

# The Healthy Buildings Workbook

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*A Guide for Asbestos, Lead-based Paint and Indoor Air Quality Risk Management and Regulations*

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## A Guide for Asbestos, Lead-based Paint and Indoor Air Quality Issues and Regulations

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## FORWARD

As one of the principals of ACC Environmental Consultants, I've spent the past 13 years working with clients to help them identify, safely manage and, when necessary, abate asbestos-containing materials (ACM) and lead-based paint (LBP).

Most clients are concerned about the presence of these materials in their buildings and want to do the right thing by protecting occupants and employees. There are also many building owners who are either not aware of their requirement to identify and manage asbestos and lead-based paint or choose to ignore the regulatory requirements. Many feel it is not their responsibility because they did not install these materials in the first place. Unfortunately, as you will learn by reading this manual, there are numerous regulations that have been enacted that require safe management of these materials by the building owner. A court of law can impose extensive penalties and even order imprisonment of an owner who fails to adhere to these regulations.

It is understandable that most building owners and managers do not know or understand all of the regulatory requirements because they are contained in hundreds of pages of regulations. *This manual was developed to summarize the building owner and manager requirements in an effort to educate the reader and help he or she take the appropriate steps to achieve compliance, identify and eliminate hazards and to protect his or her tenants and financial security.*

Regulations are currently in effect that require the building owner and manager to know the locations of asbestos and communicate its presence and locations to tenants and outside contractors working in the building. *If the owner or manager lacks knowledge or fails to provide a warning regarding the presence of these hazardous materials and a construction*

*worker is exposed to asbestos or a child becomes lead poisoned, the building owner may be sued for personal injury.*

*In the United States apartment owners have paid over 500 million dollars to families whose children were exposed to lead in their buildings. In addition, there are hundreds of cases of construction workers exposed to asbestos suing owners of buildings in which they worked, claiming that working in the building contributed to their asbestos related diseases.*

When these lawsuits are filed, the property owner will be judged on whether his negligence or failure to fulfill his requirements caused an exposure and bodily injury. For these reasons, identifying and abating hazards and documenting a safe environment is critical to the protection of your financial well being. *Courts have routinely awarded huge personal injury awards to tenants exposed to asbestos and lead-based paint. The cost of defending the claim and any damage award is not usually covered by the building owner's liability insurance because these policies typically exclude coverage for hazardous materials.*

Many building owners have the false belief that if they ignore the hazards of asbestos and lead-based paint they simply don't exist. This is a serious mistake. The regulators and courts have very little sympathy for building owners and managers who choose to ignore regulatory requirements and legal obligation to provide a safe and healthy environment for tenants and employees.

In addition to lawsuits, owners can be cited for failure to comply with regulations. Over the past decade the penalties for non-compliance have increased drastically. California Occupational Safety and Health Administration (Cal/OSHA) penalties have increased to \$7,000 per violation. Federal Environmental Protection Agency (EPA) violations have increased to \$25,000 per day.

# Section I - Asbestos Containing Materials

## WHY THESE MATERIALS ARE REGULATED

### Asbestos

Thousands of Americans have died from diseases caused by exposure to asbestos fibers. The asbestos manufacturers cover-up of the health effects caused by their products is one of history's most glaring examples of man's inhumanity to man. Even though there were volumes of medical studies documenting the adverse health effects of asbestos exposure, the asbestos manufacturers chose to cover-up and ignore the hazards and allowed their employees and the construction workers who installed their products be exposed to this deadly substance.

Because of its low cost, resistance to heat and durability, asbestos was added to thousands of construction products. *These products are found in almost every building constructed prior to 1980, when friable materials were banned by the EPA or voluntarily removed from many products by the manufacturers. However, because these materials remain in buildings and have a potential to be disturbed, regulations have been enacted to protect the health and*



*safety of building employees, occupants and construction workers from exposure to the asbestos fibers in these materials.*

### Lead-Based Paint (LBP)

*According to the EPA, low level lead poisoning is widespread among American children, afflicting as many as 3 million children under age 6 in the United States, with minority and low-income communities disproportionately affected. At low levels, lead poisoning in children causes intelligence quotient deficiencies, reading and learning disabilities, impaired hearing, reduced attention span, hyperactivity and behavior problems. The ingestion of household dust containing lead from deteriorating or abraded lead-based paint (LBP) is the most common cause of lead poisoning in children.*

Exposure to high levels of lead in the construction industry has also been documented. *Most over-exposures to lead have been found in the plumbing, welding and painting trades. Ironwork, demolition work, and remodeling work can also result in exposures. Lead poisoning in adults can lead to difficulties during pregnancy, reproductive problems in both men and women, high blood pressure, digestive problems, nerve disorders, memory and concentration problems and muscle and joint pain.*

Due to these serious health effects, OSHA and EPA began rulemaking in an effort to protect children and construction workers from exposure to lead. OSHA regulations are designed to protect construction and maintenance workers from exposure to lead. Regulations enacted by the EPA and the

California Department of Health Services are designed to protect children.

## ASBESTOS AND HOW WAS IT USED

"Asbestos" is a term used to describe six naturally occurring fibrous minerals found in certain rock formations. Asbestos has been used in numerous commercial products because of its strength, resistance to heat and corrosion, thermal properties and inexpensive availability.

Asbestos was used in over 2,000 construction products. Friable materials (materials that can be crumbled to powder with hand pressure) are of the greatest concern due to their ease of releasing fibers. These materials include:

- Fireproofing manufactured until 1973
- Sprayed-on acoustic ceiling material manufactured until 1978
- Hard pack thermal systems (pipe and boiler) insulation
- Duct insulation
- Ceiling Tiles

Non-friable materials can be found in most every building constructed prior to 1980 and even in some newer buildings. These materials need to be identified prior to demolition or renovation activities that could cause them to release fibers. Non-friable ACM's include:

- Floor coverings including floor tiles, linoleum backing and leveling compounds
- Wall and ceiling plaster
- Stucco
- Sheet rock mudding and texturizing products
- Fire door cores (90 minute rated)
- Cement pipe, shingles and panels (transite products)
- Roofing materials (patching compounds, shingles and felts)
- Boiler and machinery gaskets
- Flooring and carpet adhesives

There are so many suspect ACM's it is probably easier to remember what are not suspect materials. Non suspect materials include:

- Wood
- Steel or metal
- Glass
- Carpet



## ASBESTOS IN BUILDINGS – HOW HAZARDOUS IS IT?

The Health Effects Institute Asbestos Research (HEIAR), a non-profit organization comprised of scientists and technical experts, was commissioned by the United States Congress to:

- Determine actual airborne asbestos fiber levels prevalent in buildings
- Characterize peak exposure levels and their significance
- Evaluate the effectiveness of asbestos management and abatement strategies

The HEIAR Report concluded:

1. *Asbestos containing material in good repair within buildings is unlikely to expose office workers and other general building occupants to airborne asbestos fiber concentrations above the levels found in air outside such buildings.* The added lifetime risk of cancer for general building

occupants in well maintained buildings is estimated to be relatively low compared to the risks of two other pollutants, radon and environmental tobacco smoke.

2. *Janitorial, custodial, maintenance, and renovation workers are subject to peak asbestos fiber exposure episodes because of physical disturbance or exposure to damaged ACM during routine job duties. The added lifetime risk of cancer may be appreciably higher for custodial and maintenance workers than the risk for general building occupants. Proper controls including appropriate work practices and respiratory protective equipment should be used to minimize the exposure of such workers.*
3. Asbestos removal workers are at the highest risk of potential asbestos fiber exposure.
4. Determining and preventing exposure risks to ACM in a given building are site-specific tasks. Generally, an asbestos survey of the building is performed to determine the presence, location, quantity, condition, and potential for disturbance of ACM. Subsequent measures to control the release of asbestos fibers should be developed and employed routinely where needed during the operation and maintenance of buildings.
5. *Uncontrolled disturbance of ACM should be avoided. In well maintained buildings with comprehensive Operations and Maintenance (O&M) Programs, where airborne levels of asbestos fibers are similar to those found outside the buildings, inadvertent disturbance, improper removal or other abatement action can cause increases of fiber levels that may persist for some time.*

For over a decade, the EPA has encouraged proactive, in-place management programs for ACM. The intent of an asbestos management program is to prevent asbestos fiber exposure

risk to the occupants of the building, including general building occupants, custodians, operations and maintenance personnel, outside construction and service contractors, and visitors. This is achieved by:

- Identifying and locating ACM throughout the building
- Assessing and maintaining ACM in good condition
- Ensuring proper remedial response actions and clean-up of asbestos fibers
- Preventing further release of asbestos fibers
- Educating all parties about ACM identified in the building

## **HEALTH EFFECTS OF ASBESTOS EXPOSURE**

The adverse health effects associated with asbestos fiber exposure have been extensively studied. Results of these studies have demonstrated that inhalation of all forms of asbestos fibers may lead to increased risk of developing one or more of the following diseases:

- Asbestosis
- Lung Cancer
- Mesothelioma
- Pleural Plaques

*It is important to recognize that the majority of people who have developed a disease as a result of asbestos exposure were exposed to airborne asbestos dust in occupational situations. These workers were frequently exposed to high concentrations of asbestos fibers on a daily basis with little or no respiratory protection.*

**ASBESTOSIS** is a disease characterized by chronic fibrotic scarring of the lung caused by the presence of asbestos fibers retained in substantial quantities in the lung. It is a restrictive lung disease, which reduces the capacity of the lung. The common symptoms

are shortness of breath and persistent coughing. Asbestosis is prevalent among workers who have been exposed to large doses of asbestos fibers over a long period of time. There is a clear dose-response relationship between asbestos exposure and development of this disease. This means that the greater the asbestos exposure, the more likely it is that asbestosis will develop. All forms of asbestos have demonstrated the ability to cause asbestosis.

The action of macrophages in relationship to the presence of asbestos fibers creates inflammation fibrosis response in the lungs that can be progressive, eventually impairing its functions. This response takes years to develop into a debilitating condition. The typical latency period for asbestosis is 15-30 years.

**LUNG CANCER** is caused by many factors, of which asbestos is only one. When combined with other factors the risk of lung cancer increases as follows:

- Asbestos workers have a risk of lung cancer 5 times greater than the risk of people not working with asbestos.
- Smokers who are not asbestos workers have a risk of lung cancer 10 times greater than those who don't smoke.
- Asbestos workers who smoke have a risk of lung cancer 50-90 times greater than the normal population who neither smoke, or work with asbestos.

Like asbestosis, a long lag time exists between initial exposure and the occurrence of the lung cancer, typically 20-30 years. *There appears to be a dose-response relationship between asbestos exposure and lung cancer, although no "safe level" of asbestos exposure has yet been determined.* Again, these figures relate to past industrial situations where workers were

exposed to industrial levels of asbestos fibers and wore little or no protective equipment.

**MESOTHELIOMA** is the asbestos-associated disease of greatest concern for asbestos abatement workers, maintenance personnel and construction workers, because unlike other asbestos-related diseases, there does not appear to be a dose-response relationship between asbestos exposure and mesothelioma. Even though asbestos is the only known cause of mesothelioma, in 10% to 30% of the cases, no occupational asbestos exposure can be ascertained.

Mesothelioma occurs as a cancer of the chest cavity lining or the lining of the abdominal cavity. The cancer spreads very rapidly and is always fatal. Most cases are associated with industrial asbestos exposure, either in an occupational setting or through secondary exposure. Many wives and children of asbestos workers contracted mesothelioma as a result of their contact with their husbands' or fathers' clothing.

Like the other asbestos related diseases, mesothelioma takes 10 to 40 years to occur after initial exposure.

**PLEURAL PLAQUES** are generally characterized as thickening of the pleura, the covering of the chest wall and lining. Pleural plaques can impair lung function in proportion to the extent of pleural surface involved. They are associated with a higher incidence of lung fibrosis, which can impair lung function. They are not thought to have malignant potential. Plural plaques may often be recognized on chest X-rays.

*Evidence of pleural plaques have been found on 10% - 30% of X-rays performed on carpenters, steel metal workers, and people who frequently work on or around ACM. Ten percent of these people complain of shortness of breath and respiratory ailments.*

Pleural plaques usually occur after a long, latency period of more than 15 years. Their prevalence increases with exposure, duration and dose.

**OTHER DISEASES** are found more often among persons exposed to asbestos than the average population. These include cancer of the esophagus, stomach, colon and pancreas, pleural thickening, and pleural effusion. The incidence of these health effects is lower than lung cancer. *The importance of using the proper work practices and protective equipment to minimize the occurrence of these diseases cannot be overemphasized.*

## REGULATIONS OVERVIEW

Numerous federal, state, and local agencies have adopted asbestos regulations. OSHA and the EPA are the federal agencies responsible for enacting and revising asbestos regulations. States can adopt their own regulations. State regulations are required to be at least as stringent as the federal regulations. Asbestos regulations are found in the following codes:

### Federal Regulations

29 CFR 1926.1101 - Construction Industry Standard which covers employees engaged in demolition and construction along with removal, encapsulation, maintenance, insulation, spill cleanup, transportation, disposal, and storage of asbestos.

29 CFR 1910.1001 - General Industry Standard which covers all non-construction related operations.

40 CFR Part 61, Subpart M - National Emissions Standard for Hazardous Air Pollutants (NESHAP), which covers asbestos removal prior to demolition or renovation and

the packaging and disposal of asbestos waste materials.

40 CFR Part 763 - Asbestos Hazard Emergency Response Act (AHERA). The asbestos in schools rule for Kindergarten through 12<sup>th</sup> grade.

### California State Regulations

CCR Title 8, Section 1531 - Respiratory Protection

CCR Title 8, Section 5194 - Hazard Communication Standard

CCR Title 8, Section 1529 - Asbestos in Construction Standard, which like the federal regulation covers employees engaged in demolition and construction along with removal, encapsulation, maintenance, installation of asbestos products, excavation, spill/emergency cleanup, transportation, routine facility maintenance, disposal and storage of asbestos.

Health and Safety Code Section 25915-25924 - Asbestos Notification, requires annual notification of tenants, employees and outside contractors

Health and Safety Code Section 19827.5 - Demolition Permits which requires a copy of NESHAPS notification to obtain a demolition permit.

### Air Quality Management District Regulations

Bay Area Air Quality - Regulation 11 Rule 2

South Coast Air Quality - Rule 1403

## FEDERAL NESHAP REGULATION

The EPA is concerned about asbestos emissions to the environment. The National Emission Standard for Hazardous Air Pollutants (NESHAP) regulation specifies asbestos removal, packaging and disposal procedures. *It also mandates removal of friable materials and non-friable materials that may become friable during demolition activities.* Local air quality management districts throughout California generally enforce NESHAP compliance.

*NESHAP requires the owner or operator (building owner or contractor) of a construction or renovation site to thoroughly inspect the effected facility or part of the facility for friable and non-friable Category I and II ACM prior to the commencement of work.* Most California air quality management districts require that a California State Certified Asbestos Consultant perform the inspection.

### Materials That Require Removal Prior to Demolition or Renovation

NESHAP defines friable asbestos as "any material containing more than 1% asbestos that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure." The regulation requires that all friable materials such as fireproofing, acoustic ceiling material, ceiling tiles and thermal systems insulation be removed prior to demolition or renovation activities that will disturb the materials, causing release of fibers into the environment.

NESHAP separates non-friable materials into two categories: Category I non-friable materials include resilient floor coverings (asbestos floor tiles and linoleum), asphalt roofing products, packings, gaskets and resinous adhesives. Category I materials are not required to be removed prior to demolition unless they are in poor condition, as these materials generally do not release significant amounts of asbestos fibers, even when damaged. If, however,

Category I materials will become friable due to sanding, grinding, abrading, drilling, or cutting, they are required to be removed prior to disturbance and handled and disposed of appropriately. All non-friable ACM not included in Category I are considered Category II materials. These materials include transite cement pipe and board products, plaster, stucco, fire door cores and gypsum drywall texturizing and mudding compounds. These materials will release fibers when broken or crumbled and therefore are required to be removed prior to demolition or renovation activities.

### Pre-Removal Notification Requirements

*Contractors or building owners who have employees remove asbestos must provide notification to the EPA at least 10 working days in advance of any removal project that involves more than 100 lineal or square feet of friable material.* Notification of Bay Area, South Coast or Sacramento Air Quality Management Districts will satisfy the EPA notification requirement since NESHAP enforcement has been delegated to these agencies. Filing the notification is the responsibility of the abatement contractor prior to removal of a material. A demolition contractor is responsible for notification prior to the demolition of a building. Building owners must provide annual notifications if their employees remove more than 100 square or linear feet of asbestos per year at a site.

### Fines for Violations

The penalty for a NESHAP violation is up to \$25,000 per day. If the violation is done knowingly, the fine is \$25,000 and/or one year in jail.

## **OSHA ASBESTOS IN CONSTRUCTION STANDARD REQUIREMENTS**

OSHA enforces the Asbestos in Construction Standard. *This is the most important asbestos regulation for building owners and managers to understand and follow. The regulation places the burden of knowing and communicating the locations of ACM onto the building owner and manager because OSHA feels they are the parties most likely to be aware of the locations of asbestos in their buildings. The regulation requires building owners to determine if ACM's are present before any work on, or adjacent to, these materials is performed.*

The regulation enables OSHA inspectors to cite building owners and managers for failure to perform the following:

- Test suspect materials for asbestos prior to renovation or demolition activities
- Post asbestos warning signs in mechanical rooms
- Notify building occupants and employees of the ACM locations
- Provide annual employee training
- Provide personal protective equipment for employees disturbing asbestos
- Provide notifications to contractors bidding on work

The building owner is defined as "the legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which activities covered by the Standard takes place." This definition makes the building owner, manager, or a single building tenant responsible for compliance with the standard if they have overall management and recordkeeping responsibility for the building.

### **Presumed ACM (PACM)**

In the absence of testing, OSHA requires building owners to presume a material contains asbestos.

Presumed ACM are defined as "thermal systems insulation and surfacing material found in buildings constructed no later than 1980." Floor tile and sheet flooring must also be presumed to contain asbestos if it was installed prior to 1980.

The standard also states that "if the employer/building owner has actual knowledge, or should have known through the exercise of due diligence, that other materials are asbestos-containing, they too must be treated as such." Materials such as ceiling tile, sheet rock mudding and texturizing compounds, transite materials, wall and ceiling plaster, exterior stucco and roofing materials are some of the materials that may contain asbestos and should be treated as asbestos under this due diligence requirement.

*What this presumption of a material containing asbestos effectively does is enable OSHA to cite building owners and managers if these materials are present and are being disturbed or not properly managed. Owners will no longer be able to say they didn't know the material contained asbestos.*

### **Federal OSHA and Cal/OSHA Definitions of Asbestos**

Federal OSHA defines ACM as materials that contain greater than 1% asbestos. However, in California, contractors who disturb a material containing greater than 0.1% asbestos must be registered with Cal/OSHA. Since most construction contractors are not registered, this definition essentially requires the building owner to hire an abatement contractor to remove materials containing less than 1% or "trace" amounts of asbestos.

### **Survey Requirements**

Building owners must determine the presence and location of ACM and PACM by performing a survey in accordance with the Asbestos Hazard Emergency Response Act (AHERA) or presume

the materials contain asbestos prior to commencing any construction project.

## Notification of Requirements

Building owners must notify the following entities regarding the locations of ACM or PACM in their buildings:

- Employees of the Owner
- Prospective bidders for construction work
- Contractor/Vendors
- Tenants
- Adjacent employers on multi-employer work sites (tenants next to abatement activities and contractors working around abatement area)

Contractors must notify the following entities regarding ACM in a construction area:

- Employees
- Subcontractors
- Building Owners

Adjacent employers and tenants reoccupying areas after removal work is performed must be provided with a description of the nature of work in regulated areas, newly discovered ACM in the work area, and remaining ACM following the abatement and clearance results (if any) at the end of the project.

## Work Classifications

The regulation establishes four work classifications with specific containment, worker protection and decontamination requirements for each class as follows:

- Class I work includes removal of surfacing materials such as fireproofing, acoustical material, and thermal systems insulation.
- Class II work includes removal of asbestos that is not Class I material. This includes non-friable materials such as floor tiles and sheeting, roofing and mastics.

- Class III work includes repair and maintenance operations where ACM, including thermal systems insulation (TSI) and surfacing ACM and PACM is likely to be disturbed. This includes the removal of one glove bag or amount of surfacing material that would fit into one 60"x 60" disposal bag. Being disturbed is defined as disrupting the matrix of the material or crumbling or pulverizing the material.
- Class IV work includes maintenance and custodial activities during which employees contact but do not disturb (break up the matrix, crumble or pulverize) ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.

## Training

The regulation establishes specific training requirements for construction workers and building employees who are likely to be exposed to asbestos fibers. *For most building owners and managers, Class IV training for maintenance and engineering personnel is required because they are likely to contact asbestos.* The training requirements are as follows:

- Class I and II training is a 4-day course designed for asbestos abatement workers
- Class III training is an 8 to 16 hour course designed for employees who perform or supervise small-scale abatement activities. The course topics include:
  - ✓ Asbestos recognition and health effects
  - ✓ Operations that could result in asbestos exposure
  - ✓ Protective equipment and engineering controls
  - ✓ Work practices
  - ✓ Respirators and protective clothing
  - ✓ Housekeeping and hygiene facilities
  - ✓ Emergency procedures

- ✓ Waste disposal
  - ✓ Medical surveillance
- Class IV Training is a 2 to 4-hour course designed for employees likely to contact asbestos such as maintenance, janitorial, engineering personnel, and construction trades. The course topics include:
    - ✓ Locations of ACM and PACM
    - ✓ Health effects
    - ✓ Description of operations that could result in asbestos exposure
    - ✓ Recognition of damage, deterioration and delamination
    - ✓ Response procedures, such as damage report procedures and contacts

Attendees must receive a training certificate (the owner is required to retain a copy) and written training materials. *Annual refresher training is required.*

In addition to the training requirements, if engineers and maintenance workers are required to remove asbestos or work in an area where fiber counts may exceed the "permissible exposure level" (PEL) the regulation requires the employer to:

- Describe operations that require negative pressure enclosures
- Describe procedures for setting up regulated areas prior to performing asbestos related work
- Provide employees with respirators and assure their use
- Perform exposure monitoring of employees
- Provide annual physicals and maintain a medical surveillance program
- Provide employee and OSHA inspectors access to records and maintain them for 30 years
- Properly contain and dispose of asbestos containing waste material

Examples of activities where maintenance or engineering personnel exposures may exceed the PEL include activities such as spill cleanup, running conduit or cables adjacent to fireproofing and performing spot abatement during renovation or remodel activities.

## Recordkeeping

OSHA requires employers to maintain asbestos records. Records must be made available to an OSHA inspector upon request. If OSHA visits you, records are usually the first item they will ask for. Failure to maintain records can result in an OSHA citation. The following records must be maintained for the specified duration:

- All records concerning the presence and location of ACM/PACM
- Notification records for the duration of ownership of building
- Data to rebut PACM records for as long as it is relied upon
- Training records for 1 year beyond last training
- Objective Data for Negative Exposure Assessment for the duration of reliance on data
- Exposure measurements for 30 years
- Medical surveillance information for 30 years after last date of employment

## Recommendations for OSHA Compliance

To avoid having to implement all the requirements of the Standard, the building owner or manager may choose to have an asbestos abatement contractor on retainer to perform all "asbestos related" activities.

*For buildings with large quantities of friable materials (i.e. fireproofing) it is probably more cost effective to have a trained and equipped team in the building who can perform the ongoing asbestos related work and periodic cleaning activities.*

*Buildings without friable materials, such as older buildings that may contain only pipe insulation or non-friable materials may find it more cost effective to hire asbestos abatement contractors to perform any asbestos-related work in the building. This eliminates the cost for equipment, medical examinations, record keeping and the liability of having in-house employees perform the work.*

## **FINES FOR CAL/OSHA VIOLATIONS**

As of January, 2000 the California State Legislature significantly raised the fines for OSHA violations by enacting AB 1127. For most violations the fines are for \$15,000 per violation and \$25,000 for serious violations. AB 1127 created other changes as well:

- Fines for corporations have been increased to \$150,00
- Attorneys, doctors and union representatives can now file complaints with OSHA, not just employees
- On construction sites OSHA can cite the employer who created the hazard and the individuals responsible for health and safety
- Supervisors, project foreman and managers who willfully violates an OSHA standard can be cited and fined up to \$100,000 and imprisoned for up to 1 year.

## **WASTE DISPOSAL**

For purposes of defining asbestos containing waste that must be treated as "hazardous" material, the California Department of Health Services uses the following definition: "material that is classified as friable finely divided and powdered wastes that contain greater than one percent (1.0%) asbestos." Asbestos waste must be properly contained, labeled and transported to a landfill licensed to accept asbestos waste (usually a Class III Landfill).

Asbestos waste weighing less than 50 pounds does not need to be transported by a registered hazardous waste hauler. The generator can be held liable for future cleanup of the waste site under federal regulations. Some building owners require the asbestos abatement contractor be considered the waste generator since the abatement contractor generates the waste at the building owner's site.

## **Waste Manifests**

Waste that is transported to a hazardous waste disposal site licensed to receive hazardous waste must be accompanied by a properly completed Uniform Hazardous Waste Manifest.

*The generator is generally the building owner, must obtain an EPA Generator Identification (ID) number. For asbestos projects, the owner should obtain a temporary (90-day) ID number.*

To obtain a temporary ID number contact the Department of Toxic Substances Control at (916) 324-1781.

## **SURVEY AND TESTING REQUIREMENTS**

### **Federal NESHAP Requirement**

The NESHAP regulation requires the owner or operator (building owner or contractor) of a construction or renovation site to thoroughly inspect the affected facility or part of the facility for friable and non-friable (Category I and II) ACM prior to the commencement of renovation or demolition work.

### **State Requirement**

Under California law, there is a clear and expressed duty to determine whether a building has ACM, particularly for buildings built prior to 1978 (the year the federal government banned most of the uses of friable asbestos building materials). The duty to determine

whether ACM is present in a building is implied in numerous state and federal regulations, which the building owner may violate if he or she acts without knowing whether a building contains asbestos.

Section 6505.5 of the California Labor Code requires that for buildings built prior to 1978, a building owner or employee of the building owner makes a reasonable effort to determine whether ACM is present. The survey must be performed prior to contracting for or authorizing work which would cause a release of asbestos fibers from asbestos-containing material.

### Local Requirement

Local air quality management districts require an asbestos survey in accordance with the AHERA sampling and analytical protocols by an EPA Certified Building Inspector and Cal/OSHA certified asbestos consultant or site surveillance technician prior to renovation or demolition activities.

### Failure to Survey

*In addition to the above regulations, the failure of a building owner to determine whether a building contains asbestos can result in the violation of a number of state, federal and local laws and regulations and create the potential for extensive fines. These laws include requirements for the following:*

- Not exceed the allowable air concentrations of asbestos
- Provide respiratory protection for asbestos concentrations above specific levels
- Construct containments prior to performing asbestos related work
- Disclose the presence of asbestos to prospective tenants and contractors
- Properly package, label, and dispose of asbestos-containing waste



### NOTIFICATION REQUIREMENTS

California Health and Safety Code, Section 25915, Chapter 10.4 "Asbestos Notification", requires virtually every building owner, corporation, school district, college and public agency to provide asbestos notifications containing specific language to:

- Custodial and operations and maintenance personnel
- Tenants (including lessees and subleases)
- Construction Contractors
- Vendors

For buildings in which an asbestos survey has been conducted and an asbestos management program is in place, an abbreviated notification is allowed. *The notification must include the following information regarding known ACM.*

- The location(s) of ACM in the building, including the content and type of asbestos contained in the materials, along with

information regarding the condition of the materials and findings of the inspection

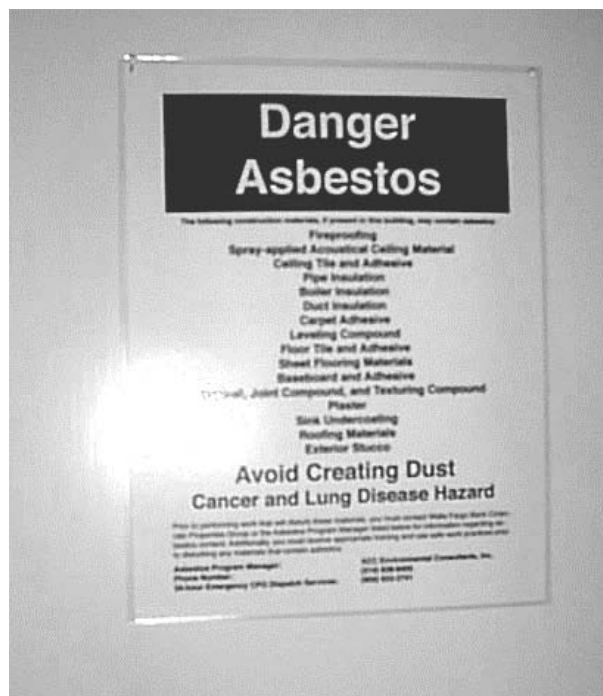
- The potential health risks or impacts that may result from exposure to and inhalation of airborne asbestos fibers
- That disturbance of ACM (such as moving, drilling, boring, sanding, etc.) by personnel untrained in asbestos handling should not be attempted because of the potential health risk resulting from exposure to airborne asbestos fibers
- The existence, availability, and location of the asbestos survey report and the Asbestos Management Program, including a description of the program's contents
- A description of the ongoing in-place management or Operations and Maintenance (O&M) Program

For the abbreviated notification, the program must include:

- Monitoring of the condition of ACM through periodic reinspection and surveillance
- Procedures for remedying unplanned or emergency asbestos fiber release episodes, as well as procedures for minimizing and controlling airborne asbestos fibers during planned disturbance of ACM for maintenance activities
- Asbestos-related training for custodial, engineering and maintenance personnel
- Record keeping procedures to document implementation of the management program

The regulation states “If the owner has not implemented an asbestos management program and has no special knowledge of the general procedures necessary to prevent and minimize

disturbance, release, and exposure to the asbestos and does not understand the potential health risks, the owner is required to inform the employees, tenants, and contractors in the notice that he or she lacks knowledge regarding asbestos”.



*The notice must also encourage employees and tenants to contact local or state public health agencies. This is not advisable because these agencies may create a public relations problem by exaggerating a problem or hazard.*

The notification must be provided in writing and sent by first class mail to all building employees and tenants by the fifteenth (15th) day after receipt of the written asbestos report identifying the presence or location of ACM. The notification shall be addressed to the person at the address designated for the receipt of notices in the lease, rental agreement, or contract with the building owner. *The Notification must be provided on an annual basis after the initial notification is sent.*

*In addition to providing asbestos notifications, the building manager must make all existing asbestos survey and monitoring data and any asbestos management program which has been prepared specific to the building available for review and photocopying to all employees, tenants, and contractors, including employees' representatives, at an accessible place and time within the building.*

## **POSTING AND LABELING REQUIREMENTS**

Cal/OSHA requires that, where feasible, installed products containing asbestos subject to disturbance by construction work shall be labeled. The purpose of the labels is to provide warnings so that employees and contractors can take necessary protective measures before handling the product. The labels must state:

**DANGER**  
**Contains Asbestos Fibers**  
**Avoid Creating Dust**  
**CANCER AND LUNG DISEASE HAZARD**

Applying labels to pipe, duct, and boiler insulation is feasible. Labeling sprayed on acoustic ceiling materials and fireproofing materials is usually not feasible. Posting warning signs in routine maintenance areas, such as telephone closets, mechanical rooms, electrical closets, etc., provides necessary warnings and complies with the labeling requirement. Warning signs are required to include:

- Asbestos warning language
- Identify which materials are present and their location
- State appropriate work practices that will ensure asbestos is not disturbed

The following is an example of a warning sign that can be posted in routine maintenance areas.

**DANGER**  
**ASBESTOS**  
**CANCER AND LUNG DISEASE**  
**HAZARD**

**The following material in this building contains asbestos:**  
**Fireproofing**  
**Floor Tiles**  
**Pipe Insulation**

**DO NOT DISTURB THESE MATERIALS WITHOUT PROPER TRAINING, EQUIPMENT AND WORK PERMIT FROM BUILDING MANAGER**

**CONTACT BUILDING MANAGER IN (ROOM OR SUITE NUMBER) BEFORE PERFORMING ANY WORK ON OR ADJACENT TO THESE MATERIALS**

Cal/OSHA also requires that signs be posted in work areas where asbestos materials are being disturbed during maintenance repair or removal activities.

## **REQUIREMENTS FOR EMPLOYEE PROTECTION**

There are two levels of exposure for asbestos, short (30 minutes) and long-term (8 hour levels). Exposure levels are determined by taking an air sample in the breathing zone of the employee while they are engaged in asbestos related activities. The first level is the Permissible Exposure Level (PEL) of 0.1 fibers per cubic centimeter (f/cc) of air as reported for an (8) eight hour time weighted average (TWA). The second level is the "Excursion Level" (EL) which is a limit of 1.0 f/cc of air as averaged over a sampling period of 30 minutes. When exposures exceed these levels, worker protection and engineering controls are required.

*Building owners are required to perform personal air monitoring for the employees whenever asbestos related maintenance activities are performed which may result in exposure to asbestos. Since most building owners do not have the proper sampling equipment, a consultant may be hired to perform the exposure monitoring.*

## **Respiratory Protection**

The employer must provide respirators to personnel who are required to perform asbestos related work in areas where the PEL may be exceeded.

Employers are also required to provide and insure the use of appropriate protective clothing and equipment to employees exposed above the PEL and EL with:

- Coveralls or similar full body work clothing
- Gloves, head and foot coverings
- Clothing removal and storage areas

*Since the PEL and EL may be exceeded, it is recommended that building employees performing the following activities use personal protection equipment:*

- *Maintenance and construction work performed in air plenums where friable fireproofing material is present*
- *Installation of pipe or electrical conduit through attics, chases, plenums, or other areas where friable asbestos containing material is present*
- *During small-scale asbestos related work, such as performing repairs on thermal systems insulation or repairing or removing*
- *small sections of damaged, sprayed applied fireproofing or acoustical ceiling material*

Prior to issuance of a respirator, employees must be trained in the use of respiratory protection in accordance with procedures set forward in a written respiratory protection program prepared by the employer. The respiratory protection program must include at a minimum the following information:

- Regulatory requirements
- Selection and use of respirators
- Respirator fit-testing
- Respirator cleaning and maintenance
- Employee records, including training records and fit testing records

## **Protective Clothing**

Employees are required to be provided with protective clothing when airborne fiber levels exceed the PEL.

## **Worker Decontamination**

Showers are required for all Class I work when more than 25 linear or 10 square feet of material are disturbed.

Decontamination chambers are required on small Class I jobs, Class II and Class III projects. Clothing must be HEPA vacuumed inside the chamber.

## **Medical Surveillance**

An employer is required to institute a medical surveillance program for all employees performing Class I, II or III work for 30 or more days per year. The medical surveillance program includes complete medical examinations and chest x-rays on an annual basis.

In addition, employees issued respirators are required to be provided with a physical examination to determine if they have adequate pulmonary function and can safely wear a respirator. OSHA feels this is necessary because respirators restrict breathing and wearing a

respirator can cause individuals with respiratory problems to pass out. The examination is required annually under the supervision of a physician.

## **ADDITIONAL REQUIREMENTS FOR SCHOOLS**

Schools throughout the United States are required to comply with all of the EPA and OSHA regulations. In addition they have requirements under the Asbestos Hazard Emergency Response Act (AHERA). AHERA required all public and private schools grades K-12 to perform an initial survey of their schools for ACM in 1989. The schools were then required to submit a management plan to the local education agency. The management plans were required to be completed by November of 1989. Under AHERA, schools are also required to perform the following:

- Label all installed products containing asbestos
- Provide 16-hour training to maintenance personnel and 2-hour awareness training to custodians

AHERA requires schools to perform the following activities on an ongoing basis:

- Inspect all identified ACM every 6 months
- Provide an annual notification to district employees and the PTA regarding the availability of the asbestos management plan at each school
- Maintain records of abatement and removal activities
- Have the schools reinspected by a certified building inspector every 3 years and update the management plan



## **CHOOSING THE APPROPRIATE RESPONSE ACTION**

According to AHERA, selection of a response action for any of the five major categories of damaged to potentially damaged ACM must be made. The response action should be implemented in a timely manner and be sufficient to protect human health and the environment.

For damaged thermal systems insulation, the minimum response is to repair the damaged area. If repair is not feasible, the material must be removed. If damaged friable surfacing material is present, the material must be encapsulated, enclosed, removed, or repaired. Under AHERA, when friable surfacing material is significantly damaged, the area must be immediately isolated and the material removed.

## **ASSESSING ASBESTOS HAZARDS**

The most widely used and accepted method for assessment of ACM and implementation of appropriate response actions is outlined in the Asbestos Hazard Emergency Response Act of 1986 (AHERA) which regulates asbestos

containing building materials in public and private schools, levels K-12. The standards outlined in AHERA represent a "standard of care" that, for liability protection, should be applied to all commercial buildings.

Per AHERA, all friable materials are categorized as one of the following:

- SIGNIFICANTLY DAMAGED friable surfacing material
- DAMAGED friable surfacing material
- SIGNIFICANTLY DAMAGED or
- DAMAGED thermal systems insulation (TSI)
- SIGNIFICANTLY DAMAGED or DAMAGED friable miscellaneous material
- Friable asbestos containing material with a POTENTIAL for DAMAGE
- Friable asbestos containing material with a POTENTIAL for SIGNIFICANT DAMAGE

**SIGNIFICANTLY DAMAGED** surfacing (sprayed-on and troweled-on materials) and miscellaneous material is where the damage or deterioration results in inadequate adhesion or cohesion and the damage is extensive and severe with one or more of the following characteristics:

- ✓ Crumbling or blistered over at least one tenth (1/10) of the surface if the damage is evenly distributed, one fourth (1/4) if the damage is localized. Large areas of the material are hanging from the surface, delaminated, or showing adhesive failure.

**DAMAGED** material is defined the same as above except that the damage is not severe.

- ✓ Crumbling, blistered, water stained, gouged, marred or otherwise abraded over less than one tenth (1/10) of the surface if

the damage is evenly distributed, less than one fourth (1/4) if the damage is localized.

**SIGNIFICANTLY DAMAGED** or **DAMAGED** thermal systems insulation (pipes, boilers, flues and HVAC insulation) is material that has lost its structural integrity or its covering is crushed, water stained, gouged, punctured, missing or not intact.

**POTENTIAL FOR DAMAGE AND POTENTIAL FOR SIGNIFICANT DAMAGE** is determined based on the following three characteristics:

- ✓ Frequency of potential contact
- ✓ Influence of vibration
- ✓ Influence of air erosion

If any one of these criteria is determined to be "high", regardless of the ranking of the other two criteria, then the material is assessed as having the Potential for Significant Damage. Similarly, if any one of the three criteria is considered "moderate", then the material is assessed as having the Potential for Damage.

## **COMPARISON OF VARIOUS ASBESTOS ABATEMENT STRATEGIES**

Response options for friable materials include removal, enclosure, encapsulation or management in place. In choosing a response action, the level of potential disturbance is combined with the current condition of the asbestos containing material to indicate an overall hazard potential. The various response actions and advantages of each are listed below.

## Removal

The best time to remove asbestos is when floors or areas of a building become vacant and major renovation work is to be performed for the next occupant. If the project is performed solely to remove asbestos, the relocation of tenants and reconstruction of the space will usually triple the project cost.

Removal eliminates the asbestos source and eliminates the need for special operations and maintenance programs. It also reduces the owner's long-term liability and will increase the value and marketability of the property since most buyers will reduce the value of the building by the estimated cost of abatement. Large corporate tenants may also request reduced rental rates for a space containing friable asbestos or require the asbestos be removed.

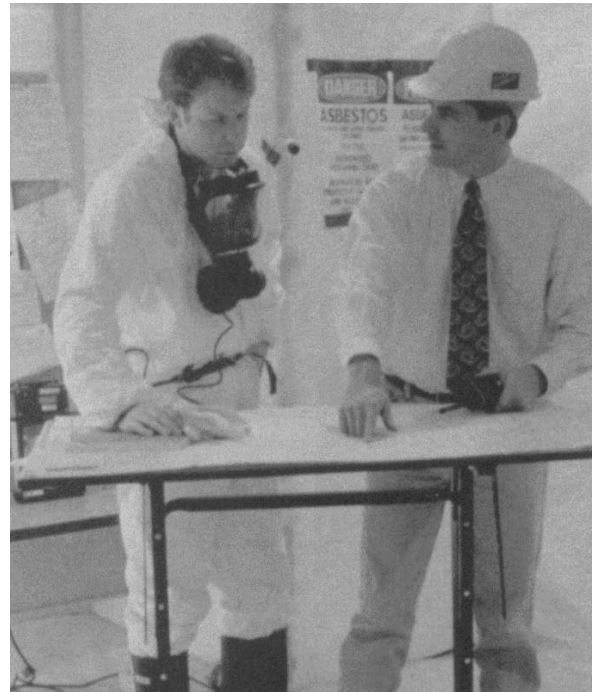
Because almost all asbestos must be removed at some point in time (prior to demolition or renovation), removing the asbestos in conjunction with a renovation activity may provide the lowest long-term cost option.

## Encapsulation

Encapsulation is the spraying of the asbestos containing material with a sealant. Encapsulation is appropriate for pipe and thermal systems insulation as well as acoustic ceiling material. This is not a good strategy for fireproofing because the added weight increases the potential for delamination.

## Enclosure

Enclosure involves the construction of "impermeable" walls around the asbestos-containing material. Enclosure of beams with fireproofing where there is an unsprayed concrete deck is feasible and may be considered. Enclosure of pipe insulation with metal jacketing is also practical.



## Repair

Repair is the restoration of damaged or deteriorated asbestos-containing material to an intact condition.

## WHEN YOU DECIDE TO REMOVE OR ABATE ASBESTOS

When a decision is made to remove asbestos, properly licensed and trained professionals should perform the work. Removal of the ACM must be approached very seriously. An improper removal can create an extremely hazardous situation, which is much worse than leaving the material in-place.

## Designing and Bidding the Project

The first step in performing an asbestos abatement project is the development of the project specifications by the project consultant. A good set of specifications will accurately define the scope of work and describe the procedures the contractor will be required to follow. The specifications create an even

playing field and assure all the contractors are bidding on the same scope of work. The consultant will usually invite five or six qualified contractors they have experience with and conduct a bid-walk. The bid walk enables the contractors to become familiar with the site. Based upon price and contractor qualifications, a contractor is selected. A good set of specifications prevents change orders and conflicts during the project.

### **During the Work**

During the abatement process, the Project Consultant/Manager has the overall responsibility for the management of the project.

The Project Manager should perform the following activities:

- Inspect the containment prior to abatement activities
- Perform daily air monitoring outside the work area
- Review the work procedures
- Monitor compliance with the specifications and asbestos regulations
- Monitor schedule compliance
- Observe worker safety procedure
- Review personal air monitoring results for the abatement workers
- Verify pressure differential systems
- Perform visual inspections and conduct clearance air sampling following abatement

### **Project Documentation**

Complete documentation of the asbestos abatement work is proof of a properly performed and completed project. It is important to retain the documentation in case of future litigation, e.g., workers or building occupants claim personal injury as a result of asbestos exposure from the removal project.

The consulting firm should, at a minimum, provide the following documentation:

- A project summary report
- Copy of contractor's insurance certificate and Cal/OSHA registration
- Copies of all required permits and agency notifications
- Laboratory results of all environmental personal and clearance air monitoring
- Negative pressure differential log sheets
- Executed copies of abatement worker training certificates and medical approvals
- Daily log of contractor activity with incidents and corrective actions taken
- Certification that each area passed visual inspection and clearance air monitoring

### **ASBESTOS MANAGEMENT PROGRAMS**

Here are the steps a property owner should take to identify and manage asbestos and comply with their regulatory requirements.

First, hire a qualified and certified asbestos consultant to survey your buildings to determine if any asbestos-containing materials are present, and evaluate the kind of management procedures to be implemented to comply with regulations.

If the survey indicates asbestos is present in the building, someone within the organization should be selected to become the Asbestos Program Manager. This person is critical to the success of the management program and must be committed to maintaining the program, tracking annually required events, and maintaining OSHA required records.

Finally, the asbestos consultant should work with the property owner or manager to develop an asbestos management program manual and recordkeeping system for the asbestos program manager to follow.

The consultant can also train the program manager on how to administer the program.

The asbestos management program should include:

- An asbestos program manual outlining the program requirements, responsibilities and work practices to be followed to prevent disturbance of asbestos or properly conduct repair and cleanup activities
- Development system of distribution of annual and project-specific asbestos notifications to comply with OSHA and
- California Health and Safety Code requirements
- Posting warning signs in routine maintenance areas to meet OSHA requirements
- Continual recordkeeping to meet OSHA requirements
- Development of a work permit system to provide asbestos information and proper notification before work by in-house personnel or outside contractors is authorized
- Training of building employees at least at the OSHA Class IV level with supervisor training for the asbestos program manager
- For buildings with friable asbestos, the requirement that outside construction contractors and trades entering the building provide asbestos training to their employees and provide the asbestos program manager with copies of their training certificates
- Commitments on the part of building management and maintenance personnel to continually maintain the program



## COMPLIANCE CHECKLIST FOR COMMERCIAL AND APARTMENT BUILDINGS, COLLEGES AND GOVERNMENT AGENCIES

CHECK	PROGRAM START-UP ACTIVITIES	REGULATION	PAGE(S)
	1. Have a consultant survey your buildings for ACM and prepare a report of findings	OSHA ACS & NESHAPS	7 & 11
	2. Develop an Asbestos Management Program and recordkeeping system for each building	OSHA ACS EPA Recommended	19
	3. Appoint a person in your organization to become the asbestos program manager to administer the program, schedule training and manage the records or database	OSHA ACS	19
	4. For multiple buildings, develop an asbestos database to track information and prepare notifications	Recommended, Not required	49
	5. Develop and distribute asbestos notification to employees, tenants, outside contractors and vendors	OSHA ACS, Health & Safety Code	9 & 12
	6. Provide initial Class III Training to employees who repair or disturb ACM. Include tools, equipment, respirators, respirator fit testing and medical examination	OSHA ACS	9
	7. Provide initial Class IV Training to employees likely to disturb ACM	OSHA ACS	9
	8. Post asbestos warning signs in all boiler and mechanical rooms, janitorial, telephone and electrical closets	OSHA ACS	14
	<b>ANNUALLY REQUIRED ACTIVITIES</b>		
	1. Re-inspect ACM and repair any damage observed	EPA Recommended	4
	2. Perform annual or periodic cleaning in areas with exposed friable material to reduce fiber levels	EPA Recommended	4
	3. Redistribute asbestos notification annually	California Health & Safety Code	9 & 12
	4. Provide annual Class III Refresher Training	OSHA ACS	9
	5. Provide annual Class IV Refresher Training	OSHA ACS	9
	6. Provide medical exam and respirator fit testing	OSHA ACS	10

## ASBESTOS COMPLIANCE CHECKLIST FOR SCHOOL DISTRICTS

CHECK	PROGRAM START-UP ACTIVITIES	REGULATION	PAGE
	1. Update your asbestos management plan by conducting a reinspection and preparing a new plan	AHERA	16
	2. Prepare or update your Asbestos Management Program Manual to come into compliance with current regulations	EPA Recommended OSHA ACS	19
	3. Appoint an individual to become the asbestos program manager to administer the program, schedule training, perform inspections and manage the records or electronic database	AHERA & OSHA ACS	19
	4. Have an district-wide asbestos database developed	Recommended, Not required	49
	5. Develop and distribute asbestos notification to the PTA, custodial employees, teachers, contractors and vendors	AHERA	6 & 9
	6. Provide initial AHERA O&M Class III Training to employees required to repair or abate ACM. Include tools, equipment, respirators, respirator fit testing and medicals	AHERA & OSHA ACS	9 & 16
	7. Provide initial Class IV Awareness Training to employees who may disturb asbestos	AHERA & OSHA ACS	9 & 16
	8. Post asbestos warning signs and label installed asbestos products in all boiler and mechanical rooms, janitorial, telephone and electrical closets	AHERA & OSHA ACS	14 & 16
	<b>PERIODICALLY REQUIRED ACTIVITIES</b>		
	1. Re-inspect ACBM every 6 months and repair damage	AHERA	6
	2. Perform annual or periodic cleaning in areas with exposed friable material to reduce fiber levels	EPA Recommended	4
	3. Redistribute asbestos notifications annually	AHERA & Health & Safety Code	6 & 9
	4. Provide annual AHERA O&M Class III and Class IV Refresher Training	OSHA ACS	9
	5. Have schools reinspected by Certified Inspector and management plan updated every 3 years	AHERA	16

## Section II - Lead-Based Paint

### HEALTH EFFECTS OF LEAD AND ROUTES OF EXPOSURE

#### Children

While potentially harmful to individuals of all ages, lead exposure is especially harmful to children under six years of age. Young children have rapidly developing nervous systems, which are particularly sensitive to the effects of lead. Children also tend to absorb lead more readily than adults. Excessive childhood lead exposure causes:

- Learning disabilities
- Lower intelligence
- Behavioral problems
- Stunted growth
- Permanent hearing and visual impairment
- Damage to the central nervous system

Children are exposed to lead primarily by ingesting lead-contaminated dust and soil through normal hand-to-mouth activity. For example, children may play with toys on a floor and then put their hands in their mouths, or they may play in dirt outdoors then eat a snack without washing their hands. Some children also may directly ingest lead-based paint chips from flaking walls, windows, and doors, or may chew surfaces covered with LBP.

If maintained in good condition, LBP is not hazardous. LBP in poor condition, however, can create a health hazard. Dust may be contaminated by lead when paint deteriorates; lead is disturbed in the course of renovation or is tracked into the home from contaminated soil in the yard or other external sources.

Soil may be contaminated with lead from the deterioration of exterior paint, industrial

emissions, and past use of leaded gasoline. Contaminated soil may be ingested directly or may contaminate dust when it enters the home. Other sources of lead exposure include lead-contaminated food, drinking water and occupational exposures to dust and airborne lead particles.

#### Adults

Adults are usually exposed to lead by inhaling lead dust on construction sites or through ingestion. A single, very high exposure to lead can cause lead poisoning. The adverse health effects in adults exposed to high levels of lead include:

- High blood pressure
- Headaches
- Digestive problems
- Memory and concentrations problems
- Kidney damage
- Mood changes
- Nerve disorders
- Sleep disturbances
- Muscle or joint pain

Lead can also affect the ability of both men and women to have healthy children.

### DEFINITIONS OF LEAD-BASED PAINT AND LEAD HAZARDS

Numerous agencies have promulgated regulations that define what constitutes lead-based paint. Unfortunately, each agency has a somewhat different definition and testing procedure.

There are three methods to test paint for lead content: 1) by obtaining a chip sample and having it analyzed by a laboratory by atomic absorption

analysis, 2) using a device called an X-ray Fluorescence Spectrum Analyzer (XRF), which takes a direct reading of the paint in the field, or 3) with a chemical test stick. (The EPA does not recommend test sticks because they have shown to be unreliable).

## **OSHA**

*The OSHA regulation pertains to paint containing any amount of lead. OSHA is concerned with worker exposure to lead, not the amount of lead in the paint. There are two factors that determine the amount of lead dust generated by a construction activity: 1) the amount of lead in the paint and 2) the type of activity being performed. For example, sanding causes more dust than scraping and burning causes higher exposure levels than sanding. For this reason, OSHA has determined that the only way to determine the exposure level is to perform an initial exposure assessment to characterize worker exposure levels for each activity.*

*The lack of a concentration at which paint is defined as lead-based often creates confusion for contractors and employers when they receive test results of paint sampling. What the employer (contractor or building owner) must do is measure exposure levels while their employees perform trigger activities as described in this section. Testing the paint prior to the commencement of work is required so the paint sample results can be used to determine where to perform the exposure assessment. The contractor should perform the initial assessment on the paint with the highest lead level. If the concentration measured does not exceed the PEL, it is safe to assume that disturbing paint with a lower lead content will also not exceed the PEL.*

## **HUD and EPA Definitions**

According to the Housing and Urban Development Department (HUD) and the EPA, if atomic absorption analysis is used, and the result is greater than .5% or 5,000 parts per million

(ppm), the paint is considered lead based. If an XRF is used, and the paint contains greater than 1.0 microgram per square centimeter, (mg/cm<sup>2</sup>), it is considered lead-based paint.

## **Department of Consumer Affairs**

The Department of Consumer Affairs set a standard in 1987 that limited the content of lead in residential paints to 0.06% or 600 ppm. Lead at this level can only be determined by atomic absorption analysis.

## **Lead Hazards – California Department of Consumer Affairs**

*The California Department of Health Services (DHS) has defined a lead hazard as lead dust exceeding the EPA guidelines of 50 ug/ft<sup>2</sup> for all public buildings. DHS defines public buildings as “a structure which is generally accessible to the public, including but not limited to, schools, daycare centers, museums, airports, hospitals, stores, convention centers, government facilities, office buildings and any other building which is not an industrial building”. This dust is based upon the HUD definition, which is a conservative figure because it applies to buildings where children are present. The DHS definition creates a serious liability for building owners because the background levels of lead in dust can easily exceed these HUD levels.*

## **SURVEY AND TESTING REQUIREMENTS**

### **Residential Dwellings**

Title X of the Housing and Community Development Act of 1992 (Public Law 102-550) requirements apply to housing receiving federal assistance and federally owned housing. Federally owned housing consists of residential dwellings owned or managed by a Federal agency, or for which a federal agency is trustee or conservator. Public housing includes

properties operated by local housing authorities and department of defense (DOD) housing. In addition, the notification requirements of Title X apply to target housing which is defined as any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than 6 years of age resides) or any 0-bedroom dwelling.

*The notification requirements of Title X, which became effective in March of 1996, apply to all renter occupied residential housing or housing being sold regardless of whether it is owned or managed by a federal agency.*

### **Inspection and Risk Assessment Requirements**

Title X requires inspections to be performed in housing receiving federal assistance based upon the year of construction. Units constructed prior to 1960 were to be initially assessed not later than January 1, 1996. The percentages of units constructed from 1960 to 1978 are to be tested by the following dates:

25% by January 1, 1998

50% by January 1, 2000

Remainder by January 1, 2002

After the risk assessment is performed, interim controls must be implemented. Interim controls are defined as a set of measures designed to reduce temporarily, human exposure or likely exposures to LBP hazards.

These controls include:

- Specialized cleaning
- Repair, maintenance and painting
- Temporary containment
- Ongoing monitoring of LBP hazards
- Establishment of management and resident education programs

Paint also needs to be tested prior to federally funded renovation or rehabilitation that is likely to disturb a painted surface.

### **Commercial and Public Buildings**

*Inspections of non-residential buildings are not required. However, paint testing may be required prior to renovation or maintenance activities under OSHA requirements. Where inspections or risk assessments are performed in public buildings in California, the Department of Health Services requires that inspections and risk assessments be performed in accordance with the HUD inspection and risk assessment guidelines. This is an impractical and burdensome requirement for commercial building owners because HUD developed their requirements for residential apartment units, which usually have paints that vary from room to room. Commercial buildings usually have very few different paints and in my opinion should not need to follow room by room testing protocols to locate LBP.*

### **Lead Hazard Reduction and Abatement Requirements**

For federally assisted projects, lead hazard reduction is required for each unit receiving less than \$25,000 in federal funds. Abatement of LBP is required for each unit receiving more than \$25,000 in federal funds.

*For all public buildings in California, DHS requires that during lead abatement activities, containment, worker training and specific work practices are required. Following abatement activities, clearance testing is performed it must be in accordance with HUD Guidelines is required. All the DHS requirements except for certain work practices apply only to lead abatement projects, not all renovation projects. DHS defines abatement as “a set of measures designed to reduce a lead hazard.” Therefore only if the project is specifically performed to remove a lead hazard do DHS requirements apply.*

## Occupant Notification

When risk assessments, inspections or hazard reduction activities have been undertaken, a notice to occupants containing the following information is required:

- Description of the nature and scope of such activities
- Risk assessment inspection reports
- Location of LBP on a *surface by surface basis*

*Before purchase or lease of any pre-1978 housing, the seller is required to:*

- Provide lead hazard information pamphlet titled “Protect Your Family From Lead in Your Home”
- Disclose to purchaser or lessee any known LBP or any known LBP hazards and provide a lead hazard evaluation report
- Completely fill out the disclosure form that confirms the lessee or the buyer has received the necessary disclosure form and retain it for 3 years
- Permit purchaser a 10-day period to conduct a risk assessment or inspection for the presence of LBP

## Fines and Penalties

Any person who violates the regulation is subject to penalties in accordance with Section 102 of the Department of Housing and Urban Development Reform Act of 1981.

Civil Liability - The owner is liable to the purchaser or lessee in an amount equal to 3 times the amount of damages incurred by the purchaser or lessee. In a civil action brought for damages, if the plaintiff prevails, the court can award costs to the party for commencing action together with reasonable attorney fees and any expert witness fees.

Prohibited Act – is defined as failing or refusing to comply with a provision or any rule or order issued. The penalty for each violation shall not be more than \$10,000.



## OSHA LEAD CONSTRUCTION STANDARD REQUIREMENTS

The Cal/OSHA Lead Standard for the Construction Industry is found in Section 8 of the California Code of Regulations 1532.1. It covers all construction work and maintenance activities where an employee may be exposed to lead. *Apartment building owners, school districts and college and universities who have employees perform painting and maintenance activities that disturb paint are required to comply with this regulation. Outside contractors hired to work in commercial buildings and residences must also comply. If a contractor fails to comply and creates a lead hazard, the property owner has a potential liability. For this reason, it is important to make sure all contractors whose work may disturb LBP comply with this regulation.*

## Exposure Levels and Project Requirements

The project requirements for personal protective equipment, respiratory protection, decontamination units, worker training and engineering control levels are based upon the workers' exposure to airborne levels of lead. To determine the personal protection requirements, the employer (contractor or building owner depending upon whose employees perform the work) is required to perform an initial exposure assessment. The exposure assessment is conducted by collecting air samples in the breathing zone of the employees while they perform various construction activities that disturb paints containing any amount of lead. Based upon the exposure level, the employer is required to provide various levels of protection and engineering controls. The regulated levels of the exposure are as follows:

The "Action Level" (AL) is 30 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) over an 8-hour time weighted average (TWA).

The "Permissible Exposure Level" (PEL) is 50  $\mu\text{g}/\text{m}^3$  over an 8 hour time weighted average if the initial exposure monitoring results are below these levels.

### "Trigger" Activities

OSHA established "trigger" activities, which are anticipated to result in exposures in excess of the PEL. Initial exposure assessments are required for the following "trigger" activities:

Category 1 activities with anticipated exposure level of 50 - 500  $\mu\text{g}/\text{m}^3$  include:

- Manual demolition
- Scraping and sanding
- Use of heat guns for paint removal
- General cleanup of LBP dust and debris
- Power tool cleaning

Category 2 activities with an anticipated exposure level of 500 - 2500  $\mu\text{g}/\text{m}^3$  include:

- Use of lead containing mortar
- Lead burning, rivet busting, power tool cleaning without dust collection system
- Cleanup of dry expendable abrasives

Category 3 activities with an anticipated exposure level greater than 2500  $\mu\text{g}/\text{m}^3$  include:

- Abrasive blasting
- Welding, cutting and torch burning on steel structures

## Employee Protection During the Initial Exposure Assessments

During the initial exposure determination, the employee is required to be provided with appropriate protection for the category of activity being performed. At a minimum, a Tyvek suit and half-faced respirator is required for a Category 1 activity. The employer is required collect personal samples representative of a full shift including at least one sample for each job classification in each work area, either for each shift, or for the shift with the highest exposure level.

### Using Objective Data

When the employer has objective data demonstrating that a particular operation cannot result in an employee exposure to lead above the action level, the employer may rely upon such data instead of implementing initial monitoring. However, objective data is not permitted to be used for exposure assessment in connection with any of the "trigger" activities. An initial exposure assessment is required for every job that involves a "trigger activity".

### Personnel Protection

*For all "trigger" activities, employers are required to provide appropriate respiratory*

*protection, full body clothing, protective gloves and disposable shoes until an initial exposure assessment indicates the exposure levels are below the PEL.*

Where the employer performs personal air monitoring for an employee in a “worst-case” exposure condition and the 8-hour TWA is less than the PEL, the employer is not required to continue providing respiratory protection or protective clothing.

## **Respiratory Protection**

For each category, the following respiratory protection is required:

- Category 1 - Air Purifying Respirator
- Category 2 - Powered Air Purifying Respirator
- Category 3 - Type C Supplied Air

## **Engineering Controls and Protection Requirements**

*When performing “trigger” activities and the initial exposure monitoring indicates exposures are below the AL, the following controls and equipment are required for all projects:*

- *HEPA vacuums - no dry sweeping allowed*
- *Wetting agents*
- *Notification of other employers on the site*
- *Hand washing facilities*

When the initial exposure monitoring indicated the exposure levels are between the AL and PEL, all of the above controls and the following are required:

- Worker training
- Biological monitoring
- Medical examinations

When the initial exposure monitoring is *above* the PEL, all of the above controls and the following are required:

- Competent person on site
- Mechanical and local exhaust ventilation
- Enclosures and containment systems
- Written compliance program
- Warning signs
- Protective clothing/gloves/shoe covers
- Decontamination area including showers
- Eating areas and facilities

## **Regulated Areas and Hygiene Facilities**

The employer is required to establish regulated areas with mechanical and localized ventilation systems whenever the airborne lead level exceeds the PEL. Hand washing facilities are required for exposures below the PEL and full showers for exposures in excess of the PEL.

## **Biological Monitoring and Medical Examinations**

The employer is required to make initial medical surveillance and blood testing available to employees occupationally exposed on any day to lead at or above the AL. The employer is required to make follow-up monitoring available every two months for the first six months and every six months thereafter for employees working at or above the AL for more than 30 days per year.

The employer is required to make medical examinations available annually to employees exposed above the AL for more than 30 days per year.

## **Worker Training**

The employer is required to provide training to communicate information concerning lead hazards in accordance with the Hazard Communication Standard to all employees exposed to lead regardless of the exposure level.

Employers are required to provide initial and annual training to employees exposed in excess of

the AL on any day covering the following information:

- The content of the lead construction standard
- The specific nature of operations which could result in exposures in excess of the PEL
- The purpose, proper selection, fitting, use and limitations of respirators
- The purpose and description of the medical surveillance program
- Information concerning the health effects associated with excessive exposure to lead
- The engineering controls and work practices
- The contents of any compliance plan in effect
- Instructions to employees to only use chelating agents under the direction of a licensed physician
- The employees right to access records

### **Recordkeeping**

The employer is required to maintain detailed records on exposure assessments, including any objective data used for exemption from air monitoring requirements, medical surveillance information and medical removals, and training records. *It is important to note that your records must be made available to an OSHA inspector upon request. It is the lack of records that will result in a citation.*

### **Written Compliance Program**

Prior to the commencement of each job where it is anticipated the PEL will be exceeded, the employer must establish and implement a written compliance program. The compliance program is required to include the following information:

- Description of each activity in which lead is emitted
- Description of the specific means that will be employed to achieve compliance and engineering plans and studies used to determine methods selected for controlling exposure to lead

- A report of the technology considered in meeting the PEL
- Air monitoring data which documents the source of lead emissions
- A detailed schedule for implementation of the program
- A work practices program
- An administrative control schedule
- On multi-contractor sites a description of methods to inform employees of potential exposure to lead and of regulated areas

## **REQUIREMENTS & RECOMMENDATIONS FOR TESTING PAINT**

### **Testing to Comply with the Hazard Communication Standard**

There are currently no regulations requiring apartment building owners, commercial building owners, school districts, colleges or government agencies to test paint for lead content, except for federally funded housing. However, testing prior to construction projects and on locations where children could be exposed to lead is recommended by the EPA. OSHA can cite a contractor or employer for failure to test paint for lead under the Hazard Communication Standard (Hazcom). Hazcom requires the employer to determine if LBP (or any other hazard) is present prior to construction and maintenance activity that may result in the exposure of the employee to a hazardous material. If LBP or other hazards are present, the hazard communication standard requires notification and training of employees.

### **Recommendations for Testing**

There are several reasons why building owners should test for LBP prior to awarding a construction project. The first reason is because the California Labor Code states “if a hazardous



material is discovered during a construction project, the removal of the material must be handled under a separate construction contract.” This requirement has resulted in contractors requesting change orders when LBP is discovered after they have signed a contract for the work. For this reason, when building owners hire painting or renovation contractors for projects where paint will be disturbed or “trigger” activities performed, it is recommended that the owner test the paint for lead and provide the contractor with the test results during the bidding process. This will prevent a change order request and ensure the contractor is properly informed before they provide a price for the work.

The building owner should communicate the presence of lead in the contract with the contractor and require the contractor to comply with all of the OSHA lead in construction and waste disposal requirements. See the sample language on the following page.

The second reason the owner should test paint is that many contractors do not include LBP testing or control procedures in their bid. If costs for testing are not included in the contractor’s estimate, it generally will not be performed and the LBP issue will be ignored and regulations will be violated.

The third reason to test for lead is liability protection. The building owner should insure that tenants are not exposed to lead dust during the work and that lead dust is not left on site following the work especially where children are present. At a minimum, the contractor or building maintenance personnel should restrict access to the site during the work, use drop cloths and wash down the work area with TSP and water at the completion of the project.

### **RECOMMENDED CONTRACTOR NOTIFICATION LANGUAGE**

The following recommended language should be incorporated in the general conditions for construction projects to prevent change orders associated with the presence of lead.

The General Contractor and subcontractors are required to comply with 29 CFR 1926.62, the Lead in Construction Standard on this project. The regulation requires contractors to protect their employees from exposures to lead in excess of the Permissible Exposure Level of 50 micrograms per cubic centimeter of air (mg/cm<sup>3</sup>). The OSHA standard does not define the amount of lead in paint that constitutes lead containing paint. Therefore, the Contractor must determine the worker exposure level for any activity that disturbs paint containing any amount of lead.

As required by the Lead in Construction Standard, until the worker exposure level is determined, Contractors are required to provide its workers with personal protection including respirators and protective clothing while performing manual demolition, sanding, scraping, abrasive blasting, and burning of paint.

If the exposure level indicates that additional worker protection and engineering controls are required for this project, they shall be provided. \_\_\_\_\_(Your Company Name\_\_\_\_\_) will not be responsible for paying any costs for any

additional compliance measures required by the Standard, including but not limited to, worker training, worker protection, cleaning or decontamination of the work area or waste disposal.

The general contractor and all subcontractors shall prepare a written compliance program for this project which will outline the methods, procedures and controls to be followed by Contractor and each subcontractor during the disturbance of lead containing paint. The Contractor's compliance program shall be submitted to \_\_\_(Your Company Name)\_\_\_ prior to the start of any work covered by the Lead in Construction Standard. The plan may be received and approved by our environmental consultants.

It is the Contractor's responsibility to maintain adequate controls and perform personal air monitoring to insure worker safety during the duration of this work. Initial exposure assessment monitoring results shall be supplied to \_\_\_(Your Company Name)\_\_\_ within 48 hours of the collection of the samples.

Intact paint on building components is exempt from consideration as hazardous waste. It is the Contractor's responsibility to test lead containing paint and debris to determine its disposal requirements and dispose of the waste in accordance with all State and Federal laws.

Following the work, the Contractor shall cleanup the work area to a level where no visible dust is present. If children under the age of 6 or pregnant women will re-occupy the area, clearance wipe sampling shall be performed by the Contractor in accordance with HUD Guidelines to ensure the area is safe for reoccupancy.

## NOTIFICATION REQUIREMENTS

### Tenant Notification Requirements for Rental Housing and Apartment Buildings

For federally owned or controlled housing, when risk assessments, inspections or reduction activities have been undertaken, notice to occupants must be provided in accordance with the Title X Lead Hazard Reduction Act. The notices are required to describe the nature and scope of such activities, including actual risk assessment inspection reports including available information or the location of any remaining LBP on a surface by surface basis.

For *all* residential housing, even if it is not federally owned or controlled, before purchase or lease of any target (pre-1978) housing the seller or a lessor shall:

- Provide lead hazard information pamphlet titled "Protect Your Family from Lead in Your Home"
- Disclose to purchaser or lessee any known LBP or any known LBP hazards and provide a lead hazard evaluation report
- Completely fill out the Title X Disclosure Form that confirms the lessee or the buyer has received the necessary disclosure form and retain it for three years
- Permit purchaser a 10-day period to conduct a risk assessment or inspection for the presence of LBP

### Pre-Renovation Notification

Prior to performing activities that disturb more than 2 square feet of paint per component, renovators or contractors are required to distribute the pamphlet titled "Protect Your Family from Lead in Your Home" to owners and occupants of most housing built prior to 1978 before commencing renovation activities. These activities include sanding, scraping and

other surface preparation activities that disrupt paint and generate dust.

### **Notification to Building Employees**

In accordance with the Hazard Communication Standard, building owners should test for lead prior to performing activities involving their own employees that disturb paint. If lead is present, specific information needs to be communicated to the employee and training provided. (See OSHA training requirements on pages 31 and 32).

### **Notification of Construction Contractors**

As previously recommended, the building owner should test for lead and provide construction contractors with the test results during the bidding process (See page 36). In addition, they should require the contractor to comply with the OSHA Lead in Construction Standard requirements (See page 35).

## **ASSESSING LEAD-BASED PAINT HAZARDS**

The U.S. Department of Housing and Urban Development (HUD) has developed a publication titled “Guidelines for the Evaluation and Control of LBP Hazards in Housing.” The guidelines state that during an inspection and risk assessment, the inspector should observe the extent of any paint deterioration by rating the paint condition as intact, fair or poor. The cause of the deterioration should also be determined.

The Toxic Substances Control Act (TSCA) defines a lead hazard in paint, dust, and soil. The standard applies to target housing (mostly housing built before 1978) and child-occupied facilities such as day-care centers. TSCA sets a standard of care that building owners with children as occupants should comply with to demonstrate their buildings are safe.

EPA defines a “poor” condition and therefore, a lead hazard under the following conditions:

- More than 2 square feet of deteriorated paint on interior components with large surface areas
- More than 10 square feet of deteriorated paint on exterior components with large surface areas
- Deteriorated paint on more than 10 percent of the total surface area of interior or exterior components with small surface areas such as windowsills, baseboards, soffits and trim.

Major factors that can lead to paint deterioration include:

- Water, either in the form of vapor or liquid is the single greatest cause of premature paint failure
- Aging, due to the continued curing which causes the paint to become too brittle to accommodate the normal contraction and expansion of the substrate leading to cracking and peeling
- Poor surface preparation. One insufficient coat of paint will cause localized failures

Dust is considered to be a hazard by the EPA if the level exceeds 50 micrograms per square foot ( $\mu\text{g}/\text{ft}^2$ ) or higher for uncarpeted floors and 250  $\mu\text{g}/\text{ft}^2$  or higher for interior window wells. Exposed or bare soil on residential properties and child occupied facilities, has a hazard level based on the yard-wide average concentration of 2000 parts per million (ppm) of lead by weight.

The clearance standard following an abatement or renovation project for target housing is 50  $\mu\text{g}/\text{ft}^2$  for uncarpeted floors, 250  $\mu\text{g}/\text{ft}^2$  for windowsills and 800  $\mu\text{g}/\text{ft}^2$  for window troughs.

## DHS Definition of A Lead Hazard

The California Department of Health Services (DHS) has defined a lead hazard as lead dust exceeding the EPA guidelines of 50  $\mu\text{g}/\text{ft}^2$  for *all public buildings*. DHS defines a public building as “a structure which is generally accessible to the public, including but not limited to, schools, daycare centers, museums, airports, hospitals, stores, convention centers, government facilities, office buildings and any other building which is not an industrial building”. *This issue creates a liability for building owners because the background levels of lead in dust can exceed these levels. During and following construction projects, the dust levels will most likely be considerably higher than 50  $\mu\text{g}/\text{ft}^2$ .*

## Friction, Impact and Chewable Surfaces

Friction and impact can also create lead dust. Wood windows that do not operate smoothly or doors that bind or otherwise contact the frame can cause paint to chip off or create dust. A child can also chew these surfaces. Surfaces with teeth marks are considered hazards if the paint is lead based.

## CHOOSING THE APPROPRIATE RESPONSE ACTIONS

### Ongoing Monitoring and Interim Controls

Paint can fail rather quickly under real-life conditions, making ongoing monitoring important. Paint should be quickly but carefully stabilized whenever a resident or owner reports that it is deteriorating.

### Abatement

Abatement is the removal of either the paint itself, the building component or the near-permanent enclosure of lead-based painted surfaces. Since removal of the paint itself is

very labor intensive, removal of the component, such as a door, door frame, window or window frame is most often the most cost effective abatement approach. For LBP on walls, covering the paint with drywall or paneling is usually the most appropriate and cost effective method of abatement. Abatement has three principal advantages, it provides a long-term solution, and eliminated the need for monitoring or reevaluation and reduces the owners liability.

## Encapsulation

Encapsulation is the process of applying a special formulated liquid coating or an adhesively bonded covering material. Covering a surface with normal paint is not encapsulation. Proper encapsulation relies on a successful bond between the surface of the existing paint and the encapsulant. All layers of existing paint must adhere well to each other or the encapsulant may fail. As a result, proper assessment of the surface and substrate is essential prior to application.

## Interim Controls

Interim controls are considered in-place management of the material and are defined as "a set of measures designed to temporarily reduce human exposure to LBP hazards."

Interim control measures are only effective as long as the paint is carefully monitored, maintained, and periodically professionally reevaluated. Interim control measures include:

- Repairing all rotted or defective substrates
- Stabilization of all deteriorated LBP surfaces by removing deteriorating paint and repainting
- Treatment of impact and friction surfaces so that they are smooth and cleanable
- Treatment of protruding or accessible chewable surfaces such as interior window sills

- Treating or covering all base soil containing excessive levels of lead
- Periodic cleaning to reduce levels of leaded dust
- Conducting reevaluations by EPA certified individuals and ongoing monitoring by owners and residents

## **LEAD-BASED PAINT MANAGEMENT PROGRAMS**

Lead-based paint management programs are recommended for entities that own or manage properties where children reside or in-house workers and maintenance crews disturb lead-based paint. These entities include:

- Apartment building owners and management firms
- Day care facilities
- School districts
- Building owners with their own maintenance crews that disturb painted surfaces
- Housing Authorities
- DOD Facilities

The first step in developing a program is to hire a qualified and certified lead-based consultant to survey the buildings to determine if lead-based paint is present and , what kind of management program can be implemented.

If the survey indicates lead-based paint is present in the building, the second step is to select someone within the organization to become the lead-based paint program manager. This person is critical to the success of the management program and must be committed to maintaining the program, tracking annually required events and maintaining OSHA required records.

Finally, the lead-based paint consultant should work with the property owner or manager to develop a LBP management program manual and recordkeeping system for the program

manager to follow. The consultant can also train the program manager in how to administer the program.

The management program should include:

- A program manual outlining the program requirements, responsibilities and work practices to be followed to prevent disturbance of lead-based paint and properly conduct repair, renovation projects and painting operations
- Development and delivery of notifications to residential tenants to comply with the Title X requirements and list of lead-containing paint to comply with OSHA requirements for communicating hazards to employees
- Continual recordkeeping of actions performed to comply with OSHA requirements for workers disturbing lead-based paint including; exposure monitoring results, training records, respirator fit test records and blood lead testing results
- Development of a work permit system to provide lead-based paint information and proper notification before work by in-house personnel or outside contractors is authorized
- Lead awareness training to comply with OSHA requirements for employees disturbing lead-based paint
- Commitments on the part of building management and maintenance personnel to continually maintain the program

## LBP COMPLIANCE CHECKLIST FOR SCHOOL DISTRICTS

CHECK	PROGRAM START-UP ACTIVITIES	REGULATION	PAGE
	1. Inspect and test for LBP	Recommended	29
	2. Repair damaged paint and encapsulate or remove paint on chewable and friction surfaces in classrooms with children under the age of 6	EPA Recommended	32 & 33
	3. Develop a LBP Management Program and recordkeeping system for the district	EPA Recommended	34
	4. Appoint a person in the organization to become the LBP program manager to administer the program, schedule training and manage the records or database	OSHA LCS	27 – 34
	5. For multiple buildings with LBP, develop a LBP database	Recommended	49 & 50
	6. Develop and distribute lead notifications to employees and outside contractors performing construction activities.	Required for employees, Recommended for contractors	31 & 32
	7. Provide initial Lead Awareness Training to employees required to disturb lead-containing paint and provide tools, equipment, respirators, respirator fit testing and medical examination	OSHA LCS	28 & 29
	<b>ANNUALLY REQUIRED ACTIVITIES</b>		
	1. Re-inspect materials and repair any damage observed	Recommended	34
	2. Perform periodic cleaning in preschools, kindergarten and 1 <sup>st</sup> grade classrooms with LBP	Recommended	34
	3. Provide annual employee refresher training	OSHA LCS	28 & 29
	4. Provide annual medical examinations and respirator fit testing	OSHA Respiratory Protection Standard	28

- **LCS is the Lead in Construction Standard**

## LBP COMPLIANCE CHECKLIST FOR APARTMENT BUILDING OWNERS AND GOVERNMENT AGENCIES

CHECK	PROGRAM START-UP ACTIVITIES	REGULATION	PAGE(S)
	1. Inspect and test building(s) for LBP	Required for Federally Owed or Subsidized Residential Units	29
	2. Develop a LBP Management Program and recordkeeping system for each building or complex	Recommended, not required	32 - 33
	3. Appoint a person in your organization to become the LBP program manager to administer the program, schedule training and manage the records or database	OSHA LCS	34
	4. For multiple buildings with LBP, develop a LBP database	Recommended, not required	49 & 50
	5. Develop and distribute lead notifications to new and existing tenants employees, and outside contractors	Title X	31 & 32
	6. Provide initial Lead Awareness Training to employees required to disturb LBP and provide tools, equipment, respirators, respirator fit testing and medical examination	OSHA LCS	28 & 29
	<b>ANNUALLY REQUIRED ACTIVITIES</b>		
	1. Re-inspect materials and repair any damage observed	Recommended	34
	2. Perform periodic HEPA vacuuming and steam cleaning in units with children and LBP on friction surfaces	Recommended	34
	3 .Provide annual refresher training	OSHA LCS	28 & 29
	4. Provide annual medical examinations and respirator fit testing	OSHA Respiratory Protection Standard	28

# Section III – Mold and Biological Contaminants

## CONTROLLING MOLD AND BIOLOGICAL CONTAMINANTS IN BUILDINGS

What are the real risks and issues with mold? Although there are several guidance documents available, there is no accepted national standard. Validated methods to measure contamination are still in their infancy, and even when measurement techniques are available, there are no clear benchmarks or standard values to compare the results against. Similar scientific uncertainties exist in the medical diagnosis of some mold-related health effects.

The scientific complexities alone would be a huge challenge, but the truth is that other difficulties dwarf them. The intense public and media attention on this topic often creates emotionally charged circumstances that make scientific judgement and reasoned dialogue difficult. In some instances, building owners tend to ignore or dismiss potentially serious problems. In other instances, building occupants or public officials can react with excessive alarm to perceived potential threats, complicating the scientific component of the evaluation and making risk communication very difficult.

While experts and practitioners disagree on which trend is of more concern, it is clear both are real and sizable. The biggest obstacle, however is the amount of money that can be involved in these disputes. As a result, the issue is increasingly clouded by the acrimony and distorted partisanship of mushrooming liability battles in the legal arena.

## Why and Where Mold Grows

Mold spores of various types are usually present in indoor and outdoor air. Indoors, high airborne mold spore levels are usually associated with the presence of mold-infested building materials or furnishings that have become sources of spores as the organisms grow and reproduce within them.

Mold spores can germinate, in conditions of at least 60% relative humidity (RH), when they settle on an appropriate nutrient base. It apparently does not take much to support fungal growth. Most severe indoor biological problems result from the growth of the offending organism on surfaces within structures.

*Virtually any substrate that includes both a carbon source and water will support the growth of some microorganism. Researchers have shown that molds can grow on such unlikely substrates as glass, jet fuel, paint, rubber, textiles, and electrical equipment. Mineral wool (or fiberglass) duct-lining materials and the substances used to hold these building materials together can also act as nutrient sources for mold growth.*

Water damage from leaks in pipe, roofs or catastrophic floods has been associated with fungal growth. In these cases the source of moisture is obvious. But even subtle changes in RH and temperature can cause a film of moisture to form on indoor surfaces, forming an ideal environment for mold spore germination and fungal amplification.

*Walls and ceilings, with their capacity to acquire moisture from water vapor in the air, or through direct contact with leaks from pipes*

*or from outside sources, and with enough organic matter to support some microorganisms, make excellent sinks for molds and mildew. Besides providing large surface areas, walls and ceilings also provide an excellent nutrient base for mold growth under the right conditions of relative humidity (RH) and moisture condensation.*

Carpets can harbor fungal growth, especially if they contain large amounts of dust. Researchers have demonstrated that carpets, particularly those made of synthetic materials, act as both reservoirs and amplifiers for fungi, particularly after water damage.

### **Why Are We Experiencing Mold Problems Now**

The growing significance of these biocontaminants in indoor environments over the last few decades can be attributed to the following:

- Building envelopes have become tighter;
- Less outdoor air is used in HVAC systems to reduce energy costs;
- Microorganisms shed indoors by humans are not readily diluted by mixing with outdoor air;
- Energy conservation measures have contributed to the build-up of moisture in indoor environments, which facilitates the growth of microorganisms; and
- Neglected maintenance programs have contributed to the buildup of dirt and debris (potential nutrients for microorganisms) in HVAC systems.

Recently, as environmental health specialists have learned more about the causes of biocontaminant-related illnesses and developed more effective sampling methods, they have begun documenting a host of cases of building-related illnesses (BRI) traceable to specific microbial agents. In contrast to former studies, such as one conducted by the US National

Institute of Occupational Safety and Health (NIOSH), which documented biocontaminants as causal agents in only 5% of problem buildings, investigators have begun to identify microorganisms as the primary cause of symptoms in as many as 35% - 50% of cases classified as sick building syndrome (SBS).

With the increased recognition of biocontaminants as the source of many building-related complaints, indoor air specialists are placing greater emphasis on including biocontaminants in indoor air investigations and remediation programs.

### **Mold Sampling**

Sampling may or may not be necessary. If visible mold is present, then it should be remediated, regardless of what species are present and whether samples are taken. In specific instances, such as cases where health concerns are an issue, litigation is involved, or the source(s) of contamination is unclear, sampling may be considered as part of a building evaluation. Sampling is needed in situations where visible mold is present and there is a need to have the mold identified.

If mold is suspected, but not visibly detectable after an inspection, then sampling may reveal evidence of mold amplifications or reservoirs indoors. If mold is being removed and there is a question about how far the colonization extends, then surface or bulk sampling in combination with moisture readings may be useful. Sampling for airborne mold spores can indicate whether the mix of indoor molds is “typical” of the outdoor mix or, conversely, “atypical” or unusual at the time.

Professionals experienced with mold issues and familiar with current guidelines must conduct any sampling. If samples are taken, regardless of the purpose, the results should help answer a clear question. Sampling without a specific

purpose greatly increases the changes of generating useless data.

A useful method for interpreting microbiological results is to compare the kinds and levels of organisms detected in different environments. Usual comparisons are indoors to outdoors or complaint areas to non-complaint areas. Specifically, in buildings without mold problems, the qualitative diversity (types) of airborne fungi indoors and outdoors should be similar. Conversely, the dominating presence of one or two kinds of fungi indoors and the absence of the same kind outdoors may indicate a moisture problem and degraded air quality.

Also, the consistent presence of certain fungi such as *Stachybotrys chartarum*, *Aspergillus versicolor*, or various *Penicillin* species over and beyond background concentrations may indicate the occurrence of a moisture problem and potential atypical exposure. Generally, indoor mold types should be similar and levels should be no greater than outdoor and noncompliant areas. Analytical results from bulk material or dust samples may also be compared to results of similar samples collected from reasonable comparison areas.

Comparisons of total bacterial levels indoors versus outdoors may not be as useful as with fungi, since natural bacteria reservoirs exist in both places. Comparisons of the specific types of bacteria present, excluding those of known human origin, can help determine building-related sources.

### **No Standards for Mold**

Why are there no standards for mold exposure? Health hazards from exposure to environmental molds and their metabolites relate to four broad categories of chemical/biological attributes. However, risks from exposure to a particular mold species may vary depending on a number of factors. Uncertainty is complicated further by a lack of information on specific human

responses to well-defined mold containment exposures. In combination, these knowledge

gaps make it impossible to set simple exposure standards for molds and related contaminants.

### **Biocontaminant, Mold and Mildew Prevention**

Finding the root cause of biocontamination sheds some light on the best preventive strategies to take. The most common causes of microbiological contamination have been found to be:

- *Inadequate building and mechanical system maintenance.* The most frequent cause of biocontamination is inadequate or completely absent building and preventive maintenance. In many contaminated buildings the roof leaks, there is the presence of standing water, and humidity and temperature levels are not controlled within acceptable ranges. In addition, internal components of air handling units, fan coil units, and induction units are seldom cleaned. Drain pans contain stagnant contaminated water. Wet cooling coils and moist downstream surfaces are covered with dirt and debris.
- *Stagnant water in drain pans.* In many buildings, drain pans contain stagnant water. Drain pans should be constructed to allow for drainage of condensed water. Many IAQ specialists recommend periodic cleaning and disinfection of drain pans.
- *Porous insulation.* In some buildings, microbiological amplification occurs in porous insulation located adjacent to or downstream from the heat exchanger. In these locations dirt and debris collect in the wet or damp ventilation systems. Often investigators will detect bacterial and fungal growth in insulation material, particularly when the system is in air conditioning mode.

- *Excessive humidity in occupied spaces.* In about one-third of contaminated buildings, fungal amplification can be attributed to elevated humidity levels. In most cases excessive humidity occurs during the summer months when latent heat is not removed due to a restrictive energy management program or when control sensors in the HVAC system are inadequate. Relative humidity should be kept below 60% to prevent fungal amplification in furnishings, and even lower at 50% - to minimize condensation on cold surfaces during summer months.
- *Outdoor air intake located near bioaerosol reservoir or amplifier.* Occasionally, the HVAC outdoor air intake is located within 25 feet (7.6 meters) of a cooling tower. In other cases, the intakes are located close to restroom stacks, sanitary vents, or dead vegetation, which could serve as microbiological sources.

The mitigation techniques employed to control mold and mildew infestations in wall and ceiling materials and other surfaces depend on the severity of the problem. Facility managers can control relatively minor mold infestations by controlling the relative humidity of the building and reducing surface temperature variations that foster water condensation on some surfaces. More severe infestations require a more active approach to remove the mold-infested materials.

Mold spores are present in nearly all indoor environments. Mold infestations occur when these spores germinate and proliferate on appropriate substrates. Controlling the moisture content of indoor surfaces and materials is the best way to prevent mold proliferation and to control minor mold growth before it becomes a major infestation.

Condensation on wall and ceiling surfaces occurs when the relative humidity (RH) of the air is

high and/or surfaces are cooler than the surrounding air.

Ways to reduce the increase in RH near these cooler surfaces include:

- Reducing the general moisture content of the room air
- Increasing air movement
- Increasing the general space temperature
- Increasing the temperature at building surfaces

In some situations, air moisture content is the dominant factor in mold growth; in other situations surface temperatures are causing the problems. Selecting an effective control strategy requires determining which of these factors is dominant.

In heating climates, where indoor moisture levels are low, poor insulation is a common cause of mold and mildew buildup. Increasing ventilation will not control the fungal growth problem in these cases. Mitigation strategies should be aimed at increasing surface temperatures and thus reducing the RH next to these surfaces. The best strategies in these cases are:

- Insulating and closing cracks in exterior walls to prevent outside air infiltration and to reduce wind-washing (air entering and passing through exterior walls without entering the building);
- Raising the thermostat setting; and/or
- Increasing air circulation to distribute warmed supply air better to interior surfaces.

In situations in which exterior wall insulation is sufficient, both mold and mildew buildup occurs because of high moisture levels in the indoor air. The best strategies in these cases are:

- Venting indoor moisture sources to the outdoors;
- Dilution of moisture-laden air with lower-moisture outdoor air (only useful during

heating periods, when outdoor air tends to be lower in humidity than indoor air); and/or

- Dehumidification.

Air-conditioned spaces may present particular challenges for reducing condensation and consequent mold problems. The following measures are recommended for air-conditioned spaces:

- Preventing hot, humid exterior air from contacting cold interior finishes;
- Elevating the temperature of interior surfaces at cold spots by relocating ducts and diffusers;
- Ensuring that vapor barriers, facing sealants, and insulation materials are properly selected, installed, and maintained;
- Avoiding overcooling by increasing room temperature.

### **Mitigation of Severe Mold Infestations**

Mold remediation should always require some level of isolation of materials or containment. The lower level of containment or isolation involves sealing removed moldy materials in a plastic bag for disposal. Local area or full area containment decisions should be made based on the size of the area of growth and the potential for occupant exposure or building contamination without containment. These decisions should be based on an understanding of the full scope of mold contamination, including visible and hidden mold sources.

Once mold has infested walls or ceilings, whether from flooding or moisture intrusion due to faulty construction, stringent measures are necessary. Simply reducing the relative humidity of the building or sections of the building will not be sufficient to mitigate the mold problem.

- Mold growth can begin soon after water intrusion, so it is important to begin remedial steps as soon as possible. The areas infested

can be treated by HEPA-vacuuming all walls and ceilings and treating all heavily mold-stained areas with an appropriate biocide in accordance with the manufacturer's instructions.

### **Prevention of Mold Contamination Following a Water Intrusion Occurrence**

When large areas of a building have become water-damaged it is important to implement stringent measures to avoid serious biocontamination. Damage caused by water is often discounted and treated lightly until microbial growth and odor (often called 'moldy or musty') from microbial fermentation become a problem.

A protocol for handling water intrusion emergencies includes the following steps:

- Maintain a proper inventory of flooded areas so that every water-damaged area is treated and cleaned;
- Remove and dispose of all water-damaged ceiling tiles. Replace them with new ceiling tiles within 24 hours;
- Remove and replace all walls and insulation materials between walls damaged by water. Since capillary action can cause water to saturate walls several inches above the water level, it is best to remove all wall materials up to 12 inches (30.5 cm) above the water line
- Introduce 100% fresh air to remove all odors
- Water extraction from flooring materials
- Dehumidification of the area
- Blowers
- Use of a reputable flood restoration contractors

## Section IV – Indoor Air Quality

### MAINTAINING A HEALTHY INDOOR ENVIRONMENT

Maintaining a healthy indoor environment involves a combination of education about IAQ, proper maintenance and operating procedures, the elimination of contaminant sources, and sufficient ventilation and filtration. An integrated prevention program requires cooperation among several factions with different responsibilities:

#### *Individual workers/building occupants:*

- Maintain and properly use products and equipment

#### *Facility managers:*

- Clean and maintain buildings and ventilation systems to control contaminant sources
- Test and balance ventilation systems to ensure adequate ventilation is provided to each area of the building
- Use zone ventilation or local exhaust at sources of pollution
- Properly use and install furnishings and equipment

#### *Architects, and contractors:*

- Adopt protection of IAQ as design criterion
- Design ventilation systems to comply with current ASHREA standards
- Provide for separation of occupants and indoor pollution sources
- Eliminate or contain potential sources of pollutants

### The Problem with Allergens

Allergies develop when a person encounters an allergy-producing substance – an allergen. Often the person is not initially sensitized to the substance, but becomes sensitized through one or more contacts. After sufficient exposure to a

potential allergen, the body's reaction to subsequent exposure is to release histamines. This causes the symptoms characteristic of allergies include; sneezing, itching of nose and eyes, nasal obstruction and congestion, fatigue, irritability, depression, dermatitis, and asthma.

*Any organic molecule can cause allergic effects in susceptible individuals. Fungal spores and bacteria, along with a number of other biocontaminants – dust mites, cat dander, cockroach skin, plant pollen – are common allergens in indoor environments.*

In some cases, the connection between an allergen and allergic symptoms is clear-cut – when the allergen is removed, the symptoms disappear. In other cases, however, the connection is more difficult to establish. It may take a longer exposure to build up an obvious sensitivity.

In some cases, bacteria from humans or from other sources begin to grow in building materials, humidifiers, or HVAC systems, where they can amplify and disseminate into the air. Gram-negative bacteria are associated with a number of diseases spread by HVAC and humidification systems.

### Importance of Proper Ventilation to Control Contaminants

Controlling the quality of the air that building occupants breathe involves a combination of improved ventilation to flush out the building, contaminant source control, and improvements in operation and maintenance and cleaning procedures.

Improvements in ventilation generally involve two basic strategies: diluting contaminants with outdoor air; or isolating and removing

contaminants by controlling relative air pressure in different zones. Both strategies can be applied to reduce occupant exposure to contaminants from a variety of indoor sources.

Controlling the intake, distributions, and exhaust of building air can be essential in maintaining acceptable IAQ. These controls include:

- *Design and layout changes* – modifications to building design and layout to increase ventilation or reduce air flow restrictions
- *Air filtration and purification* – use and maintenance of filters and air cleaners to remove pollutants from both outdoor air and recirculated air
- *Maintenance and adjustment of HVAC equipment* – assuring that ventilation rates are sufficient to remove contaminants and provide adequate ventilation to all locations

## Source Control and Removal of Contaminants

Methods of source control include the following:

- *Elimination* – the complete removal of biological contaminants (and their breeding grounds and conditions), toxic substances, and emissions sources
- *Substitution* – using products known to produce lower emissions of hazardous substances
- *Isolation* – containment, encapsulation, shielding, sealing, relocating, or altering time of use of emissions sources
- *Conditioning* – ventilation of areas prior to occupancy
- *Housekeeping* – maintenance to reduce the buildup of dust, molds, chemical spills, etc.;
- *Maintenance practices* – specifications for proper work procedures to reduce or control contaminant releases, as in the application of pesticides
- *Replacement* – replacing materials that have

become breeding grounds for biological contaminants, such as wet carpeting, ceiling tiles and gypsum wallboard.

Generally recommended methods of controlling air pressure to isolate and remove contaminants include:

- Installing effective local exhaust near sources;
- Locating occupants near supply diffusers, and sources near exhaust registers;
- Maintaining pressure differentials and eliminating pollutant pathways; and/or
- Separating pressure zones, when possible.

## Reducing Emissions During Renovations

Manufacturers and suppliers of wet materials, such as paints, varnishes, sealants, and caulks – recommend temporarily “increasing ventilation” during application of these products. Increasing natural or forced ventilation during painting does not, however, always keep airborne solvent concentrations in the renovation area.

It is particularly important to isolate the ventilation to this area to prevent these contaminants from reaching other sections of the building. The return registers in the renovation areas should be sealed off so that contaminants are not recirculated from the renovation/construction area into adjoining occupied areas. Temporary local exhaust may also be installed to remove odors and contaminants. Ventilation in other areas of the building may need to be temporarily increased.

## Reducing VOC and Ozone Emissions

The following control measures can shorten the time during which sink effects, (VOCs are absorbed and re-released by surfaces) will contribute to elevate indoor VOC levels:

- Use maximum outside air ventilation during and following the installation of finishes and

furnishings to reduce airborne VOC concentrations.

- Use temporary exhaust – through doors, stair towers, operable windows, and emergency exits – during the installation process rather than using the HVAC return system.
- Operate ventilation systems 24 hours per day, 7 days per week during episodes of elevated VOC emissions.
- Protect installed materials with sealed plastic vapor barriers to the extent possible during the use of VOC-containing finishing products and the installation of VOC-emitting furnishings.
- Protect fiber-lined HVAC ducts and return-air plenums from air flows to prevent contamination of system components. Exposed upper surfaces of ceiling panels and spray-on insulation enclosing concealed spaces used as return plenums can absorb large quantities of VOCs from air flowing past them.
- Operate newly occupied buildings at the lowest acceptable temperatures to avoid acceleration of VOC emissions.

Since removing all office equipment or reducing the need for this equipment is not usually a viable alternative, facility managers should implement measures to reduce occupant exposure to ozone and VOC emissions from photocopiers, laser printers, computer terminals, and fax machines. These preventive measures include:

- Selecting lower-emitting equipment in consultation with manufacturers and authorities on emissions;
- Minimizing the use of equipment when possible;
- Ensuring that operators of equipment are educated on the proper use and maintenance of all equipment; and
- Removing emissions at the source through ventilation and/or filtration

In many cases, reducing emissions through product selection is an unattainable goal, because not enough lower-emitting machinery is on the market. When the actual emissions of a product cannot be effectively reduced, a viable alternative is to prevent the emissions from reaching building occupants by removing them at the source. The two most common ways to do this are through specialized ventilation and through air filtration at the source.

Most IAQ professionals recommend the following techniques for reducing occupant exposure to office equipment emissions in new and existing buildings:

- Consolidate and install equipment in isolated rooms with separate exhaust systems and supply air ducts with increased amounts of outdoor air;
- If it is impossible to isolate the equipment, locate the machines so that airflow patterns do not direct fumes toward workers;
- Locate machines that need to be near workers (such as computer terminals) near return air ducts to increase dilution of contaminants;
- Provide for equipment operators to have breaks; and
- Turn machines off when not in use for long periods of time.

# INDOOR AIR QUALITY MANAGEMENT CHECKLIST FOR BUILDING OWNERS AND MANAGERS

CHECK	<b>PROGRAM STARTUP ACTIVITIES</b>
	Review HVAC design data, operating instruction and manuals
	Establish system for maintaining maintenance, calibration, testing and balancing records
	Inventory locations where occupancy, equipment or building use has changed
	Consider using alarms or facilities management software to signal the need for HVAC maintenance and periodic testing and inspection activities
	Inventory past complaint locations
	<b>CONDUCT A WALKTHROUGH INSPECTION OF THE BUILDING</b>
	Create list of staff and outside contractors responsible for various activities along with their job description and evidence of training
	Identify areas where positive or negative pressure should be maintained
	Record locations that need ongoing monitoring or correction
	<b>COLLECT DETAINED INFORMATION</b>
	Inventory HVAC components that need repair, adjustment, or replacement
	Record control settings and operating schedules of HVAC equipment
	Inventory significant pollution sources and their locations
	Obtain MSDS's for supplies and hazardous substances that are stored or used in the building
	<b>ASSIGN/TRAIN STAFF FOR THE FOLLOWING RESPONSIBILITIES</b>
	Compare ventilation quantities to design, codes and ASHRAE 62-1989
	Confirm that equipment operating schedules are appropriate
	Confirm appropriate pressure relationship between building and usage areas
	Schedule equipment inspections per preventative maintenance or recommended maintenance schedule
	Review trash disposal procedures
	<b>PEST MANAGEMENT</b>
	Consider adopting Integrated Pest Management (non toxic) procedures
	Obtain and review MSDS's; review handling and storage
	Review ventilation used during pesticide application
	<b>OCCUPANT RELATIONS</b>
	Establish health and safety committee or IAQ task force
	Review procedures for responding to complaints
	<b>RENOVATION AND REMODELING</b>
	Discuss IAQ concerns with architects, engineers and contractors
	Obtain MSDS's, use materials and procedures that minimize IAQ problems
	Schedule work to minimize IAQ problems
	Arrange ventilation to isolate work area
	Use installation procedures that minimize emissions from new furnishings

# Section V – Environmental Management Software

## THE BENEFITS OF USING ENVIRONMENTAL AND FACILITY MANAGEMENT SOFTWARE

Creating and maintaining healthy building environments is an ongoing challenge that is not easily accomplished using standard paper-based tracking and record keeping systems. Property owners and managers with multiple sites can use specially designed software to track and manage hazardous materials in their buildings and document corrective actions taken to reduce the risk of lawsuits and regulatory citations.

EcoLogic Systems, a leading developer of environmental management software has created a system designed to provide building owners and managers, school districts, colleges, large corporations and public entities with a powerful, yet easy-to-use system for managing asbestos, lead-based paint and indoor air quality records and information for their buildings.

### ADAM for Asbestos Management

As described in this workbook, various OSHA and EPA asbestos regulations clearly require the building owner, manager or tenant (in single tenant buildings) to track the locations of asbestos materials in their buildings and provide proper notifications, warnings and access to safety information. These regulations were enacted protect building employees, outside contractors, and tenants from exposure to asbestos. If lack of an adequate material inventory and notification system results in the inadvertent disturbance of a hazardous material, several serious consequences for the building owner or manager. First, OSHA and the EPA can cite the building owner or manager for:

- Failure to notify
- Failure to post warning signs
- Failure to contain the work area
- Failure to provide training to workers
- Failure to provide personal protective equipment and respiratory protection
- Failure to perform worker exposure monitoring
- Causing a spill and unauthorized release to the environment

As a result, fines for inadvertent disturbance can be in the tens or even hundreds of thousands of dollars.

Second, OSHA and the EPA can require the decontamination of large areas of the building, resulting in an expensive cleanup bill and potential loss of use of the affected areas.

Finally, occupants and workers in the vicinity of the disturbance can sue for exposure to the hazardous materials. The courts are full of cases where construction workers, maintenance personnel, and tenants were exposed to asbestos, lead-based paint and mold in buildings. The damages for exposures to these materials can be in the millions of dollars. In addition there are the costs of attorneys fees.

Due to hazardous material exclusions in liability insurance policies, the owner or manager will have to pay all attorneys fees, citations, and decontamination costs.

### How ADAM Helps You Maintain Asbestos Compliance

OSHA requires building owners to maintain records of all samples taken for asbestos. ADAM stores all sample results, as well as the

material location, its friability, assessment, quantity and removal cost.

The Base ADAM System stores all of this information for easy retrieval using simple search routines.

### **OSHA Notification Requirements**

OSHA requires building owners to provide notifications regarding the locations of asbestos in their buildings. The notification must include the materials asbestos content, location and quantity. The notification is required to be provided to contractors bidding on work, again before the start of work, and to maintenance personnel who may come into contact with asbestos. Building owners are also required to maintain a record of all notifications.

The ADAM Notification Module enables building owners to create standard notification text and prepares a building specific notification table listing the locations, asbestos content and quantity of each asbestos-containing material in the building.

### **California Notification Requirement**

The California Health and Safety Code requires building owners and managers to provide notifications on an annual basis to contractors, vendors, tenants and building employees regarding the location of asbestos in the building and the availability of reports and management plans for their review. The ADAM Notification Module enables owners to create compliant notifications. It also stores the name and address of recipients so that notifications can be generated in a batch on an annual basis.

### **Warning Sign Requirements**

OSHA requires building owners and managers to post OSHA compliant asbestos warning signs in routine maintenance areas of the building.

The signs must include a list of materials in the building that contain asbestos.

The ADAM System prepares building specific signs in compliance with OSHA requirements.

### **ADAM for Lead-based Paint Management**

As described in this workbook OSHA lead-based paint regulations require contractors to protect their workers from exposure to lead-based paint. In addition, building owners who have their own construction and maintenance crews who may disturb lead-based paint must provide them with proper notification and protection in accordance with OSHA regulations.

For this reason building owners should provide outside contractors and their own employees with test results for lead on construction projects or maintenance projects that disturb painted surfaces.

### **Tenant Notification**

The EPA also regulates lead-based paint in residential housing. The EPA requires the building owner or manager to provide proper notifications to tenants when they sign their lease regarding the locations of known lead-based paint in their buildings.

The ADAM System stores the locations, quantities and test results for lead-based paint and generates reports and notifications required by EPA.

### **ADAM for Indoor Air Quality Management**

Currently, there are no regulations specifically for indoor air quality and mold. However, building owners are required under the law to provide a healthy environment for their building tenants and employees. For this reason, it is important for building owners to ensure that the air inside the building is safe and that building

occupants are not exposed to hazardous materials such as VOC's, mold spores, particulates, and other chemicals that can cause adverse health effects.

To assist building owners in reducing liabilities and creating healthy indoor environments, the ADAM Indoor Air Quality Module stores and provides easy access to:

- Indoor air quality testing results, records of complaints and corrective actions taken
- Basic indoor air quality readings, sample results and ventilation readings to identify problems and help ensure the quality of the indoor environment

And because proper building maintenance is a critical aspect to preventing indoor air quality problems, the system tracks and provides reminders for ongoing building maintenance activities and hazardous materials inspections to ensure buildings, mechanical systems and hazardous materials are inspected and maintained on an ongoing basis.

To learn more about the ADAM System visit the EcoLogic Systems web site at [www.ecologicsystems.com](http://www.ecologicsystems.com) or call **1-800-223-0609** to arrange an on-line demonstration.