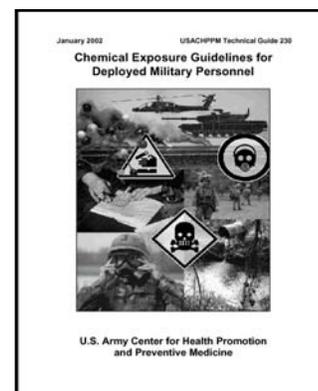


**Frequently Asked Questions (FAQs)
Regarding USACHPPM Technical Guide (TG) 230-
*Chemical Exposure Guidelines for Deployed Military Personnel***



1. Who is the intended audience of TG230?

TG230 is a technical guidance tool designed for trained military preventive medicine, industrial hygiene, or environmental science personnel or civilian counterparts who have some basic understanding of toxicology, chemical exposures, and exposure assessment.

2. What is the purpose of the guide?

The guide assists such personnel with translating the technical chemical/environmental risk assessment into language and recommendations that are pertinent to non-technical personnel such as the commander who must make risk management decisions during deployments.

3. Why was this TG developed?

Over the past decade, the US Department of Defense has broadened its list of chemical concerns beyond traditional chemical warfare agents to include more common chemicals that could pose immediate or even delayed/long-term health impacts to deployed personnel. Currently there is a US Joint Staff Memorandum and a US Army Headquarters Policy Letter that mandates that chemical exposures associated with immediate or long-term delayed health effects must be identified and documented along with traditional medical surveillance. The TG230 was developed along with other guidance documents by the USACHPPM as a means to assist personnel with implementing the new policy requirements.

4. Is TG 230 “approved” as Army doctrine?

As of July 2002, TG230 is only guidance and has not yet been incorporated into official U.S. Army doctrine.

5. What chemicals does this TG address?

TG 230 addresses a variety of common toxic industrial chemicals (TICS), agricultural chemicals, and common environmental pollutants. It also addresses nerve and blister chemical warfare agents. Though hundreds of chemicals are listed, it is not all-inclusive of all TICs and agricultural chemicals. More chemicals will be added over time. Specific requests for immediate development of a set of guidelines for a chemical are also encouraged (contact USACHPPM office listed below).

6. How does this document relate to *TG 230A – Short-term Chemical Exposure Guidelines* and *TG230B – Long-term Chemical Exposure Guidelines*?

The TG 230 dated January 2002 (with updates in April 02) supercedes previous versions including TG230A and TG230B, which made up the initial two-volume version of TG230.

7. What are MEGs?

The TG230 establishes Military Exposure Guidelines (MEGs) which are concentration levels of chemicals in air, water, and soil that can be used to assist in assessing the significance of field exposures to chemical hazards during deployments. They are designed to address a variety of scenarios such as a single catastrophic release of large amounts of a chemical, temporary exposure conditions lasting hours to days, or for continuous ambient environmental conditions such as regional pollution, use of a contaminated water supply, or persistent soil contamination where there is regular contact. In general, a MEG represents a level that defines approximately where certain health effects may begin to occur in individuals within the exposed military population after a continuous,

single exposure of specified duration. However, there is inherently much uncertainty in the toxicity data and models used to estimate these levels. For most chemicals, there are many safety factors built into the calculations. The severity of the health effects and percentage of the exposed population demonstrating health effects will increase as concentrations increase above a MEG, but the rate is chemical-specific, and therefore cannot be represented by the MEGs themselves. The MEGs are not designed for determining casualty estimates but are instead are preventive measures guidelines.

8. Under what conditions can/should MEGs be used?

MEGs were developed for use in deployments, not garrison situations. The Joint Staff (see item # 3) has defined deployment lasting 30 days or longer to an area that does not have an established medical facility (hospital). They can be used to assess temporary or permanent exposure conditions during a deployment. They are not used to provide quantitative risk levels but instead the MEGs along with the associated application guidance in TG230 is designed to following traditional US military Operational Risk Management (ORM) (see Table 1 for example ORM risk assessment and categorization matrix. Or even better - we suggest you review the hypothetical Case Studies in Appendix F of the TG230.)

9. How can MEGs address environmental compliance/remediation/clean up or other host nation issues?

MEGs are designed to protect soldiers' health - they are NOT to be used as remediation goals or to address host nation health and safety concerns relative to the local civilians.

10. How were MEGs developed and how to they relate to other US Federal standards (e.g. OSHA or EPA?)

The same risk assessment models used by US EPA were used to develop the TG230 MEGs. Some values are the same but most were adjusted to better accommodate the shorter military exposure durations (as opposed to the 70 year 'lifetime' assumptions often used by the EPA) and larger intake rates (breathing air, drinking water). Cancer risk is addressed somewhat more conservative (safer) than OSHA standards (for worker population in US industry), and a slightly less conservative than EPA standards (for US civilian populations).

11. Do MEGs assume that soldiers are healthier/less susceptible to the adverse health impacts from chemicals than the average civilian?

In general, the basic level of chemical susceptibility reflected by the MEGs is assumed to be the same as for average US civilian adults. This is based on documented variability (gender, race, age, size) and health conditions (asthma, unique genetic traits) that are found in our deployed population just as in the civilian world. MEGs are not designed to protect extremely susceptible/immune compromised individuals or infants.

12. What is the relevance of different MEGs for “short-term” (hour – days) and “long-term” (months) exposures?

In general, brief exposures to a chemical will only produce temporary health effects - unless the levels are so high to cause extremely severe or fatal damage. These exposures and associated immediate effects are often referred to as 'acute.' 'Chronic', or delayed effects, are typically associated with continuous exposures that don't initially produce symptoms but over time may result in adverse health implications such as organ damage. TG 230 provides a range of MEGs to allow the user to compare their situation with a guideline that best reflects the level anticipated for the time exposure is estimated to last.

13. Why are some MEGs for drinking water more conservative (lower) than US EPA drinking water standards?

US EPA standards are developed using the assumption that exposed individuals consume 1 - 2 liters of water each day. Soldiers typically drink 5 up to 15 liters day depending on the climate and their activity levels. The TG 230 MEGs have been modeled to account for the many chemicals where the toxicity is impacted more by the amount then the duration.

14. What degree of certainty or confidence should I have in my chemical risk assessment and the MEGs?

Current scientific methods for deriving human health guidelines are generally derived from toxicological data (usually animal) used to estimate a threshold (starting) concentration level of an effect, which is then supplemented with safety factors to account for various data gaps and uncertainties. The resulting guidelines provide an idea of when the specified effect may begin to be noticed in a small percentage of the exposed persons. It does *not* represent levels at which the majority, median, or 50% of personnel will demonstrate such effects. The human variability is also an area of uncertainty. In addition, estimate of the actual exposure to individuals in the field is also very uncertain due to limited sampling data, inability to pin point locations of personnel or their activity patterns. Table 2 summarizes three categories of confidence one may have in their risk assessment.

15. What can be done if exposures during a deployment are found to exceed MEGs?

The risk management strategies or courses of action (COAs) that a commander may choose regarding a chemical exposure scenario really depends on the other risks occurring at the same time, levels of confidence in assessments, and overall mission goals. Table 3 summarizes various Risk Management Strategies; Table 4 lists types of control actions. With regards to actual medical interventions/treatments, these would be only be required in extreme high exposure scenarios that result in immediate problems such as breathing difficulties, severe irritation or burning of eyes/skin, or most severe implications such as broncho spasm, pulmonary edema, hemolysis, or seizures. Field response to such effects should involve immediate removal from exposure and (especial if liquid contact) decontamination (for 15 minute water flushing, soap optional after), followed by symptomatic treatment (examples include antibiotics, corticosteroids, oxygen) with possible removal for higher echelons of care in more serious cases. Though classes of chemicals with similar symptoms often call for similar treatment procedures, it is advised that the specific chemical be determined for potential unique procedures.

16. How are the results of a deployment chemical risk assessment reported?

The results of a preventive medicine officer's risk assessment of chemical exposures during a deployment must be communicated to non-technical personnel, including the commander who must ultimately decide on what course of action to take. To ensure information is transmitted in an appropriate and military-relevant format, see the attached example shown in Table 5 that incorporates the ORM process referred to in item#6 above.

For additional details/ references see TG230 and the associated Reference Document (RD230) (pdf) at http://chppm-www.apgea.army.mil/desp/pages/samp_doc.htm or contact the

USACHPPM Deployment Environmental Surveillance Program at 410-436-5213/DSN 584-

TABLE 1. RISK ASSESSMENT MATRIX *

HAZARD SEVERITY	HAZARD PROBABILITY				
	Frequent (A)	Likely (B)	Occasional (C)	Seldom (D)	Unlikely (E)
Catastrophic (I)	Extremely High	Extremely High	High	High	Moderate
Critical (II)	Extremely High	High	High	Moderate	Low
Marginal (III)	High	Moderate	Moderate	Low	Low
Negligible (IV)	Moderate	Low	Low	Low	Low

*Adapted from US Army Field Manual 100-14, Risk Management and USACHPPM TG248 and TG230, see website below

TABLE 2. EXAMPLE CRITERIA FOR ASSIGNING CONFIDENCE LEVELS*

Confidence Level	Criteria
High	Sampling data quality is good. Field activity patterns are well known. True exposures are reasonably approximated. Knowledge of the symptoms of hazard exposure relative to guideline is well known. No important missing information. The predicted health outcome is plausible or already demonstrated.
Medium	Field data quality is good. Field exposures are likely to be overestimates of true exposures due to incomplete data coverage relative to actual exposure durations. Detailed information is lacking regarding true personnel activity patterns in the field. Symptoms are well known for each individual hazard, but some scientific evidence suggests that the combined effects of all hazards may exacerbate symptoms. Predicted health outcome is plausible.
Low	Important data gaps and/or inconsistencies exist. Exposure conditions are not well defined. Field personnel activity patterns are basically unknown. Predicted health outcome is not plausible because it is not consistent with real-world events/experience.

* Adapted from USACHPPM TG248 and TG230, see website below

TABLE 3. RISK MANAGEMENT STRATEGIES *

Risk Management Strategies	Attributes
No Action/Accept Risk	An implicit acceptance of the risk by the command, presumably with respect to other risks and mission requirements. This still requires documentation of personnel exposures and appropriate risk communication.
Avoid/Reduce Risk by Minimizing Severity	Use of control measures to reduce hazard severity usually by reducing chemical concentration/changing chemical makeup (such as treatment/filtration for drinking water supply) or providing prophylactics that reduce human susceptibility.
Avoid/Reduce Risk with Exposure Controls	Use of engineering or administrative methods to prevent or completely avoid exposures of concern (see Table 5, below).
Health Surveillance	Use of medical and environmental surveillance systems to monitor ambient conditions (e.g., routine air monitoring) or personnel (e.g., bio-monitoring). This is not a means to directly control chemical hazards, but it can provide information to support or change a chosen risk management strategy and or improve level of confidence/certainty of risks. In all cases/regardless of risk management strategies used, documentation of personnel exposures and appropriate risk communication is required.

* Adapted from USACHPPM TG248 and TG230, see website below

Table 4. EXAMPLES OF CHEMICAL HAZARD CONTROL MEASURES *

Administrative	Engineering	Personal Protective Equipment
Moving location of operations	Substitute use of less hazardous materials	Military Protective Mask (M-40,M-17)**
Managing deployment length/work schedules	Use of ventilation/increase dispersion	Commercial respiratory protection
Providing prophylactics/medical interventions that will reduce severity of effect	Isolate areas/build barriers or enclosures to prevent chemical release or human exposures	Eye protection
Enforcing personal hygiene standards	Use of filters (air or water purification systems)	Chemical protective clothing

* Adapted from USACHPPM TG230, see website below

** **NOTE:** The military protective mask is only approved for against NBC-warfare agents; for some TICs such as chlorine, phosgene, and hydrogen sulfide it provides reasonable protection; however, there are many TICs it may not offer adequate or any protection. Examples of TICs that the mask is not well suited for include ammonia, ethylene oxide, formaldehyde, nitrogen dioxide.

Table 5. DEVELOPED USING USACHPPM TECHNICAL GUIDE (TG) 230

CHEMICAL HAZARD	HAZARD RANKING		OPERATIONAL RISK ESTIMATE		POTENTIAL IMPACTS		COURSES OF ACTION (COA) AND NOTES
	HAZARD PROBABILITY	HAZARD SEVERITY	RISK LEVEL	CONFIDENCE	HEALTH	OPERATIONAL	
LEAD (IN AIR AND SOIL)	FREQUENT	NEGLIGIBLE	MODERATE	LOW	<p>Immediate; Delayed</p> <p><u>Potential Symptoms:</u> Malaise, headache, irritability, muscle/joint pains, abdominal pain. <u>Longer term/permanent</u> - hyper tension, kidney damage, possible reproductive</p> <p>Target <u>Organs/Systems:</u> CNS, kidney, GI tract, CVS, REPR</p> <p>Estimated Incidence: Assume less than 10%</p>	<p>Continued months of exposure could potentially lead to increased sick call for minor illnesses.</p> <p>Slight degradation of personnel functional capabilities /attention to detail possible.</p> <p>Puts exposed personnel at increased risk for future health impacts - documentation and future medical surveillance required.</p>	<p><u>OPTION 1: Accept risk (allow exposure) and</u> 1a - document exposure in personnel records (Required) 1 b - conduct additional monitoring to better assess exposure fluctuations (opt) 1c - conduct bio-monitoring through blood level (opt)</p> <p><u>OPTION 2: Minimize risk</u> 2a - Reduce exposure by: minimizing physical activity; minimizing duration/length of deployment; wearing dust masks when feasible; and/or using clean fill/rock to cover lead contaminated soil/prevent dust (opt)</p> <p>2b - see 1a (required) 2c - see 1b and 1c (optional)</p>