

**Chemical Agent Health-Based  
Standards and Guidelines Summary  
Table 1: Criteria for Airborne  
Exposures as of July 2011**

---

**Approved for public release, distribution unlimited**

**Preventive Medicine Data: AR 40-5e**

---

**PHN No. 0711-02, July 2011**



**Contact the USAPHC, Army Institute of Public Health, Environmental Medicine Program,  
410-436-2714 for more information.**

Use of trademark names(s) does not imply endorsement by the U.S. Army but is intended only to assist in the identification of a specific product.

**USA PHC\* Chemical Agent Health-Based Standards and Guidelines Summary Table 1: Criteria for AIRBORNE Exposures as of July 2011\*\***

Media: AIR	Standard Name	Population	Exposure Scenario	H/HD/HT	GA (Tabun)	GB (Sarin)	GD/GF	VX	Lewisite	Notes/Status		
Airborne Exposure Limits (AELs) mg/m <sup>3</sup>  see references and Notes	<b>IDLH</b> <i>Immediately Dangerous to Life and Health</i>	DoD Workers (civilian)	Acute 30 minute exposure	<b>0.7</b>	<b>0.1</b>	<b>0.1</b>	<b>0.05</b>	<b>0.003</b>	<b>(**)</b>	This Table supersedes previous versions and represents the most current information known to PHC at time noted. *GD/GF values were developed by Army/USACHPPM based on the relative potency to the CDC value of GB ( <b>ref a3</b> ) **Since not significant in US Stockpile, Lewisite criteria had not been reevaluated since 1988 - so the value 0.003 mg/m <sup>3</sup> - a detection value- was used as a safe level for all exposures including long term. Though cited in DA Pam 385-61 as 'surrogate' Lewisite IDLH – was non health based/not a true IDLH – Army OTSG prepared a new IDLH equivalent of 0.36 mg/m <sup>3</sup> in Aug 2009 (see note next page)		
	<b>STEL</b> <i>Short Term Exposure Limit</i>	DoD Workers (civilian)	Occasional(4x day) 15 minute exposure	<b>0.003</b> [3x10E-3]	<b>0.0001</b> [1x10E-4]	<b>0.0001</b> [1x10E-4]	<b>0.00005</b> [5x10E-5]	<b>0.00001</b> [1x10E-5]	<b>NA</b>			
	<b>WPL</b> <i>Worker Population Limit</i>	DoD Workers (civilian)	8 hr daily/ multi yr time weighted average (TWA)	<b>0.0004</b> [4x10E-4]	<b>0.00003</b> [3x10E-5]	<b>0.00003</b> [3x10E-5]	<b>0.00003</b> [3x10E-5]	<b>0.000001</b> [1x10E-6]	<b>0.003**</b>			
	<b>GPL</b> <i>General Population Limit</i>	Civilian General Population	24 hr/daily lifetime time weighted average (TWA)	<b>0.00002</b> [2x10E-5]	<b>0.000001</b> [1x10E-6]	<b>0.000001</b> [1x10E-6]	<b>0.000001</b> [1x10E-6]	<b>0.0000006</b> [6x10E-7]	<b>0.003**</b>			
Acute Exposure Guideline Levels (AEGs) mg/m <sup>3</sup>  see references, b and c for derivation, refs a and d for application	<b>Acute Exposure Guideline Levels</b>	Emergency/ Accident Scenario	1 time exposure	<b>HD</b>	<b>GA</b>	<b>GB</b>	<b>GD/GF</b>	<b>VX</b>	<b>Lewisite</b>	Final AEG values (for HD, VX, G Agents) were published in May 2003 by National Research Council (NRC) Committee on Toxicology (COT) (available at <a href="http://www.nap.edu">www.nap.edu</a> ) <b>ref b</b>  Lewisite AEGs are based on interim report dated July 2007: "Acute Exposure Guideline Levels (AEGs) for: Lewisite Compounds" <b>ref c</b>  These are guidelines, not regulatory standards. However, there is an Army-FEMA policy letter requiring use of these AEGs for the Chemical Stockpile Emergency Planning Program (CSEPP) <b>ref d</b> ; associated CSEPP guidance provide suggested use (such as AEG 2 as action level for shelter in place/ evacuation); but policy includes allowance for site specific (state, local) decision making)  See <b>refs e &amp; f</b> for AEG applications		
	<b>AEGL – Level 1</b> Above this potential for some minor discomfort or noticeable but reversible effects	Civilian General Population	10 min 30 min 1 hr 4 hr 8 hr	<b>0.40</b> <b>0.13</b> <b>0.067</b> <b>0.017</b> <b>0.008</b>	<b>0.0069</b> <b>0.0040</b> <b>0.0028</b> <b>0.0014</b> <b>0.0010</b>	<b>0.0069</b> <b>0.0040</b> <b>0.0028</b> <b>0.0014</b> <b>0.0010</b>	<b>0.0035</b> <b>0.0020</b> <b>0.0014</b> <b>0.00070</b> <b>0.00050</b>	<b>0.00057</b> <b>0.00033</b> <b>0.00017</b> <b>0.00010</b> <b>0.000071</b>	<b>NR</b> <b>NR</b> <b>NR</b> <b>NR</b> <b>NR</b>			
	<b>AEGL – Level 2</b> Above this more obvious effects begin; potentially impacting functional abilities or ability to escape; potential delayed recovery	Civilian General Population	10 min 30 min 1 hr 4 hr 8 hr	<b>0.60</b> <b>0.20</b> <b>0.10</b> <b>0.025</b> <b>0.013</b>	<b>0.087</b> <b>0.050</b> <b>0.035</b> <b>0.017</b> <b>0.013</b>	<b>0.087</b> <b>0.050</b> <b>0.035</b> <b>0.017</b> <b>0.013</b>	<b>0.044</b> <b>0.025</b> <b>0.018</b> <b>0.0085</b> <b>0.0065</b>	<b>0.0072</b> <b>0.0042</b> <b>0.0029</b> <b>0.0015</b> <b>0.0010</b>	<b>0.65</b> <b>0.23</b> <b>0.12</b> <b>0.035</b> <b>0.018</b>			
	<b>AEGL – Level 3</b> Above this level potential for serious effects potential life threatening	Civilian General Population	10 min 30 min 1 hr 4 hr 8 hr	<b>3.9</b> <b>2.7</b> <b>2.1</b> <b>0.53</b> <b>0.27</b>	<b>0.76</b> <b>0.38</b> <b>0.26</b> <b>0.14</b> <b>0.10</b>	<b>0.38</b> <b>0.19</b> <b>0.13</b> <b>0.070</b> <b>0.051</b>	<b>0.38</b> <b>0.19</b> <b>0.13</b> <b>0.070</b> <b>0.051</b>	<b>0.029</b> <b>0.015</b> <b>0.010</b> <b>0.0052</b> <b>0.0038</b>	<b>3.9</b> <b>1.4</b> <b>0.74</b> <b>0.21</b> <b>0.11</b>			
	<b>Military Exposure Guideline (MEG) mg/m<sup>3</sup></b>	<b>MEGs</b> <i>multiple severity levels and acute exposure durations -</i>	The chemical agent values for military deployment health and safety decision making include Negligible, Marginal, Critical and Catastrophic MEGs for 10 minute to eight hour timeframes. They are cited USACHPPM Technical Report (TR) 64-FF-0722-07, July 2008 ( <b>ref g</b> ) and new (2010) version of USAPHC Technical Guide (TG) 230 ( <b>ref h</b> ). NOTE: MEGs are primarily based on hierarchy selection of published CIVILIAN criteria; for short term air MEGs the first choice in hierarchy are the AEG values, but for HD and Nerve Agents only AEG 1 criteria are used as MEGs (e.g. as for Negligible MEGs). Marginal, Critical and Catastrophic are based on military toxicity values (though Marginal and Critical MEGs are generally comparable with the AEG 2 and 3 estimates (see ref e)).									

## NOTES and REFERENCES for Chemical Agent Air Standards Status Table: Existing Standards and Guidelines as of July 2011

### NOTES:

\* USAPHC was formerly known as the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)

\*\* This Table replaces previous versions (USACHPPM March 2006, USACHPPM Aug 2009, July 2010)

The air criteria listed in this Table are designed for protection from inhalation and ocular exposures as the most sensitive exposure routes; note that separate vapor exposure limits for percutaneous vapor absorption are also officially endorsed by Army for occupational use per *ref a3* below). **Perc vapor values in mg/m<sup>3</sup> are for 30 minute skin exposures: GA = 11.1; GB = 6.0; GD/GF = 1.5; VX = 0.13; H = 0.1.**

**DA Pamphlet 385 61:** ref a below replaced Department of the Army, Memorandum Subject: Implementation *Guidance Policy for New Airborne Exposure Limits for GB, GA, GF, VX, HD, and HT*; signed by Mr. Raymond J. Fatz Deputy Assistant Secretary of the Army, (Environment, Safety, and Occupational Health (OASA) (I&E), dated June 18, 2004. DA PAM 385 61 updates Army guidance and implementing procedures for conducting chemical agent safety program in accordance with AR 385-10.

\*\* **Lewisite IDLH:** In response to a June 2009 request from U.S. Army Chem Agent Safety Council (DACASC) to provide a 'true' IDLH value to facilitate ongoing non stockpile demil operations/PPE determination at Pine Bluff (PB), Ark, USACHPPM proposed a protective toxicological-based effective IDLH value of 0.36 mg/m<sup>3</sup> for DACASC consideration. The USACHPPM criterion was endorsed in an OTSG memorandum, Subject New Immediately Dangerous to Life and Health (IDLH) Concentration Level for Lewisite, 24 August 2009. While established for the PB site operations, the value is toxicologically derived and considered a safe estimate for other IDLH applications.

### REFERENCES:

a) **DA PAM 385-61, Toxic Chemical Agent Safety Standards, 17 December 2008\***

\* **NOTE:** The criteria in DA PAM 385-61 is based on the following references:

a1. Department of Health and Human Services (DHHS) Centers for Disease Control (CDC); *Interim Recommendations for Airborne Exposure Limits for Chemical Warfare Agents H and HD (Sulfur Mustard)*; Federal Register, vol 69, No 85, pp 24164-24168, **May 3, 2004.**

a2. Department of Health and Human Services (DHHS) Centers for Disease Control (CDC); *Final Recommendations for Protecting Human Health from Potential Adverse Effects of Exposure to Agents GA, GB, and VX*; Federal Register, vol 68, pp 58348-58351, **October 9, 2003.**

(x) Interim Supplemental Chemical Material Agency (CMA) Implementation for Revised AELs, DA CMA, December 2004

a3. Department of the Army Office of the Surgeon General Memorandum, Subject: *Nerve Agent Percutaneous Exposure Criteria and Airborne Exposure Levels (AELs) for GD, GF in use of Interim DA Guidance on Implementation of the New AELs*, **29 June 2004.**

b. **National Research Council (NRC) Volume 3, Acute Exposure Guidelines for Selected Airborne Chemicals**, National Academy Press, 2003, [www.nap.edu](http://www.nap.edu)

c. **Acute Exposure Guideline Levels (AEGs) for Lewisite L-1 (CAS 541-25-3) Lewisite-2 (CAS 40334-69-8) and Lewisite L-3 (CAS 40334-70-1)**, **Technical Support Document, Interim 1 July 2007.** Available at [http://www.epa.gov/oppt/aegl/pubs/lewisites\\_tsd\\_interimversion\\_1\\_07\\_2007.pdf](http://www.epa.gov/oppt/aegl/pubs/lewisites_tsd_interimversion_1_07_2007.pdf)

d. **Chemical Stockpile Emergency Preparedness Program, Policy Paper #20 (Revised), Subject: Adoption of Acute Exposure Guideline Levels (AEGs)**; U.S. Army and U.S. Federal Emergency Management Agency (FEMA), **February 2003**

**Other AEG Application Refs:**

e. USAPHC Frequently Asked Question About AEGs and Their Applications, 2011.

f. "Developing Health-based Pre-planning Clearance Goals for Airport Remediation Following Chemical Terrorist Attack: PART I: Introduction and Key Assessment Considerations (Watson AP, Hall L, Raber E, Hauschild V, Dolislager F, Love A and Hanna M) ; and PART II: Decision Criteria for Mult pathway Exposure Routes. (Watson AP, Hall L, Raber E, Hauschild V, Love A) *Human and Ecological Risk Assessment (HERA)* 17 (1): PART 1: 1-56, and Part II: 57-121. (Jan 2011).

g. **USACHPPM Technical Report 64-FF-0722-07, Health-Based Chemical Vapor Concentration Levels for Future Systems Acquisition and Development**, February 2008 with **July 2008 Update** (based on USACHPPM Technical Report 47-EM-5863-04; Acute Toxicity Estimation and Operational Risk Management of Chemical Warfare Agent Exposures; May 2004).

h. **USACHPPM Technical Guide 230; Chemical Exposure Guidelines for Deployed Military Personnel, 2010.** (*This is a new version; contact 410-436-2953 for information.*)