

Health and Safety Session

Mold Remediation Lessons from Super Storm Sandy

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On behalf of AIC-CERT, AIC Emergency
Committee, FAIC, and all of the volunteers who
responded to Sandy

(Chris is singularly unqualified to be making this presentation)

Health and Safety Session
Please Note: This slideshow was
originally presented in
the Health & Safety Committee Session,
Sustaining the Conservator,
at the American Institute for Conservation's
42nd Annual Meeting on May 31st, 2014.

Chris Stavroudis
West Hollywood, California

On behalf of AIC-CEPT, AIC Emergency
Committee, FAIC, and all of the volunteers who
responded to Sandy,
Questions or comments, please contact:
HealthandSafety@conservation-us.org

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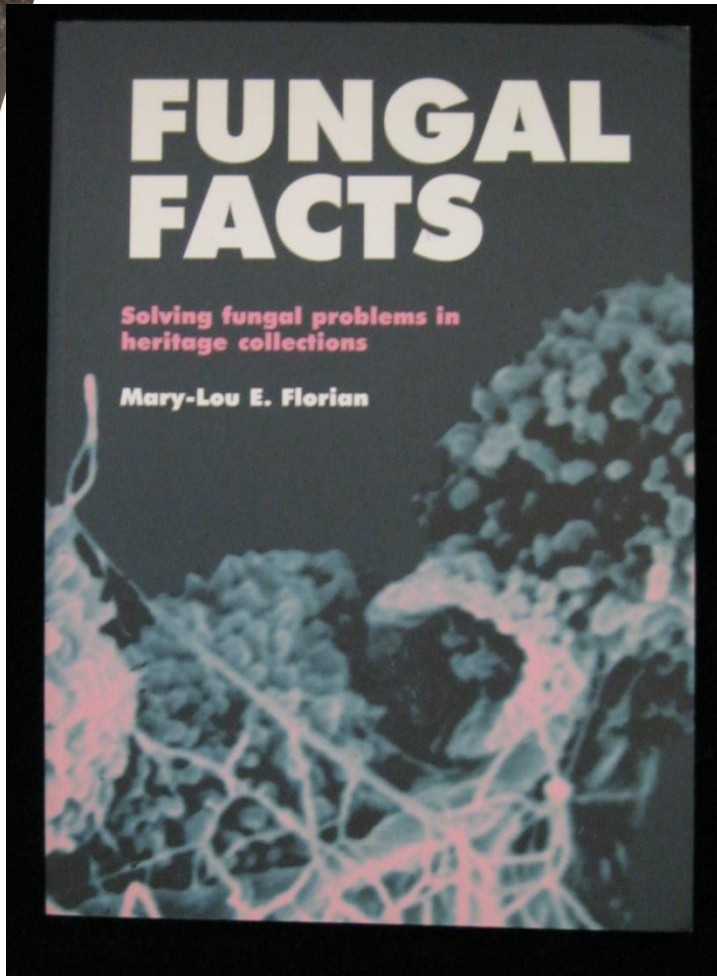
I'm No Expert

The experts:

- Mary-Lou E. Florian
- Elise Yvonne Rousseau (see her poster)

I'm not even a talented amateur. Just put different peoples' ideas together and disseminated the information.

The Bible:



By
Mary-Lou E. Florian
Published by Archetype

Superstorm Sandy

- You've all heard about it and many of you, if not most of you, witnessed it, either first hand, as responders and/or as conservators treating affected works of art.
- Massive amounts mold. Lots of affected artwork.
- AIC-CERT (AIC's Conservation Emergency Response Team) – largest response yet

Early Response

- The response of the conservation community was amazing
- Too many people to list
- I'm afraid to name any for fear of omitting someone

CRC

Cultural Recovery Center

FAIC opened the Cultural Recovery Center (CRC), an 18,000 square foot space in Brooklyn, to provide space, equipment, supplies, and volunteer expertise to assist artists and owners of damaged works to clean, decontaminate, and stabilize their paintings, works on paper, sculpture, textiles, photographs, and other objects.

What is mold?

Just had a workshop that addressed the topic very thoroughly on Wednesday.

But from our perspective, molds are basically the agents of terrestrial bio-deterioration.

If there were no mold, we would literally be knee-deep in shit and buried in leaves.

Good for getting rid of the shit, bad for the art.

What's bad about mold?

- It degrades stuff other than shit and the many other things we don't want to be knee deep in.
 - Like art, bread, bathroom grout
- Allergen
- Mycotoxins
- Really bad when it grows on us

What's good about Mold?

- That shit thing again. (Yes, it's juvenile to keep saying that.)
- Medicines – penicillin, etc.
- Mushrooms
- Many cheeses
- Huitlacoche (corn smut)
- I'm told, an illegal recreational drug

Mold can make us sick

- As a pathogen – causing disease
- As an allergen – causing the body to mount some sort of defense against the threat
 - Both mold spores and fungal bodies
- It can produce toxins

Pathogen

- Mold infecting the body
- Particularly in immunocompromised individuals
- Can be life threatening
- Can become a chronic condition
- At very least it can be really annoying (athlete's foot)

Byproducts

- Molds produce chemicals in response to stimulus from environment, defensively or metabolic byproducts or waste.
- Some of these chemicals are antibiotics – kill bacteria but not us
- Some of these chemicals are colored and stain artwork
- Some of these chemicals are toxic (mycotoxins) and can be extremely toxic
- Aflatoxins – yellow rain, etc.
- “Toxic Molds” – sick house syndrome

Why we worry about mold? Mycotoxins and disease and..

- Many if not most people have some sort of allergic response to mold or mold spores
 - Runny nose, itchy eyes or skin, tight feeling in throat
- Sensitivity varies and can change
- Hypersensitivity – some people can develop disproportionate response to allergens

Hypersensitivity

- Not a doctor (don't even play one on TV)
- Stories of people developing hypersensitivity
- Many frightening stories. The scariest I've heard:
 - Nurse working in hospital
 - Dermatitis from latex gloves – nuisance
 - Particularly gruesome treatment in ER
 - Everyone was changing their gloves repeatedly

and then...

- The nurse's body mounted a massive response to the allergen in the latex gloves
- Anaphylactic shock
- Collapsed on the floor of the ER
- Comatose for months(?) – maybe weeks
- Thereafter, the presence of a latex product in the same room would produce serious allergic response (a balloon, a pair of flip-flops)

Similar stories, similar development of hypersensitivity

Normally not as massive a response like the nurse

- Colleagues who have developed hypersensitivity to xylene. Can't be in room when a small bottle is opened for inpainting.
- I'm finally loosing my sensitivity to gasoline (after perhaps 30 years)
 - When filling my car, the rising vapors would cause any exposed skin on my chest or neck to itch and burn.

So, for us all...

- In all cases I've heard about – similar pattern
 - Minor sensitivity (runny nose, itchy skin)
- Massive overexposure
 - Nurse's being in room when her and everyone else's gloves were changed repeatedly
 - Conservator working on a massive project with lots of solvent and no (or not enough) PPE (personal protective equipment)
- Hypersensitivity developed at that incident of overexposure OR on next exposure

Don't let this happen to you

- If we don't exercise proper care when dealing with mold, this could happen to any of us.
- PPE – Personal Protective Equipment
 - Gloves (perhaps not latex)
 - Respirator – fit tested
 - Recommend using HEPA (N-95 or better) **with** organic vapor cartridge in case of mycotoxins
 - Tyvec suit with hood and booties
 - Goggles

Is enough too much?

- Honestly, we don't wear hazmat suits when cleaning bathroom grout.
- My opinion (not necessarily reflecting the advice or recommendation of AIC or H&S committee):
- Use a measured response
- When possible use engineering controls
 - Fume hood along with gloves
- PPPE– Proper Personal Protective Equipment
 - Start with gloves
 - Then FFP (filtering facepiece respirator) – not a nuisance dust mask – two straps

But wait, there's more...

- Tyvec suit to keep spores/mold fragments off skin, clothes and hair
 - Suit with hood and booties preferred
 - Don't want to track mold fragments or spores home on hair, clothes or shoes
- Eye protection – splash-proof or non-ventilated
- Half-mask respirator with HEPA/organic vapor combination cartridge

Dressing for Success and Undressing Successfully

- Steve Pine will demonstrate PPE and how to remove PPE to minimize contamination
- Best to wipe down suit with sanitizing wipes or toweling dampened with alcohol water solution

Problem of working in a disaster

- Awkward!
- How much PPE does one wear when your hosts don't (or can't) wear any.
- Judgment call on the part of each conservator
- Just how bad are the conditions.



Sometimes it's obvious that nobody should be in an environment without full PPE



...and you would do everything in your power to prevent anyone from entering an environment like this without proper protection.

I hate it when people do this

- I'm going to quote myself – the final document prepared on best practices for treating mold

First

Thanks to:

- Elise Yvonne Rousseau and her post to the CIPP list
- David Goist
- Mary-Lou Florian
- Jane Bassett
- Rustin Levinson
- Marc Williams

for their thoughts and contributions

Document produced was widely circulated – a number of the AIC listserves, MoMA artists' response blog site, WAAC Newsletter

The Basic Recipe

The following solution should offer our best chance of killing the mold with the least collateral damage.

- Contains 70% alcohol (per Mary-Lou Florian)
- 2 parts isopropyl to 1 part ethyl alcohol
- 30% water
- Hydrogen peroxide in the water (percentage as appropriate to materials and situation)

- Formula used in hospital surgical rooms
- Provided by Elise in a post to the CIPP-listserve
- A bit of an arithmetic error which we fixed
- Molds have evolved to be resistant to many fungicides. Even chlorine is less and less effective.
- Don't use thymol or other fungistats/fungicides – it just annoys them

Elise's example

- Bathroom mildew
- Clean with chlorine-based bathroom product
- Kills surface flora – fruiting bodies
- Doesn't kill fungus below surface – mycelium and hyphae have become resistant and hardy
- Selects individuals that are more resistant to chlorine bleach
- Put more energy into refruiting
- Back in a short time, just as vigorous and disgusting as before and less susceptible to chlorine bleach

Fungicidal Spray

No residual activity

- In a response environment (and in general) we use materials available from drugstore
- To make 100mL of mixture
 - 44 ml 91% isopropanol rubbing alcohol
 - 30 ml 70% ethyl alcohol rubbing alcohol
 - 7 ml 3% hydrogen peroxide
 - 19 ml distilled water

To make 1 gallon

- 48 oz of 91% isopropyl alcohol
- 32 oz of 70% ethyl alcohol
- 8 oz of 3% hydrogen peroxide
- 20 oz of distilled water

(Final amount of hydrogen peroxide is 0.2%)

Even easier – based on bottles purchased at drugstore

- 3 16 oz bottles (or 1 ½ 32 oz bottles) of 91% isopropanol rubbing alcohol
- 2 16 oz bottles 70% ethyl alcohol rubbing alcohol
- ½ 16 oz bottle 3% hydrogen peroxide
- 1 ¼ 16 oz bottles (measured in one of the empties) distilled water

Drugstore shelf



70% ethyl rubbing alcohol

91% isopropyl rubbing alcohol

3% hydrogen peroxide

Spray onto surfaces

- Use plastic garden sprayer
- All parts that come into contact with solution should be plastic as metal can cause hydrogen peroxide to decompose into water and oxygen
- Sprayer - not the cheapest, but doesn't have to be expensive
- Very happy with ~\$35 sprayer
- Not so happy with ~\$15 sprayer

Light mist

- Need to just dampen surface to kill mold
- Don't want to soak surface
- We are conservators after all
 - consider what the solution might do to substrate
 - consider what untreated mold might do to substrate
 - act/treat appropriately

Sprayer (not the one I particularly liked)



Note that I've written the recipe on the side of the sprayer.

Treatment Protocol

- First spray with alcohol / H₂O₂ mixture
- Allow surface to dry after misting
- If surface is still damp, alcohol solution will help it to dry faster
- Recommend spray before moving
- Poly wrap if necessary
- Move to containment area for treatment
- Wouldn't hurt to spray again
- HEPA vacuum
- Spray again, perhaps a couple of times
- HEPA vacuum again, very thoroughly and carefully

HEPA Vacuum

- Nilfisk is the gold standard (with HEPA filter – they sell the vacuum without the final filter housing on top)
- If HEPA isn't good enough for you, you can get an ULPA
- Other HEPA vacuums
 - Need to have vacuum bag to collect dust (bagless is bad)
 - Need to have tight fitting HEPA filter

Spraying to get mold under control



Karen Yeager
spraying down
a basement
storage area
with 70%
isopropanol at
Westbeth
(before we had
recipe above)

Careful where you spray!

Electrical
Outlet!

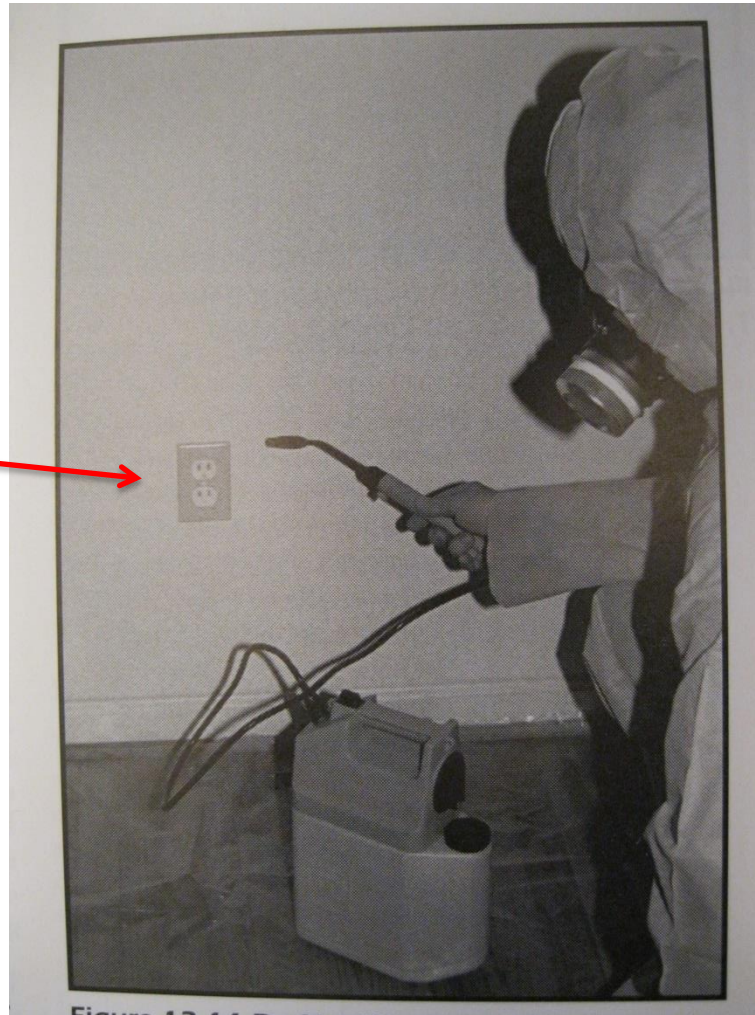
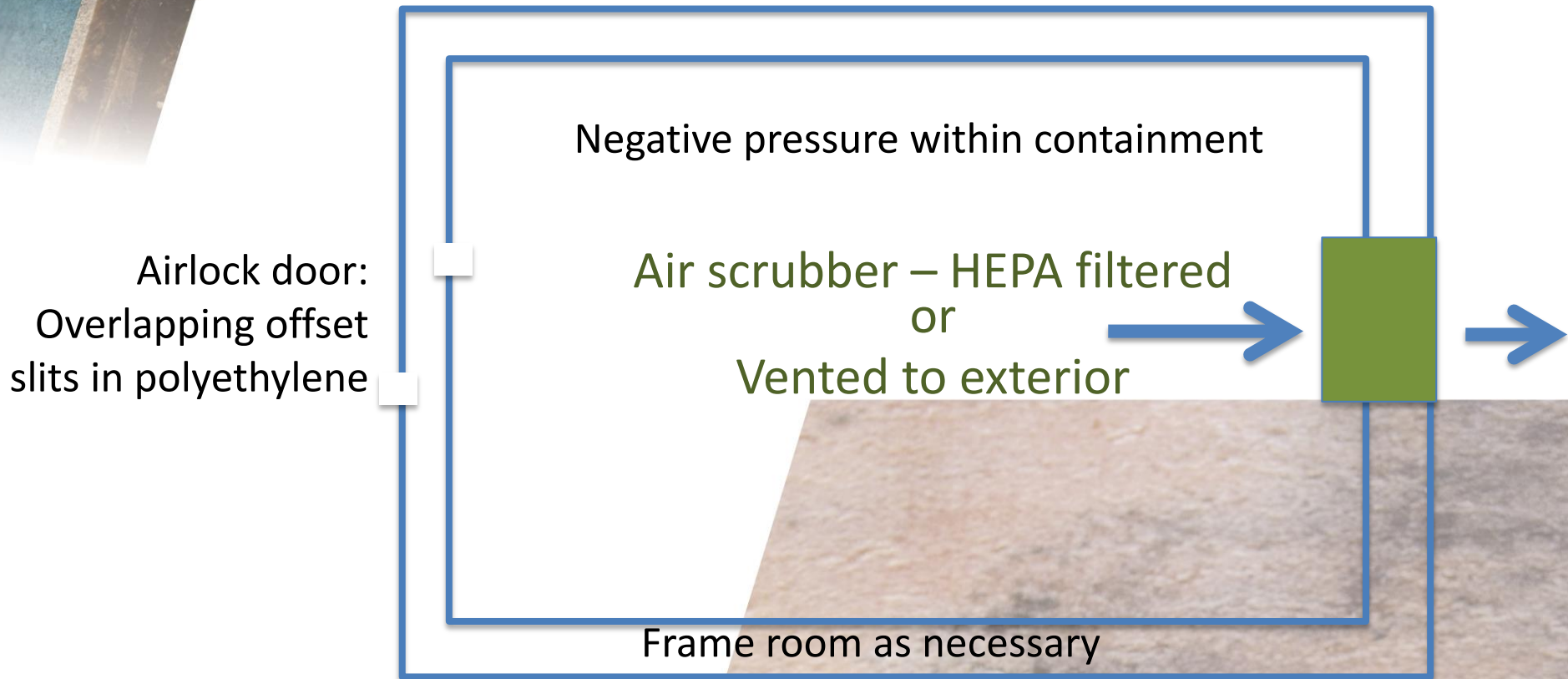


Figure 12.11

Double walled containment

Two layers of heavy polyester film
Inner and outer wall



CRC (Cultural Recovery Center) before treatment



Hanging Polyethylene Sheets In CRC











Inside



Air scrubber

Done



After containment built but before being used. (Showing Door)



Work in containment room



Actually -

- CRC had two containment spaces
- Storage rack for untreated paintings
- Treatment space

Treating non-art wood associated with artwork

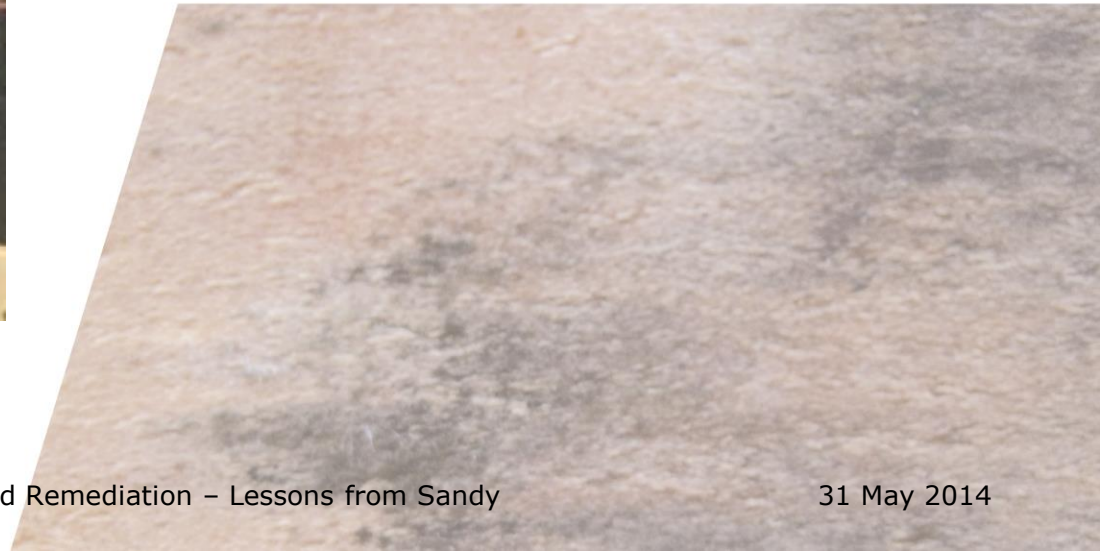
- Brush with dilute shellac in alcohol (best – super blonde dewaxed shellac flakes dissolved by in ethanol; next commercial orange shellac – better than commercial bleached)
- 2 dilute coats – first penetrates well, second more of a surface coating
- Don't want to use water based systems – reactivate mold

Response at Westbeth





Martha Graham Archive in basement at Westbeth



At CRC

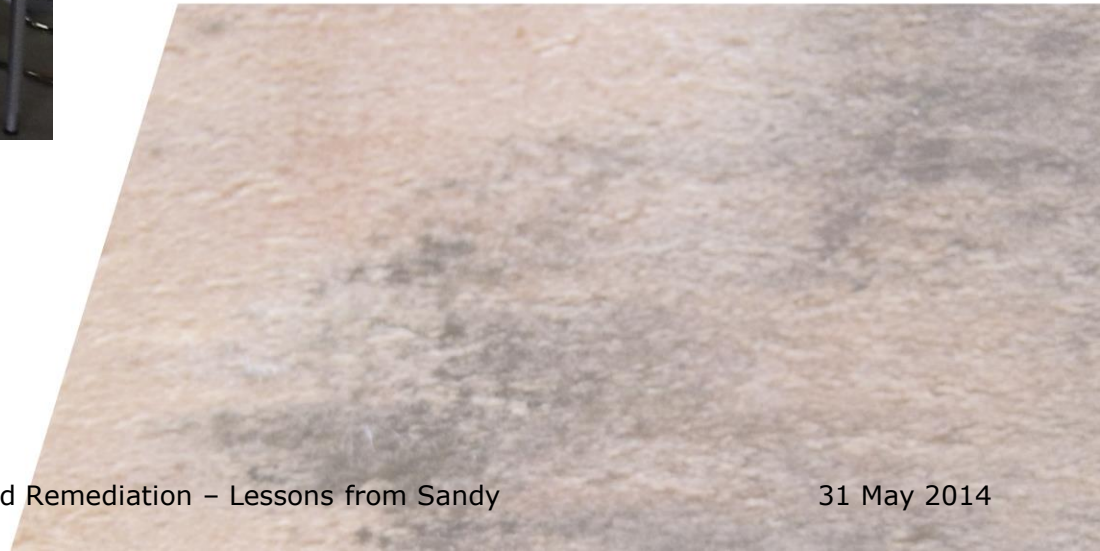
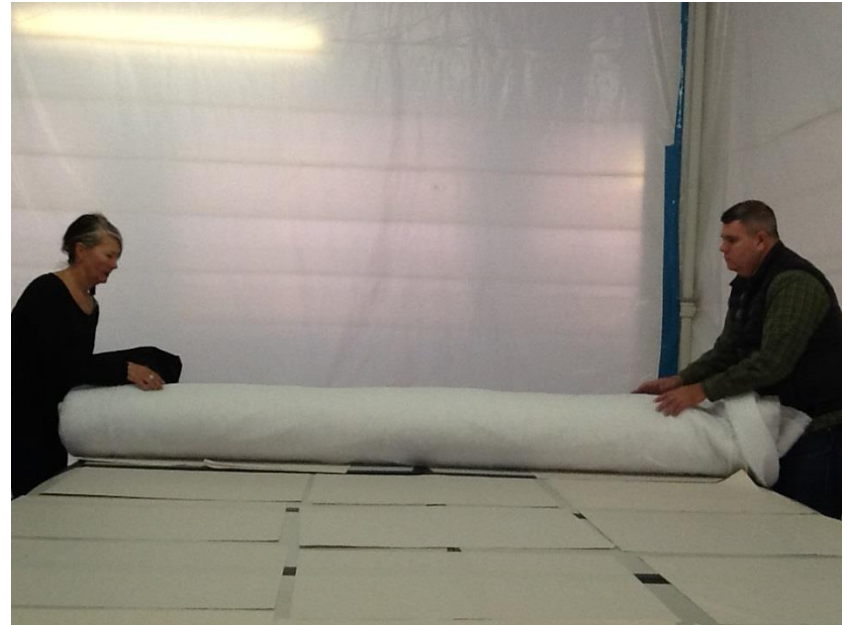




42nd Annual Meeting

Mold Remediation – Lessons from Sandy

31 May 2014



Moldy Sandy pieces even in LA



Thanks to:

- Steve Pine for demonstrating
- Steve, Andrew Robb, Jason Church, Polly Darnel and Hitoshi Kimura for sharing slides
- Steve (again), Elise Yvonne Rousseau, Jason, Andrew and Rob Proctor/Jill Whitten for helpful discussions during the preparations for this talk
- And, again, all the people who volunteered in the response to Sandy

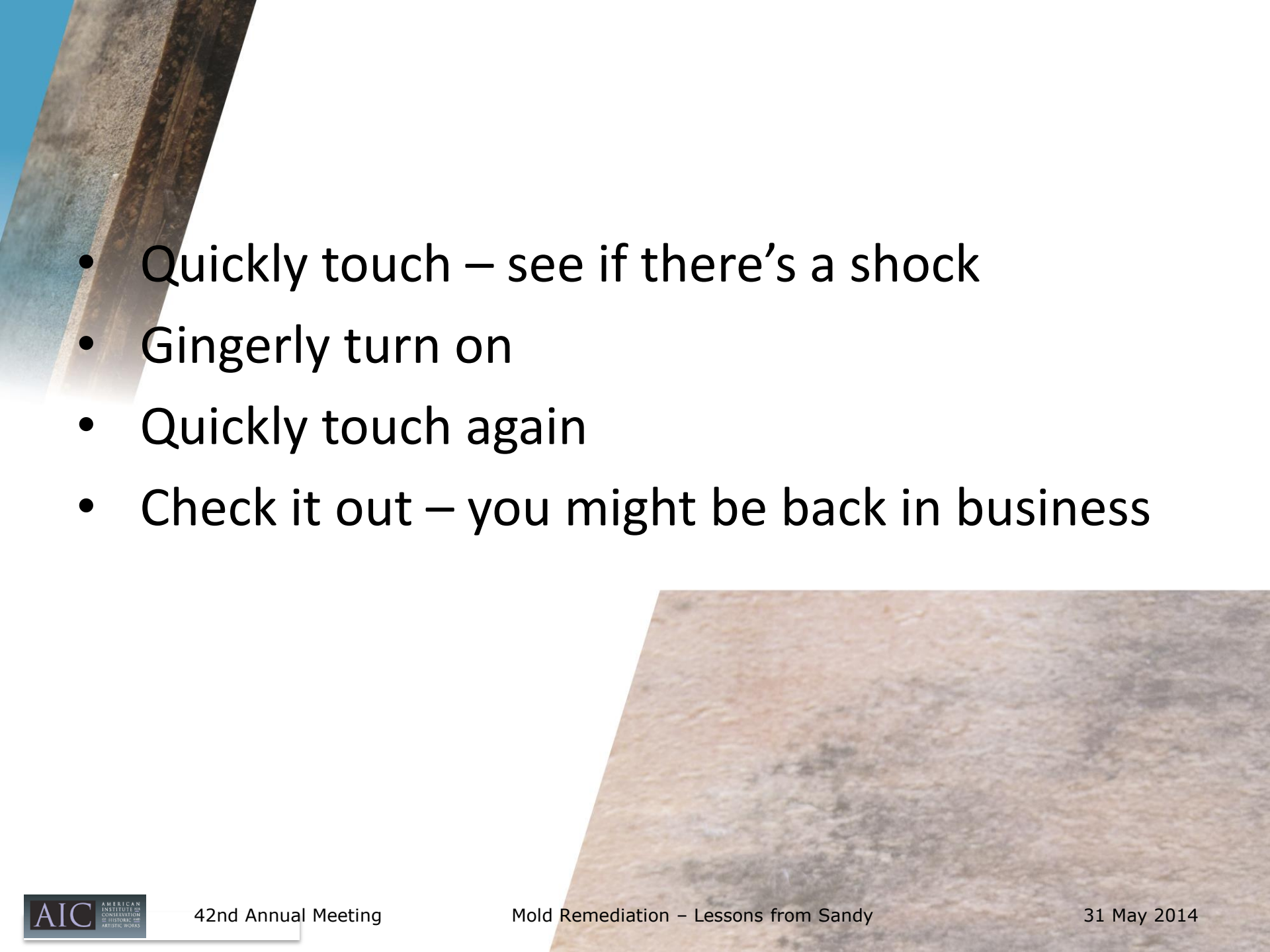
What I do know a little about Salvaging Electronics

- Have continued to develop and test since responding to question from Sandy
- Rescue of wet electronic equipment
- Tested a number of times and always (so far) works
- Unplug; remove batteries
- Don't work on anything with high voltage power supply or capacitors (CRT-based computer screens or TVs)

- Disassemble as much as possible
- Remove internal batteries (clock backup, etc)
- Remove paper components as much as possible
- Remove hard drives from computers
- Wash with copious amounts of distilled (or deionized) water
- Remove any and all traces of salts, dust and dirt

- Porous parts can be pre- or post- treated with cyclomethicone to repel water
- Blow with compressed or “canned” air
- Allow to dry – very thoroughly
- Possibly use dessicant (silica gel or rice)
- Reassemble
- Should be stable – have technician check it out when possible

- Not recommending, but if you want to start it up:
- Battery powered – not a big deal
- Line powered – be very careful
- Plug into GFCI (ground fault circuit interrupter) protected outlet
 - Don't touch!
 - See if anything blows up or GFCI trips

- 
- Quickly touch – see if there’s a shock
 - Gingerly turn on
 - Quickly touch again
 - Check it out – you might be back in business