From the
Chemical & Material Risk Management Program,
Office of the Under Secretary of Defense for Acquisition, Technology & Logistics.

Chemical & Material Emerging Risk Alert

1-Bromopropane (1-BP)

The American Conference of Governmental Industrial Hygienists proposes to lower the threshold limit value-time-weighted average from 10 parts per million (ppm) to 0.1 ppm. If implemented, this change presents a risk to certain DoD industrial operations and may require actions to meet occupational health standards.

What is 1-bromopropane?

1-Bromopropane (CAS #106-94-5) (1-BP; also called n-propyl bromide or n-PB)[1] is a brominated hydrocarbon solvent used in a variety of industrial applications (e.g., metals degreasing, cleaning of electronic circuit boards, formulation of adhesives and aerosols, and dry cleaning).[2] Use of 1-BP increased significantly when halogenated solvents, such as trichloroethene (TCE) and tetrachloroethene (PCE), underwent strict regulation as hazardous air pollutants under the Clean Air Act (CAA). 1-BP was seen as a less hazardous alternative and was used as a drop-in alternative in many applications.

How is 1-bromopropane used in the DoD?

The primary uses of 1-BP by the DoD are as a solvent, and degreaser and an ingredient in adhesives, coatings, and aerosols. Examples of shops and operations that may use 1-BP include flight-line and equipment maintenance, engine cleaning/plating, electroplating and fire protective services. 1-BP is also used as a case mount sealant in small- and medium-caliber munition cartridges.

What are the emerging health concerns?

Concern over the potential carcinogenicity of 1-BP prompted the National Toxicology Program (NTP) and Environmental Protection Agency (EPA) to assess its human health and environmental risks.

Under the NTP's Report on Carcinogens (RoC) process, the carcinogenicity of 1-BP in humans is being assessed. [3] A panel of experts recently concurred with the NTP's preliminary decision to list 1-bromopropane as a "reasonably anticipated human carcinogen."[4] Under the EPA's Toxic Substances Control Act Work Plan, the risks from 1-BP to human health and the environment are also being assessed.[5] 1-BP was selected for evaluation due to its potential carcinogenicity, presence in environmental media, estimated high releases to the environment, and wide use in consumer products.

How is 1-bromopropane regulated?

There is no Occupational Safety and Health Administration Permissible Exposure Limit for 1-BP. However, the American Conference of Governmental Industrial Hygienists (ACGIH) has adopted a threshold limit value time-weighted average (TLV-TWA) guideline of 10 parts per million (ppm) based on liver damage, embryo/fetal damage, neurotoxicity, and reproductive and developmental toxicity. Policy and guidance documents for DoD Services direct them to consider using TLV-TWAs when evaluating occupational health risks although there is not clear consensus across the DoD on the use of ACGIH TLV-TWAs.[6,7,8]

1-BP is regulated by the EPA as a volatile organic compound in aerosol coatings and as a substitute to ozone depleting chemicals under the CAA and as a hazardous material by the Department of Transportation.[9] A number of states have taken independent action to regulate 1-BP under their environmental and occupational safety and health laws. Additionally, the European Chemicals Agency characterizes 1-BP as a Substance of Very High Concern and has included it in the Candidate List of chemicals requiring authorization for specified uses.

What is the emerging risk?

In early 2012, the ACGIH released a Notice of Intended Change to reclassify 1-BP as a "Confirmed Animal

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Carcinogen with Unknown Relevance to Humans" and to lower the TLV-TWA to 0.1 ppm. A DoD Phase I Impact Assessment for 1-BP identified a high risk to some DoD functions due to worker exposures potentially exceeding the ACGIH's proposed guideline.[4] Changes to the ACGIH TLV-TWA, as well as the results from the NTP and EPA assessments may prompt revisions in current regulations and promote the development of new regulations.

What should you do in response to this Alert?

Identify operations that use 1-BP and specifications for equipment or components that may require 1-BP. Both large- and small-scale uses (e.g., degreasing tanks, hand cleaning wipes) should be identified. Take actions to reduce usage, identify or develop 1-BP replacements, and ensure that replacement products are less hazardous than 1-BP.

Monitoring the workplace is the primary means of assessing personnel exposures. Ensure there is an exposure assessment for all operations involving 1-BP, including personal breathing zone air sampling for defined similar exposure groups. Ensure engineering controls are implemented and functioning as designed and personnel protective measures are in place as needed. Monitor occupational health standards for proposed changes.

Notify the Chemical and Material Risk Management Program of critical uses of 1-BP and efforts to identify replacement chemicals. The point of contact is Nikki Bass (Nikki.Bass1@us.army.mil).

Date Issued: April 21, 2013

[1] See U.S. National Library of Medicine Toxicology Data Network at http://toxnet.nlm.nih.gov/cgi-bin/sis/search/r?dbs+hsdb:@term+@rn+106-94-5 for additional 1-bromopropane synonyms.
[2] Phase I Impact Assessment for 1-Bromopropane (1-BP). Prepared by U.S. Army Public Health Command Army Institute of Public Health. 30 November 2012.
[3] NIEHS Draft NTP Report on Carcinogens Monograph for 1-Bromopropane. 18 January 2013. http://ntp.niehs.nih.gov/?objectid=950E6597-91E6-C65B-77056D66F665C475.
[4] See the April 2013 NTP Update at http://ntp.niehs.nih.gov/NTP/PressCtr/NTP_News/2013/Update_April2013_508.pdf
[5] See USEPA TSCA Work Plan Chemicals at http://www.epa.gov/oppt/existingchemicals/pubs/workplans.html.
[6] Department of the Air Force Manual 48-155, Occupational and Environmental Health Exposure Controls. October 1, 2008. http://www.e-publishing.af.mil/shared/media/epubs/AFMAN48-155.pdf.
[7] Department of the Army Pamphlet 40-503, Industrial Hygiene Program. October 30, 2000. http://www.apd.army.mil/pdffiles/p40_503.pdf.
[8] Department of the Navy OPNAV INSTRUCTION 5100.23G, Navy Safety and Occupational Health (SOH) Program Manual, CH-1. 21 July 2011.
[9] See 40 CFR 59; 72 FR 30142, 30 May 2007, Final Rule; 72 FR 30168, 30 May 2007, Notice of Intended Rulemaking; and 49 CFR 172.101.

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