To: Sara Ahern, Superintendent of Schools, Town of Barnstable
From: Marina Brock, PhD, MS, RS, GSP
Date: October 5, 2024
RE: Sample Analysis from BUE

Overview:

At your request, I conducted an initial surface tape assessment for indoor air quality (IAQ) at Barnstable United School (BUE) on Wednesday, October 2, at 12 PM. Present during the assessment were Superintendent Sara Ahern, Assistant Director of Human Resources Tammy Cunningham, Facilities Director Douglas Boulanger, Principal Michael Wojkowski, and Custodial Manager Peter Pooler. I collected 11 preliminary surface tape samples from various locations within the building, focusing on areas of concern noted by faculty and staff. Due to classes being in session, access to some classrooms was limited, but we can return at a more convenient time to complete the assessment. The primary areas of concern identified include:

- Under desk on drawers in Assistant Principal's Office (#1)
- Office floor in the administration division nurse's office (#2)
- Hallway above suspended ceiling by current Water Leak (#3)
- Two areas in large storge room off main hall and adjacent closet (Pipe wrap above drop ceiling and on top of wall hanging metal storage box (#4 and #5)
- Two areas in Kitchen (#6 and 7)
- Ceilings surfaces proximal to air delivery diffusers dining room (#8)
- Classroom Window screen (#9)
- Discolored Concrete wall surface in classroom (#10)
- Discolored area on wall near hallway trash container 2nd floor (#11)

These samples underwent microscopic analysis to identify any unusual indoor contaminants, spores, allergens, or materials taking specific note of quantities and concentrations on each sample which could be atypical to seasonally expected or standard analysis from this area.

Key Findings:

- Except for sample #5, mold spore levels were **scant to absent on all samples**, this is consistent with the typical school indoor environments I review. Common mold species detected included **Penicillium** and **Aspergillus (Pen/Asp)** which are seasonally the most prevalent outdoor spores in our area and the most common species I see. These spores are commonly found indoors entering internal spaces via open windows, doors, or entrained in HVAC systems.

- Sample #2 Taken from the floor in the nurse's office contained debris from ambient dirt (settling from indoor airflow, floating debris from open windows, or from foot traffic - shoe bottoms). Material observed under the microscope appears to be a mix of dried organic matter, food, or beverage splash/residue with embedded and expected dirt, ambient dust, and debris, likely accumulated over time.

  Once dried, the sticky nature of the original material likely acted as an adhesive, capturing additional dust and debris, creating a visual "mound" as such, eventually drying, oxidizing, and hardening. The structure and composition of the microscopic particles are consistent with dried organic liquid splatter or food remnants, as evidenced by the irregular shapes and crystalline formations with embedded fibers, and an abundance of debris mentioned in the **Airborne Particles** section below. I did not detect any recognizable spores of any kind in this sample.

- In sample #5. Taken from atop a metal cabinet in the storage room and preexisting the remediation, **Pen/Asp mold spore debris** was present, but with no signs of hyphae or viable active mold growth, indicating that this indoor environment is not currently supporting mold growth or proliferation.

- **Airborne Particles**:
  - Most, if not all dust samples contained a typical mixture of indoor materials, such as:
    - **Plant fibers/materials**: Likely introduced through clothing, shoes, indoor plants, windows, intake vents or other external sources.
    - **Pollen particles and tubule fragments**: Seasonal variations, especially during late summer and fall, explain their presence, which is common in Cape Cod's environment. Half of these samples contained a significant concentration of various types of plant, shrubs, and tree pollens and vegetation fragments.
      1. **Ragweed Pollen**: Ragweed is one of the most common allergens during this time, producing pollen from late summer into fall. It can be quite abundant on Cape Cod.
      2. **Goldenrod Pollen**: Although goldenrod is often blamed for allergies, its pollen is heavier and less likely to cause reactions compared to ragweed. However, it is still present in the area.
      3. **Grass Pollen**: While grass pollen peaks in late spring and early summer, some grasses continue to release pollen into the late summer and early fall months, depending on the specific type of grass.

4. **Weed Pollen**: Other weeds, such as plantain, lamb's quarters, and mugwort, can also produce pollen in late summer and fall.
5. **Mold Spores**: Although not a pollen, circulating mold spores increase during this time of year due to decaying plant matter and dampness, which can exacerbate allergies.

   Note: The concentration of mold spores in the OUTSIDE air can vary significantly depending on weather conditions, location, and time of day, but in the fall on Cape Cod, average mold spore concentrations of outside air typically range from **2,000 to 10,000 spores per cubic meter of air**.

   Factors like humidity, precipitation, and wind can cause fluctuations. Wet, decaying vegetation and leaf litter can increase mold spore counts during this season. On particularly damp days or after heavy rainfall, concentrations can spike, sometimes exceeding **20,000 spores per cubic meter in OUTSIDE air** especially in areas with dense vegetation or poor drainage.

- **Synthetic and natural fibers/hair**: Potential sources include clothing, furniture, paper, **soft furnishings** or **textiles,** or other like materials.
- **Insect fragments, including dust mites and droppings, diatoms**: Common in all samples but present in minimal (expected) amounts.
- **Skin cells**: These are expected in typical dust samples, more so in schools due to high occupancy.
- **Mineral crystalline** materials found in dust samples typically consist of small particles that originate from natural sources like soil, rocks, and construction materials. These particles can include:

  1. **Quartz (Silicon Dioxide)**: One of the most common crystalline minerals in dust, often derived from soil and construction sites.
  2. **Calcite (Calcium Carbonate)**: Found in dust from outdoor sources such as soil or construction debris.
  3. **Mica**: A silicate mineral that can appear in dust due to its use in construction materials and as a natural component of soil.
  4. **Clays:** Fine mineral particles from soil that can become airborne and contribute to indoor dust accumulation.

Conclusion:

From this surface sampling, the overall indoor air quality appears within normal and acceptable ranges. The presence of mold spores in any level greater than “scant/normal” background was

limited to #5, and even in this sample the spores present were in debris form and not growing or viable. These finding indicates no observed indoor viable or proliferating mold.

Recommendations:

1. **Seasonal Moisture Management**:
    - Regularly monitor and maintain the HVAC system to prevent moisture accumulation, which could promote mold growth. Vacuum face plates of ceiling components.
    - Use provided classroom air filtrations units (HEPA) as needed, work with facilities on a filter change out schedule per manufacture's recommendations.
    - Check and report any potential sources of water intrusion, particularly during seasonal changes, to prevent future increases in mold spore levels.
2. **Routine HVAC Maintenance**:
    - Regularly replace central/classroom HVAC air filters and perform routine maintenance to minimize the circulation of dust and allergens within the indoor environment.
3. **Awareness of Other Indoor Air Quality (IAQ) Sources**:
    - Various sources can impact IAQ beyond pollens, mold, and dust. Be aware of potential irritants such as:
        - **Volatile Organic Compounds (VOCs)**: Emitted by office equipment, cleaning supplies, paints, adhesives, carpets, and furniture. Exposure can cause symptoms like headaches, dizziness, nausea, and respiratory issues.
        - **Chemical Cleaners and Disinfectants**: These can irritate the respiratory system, skin, and eyes, and should be used with caution.
        - **Office Equipment (e.g., Printers, Copiers, Computers)**: These can emit fine particulate matter (PM 2.5), ozone, and VOCs, potentially causing respiratory irritation or headaches.
        - **Perfumes and Personal Care Products**: Fragrances can trigger headaches, dizziness, or respiratory symptoms in sensitive individuals.

General Considerations for Additional and Possible Mitigation Measures:

- **Regular Cleaning**: Use hypoallergenic cleaning products and maintain a environment to reduce allergens.
- **Improve Ventilation**: Ensure adequate ventilation and air filtration to maintain high indoor air quality.

- **Implement a Fragrance-Free Policy**: Consider a fragrance-free policy to minimize reactions to scented products.
- **Monitor Indoor Air Quality Regularly/Preventative Maintenance**: Routinely check and address VOC levels, potential mold growth, and dust accumulation to prevent health issues. Work with School administration and facilities as a team.

If you have any questions or need further information, please feel free to contact me.

Respectfully submitted,

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