

State of California
Department of Industrial Relations
Division of Occupational Safety and Health
Memorandum



Date: July 30, 2020

To: Christina Shupe, Executive Officer

Occupational Safety and Health Standards Board
2520 Venture Oaks Way, Suite 350
Sacramento, CA 95833

From: Eric Berg, Deputy Chief of Health *Eric Berg*
Division of Occupational Safety and Health

Re: Evaluation of Petition 579 to Amend Title 8 Regulations to Address Water Damaged Buildings and Exposure to Mold.

1.0 INTRODUCTION

On January 15, 2020, the Division of Occupational Safety and Health (Cal/OSHA) received a petition from Pamela Saling (Petitioner). The Petitioner requests a new title 8 regulation be established to prevent, assess, and remediate water damaged buildings to prevent mold and other microbial growth and to maintain indoor environmental quality.

Labor Code section 142.2 permits interested persons to propose new or revised standards concerning occupational safety and health, and requires the Board to consider such proposals and render a decision no later than six months following receipt. California Governor Gavin Newsom, in recognition of the State of Emergency that exists in California due to the COVID-19 pandemic, extended the six month timeline by 120 days in [Executive Order N-71-20](#) (modifying the extension in [Executive Order N-63-20](#)).

Further, as required by Labor Code Section 147, any proposed occupational safety or health standard received by the Board from a source other than Cal/OSHA must be referred to Cal/OSHA for evaluation, and Cal/OSHA has 60 days after receipt to submit a report on the proposal. The Governor has also extended this timeline an additional 120 days.

2.0 REGULATORY CHANGES REQUESTED BY THE PETITIONER

The petitioner proposes that Cal/OSHA adopt a new regulation to protect workers from respiratory illness from mold and other microbial exposure by requiring inspection of water damaged buildings and immediate remediation of mold contamination and water sources.

The petitioner requests the regulation be based on a document included with the petition entitled *Medically Sound Investigation and Remediation of Water-Damaged Buildings in Cases of CIRSWDB* (hereafter referred to as “petitioner’s document”)¹.

The petitioner’s document contains procedures for:

- 2.1 Finding causes of and preventing water damage to built environments using instruments such as a moisture meter, an infrared imaging system, relative humidity meter, and a particle counter to identify abnormal moisture and airborne dust levels.
- 2.2 Investigating and remediating water damaged buildings when occupants suffer from chronic inflammatory response syndrome (CIRS) including taking samples of settled dust to identify microorganisms using quantitative polymerase chain reaction (species identification by DNA).
- 2.3 Determining when a damp indoor environment has been remediated successfully such that occupants with CIRSWDB may safely re-occupy the space; and
- 2.4 Maintaining indoor environmental quality (IEQ) over the long-term.

3.0 BACKGROUND ON MOLD

Molds are microbial fungi present virtually everywhere, indoors and outdoors. Although they are microscopic, they can form large colonies that are visible. There are thousands of known species of mold; all require moisture for growth and most feed on decaying organic matter. Molds reproduce by producing large numbers of small spores that can be airborne for long periods of time. Many molds also produce mycotoxins to inhibit the growth of competing microorganisms.²

4.0 HAZARDS ASSOCIATED WITH WATER DAMAGED BUILDINGS AND EXPOSURE TO MOLD

Water intrusion, leakage from interior water sources, or other accumulation of water or excessive moisture inside a building, if not corrected, can cause the mold growth^{3,4,5}. In addition to mold, wet materials or damped surfaces can lead to the growth of other fungi and bacteria; the release of volatile organic compounds; and the breakdown of building materials⁶.

¹ CIRS is an acronym for chronic inflammatory response syndrome. WDB is an acronym for water damaged buildings.

² Indoor Air Quality (IAQ) Section. CDPH Webpage on Mold and Dampness (August 20, 2019). <https://www.cdph.ca.gov/Programs/CCDPPH/DEODC/EHLB/IAQ/Pages/Mold.aspx>

³ DHHS (NIOSH) Publication No. 2013-102 (November 2012)] NIOSH Alert: Preventing Occupational Respiratory Disease from Exposures Caused by Dampness in Office Buildings, Schools, and Other Nonindustrial Buildings. <https://www.cdc.gov/niosh/docs/2013-102/pdfs/2013-102.pdf>

⁴ Environmental Health Laboratory Branch (EHLB) CDPH Statement on Building Dampness, Mold, and Health (2016). www.cdph.ca.gov/Programs/CCDPPH/DEODC/EHLB/IAQ/CDPH%20Document%20Library/MoldDampStatement2017_ENG.pdf

⁵ 8 CCR 3362, General Sanitation Requirements. <https://www.dir.ca.gov/Title8/3362.html>

⁶ DHHS (NIOSH) Publication No. 2013-102 (November 2012)] NIOSH Alert: Preventing Occupational Respiratory Disease from Exposures Caused by Dampness in Office Buildings, Schools, and Other Nonindustrial Buildings. <https://www.cdc.gov/niosh/docs/2013-102/pdfs/2013-102.pdf>

The US Centers for Disease Control and Prevention (CDC), the Institute of Medicine of the US National Academy of Sciences, and the World Health Organization, agree that living or working in a building with water damage and mold growth increases the risk of respiratory disease.⁷ Adverse health effects are primarily due to allergic reactions, irritation, and mycotoxins.

4.1 Allergic Reactions to Mold

Mold, mold spores, and mold fragments can cause allergic reactions in certain persons. Allergic reactions are common and can be immediate or delayed. A single exposure or repeated exposures may cause non-sensitive individuals to become sensitive and allergic to mold, and repeated exposures have the potential to increase sensitivity. Mold can cause allergic reactions whether it is dead or alive. Symptoms of allergic reaction to mold include: asthma, hypersensitivity pneumonitis, rhinosinusitis, bronchitis, difficulty breathing, headache, sneezing, red eyes, and dermatitis. Individuals with asthma or hypersensitivity pneumonitis may be at risk for progression to more severe disease if exposures continue.^{8,9,10,14,16}

4.2 Irritation from Mold

In addition, molds, mold spores, and mold fragments can cause eye, skin, nose, throat, and lung irritation and inflammation regardless of whether an individual is allergic to mold.

4.3 Mycotoxins

As molds grow, some produce potentially toxic byproducts called mycotoxins under certain conditions. More than 200 mycotoxins from common molds have been identified, and many more remain unidentified. The amount and types of mycotoxins produced by a particular mold depends on many environmental and genetic factors. Mycotoxin production from molds is not visible.

Some mycotoxins are known to cause adverse health effects, but for many mycotoxins little health information is available. Exposure to mycotoxins can occur from inhalation, ingestion and skin contact.

⁷ Environmental Health Laboratory Branch (EHLB) CDPH Statement on Building Dampness, Mold, and Health (2016). www.cdph.ca.gov/Programs/CCDCPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/MoldDampStatement2017_ENG.pdf

Centers for Disease Control and Prevention. Basic Facts about Mold and Dampness. December 16, 2019. <https://www.cdc.gov/mold/faqs.htm>.

⁸ DHS Report to the California Legislature. April 2005. Implementation of the Toxic Mold Protection Act of 2001. https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/SB732-Implemntn-LegReport-Final-2005_ADA.pdf

⁹ DHHS (NIOSH) Publication No. 2013-102 (November 2012)] NIOSH Alert: Preventing Occupational Respiratory Disease from Exposures Caused by Dampness in Office Buildings, Schools, and Other Nonindustrial Buildings. <https://www.cdc.gov/niosh/docs/2013-102/pdfs/2013-102.pdf>

¹⁰ CDC Webpage on Mold (December 16, 2019). <https://www.cdc.gov/mold/default.htm>

5.0 CAUSES OF MOLD GROWTH IN BUILDINGS

Water intrusion is a major cause of mold growth. Common sources of water intrusion in buildings include the following:

- Leaking roofs.
- Leaking or condensing water pipes, especially pipes inside wall cavities or pipe chases.
- Leaking fire-protection sprinkler systems.
- Landscaping, gutters and down spouts that direct water into or under a building.
- Condensation occurring on cold surfaces in buildings such as windows and walls in enclosed unventilated rooms and areas.
- Unvented appliances.
- Poorly draining condensate drain pans inside air handling units.
- Porous thermal or acoustic liners inside duct work.

Humidity in the air can also supply enough moisture for mold growth even without any water intrusion. To prevent mold growth, the American Society of Heating, Refrigerating and Air-Conditioning Engineers recommends that indoor relative humidity be maintained at or below 65 percent.¹¹ The U.S Environmental Protection Agency recommends maintaining indoor relative humidity below 60 percent.¹²

6.0 RECOMMENDATIONS FOR TESTING MOLD IN BUILDINGS

6.1 American Conference of Governmental Industrial Hygienists (ACGIH)

ACGIH states that an airborne exposure limit for culturable or countable bioaerosol concentrations is not scientifically supportable because:

- Culturable microorganisms and countable biological particles do not comprise a single entity;
- Human responses to bioaerosols range from innocuous effects to serious, even fatal, diseases, so, an appropriate exposure limit for one bioaerosol may be entirely inappropriate for another;
- It is not possible to collect and evaluate all bioaerosol components using a single sampling method; and
- information relating culturable or countable bioaerosol concentrations to health effects is generally insufficient to describe exposure-response relationships¹³.

The ACGIH recommended approach to assessing and controlling bioaerosol exposures relies on

¹¹ ASHRAE 62.1-2016 Standard 62.1-2016 -- Ventilation for Acceptable Indoor Air Quality

¹² U.S. Environmental Protection Agency. Mold Course Chapter 2: Why and Where Mold Grows. FEBRUARY 21, 2017 <https://www.epa.gov/mold/mold-course-chapter-2>.

¹³ ACGIH [2018 Bioaerosols Committee]. Introduction to the Biologically Derived Airborne Contaminants. By Offermann F, Vance P. Cincinnati, OH: American Conference of Governmental Industrial Hygienists. <http://www.acgih.org>.

visually inspecting buildings, assessing occupant symptoms, evaluating building performance, identifying potential environmental sources, and applying professional judgment.

6.2 New York City Department of Health

The New York City Department of Health Guidelines state that environmental sampling is not usually necessary to proceed with remediation of visually identified mold growth or water-damaged materials¹⁴. They note that currently there are no United States Federal, New York State, or New York City regulations for the assessment or remediation of mold growth and that removing mold growth and correcting the underlying cause of water accumulation can help to reduce mold exposures and related health symptoms. Decisions about appropriate remediation strategies can generally be made on the basis of a thorough visual inspection. Thus, prompt remediation of mold-damaged materials and infrastructure repair should be the primary response to mold growth in buildings.

In their December 2010 State Toxic Mold Task Force report to their Legislature, the New York State Department of Health noted that air sampling results often report concentrations for Penicillium or Aspergillus without identifying the species detected¹⁵. There are approximately 100 Penicillium species and 200 Aspergillus species. Not all species within a genus are the same in terms of their allergens or harmful effects, so grouping these species together as total counts for each genus does not adequately characterize relevant harmful exposure either qualitatively or quantitatively. Furthermore, individual species can have different strains that vary substantially in their allergen production, and allergen production can vary depending on the growth conditions. Thus, having more precise species identifications would not significantly change remediation best practices.

7.0 APPLICABLE TITLE 8 REGULATIONS TO MOLD IN BUILDINGS - SECTION 3362. GENERAL SANITATION REQUIREMENTS.

Title 8 section 3362 applies to all worksites to ensure that employers provide and maintain places of employment in a clean, orderly and sanitary condition. Subsection 3362(g) requires certain sources of water be corrected to prevent mold growth. The subsection does not require existing mold growth be cleaned or removed. Section 3362 does not mandate mold sampling nor prescribe how to prevent or remediate water intrusion. Subsection 3362(g) states the following:

¹⁴ New York City Department of Health: Guidelines on Assessment and Remediation of Fungi in Indoor Environments (2008) <https://www1.nyc.gov/assets/doh/downloads/pdf/epi/epi-mold-guidelines.pdf>

¹⁵ New York State Department of Health: New York State Toxic Mold Task Force Final Report to the Governor and Legislature (December 2010) https://www.health.ny.gov/environmental/indoors/air/mold/task_force/docs/final_toxic_mold_task_force_report.pdf

§ 3362. General Requirements.

(g) When exterior water intrusion, leakage from interior water sources, or other uncontrolled accumulation of water occurs, the intrusion, leakage or accumulation shall be corrected because of the potential for these conditions to cause the growth of mold.

8.0 BRIEF HISTORY OF MOLD REGULATION IN CALIFORNIA

In 2001, Cal/OSHA submitted to the Standards Board a proposal to amend title 8 section 3362 subsection (g) to address the adverse health effects caused by unwanted mold growth through prevention, by requiring that water intrusion, leaks, and other sources of uncontrolled water accumulation inside a building be corrected¹⁶. These amendments were adopted on June 20, 2002 and became effective on September 4, 2002.¹⁷

In 2001, the California Legislature directed the California Department of Health Services (now the California Department of Public Health or CDPH) through the 2001 Toxic Mold Protection Act to determine the feasibility of establishing health-based permissible exposure limits (PELs) for indoor mold¹⁸. If a PEL was possible, CDPH was also directed to create programs to develop guidelines for mold assessment, clean-up, and disclosure in residences.

In their 2005 report to the California Legislature on Implementation of the Toxic Mold Protection Act of 2001, CDPH responded that available evidence did not support the establishment of science-based PELs for indoor molds. Additionally, CDPH noted that while samples can provide evidence of mold presence, samples are only indirect indicators of exposure or possible levels of exposure. Thus, CDPH concluded that the presence of water intrusion, water damage, and dampness should be corrected promptly and any mold growth removed safely^{3,19}. This view remains the CDPH position to date^{20,3}.

9.0 FEDERAL OSHA REGULATIONS

Code of Federal Regulations, title 29, section 1910.141(a)(3), Sanitation, is in part, the corresponding federal OSHA regulation to California Code of Regulations, title 8, section 3362.²⁰

¹⁶Final Statement of Reasons General Sanitation Requirements Title 8 General Industry Safety Orders section 3362

¹⁷ Title 8 General Industry Safety Orders Section 3362. General Sanitation Requirements for Mold Approved Regulation Text.

¹⁸ 2001 California Legislative Senate Bill No. 732, Ortiz. Toxic Mold. www.leginfo.ca.gov/pub/01-02/bill/sen/sb_0701-0750/sb_732_bill_20011007_chaptered.pdf

¹⁹ CDPH Report to the California Legislature on the Implementation of the Toxic Protection Mold Act of 2001 (2005). www.cdph.ca.gov/Programs/CCDPPH/DEODC/EHLB/IAQ/CDPH%20Document%20Library/SB732-Implemntn-LegReport-Final-2005_ADA.pdf

²⁰ Title 29 Code of Federal Regulations, section 1910.141

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STAnDARDS&p_id=9790

However, unlike the California regulation, the federal regulation does not contain requirements to address water intrusion.

Federal OSHA can also enforce the General Duty Clause of the OSH Act and require employers to implement feasible abatement measures to protect workers from serious and recognized workplace hazards where there is no specific federal OSHA regulation. The relevant part of the OSH Act is the following:

Section 5. Duties

(a) Each employer

(1) Shall furnish to each of his [sic] employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees

* * * *

In its guide for [Preventing Mold-Related Problems in the Indoor Workplace](#), OSHA states that sampling for mold where visible mold is present, is not usually necessary and that cleanup can proceed on the basis of the visual inspection.²¹

10.0 PETITIONER'S BASIS FOR THE NEED FOR A REGULATION FOR WATER DAMAGED BUILDINGS AND PROTECTION FROM MOLD.

According to the petitioner, a regulation is needed to address deficiencies in title 8 as follows:

Title 8 is missing quite clearly mold regulations and standards via acceptable air quality standards and conditions from damp sick building syndrome, which once a building has the bacterial growth from poor historical Title 8 measures and upkeep, it becomes that the only way to remedy the situation/building is with hygienists and professional remediation services.²²

The Petitioner states that up to 50% of homes and workplaces in the U.S. have past or current water damage. Indoor water damage supports the growth of toxic-producing fungi and a host of other microorganisms and contaminants found in WDBs. The petitioner claims that approximately one in four people are genetically susceptible to develop CIRS-WDB following exposure to the interior environment of a water damaged building. They assert that if WDBs provide conditions conducive for the growth of harmful microbes and other contaminants capable of triggering systemic inflammation in persons with CIRS-WDB, then the number of CIRS-WDB cases could number up to 40 million people.

The Petitioner asserts that none of the existing remediation guidelines and standards are sufficient to protect people's health, including but not limited to the [Assessment and Remediation](#)

²¹ OSHA. Preventing Mold-Related Problems in the Indoor Workplace. A Guide for Building Owners, Managers and Occupants. OSHA 3304-04N 2006. https://www.osha.gov/Publications/preventing_mold.pdf

²² Email communications from petitioner with E. Berg Deputy Chief of Health and C. Shupe Standards Board Executive Officer.

[of Fungi in Indoor Environments](#) from the New York City Department of Health and Mental Hygiene, the [Mold Remediation in Schools and Commercial Buildings Guide](#) from the U.S. EPA, and the [S520/ R520 Standard and Reference Guide for Professional Mold Remediation](#) from ANSI/ Institute of Inspection, Cleaning and Restoration Certification. The petitioner proposes that quantitative mold detection methods be used rather than qualitative measures (such as visual detection) found in most public health guidelines.

11.0 ANALYSIS OF THE PROPOSAL

Cal/OSHA agrees with the petitioner that water intrusion, leakage from interior water sources or other accumulation of water inside a building, if not corrected, can cause the growth of mold. Similarly, Cal/OSHA concurs that the presence in buildings of visible water damage, damp building materials, visible mold, or mold odor is unhealthy and can increase the risk of workers suffering a respiratory illness, particularly if exposure to the damp building is not recognized and corrected and the exposures continues indefinitely.

Cal/OSHA also agrees with the petitioner that title 8 subsection 3362(g) is insufficient in addressing mold hazards for the following reasons:

- Subsection 3362(g) is unnecessarily limited in scope. The subsection limits water sources to exterior water intrusion, leakage from interior water sources, or other **uncontrolled** accumulation of water occurs. Uncontrolled is irrelevant to mold and microbial growth. Whether controlled or not, if water intrusion or excessive moisture inside a building is continuously present, mold will grow.
- Subsection 3362(g) does not address high humidity environments that lead to mold growth as recognized by ASHRAE and the U.S. EPA.
- Subsection 3362(g) contains no requirements for removing mold growth from buildings, only controlling certain water intrusion. Once mold growth is present, it will continue to present a hazard to building occupants even after the removal of moisture.

Cal/OSHA does not agree with the petitioner that quantitative methods be required or used to determine mold or other microbial levels in buildings. CDC, NIOSH, WHO, and CDPH recommend against measuring indoor microorganisms or using the presence of specific microorganisms to determine the level of health hazards.^{23,24,25} Conventional quantitative measurements of fungi or other microbiologic exposures, such as counts of culturable airborne fungi, have shown less consistent associations with health effects than have qualitative

²³ Same as EHLB-CDPH source #3.

²⁴ NIOSH webpage Source # 2. Plus CDC Mold webpage #9.

²⁵ CDC Webpage on Mold. Basic Facts about Mold and Dampness. (December 16, 2019). <https://www.cdc.gov/mold/faqs.htm>

assessments of visible dampness or water damage, visible mold, or mold odor.^{26,15,16} Additionally, there are no set standards to determine the different kinds of mold that could be present.²⁷

The World Health Organization (WHO) guidelines state the most important means for avoiding adverse health effects is the prevention (or minimization) of persistent dampness and microbial growth on interior surfaces and in building structures²⁸. Therefore, indoor dampness, high humidity, water intrusion, and fungal growth should be always eliminated in a safe and efficient manner, by (a) identifying and correcting the source of water, moisture, and/or humidity, (b) drying or removing damp materials, and (c) cleaning or removing the mold and moldy materials.

12.0 CONCLUSION

Cal/OSHA recognizes that the presence of water damage, damp materials, and excessive mold growth inside buildings is unhealthy, and that the best method to protect workers in buildings is by ensuring that water intrusion, excessive moisture, and excessive humidity be corrected and that mold be cleaned and removed promptly.

Cal/OSHA recommends the petition be granted to the limited extent that an advisory committee be convened to consider appropriate changes to subsection 3362(g) to address deficiencies in the subsection as noted in the analysis by Cal/OSHA in part 11 of this evaluation. The Petitioner should be included in the advisory committee.

cc: Amalia Neidhardt
Grace Delizo
Kevin Graulich
Chris Kirkham

²⁶ Mendell MJ, Mirer AG, Cheung K, Tong M, Douwes J. 2011. Respiratory and Allergic Health Effects of Dampness, Mold, and Dampness-Related Agents: A Review of the Epidemiologic Evidence. *Environ Health Perspect* 119:748-756 (2011). doi:10.1289/ehp.1002410

²⁷ CDC Webpage on Natural Disasters and Severe Weather. Information for Clinicians Helping Patients with Asthma, Other Respiratory Conditions, and/or Allergies to Mold after a Hurricane or Other Tropical Storm. (November 14, 2017). https://www.cdc.gov/disasters/clinicians_asthma.html

²⁸ W.H.O. (World Health Organization) Europe. 2009. WHO Guidelines for Indoor Air Quality: Dampness and Mould. Copenhagen: World Health Organization.
www.euro.who.int/_data/assets/pdf_file/0017/43325/E92645.pdf