David Michaels
Assistant Secretary of Labor
Occupational Safety and Health
United States Department of Labor
Washington, D.C. 20210

January 2, 2013

RE: 1912a.14 Petition to review and modify OSHA Standards relating to Nitrogen Trichloride, also known as Trichloramine (CL_3N), in indoor swimming pools, spas, wading pools, water parks and other work environments.

Dear Dr. Michaels,

The most popular method for sanitizing pools is through that addition of Chlorine. Irritants in the air at swimming pools are usually the combined chlorine by-products of disinfection. These by-products are the result of chlorine binding with sweat, urine, and other waste from swimmers. As the concentration of by-products in the water increases, they move into the surrounding air as well. Breathing air loaded with irritants can cause a variety of symptoms depending on the concentration of irritants in the air and amount of time the air is breathed. The symptoms of irritant exposure in the air can range from mild symptoms, such as coughing, to severe symptoms, such as wheezing or aggravating asthma. It is also known that routine breathing of irritants may increase sensitivity to other types of irritants such as fungi and bacteria.[1] Trichloramine is the most volatile and prevalent chloramine compound in the air around swimming pools[2]. Nitrogen Trichloride information can be found on OSHA's website[3].

The effects of exposure to Trichloramine include: Eye, nose, throat irritation; sneezing, cough, wheezing, chest tightness, dyspnea (difficulty breathing); headache. Health Effects include: Irritation-Eyes, Nose, Throat (HE16); Suspected respiratory sensitization---asthma (HE9). The affected organs are the eyes and respiratory system. Not mentioned in OSHA's list is the fact that absorption can also occur through the skin of swimmers and pool workers. One study also mentions absorption through water ingestion and lungs into the blood stream[4]. Many lifeguards are also engaged in teaching people how to swim, thus requiring them to be in the water.

The World Health Organization recommends using an air trichloramine concentration of 0.5 mg/m^3 as a provisional value, although it states that more research is needed to investigate health effects in people who use the pool for extended periods of time and the role of trichloramine in possibly causing or exacerbating asthma[5].

---

[1] http://www.cdc.gov/healthywater/swimming/pools/irritants-indoor-pool-air-quality.html CDC, Irritants (Chloramines) & Indoor Pool Air Quality. paragraph 2

[2] http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0163-3062.pdf CDC, *Investigation of Employee Symptoms at an Indoor Waterpark*. Chen L, Dang B, Mueller C, et al., page 46

[3] http://www.osha.gov/dts/chemicalsampling/data/CH_257450.html Nitrogen Trichloride.

[4] Cardador, M.J. and Gallego, M. "Haloacetic Acids in Swimming Pools: Swimmer and Worker Exposure." Environmental Science & Technology. 7 June 2011. *American Chemical Society*. 8 August 2011. <http://pubs.acs.org/doi/abs/10.1021/es103959d?prevSearch=%2528haas%2Band....

[5] World Health Organization. Guidelines for safe recreational water environments, Volume 2: Swimming Pools and Similar Environments. http://whqlibdoc.who.int/publications/2006/9241546808_eng.pdf

A study comparing the prevalence of health complaints between teenage swimmers and soccer players showed a significant increase in respiratory complaints at chloramine concentrations of 0.37 mg/m^3 or greater[6].

An OSHA recommended exposure limit on Trichloramine would greatly assist those facing poor air quality at swimming pools. It would allow for testing and perhaps adoption of better air handling equipment or conversion to non-chlorine based methods for disinfecting water[7].

Keep in mind that a swimming pool may have minimal use for much of the day. During a competitive swim practice there may be 8-10 swimmers per lane in a 25 yard pool. Practice may last for two or more hours during which Trichloramine levels continually increased due to overburdened air handlers. At the end of practice, it is not uncommon for swim lessons that may include infants in the pool area (example – Infant Swimming Classes[8]). Germany has recommended that children younger than two with a family history of allergies should not swim in indoor pools[9].

Swimming is a healthy activity. Safekids.org reports that since 1999, an average of more than 815 children ages 14 and under have dies as a result of unintentional drowning each year[10]. This demonstrates a continued need for safe, pollution free swimming environments.

I am copying Angela Irwin, OSHA Region VII, and Mick Nelson, USA Swimming, Facilities Development Director, as knowledgeable individuals on this issue. USA Swimming is a 300,000-member service organization that promotes the culture of swimming by creating opportunities for swimmers and coaches of all backgrounds to participate and advance in the sport through clubs, events and education. One of their mission points is: "We are committed to providing a safe and positive environment for all members." Please copy them on any response.

Please feel free to contact me if you request any additional information. An electronic copy of this letter is available.

Respectfully submitted,

Robert Wagner
9005 N Chatham Ave
Kansas City, MO 64154
rwagner@eruces.com
(913) 244-7608

---

[6] Levesque B, Duchesne JF, Gingras S, Lavoie R, Prud'Homme D, Bernard E, Boulet LP, Ernst P [2006] The determinants of prevalence of health complaints among young competitive swimmers. Int Arch Occup Environ Health 80(1):32-39. http://www.ncbi.nlm.nih.gov/pubmed/16586082

[7] http://www.ct.gov/dph/lib/dph/environmental_health/eoha/pdf/technical_brief_indoor_swiwfinal.pdf Environmental Health Technical Brief, Indoor Air Pollution at Indoor Swimming Pools, Connecticut Department of Public Health.

[8] http://www.parenting.com/article/infant-swimming-classes

[9] http://www.umweltbundesamt.de/uba-info-presse-e/2011/pe11-001_baby_swimming_possible_risk_of_asthma_caused_by_chlorine_disinfection.htm

[10] http://www.safekids.org/our-work/research/fact-sheets/drowning-prevention-fact-sheet.html Safekids.org

Carbon Copy:

Mick Nelson
Facilities Development Director
USA Swimming
1 Olympic Plaza
Colorado Springs, CO 80909
Office Phone 719-866-3522
Office Fax 719-866-4669 (attn: Mick)
mnelson@usaswimming.org

Angela Irwin
Email: irwin.angela@dol.gov
USDOL-OSHA, Region VII
Kansas City Area Office
2300 Main Street, Suite 168
Kansas City, Missouri 64108