



NORTHEAST TEST CONSULTANTS

# LIMITED INDOOR AIR QUALITY ASSESSMENT

at

**FALMOUTH TOWN HALL  
271 FALMOUTH ROAD  
FALMOUTH, MAINE**

NTC JOB #13458-2013

Prepared by:

**NORTHEAST TEST CONSULTANTS  
587 SPRING STREET  
WESTBROOK, ME 04092**

*Prepared for:*

*Glenn Harmon  
Oak Point Associates  
P.O. Box 1259  
231 Main Street  
Biddeford, ME 04005*

**February 12, 2013**



## NORTHEAST TEST CONSULTANTS

February 12, 2013

Glenn Harmon  
Oak Point Associates  
P.O. Box 1259  
231 Main Street  
Biddeford, ME 04005

RE: Limited Indoor Air Quality Assessment  
Falmouth Town Hall  
271 Falmouth Road; Falmouth, ME  
NTC Job #13458-2013

Mr. Harmon:

Please find enclosed the documentation for the Limited Indoor Air Quality Assessment conducted by *Northeast Test Consultants* on February 7, 2013 at the Town of Falmouth Town Hall situated at 271 Falmouth Road, Falmouth, Maine.

### **PURPOSE**

This assessment action was performed to determine current airborne mold spore activity for general sampling locations performed on the First Floor, Second Floor, and Attic Space.

This action was not intended to be a comprehensive investigation action, but to determine if elevated mold spore levels existing that would warrant additional evaluation and assessment actions to identify causes of mold growth and the locations of source reservoirs requiring possible remediation actions.

### **PROCEDURES**

This activity was comprised of the collection of 7 indoor air samples and 1 outdoor control.

The sampling conducted was performed in accordance with the *Environmental Criteria and Assessment Guidelines*, recommended by the U.S. EPA Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, US EPA 600/8-91/202 (ECAO-R-0315); American Conference of Governmental Industrial Hygienists (ACGIH); and the National Institute of Occupational Safety and Health (NIOSH).

***Biological Airborne Activity:***

Air samples were collected to determine indoor air quality relating to mold spores utilizing an Allergenco-D™ air sampling cassette collected for a ten-minute period at a flow rate of 15 liters per minute for a total sample volume of 150 Liters.

The Allergenco-D™ Air Sampling style cassette is a sampling device designed for the rapid collection and analysis of a wide range of airborne aerosols. These include fungal spores, pollen, insect parts, skin cell fragments, fibers, and inorganic particulates.

**OVERVIEW of SAMPLING DATA**

**Biological Airborne Activity:**

Airborne biological sampling indicated total mold spore levels indoors ranging from 340 - 32,340 ct/m<sup>3</sup>.

The outdoor mold spore level was <53 ct/m<sup>3</sup> (no spores detected) at the same time of sampling indicating that spore activity detected indoors other than the common outdoor isolates typically present outdoors (*Ascospores*, *Basidiospores*, and *Unknown Dematiaceous spores*) is due to indoor sources.

The species detected indoors that are contributed to indoor source growth were comprised of *Aspergillus/Penicillium-like* spores detected at 11,000 - 32,000 ct/m<sup>3</sup> for Sample A-2 (General Office Area) and A-3 (Lobby) collected on the First Floor of the original building section, as well as *Cladosporium* spores at 1,500 ct/m<sup>3</sup> detected in sample A-3 (Lobby).

Currently there are no regulatory levels for mold spore activity, but most persons typically do not have any adverse reactions to general environmental mold spore levels <5,000 ct/m<sup>3</sup>.

The most recent research by the various organizations indicate that *Aspergillus* /*Penicillium sp.* spore activity for indoor environments can be expressed as follows:

“Clean” residential buildings	Typical levels: 230 ct/m <sup>3</sup> +/- 630
Buildings with flooding/water damage	Typical levels: > 2,200 ct/m <sup>3</sup>
Mold-damaged buildings	Typical levels: > 36,000 ct/m <sup>3</sup>

Normal indoor levels of *Cladosporium* spores are typically < 500 ct/m<sup>3</sup>.

Of note is that no *Chaetomium*, *Fusarium*, *Memnoniella*, *Stachybotrys*, or *Trichoderma* mold species were identified in the indoor air environment at the time of this testing. These species are indicators of long-term and ongoing moisture issues and/or water intrusion problems. *Chaetomium*, *Fusarium*, *Memnoniella*, *Stachybotrys*, or *Trichoderma* mold species are organisms that are zero tolerance organisms for the indoor environment as they have the capability to produce mycotoxins and microbial volatile organic compounds (mvoc's) and can seriously compromise a building and/or the health of occupants. These effects for human health can be worse for immuno compromised persons (such as those with HIV, the elderly, terminally or seriously ill patients (cancer patients)), persons with pre-existing breathing conditions or asthma, and the very young.

*Refer to attached analytical data sheets for reference as the type and frequency of mold spore species detected during this sampling event.*

## **SUMMARY of FINDINGS**

The detection of elevated *Aspergillus/Penicillium-like* and moderate levels of *Cladosporium* spores in samples A-2 and A-3 indicate that sources of moisture in the presence of suitable nutrient sources is causing mold growth occurrence in the structure.

The limited nature of this assessment action does not allow adequate information so as to provide information regarding the cause of moisture influences and the locations of source reservoirs in order to provide recommendations for corrective and remediation actions at this time.

The levels of *Aspergillus/Penicillium-like* and *Cladosporium* spore activity can create an environment in which persons can create cold-like symptoms and individuals can experience upper respiratory issues such as stuffy nose and minor throat irritations. These symptoms typically do not persist for an extended period of time for normally healthy individuals upon vacating the impacted spaces; however persons with specific allergies, or pre-existing asthma or other breathing conditions may experience more intense temporary symptoms.

The mold species isolated indoors during this investigation may be causative agents for such symptoms as headaches, dizziness, sleepiness, general lethargy, coughing and watery eyes. Similar symptoms may also occur because of other indoor air pollutants or other common medical problems.

A medical professional should be consulted for a proper medical diagnosis for any persons experiencing such symptoms.

## RECOMMENDATIONS

1. Immuno compromised persons (such as those with HIV, the elderly, terminally or seriously ill patients (cancer patients)), persons with pre-existing breathing conditions or asthma, and the very young should limit their time in the First Floor area of the original structure.
2. It is currently hypothesized that the First Floor area of the original structure is not the actual source of detected spore activity but may be due to Crawl Space condition influences.
3. Further evaluation actions comprised of a through physical assessment of the First Floor area of the original structure and Crawl Space, moisture evaluations, and additional airborne and possible surface sampling actions are required to determine cause of activity and to provide recommendations for corrective actions and remediation actions.

---

The findings relating to physical conditions observed during this investigation were not intended, nor do they attempt to identify every possible source of contaminants, such as chemical or mold, throughout the entire structure.


Any measured results, analysis data, and physical conditions observed are valid only for the period in which this inspection was conducted. Any additional degradation of building materials or contamination from new or reactivated sources, or areas inaccessible at the time of the inspection are not documented in this report.

Historical events or ambient air conditions that may have existed in the past cannot be correlated in any way with the enclosed data. No warranty, real or implied, is made as to what was or is the exact cause or source that may have adversely affected the indoor air quality in the past.

Please review the enclosed analytical sampling data, interpretation of mold activity, explanation of isolates identified, and marked drawing.

Should you have any questions regarding this report, please feel free to give me a call.

Sincerely,



John M. Boilard, RIHT  
Operations Manager

Attachments

# MICROBIOLOGICAL SAMPLING DATA

Oak Point Associates  
 Falmouth Town Hall  
 271 Falmouth Rd  
 Falmouth, Maine

Sample Date: February 7, 2013  
 Sample Type: Air Sample  
 Volume: 150 Liters  
 Device: Allergenco-D Cassette™

ID #	Sample #	Location	Raw Count	Count/m <sup>3</sup>	IDENTIFIED ISOLATE
A-1	IHA3038004	Outside Control Ambient Air	0	<27	Total Mold Spore & Fragments
			0	<27	None Detected
A-2	IHA3038005	Level 1; General Office, Centered Ambient Air	1,216	32,430	Total Mold Spore & Fragments
			1,200	32,000	Aspergillus/Penicillium-like
			7	190	Smuts/Myxomycetes/Periconia
			5	130	Mycelial Fragments
			4	110	Unknown Dematiaceous Spores
A-3	IHA3038006	Level 1; Lobby Ambient Air	511	13,323	Total Mold Spore & Fragments
			2	53	Ascospores
			425	11,000	Aspergillus/Penicillium-like
			10	270	Basidiospores
			55	1,500	Cladosporium
			5	130	Smuts/Myxomycetes/Periconia
			8	210	Mycelial Fragments
			6	160	Unknown Dematiaceous Spores
A-4	IHA3038007	Level 1; Food Pantry, Corridor Ambient Air	19	500	Total Mold Spore & Fragments
			3	80	Aspergillus/Penicillium-like
			11	290	Cladosporium
			5	130	Unknown Dematiaceous Spores

**KEY:** Count/m<sup>3</sup> = Total Count per cubic meter of air

The *National Allergy Bureau* has established relative exposure guidelines with respect to the raw count of mold spores per cubic meter of air. These values are not related to any specific medical condition but rather alert sensitive or allergy stricken individuals when to avoid prolonged exposures.

Those guidelines are as follows:

Allergen	Very Low	Low	Medium	High	Very High
Mold	Less Than 500 Spores /M <sup>3</sup>	500-1000 Spores /M <sup>3</sup>	1000-5000 Spores /M <sup>3</sup>	5000-10,000 Spores /M <sup>3</sup>	Greater Than 20,000 Spores /M <sup>3</sup>

The results should be correlated with any available medical evidence of infections, allergies or symptoms of individuals occupying the space.

Analytical Lab: Northeast Laboratory Services

# MICROBIOLOGICAL SAMPLING DATA

Oak Point Associates  
 Falmouth Town Hall  
 271 Falmouth Rd  
 Falmouth, Maine

Sample Date: February 7, 2013  
 Sample Type: Air Sample  
 Volume: 150 Liters  
 Device: Allergenco-D Cassette™

ID #	Sample #	Location	Raw Count	Count/m <sup>3</sup>	IDENTIFIED ISOLATE
A-5	IHA3038008	Level 2; Community Programs  Ambient Air	14	370	Total Mold Spore & Fragments
			5	130	Aspergillus/Penicillium-like
			2	53	Basidiospores
			5	130	Cladosporium
			2	53	Unknown Dematiaceous Spores
A-6	IHA3038009	Level 2; Reception Area  Ambient Air	59	1,600	Total Mold Spore & Fragments
			45	1,200	Aspergillus/Penicillium-like
			2	53	Cladosporium
			3	80	Mycelial Fragments
			9	240	Unknown Dematiaceous Spores
A-7	IHA3038010	Level 2; Secretary Area  Ambient Air	27	720	Total Mold Spore & Fragments
			8	210	Aspergillus/Penicillium-like
			4	110	Basidiospores
			10	270	Cladosporium
			2	53	Smuts/Myxomycetes/Periconia
			3	80	Unknown Dematiaceous Spores
A-8	IHA3038011	Attic, Centered  Ambient Air	13	340	Total Mold Spore & Fragments
			2	53	Aspergillus/Penicillium-like
			3	80	Basidiospores
			5	130	Cladosporium
			1	27	Mycelial Fragments
			2	53	Unknown Dematiaceous Spores

**KEY:** Count/m<sup>3</sup> = Total Count per cubic meter of air

The *National Allergy Bureau* has established relative exposure guidelines with respect to the raw count of mold spores per cubic meter of air. These values are not related to any specific medical condition but rather alert sensitive or allergy stricken individuals when to avoid prolonged exposures.

Those guidelines are as follows:

Allergen	Very Low	Low	Medium	High	Very High
Mold	Less Than 500 Spores /M <sup>3</sup>	500-1000 Spores /M <sup>3</sup>	1000-5000 Spores /M <sup>3</sup>	5000-10,000 Spores /M <sup>3</sup>	Greater Than 20,000 Spores /M <sup>3</sup>

The results should be correlated with any available medical evidence of infections, allergies or symptoms of individuals occupying the space.

Analytical Lab: *Northeast Laboratory Services*



## MOLD INTERPRETATION

Molds can be detected both indoors and outdoors year round. Ideal conditions for the proliferation of molds are humid environments, typically in basement/crawl spaces, bathrooms, and water compromised building materials.

Mold spores are considered a normal and essential component of all environments. Typically three key conditions are necessary for the proliferation of mold spores: a favorable physical environment (light & temperature), a source of food, and moisture.

Mold spores are almost always found in outdoor air, although their type and population will vary depending on environmental and climatic conditions. Doors and windows, mechanical ventilation equipment, and everyday foot traffic provide easy access to the interior of buildings.

It is normal to find some quantity of mold spores in indoor air, although their numbers should be significantly less than outdoor levels.

*Currently, there are no regulatory standards for acceptable levels of mold spores in bio-aerosols, wipes or bulk samples derived from the indoor environment for interpreting health risks associated with molds.*

The sampling analysis data provides a medical professional the information necessary to determine the appropriate treatment for individuals with chronic lung disease, persons who are immune compromised, or for individuals with allergies or exhibiting other symptoms relating to upper respiratory complaints.

Current recommended guidelines in the *US EPA's* publication, *Indoor Air Quality in Schools*, suggests that fungal spore species identified in samples collected from the indoor environment should not be different than those species found in the outdoor air at the same time of sampling. Also, fungal spore activity present in the indoor environment should be at levels of one-third to one-half of those found outdoors. Indoor levels of similar genera higher than one-third to one-half of outdoors may indicate inadequate fresh air exchange or poor air filtration. Fungi identified indoors that are of different genera than found outdoors may indicate contamination of interior building materials and substrates.

*Chaetomium, Fusarium, Memnoniella, Stachybotrys* and *Trichoderma* are **zero tolerance organisms** for the indoor environment as they have the capability to produce mycotoxins and microbial volatile organic compounds (mvoc's) and can seriously compromise a building and/or the health of occupants. These effects for human health can be worse for immuno compromised persons (such as those with HIV, the elderly, terminally or seriously ill patients (cancer patients)), persons with pre-existing breathing conditions or asthma, and the very young.

The *National Allergy Bureau* has established **relative** exposure guidelines with respect to the raw count of mold spores per cubic meter of air. These values are not related to any specific medical condition but rather alert sensitive or allergy stricken individuals when to avoid prolonged exposures. Those guidelines are as follows:

Allergen	Very Low	Low	Medium	High	Very High
Mold	Less Than 500 Spores /M <sup>3</sup>	500-1000 Spores /M <sup>3</sup>	1000-5000 Spores /M <sup>3</sup>	5000-10,000 Spores /M <sup>3</sup>	Greater Than 20,000 Spores /M <sup>3</sup>

## EXPLANATION OF ISOLATES\*\*

### Ascospores

*Ascospores* are a general category of spores that have been produced by means of sexual reproduction (in a sack-like structure called an ascus). These are ubiquitous saprobes and plant pathogens, many of which are easily identifiable (i.e. *Chaetomium*).

This group contains potential opportunistic pathogens, toxin producers, and allergens depending on the genus and species. A rupture in the top portion of the ascus disperses the spores during rain or in times of high humidity. Some asexual fungi, such as *Aspergillus* and *Penicillium* can become sexual under specific conditions, these are then considered ascomycetes and are given distinct names.

### Aspergillus/Penicillium-like

*Aspergillus* and *Penicillium* spores are indistinguishable via direct microscopic examination. *Aspergillus* tends to colonize continuously damp materials such as damp wallboard and fabrics. *Penicillium* is commonly found in house dust, on water-damaged wallpaper, behind paint, and in decaying fabrics.

*Aspergillus* is a common Type I & III allergen. There are more than 160 different species of *Aspergillus*, sixteen of which have been documented as etiological agents of human disease but rarely occur in individuals with normally functioning immune systems.

*Penicillium* species are common contaminants on various substances. This organism causes food spoilage, colonizes leather objects and is typically an indicator organism for damp indoor conditions. Some species are known to produce mycotoxins.

The health of occupants may be adversely affected in an environment that has an amplification of *Penicillium*.

This fungal species is usually identified in source reservoirs such as chronically wet building components. *Penicillium* is typically one of the first fungal species to grow on moisture-compromised materials. *Penicillium* is characterized by rapidly growing colonies having conidial structures resembling brushes. It commonly produces a strong musty odor.

### Basidiospores

*Basidiospores* are a general category of sexual spores that have been released from the basidium of a fungus. A ubiquitous type I & III allergen, saprobe and plant pathogen, mainly found in gardens, forests, and woodlands. Spores disseminate during rain or in times of high humidity. Rarely opportunistic pathogens, Basidiospores may produce toxins, including amanitins, monomethyl-hydrazine, muscarine, ibotenic acid, and psilocybin. Basidiospores are an agent of dry wood rot, which may destroy the structure wood of buildings.

### Cladosporium

*Cladosporium*, with the ability to sporulate heavily, ease of dispersal, and buoyant spores makes this fungus the most important fungal airway allergen; and together with *Alternaria*, it commonly causes asthma and hay fever in the Western hemisphere. A few species of this genus cause disease, which range from phaeohyphomycosis, a group of mycotic infections characterized by the presence of dematiaceous septate hyphae.

### Mycelial/Hyphal Fragments

Fragments of mycelium that have the potential to reproduce are counted.

Mycelium can be a form of reproduction of certain fungi. However, due to indistinct properties, these fragments cannot be classified as to what particular species they may grow into.

### Smuts/Myxomycetes/Periconia

Smuts are ubiquitous, type I allergens that are parasitic plant pathogens, which require a living host to complete their life cycle, and are not usually found growing indoors. Smuts are most often found on corn, grass, weeds, flowering plants and other fungi; they are usually disseminated by wind. They are called smuts because they form black powdery spore masses that resemble soot or smut. Smuts are indistinguishable from Myxomycetes and *Periconia* under 600x microscopy.

### Unknown Dematiaceous spores

All other non-distinctive unidentifiable dark colored spores seen on a sample are placed into this category. The common factor among the dematiaceous fungi is the presence of melanin pigments in the cell walls and spores.

The dematiaceous fungi are found throughout the world in soil and decaying vegetation but appear to be especially common in tropical and subtropical regions.

Dematiaceous fungi have melanin-like pigments in the cell walls and can cause a variety of infections in humans known as phaeohyphomycosis (phaeo is Greek for "dark") or chromomycosis. The most severe of the phaeohyphomycoses are infections of the central nervous system (CNS).

#### **\*\*References:**

- Bioaerosols: Assessment and Control; ACGIH, 1999, Chapter 17.
- Bioaerosols: Assessment and Control; ACGIH, 1999, Chapter 19.
- Burge, 1986, Butcher *et al.*, 1987, Davis *et al.*, 1988, Hasnain *et al.*, 1985, Lehrer *et al.*, 1986, Santilli *et al.*, 1985
- Environmental Microbiology; Academic Press, 2000, Chapter 2.2.
- Environmental Microbiology; Academic Press, 2000, Chapter 2.3.
- The Fungi, 2nd Edition; Academic Press, 2001.
- Atlas of Moulds in Europe causing respiratory Allergy; Foundation for Allergy Research in Europe; Edited by Knud Wilken-Jensen and Suzanne Gravesen; ASK Publishing, Denmark, 1984.
- Manual of Medical Mycology; John Thorne Crissy, Heidi Lang, Lawrence Charles Parish; Blackwell Sciences, Cambridge, Massachusetts, 1995

## ALLERGENS

Allergens are any substance that can trigger an inappropriate immune response or can cause an allergic reaction in susceptible people.

There are four (4) types of hypersensitivity responses:

*Type I:* Anaphylactic, allergic

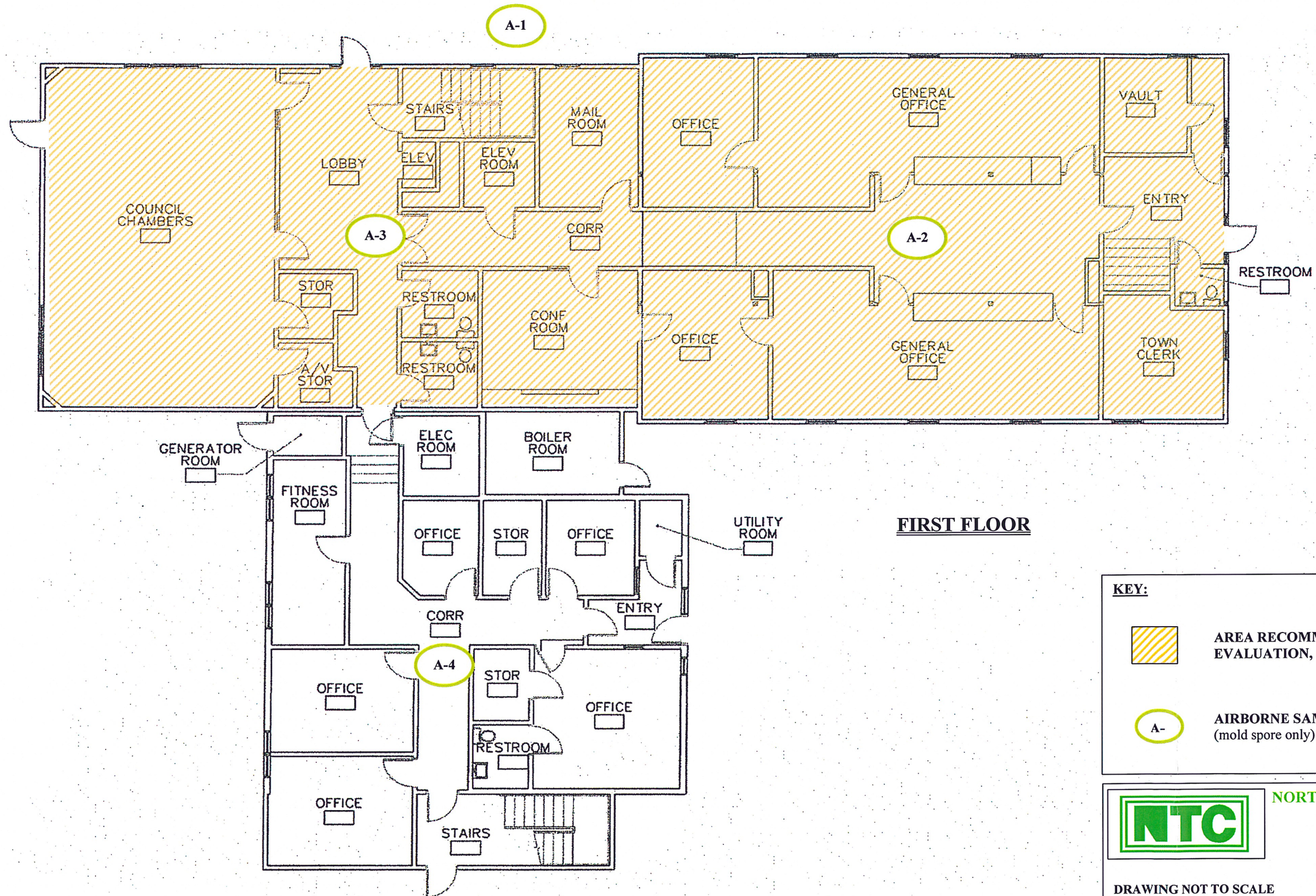
*Type II:* Cytotoxic

*Type III:* Immune Complex Induced



*Type IV:* Cell Mediated

# LIMITED INDOOR AIR QUALITY ASSESSMENT

## FALMOUTH TOWN HALL; 271 FALMOUTH ROAD; FALMOUTH, MAINE



**KEY:**

-  AREA RECOMMENDED FOR FURTHER EVALUATION, INCLUDING CRAWL SPACE
-  AIRBORNE SAMPLE LOCATIONS (mold spore only)

**NTC** NORTHEAST TEST CONSULTANTS

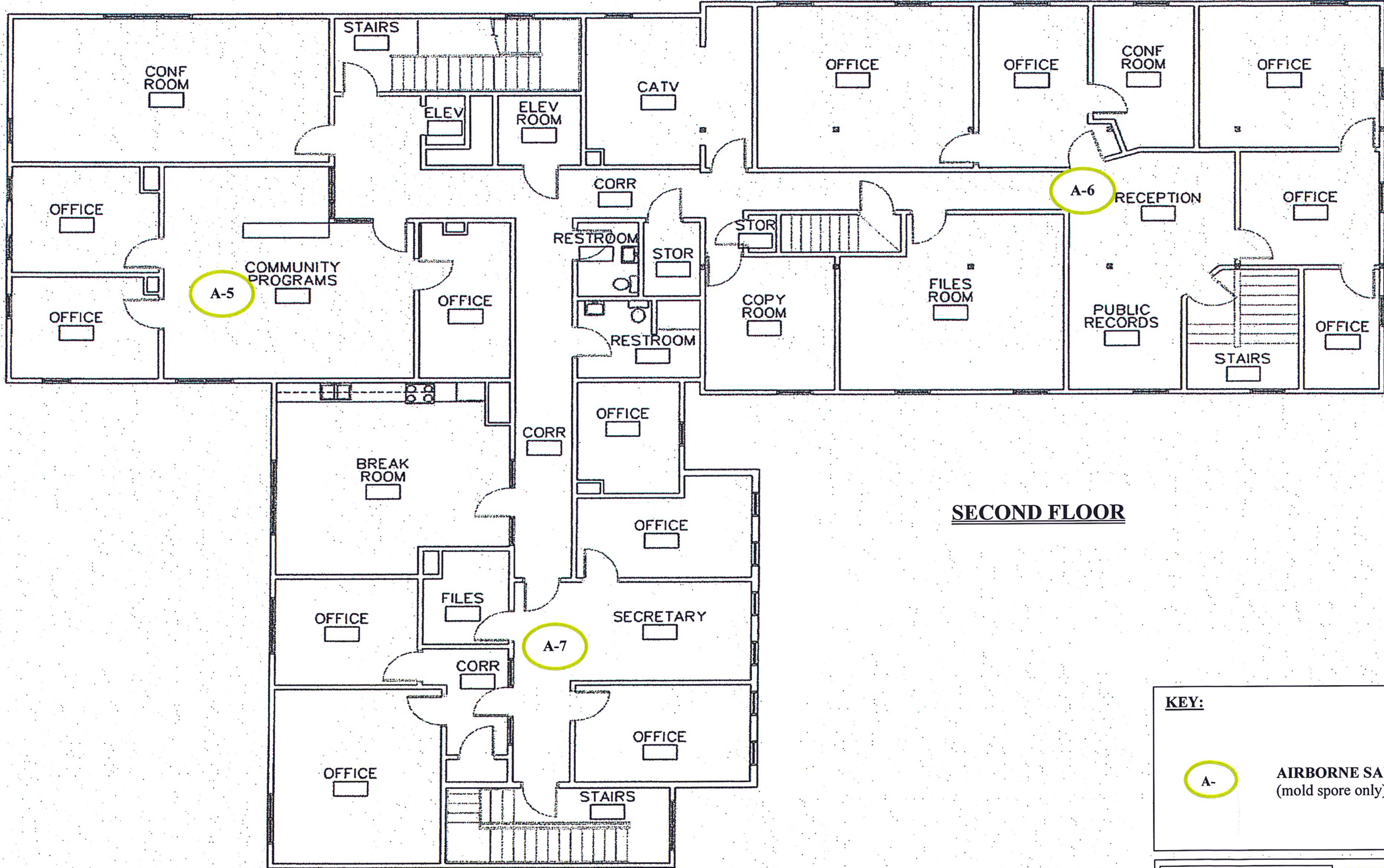
NTC JOB #13458-2013

DRAWING DATE: 2-12-2013  
JMB

DRAWING NOT TO SCALE


# INDOOR AIR QUALITY ASSESSMENT


175 FORE RIVER PARKWAY; PORTLAND, MAINE



## SECOND FLOOR

**KEY:**

 AIRBORNE SAMPLE LOCATIONS  
(mold spore only)

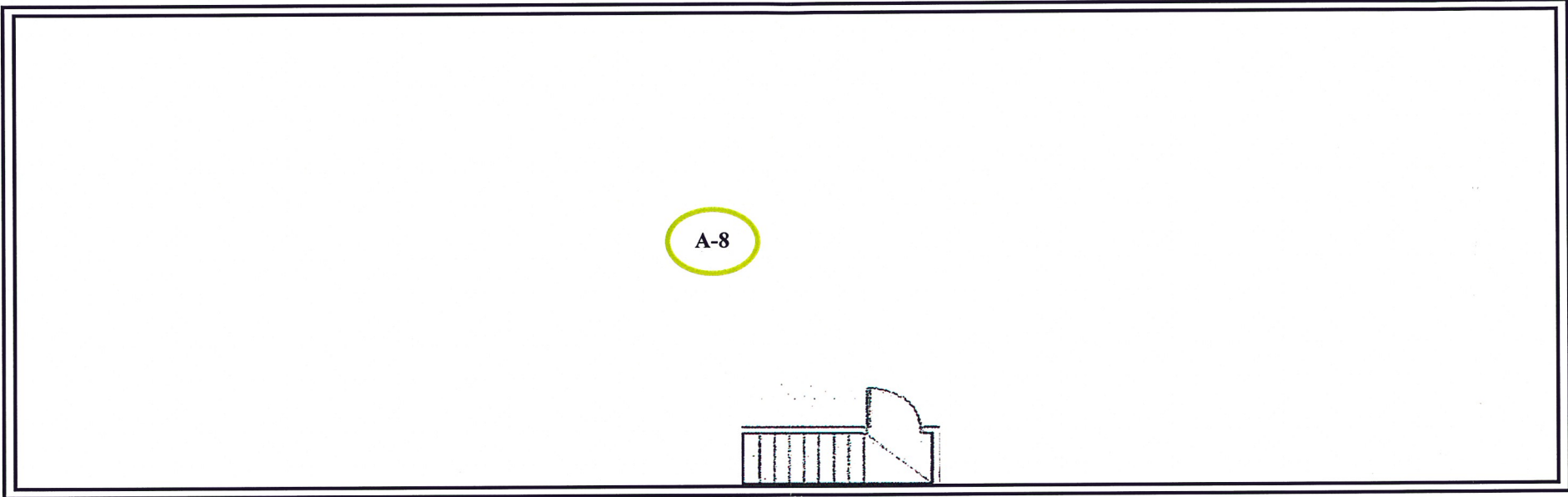
 **NORTHEAST TEST CONSULTANTS**

NTC JOB #13458-2013

DRAWING DATE: 2-12-2013  
JMB

DRAWING NOT TO SCALE

**INDOOR AIR QUALITY ASSESSMENT**  
175 FORE RIVER PARKWAY; PORTLAND, MAINE



ATTIC SPACE

**KEY:**



**AIRBORNE SAMPLE LOCATIONS**  
(mold spore only)



**NORTHEAST TEST CONSULTANTS**

**NTC JOB #13458-2013**

**DRAWING DATE: 2-12-2013**

**DRAWING NOT TO SCALE**

**JMB**