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Vermiculite Study

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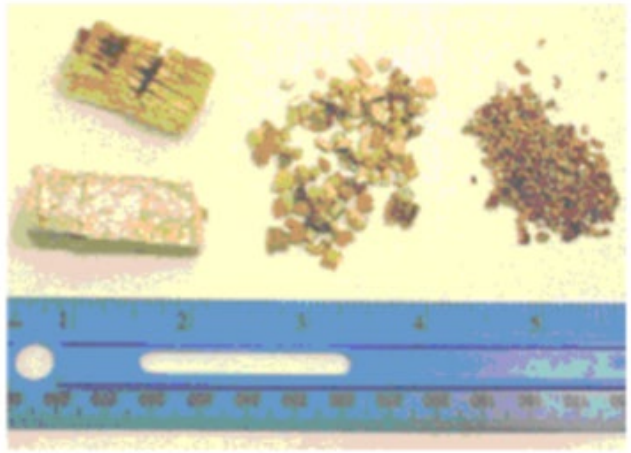
What is Vermiculite?

- Vermiculite is a naturally occurring mineral
- It expands many times its original size when heated at temperatures of 1500 to 2000 degrees Fahrenheit to form a fibrous mesh with good thermal insulation properties

Typical vermiculite insulation

Vermiculite insulation particle size relative to paper clip

Typical vermiculite insulation



Different sizes of vermiculite particles

Image Source: https://dcf.vermont.gov/sites/dcf/files/OEO/WAP/AppendixN.pdf

Vermiculite Insulation Installed Between Attic Joists

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Image Sources:
1. https://dcf.vermont.gov/sites/dcf/files/OEO/WAP/AppendixN.pdf
2. http://pearlinspection.com/vermiculite-and-asbestos-insulation/

What is the Issue with Vermiculite?

- About 70% of the vermiculite used in the US as insulation material is potentially contaminated with friable asbestos fibers (no longer used after 1990)
- There is differing guidance from states and other government organizations in how to weatherize houses with vermiculite present
  - Testing
  - Use of blower doors
  - Disturbance when weatherizing
- Uncertainty in how to safely weatherize houses with vermiculite present (worker safety and occupant safety)
- Deferral is a common end result

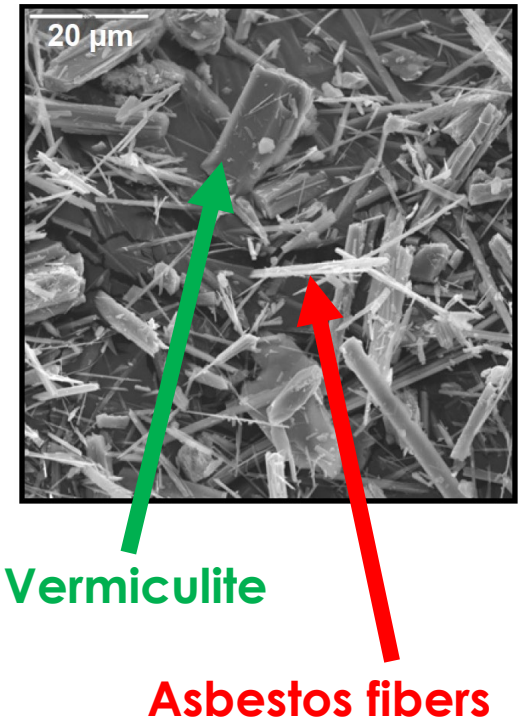


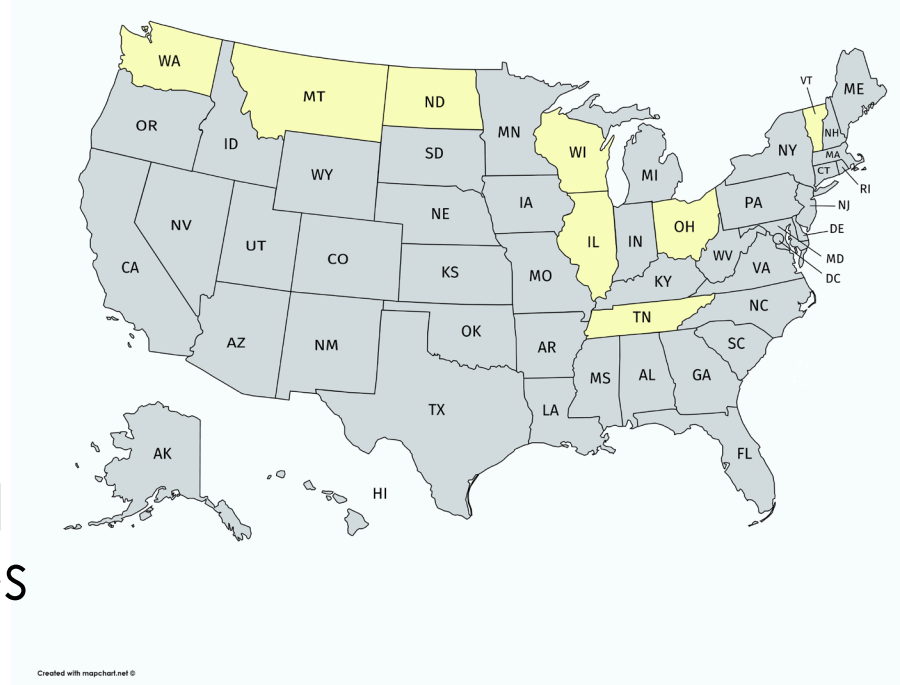
Image Source: https://www.atsdr.cdc.gov/asbestos/sites/national_map/Summary_Report_102908.pdf

Purpose – A Congressionally Mandated Study

- Quantify WAP effects on homes insulated with vermiculite
  - Discern the scope and magnitude of potential health issues posed by weatherizing such homes
  - Support the development and implementation of strategies on how to treat such homes
- Fill in data gaps for DOE
  - Asbestos levels in homes insulated with vermiculite
  - How indoor asbestos levels are impacted by diagnostic measurements (e.g., blower doors) and weatherization measures using existing approaches

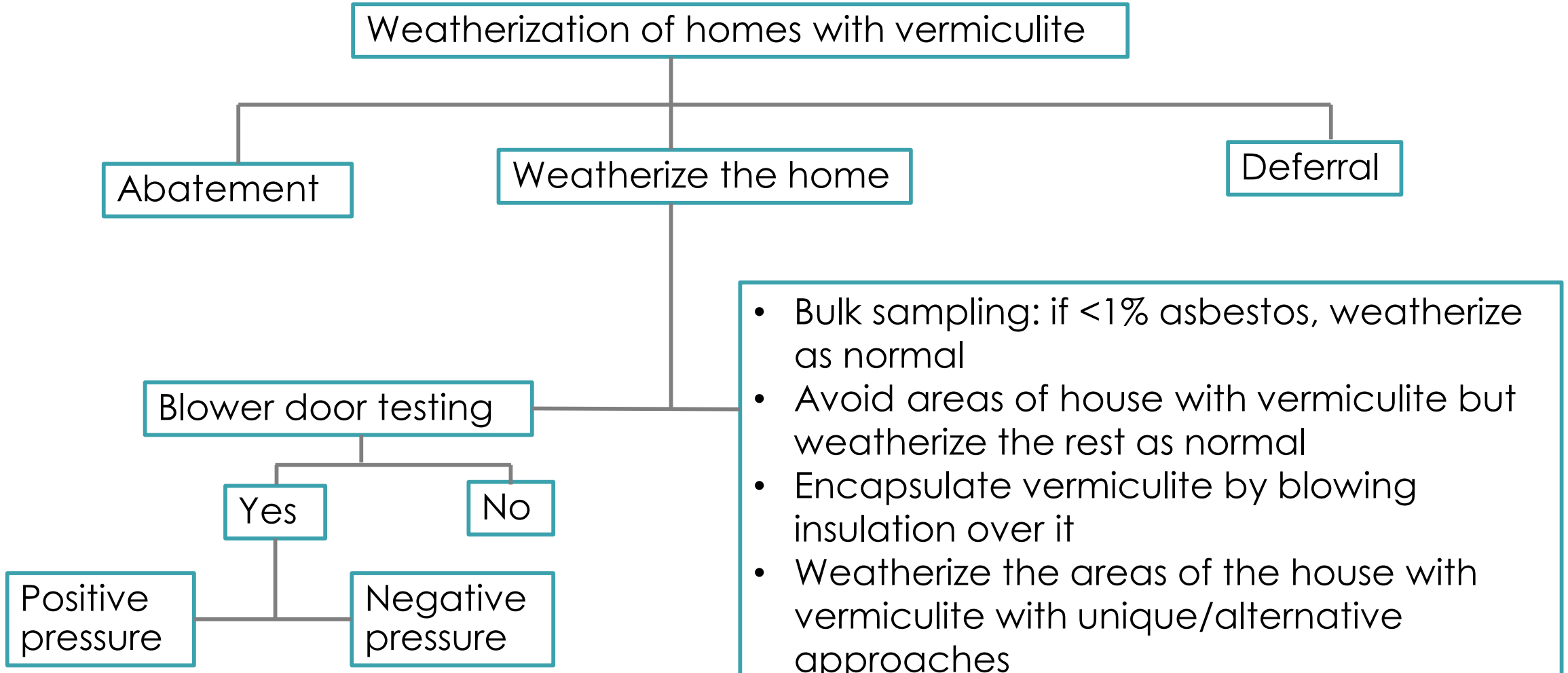
Status

- Background information obtained from states
  - State Health and Safety Plans reviewed
  - Eight states interviewed to obtain background information on current and known approaches

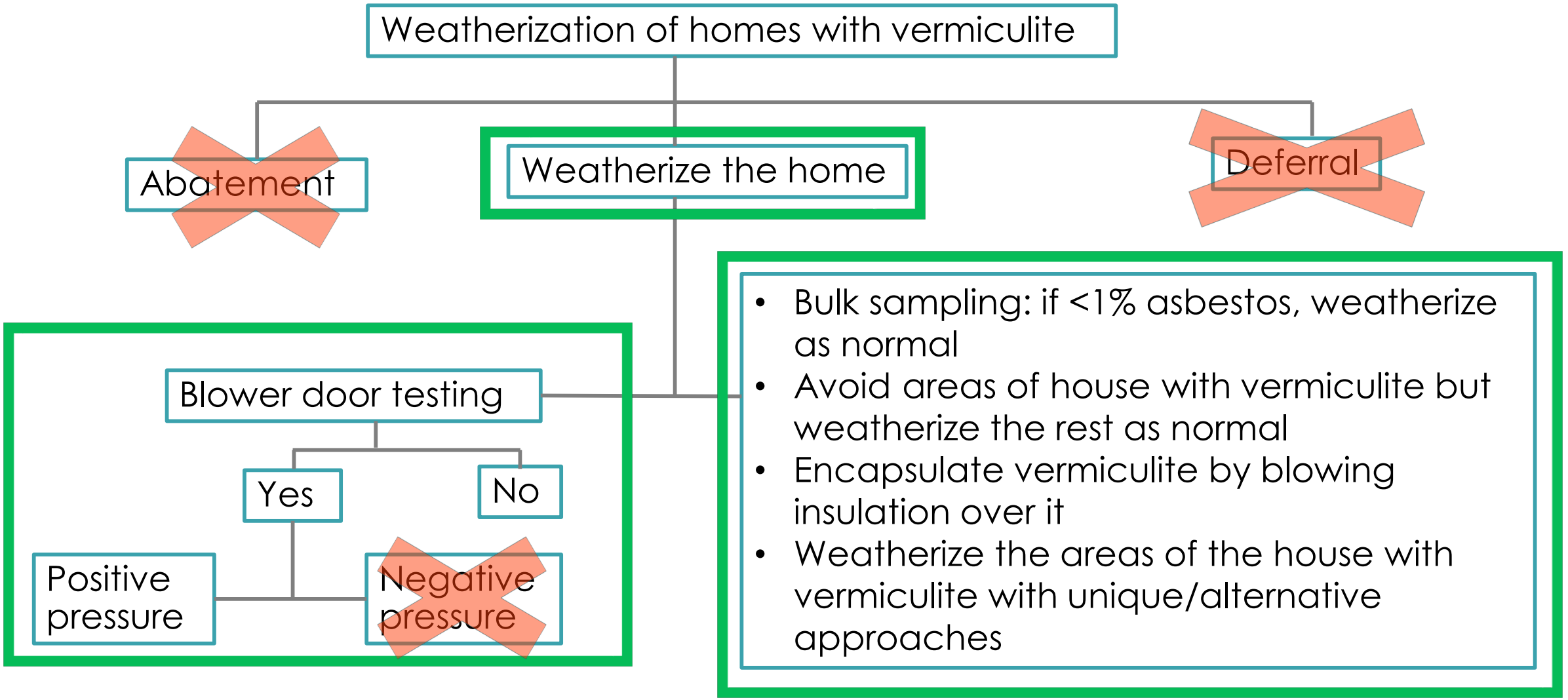


- Experimental plan developed that discusses
  - Selection and roles of participants: Grantees, Subgrantees, third-party research organizations, etc.
  - Asbestos sampling and methods
  - Analytical procedures
  - Safety protocols
  - Implementation details

Current Grantee Approaches



What Will Be Addressed in This Study



Will Potentially Work with Up to Five States

Approaches	State A	State B	State C	State D	State E
Weatherization:					
Weatherize as normal if testing indicates that the vermiculite contains <1% asbestos					X
Avoid areas of the house with vermiculite but weatherize the rest of the house as normal			X		X
Encapsulate the vermiculite by blowing cellulose or other insulation over it	X			X	
Weatherize the areas of the house with vermiculite using unique/alternative approaches		X			
Blower Door Test:					
Positive pressure blower door test	X		X		X
Negative pressure blower door test				X	

Selection of Homes

- 50 – 100 homes to be studied
  - Approaches that do not involve blower door testing:

    5 states X 2 agencies per state X 5 homes per agency = 50 home
  - Approaches using pressurized blower door test:

    3 states X 2 agencies per state X 5 homes per agency = 30 homes
- Homes will be selected as they are encountered by the Subgrantees
- Home selection criteria:
  - Single-family homes
  - Side-by-side duplexes
  - No multifamily dwellings or manufactured homes

Data Collection Will be Extensive

- Percentage asbestos in vermiculite material (**bulk sampling**)
- Percentage asbestos in settled dust on hard surfaces of living spaces (**wipe sampling**)
- Pre-weatherization airborne concentrations of asbestos(**area sampling**)
- Weatherization worker breathing zone exposure to airborne asbestos during the weatherization process(**personal sampling**)
- Post-weatherization airborne concentrations of asbestos(**area sampling**) – same locations as pre-weatherization area sampling

Bulk Sampling

- Make sure adequate personal protective equipment are being worn!
- 1-gallon Ziploc bags full of vermiculite will be collected from 3 locations at least 10 feet apart
- Zonolite Trust Fund sample collection guidelines

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Image Sources:
1. https://pksafety.com/lead-and-asbestos-removal-kit-pro-deluxe/?utm_source=google&utm_campaign=smart%20shopping%20all&utm_medium=ppc&utm_terms=&gclid=CjwKCAiAx_DwBRAfEiwA3wZYkKxfPH_sIGXjanTyF2JtQKzG-WJz-D1y-52NCSDpqngcpzGY39qZBoCpJsQAvD_BwE
2. http://pearlinspection.com/vermiculite-and-asbestos-insulation/

Wipe Sampling

- One sample collected from each area sampling location (3-5 samples)
- 'Smooth and hard' surfaces
  - Floor tiles
  - Windowsills
  - Furniture
  - Countertops
- Wet wipe sampling of 100 cm^2 (template assisted or not)
- ASTM D6480-19 Standard for sampling
- Micro Vacuum sampling standards also exist (ASTM D5755) but will not be used for this study

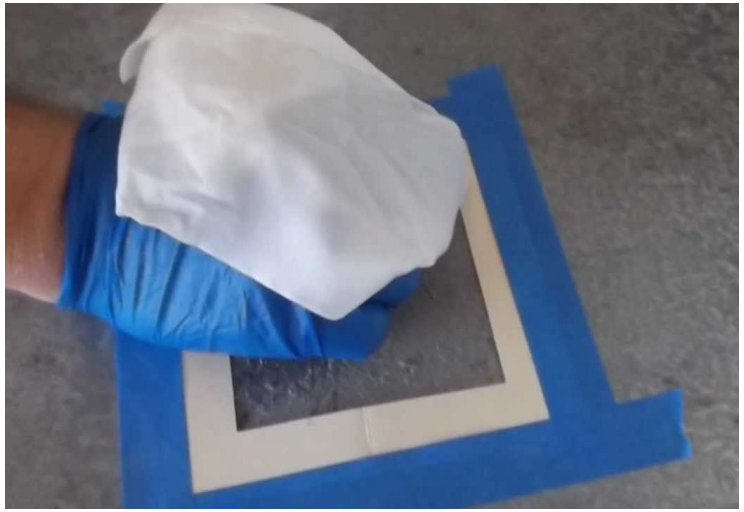

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Image Sources:

1. https://www.google.com/search?q=wipe+sampling+for+asbestos&rlz=1C1GCEB_enUS874US874&sxsrf=ACYBGNQKbOkuZ7nFJ1OLga4GpUHnDUykcw:1578952420214&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiGzf6QylHnAhVquVkKHfi0ADMQ_AUoAnoECA0QBA&biw=1098&bih=475#imgrc=y42cohShZ3EI_M:
2. https://www.skcinc.com/catalog/index.php?cPath=400000000_402000000_402000050

Area Sampling (Stationary Indoor Air Sampling)

- Continuously running pump drawing air through a filter cassette
- 3 to 5 locations (indoor only)
  - Kitchen
  - Living room
  - Bedroom(s)
  - Hallway(s)
- Sampling duration = 3.5 hours (each sampler)
- EPA AHERA method for sampling (40 CFR Part 763 Subpart E App. A)

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Image Sources:
1. https://industrialsafety.com/sensidyne-801012-100-aircon-2-dc-programmable-high-volume-pump-gilian-1-each-zefon-801012-100.html?gclid=CjwKCAiAx_DwBRAfEiwA3vwZYq9fN2VSnYDPCLAZegksVMmsxeGfMnRZB_IZKA1SanAGhCbNBoo0UhoChgYQAvD_BwE
2. https://www.mromagazine.com/2014/08/22/allegro-industries-offers-mould-lead-and-asbestos-sampling-pumps/
3. https://www.mouldlab.com.au/cassette-25mm-3-pc-.45um-5.0um-mce

Personal Sampling

- Air drawn through a filter cassette using a continuously running portable pump attached to a person
- One or more weatherization worker will be monitored
- 8 hours of total sampling time
- OSHA Standard 29 CFR 1910.1001 App B method for sampling

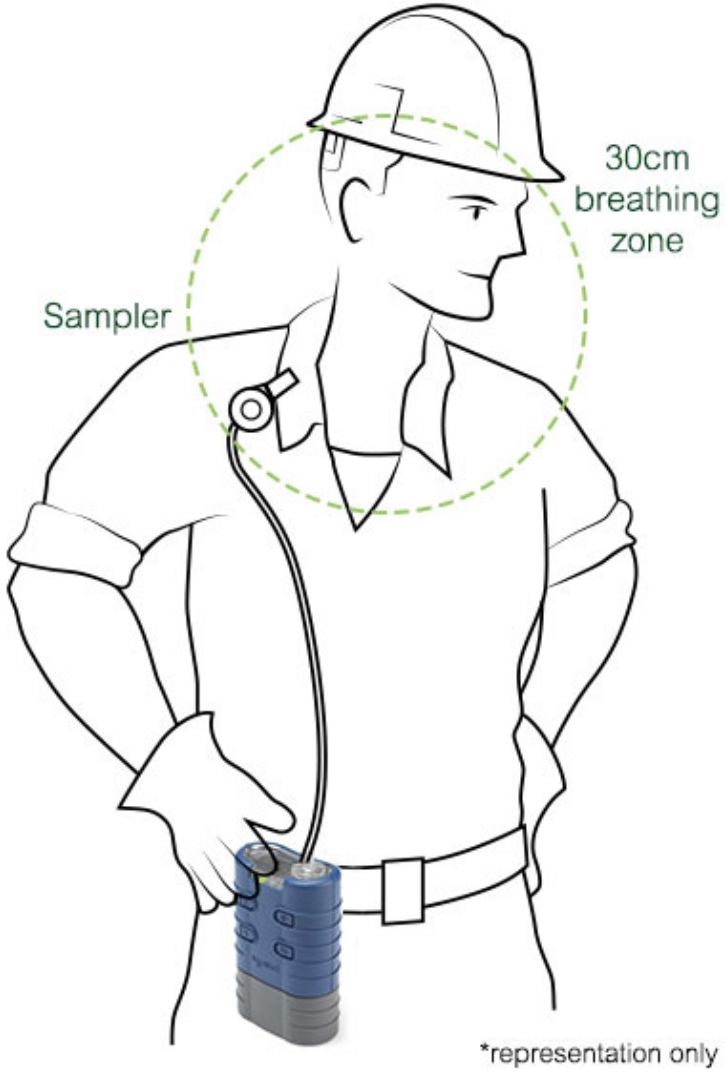

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Image Sources:
1. http://cleanlevtesting.co.uk/air-sampling.html

Laboratory Analysis of Samples

- **Laboratory accreditations**:
  - National Voluntary Laboratory Accreditation Program (NVLAP)
  - American Industrial Hygiene Association (AIHA)
- **Bulk samples**
  - Polarized Light Microscopy (**PLM**)) – EPA 600/R93/116 PLM method with milling - 400 point count method
- **Wipe samples**
  - Transmission Electron Microscopy (**TEM**) – ASTM D6480-19 Standard
- **Personal samples**
  - Phase Contrast Microscopy (**PCM**) – NIOSH 7400 method
  - **TEM** – NIOSH 7402 method
- **Area Samples**
  - **TEM** – EPA AHERA method (40 CFR §763)

Monitoring Schedule in a Single Home

Homes with blower door testing and encapsulation:

- **Day 1:**
  - Paperwork (Informed consent, forms)
  - Wipe sampling
  - Area sampling
  - Bulk sampling
- **Day 2:**
  - Blower door test/encapsulation
  - Personal sampling (if encapsulation performed)
  - Area sampling

Homes using other techniques of weatherization:

- **Day 1:**
  - Paperwork (Informed consent, forms)
  - Wipe sampling
  - Area sampling
  - Bulk sampling
- **Day 2 (+):**
  - Weatherization work
  - Personal sampling
- **Last day (day after weatherization completed):**
  - Area sampling

Project Implementation

- Grantees
  - Statewide implementation approach
  - Subgrantee selection
- Subgrantees
  - Client selection, communication, and coordination
  - Perform their standard practice weatherization work
  - Alter weatherization workflow to accommodate testing
  - Some data collection (depending on qualifications and certifications)
- Third-party research organizations/ asbestos contractors
  - Coordinate with Subgrantees
  - Perform sampling and other data collection
  - Ship samples to analytical laboratory
  - Coordinate with ORNL
- ORNL
  - Contracting
  - Training
  - Data management
  - Data Analysis
  - Report Writing

Next Steps

- Work with the ORNL Institutional Review Board (IRB)
- Implement study with two Grantees
  - Develop implementation plan and obtain consent
  - Execute necessary contracting (May/June 2020)
  - Train Subgrantees and third-party research organizations/asbestos contractors
  - Perform sampling in first house (July/August, 2020)
- Extend implementation to other states
- How can you help?
  - Other current weatherization approaches
  - New Approaches you would like to see tested
  - Interest in participating in the study

Discussion

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