



# SAFE ENCASUREMENT SYSTEMS-MIDWEST

TECHNICAL BULLETIN NO. 01-5  
DECEMBER 2001; REVISED JUNE 5, 2003; OCTOBER 25, 2004

## ENCASEMENT FOR MOLD AND MILDEW SITUATIONS

**INTRODUCTION:** The elimination of indoor air quality hazards related to the presence of mold and mildew (M&M) contamination requires that a number of steps be considered and the appropriate actions taken. First and foremost, the source of the moisture must be determined and feasible corrective actions taken. No coating technology is a solution for M&M contamination if major water infiltration recurs. The badly damaged building materials must be properly removed and discarded; no coating technology makes bad wood good. The combination of good remediation procedures and economic considerations dictate that building materials that are structurally sound, but whose surfaces are contaminated with mold and mildew, be abated cost effectively so that they will no longer be the cause of indoor air quality problems. Removal and replacement of these surfaces can quickly become cost prohibitive, possibly even necessitating total demolition if a coating solution is not chosen. Yet on those contaminated surfaces that you desire to remain (structural members, brick, rock, concrete, wood or insulation) it is frequently very difficult or even impossible to clean and treat with a mildewcide effectively (the first step in the abatement process) and fully prevent the re-growth of M&M. Reasons for this are that keeping all moisture away (including normal levels of humidity) may not be cost effective and/or the surface is porous and obtaining a complete kill is not realistic. The surfaces may be an ideal food source for M&M. Keeping the surfaces clean enough such that they do not soil and create a food source for M&M may be difficult or even impossible. Situations like these can be a good fit for a coating technology-based solution. The preparation of the surface by cleaning and sterilization should be carried out in accordance with the directions of the hygienist/consultant responsible for the project, then the coating applied in accordance with the coating manufacturer's recommendations.

**DESIRED COATING PROPERTIES FOR M&M ENCASEMENT:** A variety of encapsulant topcoats exist today, some even with the necessary testing supporting their use in M&M situations. Three factors to consider are the test results the encapsulant manufacturer has on the encapsulant's performance when tested in accordance with ASTM D3273/D3274, how is the encapsulant manufacturer achieving the passing grade, and other relevant and logical ASTM based test data pertaining to M&M remediation. ASTM D3273/D3274 cover the coating's ability to remain M&M free in a cabinet in which M&M is caused to grow. If the passing grade is due to the manufacturer's inclusion of an EPA-registered pesticide (mildewcide) in the coating, serious consideration must be given to exactly where this coating can be used safely, such that occupants will be safe from M&M without being exposed to low levels of the mildewcide. Other important factors include the coating's flexibility and its adhesion to a wide variety of surfaces. The US-EPA has established an all-encompassing set of ASTM's detailing the properties necessary for a coating to encase or encapsulate asbestos-containing materials (ACM) and lead-based paint (LBP) and be considered abatement. Though no such regulations exist as yet for M&M, a coating with this ASTM test data lineage should be your first choice for encasing M&M.

**POISON OR NO POISON:** Safe Encasement Systems believes that the use of a coating that contains a potentially harmful or poisonous substance such as an EPA-registered pesticide (mildewcide) is a step that should be taken only after extensive consideration and discussion with all parties involved. We believe that the best solution in most cases is a coating system that passes the ACM and LBP ASTM's, including ASTM D3273/D3274, but without the addition of a mildewcide, such as the basic SES encasement system consisting of SE-110 primer and SE-120 topcoat. If further protection is required, we recommend adding a thin gloss coat to provide a surface that will soil at a lower rate and clean easier, thus offering still better protection from the growth of M&M. And finally, if truly necessary, SES offers a high-gloss topcoat, SE-170-MR, that includes an EPA-registered mildewcide, and the same mildewcide can also be added to one or both products that comprise the basic SES encasement system. Again, this is only recommended where high levels of moisture and soiling are expected and the ability to perform some level of cleaning maintenance will be extremely difficult. This is also recommended only after careful consideration has been given to the facility inhabitants and their proximity to the coating's location.

There have been episodes of occupants reacting violently to pesticides in the air in their facilities after the application of a pesticide-containing encapsulant in air plenums connected to their rooms. One such pesticide, to which some individuals are extremely allergic, is 3-iodo-2-propynyl butyl carbamate (IPBC). In one documented case where approximately 12 people out of approximately 400 were affected by exposure to air-borne IPBC, one individual who suffered the worst reaction to the IPBC was tested and found to experience significant reaction within 10 minutes when exposed to as little as 15 ppt (parts per trillion). The EPA determined in 1997 that IPBC could not be re-registered for use in a number of situations, including HVAC systems, unless and until further data were submitted to prove that its use in such situations "will not cause unreasonable risks to humans or the environment". The EPA presently lacks the authority to compel manufacturers of products containing IPBC that were registered in prior years for use in HVAC systems to remove that language from their labels and literature; however, the EPA is currently seeking enforcement authority to deal with this and similar situations. Another leading manufacturer of a mildew-resistant encapsulant uses chlorothalonil in its product. This pesticide contains a large amount of chlorine. It has been reported to exhibit high toxicity when inhaled and it is classified by the EPA as a likely human carcinogen.

The EPA requires that applicators of some products containing EPA-registered "restricted use" pesticides be certified/licensed. The basic SES system does not contain a pesticide; and the pesticide used in SE-170-MR as well as in some other SES products as an option to achieve a maximum of mold/mildew resistance is not a "restricted use" pesticide. Applicators of other pesticide-containing products should check with the manufacturer and/or their local regulatory agency to determine if licensing/certification is required.

Hygienists fundamentally dislike the approach of solving one problem while potentially creating another one. Again, SES believes the use of a poisonous pesticide (mildewcide) in the coating should be considered as a last resort only after a well thought out review of all relevant facts has been completed. SE-170-MR high-gloss topcoat contains an EPA-registered mildewcide that contains neither iodine nor chlorine for use in those situations where the use of a pesticide (mildewcide) is deemed necessary. Exactly what is the quantitative difference the pesticide-containing coatings offer versus one that passes in a pesticide-free form? In an independent lab study of the SES products along with the two aforementioned competitive products, the following test results were obtained. All coating samples passed ASTM D3273/D3274 for the standard exposure timeframe of 4 weeks. This level of mold resistance is generally considered to be sufficient to meet the requirements of most real world conditions for 20 years. This study intentionally continued the exposure time frame 3-fold to 12 weeks. Only the basic SES system with its halogen-free pesticide added to both coats and the competitive product containing IPBC exhibited "no growth" after 12 weeks. Interestingly, that competitive encapsulant exhibited considerable yellowing at this point, a possible indication of incompatibility with its pesticide. Also interesting was the fact that the basic SES system with its halogen-free pesticide in the topcoat only and the encapsulant containing chlorothalonil were rated as exhibiting "trace growth" after 12 weeks. The use of a non-pesticide containing gloss coat over the basic SES system nearly made the 12 weeks growth free, receiving a "slight growth" rating after 11 weeks, while the pesticide-free basic SES encasement system showed "slight growth" after 9 weeks. Is the use of a poison in the coating system worth these minor differences in performance, which the testing indicates would only manifest themselves after a considerable period of time under conditions that are extremely conducive to mold growth?

**VARIETY OF SURFACES ENCOUNTERED:** The choice of the best coating system for dealing with M&M is complicated by the fact that quite a variety of surfaces may be encountered. These will range from wood to brick and mortar, cement, and metal. A variety of insulation surfaces and even some flexible fabric surfaces may require encasement.

Most of the encapsulants on the market today are topcoats only, and not really applicable to this variety of surfaces without appropriate and sometimes extensive surface preparation to achieve a stable surface. These facts are made even more important when you consider that the worker doing the M&M abatement activity is probably an abatement worker, or maybe a disaster restoration worker. They are not painters, and thus they are not experts in surface preparation followed by the proper application of specialty coatings to a variety of surfaces.

Some other manufacturers of mildew-resistant coatings recommend the use of a very thin coating of primer, which, however, is frequently or usually omitted. Moreover, there are few performance data thus far available for these products such as is the case for products approved for use to abate lead-based paint and asbestos. Because Safe Encasement Systems uses the same products for mold and mildew remediation that it does for lead-based paint and asbestos abatement (except for the inclusion of an optional mildewcide), there are substantial data available on adhesion, weathering/aging, flexibility, impact resistance, tensile properties, etc. for the basic SES encasement system. Moreover, based on this extensive testing, the SES products can be warranted for up to 20 years – unlike most of the other mildew-resistant products currently on the market, which come with no warranty.

The ability of Safe Encasement Systems products to provide a tough, long-lasting protective coating system with outstanding adhesion on all kinds of surfaces and with the need for only minimal surface preparation in most cases is the result of the ability of the SE-110 penetrating-stabilizer (primer) to stabilize a large variety of surfaces. And when metal surfaces are encountered, SES has a proven solution, unlike anything offered by other manufacturers of mildew-resistant coatings. First the metal surface is power washed or scrubbed with water containing Chlor\*Rid soluble salt remover. Chlor\*Rid will remove the salts that catalyze the corrosion process to levels below 5 micrograms/sq. cm. Metal surfaces having salt levels over 10 micrograms/sq.cm. should never be over-coated; early coating failure via corrosion (rust) is nearly a guarantee. Then SES applies the corrosion-inhibited version of its primer, SE-110-CI. This plus the SE-120 topcoat has surpassed 1500 hours in both humidity and salt fog cabinets. The origin of the salts that have to be removed may be easy to trace, such as from the bleach or quat treatments the facility managers have been applying to control the M&M. Or they may be more difficult to pin down, such as from a process that puts certain salts into the air stream. The level of salt on any surface can be readily analyzed. The simplest method for qualitatively determining the presence of surface salts is the observance of visible corrosion. In short, surfaces should not be coated if there is any evidence of salts being present until after these salts have been removed.

**OTHER IMPORTANT CONSIDERATIONS:** What is the quantifiable difference in adhesion between using a primer and skipping the primer? In another independent lab study ASTM D 4541 or pull-off adhesion strength was run on SES's system of primer and topcoat, then just the SES topcoat, versus the two aforementioned competitive products. The results in PSI (pounds per square inch pull off strength) were 320 for the SES system, 240 for SES's topcoat alone, and 200 and 150 respectively for the chlorothalonil-containing and IPBC-containing competitive products. So if you want to increase your adhesive strength significantly, use the primer. If a decision is made to use a single-coat encapsulant system, the SES-120 topcoat by itself offers somewhat better adhesion than either of the two competitive products.

The SES system qualifies as a water vapor retarder (having a measured perm of 0.6). Therefore, as long as the coating system isn't compromised, only infinitesimal amounts of water vapor can diffuse through the coating system and little, if any, mold growth can occur beneath the coating. Moreover, any growth that does occur will remain trapped under the coating.

Past testing has shown that the SES encasement system is a barrier to mercury vapor. Therefore, since the atomic radius of radon is 50 percent greater than that of mercury, it can be safely concluded that it will also be a barrier to radon.

**SUMMARY OF KEY FACTORS IN SELECTION OF COATINGS FOR M&M REMEDIATION:** The unique advantages offered by the use of SES products for mold and mildew remediation are as follows:

1. Mold and mildew resistance (passes ASTM D3273/3274) without the use of a pesticide, thereby avoiding the potential consequences of allergic reactions on the part of building occupants.
2. Superior adhesion on all kinds of surfaces with minimal surface preparation (ASTM D 4541, Pull-off Strength of Coatings).
3. A low cost system for dealing with metal surfaces that provides a maximum of long-term corrosion protection (ASTM B 117, Salt Fog Chamber; ASTM D 4585. Humidity Chamber).
4. ASTM tested and accepted for abatement of LBP and ACM, and based on these data and approvals, delivers a film that will last 20+ years in most environments.
5. Water vapor retarder and radon barrier.
6. No applicator license required with any SES coating materials.
7. Parental notification not required if used in schools (required for pesticide-containing products).
8. Limited product warranty available for up to 10-20 years.