PLAINTIFF'S EXHIBIT

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Special Section

Building Owners Find Alternatives To Asbestos Removal, Replacement

Evaluations show that encasement may be a promising, technically viable abatement option

Editor's Note: OH&S presents this article as a reviewed report on new technology, without taking a position on its accuracy or application.

As the medical, legal and emotional issues of the presence of asbestos in buildings increase, owners of occupied commercial, industrial, institutional and residential structures are initiating programs to control asbestos effectively in their facilities.

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PAST SOLUTIONS. In the past, facility managers (particularly in schools) had to address the emotional concerns of parents. While asbestos in schools can be removed and replaced during summer months when the buildings are unoccupied, other owners face the problem of performing asbestos abatement or correction work in occupied buildings.

Pollution insurance is not available to building owners.

The possibility of airborne asbestos fibers being transmitted beyond the abatement area therefore exists and could affect employees and contaminate the building. It is obviously impractical and expensive in most cases to vacate these buildings for weeks or months.

Stricter regulations and the need for abatement procedures feasible for occupied buildings has inspired the development of alternative methods to removal and replacement.

Building owners should evaluate carefully all technical, legal and economic aspects of these alternative techniques to determine whether they might be acceptable and effective. Direct and indirect costs of the technically acceptable abatement methods then can be reviewed.

Products and systems meeting these

TABLE 1

Encasement compared to asbestos removal and replacement when evaluated in accordance with installation and performance criteria.

Installation and Performance Criteria	Encasement	Removal and Replacement
Costs-direct and indirect Minimize costs	Preferred since direct and indirect savings of 50-70% are possible.	Higher costs
During Corrective Work Minimize or eliminate asbestos fiber release to prevent exposure to personnel and prevent contamination of adjacent areas.	Preferred since fewer fibers are disturbed than during removal.	Higher fiber release
Minimize inconvenience for building owner such as downtime and relocation of personnel and equipment	Preferred since solutions are sprayed as opposed to removal, disposal and the reapplication of fireproofing, insulation, etc.	Requires substantial downtime and relocation.
Perform corrective work in minimum time	Preferred since significantly faster than removal and replacement.	Slower corrective time.
Long-term Performance Maintain the excellent properties of the asbestos fireproofing and insulation	May be preferred since asbestos is left in place with some change in properties.	Replacement materials required with desired properties.
Prevent asbestos fiber release into building environment: When in static condition; when abraded by people or equipment, when renovation necessary, when repairs necessary	In all these instances, systems may prevent fiber release into building environment.	Removal also prevents fiber release into building environments.
Reduce maintenance costs	May be preferred since durable surfaces may provide lower maintenance than most replacement materials installed after removal work. However, have added costs of operation and maintenance program.	May have higher maintenance costs than encasement. No added costs for operations and maintenance program.
Reduce energy costs	May be preferred since systems can add thermal insulation.	Thermal insulation usually not improved.
Improve fire resistance	Preferred since systems improve fire resistance.	Fire resistance usually not improved.

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dress the asbestos problem can follow several prudent approaches:

- Survey the buildings to determine asbestos is present and establish priorities to manage and correct each situation.
- Train facility and maintenance personnel, informing them of where the asbestos is and how to manage the asbestos-containing materials safely.
- Determine which technically viable solution is most suitable and cost-effective.
- Correct and manage each situation in the appropriate manner.

More building owners are contracting architectural, engineering or industrial hygiene consulting firms that specialize in asbestos surveys and other necessary tasks.

Such studies will provide increased credibility and produce organizations specializing in state-of-the-art technologies; these same organizations can discuss the technical and economic viability of abatement solutions as well as write appropriate specifications and monitor the abatement process.

Asbestos abatement solutions are categorized as follows: removal and replacement, enclosure, encapsulation and encasement.

Since asbestos removal projects are being performed in occupied residential, commercial, industrial and institutional buildings, specifications and procedures are expanding and becoming more detailed.

MINIMIZING RISKS. These specifications seek to minimize the possibility of asbestos fibers being transmitted to other areas in the building during the removal process. The asbestos fibers could be inhaled by personnel or result in contamination of the building with the potential for lawsuits.

If the building is contaminated, thorough and expensive cleaning is necessary. The effect of this is increased indirect and direct costs and longer project completion time.

Because of these high removal costs, lengthy completion times and the concern about asbestos fiber release, more building owners are seeking alternative solutions to their asbestos problems.

ENCLOSURE OPTIONS. Enclosure solutions involve the installation of materials such as gypsum board and plywood around the asbestos to form an airtight seal.

This solution is seldom selected because cost-effective installations of enclosures are limited and asbestos fibers continue to be released behind the enclosures. This option is frequently quite expensive.

Furthermore, since the asbestos still is present in the building, a formal operations and maintenance program must be implemented to help prevent future asbestos exposure, thus causing an additional ongoing cost. Removal also may be required before demolition of the building.

Encapsulation solutions involve the spray application of materials. Penetrating encapsulants seek to penetrate and harden the asbestos to minimize asbestos fiber release while bridging sealants are sprayed on the surface of the asbestos at thicknesses usually of 1/32 inch or less.

This option also requires an operations and maintenance program and its associated costs. Again, it may be necessary to remove the asbestos before demolishing the building.

Encasement involves the low pressure spray application of a one- or two-layer structural shell generally ranging from 1/16 inch to 2 inches. Encasement systems are mechanically fastened in place where applicable to prevent delamination and asbestos fiber release.

This relatively new solution is being investigated as a viable alternative to the removal technique and its associated problems. However, similar to the other options, encasement also requires an operations and maintenance program and the possible need for removal before demolition.

OPTIONS EVALUATED. Installation and performance criteria for removal vs. encasement options are shown in the left column of Table 1. The optimum solution is one that prevents fiber release not only during the life of the building, but also during the corrective procedures.

This minimizes or eliminates any spread of fibers that could detrimentally affect personnel and items within the building. Accordingly, this solution is preferable in many cases to complete asbestos removal and replacement.

An encasement system that meets this installation and performance criteria is being utilized with significant economic benefits, as well as other benefits, by building owners. The expected benefits of encasement compared to removal and replacement are shown in Table 1.

Costs for encapsulation and encasement solutions generally range from $3 to $8 per square foot depending upon the complexity of the job, and they usually provide a 50 percent to 75 percent cost savings compared to asbestos removal and replacement. They also provide a much faster installation time.

Although the costs of these solutions are attractive to building owners, they are only cost-effective if they provide long-term performance.

Thus, building owners now are funding projects to evaluate the installation, performance and cost aspects of encapsulation and encasement solutions. They also retain independent consultants to establish and conduct evaluation studies of considered abatement solutions in their specific buildings.

SPECIFIC EVALUATIONS. Since the evaluation program addresses the specific asbestos type and thickness in a particular building, the owner and the consultant can see first-hand how the materials are applied, how they perform and the expected direct and indirect costs of utilizing such solutions.

These evaluation programs also are useful since the EPA does not give approval to specific encapsulant or encasement products. The EPA did fund work at Battelle Laboratories to establish test methods to evaluate products, but a comprehensive group of viable test methods never was developed.

Although some encapsulants were utilized as part of the test development program, all tests were conducted over mineral wool substrate and not asbestos. Since material tested over asbestos usually will perform differently than when tested over other substrates such as mineral wool, the EPA has stated that field evaluations should be conducted over the specific asbestos material present.

COMPARING SOLUTIONS. The Materials Characterization Branch of Georgia Tech Research Institute has developed several tests concerning the performance of encapsulation and encasement: fiber release by abrasion, adhesion-cohesion, penetration (where applicable) and the effects of water.

Qualitative observations of damage resistance also are made. Future tests will include fiber release during application, damageability (impact, abrasion and cutting resistance) and insulation properties of the composite. Tests involving asbestos fiber release are particularly applicable and important.