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June 5, 2026

Eric Berg
Director, Research and Standards Unit
California Division of Occupational Safety and Health
1515 Clay St., Suite 1901
Oakland, CA 94612

RE: Comments on Cal/OSHA's April 2026 Discussion Draft- Occupational Exposure to Plume in Health Care

Dear Mr. Berg,

On behalf of the California Nurses Association/National Nurses United (CNA), the largest union of registered nurses (RNs) in California with over 100,000 members, we thank you for the opportunity to comment on the discussion draft “§51XX. Occupational Exposure to Plume in Health Care” developed by the California Division of Occupational Safety and Health (Cal/OSHA, hereinafter “Division”) and posted April 24, 2026. CNA has long championed the need for an enforceable standard to protect RNs, other health care workers, and patients from surgical plume, which is a well-substantiated health hazard.

We appreciate the Division’s work to update the April 2026 discussion draft to improve protections for RNs and other health care workers occupationally exposed to surgical plume, including addressing many of our comments on previous discussion drafts. **CNA supports many of the changes made in the April 2026 discussion draft (Section I) while also urging the Division to make additional edits to ensure RNs and other health care workers are fully protected from surgical plume (Section II).**

Surgical plume poses a serious health risk to health care workers, including respiratory and ocular irritation, infectious disease exposure, and carcinogenic and mutagenic impacts.¹ Yet, **CNA’s April 2026 survey shows that, while many hospitals in California already have plume evacuation systems in place, they lack policies to require their use (Section III).** The need for an enforceable standard on surgical plume is clear, and CNA-sponsored AB 1007 (2023, Ortega) required the Division to develop such a proposal in a timely fashion. **CNA urges the Division to move expediently to propose a protective, comprehensive surgical plume standard by the legislature’s deadline of December 1, 2026.**

¹ Occupational Safety and Health Administration. *Surgical Suite: Smoke Plume*.
<https://www.osha.gov/etools/hospitals/surgical-suite/smoke-plume> (Accessed June 2, 2026).

I. CNA Supports Several Updates to the Division's Surgical Plume Discussion Draft Posted on April 24, 2026.

We appreciate the Division's diligent work to craft a standard to protect health care workers from the hazards of surgical plume exposure. We affirm the importance of several updates made to the most recent discussion draft (April 2026), including:

- Adding a definition of capture device to subsection (b)(4) and requiring the capture device to be located as close as possible to the site of plume generation in subsection (d)(1)(A)2.
- Prohibiting the use of medical-surgical vacuums to evacuate plume in subsection (d)(1)(A).
- Adding a list of contaminants that can be part of plume to the definition of plume in subsection (b)(13).
- Updating the definition of plume evacuation systems in subsection (b)(14) to clarify that such systems can be portable, mobile, or fixed.
- Including high-speed powered instruments in the list of devices that can create plume in subsection (c)(2)(D).
- Expanding language on when plume evacuation systems need to be in use to include "whenever plume is present, generated, or whenever plume generating devices are in use" in subsection (d)(1)(A)1.
- Clarifying requirements in subsection (d)(1)(A)3.ii. that plume evacuation systems must have "sufficient capacity to handle the anticipated level of plume for all procedures within its expected application." Though, as we note below in section II.D. of these comments, we would encourage the Division to separate this phrase to better enable enforcement separate from other requirements in (d)(1)(A)3.ii.
- Maintaining the clear statement that surgical masks are not respirators in subsection (d)(3)(A).
- Clarifying the need for employees who have occupational exposure to plume to receive all required training in subsection (e). CNA appreciates the Division's clear recognition of the importance of robust training.
- Adding a requirement for how employees can request additional training in subsection (e)(9).
- Establishing a timeline that requires employers to provide copies of requested records to employees or their representatives within five business days of the request in subsection (f).
- Adding a requirement that employers must maintain records of the annual review of the exposure control plan in subsection (f)(4).

CNA thanks the Division for strengthening the discussion draft with these additions and urges the Division to maintain them in future drafts.

II. CNA Urges the Division to Make Additional Updates to Further Strengthen the Surgical Plume Discussion Draft Posted on April 24, 2026.

While the Division has made many important improvements to the discussion draft, there are areas where CNA urges the Division to make further updates, which we describe below. We also provide a line-by-line proposal for the draft standard in Attachment #1.

- A. Terminology around employee representatives should be consistent with other Title 8 standards that apply in similar health care facilities.

To avoid confusion and inconsistent application of protections, the Division should not utilize definitions that deviate from definitions used in existing Title 8 standards that apply in the same or overlapping scope. In the April 2026 discussion draft, the Division updated the definitions of “authorized employee representative” in subsection (b)(3) and “designated employee representative in subsection (b)(5). However, these updates do not resolve the identified issue.

Other Title 8 standards that apply in the same types of health care facilities as the surgical plume standard utilize different terminology. For example, the Workplace Violence Prevention in Health Care Standard requires the involvement of “employees and their representatives” in designing, implementing, and reviewing the employer’s workplace violence prevention plan.² The Safe Patient Handling Standard requires provision of records to “employees and their representatives.”³ The Aerosol Transmissible Diseases Standard requires provision of written exposure control plans to employees and “employee representatives.”⁴ **CNA urges the Division to use language and definitions of “employee representatives” that is more consistent with existing Title 8 standards with which RNs and employers in covered health care settings are already familiar.**

- B. When reviewing exposure control plans, employers should be explicitly required to correct any deficiencies found and should also be required to take into account the availability of more effective plume evacuation systems.

In subsection (c)(3), the Division’s April 2026 discussion draft requires surgical plume exposure control plans to be reviewed, evaluated, and updated:⁵

- (A) At least annually,
(B) When new processes, procedures, and equipment are introduced to the workplace,
and

² 8 Cal. Code Regs. §3342(c)(2).

³ 8 Cal. Code Regs. §5120(e)(1)(D).

⁴ 8 Cal. Code Regs. §5199.

⁵ April 26, 2024 Surgical Plume Discussion draft (c)(3).

(C) Whenever a new or previously unrecognized hazard is identified.

CNA agrees with the Division that all three listed conditions should initiate a review of the exposure control plan. It is important for employers to review and update their exposure control plans periodically and when conditions change. To make it clear that employers must address any problems identified during review, **we propose additional wording to require that any deficiencies must be corrected** (Attachment #1, subsection (c)(3)).

We also note that **the Division's proposed list in subsection (c)(3) does not fully capture all the situations when an employer's exposure control plan should be re-evaluated and updated when it comes to surgical plume.** Surgical plume contains multiple hazards, including infectious pathogens, irritants, mutagens, and carcinogens.⁶ Neither the Occupational Safety and Health Administration (OSHA) nor the National Institute for Occupational Safety and Health (NIOSH) has an exposure limit for surgical plume. In the absence of an exposure limit, given that many carcinogens can cause health impacts even at low doses and that the impact of chemical mixtures can often be greater than each individual chemical alone,⁷ the goal should be to evacuate as much plume as possible.

In the event that more effective plume evacuation systems or other engineering controls are developed, employers should be required to reassess their exposure control plans and determine whether improvements are needed to maximize controls. Therefore, we suggest adding a fourth criterion to subsection (c)(3): "Whenever updated or improved plume evacuation systems or other engineering controls that effectively capture and remove plume become available."

We recognize that the current discussion draft tracks with the Injury and Illness Prevention Program (IIPP) standard, which requires employers to conduct inspections to identify and evaluate workplace hazards when the IIPP is first established; whenever new substances processes, procedures, or equipment are introduced that represent a new hazard; and whenever the employer is made aware of a new or previously unrecognized hazard.⁸ However, we also note that, where needed to effectively address specific hazards, Cal/OSHA has established additional criteria for when employers need to review and update their exposure control plans. For example, the Workplace Violence in Healthcare standard requires employers to review and update their plans at least annually and:⁹

- To reflect new or modified tasks and procedures which may affect how the Plan is implemented, such as changes in staffing, engineering controls, construction or

⁶ National Institute for Occupational Safety and Health, (June 18, 2020). *Surgical Smoke Inhalation: Dangerous Consequences for the Surgical Team*. <https://www.cdc.gov/niosh/bulletin/2020/surgical-smoke.html>.

⁷ National Institute of Environmental Health Sciences, (Dec. 22, 2025). *Chemical Mixtures*. <https://www.niehs.nih.gov/health/topics/science/chemical-mixtures>.

⁸ 8 Cal. Code Regs. §3203(4).

⁹ 8 Cal. Code Regs. §3342(e) and (e)(5)(A) through (e)(5)(D).

modification of the facilities, evacuation procedures, alarm systems and emergency response;

- To include newly recognized workplace violence hazards;
- To review and evaluate workplace violence incidents which result in serious injury or fatality; or
- To review and respond to information indicating that the Plan is deficient in any area.

Given that plume evacuation systems and other engineering controls will continue to be refined and improved as more health care facilities will be required to use them, it would be prudent for the Division to clearly require employers to take into account improved technology when it becomes available.

- C. The Division should add a requirement that only plume evacuation systems that have been shown to capture at least 90 percent of plume can be utilized to meet the standard's requirements.

CNA conducted a review of the scientific literature assessing the capture efficiencies of surgical plume evacuation systems (Attachment #2). **Our review found that there is significant variation in how effective plume evacuation systems are— measured capture efficiencies ranged dramatically from zero to 100 percent.** Some studies evaluated capture efficiency for particulate matter, others for volatile organic compounds (VOCs), with a handful of studies evaluating both. For particulate measurements, capture efficiencies ranged from 44 to 99 percent, and for VOC measurements, capture efficiencies ranged from zero to 100 percent. **Plume evacuation systems that only remove a small fraction of generated plume will not provide sufficient protection to RNs and other health care workers,** remembering that plume is a complex mixture of multiple hazards including carcinogens, mutagens, irritants, and potentially infectious particles.¹⁰

Therefore, CNA urges the Division to require that plume evacuation systems shall be demonstrated to provide at least 90 percent capture efficiency. Specifically, CNA proposes adding the following language to subsection (d)(1):¹¹

(d)(1)(A)[...] Plume evacuation systems shall:

1. Provide at least 90 percent reduction in plume, when operated in accordance with manufacturer's instructions, as tested utilizing the methodology in Annex C of ISO Standard 16571 (2024) or equivalent.

It is vital for Cal/OSHA to include a requirement for plume evacuation systems to be tested according to a standardized methodology. Without a standardized methodology,

¹⁰ National Institute for Occupational Safety and Health, (June 18, 2020). *Surgical Smoke Inhalation: Dangerous Consequences for the Surgical Team*. <https://www.cdc.gov/niosh/bulletin/2020/surgical-smoke.html>.

¹¹ See Attachment #1.

manufacturers of plume evacuation systems could elect to utilize methods that could overestimate the true capture efficiency of their systems in order to appear compliant, which would leave workers dangerously exposed to plume with a false sense of protection. A clear methodology is provided by the International Organization for Standardization (ISO) consensus standard, *Systems for evacuation of plume generated by medical devices* (ISO 16571, updated 2024) in Annex C. **CNA urges the Division to require only the use of plume evacuation systems that have been shown, by the test methodology in ISO:16571(2024) Annex C or an equivalent methodology, to provide 90 percent capture efficiency.**

We specifically call for the Division to require plume evacuation systems that provide at least 90 percent capture efficiency because this is a level that would be most protective and is technologically feasible. In the scientific literature, multiple plume evacuation systems were able to provide 90 percent capture efficiency under at least some conditions.¹² Given that surgical plume includes carcinogens,¹³ and that many carcinogens can pose health risks at low levels, lower exposures are more protective.

Additionally, while exposure limits have been established for some carcinogens found in surgical plume such as formaldehyde, acetonitrile, and benzene, **it is important to note that surgical plume is a complex mixture of multiple hazards, not all of which have exposure limits.** Further, the exact composition and amount of plume can change based on the type of surgical device, the type of tissue being cauterized, and other factors.¹⁴ **Therefore, it would be most protective to reduce exposures as low as possible.** In the event that the capture efficiencies of

¹² Carr et al. (2020) "Effect of Electrocautery Settings on Particulate Concentrations in Surgical Plume during Tonsillectomy." *Otolaryngol Head Neck Surg*, 162(6): 867-72. <https://doi.org/10.1177/0194599820914275>.

Cheng et al. (2021) "A study to quantify surgical plume and survey the efficiency of different local exhaust ventilations." *Scientific Reports*, 11: 14096. <https://doi.org/10.1038/s41598-021-92859-9>.

Gioutsos et al. (2022) "Surgical smoke: modern mobile smoke evacuation systems improve occupational safety in the operating theatre." *Interact Cardiovasc Thorac Surg*, 34(5): 775-82. <https://doi.org/10.1093/icvts/ivac024>.

Liu et al. (2020) "The utility of local smoke evacuation in reducing surgical smoke exposure in spine surgery: a prospective self-controlled study." *The Spine Journal*, 20(2): 166-73. <https://doi.org/10.1016/j.spinee.2019.09.014>.

O'Brien et al. (2020) "Surgical Team Exposure to Cautery Smoke and Its Mitigation during Tonsillectomy." *Otolaryngol Head Neck Surg*, 163(3): 508-16. <https://doi.org/10.1177/0194599820917394>.

Seipp et al. (2018) "Efficiencies and noise levels of portable surgical smoke evacuation systems." *J Occup Environ Hygiene*, 15(11): 773-81. <https://doi.org/10.1080/15459624.2018.1513134>.

¹³ National Institute for Occupational Safety and Health, (June 18, 2020). *Surgical Smoke Inhalation: Dangerous Consequences for the Surgical Team*. <https://www.cdc.gov/niosh/bulletin/2020/surgical-smoke.html>.

¹⁴ Surgical device settings can change amount of plume generated. Carr et al. (2020) "Effect of Electrocautery Settings on Particulate Concentrations in Surgical Plume during Tonsillectomy." *Otolaryngol Head Neck Surg*, 162(6): 867-72. <https://doi.org/10.1177/0194599820914275>.

Type of surgical device can change the amount of plume generated. Riopelle et al. (2022) "Plume Generated by Different Electrosurgical Techniques: An In Vitro Experiment on Human Skin." *Dermatologic Surgery*, 48(9): 949-53. <https://journals.lww.com/dermatologicsurgery/toc/2022/09000>.

Composition of plume varies based on energy, technique, and tissue. Krones et al. (2007) "Chemical composition of surgical smoke produced by electrocautery, harmonic scalpel and argon beaming – a short study." *European Surgery*, 39: 118-21. <https://doi.org/10.1007/s10353-006-0305-1>.

Karjalainen et al. (2018) "The characterization of surgical smoke from various tissues and its implications for occupational safety." *PLOS One*, <https://doi.org/10.1371/journal.pone.0195274>.

plume evacuation systems are improved over time, employers should be required to incorporate more effective technology (see comment #II.B.).

- D. Language requiring plume evacuation systems to have sufficient capacity is an important addition, but it should be moved to its own subsection for clarity.

CNA appreciates and supports the Division's addition of a requirement that plume evacuation systems must "have sufficient capacity to handle the anticipated level of plume for all procedures within its expected application" in subsection (d)(1)(A)4.ii. However, **we are concerned that adding the requirement as a second clause to requirements around plume evacuation system exhaust could complicate enforcement, and therefore request that the capacity requirement be moved to its own subsection:**

(d)(1)(A)3. Have sufficient capacity to handle the anticipated level of plume for all procedures within its expected application.

Separating this requirement into its own subsection could improve the ability of the Division's enforcement staff to establish whether a violation of this requirement was occurring. See Attachment #1.

- E. The Division should add a requirement to protect employees while handling contaminated equipment and supplies related to plume evacuation systems.

Plume evacuation systems utilize disposable parts, like tubing and capture devices, which must be replaced after each use, and filters, which must be replaced periodically. Because these disposable parts can become contaminated with plume during use, handling the items poses an exposure risk to health care workers. Members of the surgical team, including RNs, are often responsible for disposing of the tubing and capture devices when cleaning the surgery area between procedures. Procedures for monitoring and replacing filters differ by facility, often falling under the purview of housekeeping, engineering, or other maintenance staff.

The Bloodborne Pathogens standard requires safe handling practices for any materials contaminated with blood or other bodily fluids, which certainly includes surgical plume. But, as has been noted, it is important to recognize that plume also includes other hazardous substances, including irritants, mutagens, and carcinogens.¹⁵ **Therefore, CNA believes it would be most protective for the Division to make clear that health care employers need to protect employees from hazards that can be posed by contaminated equipment and supplies during activities like cleaning and maintenance of plume evacuation systems.** CNA urges the Division to add the following language to add to the discussion draft (see Attachment #1):

(d)(2)(A) All disposable accessories, including filters, hosing, or capture devices, shall be considered biohazardous material and shall be handled and disposed of safely as regulated waste required by Title 8 Section 5193 (d)(3)(E).

¹⁵ National Institute for Occupational Safety and Health, (June 18, 2020). *Surgical Smoke Inhalation: Dangerous Consequences for the Surgical Team*. <https://www.cdc.gov/niosh/bulletin/2020/surgical-smoke.html>.

Ultimately, CNA is concerned that, without such an explicit statement in the standard, health care employers may fail to establish effective procedures that cover all aspects of exposure to surgical plume.

F. General ventilation requirements should be expanded to ensure that plume hazards are effectively neutralized before room air is recirculated.

The Division's discussion draft appropriately requires exhaust from plume evacuation systems to either go directly outside or indoors through both an ultra-low particulate air (ULPA) filter and gas phase filter in subsection (d)(1)(A)3. This is essential because surgical plume has been clearly documented to contain both particulate and gaseous hazards.¹⁶ However, the Division's discussion draft only requires room air to be recirculated through a HEPA filter in subsection (d)(1)(B). This would allow gaseous contaminants in room air to be recirculated in the hospital or ambulatory surgical center, potentially exposing staff, patients, and visitors. **Therefore, CNA encourages the Division to standardize requirements that any air contaminated with surgical plume should be exhausted directly outdoors or pass through both a HEPA and gas phase filter before being recirculated.**

CNA also notes that the Division included the requirement for plume evacuation systems exhausted outdoors to be exhausted at least 25 feet from any doors, windows, air intakes, other openings in buildings, or places where persons may be present in subdivision (d)(1)(A)3., but that **these same requirements were not included in subdivision (d)(1)(B) for general ventilation air containing plume that is exhausted outdoors and should be added.** CNA urges the Division to correct these inconsistencies.

G. The Division should expand eye protection requirements in subdivision (d)(4).

CNA recommends adding a requirement to subdivision (d)(4) that employers address any potential conflict between appropriate surgical plume eye protection and other personal protective equipment (PPE), such as respirators or laser eye protection.

H. The Division should clarify and expand training requirements in subdivision (e).

Training is an important and vital element for exposure control plans to function and effectively provide protection. The Division has included many important elements for training related to surgical plume to be effective. However, **CNA requests that the Division address the following comments related to subdivision (e) Training:**

- **Include a requirement for training to be provided at the time of initial assignment to a job where plume exposure could occur**, in addition to when the plan is first established and at least annually. Once the plan is established, if an employee moves into a new job or into a new area where plume exposure is a concern, the employer should be

¹⁶ National Institute for Occupational Safety and Health, (1996). *Control of Smoke From Laser/Electric Surgical Procedures*. <https://www.cdc.gov/niosh/docs/hazardcontrol/hc11.html>.

required to provide the necessary training prior to assignment and possible exposure, rather than waiting months until the next the annual training.

- **Add a requirement that employers must provide additional training when changes are made to the exposure control plan.** Updated training is essential if the employer changes the exposure control plan, such as adjusting protocols for how plume evacuation systems are used or the addition of new equipment to the facility. CNA members have reported experiences with health care employers purchasing and providing plume evacuation systems, but then failing to provide training on how to use the evacuation systems appropriately.

See Attachment #1 for CNA's proposed language on these edits.

- I. The Division should add a requirement that employers log instances when plume evacuation systems were not utilized where required.

The Division's current draft addresses many concerns, but it does not yet require covered health care employers to track and investigate instances where plume was generated and the plume evacuation system was not utilized. **CNA urges the Division to add a clear requirement for employers to establish logs to track instances when plume evacuation systems failed or were not used.** Such logs should be evaluated during the annual review of the exposure control plan, and any repeat or serious issues identified should be remedied in a timely manner. Employers should be required to log information necessary to understand why plume evacuation systems failed or were not utilized when plume was generated. This information is necessary to ensure that employers are able to identify issues with the exposure control plan and remedy them. Finally, CNA proposes that employers should follow well-established requirements in Section 3204 that covers similar types of exposure records.

CNA proposes the addition of the following language to subsection (f) Recordkeeping:

- (f)(3)(C) The employer shall maintain logs recording all instances when a plume evacuation system was not used and/or failed during use such that surgical plume was not effectively captured and removed. The logs shall be reviewed during the annual review of the exposure control plan. Such logs shall record:
1. The date, time, length, type, and location of the procedure during which plume was generated but a plume evacuation system was not in use. Such instances shall include when a plume evacuation system fails or malfunctions at any point during a surgical procedure.
 2. The reason(s) why the plume evacuation system was not in use when plume was generated.
 3. Logs shall be maintained in accordance with Section 3204.

Requiring employers to maintain logs will support more effective control of surgical plume and, thus, better protect the health and safety of RNs and other health care workers.

III. CNA’s Plume Survey Shows That Many California Hospitals Already Have Plume Evacuation Systems in Place But Lack Policies to Require Their Use— Demonstrating a Clear Need for an Enforceable Surgical Plume Standard.

In April 2026, CNA conducted an online survey regarding plume exposure (Attachment #3). RN respondents who work in hospital operating rooms, pre-op or post-anesthesia care units, or labor and delivery units (which frequently perform C-sections) were asked questions regarding plume exposure and control. We found that:

1. Many hospitals in California already have plume evacuation systems in place.

CNA’s survey found that 52.2 percent of RNs working in hospital operating rooms, pre-op or post-anesthesia care units, and labor and delivery units report that their employer already has plume evacuation systems in place in their facility. While some facilities will need to acquire additional plume evacuation units to come into compliance with a surgical plume standard, in many cases, the equipment is present but not effectively utilized.

2. Health care employers need to take action to ensure that plume evacuation systems are used every time plume is generated.

CNA’s survey found that only 21.7 percent of RNs report that their employer has policies in place to ensure plume evacuation systems are used for every procedure utilizing electro- or laser surgery. This is a major issue because, as our results show, in many cases, the necessary equipment is available, but it is not being used. **CNA’s plume survey results indicate that more action is needed to protect California’s RNs and other health care workers from surgical plume.**

IV. Conclusion

Surgical plume poses a serious health hazard to RNs and other health care workers. Exposure to surgical plume can cause respiratory and ocular irritation, infectious disease transmission, and carcinogenic and mutagenic impacts.¹⁷ Yet, as our survey data shows, hospitals across California fail to protect health care workers and patients from this toxic hazard. CNA has long championed the need for regulatory action and enforcement to protect workers and patients from surgical plume—a need that has only grown as we learn more about the hazards posed by surgical plume. CNA stands ready to assist the Division in formulating the most protective standard on surgical plume, and we urge the Division to proceed expediently to comply with AB 1007’s deadline of December 1, 2026.

¹⁷ Occupational Safety and Health Administration. *Surgical Suite: Smoke Plume*.
<https://www.osha.gov/etools/hospitals/surgical-suite/smoke-plume> (Accessed June 2, 2026).

Sincerely,

A handwritten signature in black ink, appearing to read 'Carmen Comsti', with a stylized flourish at the end.

Carmen Comsti, Director of Government Relations
California Nurses Association/National Nurses United

- Attachment #1:** CNA's Line-by-line Proposed Edits to the Division's Surgical Plume Discussion Draft (Posted on April 2026)
- Attachment #2:** Literature Review: Plume Evacuation System Capture Efficiency
- Attachment #3:** Results of CNA's April 2026 Plume H&S Survey