ASBESTOS MAINTENANCE:

A WISE ALTERNATIVE TO ASBESTOS REMOVAL

by

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LIST OF VISUALS

LIST OF ABREVIATIONS

AI.....Asbestos Institute

AC.....Air Conditioner

ACBM.....Asbestos Containing Building Materials

ATSDR.....Agency for Toxic Substance and Disease Registry

CDC.....Center for Disease Control and Prevention

EPA.....Environmental Protection Agency

HEPA.....High Efficiency Particulate Arrestance

NCHS.....National Center for Health Statistics

NESHAP.....National Emissions Standards for Hazardous Air Pollutants

NHDES.....New Hampshire Department of Environmental Safety

NIOSH.....National Institute for Occupational Safety and Health

NYCOSH.....New York Committee for Occupational Safety and Health

O&M.....Operations and Maintenance Program

OSHA.....Occupational Safety and Health Administration

PEL.....Permissible Exposure Limit

INTRODUCTION

One of the most influential environmental issues in the United States concerns a material known as asbestos. Asbestos is a naturally occurring fibrous mineral that is used in a variety of manmade products (ATSDR). These products include building materials, friction products, and heat-resistant fabrics. Six different types of asbestos have been mined and manufactured for over a century. These six types of asbestos are chrysotile, crocidolite, tremolite, actinolite, and anthophyllite. Of the six, chrysotile is the most common (90-95%). Asbestos is a hardy mineral that does not easily burn, is resistant to most chemicals, and is extremely durable due to its high tensile strength (AI). When asbestos is disturbed, microscopic fibers become airborne and can remain so for a long period of time. These fibers, when inhaled, have been known to cause three major health problems: asbestosis (a fibrous scaring of the lungs), lung cancer, and mesothelioma (a cancer of the lining of the chest and abdomen cavity) (CDC). Prior to the 1970s asbestos was mined, manufactured, and implemented as a viable building material without regulations and safety precautions to ensure the safety of workers and occupants.

The asbestos-related health problems that resulted from negligent handling of asbestos created a need for immediate action to thwart any further consequential repercussions. Initially, asbestos was removed from buildings, and manufacturing was brought to an abrupt halt. From a health standpoint the fears associated with asbestos added to the fear of business and building owners being held liable for asbestos contained within and caused immediate reformations. Removing asbestos involved quite a process due to the large assortment of materials that contain asbestos. The following page

includes a list of some of the most common building materials containing asbestos prior to 1971:

Asbestos Containing Materials Prior to 1971

Cement Pipes	Elevator Brake Shoes
Cement Wallboard	HVAC Duct Insulation
Cement Siding	Boiler Insulation
Asphalt Floor Tile	Breeching Insulation
Vinyl Floor Tile	Ductwork Flexible Fabric Connections
Vinyl Sheet Flooring	Cooling Towers
Flooring Backing	Pipe Insulation (corrugated air-cell, block, etc.)
Construction Mastics (floor tile, carpet, ceiling tile, etc.)	Heating and Electrical Ducts
Accoustical Plaster	Electrical Panel Partitions
Decorative Plaster	Electrical Cloth
Textured Piants/Coatings	Electric Wiring Insulation
Ceiling Tiles and Lay-in Panels	Chalkboards
Spray-Applied Insulation	Roofing Shingles
Blown-in Insulation	Roofing Felt
Fireproofing Materials	Base Flashing
Taping Compounds (thermal)	Thermal Paper Products
Packing Materials (for wall/floor penetrations)	Fire Doors
High Temperature Gaskets	Caulking/Putties
Laboratory Hoods/Table Tops	Adhesives
Laboratory Gloves	Wallboard
Fire Blankets	Joint Compounds
Fire Curtians	Vinyl Wall Coverings
Elevator Equipment Panels	Spackling Compounds

Table 1: Materials Containing Asbestos (EPA)

With this considerably large number of building materials containing asbestos, the safe removal of these materials is a costly and time-consuming procedure. Asbestos removal must be conducted in an environmentally safe fashion and in accordance with all OSHA and EPA requirements. Under these guidelines and in most cases, proper asbestos procedures generally are too costly to even be considered. Fortunately, asbestos is only a health hazard when fibers are released into the air, and if asbestos is contained in such a way to prevent any asbestos fiber release, asbestos presents no measurable health risk (EPA).

In the mid 1980s the scientific consensus began to change in regards to asbestos, and an alternative to the total eradication method of asbestos abatement began to evolve. This new method was to maintain the asbestos to prevent any airborne, fibrous release. Such methods are now referred to as asbestos maintenance programs. These methods were not fully realized and implemented until the mid to late 1980s when more research data was available to confidently support the idea that asbestos could be safely maintained.

CHAPTER 1

HISTORY OF EARLY ASBESTOS HEALTH PROBLEMS AND LITIGATION FROM 1879 TO THE PRESENT

In 1879, building materials containing asbestos (primarily insulation) were first commercially manufactured. Some twenty years later, the first case of asbestosis was documented, which at the time was described as a series of "Curious Bodies" on the lungs (NYCOSH). Companies such as the Johns-Manville and the Raybestos-Manhattan were two large manufactures of materials and products containing asbestos. Their plants and manufacturing facilities created a hazardous air quality hazed with clouds of asbestos dust.

Workers in these plants were often covered from head to toe in the "white" chrystolite asbestos, and they were not at all aware of the deadly repercussions of such levels of exposure. The following are photographs of the workers in the Johns-Manville plant during the 1940s:

Photo 1: On their way to work

Photo 2: Asbestos dust on workers home


Photo 3: Worker poses with wedding gifts Photo 4: Worker handling asbestos (photo source: Brodeur, Paul. "The Asbestos Tragedy")

Asbestos levels in these facilities were so severe that workers were transporting asbestos fibers into their homes and affecting the health of their wives and children. One of the greatest pioneers in asbestos research, Dr. Irving J. Selikoff, was the director of the Mount Sinai School of Medicine's Environmental Science Laboratory in New York City. One of his surveys on the effects of asbestos reported that 30% of the families of those who worked in asbestos manufacturing had been affected by asbestos. By the early 1900s, many of the laborers who had worked in the plants for a long period of time (twenty plus years) were diagnosed with lung cancer or some other related lung disease (asbestosis or mesothelioma); however, the cause of these diseases was unknown. In 1918, Prudential Life Insurance Company officials refused to compensate these workers due to the "the health-injurious conditions of the industry" (Castleman 5-6).

From this point on, a series of controversial cover-ups attempted to keep asbestos research at a minimum and prevent public awareness of asbestos-related health risks. Many of the large manufacturers of asbestos may have learned early on of the affects of asbestos and did nothing to inform their employees or make changes to ensure their safety. Nothing much of this changed until 1964 when Dr. Selikoff provided evidence that asbestos directly causes lung disease (NYCOSH). Selikoff's report was presented at a medical convention hosting over 400 of the nation's top medical experts. This proved to be a turning point in the history of asbestos research and litigation.

CHAPTER 2

ASBESTOS REMOVAL PROJECTS PROMPTED BY FEARS OF ASBESTOS HEALTH PROBLEMS AND COSTLY LITIGATION

Once there was solid, scientific proof that asbestos was related to lung disease, workers began to file lawsuits by the thousands and were being awarded millions of dollars. Not only had manufacturing workers been affected by asbestos; but also miners, construction workers, and even occupants of buildings containing asbestos materials were coming down with lung diseases. This created an intense fear of asbestos as both an environmental hazard and as a liability for building owners and businesses. Sadly enough, it wasn't until the early 1970s that this fear prompted actions to be taken to rectify this horrible situation[1]. The scientific consensus at the time suggested that asbestos, at any rate, is dangerous and that the only way to ensure safety is to remove it. For many years thereafter, asbestos removal projects became commonplace and asbestos litigation continued to heighten the severity of asbestos as an environmental issue and as an economic disaster. Many companies would fall bankrupt to law suites against them for failure to provide safe working conditions. The Johns-Manville company, to this date, has paid out over $2.2 billion in compensation for their employees, and this figure does not include over 2,000 cases settled out of court (Brodeur).

[1] In 1971, OSHA releases the first asbestos-exposure standards. (Federal Register, vol. 36, p.10455 et. seq.; May 29,1971

CHAPTER 3

THE PROCESSES INVOLVED WITH ASBESTOS REMOVAL PROJECTS FROM A BUILDING OWNER'S PERSPECTIVE

Asbestos removal involves the total eradication of all asbestos containing materials. The process of removing asbestos in an environmentally safe fashion was, and is, extremely expensive and nonetheless necessary due to the lack of any viable alternative at the time. Since the mid 1980s, many things have changed in regards to asbestos that have presented alternatives to asbestos removal; however, asbestos is still removed under certain circumstances. It is important to know when these circumstances exist and to follow the specific guidelines of the environmental authorities when removing asbestos to ensure safety and avoid the liability for negligent actions.

Determining Asbestos Exposure Limit

It is the responsibility of property owners and property managers to ensure the safety of their employees or occupants. The current Permissible Exposure Limit (PEL) for asbestos, established by the National Emissions Standards to Hazardous Air Pollutants (NESHAP), is 0.1 f/cc (ft. per cubic centimeter) as an 8-hour time-weighed average (NHDES). If the PEL is above 0.1 f/cc, employees and occupants are at a risk of asbestos exposure. To ensure the PEL remains at a safe level, surveillance and monitoring of the asbestos PEL, as well as the condition of asbestos containing materials must be taken on a regular basis.

Selecting a Plan of Action for Asbestos Removal

If the asbestos PEL goes above the standard PEL, a decision must be made as to the most viable action for abatement. The Environmental Protection Agency's Indoor Air Quality division suggests that asbestos removal should take place when "...the asbestos containing materials are damaged beyond repair, or the disturbance of the asbestos-containing material cannot be controlled with operating and maintenance procedures[2]. Otherwise, removal activities should be built into major renovation plans, or just prior to the demolition of the building" (EPA). In the state of Texas (as in many others), an asbestos inspection must be conducted before permits will be granted to do any remodeling or demolition to an existing structure. The inspection provides site analysis and air sample results to determine what actions should be taken. If the results indicate a level of exposure that could not by any other means be maintained, then asbestos removal will be necessary. The inspection will not, however, indicate the work classification for the abatement. This information will need to be provided by an asbestos consulting firm or an asbestos removal contractor. An asbestos consultation can be quite expensive but a non-biased source of reliable information. There is a good possibility that a contractor will provide information to recommend whatever action is most profitable and convenient for the contractor to carry out.

[2] A series of work practices and surveillance's to maintain asbestos; Prevent fibrous release by minimizing and controlling disturbances and damages.

Determining Asbestos Work Classification

The Work Classification section of the OSHA Asbestos Standards for the Construction Industry divides asbestos work into four categories according to hazards presented by such asbestos abatement measures:

> Class I – asbestos work-the most potentially hazardous class of asbestos jobs-involves the removal of thermal system insulation and spray-on or troweled-on surfacing asbestos-containing materials or presumed asbestos-containing materials. Thermal system insulation includes asbestos-containing materials applied to pipes, boilers, tanks, ducts, or other structural components to prevent heat loss or gain. Surfacing materials include decorative plaster on ceilings, acoustical asbestos-containing materials on decking, or fireproofing on structural members.
>
> Class II – work includes the removal of other types of asbestos-containing materials that are not thermal system insulation-such as resilient flooring and roofing materials containing asbestos. Examples of Class II work include removal of floor ceiling tiles, siding, roofing, or transit panels.
>
> Class III – asbestos work includes repair and maintenance operations where asbestos-containing or presumed asbestos-containing materials are disturbed.
>
> Class IV – operations include custodial activities, where employees clean up asbestos-containing waste and debris. This includes dusting contaminated surfaces, vacuuming contaminated carpets, mopping floors, and cleaning up asbestos-containing or presumed asbestos-containing materials from thermal system insulation.

Asbestos Removal is commonly necessary under all four classifications. It is important to understand that asbestos removal as a plan of action refers to the need for Class I or Class II work. Removal at Class III and Class IV are generally described as maintenance procedures. Therefore when the asbestos permissible exposure limit (PEL) is above

0.1f/cc, asbestos removal is selected as the necessary plan of action, and the asbestos work classification is selected as Class I or Class II, a contractor must then be selected to carry out the task of removal.

Select a Contractor

Homeowners and regular contractors can carry out asbestos removal as long as NESHAP regulations are not violated, and work is done in compliance with OSHA rules and regulations (NHDES). It is highly recommended, however, that a licensed asbestos removal contractor conduct Class I and Class II abatement projects. Contractors should be asked to present all qualifications along with a list of references with their detailed bid proposal to be thoroughly reviewed. A contractor's qualifications and referrals should be considered more important than the final price. The risk involved with asbestos removal is very high because if the asbestos is not properly contained, high levels of asbestos exposure can occur, and asbestos can potentially infect those in and around the building or structure being renovated or demolished.

Enact a Surveillance and Monitoring Program

Keeping close watch over procedures can help to ensure the contractor is working within the regulations and requirements provided. This is not a simple task due to the limitations for access into the building or structure once it has been closed off and quarantined. To best monitor an asbestos removal project, the ability to make random checkups on progress must be made possible. Arrangements should be made with a supervisor to provide all the respiratory breathing equipment and safety suites necessary to enter the encapsulated work area and survey the safety measures being taken and progress therein.

CHAPTER 4

SCIENTIFIC CONSENSUS IN REGARDS TO ASBESTOS HEALTH RISKS AND ASBESTOS ABATEMENT CHANGES

The scientific consensus in the early 1970s was that asbestos exposure at any level is dangerous and is a reason enough to get rid of asbestos. This seems to be hardly arguable when the evidence is clear that asbestos causes lung disease; however, the earlier research and evidence seemed to overlook a major detail. Most research at the time failed to consider the circumstances surrounding the majority of asbestos exposure incidents. Since the mid 1980s, research has focused on the amount of exposure to asbestos that causes a measurable health risk. More than half (55%) of those who have died as a result of asbestosis have worked in industries directly associated with asbestos.

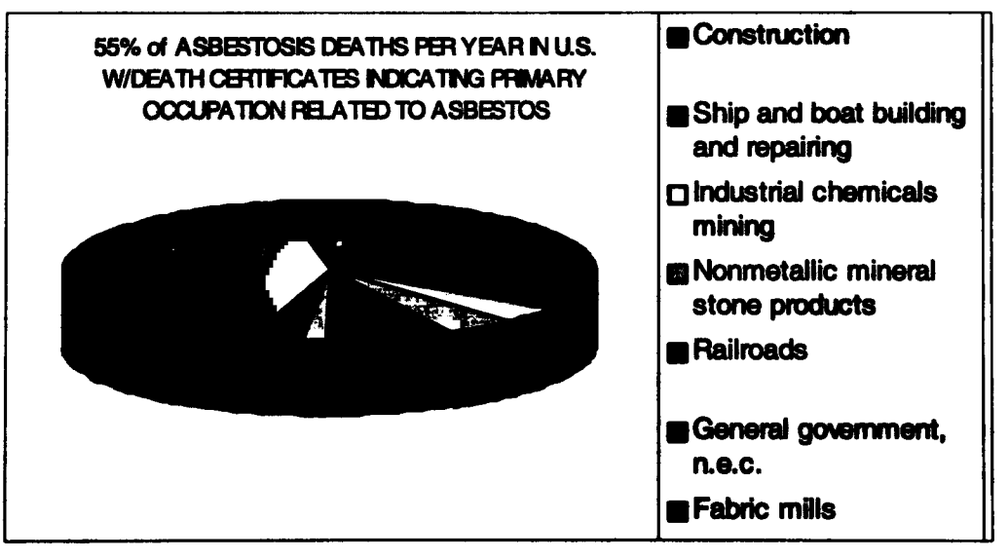

Table 2: National Center for Health Statistics - Primary Occupations for Asbestos Deaths

Dr. Selikoff's research indicates that over 30% of the wives, children, and family of those who worked directly with asbestos and were diagnosed with lung disease also developed lung disease. If 55% of deaths in the US related to asbestos occur in people who work

directly with asbestos, and 30% of their families also get asbestosis, then 71.5% of asbestos deaths in the US each year are directly related asbestos workers. According to the following NIOSH Work Related Lung Disease (World) Surveillance Report 1999, 79% of all morbidity cases related to asbestos were diagnosed with asbestosis.

CIC	Industries most frequently sampled, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
060	Construction	126	18.7	1.6	0.13
142	Yarn, thread, and fabric mills	53	7.9	0.0	0.03
040	Metal mining	42	6.2	0.0	0.00
140	Dyeing and finishing textiles, except wool and knit goods	41	6.1	0.0	0.02
050	Nonmetallic mining and quarrying, except fuel	36	5.3	0.0	0.01
842	Elementary and secondary schools	33	4.9	0.0	0.02
910	Justice, public order, and safety	32	4.8	0.0	0.03
712	Real estate, including real estate-insurance offices	20	3.0	0.0	0.00
351	Motor vehicles and motor vehicle equipment	19	2.8	5.3	0.14
262	Miscellaneous nonmetallic mineral and stone products	16	2.4	12.5	0.22
	All other industries	255	37.9	0.4	0.46
	TOTAL	673	100.0	0.9	0.21

Table 3: NIOSH Work Related Lung Disease (World) Surveillance Report 1999

Deducting the of the total morbidity rate of asbestosis, Dr. Selikoff's research would indicate that only 7.5% of asbestosis cases were not either a family member of someone who worked directly with asbestos. There is a good possibility that these 7.5% of

asbestosis deaths were not some strange exception, but rather, an inaccurate recording and associated with asbestos in some direct way.

The remaining 21% of asbestos related mortality cases are not as easily measurable due to the small amount of available data associated with these asbestos-caused diseases. The numbers are probably similar to those of the asbestosis research, which would indicate that most cases of asbestos-related health problems come from direct, high levels of exposure from handling asbestos. This is not to say that there are not cases of asbestos-related health problems developed from work places, apartment complexes, or residential houses containing asbestos materials. The fact is, these occurrences are not common and are most likely the results of poor management practices allowing asbestos-containing materials to become damaged and fragmented for an extended period of time. The fears associated with asbestos and its removal are usually not warranted. The problem is, for example, convincing parents of a school that has been reported to contain asbestos, that removal of asbestos is not necessary because the health risks are not at a "PEL" that would require abatement actions. Many people sympathize with the old school of thought that asbestos is dangerous under any circumstances, which means many scientists are faced with the task of convincing the public otherwise. Scientists are now conducting research to provide evidence that asbestos is not dangerous under certain, "contained" circumstances.

The general scientific consensus of today suggests that asbestos is far less dangerous than previously expected. The majority of those affected dealt with asbestos directly and worked in an asbestos related industry for twenty years or more. The need for the total eradication of asbestos-containing materials from public buildings, schools,

office buildings, municipalities, apartments and homes is usually not necessary. The alternative presented by research today point towards asbestos maintenance programs that maintain the asbestos in place to prevent asbestos fibers from being released.

CHAPTER 5

ASBESTOS MAINTENANCE METHODS AND TECHNIQUES PROVIDE ALTERNATIVES TO ASBESTOS REMOVAL

Since the current scientific consensus of asbestos is that asbestos is far less dangerous than previously thought, asbestos maintenance programs are far more common. Asbestos materials can be perfectly safe as long as an asbestos maintenance program is enacted. Such a program will ensure that asbestos containing materials are not causing air quality to be contaminated beyond the PEL. Asbestos maintenance programs, under guidance of the EPA and OSHA, are a wise alternative to eradication. The following methods of asbestos maintenance are provided by the Texas Department of Health's Indoor Air Quality web site:

Operations and Maintenance (O&M) Program

An O&M is a program of work practices designed to maintain asbestos in good condition and ensure cleanup of asbestos fibers previously released. An effective O & M program can prevent further release by minimizing and controlling friable asbestos disturbance or damage. *(See Chapter 8 for a complete description of the O&M Program.)*

Repair

This involves returning damaged ACBM to an undamaged condition or to an intact state by replacing limited sections or patching damaged areas.

Encapsulation

This involves the treatment of ACBM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers. The encapsulant either creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant). Both types of encapsulants are applied to the material surface using airless spray equipment at low pressure to reduce release of fibers during the application.

Enclosure

This involves creating an airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air. The barrier is typically attached physically or sprayed on. For example, materials such as PVC (pipe) or corrugated metal may be fastened around insulated piping, or a barrier may be constructed around asbestos fireproofing on structural members by spraying material that cures into a hard shell.

It is always wise to follow the local guidelines for asbestos abatement as well as federal regulations because the local guidelines (state, region, county, and/or city) will probably be more stringent.

CHAPTER 6

THE PROCESSES INVOLVED WITH ASBESTOS OPPERATIONS AND MAINTENANCE PROGRAMS FROM A BUILDING OWNER'S PERSPECTIVE

The processes involved with asbestos operations and maintenance (O&M) programs do not include any Class I or Class II work. Any Class I or II work needs to be completed before enacting a maintenance program. As soon as all repair, removal, encapsulating, or enclosing has been completed to establish the PEL for occupational safety, asbestos O&M procedures will maintain these safe levels for as long as possible. All of the subtitled sections under chapter 6, not otherwise indicated, are as suggested by the EPA—the authority for asbestos abatement.

Determining Response Action for Asbestos Operations and Maintenance

An asbestos consultant or an environmental agency should be brought in to assess the building to determine what asbestos maintenance procedures would be most beneficial. Asbestos O&M programs can be very versatile to accommodate the unique necessities of the building's occupants or functions. This versatility is due to the different situations provided by every building, such as the building's design, layout, occupied areas, and the status of asbestos materials within. Some maintenance procedures for a particular building may not be necessary for another building, but all possibilities must be considered carefully to be safely sure the PEL is maintained.

Performing Initial Cleaning

Every six months, a building must be cleaned according to the following specifications:

- All carpeted floors must be cleaned by either steam cleaning or with a HEPA vacuum.
- All other floors must be wet cleaned by mopping or with a HEPA-vacuum.
- All cleaning supplies such as rags, mop-heads, towels, or vacuum filters must be disposed of in leak-proof bags before disposal.
- Additional cleaning is to be assigned by the property manager according to whatever other problematic areas might be of in need for cleaning.

Performing Operation and Maintenance Activities

Areas where maintenance procedures are being carried out should be isolated by barriers by scheduling times when the building or section of the building will be empty of occupants. The following are operations and maintenance procedures.

- Post signage to prevent entry of unauthorized personnel.
- Restrict air movement through ventilation systems, or air conditioners through areas where maintenance is underway. If possible, temporarily shut off AC system to prevent circulation.
- Use protective control methods such as leak-proof waste removal bags, disposable gloves, HEPA-vacuums, wet methods, or any other means necessary to prevent the spread of (potential) asbestos fibers.

- **Keep all ceiling fixtures, ceiling fans, or other overhead objects clean.**
- **Place all debris in sealed, leak-proof containments before immediate disposal.**

Providing Maintenance Operations For Incidents of Fiber Release

Minor Incident—In the case that an accident occur where an asbestos containing section of a building smaller than 3ft. x 3ft. is disturbed, the damaged area should be saturated with water, all damaged particles should be disposed in leak-proof bags, and the damaged area should be temporarily patched with plastic sheathing until the section is repaired. The section should be repaired by conventional methods, ensuring that latex paint or an encapsulate is applied.

Major Incident—In the case that a large section, larger than 3ft. x 3ft., of a building becomes dislodged or damaged, the damaged area must be restricted from unauthorized persons by using the proper signage. The area must then be shut off from any air circulation into and out of the restricted area (temporarily shutting off the AC unit if possible). The response actions for major incidents of fiber release should be assessed by an EPA official, or some other certifiable persons, and handled accordingly.

Training of Custodial Workers or Management Personnel

All custodial workers and maintenance persons should receive at least two hours of asbestos awareness training within the first 60 days of their employment. There are a variety of training methods available to provide asbestos awareness for custodial and management persons to better ensure their own safety, as well as the safe environment of others.

Performing Surveillance Measures

Constant surveillance of all materials containing asbestos or presumably containing asbestos should be performed and recorded by organizing a plan for surveillance for a specific building. The initial survey will include a list of all asbestos-containing materials and what symptoms will be a red flag that corrective measures should be taken (AI). The frequency of surveillance will depend upon the same factors identified in the beginning of this chapter addressing the individual circumstances presented with the buildings asbestos conditions. Surveillance data to be recorded should include periodic air samples and a checklist of certain vulnerable areas of concern. Surveillance measures should be taken as long as asbestos is still in the building or suspected to be so.

CONCLUSION

The overall air quality of a building containing asbestos, under an asbestos maintenance program, will be greatly improved at minimal costs to the building owner. The majority of maintenance measures presented under an O&M program is usually quite similar to typical maintenance measures already being taken simply for cleanliness and sanitation purposes. The economics of this method of control is the reason O&M programs are so common among universities, public schools, business complexes, and other buildings predating the early 1990s.

The benefactors of an O&M include virtually everyone, with the exception of asbestos removal contractors. The occupants of the building can be safe from asbestos-related lung disease; owners and operators can be safe from asbestos litigations, and workers can be provided with a safe environment.

Asbestos maintenance programs are actually safer than asbestos removal projects because a number of different reports and surveys indicate that more asbestos-related health problems have come as a result of negligent removal projects. O&M programs are clearly the safest alternative to abatement, but there is still a problem with convincing the general public that asbestos maintenance programs are a safe alternative to difficult, costly, and timely asbestos removal projects. Paul Cotter, the Interim Director of Environmental Health and Safety at Texas Tech University, told me in an interview, "There is clearly a problem with the lack of education in regards to the asbestos." Cotter, the director of the O&M program at Texas Tech, believes the program provides a safe environment for Texas Tech students, staff, and employees. He told me there were some under-the-cover considerations for asbestos removal in the early 70s, and eradication of

all asbestos containing materials on campus were estimated to cost (at the time) over $77 million dollars. This estimate included only removing the asbestos and did not include putting the building back together. I asked Cotter what would be left to replace after asbestos removal was complete, and he replied, "Literally nothing but the cement floors and structural shell." It is easy to see why such measures were tabled for further review.

Asbestos abatement has been one of the greatest environmental issues of the 20th Century. Asbestos-related health problems and litigation created a fear of asbestos that still lingers today; however, asbestos maintenance programs have controlled the situation effectively, and the fear of asbestos is all that is left to control.

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