Asbestos expert says  
“I take it all back”

The state of the art in handling a problem product

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When we start talking about the basic asbestos materials problems, we need to first discuss briefly the nature of asbestos. Asbestos is a mineral fiber. One of the big problems with it is that the more it is machined, the more you work with it and handle it, the more it breaks down into small particles of fiber. It never really loses its fibrous shape.

We have three major types of asbestos. Actually, there are six types of materials that are called asbestos or have asbestos forms, but we are concerned with only three main types.

One is a Chrysotile, which is a serpentine type of asbestos. The other two are Crocidolite and Amosite. The Chrysotile is what is called white asbestos, the Amosite is brown asbestos, and the Crocidolite is blue asbestos. There is a lot of controversy as to whether one form of asbestos is more dangerous than another. It is generally believed the blue asbestos, or Crocidolite, is more hazardous.

What are we getting into in talking about asbestos problems? There are more than 3,000 commercial uses of asbestos, and frankly, I don’t think it will ever be totally eliminated. It is a completely unique material. But when it is completely encapsulated as it is in floor and ceiling tiles or in roof coatings, there is no real hazard, unless you’re going to grind or sand it or otherwise do something that is going to release its fibers.

We get into the problems, then, with sprayed asbestos products, because you have a greater potential for fiber release with these products. Many of these products were bound with gypsum cement or portland cement, water-soluble resins, clays and other materials. After a while, any of these products can have a tendency to age and decay, and when they do, you have a situation that can result in the release of asbestos fibers.

Obviously, in some situations, we can be dealing with a significant release of asbestos fibers. Now, the kind of fibers we’re talking about can be anywhere from 150 to 1,000 times smaller than the size of a human hair. More specifically, we’re talking about fibers that can be from five to one-tenth of a micrometer in length; these are the hazardous fibers.

Another phase of the problem is that we are talking about fibers that are very aerodynamic. A glass fiber, for instance, is a solid fiber. An asbestos fiber, by comparison, is a tube or spiral-shaped fiber. It has been recorded and documented that a single asbestos fiber of one micrometer in length, with a diameter one-third of the length, will remain in still air up to 80 hours! And, that’s not even the bad side of the problem, because once it does fall to the ground a single person walking into that room can re-entrain that fiber into the air again. That’s a major factor in our contamination problems with asbestos materials.

Types of contamination

We are actually dealing with three types of contamination. We have the gradual fallout problem with decaying products. We have a problem with the materials remaining in air. Thirdly, we have the re-entrainment problems.

In understanding this contamination, it is important to note that asbestos is not a gas. It is a fiber, and it has a tendency to stay in the area from which it came.

Contamination is, of course, a problem because of the asbestos-related diseases. The worst of these (and the one the regulations are set up to prevent) is asbestosis. This disease involves the hardening or scabbing of the lung. In severe cases, a worker can lose the use of a lung completely. In the best of cases, deterioration of the lung exists.

Asbestosis is a deadly serious disease. It can totally remove the functions of the lung. It has proven to be fatal.

Another major disease related to asbestos is mesothelioma, which is a rare cancer of the chest and abdominal lining. It is one of several cancerous and tumorous diseases now associated with asbestos exposure.

The worst aspect of this problem, aside from the diseases themselves, is that we cannot say definitely what constitutes a minimum or maximum exposure likely to cause cancer. We do know the lag time between exposure and the development of cancer can be from 25-40 years.

We have seen a case where the only exposure of a wife and child to
asbestos was from the contaminated clothing a worker wore home. The child was exposed simply by hugging her father. The wife was exposed by shaking out the clothes for the laundry. Both mother and daughter later died from mesothelioma.

We find it very hard, some 40 years later, to document where exposure to asbestos occurred, but we do know it can cause these diseases. Mesothelioma, as I said, is a very rare disease, and right now, it is associated only with exposure to asbestos. There may be other causes, but no one has yet found them.

Ten years ago, if you went to a medical doctor and asked him how many cases of mesothelioma he had seen, he might have asked you what it was. Today, virtually every hospital in the United States is handling from 10-15 cases a year.

Worse, there are projections that in the next 20 years, we will see roughly 20,000 deaths per year from lung cancer either directly or indirectly related to asbestos contamination.

It is a scary situation.

Smokers beware!

How about some additional complications? Statistics indicate a man who smokes three packs of cigarettes has six times the chance of getting lung cancer than a person who does not smoke. The National Cancer Institute also states that a person who has had a heavy exposure (although they do not define heavy) to asbestos and who smokes has a five times greater chance of getting cancer than a smoker who has not been exposed to asbestos. If you were exposed to asbestos and you are still smoking at the rate of three packs a day, your chances of getting cancer are 90 times greater than someone who has neither had the asbestos exposure nor smoked cigarettes.

You get another view of the problem when you look at the insulation unions in New York City. I’m not trying to be facetious when I say this, but they are unique because they have fewer people on retirement than any other union in the United States. They just don’t live long enough to go on retirement. That union of about 6,000 members averages about 23% of their people who have died from asbestos-related causes.

There are, of course, OSHA standards for permissible area limits for asbestos particles in the air. And, there are even more stringent standards that have been proposed. But the real problem remains, as the doctors will tell you, that we can’t really say what is an acceptable limit. We don’t really know how much exposure will cause cancer.

Meeting the hazards

When you get into a school or public building, or into commercial buildings containing the same types of friable asbestos materials we see in schools, we want to work with bulk sampling techniques. We want to find out if certain materials do or do not contain asbestos.

If it does not contain asbestos, even if it is friable, it is not a hazard
to us. Our best method for testing the material is taking a bulk sample. In taking this sample, it is necessary to take a sample that goes all the way through the material.

Often, the material will be several layers thick, for instance a plaster-type material over a brown coat, which can in many cases contain asbestos. So you test all the layers to determine if you have a hazard.

By using today’s technology, the testing isolates a fiber under a high-powered microscope. The use of a liquid with the same refracting characteristics will confirm the presence of asbestos, if the fiber disappears when compared to the applicable sample. Often, the sample must be confirmed with the X-ray defraction method, and as you do more and more testing, the cost goes up accordingly.

Right now, the average cost of most bulk sample tests is from $20-$25. A good X-ray defraction will run you from $100-150. There are other techniques, including the scanning electron microscope, with which you can also look at the fibers and learn a lot more detail about the fibers in a given material, but a simple test of one sample using the electron microscope is running from $400-400.

Another way of analyzing fibers is by air monitoring. This is a good way to approach the problem when working with the material, encapsulating or removing, because you count the actual fibers within the air. The monitoring is completed by forcing a known amount of material through a small filter. Our technology also includes personal monitors, which attach to the breathing apparatus.

Once you determine your material has asbestos in it, then it is necessary to make an assessment of exposure. The EPA has refined the reporting techniques for this assessment, and you can obtain the charts and graphs from them.

In making the assessment, the things you must look for are the condition of the material, any effects from water damage, accessibility, exposure surface area and how much exposure to an air stream exists. Another thing to consider is friability. What is friability? It is the softness of the materials, or put another way, these are materials that can be crumbled or powdered in the hands. Finally, the assessment ends with the consideration of the asbestos content of materials, which can be from 5-50% in most friable strayed on materials.

**What to do with asbestos**

The EPA is taking a serious look at the content levels of asbestos materials, and by September, they will be publishing a standard (probably with contents above 60%) for when the materials must be removed. This standard will apply, initially, only to schools.

All of this began when the Environmental Defense Fund petitioned the EPA to do something to remove the asbestos threat to school children. The result was a voluntary compliance program which produced the EPA’s and other guidance manuals. Now, the Environmental Defense Fund has petitioned EPA again, this time for a binding program. I feel certain that once this standard takes care of the problem for schools, it will be expanded to other public buildings. So, the amount of asbestos removal work is going to increase.

Fine. But what do we do with asbestos?

We have three basic techniques to look at: removal, encapsulation or enclosure.

Let’s look at enclosure. A drop ceiling would not be a true enclosure, because a worker could expose himself or others to asbestos materials anytime he lifted a ceiling panel to do any work above the panel. The type
of enclosure we’re talking about would be more like drywall, installed with a gap between it and the material and with all the joints properly sealed. In other words, a proper enclosure would be a permanent barrier that ‘it would take a saw or some like tool to get through. But it is important to realize that if you use enclosure, the asbestos material is still there behind the enclosure, and if you violate that space, you’re recreating the problem.

Encapsulation is the use of a sealant to cover the asbestos materials. Generally, a number of encapsulants are in use. Several paints, if you want to call them that, can be used. You can use, for example, two-component epoxies that are water-based, poly-vinyl acetate, acrylics or any that have a sealing function.

We have found that sealants fall into two basic categories. One, we call a bridging sealant. It puts a barrier over the surface, not really penetrating the material more than a half an inch. These are often pigmented materials that have a decorative value as well. The major reason they do not penetrate is that asbestos fibers are good filtering material, and they won’t let the resins or pigment get too far below the surface of the material. Which brings us to the other type of sealants, which we call penetrating sealants. These have a decided advantage, because you can get them to penetrate all the way through the material.

The major benefit they have if you achieve full penetration is that they increase the adhesion of the asbestos materials to the sub-base materials, and they also increase the strength of the bondage of the material. In effect, we’re binding or tying the asbestos material up. The only thing we’re working against in this material is gravity; remember most of these materials are on the ceiling, so we have to count on capillary action to pull the sealant through the material. For this reason, most of the penetrating sealants are very thin, water-like products of low viscosity. We highly recommend the use of an airless spray system for application; when you use an air sprayer, you are dealing with pressure, and you might literally blow some of the fibrous material off the ceiling.

Another problem to consider about sealants is that if you get poor adhesion or lack of bondage strength, you’re actually going into what we call an expensive removal technique. From many of these materials, you won’t get more than 50 sq. ft. of coverage to a gallon at about $27 a gallon. If it doesn’t bond, you’ll come back the next day and see that it has all fallen down. You could achieve the same thing using amended water for a lot less money. The point is, you really have to be careful with encapsulation and consider the areas you’re encapsulating.

Encapsulation techniques are not complicated. We recommend a first coat sprayed on a little farther from the material than would normally be used for paints. We want to achieve a mist coat, which ties up the loose fibers. You should cover about 12 sq. ft. with a mist coat, then go back over the area with a heavier spraying and the two applications would serve as one coat. Then, after four to six hours—depending on the material used—you would apply a second coat.

Removal techniques depend heavily on amended water, which is water with wetting agents. The purpose of this is that asbestos materials will often be difficult to wet with just water. The wetting agents reduce the amount of water usage. We highly recommend an area to be removed be wet down the evening before the actual removal, left to soak overnight, then wet down again about 15 minutes before removal takes place. Removal itself can be done by scraping or with hoses, or with wire
brushes, and it’s important to note that even then, you’re not likely to remove every minute fiber. So, the area can be sprayed with an encapsulating material after the removal for increased effectiveness.

The working guidelines

Now, we get into the working guidelines. There are many things we want to do. One, we want to seal off the work area. We want to contain the fibers to the work area. We want to protect the worker. We want to minimize the number of airborne fibers within the work area. And, we want to be sure we have good cleanup and disposal techniques.

Protecting the worker is the overall critical part of the operation. We recommend the worker be provided with protective disposable clothing, boots and a respirator.

When a worker leaves the work area, he should remove all disposable clothing, his boots, in fact everything but the respirator. He should wear the respirator into a shower, turn his head up to the water stream, and fully wet down his respirator before removing it.

Then you get into medical examinations. OSHA requires that an asbestos worker’s medical records be held for 20 years. There are two basic tests for asbestos evaluation. One is the lung capacity test and the other is the lung X-Ray.

In approaching the minimizing of fibers in the air, there are a number of methods available. We’ve already discussed the use of amended water. Dry removal, except in the rarest of cases, is strictly forbidden.

Securing the job site is also important. Often, we encapsulate the area with plastic, and we sometimes include an “air lock” formed by double sheets of plastic you have to pass through. All air conditioning and other forms of ventilation should be shut down. You have to be careful, here, because without ventilation, some of the encapsulation materials can be dangerous, can cause your workers to pass out from fumes, etc.

Basically, we recommend the setting up of a tunnel system, where the plastic is arranged in such a way that one side closes before you pass through the other side. It is preferable to have a change room, where workers can leave their disposable work clothes and proceed to the shower. I’ve seen some tunnel systems in New York schools, where the tunnels would be up to 400 feet long. It is a very elaborate process.

Cleanup and disposal is just as important as any of the other techniques. In order to properly clean up after a removal job, you must get the material off the floor as quickly as is possible. Once you clean up the material, you put it into plastic bags and seal them off. A six mil bag is recommended, but I haven’t found one, so often we double bag with four mil bags. Once you’ve removed the materials and bagged them, you take down all of the plastic protection you’ve used. Plus the disposable clothing, in fact, all of the protective plastic and clothing must be treated the same way as asbestos materials, because of the contact with fibers. Once everything is bagged, it must be put into steel drums, then buried.

The use of a high efficiency absolute particulate vacuum cleaner is important. A normal commercial vacuum is nothing more than a good entrainment device, because it does not have filters sufficient to hold the small asbestos fibers.

Once you have everything sealed up in drums, you must take them to an approved disposal site. That can be a real kicker. One of the problems in the New England states is that they do not have an approved site in the whole region. They ship the asbestos wastes to other states. If you’re going to bid on an asbestos removal job, I would caution you to know where the nearest approved disposal site is and compute your transportation costs as part of your bid. A job’s profit can be completely lost within these transportation costs.

Currently, the encapsulation and enclosure are proving to be the cheapest means of dealing with the asbestos removal. However, I would estimate that only about 15% of the jobs will fall within the standard for these techniques once the EPA guidelines are issued. When removal began, it cost about $8-10 per sq. ft., but that has come down to $4-5. Encapsulation is running from $3-4 per sq. ft. But it is important to remember, too, that if the job is a removal technique, the cost is also more likely to grow, because once you remove asbestos, you must replace it with a suitable material in order to comply with fire codes.

Editor’s Note: This article is adapted from the remarks of Bill Mirick before the 63rd AWCI Convention in Phoenix, Arizona.