

Mould Thresholds of Cleanliness

How clean is clean enough for mould damaged cultural heritage artefacts?

What are the thresholds? They are a conceptual framework for thinking about mould remediation in cultural heritage.

Why do we need thresholds? Exposure to mould is hazardous to human health, but affects humans in a variety of ways, presenting a range of symptoms and health outcomes. As such, there is no way to define a 'safe amount' of mould exposure. Prevention and minimising exposure are recommended health practices. Retention of mould damaged artefacts with porous substrates is not addressed in non-heritage remediation guidelines, which generally recommend disposal.

As mould remediation can rarely eliminate all risks, the framework is meant to connect remediation methods with theoretical targets. These inform decisions of what is necessary, helping to answer questions like: If mould is everywhere, why should I clean? If we can never remove all the mould, how do I decide if I've cleaned enough? Do I have to kill the mould in addition to cleaning it? And are remediated items safe for storage and use?

The thresholds can be used in conjunction with the [Mould Remediation Decision Tree](#) (I think I have mould - what now?) and [Mould & Health Risk Diagram](#) (Is it safe? - achieving Threshold 1, in detail), which are available at <https://canadianconservationconsortium.ca/en/mould-levels>

Idealised/ Theoretical

Threshold 1 (necessary) → Minimise spread of mould/health effects

Goal: Mould spores and fragments are not actively contaminating the remediated item's direct surroundings during storage or use. Presents a relatively low health risk to users. Requires storage in stable environments, or environments not conducive to mould growth.

Threshold 2 (additional) → Minimise ability for that same mould to regrow

Goal: The remediated item is no more susceptible to further mould damage than any other substrate in the same environment. (E.g. the viability of the mould is minimised)

Achieving the thresholds in practice

Have I cleaned it enough? Is it safe?

Use Mould Health Risk Diagram for determining if Threshold 1 has been achieved to a sufficient level.

Threshold 1 (necessary) → Stop active growth and address surface mould

- Dried (mould is no longer actively growing)
- Cleaned and contained
 - Eg. surface cleaning (vacuum + brush, smoke sponges, etc)
 - Encapsulation or separating objects which cannot be adequately cleaned
- Ongoing environmental controls (no high temps + humidity)

Threshold 2 (additional) → Address future viability of embedded mould

- Threshold 1 + a fungicidal technique

Some treatments such as the application of 70:30 Ethanol:Water are applicable to Threshold 1 and 2 → the solvent application is meant to kill mould BUT also removes additional mould residues

Challenges to the thresholds

Threshold 1 (necessary) → Minimise spread of mould/health effects

There is no definable 'clean enough'. Health effects vary widely from person-to-person and are caused by a wide variety of mould components (metabolites vary widely depending on conditions and mould / substrate combination). Porous materials will never be totally cleanable

Threshold 2 (additional) → Minimise ability for that same mould to regrow

Artefact susceptible to new mould growth. Degraded substrates may be more likely susceptible than non-degraded substrates.

Fungistatic / fungicidal treatments unlikely to be successful to all moulds or safe for all substrates