

# LIME & HEALTHY BUILDINGS

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VIRGINIA LIME WORKS INFORMATION BULLETIN

How many times have we heard the horror stories of unhealthy buildings? Schools are shutting down, buildings are being demolished, people are in the hospital, all due to their workplace environment. Let's talk about Sick Building Syndrome and what we can do to start building buildings we can literally breathe easier in.

Sick Building Syndrome or SBS, is caused by buildings that literally make you sick. The causes of SBS are often attributed to poor ventilation, high levels of chemical and microbiological pollution such as Volatile Organic Compounds (VOCs) and mold, temperature, humidity, and others. Symptoms of SBS include irritation of the eyes, nose, and skin, headache, fatigue, and difficulty breathing. More serious symptoms can include nausea, asthma, memory impairment, cancer, and liver, kidney, and or nervous system damage. SBS is something we cannot take for granted. For that matter neither can BRI or Building Related Illness. With Sick Building Syndrome a good majority of sufferers experience relief from their symptoms shortly after leaving the toxic environment. Some people may feel that toxic is too strong a word here, but if merely standing in a room can make you sick, I would consider that toxic. However, with Building Related Illness, the symptoms can require prolonged recovery times after leaving the building.

Let's look at the impact Sick Building Syndrome and Building Related Illness can have on Americans.

Statistically Americans spend 90% of their times indoors, and indoor pollution levels can be at least 2-5 times higher and occasionally 100 times higher than outdoor levels. In the 1990's 20% of our schools reported unsatisfactory indoor air quality. 64 million Americans or approximately 50% of our workforce have complained of SBS style symptoms. 23% of those 64 million report that their symptoms improve after leaving their work environment (sound familiar?). There is limited information available but current studies show that on an average of four tests yielded a 14% decrease in productivity. If you multiply this by the estimated sufferers of Sick Building Syndrome, this could be approximately 3% decline in productivity nationwide. The estimated money lost due to our unhealthy buildings could be as much as 60 billion dollars. Just because we don't build the best buildings we can.

Just by improving our work environment we could save (in 1996 dollars) 6-14 billion dollars in reduced instances of respiratory illness. 1-4 billion could be saved due to reduced allergies and asthma. On the subject of Asthma, a common complaint of SBS sufferers, over 20 million people are inflicted with this condition. 6 million of those people are children. In fact asthma is the most common serious chronic disease in children and is the 3<sup>rd</sup> ranking cause of hospitalization in children 15 and younger. Over 14 million school days are lost due to asthma. If you look past the children's numbers 10 million outpatient hospital visits are attributed to asthma coupled with 2 million emergency visits over 4500 people die every year due to asthma related problems. Think, let's just for the sake of argument say that conservatively only 1% of these problems can be blamed on unhealthy buildings. That means that 120,000 people will not have to go to the hospital next year. Even if we don't take these issues seriously, surely it wouldn't hurt helping these people by building healthier buildings. And certainly no one could complain that we could help the 68.5 million children that attend over 117,000 public and private elementary and secondary schools in the nation.

So if you wouldn't mind I'd like to throw some more numbers out there to help build this case for building performance. We often say we don't build them like we used to. There is definitely truth in that

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statement. In a study done, U.S. military personnel experienced a 33% lower prevalence of respiratory illness when they were quartered in older historic barracks than newer modern and lower ventilated barracks. Students that studied in classrooms that were ventilated by natural drafts versus fan or man-made ventilation techniques had a 15% higher attendance rate and were 41% less likely to get sick. In workplace environments and buildings that had higher rates of ventilation personnel were 35% less likely to have short term absences. In 1995 a court awarded 26 million dollars to Polk County Florida to correct design and construction flaws that resulted in high mold growth and caused occupant illnesses less than 10 years after the doors had opened on the building!

Hopefully by this point we can all agree that we need to start building healthier buildings. We need a wall system that doesn't trap moisture within the structure promoting mold growth and we need good air circulation. Is it possible that the actual walls that we design could act not only as a filter for our buildings, but also as a humidifier and de-humidifier? Absolutely! Through mass wall construction built of traditional materials such as lime, this can be achieved.

Imagine a mass masonry wall. The masonry itself could be brick, stone, block. We bed these masonry units with a lime mortar, then we apply a lime stucco (or render) on the exterior and we plaster the interior. Then we use a natural V.O.C. free paint like a lime wash on both the exterior stucco and the interior plaster. Not only is the entire wall system absorbing CO<sub>2</sub>, but it's also working together. The limewash and stucco will provide a degree of water shedding to the wall. Any vapor that travels in will either dissipate in its journey through the mass wall or it will travel all the way through the wall and dissipate as vapor into the interior space. There's your humidification. Now if the balance of water vapor begins to get too high inside, the wall will begin to absorb the vapor back into itself where it travels through the masonry again to be released through the exterior of the building. There is your dehumidification. If for some reason a basement becomes flooded, the walls will naturally dry out. Because you do not have stagnant water vapor in the structure, which can only be helped by the use of natural ventilation such as well placed windows and doors, mold growth and microbiological pollution is reduced or eliminated.

Now let's say you don't quite trust this idea. Say, that you like the idea of the mass masonry wall, which will provide thermal mass for heating and cooling, etc., but you think it needs to be designed with a vapor barrier as well. Let's see what happens. Moisture travels in through the masonry (we know from the buildings built in the 70's that you can't seal a building up) and gets trapped behind this vapor barrier. The vapor as it cools begins to condensate promoting an ideal environment for mold growth. On top of that, now there is (in essence) water in your walls, the free lime that gives mortars the ability to heal themselves go into solution and begins leeching out of your walls. Even the best intentions can cause unwelcome problems. We must start thinking of buildings as living things. They move, and they breathe. How would you like it if someone put a vapor barrier on you! Isn't it time we started building smarter?