

NYCHA MOLD TRAINING



Mold Building Sciences for Maintenance Training Presentation

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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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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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Public (Housing) Enemy #1



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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.



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Mold and the Asthma Epidemic in NYCHA Housing

- >400,000 low-income residents
- 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

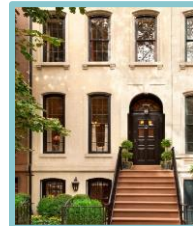
Wide health disparities in childhood asthma by housing type in NYC³



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>

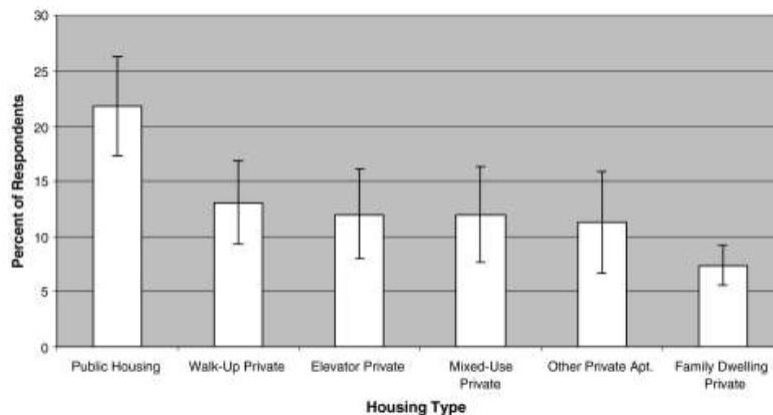
² State of Connecticut Department of Public Health. *A Collaborative Approach for Addressing Asthma in Connecticut, 2009-2016*

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



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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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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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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?

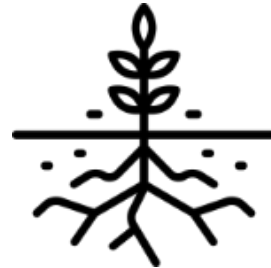
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Mold Root Causes

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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Mold Root Causes

Twenty-nine (29) Root Causes are organized by five (5) general categories how the problem was caused.

- I. Sealant Related Issues – Issues that can be resolved by removing and replacing old caulking.
Example: Caulking around a bathtub.
- II. Leak Issues – Issues caused by a leak other than an sealant issue.
Example: Crack in exterior (façade) is causing a water enter the unit.
- III. Resident-Caused – Issues that can be prevented due to adjustments to resident education and behavior.
Example: Resident is not opening a window after a shower.
- IV. Ventilation – Issues that are a result of inoperable roof fans and/or lateral duct issues.
Example: A clog in the lateral duct is preventing air from flowing into the apartment.
- V. Other – Issue(s) are being caused due to reasons outside of the four categories previously listed.
Example: Condensation (sweating on the pipes) due to the damaged or missing insulation.

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Root Cause Maintenance Work

- Toilet pulls
- Caulking
- Insulation/re-insulation
- Exhaust grill/duct/backflow damper cleaning
- Fan belt replacement
- Plumbing repairs,



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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



Aerotech Laboratories, Inc.

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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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NYCHA Mold Inspector

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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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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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UPDATED - 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. Mold can be found almost anywhere; it can grow on virtually any substance if moisture is present. For example, there are molds that can grow on sheetrock, painted plaster and concrete, wood, paper, carpet, foods, and even dusty inorganic building materials
3. 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.
4. If mold is a problem in an apartment or building, we must clean up the mold and eliminate sources of moisture.
5. 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

6. Reduce indoor humidity (to 30-60%) to decrease mold growth by: venting bathrooms and kitchens; using air conditioners and de-humidifiers; and increasing ventilation. Staff shall ensure that mechanical ventilation is functioning (clear lateral ductwork and operable roof fans). Further, staff can use a hygrometer to check the relative humidity in a resident's apartment
7. Clean and dry any damp or wet building materials and furnishings within 24-48 hours to prevent mold growth.
8. Clean minor levels off off hard surfaces with water and detergent, and dry completely. Absorbent materials, such as sheetrock, that are moldy will need to be replaced.

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Top Ten Things NYCHA Staff Should Know About Mold & Moisture

9. Prevent condensation: reduce the potential for condensation on cold surfaces by assuring that cold water pipes in wall cavities are properly insulated.
10. If needed as a result of asthma, individuals with mold and/or excessive moisture in their apartments are entitled to reasonable accommodations from NYCHA.

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Health Effects

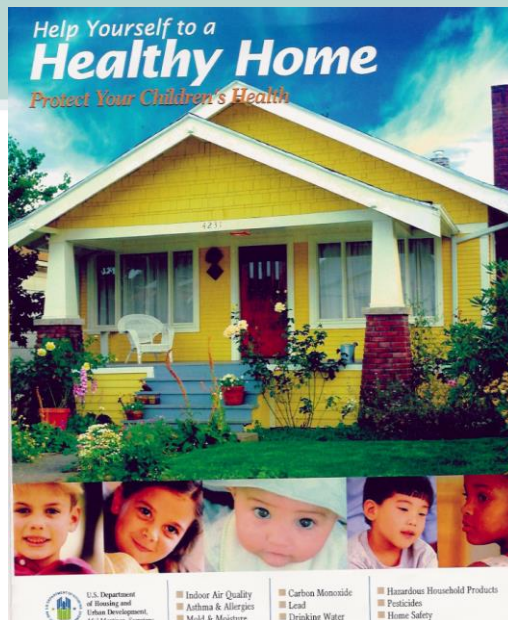
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Why Is Mold A Problem Today?

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

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Mold Exposure

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

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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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Health Effects

- ["Breathing Mold Can Cause Health Issues"](#) – IAQ TV

Potential Health Effects

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



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



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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

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Uncommon Allergic Syndromes

- Allergic bronchopulmonary aspergillosis
- Allergic fungal sinusitis

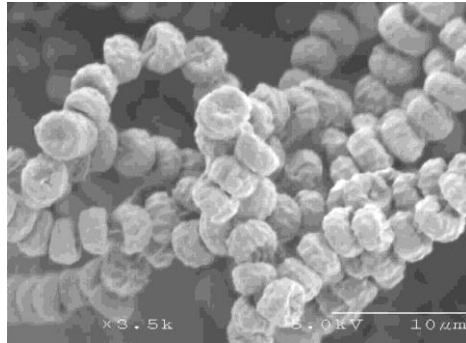
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Irritant Effects

- 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

Toxic Reactions

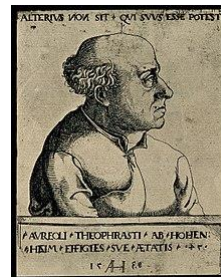
- Some molds can produce toxic substances called mycotoxins.
- Some mycotoxins are on the surface of mold spores; others are within the spore.
- Over 200 mycotoxins have been identified from common molds.

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.

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.



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.



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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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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)

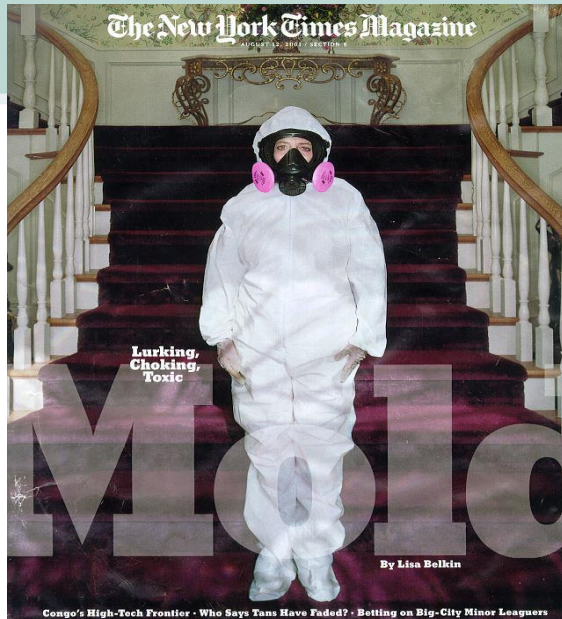
- Receiving Attention
 - Media
 - Medical
 - Legal
- Baez Lawsuit

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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 Journal

October 20,

www.ohio.com/bj

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, expect-

ed 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 com-

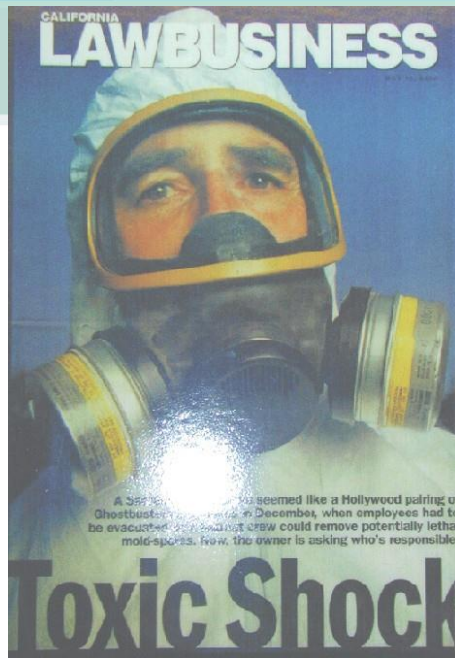
plaints from tenants in the occupied and recently renovated buildings.

AMHA intends to check mold in the occupied buildings after the agency gets a better idea of the scope of the problem in the empty buildings, O'Leary said.

He said the AMHA has knowledge that any Joy Park residents have been exposed to mold.

Please see Mo

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A 35-year-old man seemed like a Hollywood pairing of Ghostbuster in December, when employees had to be evacuated from a building that could remove potentially lethal mold spores. Now, the owner is asking who's responsible.

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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 plaintiff's lawyer 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:

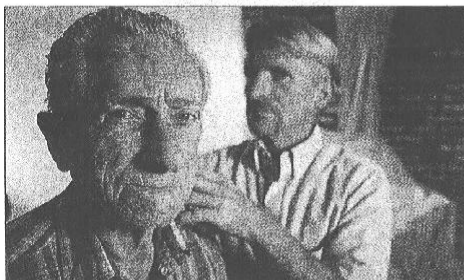
- property damage and personal injury (allergic reactions)
- construction defect claims against builders, contractors and architects;

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OCTOBER 6, 2000

SACRAMENTO BUSINESS JOURNAL 5



DENNIS MCCOY / SACRAMENTO BUSINESS JOURNAL

Tom Anderson, with son Alan, said Alistate 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 Alistate Insurance Co.

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

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

Anderson's house was damaged more than 3 1/2 years ago when a water pipe burst and mold took hold throughout the modest structure. He rejected Alistate's offer of \$17,300 to repair the house and sued Alistate in July 1998.

"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 Farber.

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 Alistate 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 Alistate 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."

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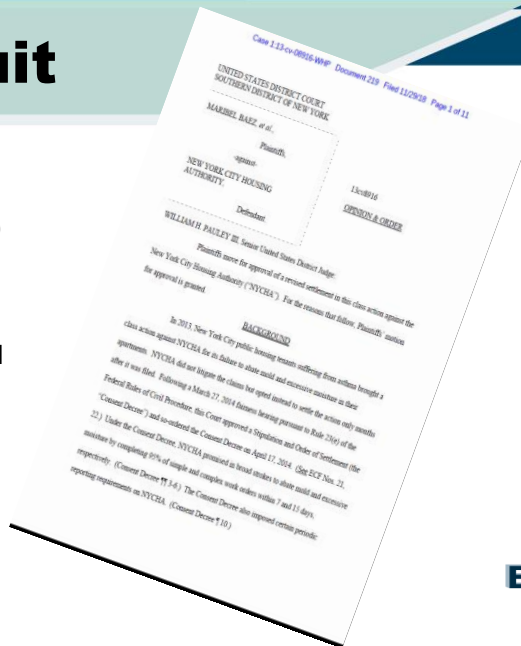
"Bringing
CR Richard Ellis in to help
plan and coordinate our
corporate cam

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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 moisture for residents suffering from asthma.

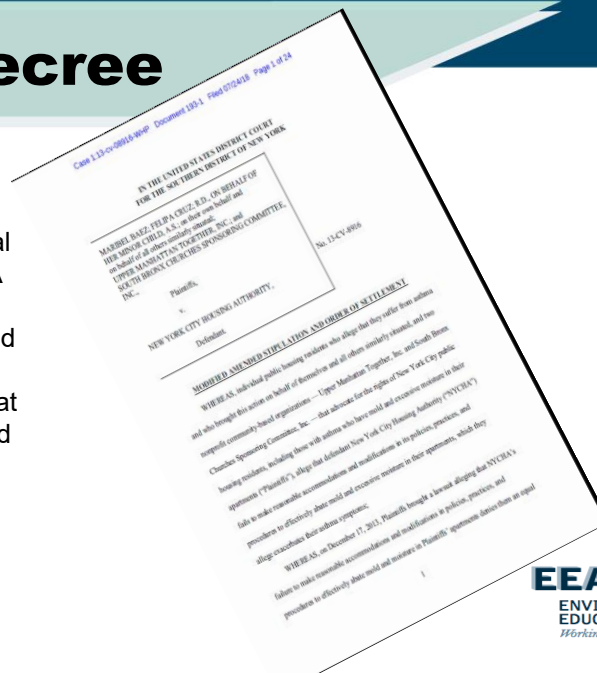


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Consent Decree

- 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



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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 Tech Service Mold Unit

- Coordinate classroom training for over 2,500 operations staff, including property management and front line staff.
- Conduct field training to ensure adherence to Mold Standard Procedure and process.
- Facilitate distribution of all Mold Busters tools.
- Communicate with all NYCHA residents.
- Coordinate and prioritize mold work order scheduling to streamline repairs.



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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.



68

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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Training Requirements

- Inspector (32 hrs) - Training on inspection tools and methods as well as conducting and documenting inspections
 - Directors, Regional Asset Managers, 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, Regional Asset Managers, 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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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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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

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

- Remediation of HVAC Systems
 - Small Isolated Area of Mold Growth in the HVAC System (<10 square feet) – e.g. box filter, small area on insulation
 - Large Area of Mold Growth in the HVAC System (>10 square feet)



77

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



78

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

Establishes Standards for:

- Mold Remediation Plans by Assessors
- Mold Remediation Work Plans by Contractors
- Post-remediation Assessment by Assessors



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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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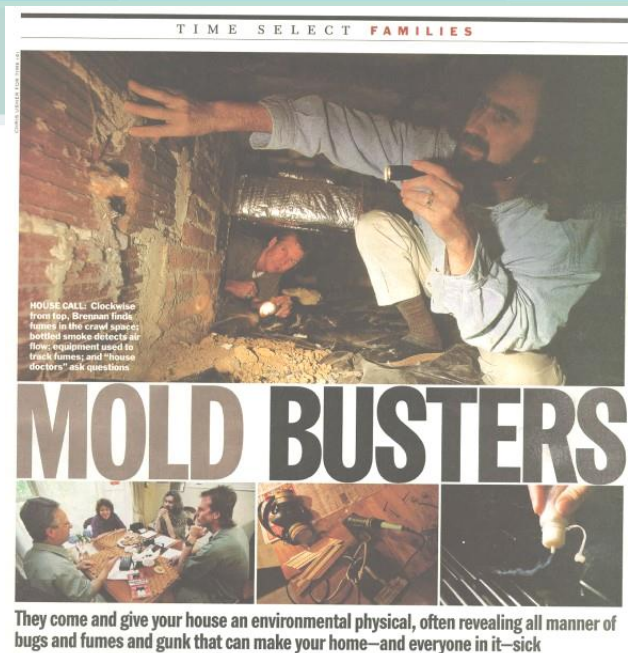
NYCHA MOLD TRAINING



**Mold Evaluation
Practices**

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Mold Evaluation & Testing Practices

- The goals for a Mold Assessment is to find the mold and determine its extent so that it can be removed in a safe manner.
- However the differences as to how to properly perform mold assessment can be substantial.
- Some, such as EPA, focus on finding the moisture and you find the mold.
- Others, such as IICRC, focus mostly on sampling to develop remediation procedures.
- We look at these differences and discuss approaches to mold assessments that are most often used by mold remediation professionals.
- We also look at NYSDOL requirements for the compiling of information for use in a Mold Remediation Plan

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Mold Evaluation & Testing Practices

Should:

- Focus on **presence** and **location** of mold.
- Determine the **extent** (of hidden mold), and **origin** (cause) of mold.



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Mold Evaluation & Testing Practices

Sometimes Includes:

- Pictures of the problems / problem areas.
- Determination of Hidden Mold in Walls.



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Step 1 - Walk-Through Inspection

- Step A involves:
 - Visual, non-destructive inspection
 - A careful walk-through inspection will include close observation of accessible interior surfaces using common inspection tools, notes and photographs.



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Step 1 - Walk-Through Inspection

- Investigate any noticeable odors or visible evidence of fungal growth, and any blisters, stains, corrosion, deterioration, or discoloration that might indicate water intrusion or condensation problems



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Step 1 - Walk-through Inspection: Where to Look

All surfaces should be closely inspected, especially:

- seams and crevices along the base of walls
- edges of carpets
- seams of wall fabrics
- the base of all window and door jambs
- tops of walls
- joints in ceiling materials
- airstream surfaces of accessible air conditioning or humidification equipment



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Step 1 - Walk-through Inspection: Where to Look

- Organic substrates wetted by water are the most common amplification sites, but even elevated relative humidity or dust on hard surfaces might support growth.
- The inspector should first look for any evidence of liquid water from leaks or condensation.



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Step 2 - Invasive Inspection and Investigation

- Locations for invasive inspection are chosen where mold colonization is most likely
- Based on visual evaluation of exposed surfaces, experience with similar construction.
- Review of building plans.
 - Other locations should be selected to view representative conditions where mold is not expected, to confirm its absence or identify the unexpected.



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Step 2 - Invasive Inspection and Investigation : Ventilation

Inspection should include ventilation systems where present.

- Dirty ventilation grills & ducts might be the source of contamination, or the means of its distribution between spaces, or might indirectly contribute to the concentration of indoor air contaminants by providing inadequate ventilation.



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Procedure for Inspection of Wall Cavities

- The goal is to inspect every wall cavity in the area under investigation, identify the location and extent of mold growth in each wall cavity, and delineate areas requiring remediation.
- Destructive investigation will likely result in release of contamination, so containment, safe work practices and personal protective equipment is necessary

Procedure for Inspection of Wall Cavities

- Where visible contamination extends up into the wall cavity above, and where leaks from overhead roofs, decks, windows, or pipes are suspected, smaller openings should be made high on walls or ceilings, so that the leak source and extent of contamination can be identified.



Procedure for Inspection of Wall Cavities

- Mold growth is likely to be present on the paper covering on the back side of sheetrock in areas that
 - measure wet,
 - display water damage
 - have a reported history of water damage

The cellulose content of this paper covering provides ideal nutrient for the development of *Stachybotrys* type mold growth



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Mold Root Causes

Twenty-nine (29) Root Causes are organized by five (5) general categories how the problem was caused.

- I. Sealant Related Issues – Issues that can be resolved by removing and replacing old caulking.
Example: Caulking around a bathtub.
- II. Leak Issues – Issues caused by a leak other than an sealant issue.
Example: Crack in exterior (façade) is causing a water enter the unit.
- III. Resident-Caused – Issues that can be prevented due to adjustments to resident education and behavior.
Example: Resident is not opening a window after a shower.
- IV. Ventilation – Issues that are a result of inoperable roof fans and/or lateral duct issues.
Example: A clog in the lateral duct is preventing air from flowing into the apartment.
- V. Other – Issue(s) are being caused due to reasons outside of the four categories previously listed.
Example: Condensation (sweating on the pipes) due to the damaged or missing insulation.



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I. Mold Root Causes – Sealant Related Issues

Issues that can be resolved by removing and replacing old caulking or grouting.

Example: Caulking around a bathtub.

Caulking - Is a material used to seal joints or seams against leakage in various structures and piping. Maintenance and Plaster.

Grouting – A dense fluid which is used to fill gaps or used as reinforcement in existing structures. Grout is generally a mixture of water, cement, and sand. Grout is thin so it flows readily into gaps. Bricklayer.



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I. Mold Root Causes – Sealant Related Issues

- Caulking DML (Maintenance)
The maintenance worker will follow-up on this work order and do the caulking.
- Grouting DML (Bricklayer)
A bricklayer, craft, will follow-up on this work order and do the grouting.
- Grouting DML (Plasterer)
A plasterer, craft, will follow-up on this work order and do the grouting.
- Grouting/ Caulking DML (Plasterer)
A plasterer, craft, will follow-up on this work order and do the grouting / caulking work.
- Grouting/ Caulking DML (Bricklayer)
A bricklayer, craft, will follow-up on this work order and do the grouting/ caulking.

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II. Mold Root Causes – Leak Issues

Issues caused by a leak other than a sealant issue.

- Leak Around Window
Lack of sealant around the window that causes water to penetrate.
- Leak Through Façade
A crack or damaged/missing mortar affecting the exterior wall.
- Leak From Above/Beside - Investigate
There is an active leak from a unit above or beside the unit with a mold condition.
- Leak From Above * – Previously Identified
There was a leak that was abated but mold/ water damage remain present.
- Plumbing Leak - In Unit
A pipe leaking within the wall cavity requiring a wall break.

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Plumbing Leaks/Flooding



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Perimeter Wall Condensation



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II. Mold Root Causes – **Leak Issues** (continued)

Leak From Above - Previously Identified

Previously Identified should be selected when the root cause or remediation work for the mold, water damage, or wet condition had been identified or abated by Property Maintenance staff or Skilled Trades on a prior work order.

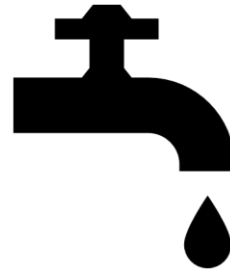
A note and pictures are required for this root cause.

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II. Mold Root Causes – Leak Issues (continued)

- Roof Leak - Non Capital
Roof replacement or repair is required.
- Sink Supply Line Leak
Caused by a leak(s) in the supply line.
- Sink Waste Line Leak
Caused by a leak(s) in the waste line.
- Toilet Leak
Active leak coming from the toilet.



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II. Mold Root Causes – Leak Issues (continued)

Leak From Above - Previously Identified *

- 1) Pre-inspection to look-up leak history for the specific unit.
- 2) Does not cancel or duplicate previous generated tickets.
- 3) Escalates the matter if root cause is being caused by something else if it keeps reoccurring.

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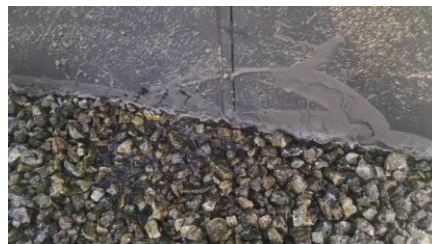
Façade Leaks



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Roof Leaks



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Toilet Condensation - From Above



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III. Mold Root Causes – Resident-Caused

Issues that can be prevented due to adjustments to resident education and behavior.

Examples:

- Not opening the window for ventilation during, or after, a shower.
- Covering the roof fan vent.
- Improper installation of a dishwasher or washing machine.
- Improper installation of a clothing dryer in the apartment.



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III. Mold Root Causes – Resident-Caused

- Resident-Caused (Code 1)
Resident doesn't open the window or door after taking a shower
- Resident-Caused (Code 2)
Dishwasher was installed improperly.
- Resident-Caused (Code 3)
Washing machine was installed improperly.
- Resident-Caused (Code 4)
Vent is blocked or covered.
- Resident-Caused (Code 5)
Clothing dryer was installed improperly.
- Resident-Caused (Code 6) *
Other – the option was not listed.



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III. Mold Root Causes – Resident-Caused. (continued)

Resident-Caused by Other Actions (Code 6) *

Mold Busters Education will be needed for the resident(s) for future prevention of mold. A mandatory inspection will be needed to find the exact reason(s).

A note and pictures are required for this root cause.

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III. Mold Root Causes – Resident-Caused. (continued)

Resident-Caused by Other Actions (Code 6) *

Examples:

- Excessive boiling of pots.
- Unbalanced hot/cold temperatures in the unit and/or units above, below, or adjunct.

A picture and an explanation is needed for the reader to understand the reasoning for selecting this root cause.

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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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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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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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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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Measurement Equipment

- On-site testing equipment that indicates if moisture or ventilation problems may be present
- Used to help identify root causes
- Provides immediate information
- Inspector must be able to operate and understand data

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Inspection Equipment

- Moisture Meter
- Hygrometer
- Anemometer
- Boroscope



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Field Measurements

- Moisture meter – for moisture content in building materials
- Hygrometer – measures humidity levels
- Anemometer – provides air flow in CFM
- Boroscope – allows view behind walls and other cavities

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Moisture Meters

Protimeter Survey Master

Pin-probe Mode
Measurements given as %
moisture

Note: Pin-probe readings can
provide additional information, but
are not used during the root-cause
assessment.



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Hygrometer

- A hygrometer is used to measure moisture content in the atmosphere.
- Humidity measurement instruments usually rely on measurements of some other quantity such as temperature, pressure, mass or a mechanical or electrical change in a substance as moisture is absorbed.



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Anemometers

- Used for measuring the speed of air
- Vane Anemometers use a remote fan (vane) that freely rotates in response to air flow



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Hands-on Demonstration

Evaluation Equipment & Calibration

- Utilize boroscope to identify cavity contents
- Determine Relative Humidity (RH%) - Testo
- Measure Ventilation Rate (CFM) - Testo

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Anemometers

- NYCHA uses **Testo Vane** instrument
- Must be set to Cubic Feet per Minute (CFM) - unit for Air Volume measurements.
- **NEW - Must be calibrated to 55% free air**



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Boroscope

- A boroscope is a hand-held tool that allows users to see potential mold problems inside walls, ceiling plenums, crawl spaces, and other tight areas.
- It consists of a video camera on the end of a flexible "snake."
- No major drilling or cutting of dry wall is required.



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Precautions

- Investigating hidden mold problems may be difficult and will require caution when the investigation involves disturbing potential sites of mold growth.
- Safe work practices & personal protective equipment should be used if mold contamination is present that may be disturbed



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Mold Busters App

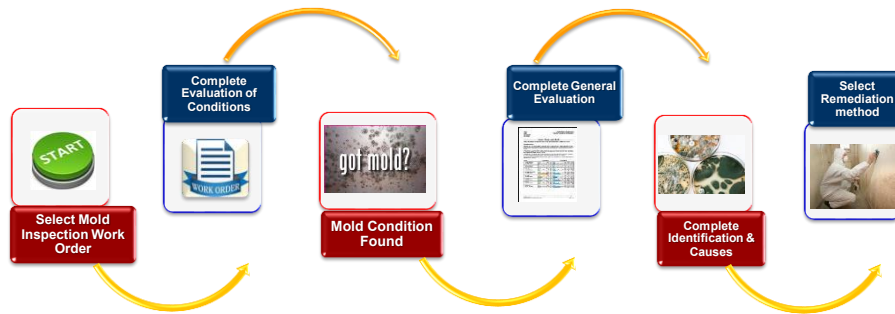
- Mold Inspection Procedures
- Designed by & for NYCHA Housing
- Critical for recording results of inspection
- Used to determine remediation work orders
- Integrated into Maximo

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MOLD/MILDEW WO Workflow - (Continued)

Mold is Found ...Doing the Work (Part 1)...



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MOLD/MILDEW WO Workflow - (Continued)

Mold is Found ...Doing the Work (Part 2)...



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Work Order Workflow

Doing the work...



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Work Order Workflow

Ending the work...



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Samsung Galaxy S8 Device

Display:
5.8 inches

Cameras:
Rear 12MP w/Flash
Front 8MP

Storage:
64GB Device
4GB RAM

Software:
Android 8.x

Talk Time:
Up to 20 hours



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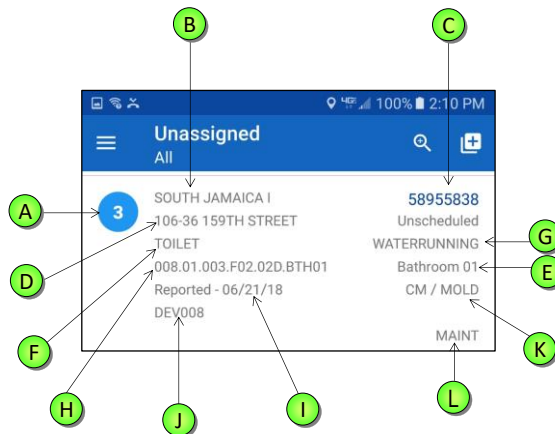


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View Work Order Details

The **WO** List screen shows a detailed summary about each WO.

- A** Priority
- B** Development
- C** WO Number
- D** Address
- E** Room/Location
- F** Failure Class
- G** Problem Code
- H** Location String
- I** Reported By Date
- J** Owner Group
- K** WO Type
- L** Craft



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NYCHA Locations Explained

Examples of NYCHA Locations:

- Developments
- Buildings
- Stair Halls
- Floors
- Apartments
- Rooms (bedroom, bathroom, etc.)
- Heating Plumbing Line
- Grounds
- Elevators
- Community Centers

005.01.001.F02.02C.KIT01

Development #/ Building / Stair Hall / Floor / Apartment / Room
005. 01. 001. F02. 02C. KIT01



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View Work Order Details

- 1 The user can review the **Work Order Details** by scrolling up and down on the **Details** tab.

The fields below are unique for the **Mold Inspection** Work Order:

- 2 **Work Type = CM**
Job Plan# = INSMOLDCM
Sub-work Type = MOLD
Failure Class = MILDEWCONDITION
Problem Code = MILDEW

1

2

WO# 58956270

DETAILS WORK LOGS COMM LOGS MATERIALS A

Address
107-25 159TH STREET

Work Type	Job Plan#	Sub-Work Type
CM	INSMOLDCM	MOLD
Failure Class	Problem Code	
MILDEWCONDITION	MILDEW	
Craft	Responsible Scheduler	
SUPT	MAXIMO	
Priority	Status	
4	APPR	
Scheduled Start	Owner Group	
Jun 22, 2018 10:01 AM	DEV008	
Actual Reported Date	Message Code	
Jun 22, 2018 9:47 AM		
Residence Info		
VIEW WORK ORDER		



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Inspection Status

On **Perform Inspection** screen you can see the **WO Inspection State**. This is the current **State** of the Inspection.

- 1 **COMPLETE** – All required results have been entered.
- 2 **PARTIAL** – Some results have been entered, but not **All** required results.
- 3 **NONE** – No results have been entered.
- 4 **NOTE: WO Inspection State** of the whole WO will appear on this screen and on the **Work Order List** screen.



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Perform Inspection

The first task in a series of tasks is

Task 1: Evaluation of Conditions

- 1 The **WO Inspection State** is **NONE**.
- 2 Tap **INSPECT**



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Evaluation of Mold Growth – (Continued)

Items that must be inspected are marked by a red asterisks (*)

All questions that have an asterisk (*) are mandatory.

- 1 **Evaluation of Conditions** screen requires evaluation for:
- **Mold Growth** (Yes/No)
 - **Water Damaged** (Yes/No)
 - **Moisture Measurement >= 599** (Yes/No)

- 2 Tap **NONE** next to **Is there mold growth?**



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Evaluation of Mold Growth – (Continued)

The **Select Response** window display 3 options:

- **Notes** (optional)
- **No**
- **Yes**

- 1 In the **Notes** field, the user can input free-text information.

- 2 Tap **YES**



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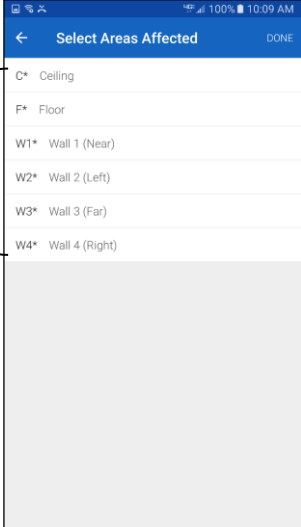
144

Evaluation of Mold Growth – (Continued)

The **Select Areas Affected** screen displays, all of the fields or areas to select.

1 To select an affected area tap on it, **iWM** then highlights the selected area in **Green** color.

To unselect an area tap on it again and the **Green** bar disappears.





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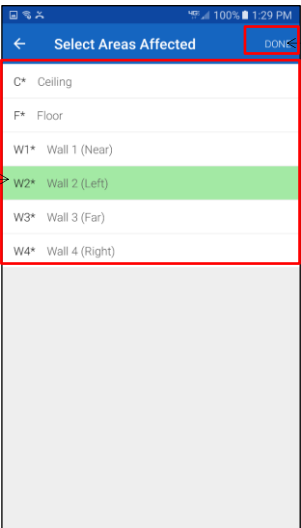


145

Evaluation of Mold Growth – (Continued)

1 Tap on **W2* Wall 2 (left)**, the system highlights it in Green.

2 Tap **DONE**





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146

Evaluation of Mold Growth – (Continued)

1 Tap on **W2* Wall 2 (left)**, the system highlights it in Green.

2 Tap **DONE**



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147

Evaluation of Water Damage

The second Mandatory question on the **Evaluation of Conditions** screen is: “**is there Water Damage?**”

1 Tap **NONE** next to **is there Water Damage?**



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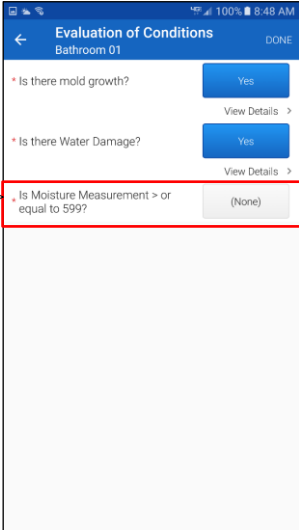
148

Evaluate Moisture Measurement Level

The last question on the **Evaluation of Conditions** is to evaluate the moisture level.

Evaluate the moisture measurement level (greater than) ≥ 599

1 Tap NONE





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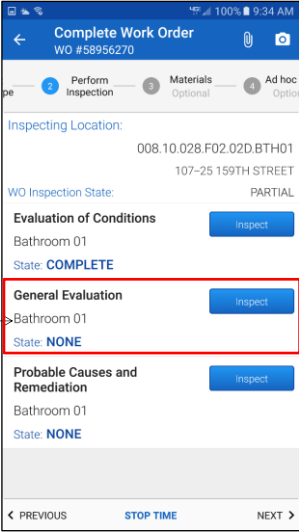
149

Perform General Evaluation Inspection

The second task in a series of tasks is

Task 2: General Evaluation

1 Tap INSPECT





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150

Perform General Evaluation Inspection – (Continued)

Items that have to be inspected are marked by a red asterisks (*)

All questions that have an asterisk (*) are **mandatory**.

- 1 Tap **NONE**, next to **Interior Wall Finish**



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151

Perform General Evaluation Inspection – (Continued)

The Supervisor shall input the **Relative Humidity** of the room. Upon tapping the **Relative Humidity** field, the device keyboard appears.

- 1 Type **58**
- 2 Tap **DONE** on the device to remove the keyboard.



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152

Perform General Evaluation Inspection – (Continued)

The Supervisor shall enter the **CFMs (Cubic Feet Measurement)** at the exhaust vent in the appropriate field.

The CFM's measurement is a **mandatory field**.

- 1 Type **24** on the device keyboard.
- 2 Tap **DONE** on the device keyboard.
- 3 The **Notes** field is optional.

NOTE: If CFM is less than (<25), **Maximo** will auto-generate a Work Order to check the roof fan, upon submission of the inspection results.

- 4 Tap **DONE**



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Perform General Evaluation Inspection – (Continued)

If there was **NO** Exhaust Fan, the Supervisor shall answer **"Is Window Operable?"** question as **YES** or **NO**.

- 1 Tap on **View Details** below the **Window Operable** field to review information entered.

NOTE: If the Supervisor answers **NO** for **Window Operable** question, **Maximo** will auto-generate a Work Order to fix the window, upon submission of inspection results.



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154

Perform General Evaluation Inspection – (Continued)

If the location is a bathroom, the Supervisor must answer the question, “Is sealant/caulking present around toilet bowl base?” as YES or NO.

- 1 Tap **NONE** and select **NO** from the **Select Response** window.

NOTE: Maximo will auto-generate a Work Order, if the answer is **NO**, to fix the caulking/sealant with mold resistant caulking, upon submission of the inspection results.

- 2 Tap **DONE**



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Probable Causes And Remediation

The third task in a series of tasks is
Task 3: Probable Causes and Remediation

- 1 Tap **INSPECT**



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Probable Causes And Remediation – (Continued)

- 1 On the top of the screen, iWM is reminding the user to select a **Probable Cause and Remediation method** for the **Walls 1, Walls 2, and the Floor**.

Those were the **Affected Areas** selected in **Task 1: Evaluation of Conditions**.

Selecting **Remediation** for all these walls is **mandatory**.

- 2 The **Wall-break** is a **Mandatory** question.

Probable Causes and Reme...
Bathroom 01

No Probable Cause and Remediation has been selected for the following areas: Floor, Wall 1 (Near), Wall 2 (Left). Please select probable cause and remediation for all areas.

* Is Wall-break required? (None)

Bathtub/Shower (None)

Caulking (None)

Exterior Wall (Winter) (None)

Façade (None)

Grouting (None)

Pipe Insulation (None)

Leak - above/beside investigate (None)

Plumbing - In unit (None)

Resident - Cause (None)



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Probable Causes And Remediation – (Continued)

- 1 On the top of the screen, iWM is reminding the user to select a **Probable Cause and Remediation method** for the **Walls 1, Walls 2, and the Floor**.

Those were the **Affected Areas** selected in **Task 1: Evaluation of Conditions**.

Selecting **Remediation** for all these walls is **mandatory**.

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Probable Causes and Reme...
Bathroom 01

No Probable Cause and Remediation has been selected for the following areas: Floor, Wall 1 (Near), Wall 2 (Left). Please select probable cause and remediation for all areas.

* Is Wall-break required? (None)

Bathtub/Shower (None)

Caulking (None)

Exterior Wall (Winter) (None)

Façade (None)

Grouting (None)

Pipe Insulation (None)

Leak - above/beside investigate (None)

Plumbing - In unit (None)

Resident - Cause (None)



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Probable Causes And Remediation – (Continued)

The **FollowUp Info** screen displays, with 4 fields:

- **Failure Class**
- **Problem Code**
- **Location**
- **Notes (Optional)**

1 Tap Failure Class

Followup Info
Addressing Cause of Mold, Mildew o... DONE

Failure Class
Please select...

Problem Code
Please select...

Location
Please select...

Notes



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Probable Causes And Remediation – (Continued)

The **Failure Class** is a very limited list.

1 Tap BATHTUBSHOWER

Select Failure Code

BATHTUBSHOWER
Bathub Shower

WALLS
Walls



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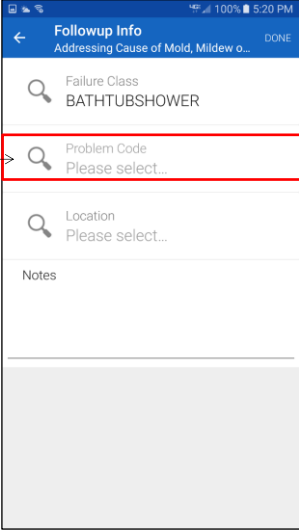


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Probable Causes And Remediation – (Continued)

The **FollowUp Info** screen reappears, select a **Problem Code** appropriate to the **Failure Class**.

1 Tap **Problem Code**





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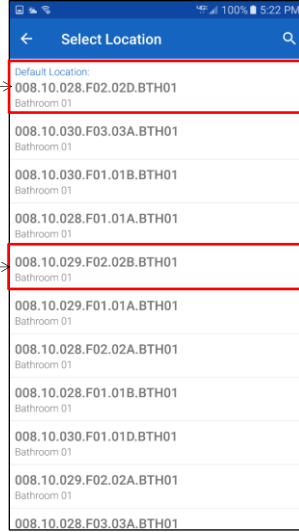


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Probable Causes And Remediation – (Continued)

1 The **Default Location** is where the inspection is happening.

2 Search for the other **Location** where it is the suspect of the problem.





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Probable Causes And Remediation – (Continued)

Depending on the wall type the **Remediation** methods can vary.

- 1 Choose what's the appropriate remedy by tapping on the different **Remediation** method.

Select Remediation DONE

- 11B Bathroom Vanities (significant mold)
Remove and dispose of cabinetry. Replace cabinetry.
- 12A Bathtub and shower grout/caulking (Bricklayer)
Where grout/caulking displays heavy and widespread levels of mold growth, dig out existing grout/caulking and replace with approved mold resistant product.
- 12B Bathtub and shower grout/caulking (Plasterer)
Where grout/caulking displays heavy and widespread levels of mold growth, dig out existing grout/caulking and replace with approved mold resistant product.
- 13 Minor mold growth (on painted surfaces, shower grout, cabinets, etc.)
Clean surfaces thoroughly using a low-toxicity household cleaner with slightly abrasive properties.
- 8 WALLS: Sheetrock with wood framing
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 next available framing member. In areas where significant water damage, mold growth, or moisture is present on sheetrock,



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Conclusion

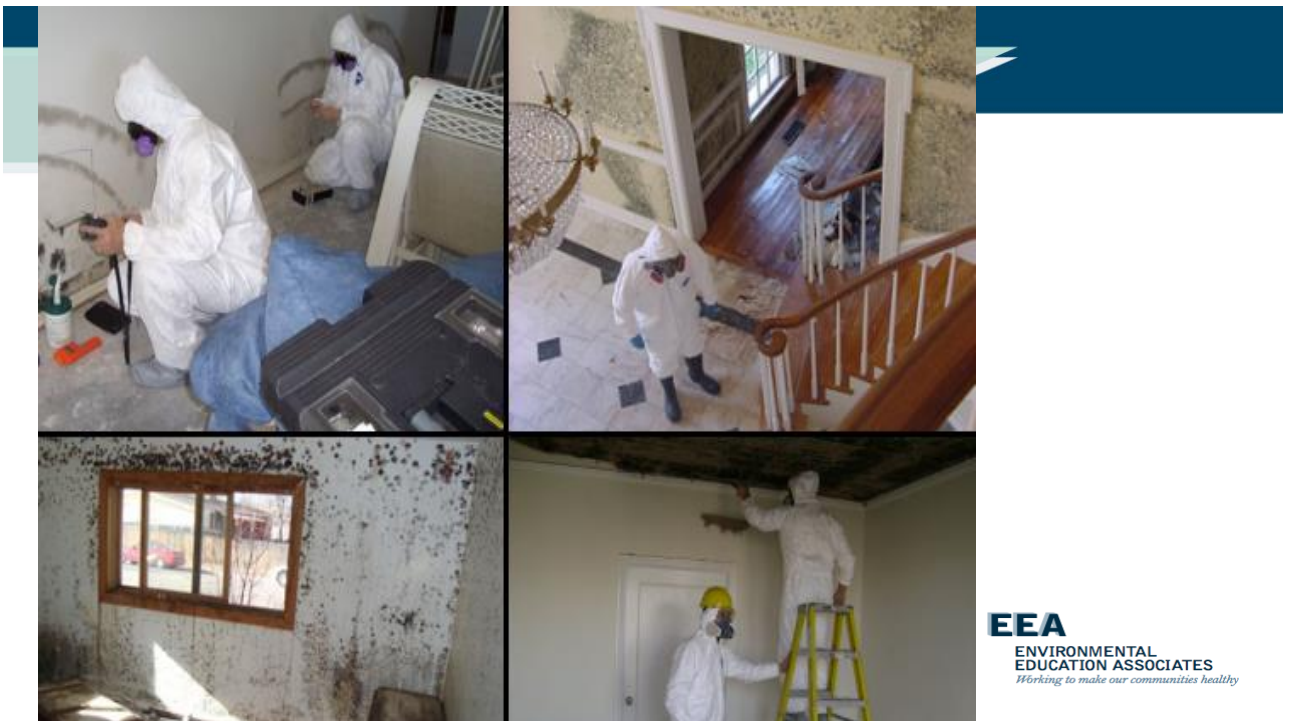
- Responsible and effective problem evaluation will depend on the skill and experience of the inspector, but will also benefit from consistent use of standard protocols that can be adapted to individual project needs. Various steps of inspection and investigation may be required, depending on the complexity and extent of the problem.
- All inspection efforts require identification of the extent and location of mold growth and determination of root cause(s).

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Remediation Overview

- [Remediation Planning](#)



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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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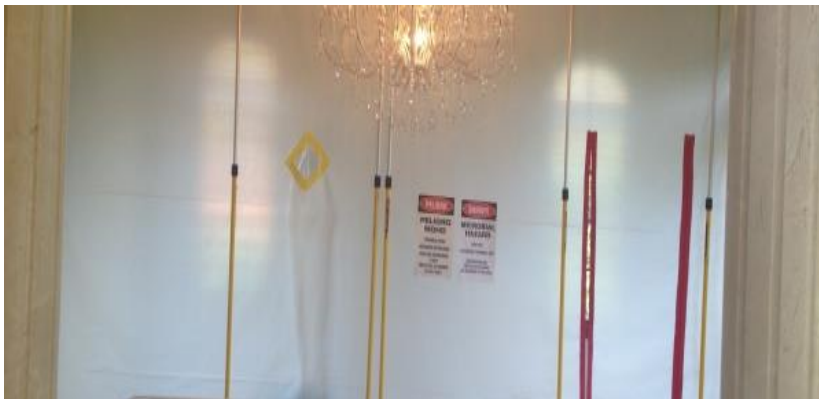
Containment

- Containment
 - plastic sheeting, duct tape
 - exhaust fan with HEPA filter
 - allow for decontamination, staging areas
- Control of Exposure
 - vacate adjacent areas as appropriate

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Containment



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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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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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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 040:18:02 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
 - Interim Guidance on Roof Fan Inspections
- Are documented with photographs



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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 – 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 – 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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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.

SP 040:18:2 – Preforming 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

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.

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.

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.

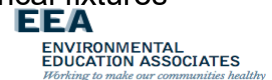


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SP 040:18:2 – Performing Work

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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HEPA Filtration

- Vacuums



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HEPA Filtration

- 99.97% efficient to 0.3 microns



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HEPA Exhaust Containment



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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 (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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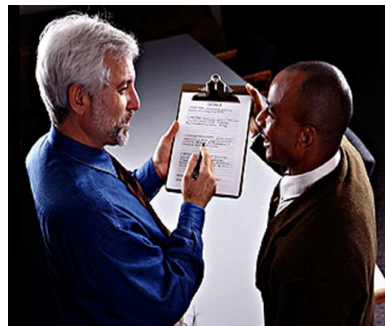
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Work Site Hazards

- **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

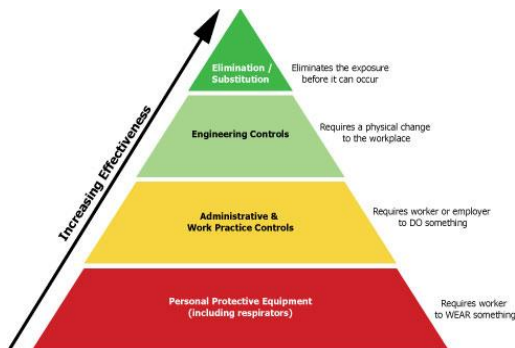


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Work Place Hazards

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

Respiratory Protection

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

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.

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Types of Respirators

- **Filter Efficiency** - selection of filter efficiency (i.e., 95%, 99%, or 99.97%) depends on how much filter leakage can be accepted. Higher filter efficiency means lower filter leakage.
- **Oil Resistance** - selection of N-, R-, and P-series filters depends on the presence or absence of oil particles, as follows: If no oil particles are present in the work environment, use a filter of any series (i.e., N-, R-, or P-series).
 - If oil particles (e.g., lubricants, cutting fluids, glycerine, etc.) are present, use an R- or P-series filter.

Note: N-series filters cannot be used if oil particles are present.

 - If oil particles are present and the filter is to be used for more than one work shift, use only a P-series filter.

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Types of Respirators

- Half Face Negative Pressure
- N100 Fitted Facepiece
- N95 Fitted Facepiece
(i.e. dust mask)



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Types of Respirators

- [NIOSH Video](#)

“A Particle is a Particle”

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Respiratory Program

- **Minimum Requirements:**

- | | |
|---|---|
| – <i>written SOP</i> | – <i>cleaning & disinfection</i> |
| – <i>MSHA/NIOSH
certified respirators</i> | – <i>respirator storage</i> |
| – <i>appropriate for
hazard</i> | – <i>inspection & repair</i> |
| – <i>training of wearer</i> | – <i>work area monitoring</i> |
| – <i>individual
respirators</i> | – <i>medical review</i> |
| | – <i>annual evaluation of
respiratory program</i> |

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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= Asbestos Containing Materials

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

PACM=Presumed Asbestos Containing Materials

- 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)**

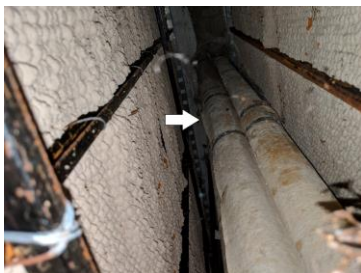


**ACM- Spackle/Joint
compound**

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ACM at NYCHA



**ACM- Pipe insulation
(T.S.I)**



ACM - Flooring

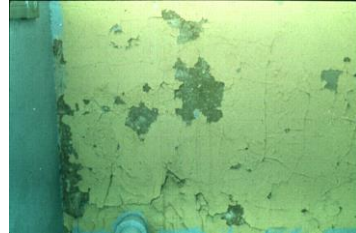
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Lead Based Paint

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

213

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

214

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.*

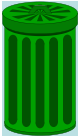
Does this pose a serious problem for exposed workers and their employers ...

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

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.

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.

222

Confined Spaces

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

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



223

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.



224

Confined Spaces

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

Don't become a statistic!



225

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



226

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.

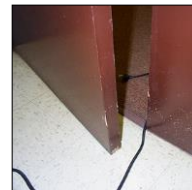


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Hazard – Damaged Cords

- 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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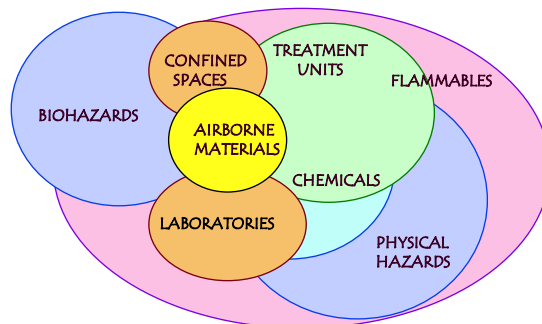
Problems With Heat

- 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**

233

Hazard Recognition

Look at the BIG picture!



234

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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Building Science for Maintenance Part 2- In Person

1

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Work Area Preparation

2

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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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

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

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 mil poly to protect them from damage and contamination

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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.

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

Work Area Prep

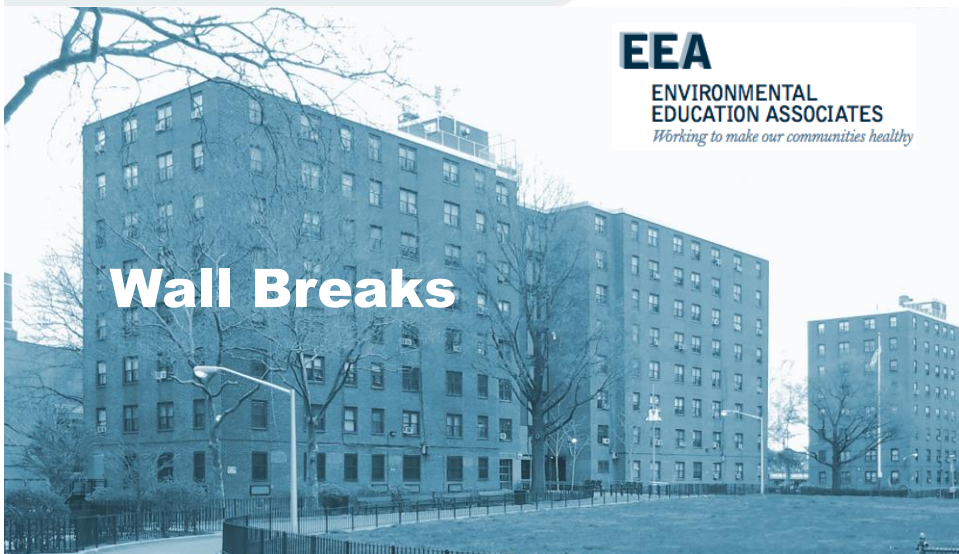
The time invested in prepping the work area is easily regained during the clean-up phase.

Mold Remediation – Containment Barrier

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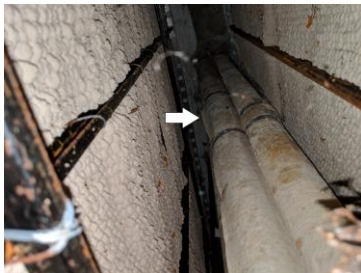
Wall Breaks

- When opening a wall to perform or prepare for repairs, staff must take the necessary precautions to protect residents and staff from mold, asbestos, and lead.
- This guidance (which supplements the wall break procedures detailed in SP 040:18:02) details the steps staff must take before, during, and after the wall break. Instructions on temporary wall closures are also included in this guidance; temporary wall closures are an important customer service practice that must be implemented until permanent repairs can be completed.
- Maintenance workers, bricklayers, carpenters, plumbers, plasterers and roofers are responsible for performing repairs that require wall breaks, and are responsible for following the below guidance.

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Asbestos Pipe Insulation



ACM Pipe insulation

- Asbestos containing thermal system insulation (TSI) may be present in wall cavities.
- Avoid disturbing and contact Tech Services if TSI is disturbed or must be disturbed

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Work Area Prep

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

Work Area Prep

After determining that a wall break must be performed, staff must immediately obtain the necessary supplies before proceeding with repairs.

Supplies include, but are not limited to:

- 6 mil polyethylene sheets
- duct tape
- a spray bottle
- a sheet of pre-cut Masonite

Work Area Prep

- Lay polyethylene sheets on all horizontal surfaces in the immediate vicinity of the wall opening and secure them with duct tape.
- **Just prior** to starting work, mist with water the surface area to be opened to reduce the amount of dust produced from the wall break.

Work Area Prep

- If you are working in a development with known lead-based paint or lead components (listed in Appendix A and B of SP 1040:18:02), polyethylene sheets should cover all horizontal surfaces in the room where the repairs occur.
- The entrance door should also be covered and weighted at the base to prevent dust from entering other rooms.
- In these developments, you should make every effort to keep the wall opening under two (2) square feet to limit the amount of dust produced.

Precautions while preforming repairs; Temporary Wall Closure

- Where possible, score painted walls with a utility knife or use a pry bar or chisel to open a glazed wall. Sawing and drilling should be avoided, if possible, as they produce significantly more dust and make containment and clean up more difficult.
- The wall opening should measure 1' by 1' when done for exploratory purposes (e.g., locating a leak), 2' by 2' for smaller repairs, and 4' by 4' for larger repairs.
- By opening the wall according to these standard sizes, staff can quickly and easily create a temporary closure using pre-cut Masonite. Developments should maintain a stock of Masonite cut in these sizes to fit the standard wall opening.

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Precautions while preforming repairs; Temporary Wall Closure

- Staff **must** make a temporary closure over the opening so that residents are not left with an open wall until final repairs can be completed. Staff should place a pre-cut Masonite sheet over the opening and screw in to secure it. The edges should be covered with duct tape to seal it.

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Precautions while performing repairs; Temporary Wall Closure

- When the wall opening is performed on a tub wall, staff must waterproof the temporary Masonite closure. Use a new piece of polyethylene sheeting to cover the affected wall from the side and top edges to the tub ledge and extend 12 inches past the corner onto the adjacent wall, securing all edges with duct tape.
- Carefully cut an opening for the tub spout and shower controls, and tape down edges as thoroughly as possible.

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Precautions while performing repairs; Temporary Wall Closure – Note!

- Staff are required to detail that a wall opening has been performed on a tub wall in the notes section of the work order. The subsequent permanent repairs must be expedited in order to prevent potential damage to apartments below. To do so, staff must also notify the development supervisor(s), who will inform the Planning Unit that the follow-up work order must be prioritized.

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Clean Up

- Once the temporary wall closure is complete, use a HEPA-filter vacuum to remove dust, then wet wipe the work area using a clean rag or moistened towel to remove any remaining dust.
- If you suspect lead is present, use a clean rag or moistened towel with lead-specific detergent to wipe down the work area.

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Common Problems: Exhaust Grill



Dirty



Closed



Not sealed

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Common Problems: Duct Shaft



Dirty

Blocked

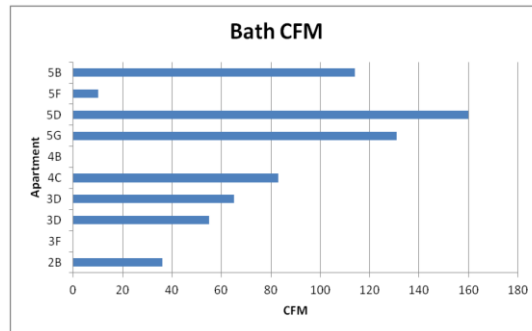


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Common Problems Imbalance

- **Over-ventilation**
 - Wastes energy
- **Under-ventilation**
 - Leads to poor IAQ and possible mold



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Solutions: Ventilation

- Clean duct shafts/branches
- Clean or replace exhaust grilles



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Instructions for Cleaning Horizontal Vent Ductwork

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

- (1) 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.
- (2) Must use caution when cleaning the fire damper inside the ductwork.



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Anemometers

- Used for measuring the speed of air flow
- Maintenance staff will measure air flow after vent cleaning



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Anemometers

- NYCHA uses **Testo Vane** instrument
- Must be set to Cubic Feet per Minute (CFM)
 - unit for Air Volume measurements.
- Must be calibrated to 15% free air



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Pipe Insulation

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Background

- When performing repairs that require a wall break and/or repairs to water/ fire system piping or heat supply lines, NYCHA has the opportunity to quickly and efficiently retrofit piping with insulation in accordance with New York City code.¹
- This Interim Guidance provides information on how to inspect and install insulation when a wall break has been performed in the course of completing a repair.
- Maintenance workers, bricklayers, carpenters, plumbers, plasterers and roofers are responsible for conducting repairs that require wall breaks and/or repairs to water piping. Thus, maintenance workers and the aforementioned trades will be responsible for following the below guidance.



45

Process Details

For repairs requiring a wall containing pipes to be opened, maintenance and applicable skilled trades staff are instructed to inspect pipes, valves and fittings exposed for the presence of insulation.

- apartment repairs - staff must inspect all domestic water pipes for insulation
- public space - staff must inspect water/ fire system piping or heat supply lines affected by the repair
- All new piping (other than waste, vent piping and heat return lines) must be insulated and any repairs that require removal of insulation must include replacing the removed insulation



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Asbestos Pipe Insulation



ACM Pipe insulation

- Asbestos containing thermal system insulation (TSI) may be present in wall cavities.
- Inspector should inspect all risers, t's and fittings both in the area and distal from the wall opening

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Toilet Supply Line



- Condensation on uninsulated toilet supply line can lead to moisture on walls and floors

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Process Details

- If there is no insulation present, staff must install insulation on all pipes, valves and fittings exposed and accessible as a result of the wall break.
- Where possible, one-inch thick insulation should be installed. If pipe spacing prevents one-inch insulation to be installed, half-inch thick insulation should be installed.

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Fiberglass Insulation

- Use the charts below to determine what size fiberglass pipe insulation to order.
- There are two charts each for different types of piping. The Copper Pipe chart is for copper piping only and the Iron Pipe chart is for most non-copper piping (Iron, Black, PVC, CPVC, Sch 40/80 etc).
- The charts list the pipe size, the outside diameter measurements of the pipe, the circumferences around the pipe, and the size to order.



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Fiberglass Insulation

FIBERGLASS PIPE INSULATION E-Z SIZE CHART FOR IRON PIPES

IRON PIPE SIZE	OUTSIDE DIAMETER	PIPE CIRCUMFERENCE	ORDER THIS SIZE
1/2"	7/8"	2-5/8"	1/2 x
3/4"	1-1/8"	3-1/4"	3/4 x
1"	1-3/8"	4-1/8"	1 x
1-1/4"	1-5/8"	5-1/4"	1-1/4 x
1-1/2"	1-7/8"	6"	1-1/2 x
2"	2-3/8"	7-1/2"	2 x
2-1/2"	2-7/8"	9"	2-1/2 x
3"	3-3/8"	11"	3 x
4"	4-3/8"	14-1/8"	4 x
5"	5-3/8"	17-1/2"	5 x
6"	6-5/8"	20-3/4"	6 x
7"	7-5/8"	24"	7 x
8"	8-5/8"	27-1/8"	8 x
9"	9-5/8"	30-1/4"	9 x
10"	10-3/4"	33-3/4"	10 x
11"	11-3/4"	36-7/8"	11 x
12"	12-3/4"	40"	12 x

FIBERGLASS PIPE INSULATION E-Z SIZE CHART FOR COPPER PIPES

COPPER PIPE SIZE	OUTSIDE DIAMETER	PIPE CIRCUMFERENCE	ORDER THIS SIZE
1/2"	5/8"	2"	5/8 x
3/4"	7/8"	2-5/8"	1/2 x
1"	1-1/8"	3-1/4"	3/4 x
1-1/4"	1-3/8"	4-1/8"	1 x
1-1/2"	1-5/8"	5-1/4"	1-1/4 x
2"	2-1/8"	6-5/8"	2-1/8 x
2-1/2"	2-5/8"	8-1/4"	2-5/8 x
3"	3-1/8"	9-3/4"	3-1/8 x
4"	4-1/8"	13"	4-1/8 x
5"	5-1/8"	16-1/8"	5-1/8 x
6"	6-1/8"	19-1/4"	6-1/8 x

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Process Details

- Owens Corning ASJ Max insulation of both sizes and related materials (or other manufactured insulation approved by Supply Chain Operations) will be available in the development storeroom for maintenance and skilled trades staff to install on water pipes of various sizes.
- The full list of insulation and related materials is included in Appendix A.
- Should they not be available in the development storeroom at the time of the appointment, staff should make a temporary closure to the wall opening using Masonite until the material is obtained at which point work may resume. **(Please follow Interim Guidance for Wall Breaks)**

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Process Details

- Maintenance workers and applicable skilled trades staff are responsible for fully inspecting the pipes exposed and accessible after the wall is opened.
- Should they find these pipes lack insulation, they must install the insulation during the course of the repair. Staff should consult the manufacturer's installation instructions for additional information.
- Staff issued with a handheld device must take a photo of the installed insulation once they have completed the installation, select the appropriate insulation remedy codes and attach the photo to the work order in Maximo.

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Process Details

- If staff finds that insulation is ripped, damaged or unsecured, staff should remove what remains of the old insulation, and then install insulation around all pipes, valves and fittings that are exposed and accessible as a result of the repair.
- In the event staff suspects existing insulation may contain asbestos, they are to report it to the development and follow the existing process for testing and abatement. Once insulation has been tested and/or abated, staff should resume installation as outlined above.

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Process Details

- Superintendents, assistant superintendents, and skilled trades supervisors are responsible for ensuring that maintenance and skilled trades staff have properly inspected pipes and installed insulation and adhered to policy and procedure outlined in this interim guidance.
- Superintendents and supervisors should review the work orders where insulation has been installed and view the attached photos to evaluate the installation.
- Additionally, superintendents and development staff are responsible for ensuring that an adequate supply of insulation is in stock, monitoring the supply, and ordering additional insulation, when necessary.

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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

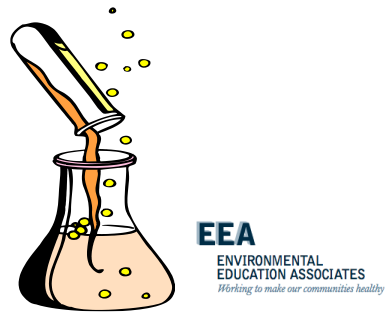


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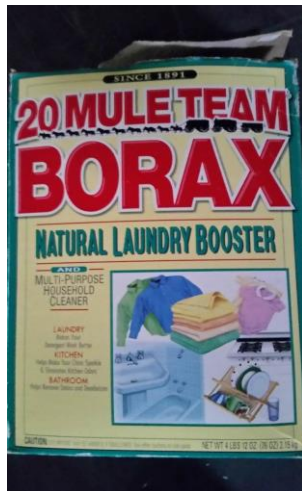
Fungicides/ Fungistats

- 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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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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Cleaning Methods

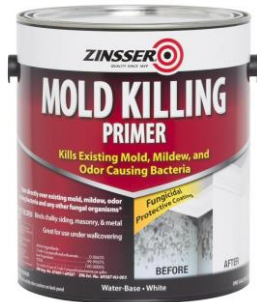
- You can clean without disinfecting
- You can NOT disinfect without cleaning



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Mold Resistant Paint



- Applied after surfaces are cleaned, disinfected & dry
- Apply per manufacturers instructions

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Anti-microbial coatings

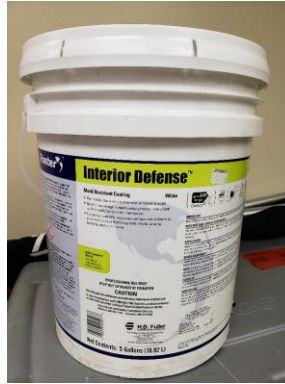
- Used to treat building materials prone to mold growth
- Applied to framing and drywall, among other substrates during new construction or after remediation
- Long term protection against mold and mildew growth.

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NYCHA Products

- Fosters 40-50 Anti-Microbial Coating



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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](#)

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.

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

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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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Simulation & Practical Scenario

- Virtual Reality
- COVID Rules
 - Don't participate if you think you might not feel well
 - Use a clean headset
 - Segregate after use so that the headsets can be decontaminated
 - Wash you hands after use.



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NYCHA MOLD TRAINING



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Outputs

- Mold in NYCHA apartments is remediated and the root causes are identified and corrected within the allowable timeframes.
- Mold recurrence is reduced

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Performance Reporting

NYCHA shall centrally assign...

Staff to review reports to identify developments with:

- High parent mold work order completion time frames.
- High rates of unfounded mold work orders.
- High reoccurrence rates for mold work orders.

Performance Reporting

NYCHA shall centrally assign...

Supervisory staff trained in mold inspections to:

- Visit developments and inspect randomly selected apartments with high rates of unfounded or reoccurring (as applicable) mold work orders.
- Report findings on the underlying issue, i.e. a building system and/or mold inspection and remediation process issue.
- Provide follow up recommendations to the regional asset manager.

Performance Reporting

- For building system issues, the supervisory staff may, for example, recommend additional repairs.
- For process issues, the regional asset manager follows up with the property manager and property maintenance supervisor to address the process issue which could include providing additional training, reviewing key accountabilities, or providing progressive discipline.

Reports

- Operations reports to be developed with the independent data analyst

Record Keeping

- The IT Business Solutions Technology Department's Maximo Team retains electronically created and stored completed work orders for at least seven (7) years

- The IT Business Solutions Technology Department's Maximo Team retains electronically created and stored completed work orders for at least seven (7) years

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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