NYCHA MOLD TRAINING

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Remediation Methods Part 1

Welcome NYCHA Staff

- This training is presented by EEA under contract to NYCHA
- EEA is an accredited asbestos, lead & mold training provider
- We look forward to working with you to provide this very important training
- It's critical to public housing in NYC
- NYCHA succeeds when YOU succeed!
- General Manager's Intro

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Welcome NYCHA Staff

- Registration & sign-in/out
- Training materials
- Training Agenda
- Training Goals
  - Understand importance of controlling mold & moisture
  - Be able to use the tools, practices & procedures
  - Be ready to get this done!

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Why Are We Here Today?

- Because exposure to excessive moisture and mold is considered a major asthma trigger - IOM 2004, WHO 2009, and NYC DOHMH 2008

- Because the mold problems in NYCHA apartments keep coming back: 1) mold growth conditions are being painted over and paint is mold food; 2) the **Root-Cause** of the moisture conditions has not been identified and corrected.

Photo Source: NY Daily News

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NYCHA Facilities

- 2,413 buildings in 325 developments over five boroughs; 769 facilities; 177,666 apartments; 404,000 residents
- 70 percent of NYCHA buildings built before 1969.
- List of NYCHA Properties
- Building materials that can be affected by mold & moisture include:
  - Plaster
  - Drywall
  - Wood Studs/Framing
  - Cabinets

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NYCHA Sustainability Agenda

- NYCHA is committing to systemically eliminating the root causes of mold by fixing leaks in roofs, facades, pipes and modernizing ventilation systems by 2025
- Next Generation NYCHA Sustainability Agenda

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Mold and the Asthma Epidemic in NYCHA Housing

- Childhood asthma at epidemic levels (21.8%)
- In 2013, with help from LSAFHS and NRDC, NYCHA residents with asthma file class action lawsuit against NYCHA (Baez case). Residents prevail. Consent decree requires NYCHA to promptly and effectively identify and remediate mold and correct underlying moisture root causes.
- NYCHA violates consent decree – court appoints Special Master

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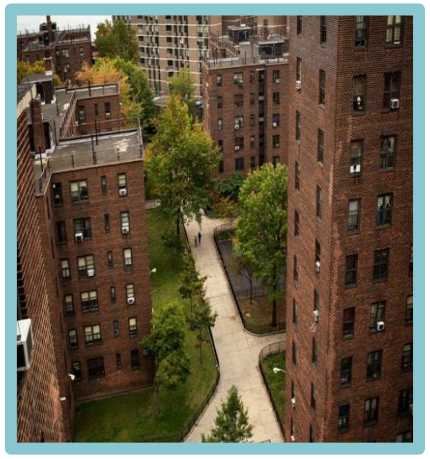
Health Inequity – Asthma in Low-Income Housing

Prevalence, Health Inequity, and Opportunity

Over 24 million Americans have current asthma (7.8% of US population)[1], CT 9.3%[2]

Over 6 million American children have asthma (8.4% of US population)[1], CT 10.5%[2]

Wide health disparities in childhood asthma by housing type in NYC[3]



NYC Public Housing
22% asthma prevalence

Typical NYC Apartment
12% asthma prevalence

Private NYC Housing
7% asthma prevalence

[1] Center for Disease Control and Prevention. https://www.cdc.gov/asthma/mostrecentdata.html

[2] State of Connecticut Department of Public Health. *A Collaborative Approach for Addressing Asthma in Connecticut, 2009-2014*.

[3] Northridge, Jennifer et al. "The Role of Housing Type and Housing Quality in Urban Children with Asthma." *Journal of Urban Health: Bulletin of the New York Academy of Medicine* 87.2 (2010): 211-224. *PMC*. Web. July 2016.

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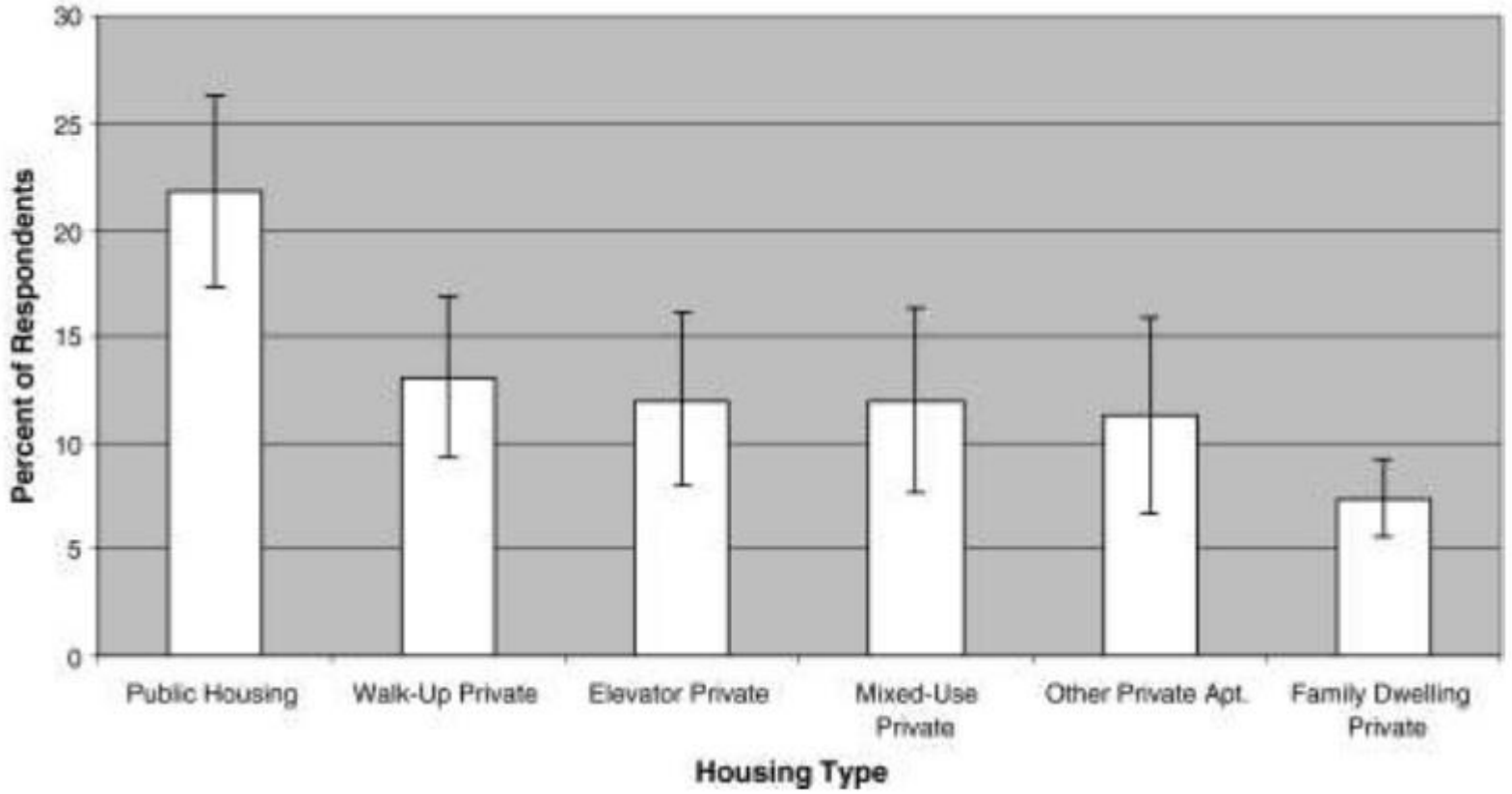
Asthma Prevalence Data



Northridge, et al. The role of housing type and housing quality in urban children with asthma. *Journal of Urban Health*, 2010; vol 87, no. 2.

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Public (Housing) Enemy #1

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Where Does Mold Grow in NYCHA?

- The paint on plaster, concrete, and sheetrock walls/ceilings
- The paper covering of sheetrock walls/ceilings (front/back and top/bottom sides)
- The covering of pipe-wrap insulation in wall cavities
- Bathroom tile grout and caulking
- Kitchen and bathroom cabinetry
- Wood framing materials in wall cavities

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Preventing Mold In NYCHA

- Mold growth is always associated with excessive moisture problems.
- How do we **prevent** or **control** excessive moisture and what are the **Root-Causes** of excessive moisture?

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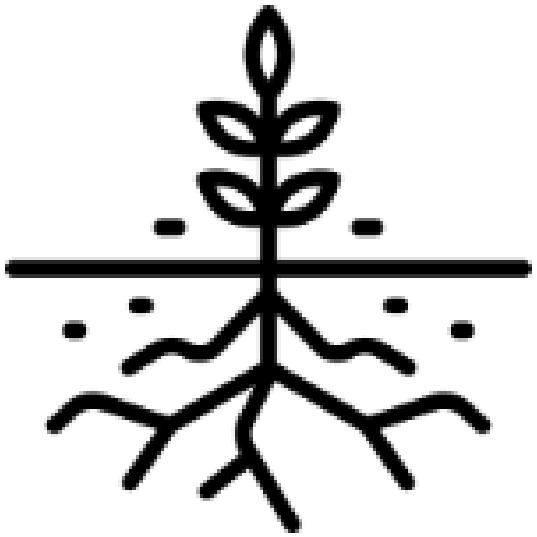
Mold Root Causes

The fundamental reason(s) for the occurrence of mold, water damage or moisture.

- Identify and select the most correct root cause(s) to ensure the condition does not reoccur – up to four (4) can be selected.
- Root cause(s) might often be not visible at first and require a comprehensive investigation to identify.



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V. Mold Root Causes – Other

- **Toilet Bowl/ Tank Needs Barrier**
  Toilet tank is in direct contact with the surface of the wall, allowing condensation to transfer across surfaces.
- **Tub Surround DML**
  Water is penetrating through missing or damaged areas of the tub surround.
- **Bathtub Shower Issues**
  Bathtub is missing, faucet is leaking, faucet is running, and/or faucet is dripping.
- **Pipe Insulation DML**
  Damaged or missing pipe insulation resulting in condensation (or sweating) on pipe surfaces. A wall-break is required to diagnose this problem.
- **Other** * This option should be selected if the root cause is not listed or not evident through the standard assessment practices.

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Shower Vapor Condensation

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Cold Weather Condensation

- Can occur when warm moist interior air contacts cooler surfaces such as windows.
- Condensation forms when the surface temperature is below the dew point temperature for the interior air

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Condensation on Cold Water Pipes In Wall Cavities

Missing insulation on cold water riser

Damaged insulation on cold water riser

Missing insulation on cold water supply t

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Warm Weather Condensation

- Can occur when warm moist interior air contacts cooler surfaces such as cold water pipes.
- Toilet tanks containing cold water often causes condensation
- Hot showers can cause condensation on “warm” surfaces

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Toilet Condensation - In Apartment

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Toilet Condensation - From Above

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Perimeter Wall Condensation

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Plumbing Leaks/Flooding

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Roof Leaks

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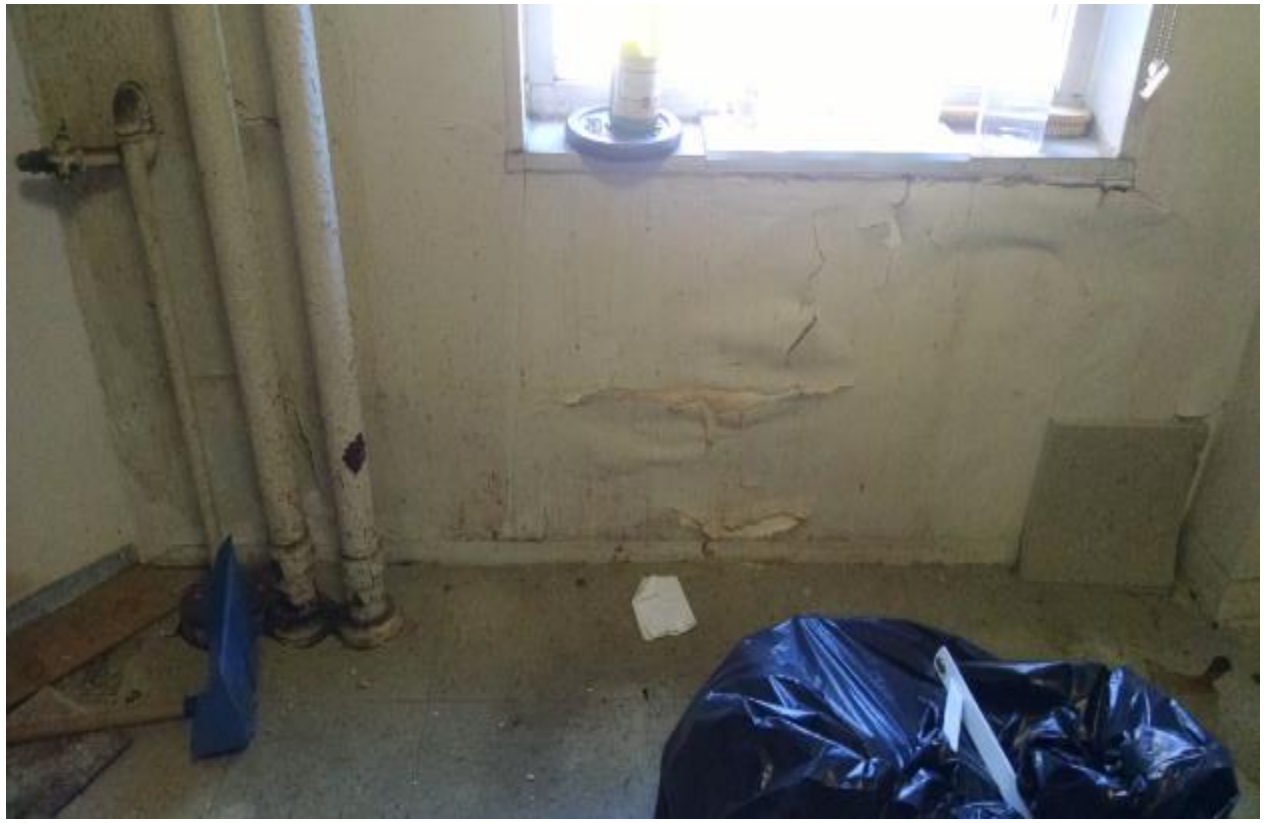
Façade Leaks



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Water Infiltration

- Major cause of mold growth
- Present in app. 75% of all properties
- Moisture is the leading cause of building problems costing more than $9 billion dollars annually in the US.

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How Long Has Mold Been A Problem?

From Leviticus Chapter 14, verses 33-57

On the seventh day the priest shall return to inspect the house. If the mold has spread on the walls. He is to order that the contaminated stones be torn out and thrown into an unclean place outside the town. He must have all the inside walls of the house scraped and the material that is scrapped off dumped into an unclean place outside the town. Then they are to take other stones to replace these and take new clay and plaster the house.

If the mold reappears in the house after the stones have been torn out and the house scrapped and plastered the priest is to go and examine it and if the mold has spread in the house, it is a destructive mold: the house is unclean. It must be torn down - its stones, timbers and all the plaster - and taken out of the town to an unclean place.

Anyone who goes into the house while it is closed up will be unclean till evening.

Anyone who sleeps or eats in the house must wash his clothes...

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How Mold Grows

- Finds suitable conditions
  - Water
  - Food
  - Temp (hot or cold)
- Grows
- Spreads

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Localized Mold Contamination

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Major Mold Infestation

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Efflorescence

- Efflorescence is the residue that's left behind when water seeps through concrete, stone, or brick.
- Salt deposits leave a white residue that resembles mold.
- Won't grow or spread, and isn't a fungus.

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Preventing Mold Growth

Simple Steps

- keep exterior moisture out of the building
- control moisture from internal sources

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Preventing Mold Growth

- It’s important to establish a cooperative partnership between NYCHA staff and residents so that conditions that require attention are identified and dealt with promptly.
- NYCHA staff and residents should take action to detect and correct leaks, condensation problems, and floods as soon as they are discovered.
- The potential for building structural damage, mold growth, and increased adverse health effects can and should be reduced by limiting the buildup of indoor moisture.

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Top Ten Things NYCHA Staff Should Know About Mold & Moisture

1. Potential health effects and symptoms associated with exposures to mold and excessive moisture include allergic reactions, asthma, and other respiratory complaints.
2. There is no practical way to eliminate all mold and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.
3. If mold is a problem in an apartment or building, we must clean up the mold and eliminate sources of moisture.
4. Fix the source of the water problem or leak to prevent mold growth, including repairing leaky roofs.

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Top Ten Things NYCHA Staff Should Know About Mold & Moisture

5. Reduce indoor humidity (to 30-60%) to decrease mold growth by: venting bathrooms; using air conditioners and de-humidifiers; increasing ventilation; using exhaust fans whenever cooking, dishwashing, and cleaning; and pursuing tenancy actions for lease violations for using moisture-generating sources, such as dryers, within apartments. Staff can use a hygrometer to check the relative humidity in a resident's apartment.
6. Clean and dry any damp or wet building materials and furnishings within 24-48 hours to prevent mold growth.
7. Clean mold off hard surfaces with water and detergent, and dry completely. Absorbent materials, such as sheetrock, that are moldy shall be replaced.

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Top Ten Things NYCHA Staff Should Know About Mold & Moisture

8. Prevent condensation: reduce the potential for condensation on cold surfaces such as piping by adding insulation.
9. If needed as a result of asthma, individuals with mold and/or moisture in their apartments are entitled to reasonable accommodations from NYCHA.
10. Molds can be found almost anywhere; they can grow on virtually any substance if moisture is present. For example, there are molds that can grow on wood, paper, carpet, and foods.

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Health Effects

Why Is Mold A Problem Today?

- Recent discoveries linking the presence of mold with health problems
- Improved understanding of healthy housing

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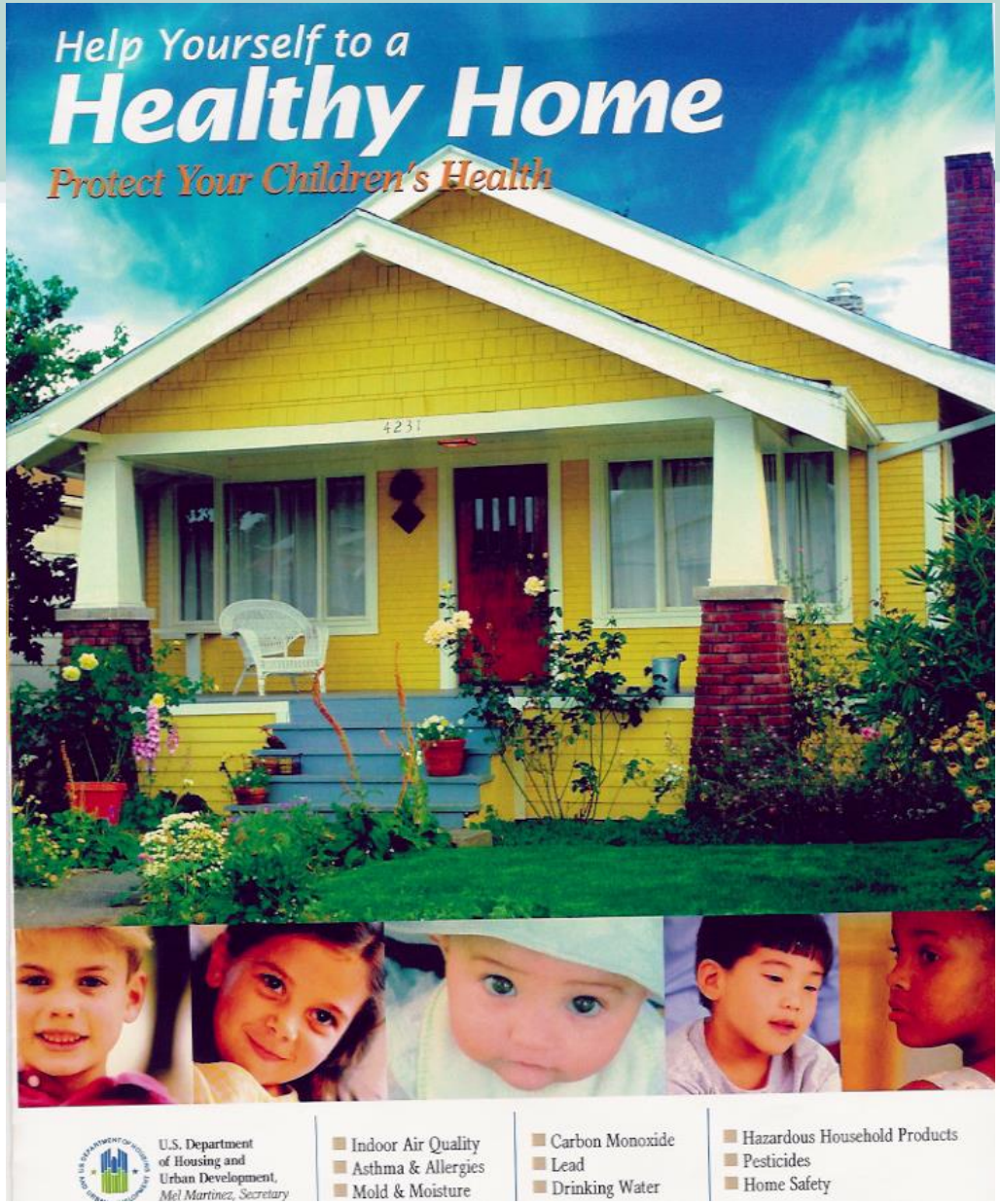

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CASE STUDY

Improved Asthma Control After Remediation of Environmental *Stachybotrys* Contamination

Christopher D. Miller, MD; Susan M. Flappan, MS, CIH; Jay M. Portnoy, MD

INTRODUCTION

Fungal mycotoxins have been implicated in human and animal disease. In this case report, we propose that a non–IgE-mediated mechanism, and probably fungal mycotoxins, were responsible for a worsening of asthma symptoms in a toddler. We also demonstrate the importance of environmental assessment and the effects of environmental remediation.

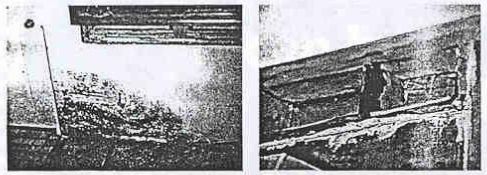

Figure 1. Walls contaminated with a black, slimy fungus later identified as *Stachybotrys*.

CASE REPORT

A 2-year-old white male with a previous history of asthma was brought to our allergy clinic with asthma symptoms that were not well controlled by his current medical therapy of a β-agonist. The patient's symptoms of cough, rhinorrhea, sneezing, ocular irritation, and wheezing first arose when he was 8 months old. His symptoms were perennial and more prevalent in the morning and evening. His family history was negative for atopic disease.

Figure 2. Photomicrographs of *Stachybotrys* isolated from contaminated surface.

On physical examination, the patient appeared to be an active 2-year-old in no apparent distress. He was in the 20th percentile for height and weight and, according to his parents, his growth and development were normal. Physical examination was unremarkable except for pale nasal mucosa. Respiratory wheezing was documented during prior visits to his primary care physician.

Initial workup included prick skin testing, which yielded negative results for molds, cat, dog, dust, cockroach, and dust mite. The patient had appropriate positive and negative controls. His serum IgE was 27 IU/mL, with normal being 0 to 99 IU/mL.

Daily anti-inflammatory treatment consisting of fluticasone delivered through a spacer and mask was started. Long- and short-acting β-agonists were also prescribed for worsening or breakthrough symptoms.

Despite these interventions, the patient's symptoms persisted. Because the initial history revealed water leakage in the basement of his home, it was decided to perform a home environmental assessment—something for which his parents expressed a great deal of enthusiasm.

The patient's home was a 12-year-old, detached, bi-level house in an upper-middle-class suburb. It had a wood-burning fireplace, a central gas forced-air heating system, central air conditioning, and a finished walkout basement with carpeting. Severe water leakage in the basement occurred on two occasions after heavy rainfall. After the first event, the wet carpet pad was removed and the original carpet was reinstalled.

An inspection of the basement identified two areas of wallboard and wood structure with what appeared to be fungal contamination (Figure 1). Surface samples of these areas later revealed numerous fungal species, including *Stachybotrys*, *Chaetomium*, and *Cladosporium* (Figure 2). Air samples, collected with a volumetric grab sampler, revealed elevated spore counts throughout the house (Table 1). In particular, the spore counts were highest in the patient's bedroom and in the playroom located in the basement. *Stachybotrys* spores were also identified in the basement air samples.

It was therefore assumed that the patient's asthma symptoms might have been related to his exposure to fungi. However, further testing for *Stachybotrys* showed that the patient's IgG response to the organism was less than 3 µg/mL, with normal being less than 34 µg/mL. His IgE response to *Stachybotrys* was 279 counts, with normal being less than 3,600.

Nevertheless, his family arranged for environmental remediation in the home. This consisted of removing contaminated building materials, cleaning ductwork, steam-cleaning all carpets, using a vacuum cleaner with a high-efficiency particulate-arresting (HEPA) filter, and installing a pleated furnace filter.

The patient's quality of life, assessed with a tool described by Juniper et al,[1] improved dramatically with home remediation (Figure 3). In addition, he was weaned from his anti-inflammatory medications and has remained asymptomatic, with no further wheezing exacerbations and a significant decrease in rhinitis symptoms. Follow-up air

see CASE STUDY, page 32

TABLE 1

RESULTS OF AIR SAMPLE TESTS (SPORES/M³)*

	Sample Dates		
	11/13/97	12/11/97	2/12/98
Kitchen	10,000	800	0
Patient's room	11,200	1,600	100
Basement	12,200*	3,600	100

*Spores identified as *Stachybotrys*.

Dr. Miller is an allergy fellow, Dr. Portnoy is Program Director/Chief, and Ms. Flappan is an indoor air quality specialist, all at The Children's Mercy Hospital, Section of Allergy, Asthma and Immunology, Kansas City, Mo.

says Ob-Gyn David Campbell Walters, author of "Just Take It Out!" He says the evolution of the human head has made it too big to fit comfortably into the birth canal. A 1997 study found that 31 percent of female British obstetricians would prefer to deliver their own babies by cesarean.

Vaginal delivery can have serious—and costly—medical consequences. Especially if doctors use mechanical interventions, such as forceps, vacuum extraction or episiotomy, vaginal delivery can increase the risk of lasting problems like gas and urinary incontinence. And long labors—particularly when followed by unplanned C-sections (and lawsuits)—can add thousands to the overall price tag.

Vaginal births after cesareans (VBAC) can be dangerous. Many women with prior cesareans don't want to risk rupturing the uterus during labor, so they often reject the medical establishment's encouragement to undergo a VBAC. "If a woman ruptures her uterus, you have about 17 minutes to have the baby out before you begin to have [brain] damage," says Dr. Roger Freeman, chair of the American College of Obstetricians and Gynecologists task force on cesarean-delivery rates. ACOG said in August of 1999 that a physician should be "immediately" available, not just "readily available," during VBACs. That's not always possible, especially in rural areas. If a clinic isn't equipped to perform VBAC safely, cesarean delivery isn't just a convenience but a practical necessity.

In the end, both sides are half right. Vaginal delivery is the cheaper method of childbirth—and, unlike a cesarean, is not major abdominal surgery. But from the perspective of some Ob-Gyns, restricting a woman's right to choose a form of childbirth makes no more sense than forcing her into the cheaper of two cancer therapies. "In natural childbirth," says Walters, "we don't even mention that there is an alternative. They're not told their bladder is likely to be negatively impacted. They're not told about the possibility of worse sexuality. We are keeping the advantages of cesarean delivery secret."

A cesarean isn't for everyone—and insurance may not cover it if you're doing it just for your own convenience. Talk to your doctor to decide whether a C-section is right for you. Wanting more peace of mind after a previous cesarean or being certain your own doctor is on hand may be reason enough. Just make sure you understand the risks as well as the benefits. ■

YOUR HOME

A Hidden Health Hazard

Sneezing and sniffling? Maybe the problem isn't a cold but mold. It's more dangerous than you think.

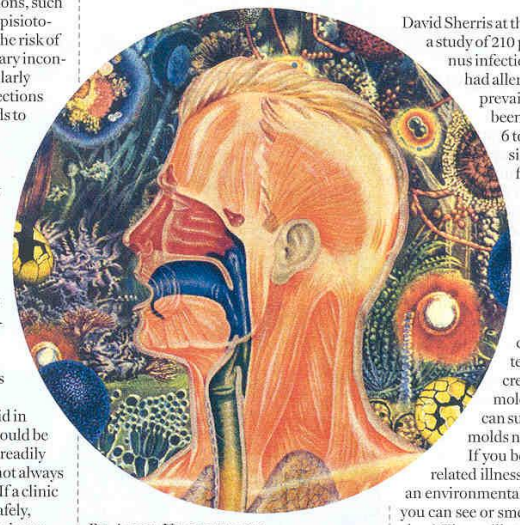

ILLUSTRATION BY JOHN CRAIG

BY ANNE UNDERWOOD

DEENA KARABELL HAD LIVED in her New York City apartment for 15 years, so when she fell ill in 1983, she never suspected that her apartment itself could be to blame. Over the next 15 years she grew progressively weaker. Finally, in the spring of 1998, she lost 30 pounds and went into anaphylactic shock three times. She literally lay dying in her bedroom when a hired nurse noticed a strong odor of mold in the closet. Suddenly things clicked. Karabell's family moved her out immediately. Today—at a safe distance from the mold—she is almost back to normal. "People are amazed at my recovery," she says.

Molds have been an underrecognized health problem, but that is changing. Health-care professionals now know that molds can cause allergies, trigger asthma attacks and increase susceptibility to colds and flu. Anyone with a genetic predisposition can become allergic if exposed repeatedly to high enough levels. Last year Dr. David Sherris at the Mayo Clinic performed a study of 210 patients with chronic sinus infections and found that most had allergic fungal sinusitis. "The prevailing medical opinion has been that mold accounted for 6 to 7 percent of all chronic sinusitis," says Sherris. "We found that it was 93 percent—the exact reverse."

More rarely, molds appear to cause problems like Karabell's. These aren't just allergies but reactions to toxins. Certain molds produce poisons in order to kill off competing fungi and bacteria. Risks of toxicity increase with the amount of mold—and flooding and leaks can supply the moisture that molds need to thrive.

If you believe you have a mold-related illness, consult an allergist or an environmental-health specialist. (If you can see or smell mold, that's a good clue.) They will at least be able to confirm the diagnosis and proceed accordingly. The best remedy of all is simply to get rid of the mold. Small blooms on the surface of walls can be removed with a weak solution of chlorine bleach. Wear rubber gloves, open the windows for ventilation and throw out the sponge afterward. A face mask could also be a good idea. "Dead or alive, mold still contains the proteins that provoke allergies," says J. David Miller, a mold specialist at Carleton University in Canada.

If your home has more extensive water damage, remediation may be the only answer. Seek professional help. You need to fix leaks, replace moldy drywall and improve ventilation. Beware of built-in humidifiers in forced-air heating systems. "Molds and slime build up there and never get cleaned out," says Jack Spengler of Harvard. New York City has guidelines on remediation at www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html. California state also has fact sheets at cal-iaq.org//iaqsheet.htm to help you to a healthier home environment. ■

Mold Exposure

- Inhalation – most common
  - Respiratory disease
  - Allergic reaction
  - Possible CNS dysfunction
- Dermal – irritation/infection
- Ingestion – Infection

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Health Effects

- "Breathing Mold Can Cause Health Issues" – IAQ TV

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Exposures To Residential Dampness And Mold

Associated with increased risks of;

- Respiratory symptoms
- Asthma
- Hypersensitivity pneumonitis
- Rhinosinusitis
- Bronchitis
- Respiratory infections.

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Potential Health Effects

- Allergic reactions/disease
- Irritant effects
- Infections
- Toxic effects

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Mold Exposure Symptoms

- sneezing
- runny nose
- coughing
- wheezing
- watery eyes
- redness of the eyes
- itchy eyes
- skin irritation, or rash

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Allergic Responses

- Reactions can be immediate or delayed.
- Reactions can result from inhaling or touching mold or mold spores.
- Mold spores and fragments, whether dead or alive, can produce allergic reaction in sensitive individuals.
- Repeated or single exposure may cause previously non-sensitive individuals to become sensitive.
- Repeated exposure has the potential to increase sensitivity.

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Allergic Responses

Hay fever-type symptoms

- Sneezing
- Runny nose
- Red eyes
- Skin rash (dermatitis)

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Allergic Responses

Asthma

- Molds can trigger asthma attacks in persons allergic (sensitized) to molds.
- Asthma is a major problem in New York City. In some low-income parts of New York City, as many as one in four children have asthma.
- What is Asthma – Khan Institute

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Asthma Prevalence Data

United States

- 20 million - 1 in 15 or 6.7% [1]

New York City

- 813,000 - 1 in 7.5 or 13.5% [2]

East Harlem

- 20,000 - 1 in 5 or 19.6% [2]

1. Asthma and Allergy Foundation of America
2. NYC DOHMH Community Health Survey

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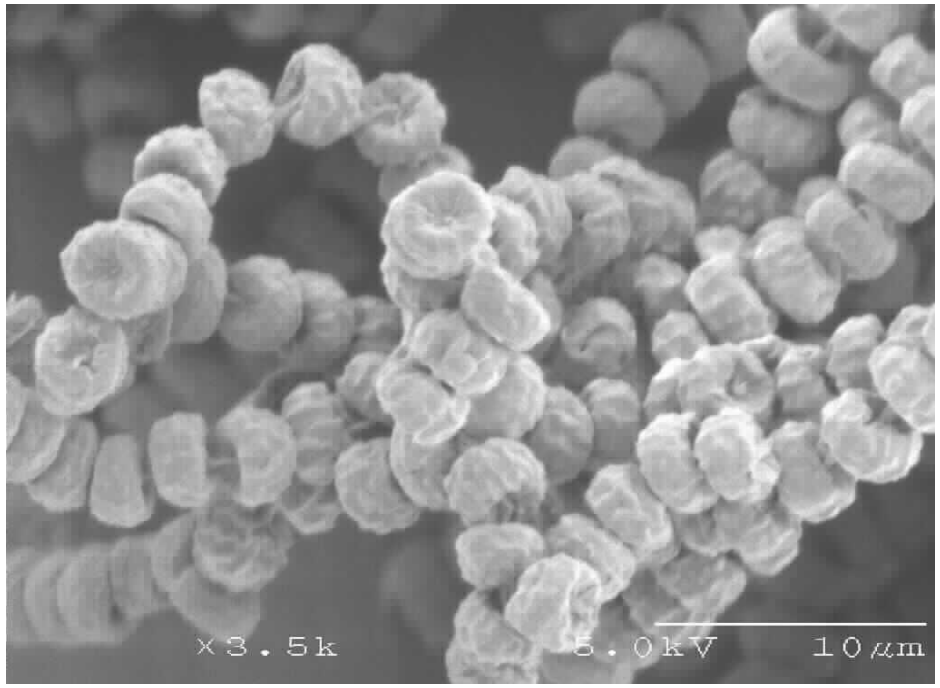
Allergic Responses

Hypersensitivity pneumonitis (HP)

- Rare, but serious, immune-related condition resembling bacterial pneumonia
- May develop after either acute or chronic exposure (via inhalation) to molds
- Usually related to occupational exposure
- Can also be caused by bacteria

Irritant Effects

- **Irritation of:**
  - Eyes
  - Skin
  - Nose
  - Throat
  - Lungs



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Irritant Effects

Mold exposure can irritate the eyes, skin, nose, throat, and lungs of both mold-allergic and non-allergic people.

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Microbial Volatile Organic Compounds (mVOCs)[1]

- Produced by molds and released into air
- Often have strong and/or unpleasant odors
- Exposure linked to symptoms such as headaches, nasal irritation, dizziness, fatigue, nausea
- Health effects research in early stages

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Toxic Reactions

- Some molds can produce toxic substances called mycotoxins.
- Some mycotoxins are on the surface of mold spores; others are within the spore.
- Over 200 mycotoxins have been identified from common molds.

Mycotoxins

- Medical evidence of whether mold growing in homes or offices causes health effects in occupants due to mold toxins is lacking.

* Research is needed.

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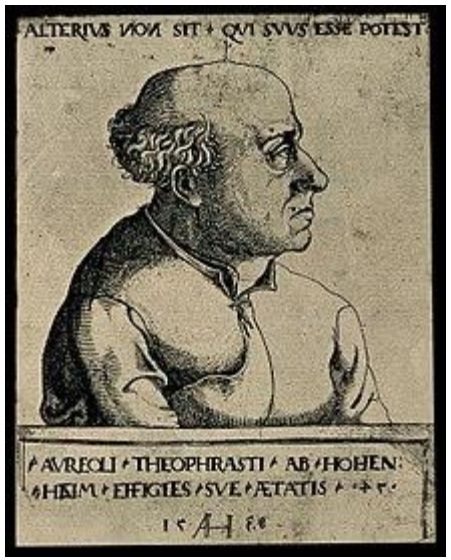
Degrees of Exposure

- "**The dose makes the poison**" (in Latin: ***sola dosis facit venenum***) – Paracelsus (1538 AD)
- a substance can produce the harmful effect associated with its toxic properties only if it reaches a susceptible biological system within the body in a high enough concentration
- Occupants or remediation workers disturbing large areas of mold growth face greater exposure potential, and thus, greater potential for adverse health effects.



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Common-Sense Approach

- **Small amounts of mold growth in homes and buildings are common occurrences, that for the majority of people present minimal health risks.**
  - The solution is to fix the moisture problem and clean up the mold quickly.
- **Large areas of mold growth present a more likely risk of exposure and adverse health effects for some people.**
  - Large areas of mold growth indicate more extensive water damage/moisture intrusion in the building.
  - Additional and more extensive measures should be used during remediation to protect both workers and occupants of the building.

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Unknowns

- There are insufficient data to determine if molds cause other adverse health effects, such as pulmonary hemorrhage, memory loss, or lethargy.
- We do not know if the occurrence of mold-related illnesses is increasing.
- Other than surveillance for hospital-acquired infections, there is no system to track the public's exposure to and the possible health effects of mold.

Health Issues for Workers

- Mold assessment and remediation employees with persistent health problems that appear related to mold should see a physician.
- Referrals to physicians trained in occupational, environmental or allergy medicine may be needed.

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Health Issues for Workers

- **During mold remediation projects, workers could be exposed to other substances or hazardous materials that could cause adverse health effects:**
  - Asbestos
  - Lead-based paint
  - High levels of particulates
  - Bacteria (associated with water-damaged materials, floods, sewage backups)
  - Cleaning products/biocides used as part of the projects

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Golden Rule for Mold Exposure Safety

Minimizing mold-related exposures will reduce the possibility of health impacts on occupants and workers.

- As the potential for exposure increases, the need for protective measures increases.
- Workers can reduce exposure potential by proper use of personal protective equipment (PPE).
  - Respirators (Minimum N-95)
  - Gloves
  - Protective clothing
  - Goggles

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Dealing with the Public

- Do not give medical advice to residents.
- Tell them to consult a health care provider regarding any health effects they might be experiencing.

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Break

- Good work so far!

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NYCHA MOLD TRAINING

Guidelines & Requirements

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Public Awareness

DAILY NEWS

NYC Housing Authority to come under judicial oversight over mold in apartments

A child in a NYCHA apartment with mold on the wall. The New York City Housing Authority will come under federal judicial oversight over mold in apartments, enabling residents to go directly to a federal judge if the agency does not resolve the problem. (Richard Harbus for New York Daily News)

- Receiving Attention
  - Media
  - Medical
  - Legal
- Baez Lawsuit

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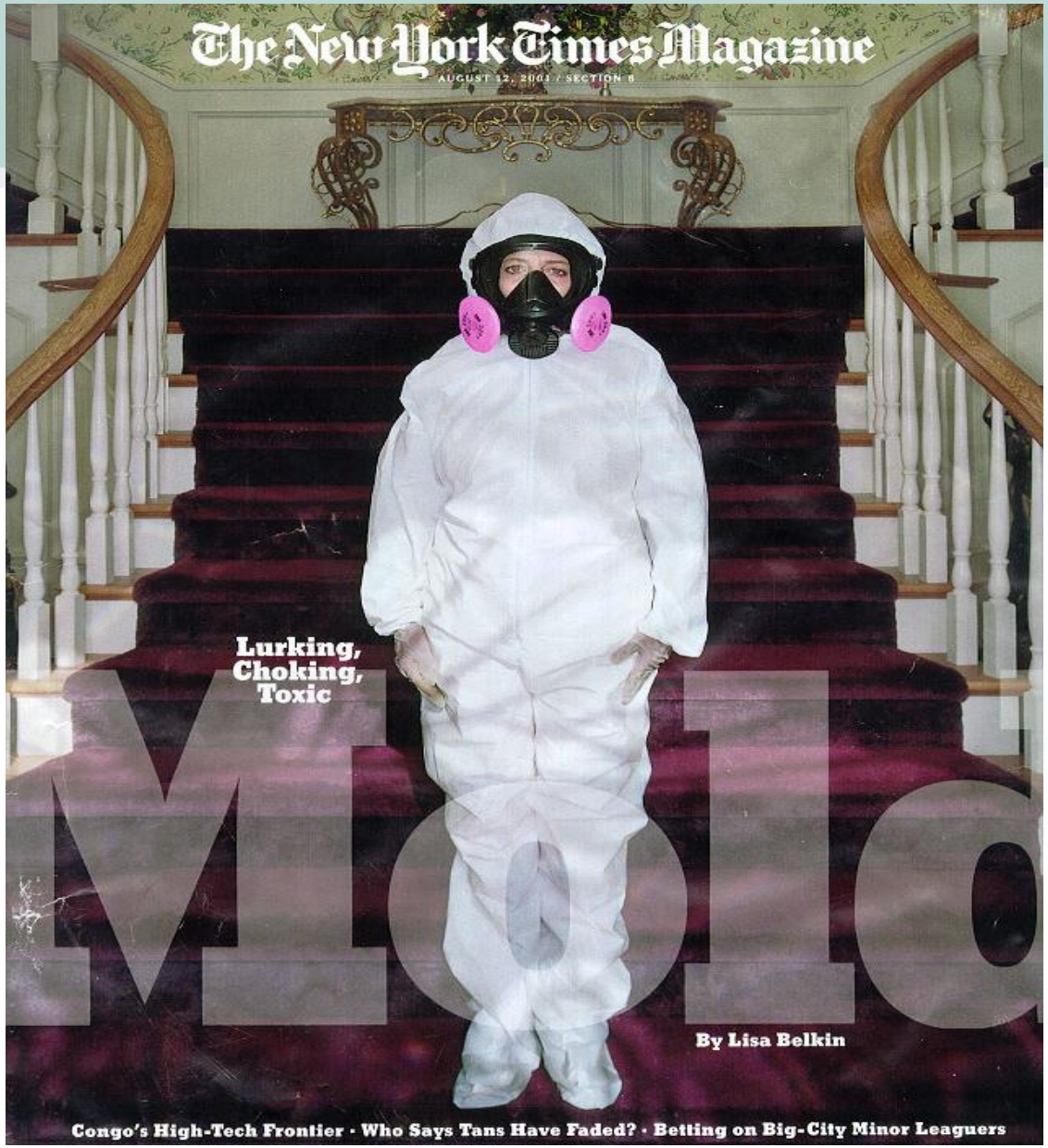

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Ohio chief justice speaks at seminar about fairness

Ohio Supreme Court Chief Justice Thomas Moyer acknowledges racial unfairness in Ohio's legal system during speech in Cuyahoga Falls.

D4

Local

Election panel allows secret group's TV ad

Ohio Elections Commission panel dismisses complaint against a TV ad opposing Ohio Supreme Court justice.

D3

The Beacon Jo
F
October 20,
www.ohio.com/b

Mold cleanup starts at apartments

Akron housing authority spending $800,000 to scrub Joy Park complex

By Bob Downing
Beacon Journal staff writer

The Akron Metropolitan Housing Authority will spend an estimated $800,000 to check for and deal with a potentially dangerous greenish-black mold in Joy Park apartment buildings in southeast Akron.

The agency also is in the process of removing the same slimy mold - called stachybotrys - from two of its empty apartments on Copley Road in southwest Akron.

Cleanup of the Copley Road apartments by Cardinal Environmental Services began yesterday, said AMHA Executive Director Tony O'Leary.

The cleanup involves removing carpeting, drywall and any wood that may have been contaminated by the mold, he said.

The mold was discovered in one Copley Road apartment by AMHA staffers after its tenants had moved out. It also was found in an area damaged by a leaky pipe in a second empty apartment in the same building.

No complaints were filed by the tenants, although the mold was "pretty obvious . . . and suspicious," O'Leary said.

The work at Joy Park, expected to begin Nov. 13, will include checking 23 empty buildings for the mold behind the walls and removing it, O'Leary said. In addition, new waterproof wallboard will be installed in the buildings to reduce the likelihood that the mold will come back.

"It's not yet resolved," he said of the mold problem. "It's something we're still working on very actively."

AMHA officials met yesterday with contractors, and bids for the Joy Park mold abatement work will be opened Oct. 31, O'Leary said.

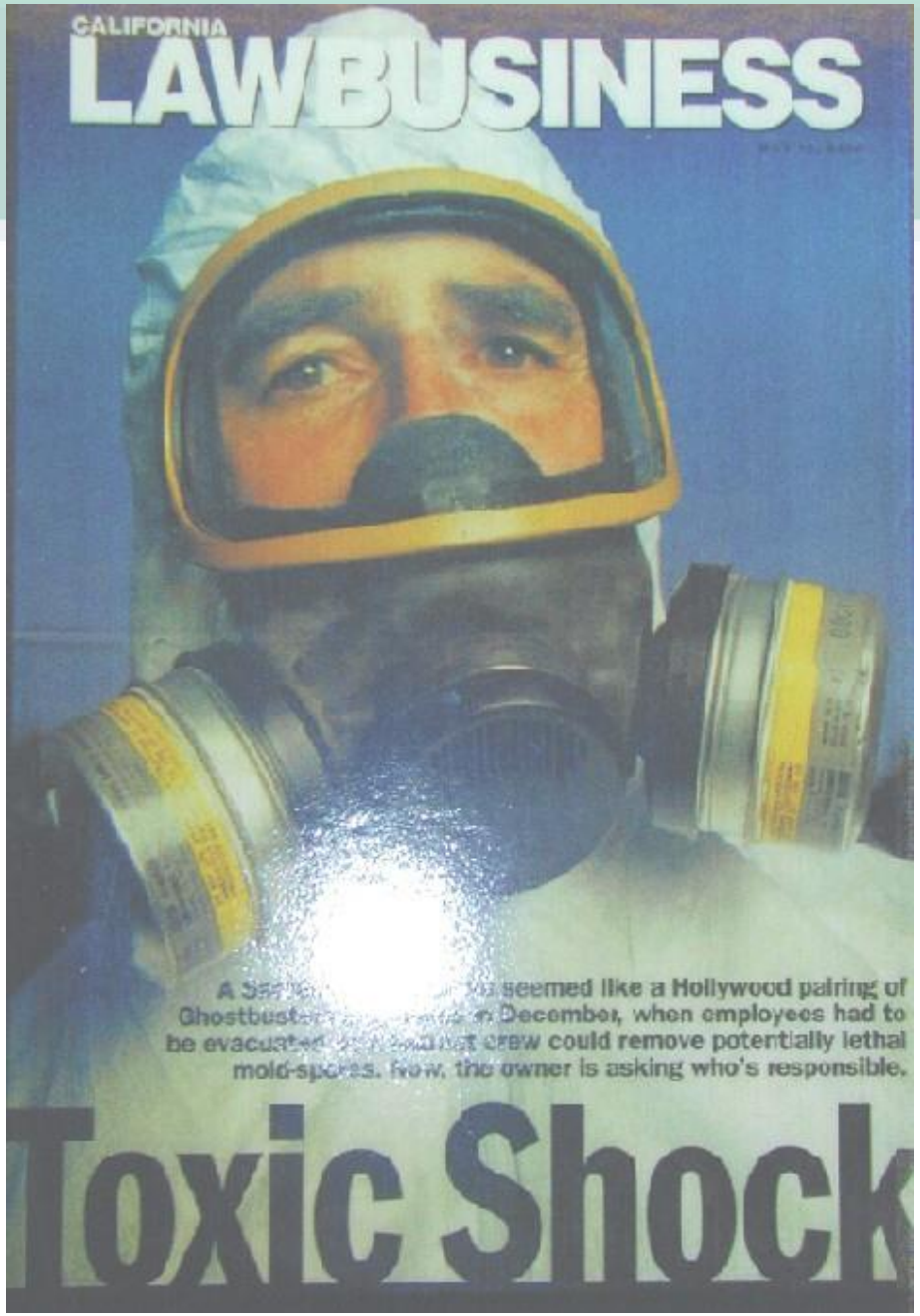
The housing authority owns 41 buildings with 200 apartments at Joy Park: the 23 where the mold work will be done, two empty buildings to be razed and 16 occupied buildings, said construction manager Tom Gilbert.

He said the agency is unaware of any mold problems or complaints from tenants in the cupied and recently reno buildings.

AMHA intends to che mold in the occupied bui after the agency gets a idea of the scope of the pr in the empty buildings, O said.

He said the AMHA h knowledge that any Joy Pa idents have been exposed mold.

Please see Mo



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LAWYERS WEEKLY USA
THE NATIONAL NEWSPAPER FOR SMALL-FIRM LAWYERS

October 2, 2000 Cite this Page: 2000 LWUSA 853

Article of the week from *Lawyers Weekly USA*:

TOXIC MOLD ... the Next Asbestos?

By Sylvia Hsieh

Claims for personal injury and property damage caused by mold growing inside buildings are on the rise, plaintiffs' lawyers and insurance defense attorneys tell *Lawyers Weekly USA* , and some experts predict they will be the next big tort wave.

"It is a trend. It's one of the hottest areas in construction defect as well as toxic tort law. I view these mold claims as similar to asbestos 30 years ago," says Alexander Robertson, a Los Angeles plaintiffs' lawyers who is currently representing over a thousand plaintiffs against hundreds of building owners for mold contamination.

Injuries from mold range from respiratory problems, skin rashes and headaches to lung disease, cognitive memory loss and brain damage, experts say.

"Mold is everywhere. There are no specific government guidelines and not a whole lot of medical information on it. It's ripe for lawyers to get into and expand it," says Sara Thorpe, a San Francisco defense lawyer.

"Anytime you have some water penetration in a building, you have potential for mold – and a lot of potential for litigation," says David Governo, a Boston toxic tort defense lawyer.

Claims include:

- property damage and personal injury claims against insurers;
- construction defect claims against builders, contractors and architects;

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DENNIS McCOY / SACRAMENTO BUSINESS JOURNAL

Tom Anderson, with son Alan, said Allstate offered $17,300 to do $30,000 in home repairs

Mold verdict: $18 million

KELLY JOHNSON / STAFF WRITER

A federal court jury in Sacramento on Tuesday awarded a 96-year-old Placerville man $18 million in punitive damages in his bad-faith insurance claims-handling lawsuit against Allstate Insurance Co.

"Allstate could have repaired my house for a little over $30,000 to start with," Tom Anderson said after the decision.

Allstate, the nation's second-largest home and car insurer, plans to appeal.

Anderson's house was damaged more than 3½ years ago when a water pipe burst and mold took hold throughout the modest structure. He rejected Allstate's offer of $17,300 to repair the house and sued Allstate in July 1999.

"Thank God it's over," he said Tuesday.

Anderson won't collect any money while the case is on appeal. "Usually it's a two- to three-year process," said Ron Haven of the plaintiff's law firm, Shepard & Haven, in Sacramento. Anderson's lead attorney was Stan Parrish.

son said, he had killed down the mold, but didn't eliminate it. Now the house must be torn back down to the frame.

At trial, an Allstate expert disagreed.

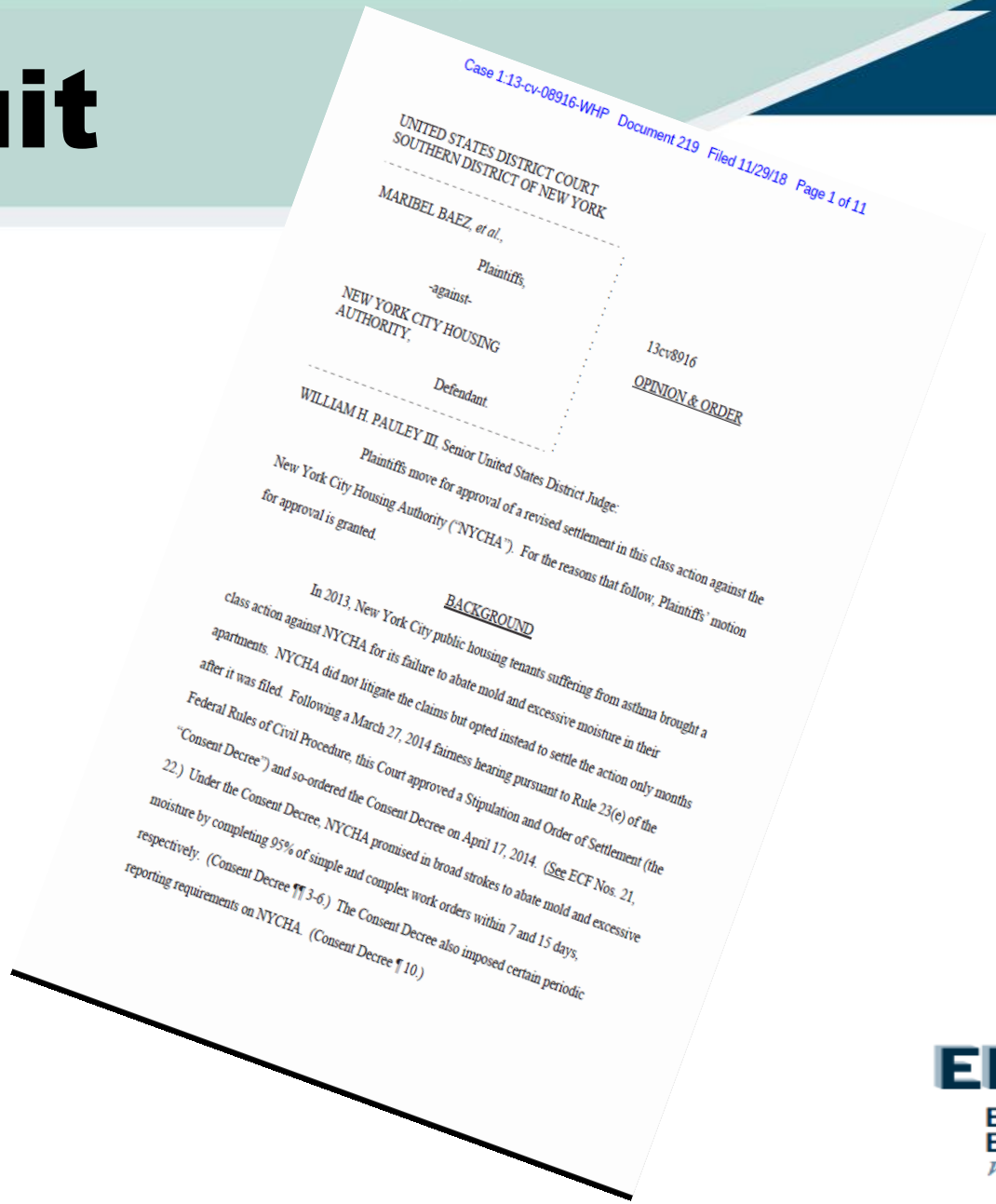
Tom Anderson, who has been living with his son, misses his own home, yard and neighbors.

A year ago Alan Anderson figured that Allstate was waiting for his father to die because the bad-faith lawsuit would have died with him. Now, if Tom Anderson were to die before the appeal is decided, the economic and punitive damages would remain, while the non-economic damages would be lost, Haven said.

"It is a big victory," Alan Anderson said, "for the little guy."

Baez Lawsuit

Maribel Baez vs NYCHA (“Baez”) is a class action lawsuit filed December 2013, as a violation the Americans with Disabilities Act for the conditions of mold and excessive moisturefor residents suffering from asthma.



Case 1:13-cv-08916-WHP Document 219 Filed 11/29/18 Page 1 of 11

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

MARIBEL BAEZ, *et al.*,

Plaintiffs,

-against-

NEW YORK CITY HOUSING AUTHORITY,

Defendant.

13cv8916

OPINION & ORDER

WILLIAM H. PAULEY III, Senior United States District Judge:

Plaintiffs move for approval of a revised settlement in this class action against the New York City Housing Authority ("NYCHA"). For the reasons that follow, Plaintiffs' motion for approval is granted.

BACKGROUND

In 2013, New York City public housing tenants suffering from asthma brought a class action against NYCHA for its failure to abate mold and excessive moisture in their apartments. NYCHA did not litigate the claims but opted instead to settle the action only months after it was filed. Following a March 27, 2014 fairness hearing pursuant to Rule 23(e) of the Federal Rules of Civil Procedure, this Court approved a Stipulation and Order of Settlement (the "Consent Decree") and so-ordered the Consent Decree on April 17, 2014. (See ECF Nos. 21, 22.) Under the Consent Decree, NYCHA promised in broad strokes to abate mold and excessive moisture by completing 95% of simple and complex work orders within 7 and 15 days, respectively. (Consent Decree ¶¶ 3-6.) The Consent Decree also imposed certain periodic reporting requirements on NYCHA. (Consent Decree ¶ 10.)

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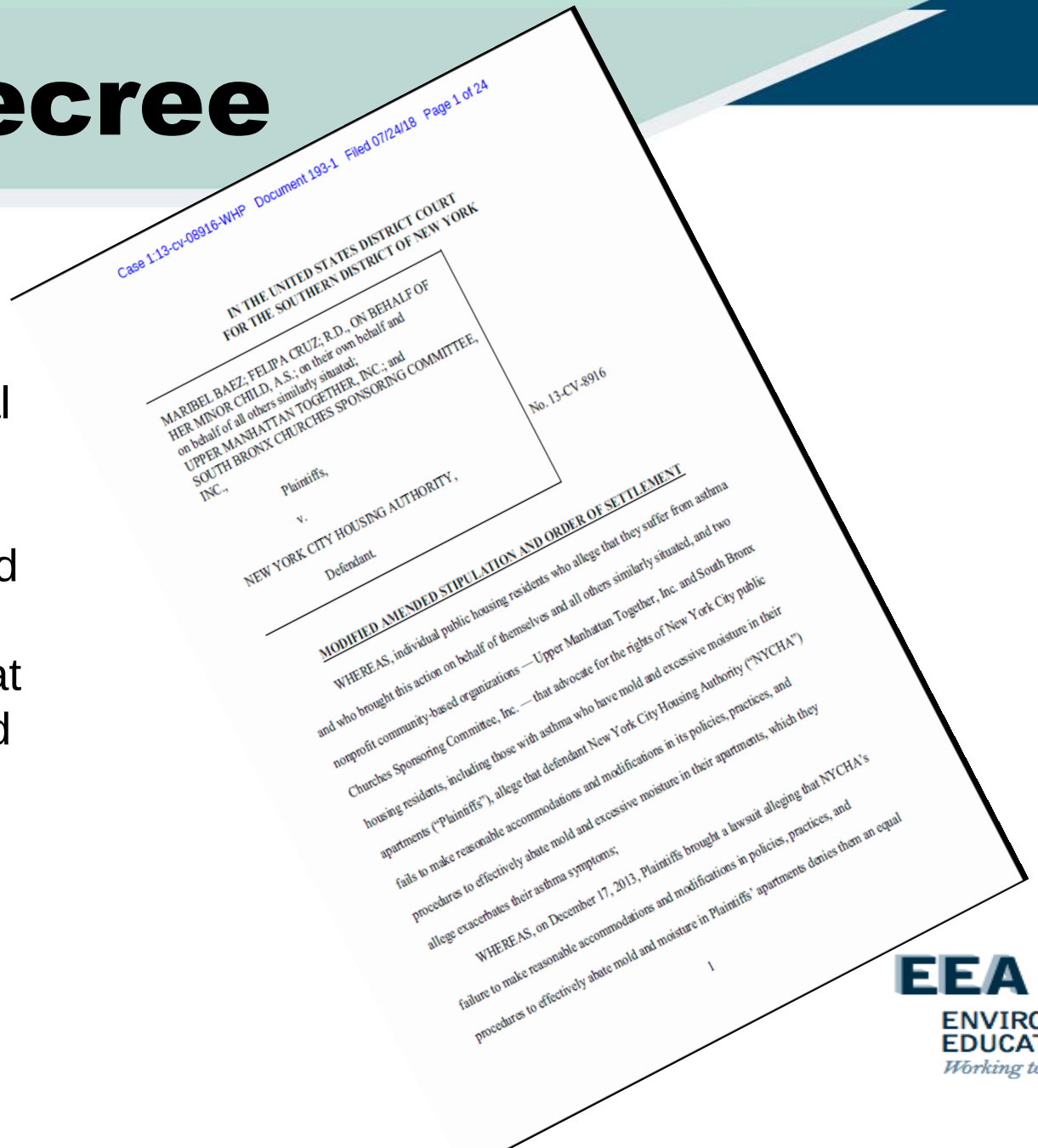
Consent Decree

- In partnership with the Special Master and Plaintiffs, NYCHA has revised its standard procedure for addressing mold complaints.
- These changes were piloted at 38 developments in 2017, and will be launching citywide in January 2019



Case 1:13-cv-08916-WHP Document 193-1 Filed 07/24/18 Page 1 of 24

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

MARIBEL BAEZ; FELIPA CRUZ; R.D., ON BEHALF OF HER MINOR CHILD, A.S.; on their own behalf and on behalf of all others similarly situated; UPPER MANHATTAN TOGETHER, INC.; and SOUTH BRONX CHURCHES SPONSORING COMMITTEE, INC.,

Plaintiffs,

v.

NEW YORK CITY HOUSING AUTHORITY,

Defendant.

No. 13-CV-8916

MODIFIED AMENDED STIPULATION AND ORDER OF SETTLEMENT

WHEREAS, individual public housing residents who allege that they suffer from asthma and who brought this action on behalf of themselves and all others similarly situated, and two nonprofit community-based organizations — Upper Manhattan Together, Inc. and South Bronx Churches Sponsoring Committee, Inc. — that advocate for the rights of New York City public housing residents, including those with asthma who have mold and excessive moisture in their apartments ("Plaintiffs"), allege that defendant New York City Housing Authority ("NYCHA") fails to make reasonable accommodations and modifications in its policies, practices, and procedures to effectively abate mold and excessive moisture in their apartments, which they allege exacerbates their asthma symptoms;

WHEREAS, on December 17, 2013, Plaintiffs brought a lawsuit alleging that NYCHA's failure to make reasonable accommodations and modifications in policies, practices, and procedures to effectively abate mold and moisture in Plaintiffs' apartments denies them an equal

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NYCHA Mold Busters

- **Better Tools**
  - Staff will use new tools to find and fix the source of the problem, including moisture meters and new mold-fighting paint.
- **Enhanced Training**
  - Staff will receive additional hands-on training to become successful Mold Busters.
- **More Accountability**
  - A new inspection and recording process requires photos of the affected areas and guides the staff through the process of finding the cause of the mold or moisture problem. NYCHA will also inspect apartments after the work is completed to ensure that the staff has properly fixed the condition, and there is no mold.

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NYCHA Policies

- It is the policy of NYCHA to establish a cooperative partnership between staff and residents to quickly identify mold and its root causes.
- NYCHA will promptly remove mold from NYCHA locations and identify and correct the root cause of the mold growth; i.e., the moisture source and/or inadequate ventilation.

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NYCHA Purpose

- Standard Procedures establish responsive measures to mold and its root causes in NYCHA public housing locations, and creates protocols to protect the health of residents and staff when remediating mold and identifying and correcting its root causes.

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Standard Procedures - Inspections

All inspection work must conform to the protocols in the following documents:

- GM 040:14:1, Mold/Mildew Control in NYCHA Residential Buildings
- NextGeneration NYCHA Informer Work Management (iWM) handheld application

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Standard Procedures - Remediation

All remediation & related maintenance work must conform to the protocols in the following documents:

- GM 040:14:1, Mold/Mildew Control in NYCHA Residential Buildings, including Appendix A – Remediation Methods
- GM-040:18:2 Revised, Maintenance Tasks – Dust Control and Clean Up in Apartments, which establishes Work Area Preparation/Performance Levels
- Interim Guidance on Wall Breaks
- Interim Guidance on Pipe Insulation

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NYCHA Applicability

- This Standard Procedure applies to staff responsible for the operation and maintenance of public housing developments that receive Section 9 subsidies from the U.S. Department of Housing and Urban Development (HUD) and are operated by NYCHA.
- This procedure does not apply to privately managed developments including Permanent Affordability Commitment Together (PACT) developments.

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Training Requirements

- Inspector (32 hrs) - Training on inspection tools and methods as well as conducting and documenting inspections
  - Directors, Neighborhood Administrators, Housing Managers, Resident Building Superintendents, and Assistant Resident Building Superintendents
- Building Sciences (16 hrs) - Training on identifying the root causes of mold and on the methods to correct the root causes to prevent the reoccurrence of mold.
  - Directors, Neighborhood Administrators, Housing Managers, Resident Building Superintendents, Assistant Resident Building Superintendents, and Maintenance Workers
- Remediation Methods (8 hrs) -Training on how to safely and effectively remediate mold and its root causes.
  - Skilled Trades, Painters, and Caretaker (P)

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NYCHA Roles & Responsibilities

7. The Property Management Department Planning Unit supervisor shall schedule skilled trades workers for mold related work in coordination with the property maintenance supervisor or assistant property maintenance supervisor.

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Maintenance Repairs and Skilled Trades Department

The supervisor of Environmental Field Operations shall oversee staff for large remediation jobs and coordinate scheduling work with the property maintenance supervisor or assistant property maintenance supervisor.

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All NYCHA Employees Performing Work in Apartments

Any employee performing work in a resident apartment that observes a mold condition shall create a parent mold work order either on the handheld device or submit a paper mold work order to the property management office.

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Performance Metrics

- Average number of days to complete repairs and close mold work orders.
- Average number of days to complete initial inspections.
- Percent of mold work orders for reoccurring mold.

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Non-compliance

- If unsatisfactory work is identified during a quality assurance inspection in Section VIII.H, or at any other time, supervisory staff must take one or more of the following actions:
  - Identify areas for follow up training for the employee and ensure training is scheduled and provided.
  - Reinforce with the employee(s) the job expectations, accountabilities, and the progressive discipline process.
- Failure to comply with the requirements of this Standard Procedure may result in disciplinary actions.

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NYCHA MOLD TRAINING

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Update Performance Deficiencies

Quality Assurance Deficiencies

- As a result of a quality assurance review, the NYCHA has found a small group of staff performance shortfall when it comes to mold inspections and remediation.

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Remediators Performance Shortfalls

- failure to use/properly use the anemometer and Testo app to measure exhaust vent output (bathrooms and kitchens)
- failure to use mold resistant paint as required based on the remediation methods and development construction
- failure to check/confirm that pipes are properly insulated when checking for excessive moisture/leaks in wall cavities
- failure to use/properly use the borescope to inspect wall cavities
- failure to ensure mold impacted surfaces are
  - 1. cleaned with the appropriate detergent solution/fungicide cleaner
  - 2. completely dry prior to moving forward in the mold remediation process.

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Other Agency Guidelines

New York City Department of Health and Mental Hygiene “Guidelines on Assessment and Remediation of Fungi in Indoor Environments” – 2008

- Environmental Assessment
  - Visual Inspection
  - Environmental Sampling
- Communication with Building Occupants

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Other Agency Guidelines

New York City Department of Health and Mental Hygiene “Guidelines on Assessment and Remediation of Fungi in Indoor Environments” – 2008

- Remediation
  - Moisture Control and Building Repair
  - Worker Training
  - Cleaning Methods
  - Quality Assurance Indicators
  - Restoring Treated Spaces

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Other Agency Guidelines

New York City Department of Health and Mental Hygiene “Guidelines on Assessment and Remediation of Fungi in Indoor Environments” – 2008

- Remediation Protocol
  - Small Isolated Areas (less than 10 square feet) – e.g. ceiling tiles, small areas on walls
  - Medium-Sized Isolated Areas (10 – 100 square feet)
  - Large Areas (greater than 100 square feet in a contiguous area) – e.g. on separate walls in a single room

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Other Agency Guidelines

EPA Mold Remediation in Schools and Commercial Buildings – 2008

- Mold Remediation – Key Steps
- Plan the Remediation Before Starting Work
- Remediation Planning
- HVAC System

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Other Agency Guidelines

EPA Mold Remediation in Schools and Commercial Buildings – 2008

- **Remediation**
  - Table 1: Water Damage – Cleanup and Mold Prevention
  - Table 2: Mold Remediation Guidelines
  - Cleanup Methods
  - Personal Protective Equipment (PPE)
  - Containment
  - Equipment

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Other Agency Guidelines

OSHA “Brief Guide to Mold in the Workplace” – 2013

- Skin and Eye Protection -
- Respiratory Protection
- Protective Clothing
- Remediation methods – per EPA/NYC
- Sampling – Not Recommended for visible mold
- Equipment for Assessment & Remediation

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Trade Organization Protocols

IICRC S520 - a procedural standard and reference guide for the remediation of mold damaged structures and contents and is based on reliable remediation and restoration principles, research and practical experience, and attempts to combine essential academic principles with practical elements of water damage restoration for technicians facing “real-life” mold remediation challenges.

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NYS Article 32

- Signed by Governor January, 2015
- Establishes certification and licensing program with fees
- Provides for accreditation of training providers
- Establishes standards for assessment & remediation
- Defines practices & procedures
- Serves as the basis for this training

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NYS Article 32

- Enforced by NYS Dept of Labor Division of Safety & Health
- Assigns Roles & Responsibilities
  - Mold Assessors
  - Mold Remediation Contractors
  - Mold Abatement Supervisors
  - Mold Abatement Workers

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NYS Article 32

The Mold Remediation Plan Must Specify:

- The rooms or areas where the work will be performed
- The estimated quantities of materials to be cleaned or removed
- The methods to be used for each type of remediation in each type of area
- The PPE to be supplied by licensed remediators for use by licensed abaters
- The proposed clearance procedures and criteria for each type of remediation in each type of area
- Occupant notification
- Recommendations for notice and posting requirements
- An estimate of cost and an estimated time frame for completion
- When possible, the underlying sources of moisture that may be causing the mold and a recommendation as to the type of contractor who would remedy the source of such moisture.

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Mold Remediation Work Plan NYSDOL

- A licensed Mold Remediation Contractor will utilize the information provided by the Mold Assessment Consultant in the *Mold Remediation Plan* and generate a *Mold Remediation Work Plan* specific to each project.
- The Work Plan must fulfill all the requirements of the mold remediation plan developed by the Mold Assessment Consultant as provided to the client and provide specific instructions and/or standard operating procedures for how a mold remediation project will be performed.

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NYS Article 32

Post-remediation Assessment And Clearance

- Determine whether the work area is free from all visible mold
- All work has been completed in compliance with the remediation plan and remediation work plan meets clearance criteria specified in the plan.

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NYS Article 32

EXEMPTIONS

- A residential property owner who performs mold inspection, assessment, remediation, or abatement on his or her own property;
- A non-residential property owner, or the employee of such owner, who performs mold assessment, remediation, or abatement on an apartment building owned by that person where the property has four or less dwelling units;
- An owner or a managing agent or a full-time employee of an owner or managing agent who performs mold assessment, remediation, or abatement on commercial property or a residential apartment building of more than four dwelling units owned by the owner. This exemption will not apply if the managing agent or employee engages in the business of performing mold assessment, remediation, or abatement for the public; and
- A federal, state or local governmental unit or public authority and employees thereof that perform mold assessment, remediation, or abatement on any property owned, managed or remediated by such governmental unit or authority.

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NYCHA MOLD TRAINING

Remediation Overview

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Remediation Basics

- Get rid of the water!
- Get rid of the food!
- Kill, then control!
- Don’t forget the air!
- Vac! Wash! Vac!

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Remediation Basics

- Restrict access to work area
- Construct containment & install engineering controls
- Remove contaminated and water damaged porous building materials
- Clean & decontaminate non-porous materials
- Clean & seal exposed surfaces
- Evaluate for completeness of work

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Containment

- Containment
  - plastic sheeting, duct tape
  - allow for decontamination & staging areas
- Control of Exposure
  - vacate adjacent areas as appropriate

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Containment

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HEPA Filtration

- 99.97% efficient to 0.2microns

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Engineering Controls

- HEPA Equipped
  - Vacuum

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Engineering Controls

- HEPA Equipped
  - Exhaust Filtration

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Cleaners & Disinfectants

- Specialized chemicals for mold remediation
- Anti-microbial cleaners used first
- Disinfectants used AFTER cleaning is complete
- NYCHA Products

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Sodium Hypochlorite (Chlorine Bleach)

- **Disadvantages**
  - Not compatible with all surfaces
  - Safety issues
  - Not a cleaner
  - Inactivated by heavy organic soil
  - Unstable

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Follow Manufacturer's Directions

- Use the right dilution
- Use the right application
- Change solution when recommended
- Avoid cross-contamination

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Remediation Basics

- You can clean without disinfecting
- You can NOT disinfect without cleaning

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Points to Remember

- Eliminating water is the best way to eliminate fungi
- You cannot disinfect and kill fungi without cleaning first
- Choose the right chemicals &/or equipment for the job and follow manufacturer's directions
- Healthy employees are the best

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Remediation Overview

- Remediation Planning

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NYCHA MOLD TRAINING

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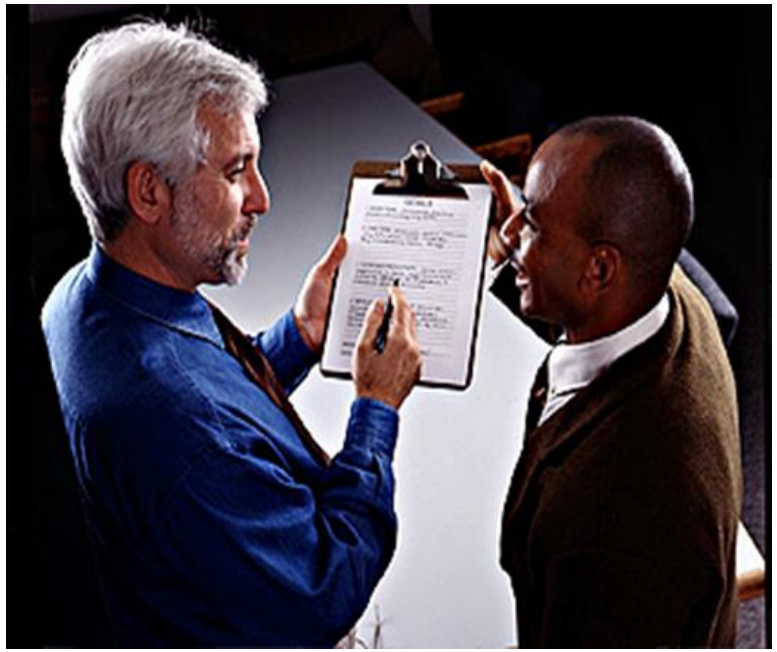
Work Place Hazards

Work Site Hazards

- **Physical**
  - Confined Space
  - Electrical
  - Slips, Trips & Falls
  - Heat-related disorders
- **Chemicals**
  - Asbestos containing materials
  - Lead based paint
  - Cleaners, disinfectants & sealers



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Work Site Safety Hazards

- Sharp objects
- Slippery surfaces
- Falling objects
- Terrain
- Unstable surfaces
- Burns
- Improper lifting Ergonomic hazards
- Pinch points
- Environmental (weather, animals, poisonous plants)
- Struck-by / Roll Over
- Public/Other Contractors
- Dehydration

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Chemical Work Site Safety Hazards

- Asbestos Containing Materials (ACM)
- Lead (LBP)
- Chemicals
  - Cleaners
  - Disinfectants
  - Sealers

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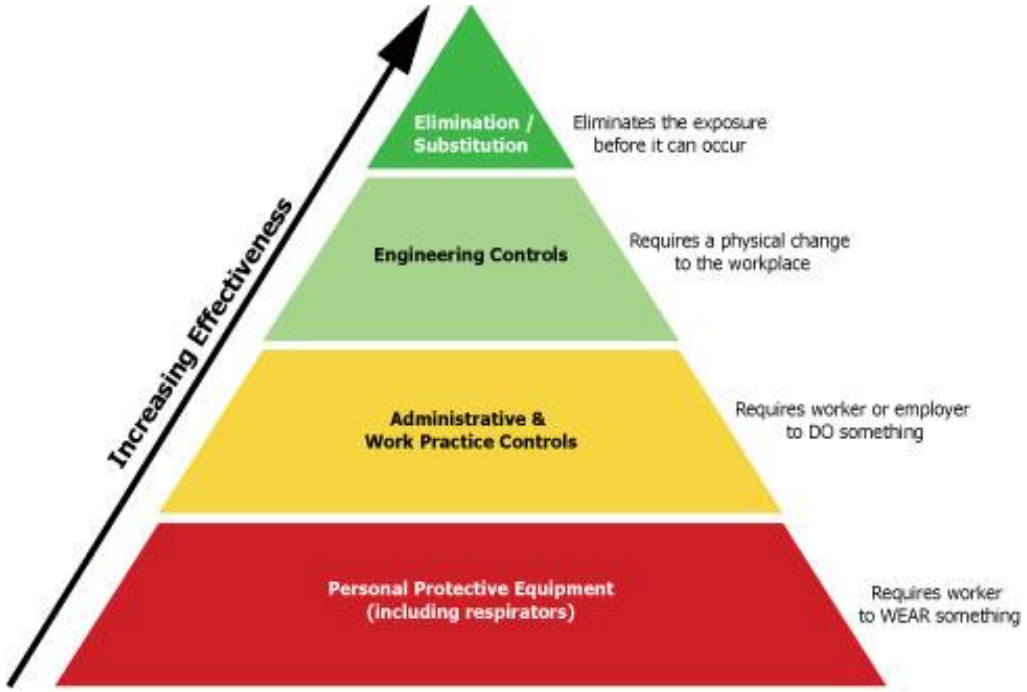
Work Place Hazards

OSHA's Hierarchy of Controls



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Personal Protective Equipment

- 29 CFR 1910.132

"Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices…shall be provided, used and maintained whenever it is necessary by reason of hazards of processes or environment… capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact." - OSHA

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Protective Clothing

- Protective Clothing
- Hoods and boots
- Respirator inside of hood
- Oversize suits for ease of movement
- Reinforce suits with duct tape
- Tape wrists to gloves, ankles

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Respiratory Protection

- Respirators are the last option after:
  - engineering controls
  - administrative controls
  - work practices
  - alternative materials
  - other methods

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Personal Protective Equipment

Mold Remediation of Less than 100 Square Feet

Employees must wear the following:

- An N95 disposable respirator (i.e., a dust mask) in accordance with the OSHA respiratory protection standard (29 CFR 1910.134)
- Disposable protective clothing covering both head and shoes
- Gloves
- Eye protection

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Personal Protective Equipment – Note!

Employees using respirators must follow the requirements in SP 001:17:2, Respiratory Protection Safety Program.

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Types of Respirators

- Three levels of particulate filter efficiency are 95%, 99%, and 99.97%. The three categories of resistance to filter efficiency degradation are labeled N, R, and P. The class of filter will be clearly marked on the filter, filter package, or respirator box.

Types of Respirators

- Half Face Negative Pressure

- N100 Fitted Facepiece

- N95 Fitted Facepiece (i.e. dust mask)

Types of Respirators

- NIOSH Video

“A Particle is a Particle”

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Respiratory Program

- **Minimum Requirements:**
  - ***written SOP***
  - ***MSHA/NIOSH certified respirators***
  - ***appropriate for hazard***
  - ***training of wearer***
  - ***individual respirators***
  - ***cleaning & disinfection***
  - ***respirator storage***
  - ***inspection & repair***
  - ***work area monitoring***
  - ***medical review***
  - ***annual evaluation of respiratory program***

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Other Important Issues

- Medical fitness to wear a respirator
- Facial hair & respiratory protection
- Care & cleaning of respirators
- Inspection of respirators
- Cleaning & disinfection
- Repairs
- Storage

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Asbestos: What Is It?

- Asbestos minerals share some common characteristics:
  - Naturally occurring from Ores rich in Magnesium, Calcium, Silica, and Iron
  - High tensile strength along the axis of the fiber
  - Chemically inert
  - Non-combustible

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Definitions

ACM= **A**sbestos **C**ontaining **M**aterials

- This is any material that contains **greater** than 1% asbestos fibers

PACM=**P**resumed **A**sbestos **C**ontaining **M**aterials

- This is any TSI, Surfacing, or Misc vinyl/asphalt flooring or roofing installed before 1980

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Mold on ACM

ACM- Pipe insulation (T.S.I)

ACM- Spackle/Joint compound

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ACM at NYCHA

ACM- Pipe insulation
(T.S.I)

ACM - Flooring

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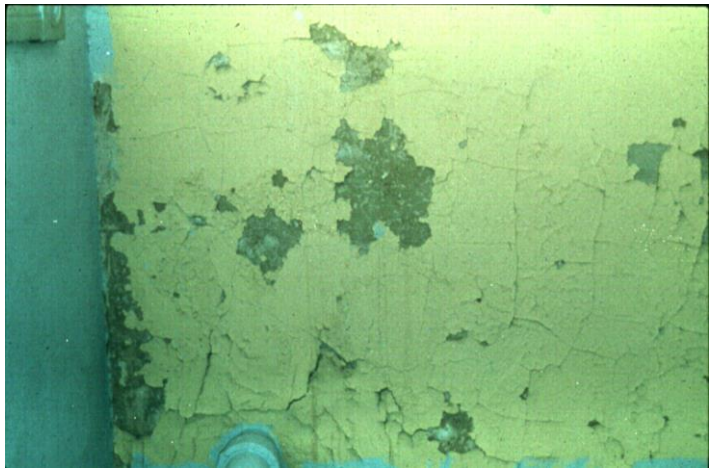
Lead Based Paint

On mold remediation projects lead based paint can also be impacted.

- It will typically be in the paint on or near the areas with mold growth
- Demolition or removal of these painted surfaces can create potentially dangerous exposures to lead dust and lead contaminated debris



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Why are Dust and Debris a Problem?

- Remediation activities that disturb lead-containing materials create dust and debris
- Lead-contaminated dust is poisonous
- Very small amounts of lead-contaminated dust can poison children and adults
  - **Children swallow dust during ordinary play activities.**
  - **Adults swallow or breathe dust during work activities.**
- Workers can bring lead-contaminated dust home and poison their families

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Lead Renovations

- EPA requires that those conducting renovation, repair & painting obtain RRP certification and use Lead Safe Work Practices (LSWP)
- HUD requires LSWP for activities that disturb more than 2 sq. ft of painted surface in any one room

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Hazard Communication

Mold remediation involves use of :

- Cleaners
- Disinfectants
- Anti-microbials
- Biocides

Chemicals in these substances require that an employer have a hazard communication programs in place

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Hazard Communication

The basic goal of a Hazard Communication Program is to be sure employers and employees know about work hazards and how to protect themselves; this should help to reduce the incidence of chemical source illness and injuries.

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HAZCOM is RIGHT TO KNOW

OSHA has estimated that more than 32 million workers are exposed to 650,000 hazardous chemical products in more than 3 million American workplaces.*

Does this pose a serious problem for exposed workers and their employers …

What do you think?

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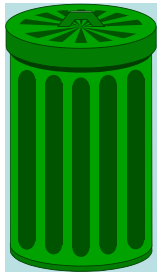
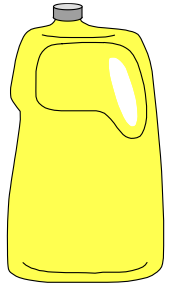
Case Studies

New York City Sanitation, November 1996



Michael Hanly, trash collector,
killed while standing behind his truck
as 70% hydrofluoric acid gas escaped
from containers under compaction

City workers in another location find
six plastic jugs of hydrofluoric acid
placed curbside with recyclables



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What Does This Standard Do?

- The HCS provides workers the right-to-know concerning the hazards and the identities of the chemicals they are, or may have the potential to be, exposed to in the workplace.

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Steps to an Effective HAZ-COM program

- Hazard Assessment
- Develop a written HAZCOM Plan
- Appointment of a HAZCOM Coordinator
- Conduct the chemical inventory
- Initiate labeling requirements
- Maintain the SDS library
- Establish employee training

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Hazard Determination

- The standard requires that employers inventory all hazardous chemicals in the workplace and include that inventory as a part of the written hazard communication program.
- This inventory will eventually serve as a master list for which a SDS must be obtained and maintained.

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Establish Employee Training

- Each employee who may be "exposed" to hazardous chemicals when working must be provided information and trained prior to initial assignment to work with a hazardous chemical, and whenever the hazard changes.

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Employee Responsibilities

- Know where to get information about hazardous substances used, stored, or handled at your inspection sites.
- Learn to read labels and understand SDSs.
- Identify hazards before you begin a task.
- Do not be afraid to ask questions.
- Use personal protective equipment.

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Confined Spaces

NYCHA staff may encounter the following confined spaces during mold remediation:

- Roof fan housing
- Chimneys
- Interstitial spaces
- Elevator shafts
- Others?

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Confined Spaces

- Definition of a confined space is any space that
  - A person can enter
  - Has a limited opening for entry or exit
  - Is not designed for continuous occupancy
- A confined space that has any associated hazard is considered a permit-required confined space
- Hazards can include oxygen deficient or enriched atmospheres, toxic or flammable atmospheres, mechanical or electrical hazards, falls, engulfment, etc.

Confined Spaces

60% of confined space deaths are among would-be rescuers.

Don’t become a statistic!

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Electrical Hazards

- Electrocution and electric shocks are among the most common hazards.
- Incorrect wiring, improper grounding, and lack of proper insulation result in over 1,000 people being electrocuted each year

Worker Responsibilities

- Being aware of potential hazards
- Knowing how hazards should be treated
- Knowing what to do to protect themselves from electrical shock while working in a regulated abatement work area.

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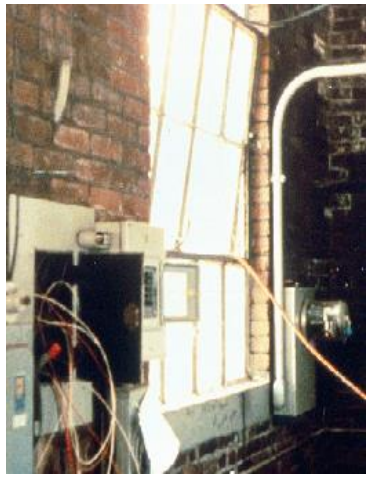
Hazard – Damaged Cords

- Cords can be damaged by:
  - Aging
  - Door or window edges
  - Staples or fastenings
  - Abrasion from adjacent materials
  - Activity in the area
  - Improper use can cause shocks, burns or fire



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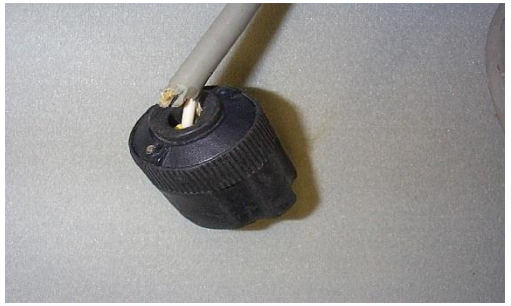
Hazard – Defective Cords & Wires

- Plastic or rubber covering is missing
- Damaged extension cords & tools



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Hazard - Improper Grounding

- Tools plugged into improperly grounded circuits may become energized
- Broken wire or plug on extension cord
- Some of the most frequently violated OSHA standards

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Clues that Electrical Hazards Exist

- Tripped circuit breakers or blown fuses
- Warm tools, wires, cords, connections, or junction boxes
- GFCI that shuts off a circuit
- Worn or frayed insulation around wire or connection

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Slips, Trips and Falls

- Mold remediation sites present some significant risks for slips, trips and falls.
- Non-slip rubber boots or shoes with non skid soles can greatly reduce slips and falls when working on wet polyethylene
- No running, jumping, or “horseplay” should be allowed in the work area

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Problems With Heat

- The body naturally tries to cool itself by sweating
- If you are wearing an impermeable suit, your body heat cannot escape
- Your lungs are already in overdrive due to the added stress of the respirator
- The Air Conditioning has been shut off for the summer, and the air in the work area is much warmer than the air outside
- Perfect conditions for the onset of HEAT STRESS or HEAT STROKE

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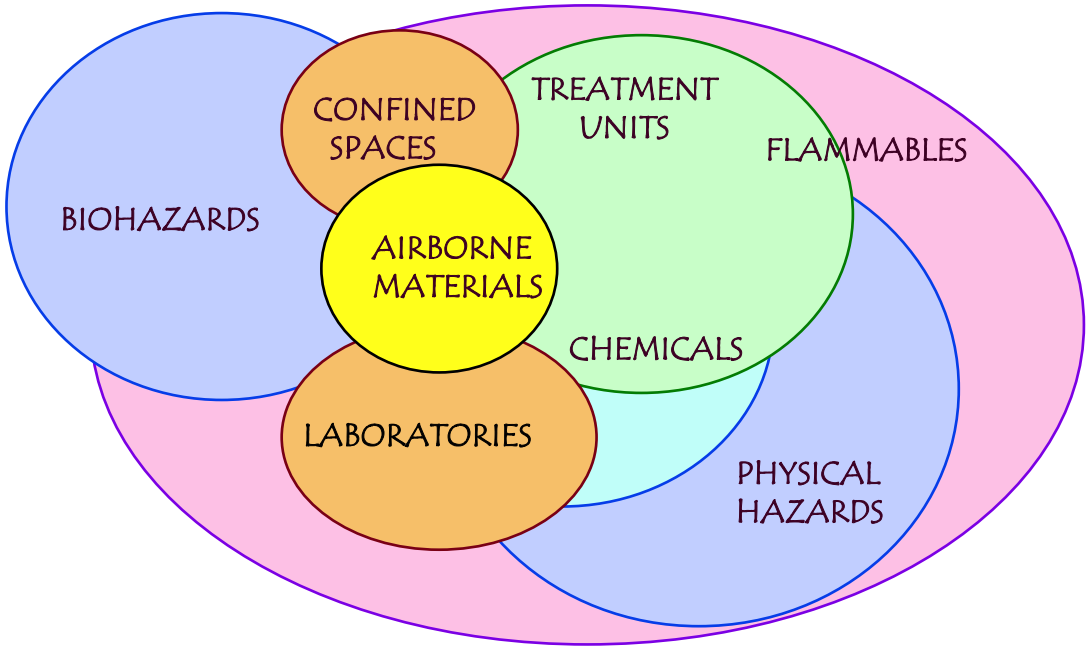
Hazard Recognition

Look at the BIG picture!



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Hurt at Work

- You've carefully thought out all the angles.
- You've done it a thousand times.
- It comes naturally to you.
- You know what you're doing, its what you've been trained to do your whole life.
- Nothing could possibly go wrong, right ?

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Think Again!

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NYCHA MOLD TRAINING

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Remediation Methods Part 2

NYCHA MOLD TRAINING

Work Area Preparation

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Overview of Containment

- The goal of containment is to limit the spread of mold throughout the building in order to minimize the exposure of remediators and building occupants to mold.
- The larger the contaminated area, and the greater the possibility that someone will be exposed to mold, the greater the need for containment.

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EPA Guidelines for Containment

Two types of containment are described in EPA's mold remediation guidance:

Limited- Limited containment is generally used for areas involving between 10 and 100 square feet of mold contamination.

Full containment- is used when areas larger than 100 square feet are to be remediated or in cases where it is likely that mold could be spread throughout the building during remediation

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Limited Containment

- A single layer of 6-mil fire-retardant polyethylene sheeting enclosing the moldy area.
- Access to the contained area is through a slit entry covered by a flap on the outside of the containment area.
- Containment is generally recommended for areas involving 10 to 100 square feet of mold contamination.

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Limited Containment

- In small areas, the polyethylene sheeting can be secured to the floor and ceiling with duct tape.
- In larger areas, a frame of aluminum extension poles or wooden studs can be built to hold the polyethylene sheeting.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

In **apartments**, discuss the following with the resident:

- Extent of containment needed
- How the containment area will be prepared
- Advise residents not to enter the containment area until after clean-up
- Direct residents not to allow children to enter any area in which plastic sheeting is being used or stored due to the risk of suffocation

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- Secure the apartment and/or work area against unauthorized entry.
- Move all objects out of the room, if possible.

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Non-Movable Items

- Items which can’t be moved must be cleaned, covered and sealed with two layers of 6 ml poly to protect them from damage and contamination

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Work Area Prep

- Pre-clean and install critical barriers
- Barriers are constructed to seal off all openings and penetrations to the work area
- Barriers to be constructed of 6 ml fire-retardant poly sealed with duct tape

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Signs

- Shall be displayed at all accessible entrances to remediation areas
- Should be in the language of the local population
- Should only be removed after final clean

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- Cover the floor of the work area with one layer of six-mil disposable polyethylene sheeting, and tape the sheeting down to prevent movement.
- The floor sheeting must extend six (6) feet in all directions from the work area where practical, unless vertical containment is installed. Use two layers of sheeting to cover wall-to-wall carpeting, overlapping the seams by at least six (6) inches.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- If vertical containment is used, the floor covering may stop at the vertical barrier, if it is impermeable, extends from the floor to the ceiling, and is tightly sealed at all floors, ceiling, and walls.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- Cover the work area entrance or vertical containment doorway with one layer of sheeting.
- Tape the sheeting to the top of the door frame or vertical containment high point and weigh down the bottom to create a seal.
- Create a door flap on the sheeting that allows access into the work area.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- Close and cover all forced air systems (HVAC) in the work area with one layer of disposable polyethylene sheeting, including bathroom vents, common area vents, exhaust vents, and hall vents.
- All supply and air vents, doors, and pipe chases in the containment area must be sealed with polyethylene sheeting to minimize the spread of mold and mold spores to other areas of the building.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- Close windows, and where applicable, cover the windows with one layer of sheeting to prevent dust and debris from settling on windowsills.
- Close windows, and where applicable, cover the windows with one layer of sheeting to prevent dust and debris from settling on windowsills.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- In kitchens and bathrooms, cover counter tops, cabinets, sink base cabinets, and all other horizontal surfaces with sheeting, to ensure that all doors and drawers are sealed.
- Cover the stove with sheeting and seal. Ensure that the stove is off and cool to the touch before covering.
- Cover and seal the refrigerator with sheeting. Prior to covering, cut slits in the sheeting to allow for ventilation.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

Other items:

- Cover any items that cannot be relocated out of the work area.
- Tape the protective sheeting to the wall of the building or use a 2x4 wrapped in protective sheeting to hold the material next to the wall. Use heavy objects to weigh the other edges of the protective sheeting to the ground to secure.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- When using ladders on plastic sheeting, place a sturdy piece of plywood on the plastic and then set the ladder on the plywood to prevent the ladder from puncturing the plastic and to provide a stable surface for the ladder. If plywood is used, take special care to secure it to the ground so that it does not move.

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SP 040:18:2 , Lead Safety for RRP – Site Prep

- Cover all items which were not moved from the work area with one layer of disposable polyethylene sheeting. The sheeting must be taped together with duct tape, and taped to the floors or bottom of the walls or baseboards, to form a continuous barrier to the penetration of dust.

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Work Area Prep Reminder!

- Work area must be cleaned (HEPA vac and/or wet methods)
  - Methods that raise dust are prohibited
- Pre-cleaning intended for preparation work only!
  - No disturbance of visible mold until containment is established

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Work Area Prep

The time invested in prepping the work area is easily regained during the clean-up phase.

Mold Remediation – Containment Barrier

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Work Area Prep

- Hands – On: Prepare an enclosure fro containing mold contamination

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NYCHA MOLD TRAINING

Remediation Procedures

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Remediation Procedures

1. All remediation work must conform to the protocols in the following documents:

- SP 040:18:2 Revised, Maintenance Tasks – Dust Control and Clean Up in Apartments, which establishes Work Area Preparation/Performance Levels
- Appendix A, Remediation Methods
- Interim Guidance on Wall Breaks
- Interim Guidance on Pipe Insulation

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Remediation Procedures – Note!

If cracked or crumbling tile is present, staff must:

- cover the exposed area of floor with plastic
- tape all edges securely with duct tape
- instruct the resident not to disturb the covered area
- contact the Technical Services Department's Asbestos Unit for further instructions.

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Remediation Procedures

2. All work must be documented with photographs, including at least one close-up photo of the condition(s) and at least one photo of the larger area.

- Employees must take and upload photos into Maximo using the handheld device of:
- The condition before work is performed.
- The condition after work is completed.
- Other photos as needed to demonstrate that work behind a surface was completed to standard, e.g. photos of insulated pipes, mold free areas.

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Remediation Procedures

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Remediation Procedures – Note!

Any work that would disturb more than 2 square feet per room in a unit which could contain lead-based paint must use lead-safe work practices and RRP certified workers.

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Lead Based Paint

On mold remediation projects lead based paint can also be impacted.

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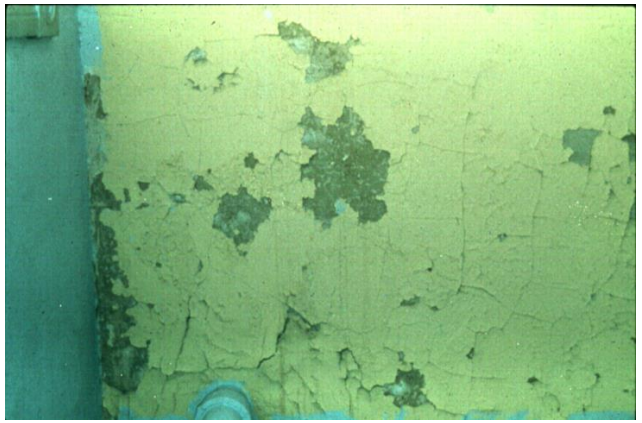
- Demolition or removal of these painted surfaces can create potentially dangerous exposures to lead dust and lead contaminated debris



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Personal Protective Equipment

Mold Remediation of Less than 100 Square Feet

Employees must wear the following:

- An N95 disposable respirator (i.e., a dust mask) in accordance with the OSHA respiratory protection standard (29 CFR 1910.134)
- Disposable protective clothing covering both head and shoes
- Gloves
- Eye protection

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Personal Protective Equipment – Note!

Employees using respirators must follow the requirements in SP 001:17:2, Respiratory Protection Safety Program.

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Correcting Root Causes

Employees must ensure that all repairs to correct root causes:

- Are completed to industry standards.
- Conform to the protocols in the following documents:
  - SP 04-18-02, Maintenance Tasks – Dust Control and Clean Up in Apartments, which establishes Work Area Preparation/Performance Levels.
  - Interim Guidance on Wall Breaks
  - Interim Guidance on Pipe Insulation
  - Interim Guidance on Roof Fan Inspections
- Are documented with photographs

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Instructions for Specific Tasks – Pipe Insulation

When performing any wall break including instances where the probable root cause is the lack of pipe insulation in the wall, employees must install or replace pipe insulation in any area inside the wall cavity where the employee determines that the insulation is missing or defective.

The employee creating the wall break shall create an opening of sufficient size to allow visibility of all pipes within the wall cavity with assistance of the borescope.

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Cleaning Horizontal Vent Ductwork

When cleaning horizontal vent ductwork from inside the apartment, employees:

- Remove the face of the grill to the vertical shaft and HEPA-vacuum the grill and the interior and exterior of the horizontal vent ductwork.
- *Use caution when cleaning the fire damper inside the ductwork*.

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Personal Protective Equipment (PPE)

- Employees must wear the PPE required to perform their specific task. An employee should refer any questions about the required PPE to their supervisor, or contact the Office of Safety and Security at 212-306-8800.
- Please refer to the Personal Protective Equipment (PPE) and Other Safety Equipment Catalogue for HA numbers and item descriptions. The catalogue is located on the SafeNYCHA webpage on NYCHA Connect/Departments.

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SP 040:18:2 – Performing Work

- For painted surfaces, if a component is to be removed from an underlying surface, score the perimeter/edge of the component with a utility knife to minimize the quantity of painted surface that is impacted.

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SP 040:18:2 – Performing Work

- Using the spray water bottle, spray the surfaces that will be disturbed to limit the creation and dispersal of dust. Periodically rewet the area while working

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SP 040:18:2 – Performing Work

- If power tools are used that impact lead-based paint, only those equipped with a vacuum attachment connected to a HEPA vacuum are allowed to be used.

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SP 040:18:2 – Performing Work

Observe safety precautions in contained work areas:

- Do not eat or drink in the work area.
- Keep polyethylene sheeting away from open flames, e.g. stoves and blowtorches.
- Exercise caution when spraying in the vicinity of electrical outlets.
- Prevent children and pets from entering the work area.

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SP 040:18:2 – Performing Work

- Immediately repair torn sheeting using duct tape for minor tears. Total sheet replacement may be necessary for major tears.

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SP 040:18:2 – Performing Work

The following work practices are prohibited:

- Open flame burning or torching of painted surfaces.
- Use of machines that remove paint or other surface coatings through high-speed operation, unless they have shrouds or containment systems and are equipped with a HEPA vacuum attachment.
- Operating a heat gun on painted surfaces above 1100 degrees Fahrenheit or charring the paint.
- Paint stripping using a volatile stripper in poorly ventilated space.
- Dry sanding or scraping, except within one (1) foot of electrical fixtures (e.g. switches, outlets, light fixtures, breaker boxes).

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Ceiling: Painted Concrete (Leak or Condensation; Kitchen or Bathroom)

A. HEPA-vacuum and clean with a detergent solution surfaces displaying water damage, mold growth, and/or that measure wet.
B. Wet-scrape or wire-brush any loose paint.
C. Repaint with mold resistant paint.

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Ceiling: Painted Concrete (Leak or Condensation: Other Rooms)

A. HEPA-vacuum and clean with a detergent solution surfaces displaying water damage, mold growth, and/or that measure wet.

B. Wet-scrape or wire-brush any loose paint.

C. Repaint with standard paint.

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Ceiling: Sheetrock with Steel Framing (Leak; All Rooms)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock, use a HEPA-vacuum at the point of dust generation during the sheetrock removal work.
B. Replace sheetrock.
C. Repaint with standard paint.

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Ceiling: Sheetrock with Wood Framing (Leak; All Rooms)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock, use a HEPA-vacuum at the point of dust generation during the sheetrock removal work.
B. HEPA-vacuum and clean with a soap or detergent solution any wood framing components displaying water damage and/or minor levels of mold growth.
C. Paint any wood framing components displaying water damage and/or minor levels of mold growth conditions with mold resistant paint.
D. Remove and replace wood framing displaying significant mold growth.
E. Replace sheetrock.
F. Repaint with standard paint.

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Ceiling: Sheetrock with Steel Framing

(Condensation; Bathroom or Kitchen)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock, use a HEPA-vacuum at the point of dust generation during the sheetrock removal work.
B. Replace sheetrock
C. Repaint with mold resistant paint.

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Ceiling: Sheetrock with Steel Framing (Condensation; Other Rooms)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock, use a HEPA-vacuum at the point of dust generation during the sheetrock removal work.
B. Replace sheetrock.
C. Repaint with standard paint.

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Ceiling: Sheetrock with Wood Framing (Condensation; Bathroom or Kitchen)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock, use a HEPA-vacuum at the point of dust generation during the sheetrock removal work.
B. HEPA-vacuum and clean with a soap or detergent solution any wood framing components displaying water damage and/or minor levels of mold growth.
C. Paint any wood framing components displaying water damage and/or minor levels of mold growth conditions with mold resistant paint.
D. Remove and replace wood framing displaying significant mold growth.
E. Replace sheetrock.
F. Repaint with mold resistant paint.

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Walls: Painted Plaster (Leak or Condensation; All rooms)

A. HEPA-vacuum and clean with a detergent solution surfaces displaying water damage, mold growth, and/or that measure wet.

B. Wet-scrape to remove the affected paint and top-coated plaster or skim-coating to which the paint is adhered. Continue wet-scraping to a point of at least 12 inches beyond any visible water damage, mold growth, and/or areas that measure wet.

C. Repaint with standard paint.

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Walls: Sheetrock with Steel Framing (Lead or Condensation; All Rooms)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member.
B. Replace sheetrock.
C. Repaint with standard paint.

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Walls: Sheetrock with Wood Framing (Leak or Condensation; All rooms)

A. Remove and dispose of sheetrock displaying visible water damage, mold growth, and/or that measure wet. Continue removal to a point of at least 6 inches beyond any visible water damage or mold growth on the front or back sides of the sheetrock and/or areas that measure wet or to the next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock, use a HEPA-vacuum at the point of dust generation during the sheetrock removal work.

B. HEPA-vacuum and clean with a soap or detergent solution any wood framing components displaying water damage and/or minor levels of mold growth.

C. Paint any wood framing components displaying water damage and/or minor levels of mold growth conditions with mold resistant paint.

D. Remove and replace wood framing displaying significant mold growth.

E. Replace sheetrock.

F. Repaint with standard paint.

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Floors: Finished Wood Floors (Leak or Condensation; all rooms)

A. Remove and dispose of finished wood floorboards displaying significant water damage (buckling) and/or that measure wet. Continue removal to a point of at least 12 inches beyond any visible mold growth on the top and/or bottom sides of finished wood floorboards, plywood sub-flooring, and/or sleepers or to the perimeter of the room.
B. If wet, water-damage, and/or mold growth conditions reach the perimeter of a room, evaluate flooring in the adjacent room to determine if additional removal work is necessary.
C. Replace flooring.

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Floors: Vinyl Floor Tiles (Leak or Condensation; all rooms)

A. Remove and dispose of water-damaged vinyl floor tiles or tiles measuring wet.

B. HEPA-vacuum underlying concrete slab and clean using a detergent solution.

C. Replace floor tiles.

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Kitchen Cabinetry and Bathroom Vanities (Significant Mold)

A. Remove and dispose of cabinetry.

B. Replace cabinetry.

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NYCHA MOLD TRAINING

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Cleanup & Quality Assurance

Cleanup Method

- **Method 1:** Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.

- **Method 2:** Damp-wipe surfaces with plain water or with water and detergent solution (except wood – use wood floor cleaner); scrub as needed.

- **Method 3:** High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.

- **Method 4:** Discard – Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

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Cleaning Methods

- HEPA vacuum surfaces
- Damp-wipe & dry
- HEPA vacuum surfaces again
- Discard in plastic as C&D waste
- HEPA vacuum entire work area

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Cleaners & Disinfectants

- Specialized chemicals for mold remediation
- Anti-microbial cleaners used first
- Disinfectants used AFTER cleaning is complete
- NYCHA Products

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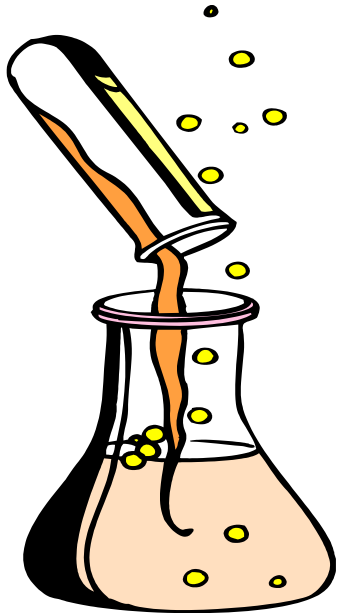
Fungicides/ Fungistats

- Sodium Tetraborate
- Quaternary Ammonium Compounds
- Other Disinfectants
- NYCHA Products



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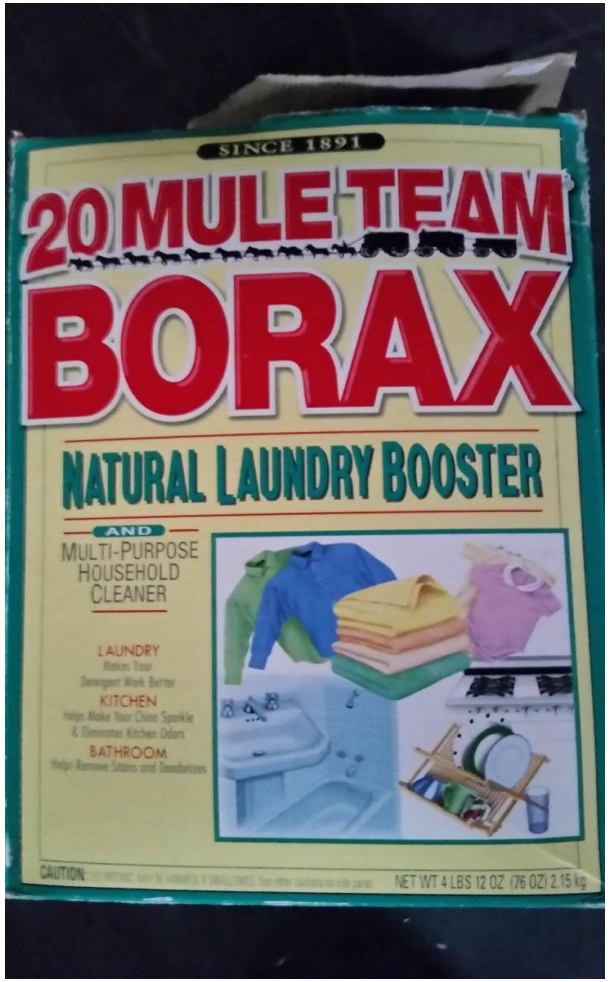
Sodium Tetraborate:



- Advantages
  - Cheap
  - Effective
  - All natural
  - Readily available

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Quaternary Ammonium Compounds

- Advantages
  - Excellent Cleaner
  - Effective in organic soil
  - Mildewstatic properties
  - Safe
- Disadvantages
  - Need to keep using until the mold's food source or water is eliminated

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Other Disinfectants

- Advantages
  - Effective mildewstat
  - Low toxicity
  - Readily available
  - Inexpensive
- Disadvantages
  - Not a fungicide
  - Dilution factors
  - Not commercial

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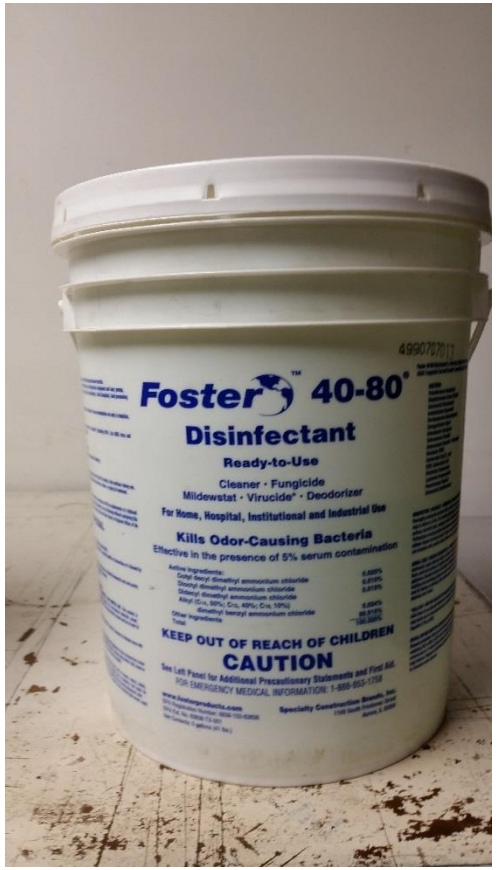
Fosters 40-80



- Use as a disinfectant, sanitizer, cleaner, fungicide, deodorizer, virucide and germicide.
- Kills a large variety of microbes within minutes.
- Contains surfactants to help clean and remove residue.
- Designed for use in water damage restoration situations.

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NYCHA Products

- Micro Bio- Wash Cleaner

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Follow Manufacturer's Directions

- Use the right dilution
- Use the right application
- Change solution when recommended
- Avoid cross-contamination

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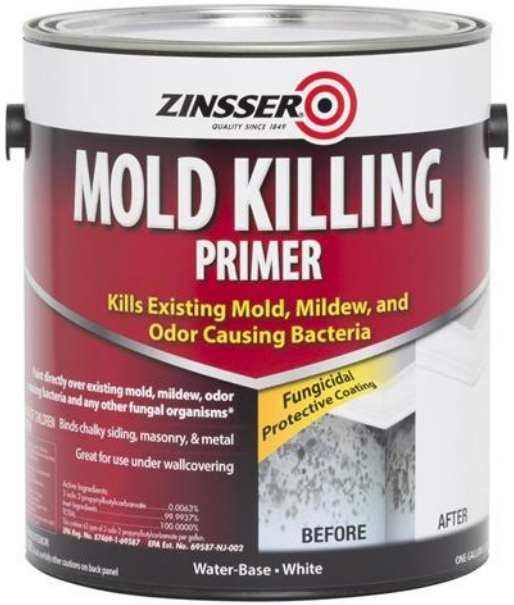
Make Your
Cleaning
Count:
Wash
Lead
Out!

Post Remediation Coating

- Sealing of surfaces that have been remediated, cleaned and disinfected
- Specialized coatings contain anti-microbials and lubricants
- Standard paints can promote future mold growth



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Anti-microbial coatings

- Used to treat building materials prone to mold growth
- Applied to framing and drywall, among other substrates during new construction or after remediation
- Long term protection against mold and mildew growth.

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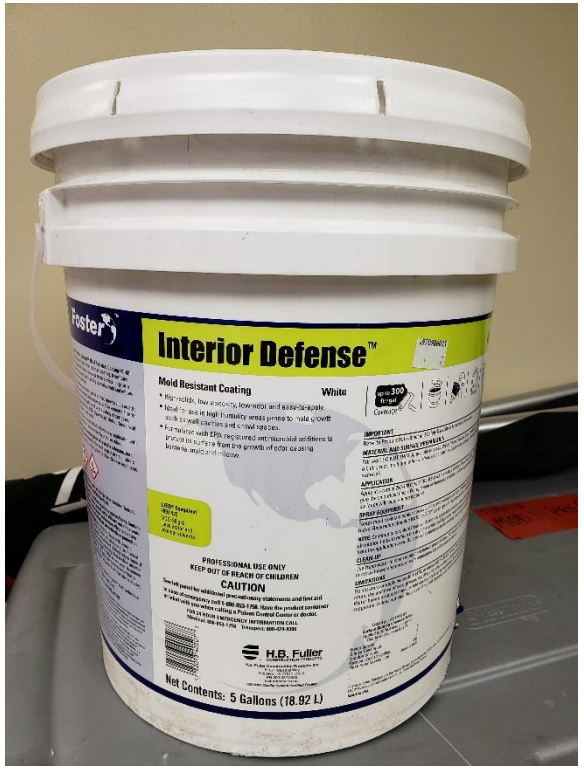
NYCHA Products

Fosters 40-50 Anti-Microbial Coating

- High solid, low viscosity coating which contains EPA-registered antimicrobial additives that protect its surface from the growth of odor causing bacteria, mold and mildew



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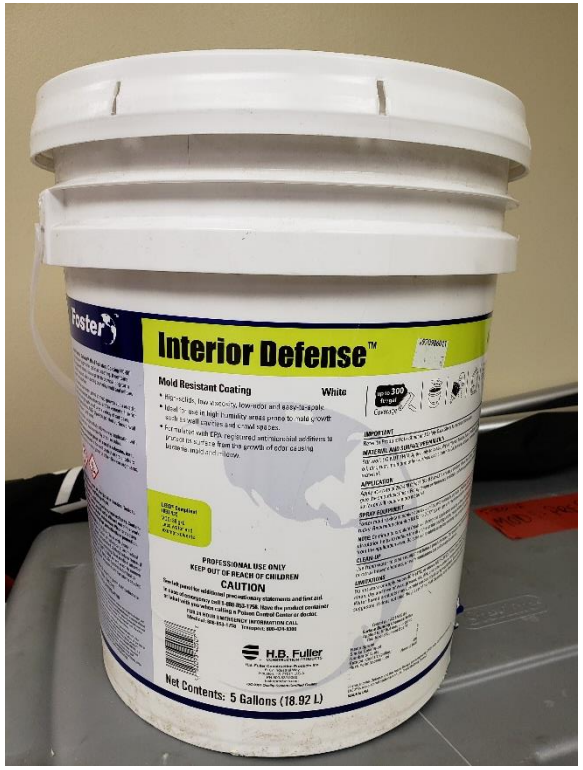
NYCHA Products

Fosters 40-50 Anti-Microbial Coating

- Applied to framing and drywall, among other substrates.
- Should not be painted over



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New Developments

Plast-tec waterproof barrier

- Ready to use for an interior or exterior floor
- Mold and mildew resistant

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New Developments

- Mold-resistant caulking

  securely bonds to a variety of substrates and finishes, including glass, ceramic, porcelain, tiles, stainless steel, plastics, glazed surfaces, imitation marble, aluminum, and many composite materials.

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Disposal

- Removal of Containment Materials
  - 6 mil Contractor bags
  - Goose-neck sealed
  - Decontaminated
  - Taken directly to secure container

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Goose-necking

- How to goose-neck a waste bag

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Quality Assurance Inspections

- Maximo automatically generates a quality assurance inspection work order twenty-five (25) days after the last child work order is closed for all apartments where a mold, water damage, or moisture (i.e. a wet measurement) condition was identified during the inspection. The target start date is automatically populated as 30 days after the last child work order closed and the target end date is populated as 45 days after the last child work order closed.
- Once the quality assurance inspection work order is generated, property management staff contacts the resident and schedules the quality assurance inspection to take place between 30-45 days after the last child work order is closed. See Section VIII.A.3 for the process to schedule appointments.

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Quality Assurance Inspections

Inspecting for Mold, Water Damage, and Moisture

The Inspector:

- Visually inspects for mold any wall, floor, ceiling, or component identified in the initial inspection as having mold and records the results in the handheld device.
- Visually inspects for water damage any wall, floor, ceiling, or component identified in the initial inspection as having water damage and records the results in the handheld device.
- Uses the moisture meter to measure for subsurface moisture any, wall, floor, ceiling, or component that measured wet during the initial inspection and records the results in the handheld device.

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Quality Assurance Inspections

If all work was satisfactorily completed:

- The inspector completes the quality assurance inspection by taking photo(s) of the inspection area free of mold, water damage, and/or moisture and uploading the photo(s) into Maximo.

If any work was not satisfactorily completed:

The inspector:

- Immediately creates a child work order in Maximo.
- Takes and uploads a photograph of the unsatisfactory work into Maximo if the work is visible in the apartment.
- Closes the existing quality assurance inspection work order.
- Follows up with supervisor of the staff person(s) who performed the work to report the unsatisfactory work and ensure the work is completed.

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Quality Assurance Inspections

If any work was not satisfactorily completed:

The inspector:

- Immediately creates a child work order in Maximo.
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- Closes the existing quality assurance inspection work order.
- Follows up with supervisor of the staff person(s) who performed the work to report the unsatisfactory work and ensure the work is completed.

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Course Review

- Mold growth is always associated with excessive moisture problems.
- How do we **prevent** or **control** excessive moisture and what are the **Root-Causes** of excessive moisture?

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Knowledge Assessment

- 20 question quiz

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