


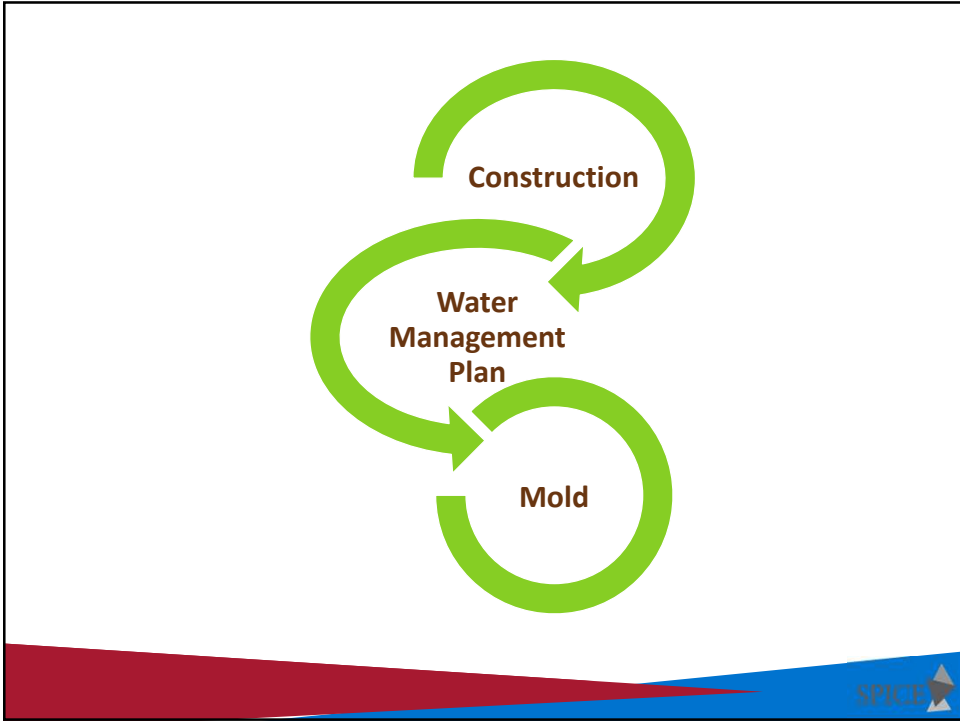
North Carolina  
**SPICE**  
Statewide Program for  
Infection Control & Epidemiology

# INFECTION CONTROL ISSUES CONSTRUCTION AND RENOVATION WATER MANAGEMENT AND MOLD REMEDIATION

Evelyn Cook, RN, CIC  
Associate Director  
Statewide Program for Infection Control and Epidemiology  
(SPICE)  
UNC School of Medicine



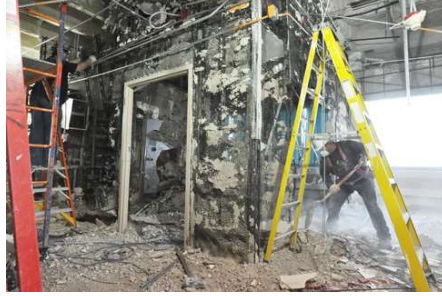
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**I want to begin with the premise that patients can leave the hospital sicker than they arrived if construction crews don't use established precautions to control infection during new construction or major renovations. In fact, it is estimated that there are at least 5000 construction-related infections that occur every year in healthcare facilities.**

# 5000



Bartley J. *Engineered Systems* (2007) July:1-7



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## JOINT COMMISSION

### EC.02.06.05 – The hospital manages its environment during demolition, construction or renovation (d/c/r) to reduce risk to those in the organization

- ▶ EP 1 – When planning for new, altered or renovated space, use one of the following design criteria
  - ▶ **State rule and regulations**
  - ▶ 2018 FGI Guidelines for Design and Construction of Hospitals, includes ANSI/ASHRAE/ASHE Standard 170-2017 – Ventilation of Healthcare Facilities
  - ▶ When above rules, regulations and guidelines do not meet specific design needs, use other reputable standards that provide equivalent criteria



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## NORTH CAROLINA STATE RULES

### MEMORANDUM

**DATE:** September 1, 2017

**TO:** Interested Parties

**FROM:** Nadine Pfeiffer, Rule Review Manager *NP*

**RE:** Proposed Repeal of Hospital Construction Rules  
10A NCAC 13B Licensing of Hospitals

GS 150B-21.2 requires a rule-making body to notify certain individuals of its intent to adopt a permanent rule. It also requires notification of the date, time and location of the public hearing on the rule and any fiscal note that has been prepared in connection with the proposed rule.

The North Carolina Medical Care Commission has submitted form OAH 0300 to the Codifier of Rules, Office of Administrative Hearings, indicating its intent to repeal the following 29 rules:

10A NCAC 13B .6001, .6002, .6104, .6201-.6206 and .6208-6227.

The enactment of Session Law 2017-174, Senate Bill 42, known as “*An Act Directing the Medical Care Commission to Adopt the Recommendations of the American Society of Healthcare Engineering’s Facility Guidelines Institute*” that became effective July 21, 2017 requires the N.C. Medical Care Commission to repeal rules to implement the provisions of the Act. In accordance with G.S. 150B-21.4(d), a fiscal note is not required for a repeal of a rule.

[www.ncdhhs.gov/dhsr/ruleactions.html](http://www.ncdhhs.gov/dhsr/ruleactions.html)



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## FGI GUIDELINES



The FGI Guidelines for Design and Construction documents are the most widely recognized standard for planning, designing, and constructing health and residential care facilities. The Guidelines documents consolidate minimum program, space, risk assessment, infection prevention, architectural detail, surface, built-in furnishing, and building system requirements in one convenient place. States and federal agencies use the Guidelines to regulate new construction and major renovations of health and residential care facilities.

[Guidelines](#)



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## JOINT COMMISSION

**EC.02.06.05 – The hospital manages its environment during demolition, construction or renovation (d/c/r) to reduce risk to those in the organization**

- ▶ EP 2 – When planning for d/c/r, hospital conducts a preconstruction risk assessment for air quality, infection control... and other hazards that affect care, treatment and services



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## FGI 2022 GUIDELINES

### 1.2-4 Safety Risk Assessment Components

- ▶ **Infection control risk assessment (1.2-4.2)**
- ▶ Patient handling and movement assessment (1.2-4.3)
- ▶ Fall prevention assessment (1.2-4.4)
- ▶ Medication safety assessment (1.2-4.5)
- ▶ Behavioral and mental health risk assessment (1.2-4.6)
- ▶ Patient immobility assessment (1.2-4.7)
- ▶ Security risk assessment (1.2-4.8)
- ▶ Disaster, emergency, and vulnerability (1.2-4.9)

Interdisciplinary

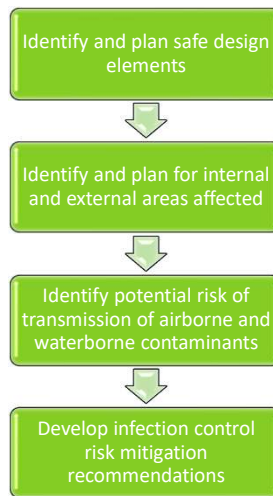
Documentation

Proactive



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## ICRA DOCUMENTED PROCESS TO PROACTIVELY:



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## ICRA CONSIDERATIONS

Identify and plan safe design elements

### Design Elements

- ▶ Number and location of Airborne Infection Isolation (AII) and Protective Environment (PE) rooms (*determine if an anteroom is to be provided*)
- ▶ Heating Ventilation Air Condition (HVAC) needs
- ▶ Number and location of hand washing stations and hand sanitation dispensers, eyewash stations and deluge showers
- ▶ Assessment of risk from transmissible waterborne, opportunistic pathogens



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ROOM : 280 sf  
TOILET : 50 sf  
TOTAL : 330 sf



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## OTHER ICRA CONSIDERATIONS

Identify and plan for internal and external areas affected

Identify potential risk of transmission of airborne and waterborne contaminants

### Construction Elements

- ▶ Disrupting essential services
- ▶ Specific hazards and protection levels
- ▶ Location of patients
- ▶ Impact of moving debris, traffic flow, and spill clean-up
- ▶ Assessment of construction activities
- ▶ Location of known hazards

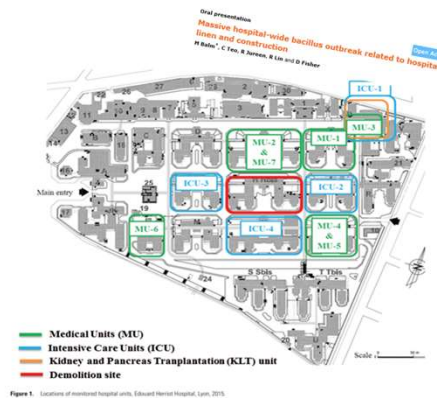


Figure 1. Locations of noncritical hospital units, Edward Medical Hospital, Lynn, 2015.



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## RISK MITIGATION

Develop infection control  
risk mitigation  
recommendations

- ▶ Patient placement/location
- ▶ Barriers and other protective measures
- ▶ Temporary phasing of HVAC/water
- ▶ Protection from demolition
- ▶ Training
- ▶ Impact of utility outages
- ▶ Movement of debris, traffic flow, cleanup and elevator control
- ▶ Provision of bathroom and food for construction workers
- ▶ Protection of building material



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## RISK MITIGATION



### Monitoring plan and procedures

- ▶ Determined by the governing body
- ▶ Conducted by IP, epidemiologist, construction coordinators, safety staff or an outside consultant
- ▶ Have written procedures for emergency suspension of work
- ▶ Procedures indicating the responsibilities of each party (governing body, contractor, designer, and monitor)



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## 1-DETERMINING CONTROL MEASURES

Identify type of  
Construction

- Type A – Inspection and non-invasive activities
- Type B – Small scale, short duration, minimal dust and debris
- Type C – Larger scale, longer duration activities that create moderate amount of dust and debris
- Type D – Major demolition and construction

[https://www.ashe.org/system/files/media/file/2023/01/ASHE\\_ICRA\\_2\\_TM\\_form\\_0.pdf](https://www.ashe.org/system/files/media/file/2023/01/ASHE_ICRA_2_TM_form_0.pdf)



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## 2-DETERMINING CONTROL MEASURES

Patient Risk  
Groups

- **Low risk** – Non patient care areas i.e., office areas, public areas-Change from prior
- **Medium risk** – Patient care support areas i.e., waiting areas, clinical engineering, kitchen, sterile processing (dirty side)
- **High risk** – Patient care areas i.e., patient rooms and areas, all inpatient nursing units, ER, employee health, pharmacy, medication rooms, imaging suites, diagnostic imaging laboratory
- **Highest risk** - Procedural, invasive, sterile support and highly compromised patient care areas i.e., all ICUs and , oncology, surgical suites (OR, PACU), **procedural suites**, pharmacy compounding, sterile processing (clean side), dedicated isolation units, **invasive imaging suites**



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### 3-DETERMINING CONTROL MEASURES

Table 3 - Class of Precautions:

Patient Risk Group	Construction Project Type			
	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	III	IV	V
HIGHEST Risk Group	III	IV	V	V



Infection control permit and approval will be required when Class of Precautions III (Type C) and all Class of Precautions IV or V are necessary.

Environmental conditions that could affect human health, such as sewage, mold, asbestos, gray water and black water will require Class of Precautions IV for LOW and MEDIUM Risk Groups and Class of Precautions V for HIGH and HIGHEST Risk Groups.



### STEP FOUR

► Surrounding area assessment

- Unit below
- Unit above
- Unit lateral
- Unit behind
- Unit in front

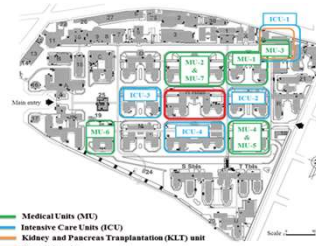


Figure 1. Location of Intensive Care Unit, Edward Mallin Hospital, Oct. 2015.

► Additional controls

- Noise, vibration, dust control ventilation, pressurization, Impact to other systems (i.e., data, mechanical, medical gasses)



# Before and During Construction



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## INFECTION CONTROL PRECAUTIONS BY CLASS

### Class I

1. Perform noninvasive work activity as to not block or interrupt patient care.
2. Perform noninvasive work activities in areas that are not directly occupied with patients.
3. Perform noninvasive work activity in a manner that does not create dust.
4. Immediately replace any displaced ceiling tile before leaving the area and/or at end of noninvasive work activity.

### Class II

1. Perform only limited dust work and/or activities designed for basic facilities and engineering work.
2. Perform limited dust and invasive work following standing precautions procedures approved by the organization.
3. This Class of Precautions must never be used for construction or renovation activities.



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## INFECTION CONTROL PRECAUTIONS BY CLASS

**Class III**

1. Provide active means to prevent airborne dust dispersion into the occupied areas.
2. Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door.
3. Remove or isolate return air diffusers to avoid dust from entering the HVAC system.
4. Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
5. If work area is contained, then it must be neutrally to negatively pressurized at all times.
6. Seal all doors with tape that will not leave residue.
7. Contain all trash and debris in the work area.
8. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
9. Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled.
10. Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.

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## INFECTION CONTROL PRECAUTIONS BY CLASS

**Class IV**

1. Construct and complete critical barriers meeting NFPA 241 requirements. Barriers must extend to the ceiling or if ceiling tile is removed, to the deck above.
2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor.
3. Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type).
4. Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air.
5. Remove or isolate return air diffusers to avoid dust entering the HVAC system.
6. Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
7. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized.
8. Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air.
9. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas.
10. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable.
11. Install device (e.g., magnehelic, manometer, or digital monitoring) on exterior of work containment to continually monitor negative pressurization. The "ball in the wall" or similar apparatus are not acceptable.

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## INFECTION CONTROL PRECAUTIONS BY CLASS

12. Contain all trash and debris in the work area.
13. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
14. Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suites is acceptable.
15. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed.
16. Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled.
17. Consider collection of particulate data during work to monitor and ensure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.

# IV

Continued.....



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## INFECTION CONTROL PRECAUTIONS BY CLASS

**Class V**



1. Construct and complete critical barriers meeting NFPA 241 requirements. Barriers must extend to the ceiling or if ceiling tile is removed, to the deck above.
2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor.
3. Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type).
4. Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area.
5. Personnel will be required to wear coveralls at all times during Class V work activities. Coveralls must be removed before leaving the anteroom.
6. Remove or isolate return air diffusers to avoid dust entering the HVAC system.
7. Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
8. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized.
9. Maintain negative pressurization of the entire workspace using HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air.
10. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas.
11. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is not acceptable.
12. Install device (e.g., magnehelic, manometer, or digital monitoring) on exterior of work containment to continually monitor negative pressurization. The "ball in the wall" or similar apparatus are not acceptable.
13. Contain all trash and debris in the work area.
14. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
15. Worker clothing must be clean and free of visible dust before leaving the work area anteroom.
16. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed.
17. Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled.
18. Consider collection of particulate data during work to monitor and ensure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.

# V



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# Performed Upon Completion Of Work Activity



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Classes I, II and III

Cleaning:

1. Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.
2. Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.


HVAC Systems:

1. Remove isolation of HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational.
2. Verify the HVAC systems meet original airflow and air exchange design specifications.



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**Classes III, IV and V**



Class III (Type C Activities only), IV, and V precautions require inspection and documentation for downgraded ICRA precautions.

Construction areas must be inspected by an infection preventionist or designee and engineering representative for discontinuation or downgrading of ICRA precautions.

**Work Area Cleaning:**

- Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.
- Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.

**Removal of Critical Barriers:**


- Critical barriers must remain in place during all work involving drywall removal, creation of dust and activities beyond simple touch-up work. The barrier may NOT be removed until a work area cleaning has been performed.
- All (plastic or hard) barrier removal activities must be completed in a manner that prevents dust release. Use the following precautions when removing hard barriers:
  - Carefully remove screws and painter tape.
  - If dust will be generated during screw removal, use hand-held HEPA vacuum.
  - Drywall cutting is prohibited during removal process.
  - Clean all stud tracks with HEPA vacuum before removing outer hard barrier.
  - Use a plastic barrier to enclose area if dust could be generated.

**Negative Air Requirements:**


- The use of negative air must be designed to remove contaminants from the work area.
- Negative air devices must remain operational at all times and in place for a period after completion of dust creating activities to remove contaminants from the work area and before removal of critical barriers.


**HVAC systems:**


- Upon removal of critical barriers, remove isolation of HVAC system in areas where work is being performed.
- Verify that HVAC systems are clean and operational.
- Verify the HVAC systems meets original airflow and air exchange design specifications.



**Type C  
only**










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<p><b>ASHE ICRA 2.0™ Infection Control Risk Assessment and Permit</b></p> <p>Project Name: _____</p> <p>ICRA Number: _____</p> <p>Requested by: _____</p> <p>Completion Date: _____</p> <p>Location of Work Activity: _____</p> <p>Estimated Duration: _____</p> <p>Foreman/Supervisor: _____ Phone: _____</p> <p>Contractor Performing Work: _____ Phone: _____</p> <p>Approving Authority: _____ Phone: _____</p> <p>Please note that the above signature is approval of the work activity as described and assessed documented here. Should the scope of work change or the discovery of additional toxic or biological substances, STOP WORK and seek additional approval and guidance before proceeding.</p> <p><b>1. Type of Activity</b> Explain this reasoning for this assessment</p> <p><input type="checkbox"/> Type A: Non-invasive</p> <p><input type="checkbox"/> Type B: Small-scale, short duration</p> <p><input type="checkbox"/> Type C: Large-scale, longer duration</p> <p><input type="checkbox"/> Type D: Major demolition, construction</p> <p><b>2. Patient Risk Area</b> Describe key patient risks</p> <p><input type="checkbox"/> Low: Non-patient care areas</p> <p><input type="checkbox"/> Medium: Patient care support areas</p> <p><input type="checkbox"/> High: Patient care areas</p> <p><input type="checkbox"/> Highest: Invasive, sterile or highly compromised care</p> <p><b>3. Class of Precautions</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td></td> <td>Type A</td> <td>Type B</td> <td>Type C</td> <td>Type D</td> </tr> <tr> <td>Low</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> </tr> <tr> <td>Medium</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> </tr> <tr> <td>High</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> </tr> <tr> <td>Highest</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> </tr> </table> <p><b>4. Surrounding Area</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Unit</td> <td>Below:</td> <td>Above:</td> <td>Laterals:</td> <td>Behind:</td> <td>In Front:</td> </tr> <tr> <td>Risk group</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Phone</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>Controls</p> <table border="1" style="width: 100%;"> <tr> <td><input type="checkbox"/> Noise</td> <td><input type="checkbox"/> Noise</td> <td><input type="checkbox"/> Noise</td> <td><input type="checkbox"/> Noise</td> <td><input type="checkbox"/> Noise</td> </tr> <tr> <td><input type="checkbox"/> Vibration</td> <td><input type="checkbox"/> Vibration</td> <td><input type="checkbox"/> Vibration</td> <td><input type="checkbox"/> Vibration</td> <td><input type="checkbox"/> Vibration</td> </tr> <tr> <td><input type="checkbox"/> Dust</td> <td><input type="checkbox"/> Dust</td> <td><input type="checkbox"/> Dust</td> <td><input type="checkbox"/> Dust</td> <td><input type="checkbox"/> Dust</td> </tr> <tr> <td><input type="checkbox"/> Ventilation</td> <td><input type="checkbox"/> Ventilation</td> <td><input type="checkbox"/> Ventilation</td> <td><input type="checkbox"/> Ventilation</td> <td><input type="checkbox"/> Ventilation</td> </tr> <tr> <td><input type="checkbox"/> Pressurization</td> <td><input type="checkbox"/> Pressurization</td> <td><input type="checkbox"/> Pressurization</td> <td><input type="checkbox"/> Pressurization</td> <td><input type="checkbox"/> Pressurization</td> </tr> </table> <p>Systems impacted:</p> <table border="1" style="width: 100%;"> <tr> <td><input type="checkbox"/> Data</td> <td><input type="checkbox"/> Data</td> <td><input type="checkbox"/> Data</td> <td><input type="checkbox"/> Data</td> <td><input type="checkbox"/> Data</td> </tr> <tr> <td><input type="checkbox"/> Mechanical</td> <td><input type="checkbox"/> Mechanical</td> <td><input type="checkbox"/> Mechanical</td> <td><input type="checkbox"/> Mechanical</td> <td><input type="checkbox"/> Mechanical</td> </tr> <tr> <td><input type="checkbox"/> Med Gas</td> <td><input type="checkbox"/> Med Gas</td> <td><input type="checkbox"/> Med Gas</td> <td><input type="checkbox"/> Med Gas</td> <td><input type="checkbox"/> Med Gas</td> </tr> <tr> <td><input type="checkbox"/> Hot/Cold Water</td> <td><input type="checkbox"/> Hot/Cold Water</td> <td><input type="checkbox"/> Hot/Cold Water</td> <td><input type="checkbox"/> Hot/Cold Water</td> <td><input type="checkbox"/> Hot/Cold Water</td> </tr> <tr> <td><input type="checkbox"/> Other</td> <td><input type="checkbox"/> Other</td> <td><input type="checkbox"/> Other</td> <td><input type="checkbox"/> Other</td> <td><input type="checkbox"/> Other</td> </tr> </table> <p>Were there discoveries in surrounding areas that would serve as cause to increase the class of precautions and necessitate additional controls? If so, please summarize.</p>		Type A	Type B	Type C	Type D	Low	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Medium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	High	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Highest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unit	Below:	Above:	Laterals:	Behind:	In Front:	Risk group						Contact						Phone						<input type="checkbox"/> Noise	<input type="checkbox"/> Noise	<input type="checkbox"/> Noise	<input type="checkbox"/> Noise	<input type="checkbox"/> Noise	<input type="checkbox"/> Vibration	<input type="checkbox"/> Vibration	<input type="checkbox"/> Vibration	<input type="checkbox"/> Vibration	<input type="checkbox"/> Vibration	<input type="checkbox"/> Dust	<input type="checkbox"/> Dust	<input type="checkbox"/> Dust	<input type="checkbox"/> Dust	<input type="checkbox"/> Dust	<input type="checkbox"/> Ventilation	<input type="checkbox"/> Ventilation	<input type="checkbox"/> Ventilation	<input type="checkbox"/> Ventilation	<input type="checkbox"/> Ventilation	<input type="checkbox"/> Pressurization	<input type="checkbox"/> Pressurization	<input type="checkbox"/> Pressurization	<input type="checkbox"/> Pressurization	<input type="checkbox"/> Pressurization	<input type="checkbox"/> Data	<input type="checkbox"/> Data	<input type="checkbox"/> Data	<input type="checkbox"/> Data	<input type="checkbox"/> Data	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Med Gas	<input type="checkbox"/> Med Gas	<input type="checkbox"/> Med Gas	<input type="checkbox"/> Med Gas	<input type="checkbox"/> Med Gas	<input type="checkbox"/> Hot/Cold Water	<input type="checkbox"/> Hot/Cold Water	<input type="checkbox"/> Hot/Cold Water	<input type="checkbox"/> Hot/Cold Water	<input type="checkbox"/> Hot/Cold Water	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<p><b>5. Detailed Plan of ICRA Controls for this Work</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Final Class of Precautions being applied</th> <th colspan="5">Class I</th> </tr> <tr> <th>I</th> <th>II</th> <th>III</th> <th>IV</th> <th>V</th> </tr> </thead> <tbody> <tr> <td>Controls required for this project</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Specifications/ Materials</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Verification method and frequency</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Exceptions/Additions to this permit Date and initials are noted by attached memoranda</p> <table border="1" style="width: 100%;"> <tr> <td>Initials</td> <td>Date</td> </tr> <tr> <td>Permit Request By</td> <td>Date</td> </tr> <tr> <td>Permit Authorized By</td> <td>Date</td> </tr> <tr> <td>Approval Signature</td> <td></td> </tr> </table> <p><small>©2022 The American Society for Health Care Engineering of the American Hospital Association Disclaimer: This document is provided by ASHE as a service to its members. The information provided may not apply to a reader's specific situation and is not a substitute for application of the reader's own independent judgment or the advice of a competent professional. ASHE does not make any guaranty or warranty as to the accuracy or completeness of any information contained in this document. ASHE and the authors disclaim liability for personal injury, property damage, or other damages of any kind, whether special, indirect, consequential, or compensatory, that may result directly or indirectly from use of or reliance on this document.</small></p>	Final Class of Precautions being applied	Class I					I	II	III	IV	V	Controls required for this project						Specifications/ Materials						Verification method and frequency						Initials	Date	Permit Request By	Date	Permit Authorized By	Date	Approval Signature	
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## CONTROLLING DUST

- ▶ Sticky mats changed routinely and when visibly soiled
- ▶ Damp mopping or HEPA vacuuming surfaces
- ▶ Consider collection of particulate data during work to monitor and ensure contaminants do not enter occupied spaces.



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## EDUCATION AND TRAINING

Five groups for whom training is important

1. Construction company supervisory personnel
2. Construction workers
3. Hospital staff impacted by construction projects
4. Healthcare facility maintenance and engineering personnel
5. Healthcare project manager

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## EDUCATION

### ► Construction Workers:

- Adverse effects of construction dust on patients
- The ICRA process
- Specific facility rules, such as entry and exit from buildings
- Worksite containment
- Dust control measures
- Containment and transport of construction materials and debris (this would include use of elevator(s))



### ► Facility staff impacted by project:

- A review of the ICRA plan
- Appropriate signage at the worksite
- What proper barriers look like
- Proper above-ceiling dust control measures
- The importance of negative pressure
- Proper debris removal procedure
- Whom to notify about possible deficiencies.

*APIC Infection Prevention Manual for Construction and Renovation*



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## SUMMARY

The IP should be involved in all construction projects from planning to completion

Common challenge – Lack of engagement or support from administration and getting support for IP involvement in construction activities

- Need to comply with regulatory agencies (State, FGI and TJC)
- Demonstrate value of the program
- Demonstrate how IP input results in an enhanced outcome and/or where the lack of input resulted in adverse outcomes



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# WATER MANAGEMENT PLAN

**DATE:** June 02, 2017

**TO:** State Survey Agency Directors

**FROM:** Director  
Survey and Certification Group

**SUBJECT:** Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)

Memorandum Summary

- **Legionella Infections:** The bacterium *Legionella* can cause a serious type of pneumonia called LD in persons at risk. Those at risk include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. Outbreaks have been linked to poorly maintained water systems in buildings with large or complex water systems including hospitals and long-term care facilities. Transmission can occur via aerosols from devices such as showerheads, cooling towers, hot tubs, and decorative fountains.
- **Facility Requirements to Prevent Legionella Infections:** Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *legionella* and other opportunistic pathogens in water.

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## Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings

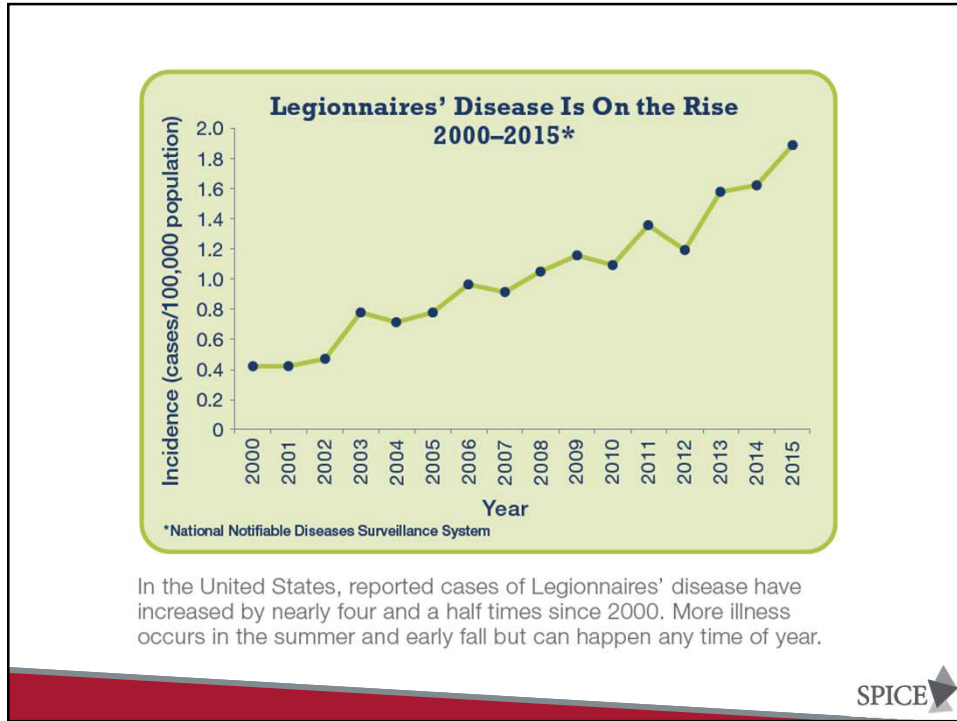
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### A PRACTICAL GUIDE TO IMPLEMENTING INDUSTRY STANDARDS

<https://www.cdc.gov/legionella/downloads/toolkit.pdf>

SPICE

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## **LEGIONELLA PNEUMOPHILA**

- ▶ *Legionella* is found naturally in freshwater environments (lakes and streams) but generally does not lead to disease
- ▶ *Legionella* can become a health problem in building water systems
- ▶ *Legionella* first must grow...THEN
- ▶ Must be aerosolized so people can breathe in small, contaminated water droplets

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## WHERE CAN *LEGIONELLA* GROW AND SPREAD ?

- ▶ Hot and cold-water storage tanks
- ▶ Water heaters
- ▶ Water filters
- ▶ Aerators Faucet flow restrictors
- ▶ Pipes, valves and fittings
- ▶ Electronic and manual faucets\*
- ▶ Showerheads\*
- ▶ Centrally-installed misters and humidifiers\*
- ▶ Eyewash stations\*
- ▶ Ice Machines\*
- ▶ Hot tubs\*
- ▶ Decorative fountains\*
- ▶ Cooling towers\*
- ▶ Medical Devices\*
  - ▶ CPAP machines, hydrotherapy equipment, bronchoscopes



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## LEGIONNAIRES' DISEASE

▶ Council for State and Territorial Epidemiologist (CSTE):

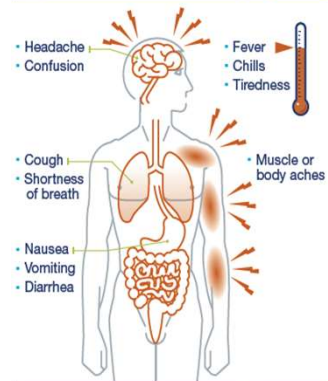
▶ Presumptive HCA

- ▶ A case with  $\geq 10$  days of continuous stay at a healthcare facility during the 14 days before onset of symptoms

▶ Possible

- ▶ A case that spent a portion of the 14 days before date of symptom onset in one or more a healthcare facilities, but does not meet the criteria for presumptive HA-LD.

Legionnaires' disease symptoms



Symptoms usually begin 2 to 10 days after being exposed to *Legionella*.



<https://www.cdc.gov/legionella/health-depts/healthcare-resources/healthcare-facilities.html>



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## Identifying Buildings at Increased Risk

Survey your building (or property) to determine if you need a water management program to reduce the risk of *Legionella* growth and spread.

**If you answer YES to any of questions 1 through 4, you should have a water management program for that building's hot and cold water distribution system.**

### Healthcare Facilities

- Yes \_\_\_ No \_\_\_ 1. Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems<sup>†</sup> or weakened immune systems?
- Yes \_\_\_ No \_\_\_ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?
- Yes \_\_\_ No \_\_\_ 3. Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?
- Yes \_\_\_ No \_\_\_ 4. Does your building have more than 10 stories (including basement levels)?



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**Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer NO to all of questions 1 through 4 but YES to any of questions 5 through 8, you should have a water management program for that device.**

- Yes \_\_\_ No \_\_\_ 5. Does your building have a cooling tower\*?
- Yes \_\_\_ No \_\_\_ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use?
- Yes \_\_\_ No \_\_\_ 7. Does your building have a decorative fountain?
- Yes \_\_\_ No \_\_\_ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?



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## WHAT NEEDS TO BE DONE?

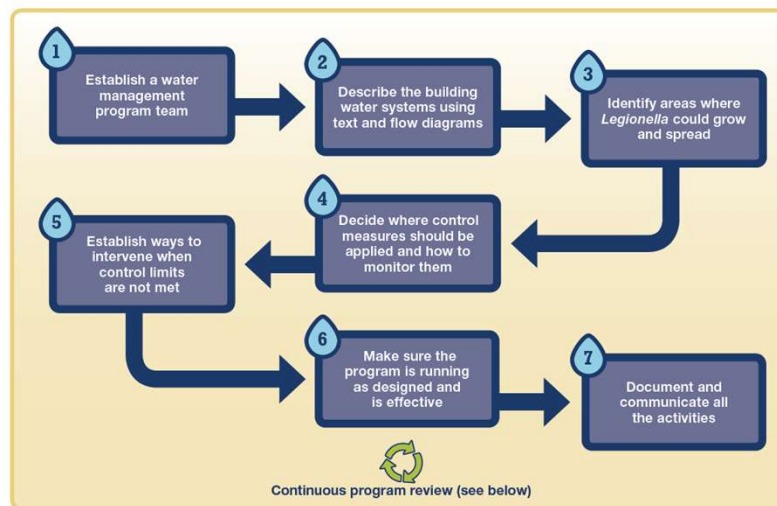


- Identify building water systems for which *Legionella* control measures are needed
- Assess how much risk the hazardous conditions in those water systems pose
- Apply control measures to reduce the hazardous conditions, whenever possible, to prevent *Legionella* growth and spread
- Make sure the program is running as designed and is effective



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## ELEMENTS OF A WMP



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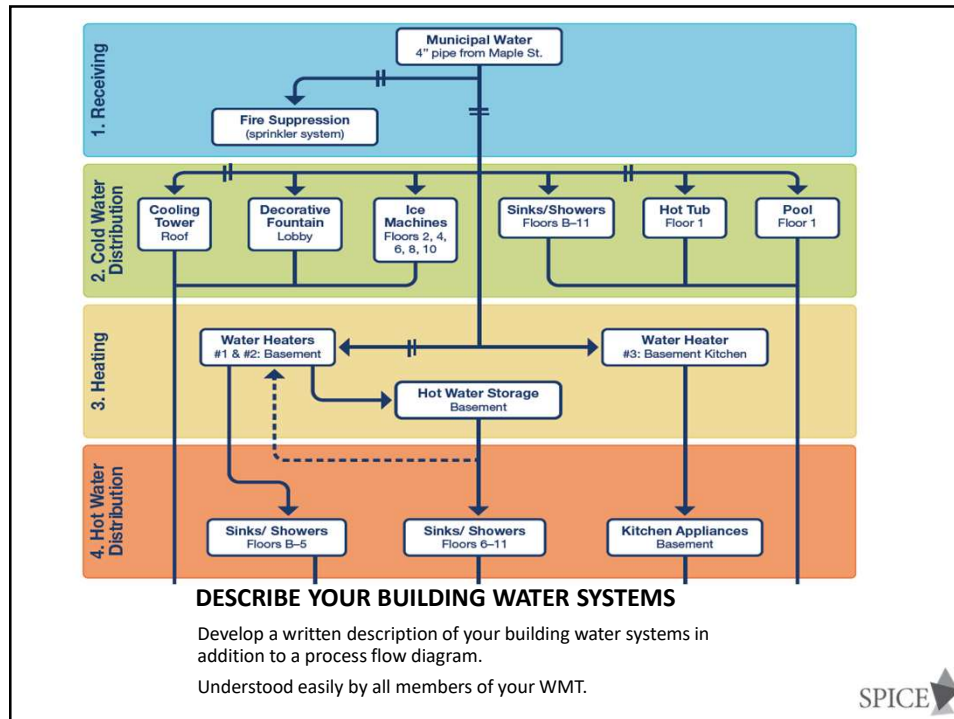


## WATER MANAGEMENT TEAM

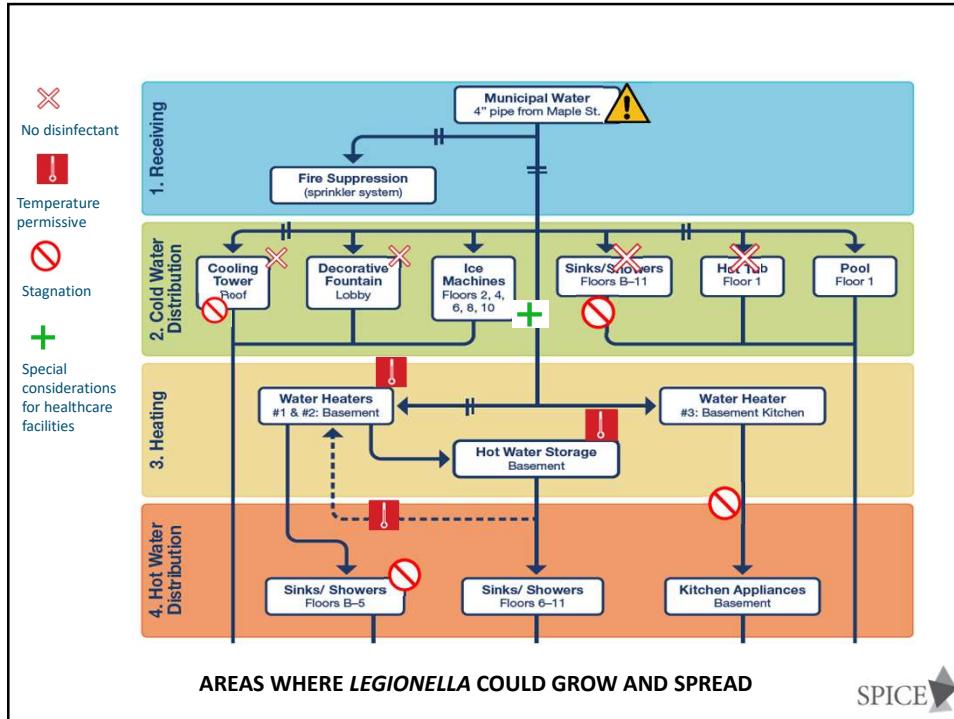
- ▶ Administrator
- ▶ Maintenance or engineering
- ▶ State/local health officials
- ▶ Infection preventionist
- ▶ Medical director
- ▶ Risk/Quality management staff



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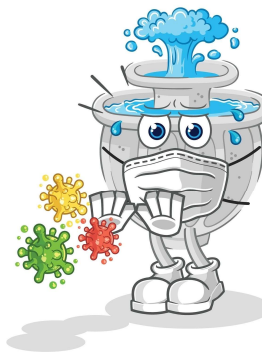
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## ADDITIONAL ELEMENTS OF A WMP

1. Describe control measures and how monitored
2. Ways to intervene when control limits not met
3. Make sure program is running as designed
4. Document and communicate



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## MOLD

- Over millions of years old
- Part of our natural environment:
  - Breaks down and digests organic materials such as leaves in outdoor areas
- Can be found indoors and outdoors-water, soil and air
- Need a food source to grow and moisture helps the spore grow
- Mold like cellulose materials such as:
  - Drywall
  - Ceiling Tiles
  - Behind wallpaper and wall coverings

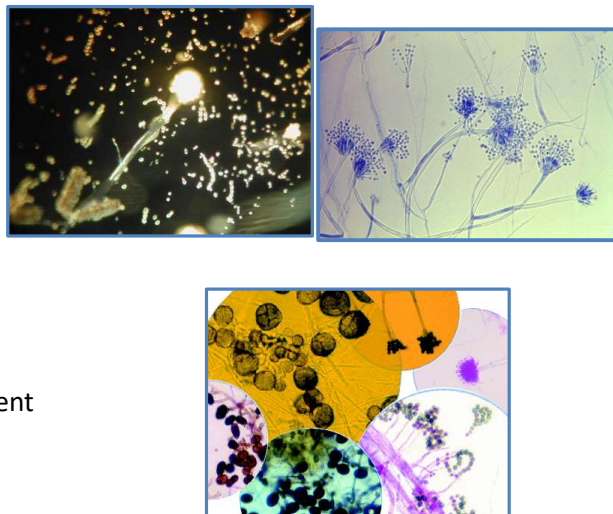


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## Mold spores

- Mold spores
- Dispersed when disrupted
- Can be transferred by:
  - Air currents
  - Unclean hands
  - Uncleaned materials/equipment



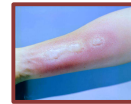
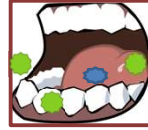
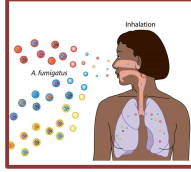
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CECO

# Mold Spores

- Inhalation
- Ingestion
- Open wounds
- Burns



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# SOURCES OF WATER IN HC

Roof leaks

Steam leaks

Leaking fire sprinkler

Burst pipes

HVAC condensate pans

Sewage back-ups

Groundwater Infiltration



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## Slide 55

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**CEC0** In the notes would delete "with our macrophages, an innate defense mechanism" and just say "with our bodies defense mechanisms".

Cook, Evelyn C, 2022-07-05T13:28:40.385

## Conditions for Mold Growth

- Water intrusion

- Upon inspection

- Look up



- Look down



- Look out



- Look all around



Image from:  
<https://www.placenorthwest.co.uk/news/work-underway-on-rochdale-indoor-market/>

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CECO

## Conditions for mold Growth

- Relative Humidity

- Relative humidity above 70% for extended periods of time indoors can aid in mold growth.
  - Condensation can appear on surfaces, especially when there are cold surfaces in the facility.



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## Slide 58

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**CEC0** Wonder if the speaker notes can be simplified a little  
Cook, Evelyn C, 2022-07-05T13:45:46.758

## Common Areas in Healthcare Facilities



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## MOLD REMEDIATION

- ▶ *Although molds can be found almost anywhere, they need moisture and nutrients to grow. The exact specifications for optimal mold growth vary by the species of mold. However, mold grows best in damp, warm environments. The availability of nutrients in indoor environments rarely limits mold growth because wood, wallboard, wallpaper, upholstery, and dust can be nutrient sources. When a hospital experiences water intrusion such as flooding or water leaks, resulting mold growth can seriously compromise the health of patients and others such as nursing staff and physicians*

*Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods  
MMWR; June 9, 2006/Vol.55/No.RR8*

<https://www.cdc.gov/mmwr/PDF/rr/rr5508.pdf>

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## NORTH CAROLINA GUIDELINES FOR MOISTURE MANAGEMENT AND MOLD REMEDIATION IN HEALTHCARE FACILITIES

These guidelines are a consensus document approved by the Association for Professionals in Infection Control (APIC-NC), the Statewide Program for Infection Control and Epidemiology (SPICE), the Public Health Institutional Task Force for Best Practices (PHIT Force), North Carolina State Division of Public Health, and the North Carolina Infectious Disease Society (NCIDS).

<https://spice.unc.edu/wp-content/uploads/2016/12/mold-2007-03-08-1.pdf>



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## THE REMEDIATION PLAN SHOULD INCLUDE

- ✓ Steps to permanently correct the water or moisture problem
- ✓ The use of appropriate personal protective equipment (PPE)
- ✓ Steps to carefully contain and remove moldy building materials in a manner that will prevent further contamination.
- ✓ Depending on the size and complexity of the job, allow for revision of the plan if circumstances change or new facts are discovered.
- ✓ Evaluating patient or healthcare case workers' exposure to contaminated air and construction materials.



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*It is important for infectious disease physicians and infection preventionists in collaboration with building contractors and other associated departments to appropriately implement risk assessment and mitigation measures and prevent healthcare-associated fungal outbreaks and infections.*

*Review of Fungal Outbreaks and Infection Prevention in Healthcare Settings During Construction and Renovation  
Hajime Kanamori, William A. Rutala, Emily E. Sickbert-Bennett, and David J. Weber*



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## QUESTIONS



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