
 - General Contractor/Subcontractors
 - AHERA Building Inspectors/Asbestos Survey Records

Appendix J: Glossary⁸¹

ACGIH – American Conference of Governmental Industrial Hygienists. ACGIH is a not-for-profit organization of industrial hygienists that publishes Threshold Limit Values for asbestos and other chemical and physical agents.

ACM – asbestos-containing materials.

Actinolite – one of five forms of amphibole asbestos specifically named and regulated by the EPA and OSHA.

AHERA – Asbestos Hazard Emergency Response Act of 1986. The stipulations and impact of this Act are discussed in Appendix B.

AIA – Asbestos Information Association. This group was founded in 1970 to represent the interests of the chrysotile asbestos industry in the U.S.

AIHA – American Industrial Hygiene Association. AIHA is the trade association of industrial hygienists. Members work to reduce exposure to hazards in workplaces.

Amosite – one of five forms of amphibole asbestos specifically names and regulated by the EPA and OSHA. It occurs in certain mining districts of southern Africa as the asbestiform variety of cummingtonite-grunerite.

Amphibole (asbestos) – one of the two categories of asbestos that includes the EPA and OSHA regulated forms of asbestos known as actinolite, amosite, anthophyllite, crocidolite, and tremolite. The other category of asbestos is the serpentine variety, known as chrysotile.

Anthophyllite – one of five forms of amphibole asbestos specifically named and regulated by the EPA and OSHA. Major deposits of anthophyllite are located in Finland. It was once commercially exploited from mines in northern Georgia in the United States.

Arc chute – a device used in some electrical switches to protect the switch from damage from electric arcs.

Asbestos (mineralogical definition)⁸² – a group of highly fibrous silicate minerals that readily separate into long, thin, strong fibers that have sufficient flexibility to be woven, are heat resistant and chemically inert, are electrical insulators, and therefore are suitable for uses where incombustible, non-conducting, or chemically resistant material is required.

⁸¹ The U.S. Geological Survey has compiled an extensive list of definitions of asbestos-related terms from a variety of sources: Lowers, H., and Meeker, G., *Tabulation of Asbestos-Related Terminology*, Open-File Report 02-458, online at <http://pubs.usgs.gov/of/2002/ofr-02-458/OFR-02-458-508.pdf>.

⁸² Veblen, D.R. and Wylie, A.G., 1993, *Mineralogy of Amphiboles and 1:1 Layer Silicates* in Guthrie Jr., G.D. and Mossman, B.T., eds., *Health Effects of Mineral Dusts: Reviews in Mineralogy*, v. 28, p. 61-137. Cited by Lowers and Meeker in *Tabulation of Asbestos-Related Terminology*, op. cit.

Asbestos (regulatory definition)⁸³ – the asbestiform varieties of: chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); anthophyllite; tremolite; and actinolite.

Asbestiform – a term used to describe certain minerals that have grown in a fibrous habit.

Asbestos abatement – procedures to control fiber release from asbestos-containing materials or to remove it entirely. These procedures may involve removal, encapsulation, enclosure, encasement, repair, and operations and maintenance programs.

Asbestos-containing material (ACM) – any material that contains more than one percent asbestos.

Asbestos diaphragm – a device containing asbestos used in chlorine manufacturing to separate chloride from sodium in salt water to produce chlorine.

ASHAA – Asbestos School Hazard Abatement Act of 1984.

ASHARA – Asbestos School Hazard Abatement Reauthorization Act of 1990.

ASTM – American Society of Testing and Materials. Founded in 1898, ASTM International is a not-for-profit organization that provides a global forum for the development and publication of voluntary consensus standards for materials, products, systems, and services.

Asbestosis – A disease caused by inhalation exposure to asbestos resulting in scarring of the lung tissue.

ATSDR – Agency for Toxic Substances and Disease Registry, part of the Centers for Disease Control within the U.S. Department of Health and Human Services.

Blue book – a guidance document issued by the EPA in 1983 titled, *Guidance for Controlling Friable Asbestos-Containing Materials in Buildings*, EPA publication no. 560/5-83-002, having a blue cover.

BOMA – Building Owners and Managers Association. BOMA represents the owners and managers of nine billion square feet of North American office space.

CDC – Centers for Disease Control and Prevention, part of the U.S. Department of Health and Human Services.

Chrysotile – the serpentine form of asbestos.

CPSC – U.S. Consumer Product Safety Commission, an independent federal agency.

⁸³ EPA Part 763 – Asbestos Subpart E – *Asbestos-Containing Materials in Schools* (7-1-01 Edition). Cited by Lowers and Meeker in *Tabulation of Asbestos-Related Terminology*, op. cit.

Crocidolite – one of five forms of amphibole asbestos specifically named and regulated by the EPA and OSHA.

DOT – U.S. Department of Transportation.

EIA – Environmental Information Association. EIA is a non-profit group specializing in the dissemination of information about the abatement of asbestos and lead-based paint, indoor air quality, safety and health issues, analytical issues, and environmental site assessments.

EPA – U.S. Environmental Protection Agency. Established in 1970, this federal agency has a mandate to protect human health and to safeguard the natural environment.

FDA – Food and Drug Administration, a division of the U.S. Department of Health and Human Services.

FHSA – Federal Hazardous Substances Act. This Act requires the labeling of certain hazardous household products, and gives the Consumer Product Safety Commission the authority to ban hazardous substances in instances where labeling alone is not sufficient to protect the public health.

Focus group – research involving organized discussion with a selected group of individuals, having a common interest, to gain information about their views and experiences of a topic, such as asbestos.

Friable – a material which when dry may be crumbled, pulverized, or reduced to powder by hand pressure.

Friction products – a group of products that use friction to increase or decrease the speed of a moving part. Common friction products are brakes and clutches.

Gasket – a material used to form a seal between two immovable parts. Sheet gaskets are commonly used on pipe flanges. Rope gaskets are commonly used on oven doors.

GETF – Global Environment and Technology Foundation. GETF is a 503(c)(3) not-for-profit organization that brings together industry, government and communities to address environmental challenges with innovative solutions.

Green book – a guidance document issued by the EPA in 1990 titled, *Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials*, EPA publication no. 20T-2003, having a green cover.

HEI-AR – Health Effects Institute – Asbestos Research. HEI-AR was an independent, non-profit organization formed in 1990 to compile and disseminate reliable and objective information pertaining to the health effects of asbestos. The group completed its research in 1994.

ICD – International Classification of Diseases. The International Classification of Diseases is the classification used to code and classify mortality data from death certificates.

MAC – maximum acceptable concentration.

MAP – Model Accreditation Plan. Training and testing requirements for persons that inspect, develop management plans, conduct, supervise, and design asbestos response actions, found at Appendix C to the EPA AHERA regulations.

Mesothelioma (malignant) – a cancer of the mesothelium, a thin lining covering the major organs of the body. If it originates in the chest cavity, it is called pleural malignant mesothelioma. In the abdominal cavity it is known as peritoneal malignant mesothelioma.

MSDS – Material Safety Data Sheet (or Sheets). These documents provide information on the properties, storage, and handling requirements of chemicals. MSDS also detail the human health effects of hazardous chemicals.

MSHA – Mine Safety and Health Administration. An agency within the U.S. Department of Labor, MSHA oversees workplace safety and health within the mining industry.

NAS – National Academy of Sciences. Established in 1863, the National Academy of Science is a private non-profit institution that advises Congress on scientific issues.

NCSL – National Conference of State Legislatures.

NESHAP – National Emission Standard for Hazardous Air Pollutants. The EPA asbestos NESHAP is found at 40 CFR, Subpart M. The stipulations and impact of NESHAP requirements are discussed briefly in Appendix B.

NIBS – National Institute of Building Sciences. Established in 1974, NIBS is a non-profit, non-governmental organization. It focuses on bringing together the public and private sectors to address issues related to the development of safe, affordable buildings.

NIOSH – National Institute for Occupational Safety and Health. NIOSH is a division of the Centers for Disease Control, within the U.S. Department of Health and Human Services.

NIST – National Institute for Standards and Technology. NIST is an agency of the Technology Administration within the U.S. Department of Commerce.

Nonfriable – a material which when dry may not be crumbled, pulverized, or reduced to powder by hand pressure.

O&M program – operations and maintenance program. An O&M program is a set of procedures designed to reduce asbestos exposure to building workers and occupants in buildings with asbestos-containing materials.

Orange book – a guidance document issued by the EPA in two parts in 1979 titled, *Asbestos-Containing Materials in School Buildings: A Guidance Document*, having an orange cover.

OSHA – Occupational Safety and Health Administration. Established in 1970 as a division of the U.S. Department of Labor, OSHA has a mandate to ensure workplace safety for over 100 million American workers.

PACM – presumed asbestos-containing material; in the OSHA asbestos standards it means thermal system insulation and surfacing material found in buildings constructed not later than 1980

PCM – phase-contrast microscopy; a type of microscopy that uses special illumination to enhance the ability to see fibers. It is a common method to count fibers collected on filters from the air.

Peak exposures – high intensity exposures to a substance, such as asbestos, that occur for brief periods.

PEL – permissible exposure limit.

PLM – polarized light microscopy; a type of microscopy often used to identify asbestos in a material.

Prevalent level – the typical concentration of a substance found in the air, water, soil, or other medium, although the concentration may be higher or lower than this level for brief periods of time.

Purple book – a guidance document issued by the EPA in 1985 titled, *Guidance for Controlling Asbestos-Containing Materials in Buildings*, EPA publication no. 560/5-85-024, having a purple cover.

RACM – regulated asbestos-containing material.

Response action – a method, including removal, encapsulation, enclosure, encasement, repair, and operations and maintenance activities that are designed to reduce asbestos exposure to building workers and occupants.

Richterite – a mineral having an asbestiform variety not listed specifically by EPA or OSHA as “asbestos.”

SEM – scanning electron microscopy.

Serpentine – One of the two categories of asbestos. Chrysotile is the only recognized form of serpentine asbestos. The other category is amphibole asbestos.

Stakeholder – an individual or organization having a specific interest in a topic or issue.

TEM – transmission electron microscopy.

Thermal system insulation – material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other facility components to prevent heat loss or gain, or water condensation, or for other purposes.

TLV – Threshold Limit Value.

TSCA – Toxic Substances Control Act. Enacted in 1976, this Act gives EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States, including asbestos.

TSI – thermal system insulation.

USGS – U.S. Geological Survey. A bureau of the U.S. Department of the Interior, USGS provides geological information to the government and the public. USGS compiles statistics on the use of minerals, including asbestos, in commerce and industry.

Vermiculite – a magnesium silicate mineral (mica) occurring naturally in sheets that has been heated or chemically treated to expand to many times its original size.