



October 13, 2017

Subject: NIOSH RFI CDC-2017-0015 and Docket Number NIOSH-295. Peracetic Acid (PAA)

In response to the NIOSH RFI (CDC-2017-0015 and Docket Number NIOSH-295), the Healthcare Working Group (HCWG) of the American Industrial Hygiene Association® (AIHA) is pleased to submit the following comments regarding “Health Risks to Workers Associated With Occupational Exposures to Peracetic Acid.”

1. Workplace exposure data: Members of the HCWG having direct experience with PAA submitted data to Stephen Derman (HCWG Hazard Evaluation & Control Team Leader & Past Chair). The data with a description of work processes, descriptions of worker health effects described during the exposure monitoring, exposures to PAA, hydrogen peroxide, and acetic acid, as available, can be found in Table 1.
2. Health effects of healthcare workers have been described to HCWG industrial hygienists (IH); these have included: upper respiratory irritation, “burning eyes,” “burning nose,” “skin redness” and “itching,” headache, and “redness on knee.”
3. Workplaces and products in which peracetic acid may be found: Healthcare environments where instrument cleaning with high level disinfection occurs. More recently products containing PAA may be used by housekeepers or those responsible for cleaning and sanitizing surfaces. There are several products containing peracetic acid including: Rapicide PA, Acecide C, Peridox, and Oxycide.
4. Description of work tasks and scenarios with a potential exposure to PAA: Healthcare environments where instrument cleaning with high level disinfection occurs (see more detailed description in answer 8 below). More recently products containing PAA may be used by housekeepers or those responsible for cleaning and sanitizing surfaces.
5. Descriptions of in vivo and in vitro toxicity studies with PAA: Not noted nor quantified other than reported in Table 1.
6. Data applicable to quantitative risk assessment of health effects associated with acute, subacute, and chronic workplace exposures to PAA: See Table 1. Please note that though several HCWG IHs have received complaints of health effects, we were unable to associate health effects with monitored exposures on the days of the IH exposure monitoring. The monitored exposures were characteristic of exposures and processes when employees described health effects.
7. Sampling and analytical methods: Though there are no validated sampling and analytical methods, our members sampled and reported data from AIHA Accredited laboratories

using: Institut National de Recherche et de Sécurité (INRS), filter cassette containing a quartz pre-filter chemically coated with titanium oxysulfatesil, & silica gel tube coated with MTSO<sup>1</sup>. A company, ChemDaq, manufactures a direct reading PAA instrument, we could not provide data with that instrumentation for several reasons: no available data that had been presented, lack of a validated sampling and analytical method to use as a basis for comparison, lack of published laboratory and field tested studies, and lack of data in peer reviewed scientific publications.

8. Control measures including engineering controls, work practices, and PPE: We currently have a very small amount of information to describe.
  - a. Where high level disinfection is used, the instruments are placed in automated endoscope reprocessors (AER). There is no direct handling of PAA; rather the cleaning and disinfection process is automated with individuals placing instruments into the AER, connecting the devices to ports of the AER, closing the lid, and turning on the AER. After the automated cleaning, disinfection, rinsing, and drying process is complete, the medical staff removes the clean and disinfected medical device. Sometimes these devices are placed in a separate room; in other facilities, the AER is in a patient care room. Ventilation is generally normal dilution ventilation with the room doors open or closed. For new construction, one should reference ANSI/ASHRAE/ASHE Standard 170, *Ventilation of Health Care Facilities*. Personal protective equipment may include nitrile gloves, a full cover gown, safety glasses, and surgical mask.
  - b. When surfaces are cleaned, at times by housekeepers, personnel will either use a spray bottle with a towel for wiping the surfaces, or pour the PAA containing product onto a towel when the product is spread onto a surface. Ventilation is typically general dilution with room doors being open or closed. Personal protective equipment may include nitrile gloves. Safety goggles or safety glasses tend to be available and should be used.

We appreciate this opportunity to comment and provide information to NIOSH and act as a resource to prevent adverse health effects. Upon review of the RFI and supporting documents, we believe that the human health hazards and exposures (including the proposed IDLH) have not been suitably and comprehensively characterized. There are no validated sampling and analytical methods; therefore, exposures as reported in the literature are premature at best. The commonly accepted, albeit still invalidated, method was published in 2004, bringing the previously published papers describing exposures into question. As recently as 2014, AIHA's Healthcare Working Group questioned the PAA sampling and analytical method by the Institut National de Recherche et de Sécurité, because HCWG IHs sampling in locations where employees having exposure concerns tended to have very low sampling results (leading to a further review with the laboratory and media supplier).<sup>2</sup> Considering the ACGIH TLV of 0.4

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<sup>1</sup> <https://academic.oup.com/annweh/article/48/8/715/139609/Simultaneous-Sampling-of-Peroxyacetic-Acid-and>

<sup>2</sup> [https://www.aiha.org/publications-and-resources/TheSynergist/SynergistSolutionsArticles/14May\\_Synergist%20Solutions%20article.pdf](https://www.aiha.org/publications-and-resources/TheSynergist/SynergistSolutionsArticles/14May_Synergist%20Solutions%20article.pdf)

ppm STEL, the proposed IDLH of 0.55 ppm seems uncomfortably close to that concentration. To base an IDLH on sensory irritation in human volunteers (Fraser and Thorbinson 1986) seems limited and not representative of what “Immediately Dangerous to Life and Health” represents. Animal studies are not necessarily indicative of human exposures; in vitro studies using extrapolation and uncertainty factors are extrapolations based on hypothetical data.

We look forward to working with NIOSH in developing a PAA document, REL &/or IDLH. If you have additional questions or comments about this submission, please contact Steve Derman at [sderman@medishareehs.com](mailto:sderman@medishareehs.com) or (408) 330-7508.

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**Table 1. Peracetic Acid, Hydrogen Peroxide (and some Acetic Acid Exposure Data -  
Prepared by AIHA Healthcare Working Group as Requested by NIOSH  
(RFI: CDC-2017-0015 and Docket Number NIOSH-295)**

Sample No.	Process Sampled	Minutes Sampled	H2O2 Exposure (ppm)	Acetic Acid Exposure (ppm)	PAA Exposure (ppm)	Health Effects Reported?	Additional Comments
1	Surfaces. Room cleaning w Oxycide	41	0.59	NA	0.25	No	
2	Surfaces. Room cleaning w Oxycide	40	0.35	NA	0.15	No	
3	Surfaces. Room cleaning w Oxycide	44	0.33	NA	0.13	No	
4	Surfaces. Room cleaning w Oxycide	42	0.26	NA	0.088	No	
5	Surfaces. Room cleaning w Oxycide	39	0.76	NA	0.32	No	
6	Surfaces. Room cleaning w Oxycide	37	0.53	NA	0.12	No	
7	Surfaces. Room cleaning w Oxycide	37	0.24	NA	1.067	No	
8	Surfaces. Room cleaning w Oxycide	37	0.45	NA	0.15	No	
9	Surfaces. Room cleaning w Oxycide	37	0.36	NA	0.11	No	
10	Solution change. Scope removal. Rapicide PA	38	<	NA	< 0.12	No	Difficulty maintaining rate
11	Solution change X2. Scope disinfection Rapicide PA	45	<	NA	< 0.33	No	Difficulty maintaining rate
12	Surfaces. Room cleaning w spray Peridox	30	2.6	NA	0.31	No	
13	Surfaces. Room cleaning w spray Peridox	30	3	NA	0.3	No	
14	Surfaces. Room cleaning w spray Peridox	30	3.5	NA	0.33	No	
15	Surfaces. Room cleaning w spray Peridox	30	0.59	NA	< 0.54	No	
16	Surfaces. Room cleaning w cloth applied Peridox	30	4.9	NA	0.26	No	
17	Surfaces. Room cleaning w cloth applied Peridox	30	5	NA	0.29	No	
18	Surfaces. Room cleaning w cloth applied Peridox	30	2.5	NA	0.14	No	
19	Monitoring scope cleaning & disinfection. Acecide C	45	<	NA	< 0.12	No	Intermittent upper respiratory irritation reported; not now
20	Monitoring scope cleaning & disinfection. Acecide C	24	<	NA	< 0.33	No	Intermittent upper respiratory irritation reported; not now
21	Area sample. Cleaning & disinfecting endoscopes. Rapicide PA	435	0.08	0.13	0.02	No	Intermittent upper respiratory irritation reported; not now
22	Change out Rapicide PA, install full containers, triple rinsing, disposal	17	< 0.6	3.8	1.03	No	Intermittent upper respiratory irritation reported; not now
23	Area sample. Cleaning & disinfecting endoscopes. Rapicide PA	434-490	0.07	NA	0.02	No	Intermittent upper respiratory irritation reported; not now