Prevention of Infection During Construction, Renovation, Maintenance Repair in Health Care Facilities

Infection Prevention & Control
October 2019

Southern Health Santé Sud

Goals

- Overview of Southern Health – Santé Sud (SH-SS) *Infection Prevention During Construction, Renovation and Maintenance* policy
- Identify infections linked to construction, renovation, maintenance and repair activities in health care facilities
- Discuss how project activity risks are determined using the infection control risk assessment (ICRA)
- Review required risk mitigation strategies as per CSA Z317.13 *Infection Control During Construction, Renovation, Maintenance and Repair of Health Care Facilities.*

Southern Health Santé Sud

Client

- Patients in hospital
- Residents in personal care home
- Clients accessing care from the community

Southern Health Santé Sud

Construction

- Construction
- Renovation
- Maintenance
- Repair
- Disturb or change facility structures and/or systems

Major or Minor

Southern Health Santé Sud

Infection Prevention and Control (IP&C)

Infection Control Practitioner (ICP)

- Scientific approach
- Practical solution
- To prevent harm caused by infection to clients and health care workers

Expert in the prevention and control of healthcare associated infection

Southern Health Santé Sud

Multidisciplinary Team (MDT)

- Group of representatives from various disciplines in the health care facility
- Work with the project management team and others
- Ensure that the appropriate IP&C measures are followed during construction activities.

Southern Health Santé Sud

Preventive Measures (PM)

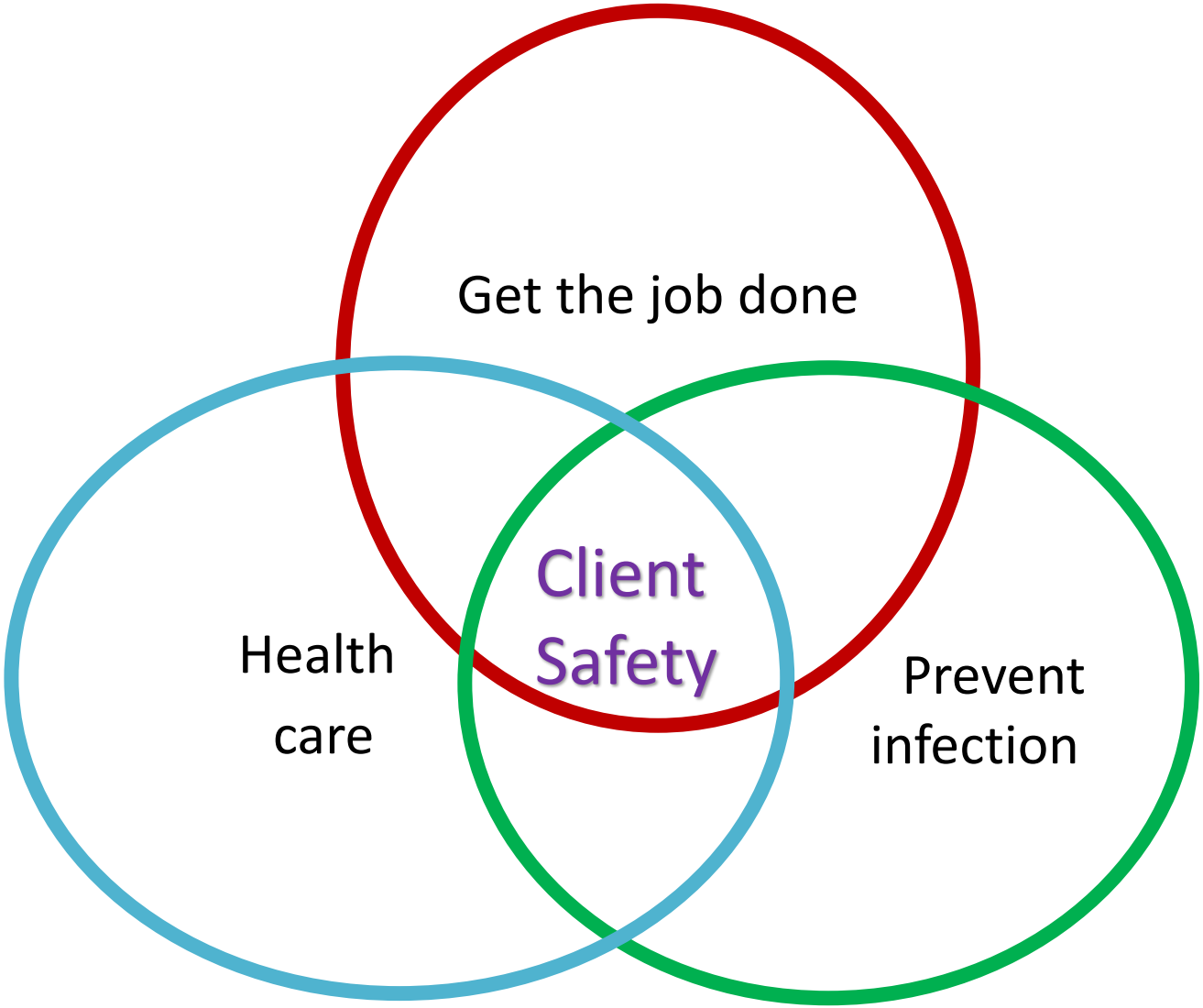
System to decrease the spread of contaminants during construction activities involving:

- Precautionary actions
- Equipment
- Barriers

and

- Inspections at each phase of a project

Client Safety



Southern Health Santé Sud

Policy

Projects abides by the precautionary and remedial measures

Preventing exposure to infectious agents during health care facility construction work

Compliance with current CSA Standard CAN/CSA Z317.13.

Southern Health Santé Sud

Policy

Infection prevention and control measures are:

- Documented
- Outlined in construction documentation
- Employed, before project is started
- Maintained for the duration of project

Southern Health Santé Sud

Policy

Any member of the project's MDT:

has the authority to stop any construction work,

if client, health care workers or visitors are deemed to be at risk of exposure to potentially pathogenic dust or substances.

Why is IP&C Important?

Construction Dust

Who is on the other side of the wall?

Client Safety

Vulnerable Clients

Southern Health Santé Sud

Why is IP&C Important?

Southern Health Santé Sud

Causes of Contamination

Inadequate	Disturbance	Water
• Planning • Ventilation • Containment • Storage • Cleanup	• Contaminants • Dust	• Penetration • Stagnant • Contamination

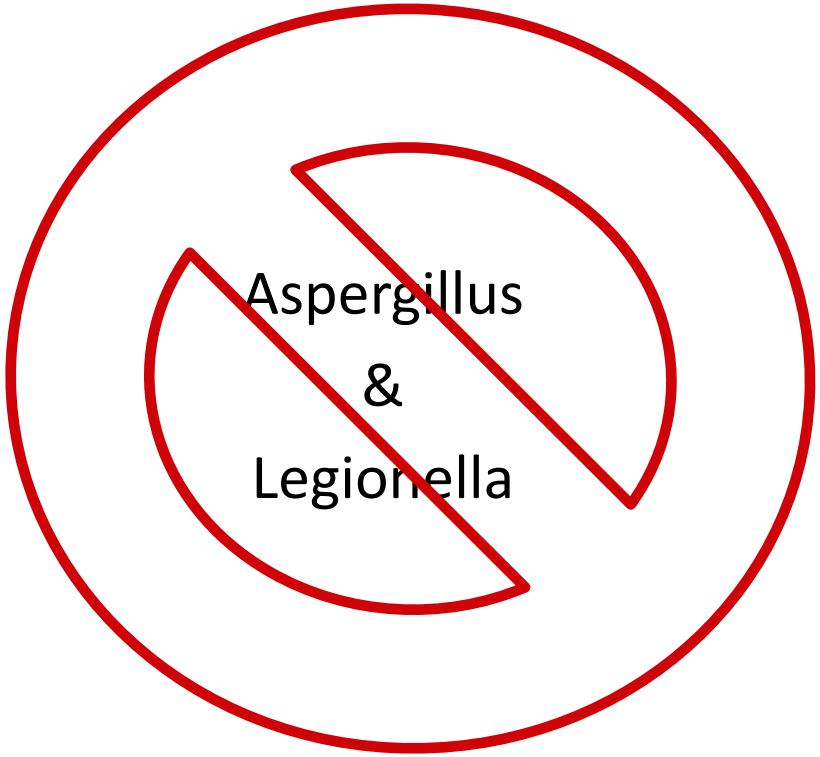
Southern Health Santé Sud

Contamination Activities

Southern Health Santé Sud

What Are The Contaminants?

Harmful organisms can be found in soil, water & dust



Southern Health Santé Sud

Aspergillus

a mould

Aspergillus

- Found in soil, water, and damp, moist, wet, decaying materials
- Dormant until disturbed or exposed to moisture
- When disturbed, can become airborne
- Mortality rate 65% - 100%

Southern Health Santé Sud

Construction-associated Fungal Infections

Children's Medical Center in Dallas, TX – 2006-2007 (published in 2013)

Excavation next to facility

50 children infected

10 children died

Southern Health Santé Sud

Construction-related Illnesses

2008 – Cancer clients – 6 infected, 2 died (aspergillosis infections coincided with major hospital construction)

2006 – Pediatric cancer clients – 14 infected, 9 died (high fungal air contamination due to adjacent building construction work)

2003 – Kidney transplant clients – 4 infected, all died (California Hospital with ongoing construction)

Clinical Infectious Diseases, Volume 61, Issue 3, 1 August 2015, Pages 433–444

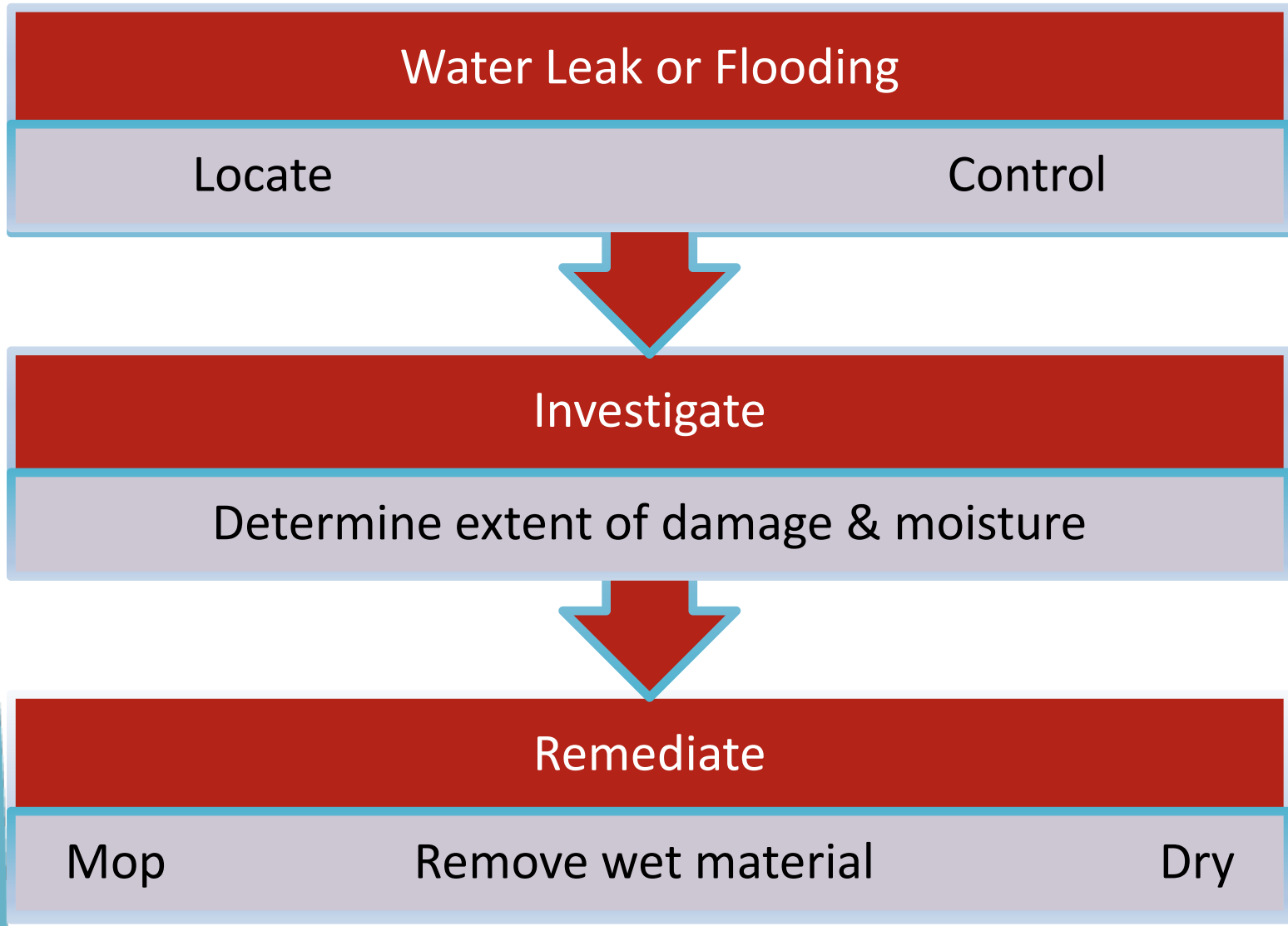
What Do You Do If You Find Mould?

Mould on walls

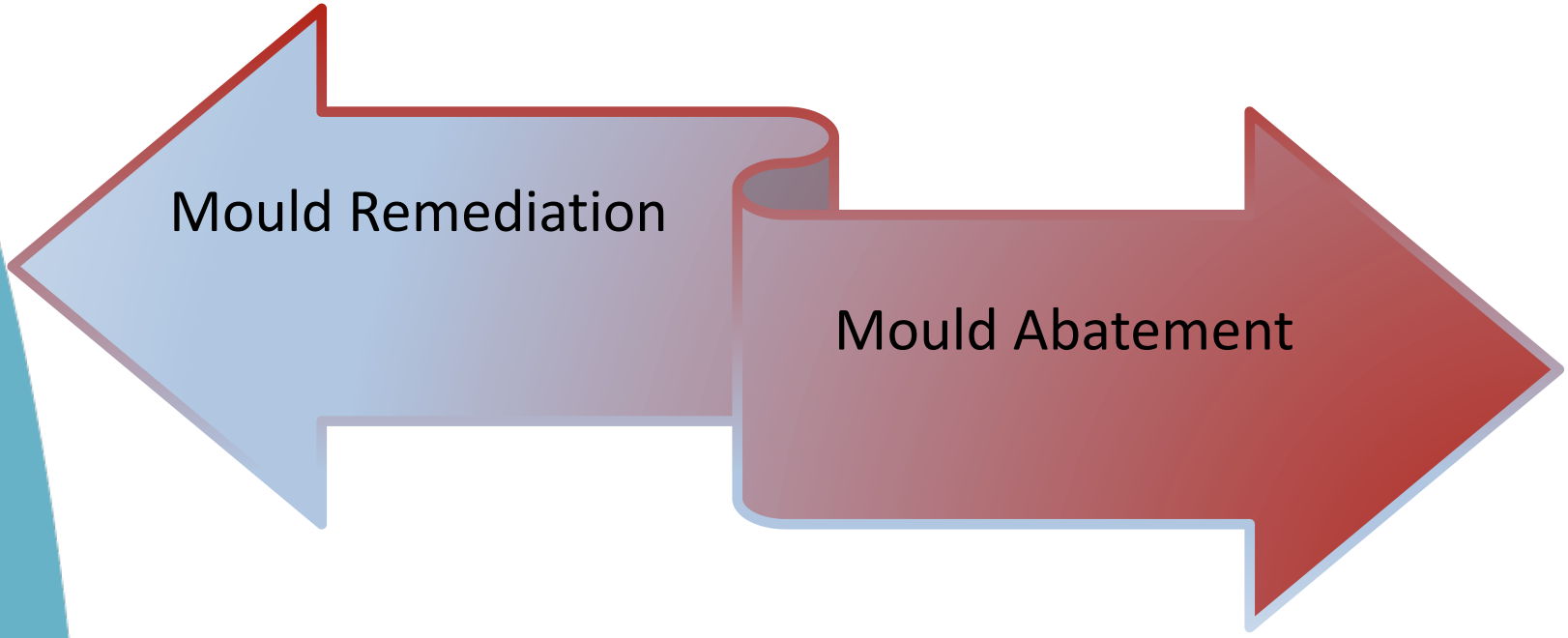
Mould on ceilings

Southern Health Santé Sud

The Critical 48 Hours



Stop The Work!!



- Work must stop to prevent mould spread
- Mould abatement plan
- Trained and qualified mould abatement worker

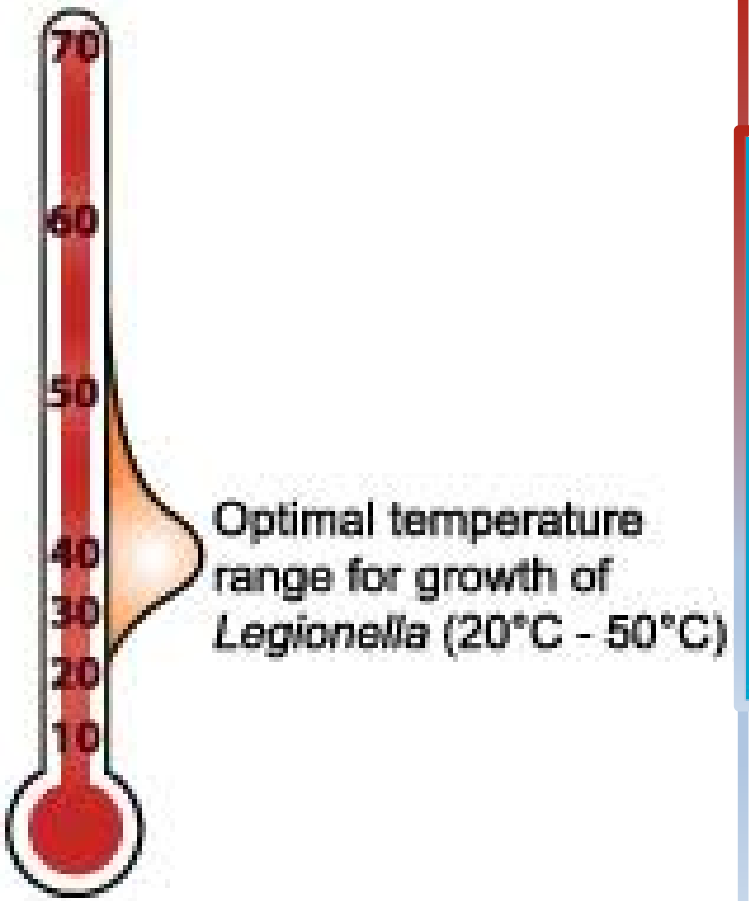
Southern Health Santé Sud

Bacteria ⇨ Legionella

- Causes: Legionnaire's Disease
- Results in: Pneumonia and/or respiratory failure
- Route: Aspiration and/or inhalation of contaminated aerosols
- Found in: Stagnant water, cooling towers, showers, faucets and room air humidifiers

Southern Health Santé Sud

Legionnella



Mortality Rate
24% - 80%

Southern Health Santé Sud

Construction Associated Legionella Outbreaks

May 2019

Legionella outbreak in Mount Carmel Grove City Hospital, Ohio

Source: Water supply **Outcome:** 7 confirmed cases

October 2005

Legionella outbreak in a Toronto area nursing home

Source: Cooling tower **Outcome:** 135 persons became ill

23 residents died

Southern Health Santé Sud

Infection Control Measures During Construction Activities

4 Required Steps for Every Project

#1 - Complete the ICRA

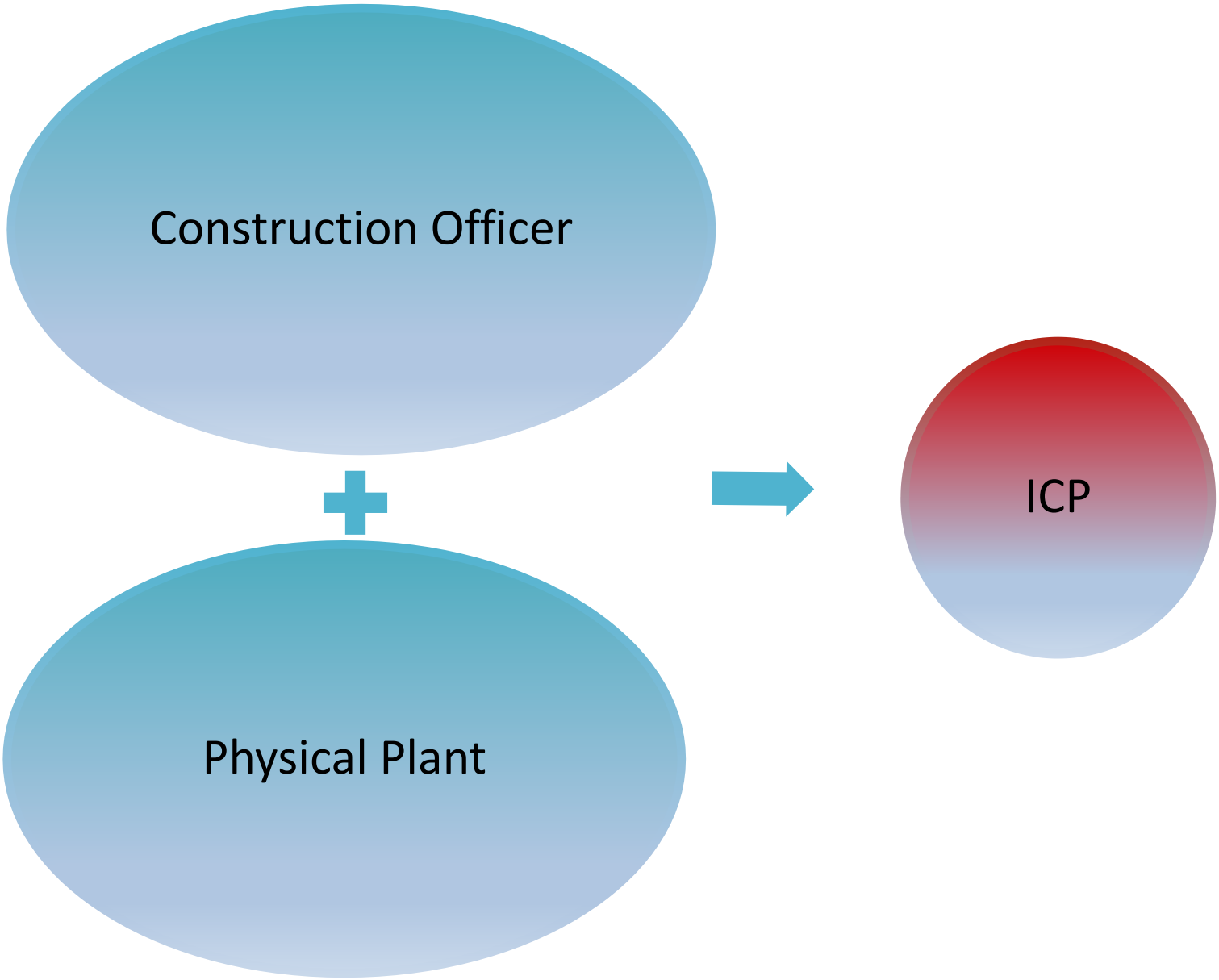
#2 – Identify the Preventive Measures

#3 – Develop the Infection Control Plan

#4 – Implement Preventive Measures and Proceed

Southern Health Santé Sud

Who Completes the ICRA



Infection Control Risk Assessment (ICRA)

- **PART A: Project Activity Type**

Type A	Type B	Type C	Type D

- **PART B: Population Risk Groups and Geographical Areas**

Group 1	Group 2	Group 3	Group 4
Lowest risk	Medium risk	Medium to High risk	Highest risk

- **PART C: Construction Activity and Risk Group Matrix**

Risk Group	Project Activity			
	Type A	Type B	Type C	Type D
Group 1	I	II	III	III/IV
Group 2	I	II	III	IV
Group 3	I	III	III/IV	IV
Group 4	I-III	III/IV	III/IV	IV
Contact IC to ensure appropriate classification III/IV				

Southern Health Santé Sud

ICRA

PART A: Project Activity Type

Type A	Type B	Type C	Type D
Inspection and non-invasive activities.	Small scale, short duration (e.g., less than 2 hrs.) activities that create minimal dust.	Activities that generate moderate to high level of dust, cause a moderate service disruption, require demolition, require removal of a fixed facility component (e.g., sink) or assembly (e.g., countertop or cupboard), or cannot be completed in a single work shift.	Activities that generate high levels of dust, activities that necessitate significant service disruptions, and major demolition and construction activities requiring consecutive work shifts to complete.

Southern Health Santé Sud

ICRA

PART B: Population Risk Groups and Geographical Areas

Group 1 - Lowest risk	Group 2 - Medium risk	Group 3 - Medium to High risk	Group 4 - Highest risk
Office areas	Patient care areas unless listed in Group 3 or Group 4	Emergency rooms (except trauma rooms)	ICUs (ICU, PICU, NICU, etc.)
Unoccupied patient care units	Outpatient clinics (except oncology and surgery)	Diagnostic imaging	ORs (including prep, induction, post-anaesthetic care units, and scrub areas)
Public areas not intersecting a patient care area	Admission and discharge units	Labour and birthing rooms (non-operating)	Anaesthesia storage areas and workrooms
Soiled linen or storage areas	Waiting rooms	Nurseries for healthy newborns	Oncology units and outpatient clinics
Physical plant workshops	Autopsy and morgue	Nuclear medicine	Transplant units and outpatient clinics
Housekeeping rooms and closets	Occupational therapy areas remote from patient care areas	Hydrotherapy	Inpatient units and outpatient clinics for clients with AIDS or other immunodeficiency diseases
	Physical therapy areas remote from patient care areas	Echocardiography	Dialysis units
		Laboratories	Critical care nurseries
		General medical and surgical wards or units (includes all soiled and clean utility rooms)	Labour and delivery operating rooms
		Pediatric units	Interventional or high-risk diagnostic imaging, e.g., Cardiac catheterization and angiography, Interventional radiology, Endoscopy, Bronchoscopy, Cystoscopy
		Geriatric units	Cardiovascular and cardiology patient areas
		Long-term care units	Pharmacy admixture rooms
		Food preparation, serving, and dining areas	Medical device reprocessing areas
		Respiratory therapy	Central sterile supply
		Clean linen handling and storage areas	Clean and sterile storage
			Burn care units
			Animal rooms
			Trauma rooms
			Protective isolation rooms
			Tissue culture laboratories
			Pacemaker insertion rooms
			Dental procedure rooms

Southern Health Santé Sud

ICRA

PART A: Project Activity Type

Type A	Type B	Type C	Type D

PART B: Population Risk Groups and Geographical Areas

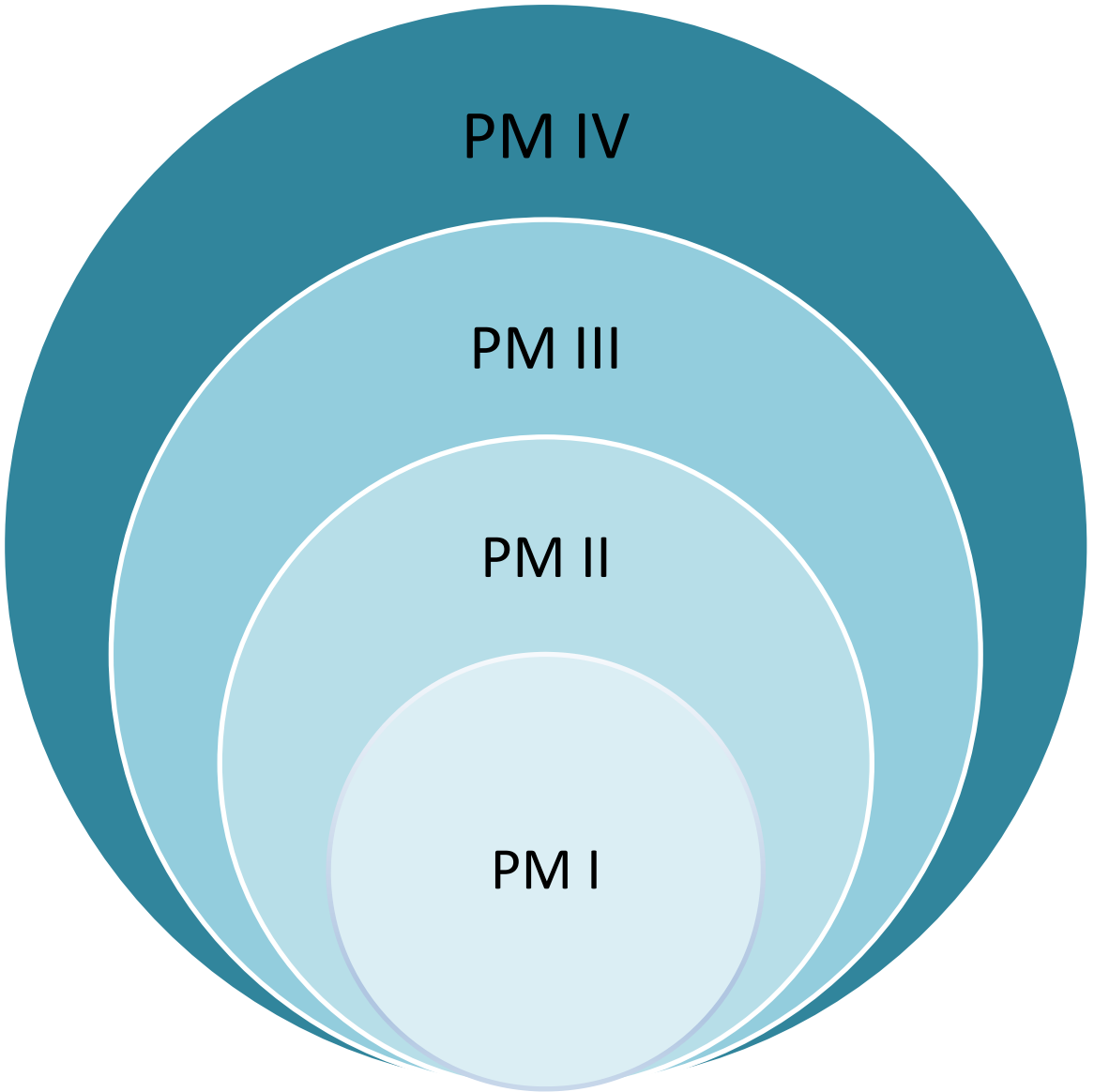
Group 1	Group 2	Group 3	Group 4
Lowest risk	Medium risk	Medium to High risk	Highest risk

PART C: Construction Activity and Risk Group Matrix

Risk Group	Project Activity			
	Type A	Type B	Type C	Type D
Group 1	I	II	III	III/IV
Group 2	I	II	III	IV
Group 3	I	III	III/IV	IV
Group 4	I-III	III/IV	III/IV	IV
Contact IC to ensure appropriate classification III/IV				

Southern Health Santé Sud

Preventive Measures



Southern Health Santé Sud

Preventive Measures I

- Clients, Equipment, Supplies - protect or remove
- Work – during low activity
- Materials – clean and dry
- Dust – keep to a minimum
- Ceiling tile – visual inspection only

Southern Health Santé Sud

Preventive Measures I

- Water and ventilation – identify impact, report discoloration
  - Plumbing – according to CSA
  - Clean – HEPA vacuum &/or wet mop

Southern Health Santé Sud

Preventive Measures II

PM I plus

- Dust – minimize dispersion
- Doors and openings – sealed
- HVAC – supply and return air ducts sealed

Southern Health Santé Sud

Preventive Measures II

- Walk-off/sticky mats
  - Outside and inside construction zone
  - Large enough for 2 footsteps
  - Change when no longer sticky

Southern Health Santé Sud

Preventive Measures II

- Clean/sterile supplies – safe route
- Construction traffic pattern – identified
- Debris – removed in clean covered cart

Southern Health Santé Sud

Preventive Measures II

- Cleaning – daily
- Before occupancy
  - Water lines – flushed X 10 minutes
  - Terminal cleaning by facility staff

Southern Health Santé Sud

Preventive Measures III & IV

Higher risk

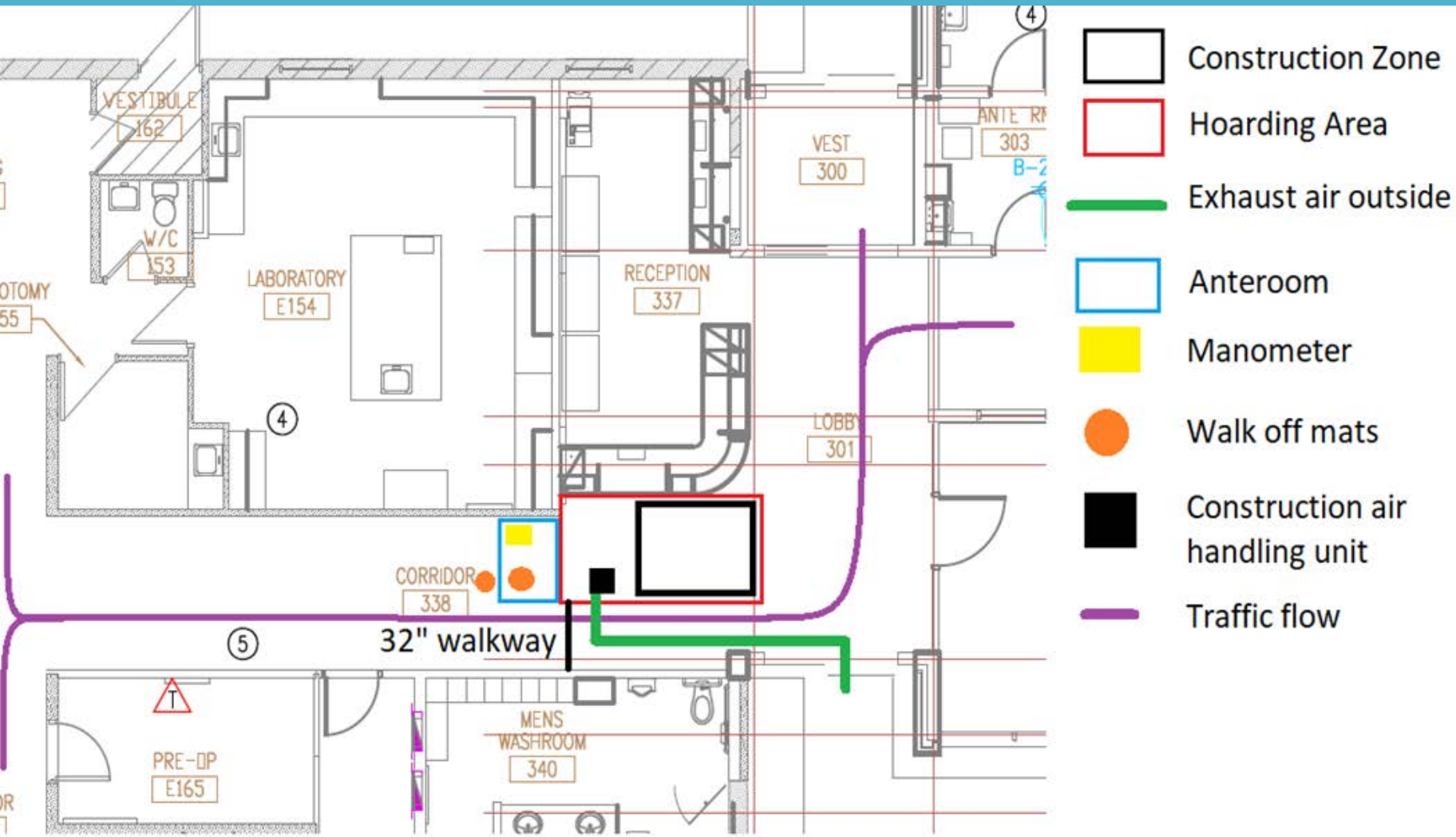
ICP involvement

Infection Control Plan

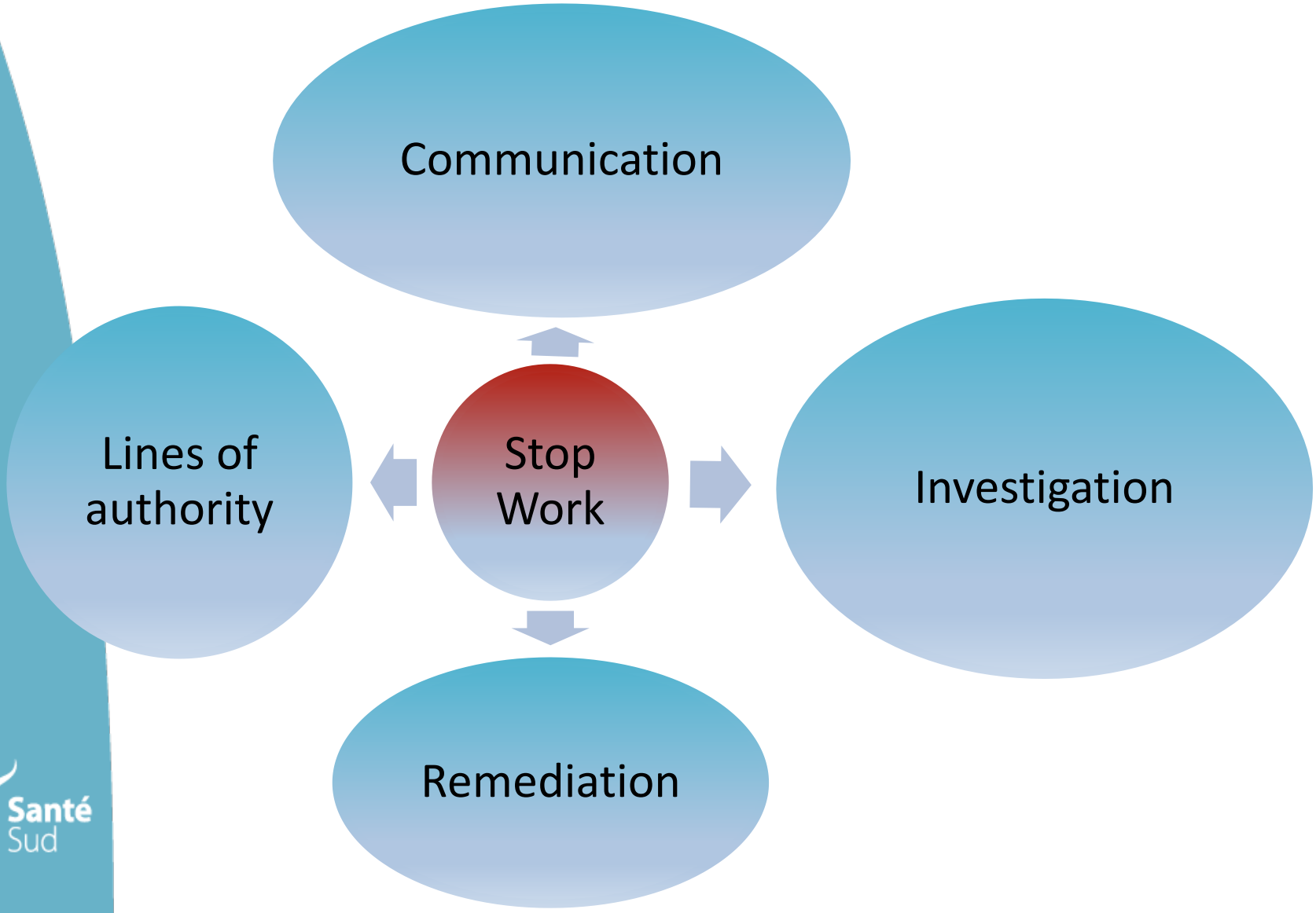
Southern Health Santé Sud

Preventive Measures III

Infection Control Plan



Preventive Measures III



Preventive Measures III

PM I + II plus

Before Project Begins

- MDT –set up
- Services disruption – identified
- Construction staff – educated

Preventive Measures III

Before Project Begins

- Infection Control Plan – reviewed & approved with ICP
- Plumbing & Water – disruption schedule, potable H_2O
- Dust barrier – floor to true ceiling poly, hard hoarding or 2 layers of 6 mil poly

Southern Health Santé Sud

Preventive Measures III

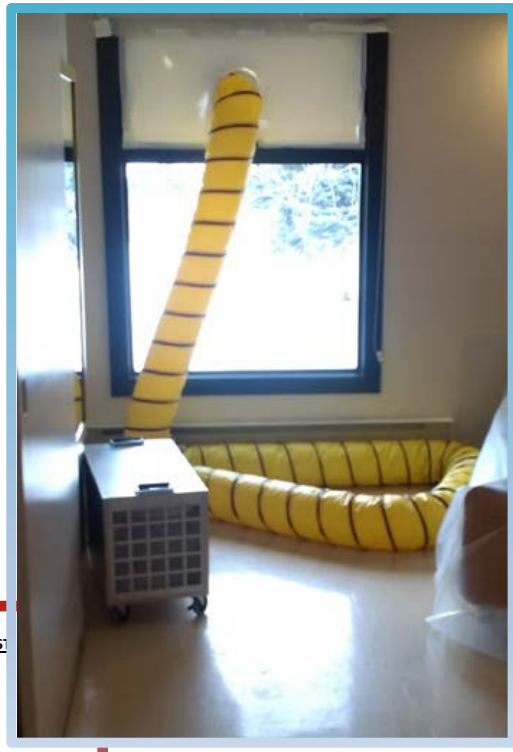
Before Project Begins

- All seams/penetrations – sealed

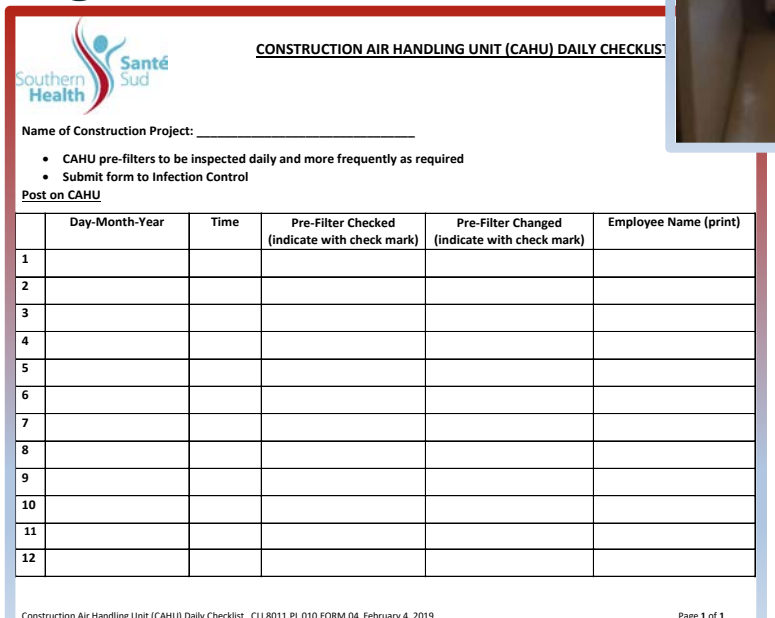
Southern Health Santé Sud

Preventive Measures III

Before Project Begins



- Construction Air Handling Unit (CAHU)
  - HEPA filtration certified
  - Filters checked and changed as needed
  - Logged daily
  - Air exhausted outside



Southern Health Santé Sud

CONSTRUCTION AIR HANDLING UNIT (CAHU) DAILY CHECKLIST

Name of Construction Project: _____

- **CAHU pre-filters to be inspected daily and more frequently as required**
- **Submit form to Infection Control**

Post on CAHU

	Day-Month-Year	Time	Pre-Filter Checked (indicate with check mark)	Pre-Filter Changed (indicate with check mark)	Employee Name (print)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

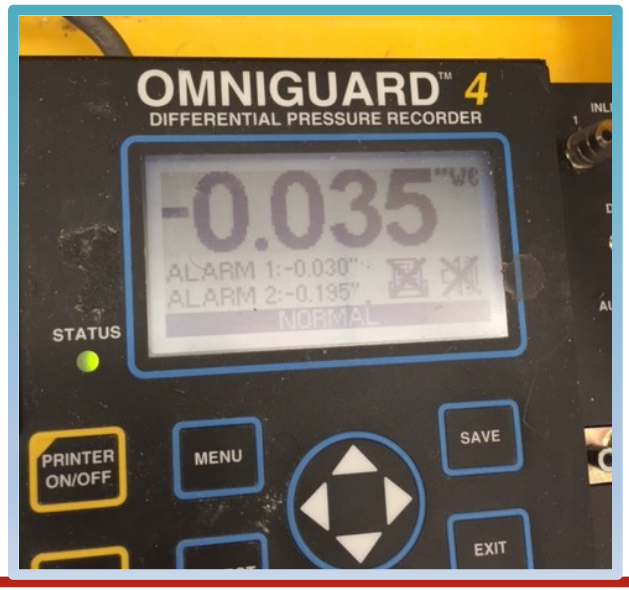
Construction Air Handling Unit (CAHU) Daily Checklist CLI.8011.PL.010.FORM.04 February 4, 2019 Page 1 of 1

Southern Health Santé Sud

Preventive Measures III

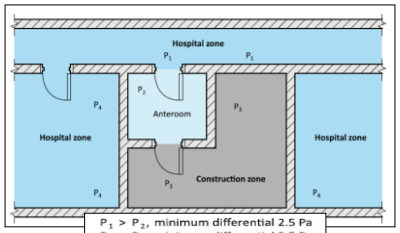
Before Project Begins

- Negative air maintained
  - Minus 7.5 Pascals (- 0.03 inWC)
  - Alarmed monitoring device
  - Log at least daily
- Anteroom – may be required



Southern Health Santé Sud

PRESSURE DIFFERENTIAL DAILY CHECKLIST



Name of Construction Project: _____

- Pressures are to be documented daily
- Submit form to Infection Control

Post at Construction Entrance

	Day-Month-Year	Time	Pa or inches water column Inside Construction Zone	Pa or inches water column Inside Anteroom	Employee Name (print)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Southern Health Santé Sud

Preventive Measures III

PM I + II plus

During Project

- Hoarding – frequent checks & immediate and repair
- Minimize dust production and spread - priority

Southern Health Santé Sud

Preventive Measures III

PM I + II plus

During Project

- HEPA vacuum
  - Equipment
  - Inside wall cavities
  - Construction clothing

Southern Health Santé Sud

Preventive Measures III

PM I + II plus

During Project

- HVAC ducting
  - protect from dust and moisture
  - store in clean area
  - sealed until installation

Southern Health Santé Sud

Preventive Measures III

PM I + II plus

During Project

- Dead leg water pipes – removed
- Excavation
  - Windows, doors closed/sealed
  - Frequent air intake filter changes
  - Water down soil
- In-house cleaning – increase frequency

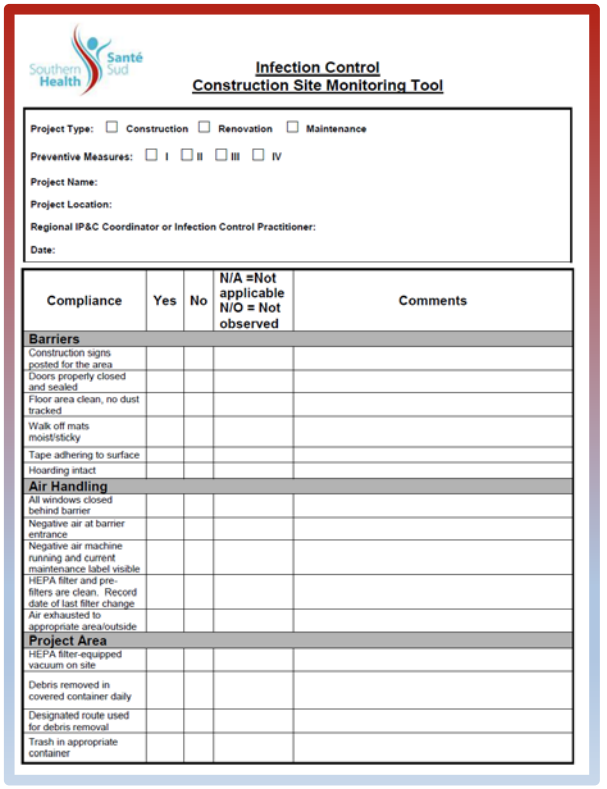
Southern Health Santé Sud

Preventive Measures III

PM I + II plus

During Project

- MDT & ICP
  - Air sampling – baseline, periodic, act on results
  - Site visits



Infection Control
Construction Site Monitoring Tool

Project Type: ☐ Construction ☐ Renovation ☐ Maintenance

Preventive Measures: ☐ I ☐ II ☐ III ☐ IV

Project Name:

Project Location:

Regional IP&C Coordinator or Infection Control Practitioner:

Date:

Compliance	Yes	No	N/A =Not applicable N/O = Not observed	Comments
Barriers				
Construction signs posted for the area				
Doors properly closed and sealed				
Floor area clean, no dust tracked				
Walk off mats moist/sticky				
Tape adhering to surface				
Hoarding intact				
Air Handling				
All windows closed behind barrier				
Negative air at barrier entrance				
Negative air machine running and current maintenance label visible				
HEPA filter and pre-filters are clean. Record date of last filter change				
Air exhausted to appropriate area/outside				
Project Area				
HEPA filter-equipped vacuum on site				
Debris removed in covered container daily				
Designated route used for debris removal				
Trash in appropriate container				
Routine cleaning done on job site				
Air vents sealed/duct work capped/drains covered				
Traffic Control				
Restricted to construction workers and necessary staff only				
All doors and exits free of debris				
Dress Code				
Appropriate for the area (i.e. OR, CSR, L&D, etc.)				
Required to enter				
Required to leave				
Protective clothing required in work space				
Workers clothing clean on exiting workspace				

Deficiencies reported to:

Date:

Corrective measures: describe what and by whom:

Preventive Measures III

PM I + II plus

End of Project

- Water lines – flushed or disinfected
- Air filters – changed or cleaned
- Work space and dust barrier inside hoarding
  – construction cleaned & removed
- Terminal cleaning – done by housekeeping
- Final inspection – by ICP before perimeter hoarding dismantle

Southern Health Santé Sud

Preventive Measures IV

PM I + II + III plus

Anteroom – Required

- Barrier – sealed
- Large enough - materials move through without both doors open
- Entry doors - gasket frames and closers
- Walk-off sticky mats – at entry and inside
- Negative pressure

Southern Health Santé Sud

Policy, Forms and Supporting Documents

On HPS

- Infection Prevention During Construction Renovation and Maintenance Policy
- Preventive Measures Quick Reference List
- Infection Control Preventive Measures Plan
- Infection Control construction Barrier Sign – English & French

Southern Health Santé Sud

Policy, Forms and Supporting Documents

On HPS

- Infection Control Risk Assessment (ICRA) For Health Care Facility Construction, Renovation and Maintenance
- Infection Control Construction Site Monitoring Tool
- Infection Control Post Construction Checklist
- Construction Air Handling Unit (CAHU) Daily Checklist
- Pressure Differential Daily Checklist

Southern Health Santé Sud

Good Hygiene and IP&C Practices

Sick
stay home

Cough & Sneeze into sleeve

Clean Hands when entering and leaving facility

Keep vaccination up to date – get the flu shot

Southern Health Santé Sud

Conclusion

- SH-SS policy applies to all construction, renovation, maintenance and repair projects – big or small
- Aspergillus and Legionella infections are linked to construction, renovation, maintenance and repair activities in health care facilities
- Every project requires an ICRA to determine the preventive measures required.
- Preventive measure must be followed by all.

Southern Health Santé Sud

Thank You

Prevention of Infection During Construction, Renovation, Maintenance and Repair in Health Care Facilities

For more infomation contact:

ICP

Construction Officer

Physical Plant Manager

Southern Health Santé Sud

References

Canadian Standards Association Z317.13-17. *Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities*, 2017

Canadian Standards Association Z8000-18. *Canadian Health Care Facilities, 2018*

Southern Health-Santé Sud. CLI.8011.PL.010. Infection Prevention During Construction, Renovation and Maintenance

Pictures accessed through Southern Health-Santé Sud Construction Office & Google.com

Southern Health Santé Sud