Department of the Army
Pamphlet 40–173

Medical Services

Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT

Headquarters
Department of the Army
Washington, DC
3 June 2003

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SUMMARY of CHANGE

DA PAM 40–173
Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT

This revision dated 3 June 2003--

- Updates office symbols (suggested improvements paragraph and para 1-4b).

- Deletes the requirement for a slit lamp examination during the preplacement, periodic, and termination medical surveillance examinations for categories A and B (paras 4-1b and B-1).

- Deletes the requirement to test intraocular pressure during the preplacement and periodic medical surveillance examinations for categories A and B (paras 4-1b and B-1).

This pamphlet is a health related publication developed to complement existing and future Occupational Safety and Health Administration and safety requirements. It--

- Explains how to request a waiver or exception (para 1-4).

- Presents guidance about exposure limits (para 2-1), engineering controls and work practices (para 2-3), respiratory protection (para 2-4), optical inserts (para 2-4c), contact lenses (para 2-4d), exposure monitoring (para 2-5), recordkeeping requirements (para 3-1), hazard communication information (para 3-3d),and material safety data sheets (para 3-4).

- Provides guidance for a medical surveillance program for all personnel potentially exposed to mustard agents H, HD, and HT (chap 4 and app B).

- Provides medical personnel with general information about the diagnosis and treatment of mustard intoxication(app D).

- Explains the policies with regard to qualitative fit testing using isoamyl acetate and irritant fume (para 2-4e and app C).

- Reduces the number of atmospheric monitoring records that must be maintained in the occupational health record by defining criteria for exposure and potential exposure (para 3-1c(2)).

- Explains the role of the surety officer or safety officer in categorizing exposure potential (para 4-2).

- Explains the roles of the installation or activity commander and installation medical authority or designated contract physician in the medical surveillance program (paras 4-4 and 4-5).

Headquarters
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***Department of the Army Pamphlet 40–173**

Medical Services

Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

Official:

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Administrative Assistant to the Secretary of the Army

History. This publication is a rapid action revision. The portions affected by this partial revision are listed in the summary of change.

Summary. This pamphlet explains medical occupational policies and provides procedures pertinent to mustard agents H, HD, and HT. The medical policies and procedures are prescribed in AR 50-6.

Applicability. This pamphlet applies to all Active Army commands, agencies, organizations, and Department of Defense contractors with a mustard agent mission. It does not apply to the Army National Guard of the United States or the U.S. Army Reserve.

Proponent and exception authority. The proponent of this pamphlet is The Surgeon General. The proponent has the authority to approve exceptions to this pamphlet that are consistent with controlling law and regulation. The proponent may delegate this approval authority, in writing, to an individual within the proponent agency in the grade of colonel or the civilian equivalent.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to HQDA, ATTN: DASG–PPM–NC, 5109 Leesburg Pike, Falls Church, VA 22041-3258.

Distribution. This publication is available in electronic media only and is intended for command levels C, D, and E for the Active Army.

Contents (Listed by paragraph and page number)

*This pamphlet supersedes Department of the Army Pamphlet 40–173 dated 30 August 1991.

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Contents—Continued

Appendixes

Table List

Glossary

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Chapter 1
Introduction

1–1. Purpose

This pamphlet—

a. Provides procedures for the occupational health aspects of the Chemical Surety Program established in AR 40-5 and AR 50-6 for all personnel potentially exposed to Levinstein mustard (H), distilled mustard (HD), or HT (mixture of 60 percent HD and 40 percent bis(2-chloroethylthioethyl) ether), hereinafter referred to as mustard.

b. Provides occupational health guidance for the evaluation and control of exposures to mustard in industrial, depot, and laboratory operations.

c. Does not apply to battlefield operations or nitrogen mustard.

1–2. References

Required and related publications and prescribed and referenced forms are listed in appendix A.

1–3. Explanation of abbreviations and terms

Abbreviations and special terms used in this pamphlet are explained in the glossary.

1–4. Waivers and exceptions

a. As a minimum, submit the following information to request a waiver or exception:

(1) The reference to the specific standard and to the specific paragraph for which the waiver or exception is being made.

(2) The reasons why the standard cannot be met.

(3) The interim measure used that compensates for the inability to comply with the standard.

(4) The action being taken to meet the standard and the estimated date the action will be completed.

(5) A statement of the impact if the waiver or exception is not approved.

b. Forward the request for waiver, extension of waiver, or exception through command channels to HQDA (DASG–PPM–NC), 5109 Leesburg Pike, Falls Church, VA 22041-3258.

1–5. Procurement

Incorporate the guidance provided in this pamphlet into the procurement of contractor services initiated after the date of this publication. Preexisting contracts do not require modification.

Chapter 2
Methods to Control Exposure

2–1. Exposure limits

Do not intentionally expose unprotected individuals to—

a. Mustard airborne concentrations exceeding the limits shown in table 2-1.

b. Direct eye or skin contact with any amount of mustard. Contact with liquid mustard is a medically significant route of exposure.

2–2. Hygiene practices and facilities

a. Individuals will not store, use, or consume food, beverages, tobacco products, cosmetics, and chewing products in an agent operating area.

b. Individuals required to wear protective clothing and equipment must use the clean change area and shower facility.

2–3. Contamination control

a. Procedures

(1) Design airflow from nonagent to agent areas.

(2) Do not exhaust air to the external environment when it contains concentrations of mustard greater than 0.003 milligrams per cubic meter (mg/m^3) for noncombustion emissions or 0.03 mg/m^3 for combustion emissions. The hostile sampling environment present with combustion emissions precludes measurements of concentrations below 0.03 mg/m^3. Therefore, that level is the minimum technologically feasible real-time detection limit.

(3) Introduce clean makeup air in sufficient volume (AR 385-64) to—

(a) Maintain the appropriate negative pressure atmosphere in agent areas.

(b) Assure the correct operation of the local exhaust system.

(4) Decontaminate and containerize equipment, material, or other items removed from an agent area to preclude contamination of nonagent areas or the external environment.

(5) Ventilate hoods continuously when mustard is present.

b. Engineering controls. When operationally feasible, use local exhaust ventilation as an engineering control.

(1) For new construction or modification, a laboratory-type hood must provide an average face velocity of 100 plus-or-minus 10 linear feet per minute (fpm) through the fully open sash. Use existing laboratory hoods, designed and approved at 150 plus-or-minus 30 linear fpm, until they can be modified. Verify containment by performing smoke capture tests.

(a) Use a traverse of one measurement per square foot (approximately) to compute the average face velocity.

(b) Ensure that individual readings do not deviate from the average face velocity by more than 20 percent.

(c) Take measurements every 6 months or when the system has undergone major repairs.

(2) Glove boxes and similar isolated systems must have an average inward velocity of at least 50 linear fpm through open ports and doors or must have 0.25 inch of static pressure on a closed system.

(3) Hoods used only for the storage of double contained agents (that is, no operations) are not subject to upper limits on airflow when the hood sash is lowered and locked for security.

(4) As a minimum, and under the following conditions, perform smoke capture testing:

(a) When measurements are made, or, when any process change has the potential to redirect air patterns.

(b) With personnel in their normal working position in front of the hood and with no obstruction to the front of the hood.

c. Work practices.

(1) Work practices drastically influence hood performance.

(a) During operations, keep mustard at least 20 centimeters (7.9 inches) inside the hood sash with the hood sash closed to the smallest opening practical.

(b) To ensure adequate airflow, minimize or eliminate storing reagents and equipment in hoods. Use ventilation cabinets when additional storage is needed.

(2) Personnel conducting performance testing and participating in facility design need to, be aware of the effects of outside air movement on hood performance. Consider—

(a) Velocity and method of introducing makeup air.

(b) Drafts from open doors or windows.

(c) Flow patterns around the worker.

(d) Proximity to other hoods.

(e) Pedestrian traffic.

d. Standing operating procedures (SOPs).

(1) The supervisor—

(a) Develops an SOP for each mustard operation.

(b) Obtains the local safety officer's approval of each SOP.

(c) Posts the SOP in each agent area.

(d) Enforces the SOP requirements per AR 50-6, paragraph 6-3.

(2) All individuals working in mustard areas must be trained in emergency procedures and be familiar with the SOPs.

(3) All individuals entering mustard areas must be familiar with emergency requirements and be accompanied by appropriately trained personnel.

2–4. Respiratory protection

a. Program. The installation or activity commander establishes the respiratory protection program for mustard operations according to AR 11-34 and TB MED 502/DLAM 1000.2.

b. Medical evaluation. Do not assign individuals to tasks requiring the use of respirators until the installation medical authority (IMA) or the designated contract physician—

(1) Performs the medical evaluation (app B).

(2) Determines whether either of the following applies:

(a) Individual is able to perform the necessary tasks while wearing a respirator.

(b) Individual's use of a respirator impairs the safety and health of the individual or others.

c. Optical inserts.

(1) The installation or activity commander procures optical inserts according to the criteria in AR 40-3 and AR 40-63/NAVMEDCOMINST 6810.1/AFR 167-3, table 1-1.

(2) The certifying official will not allow individuals to be assigned to or maintained in positions requiring access to mustard surety material if the person has poor visual acuity (requiring the use of glasses) and does not have mask or

lens inserts for the protective mask. Mask issue personnel will not issue the respirator until the required inserts are available. The IMA or designated contract physician may make exceptions on an individual basis.

(3) Eye clinic or appropriately trained personnel—

(a) Initially place the inserts in the respirator to ensure proper placement.

(b) Instruct the worker about the proper care and subsequent placement of the inserts.

(c) Instruct the mask issue personnel in the placement of optical inserts.

d. Contact lenses.

(1) Workers may not wear contact lenses under the respirator in areas where potential exposure to mustard exists.

(2) Infrequent visitors may wear contact lenses, even if full-facepiece respirators are worn. However, an escort must accompany them.

e. Selection of respiratory protection equipment.

(1) The selection of appropriate respiratory protection for mustard operations must take into account the—

(a) Exposure profile of the worker to mustard.

(b) Oxygen content of the environment.

(c) Operational considerations of wearing particular types of respiratory protection.

(2) Qualitatively fit test all workers who wear respiratory protection devices (para C-1). If workers fail the odor sensitivity test for detecting isoamyl acetate, perform qualitative fit tests using the irritant fume protocol in paragraph C-2. In lieu of qualitative fit testing, quantitative fit testing may be performed using surrogate masks. Never wear air-purifying protective masks (for example, the M9, M17, or M40-series or other certified equivalent masks) in oxygen deficient atmospheres (that is, oxygen concentrations less than 19.5 percent).

(3) The following are general guidelines for the use of respiratory protection in mustard operations:

(a) Operations conducted in atmospheres with concentrations at or below 0.003 mg/m^3 (taken as an 8-hour time-weighted average (TWA)). Protective masks are not required provided continuous real-time monitoring (with alarm capability) is conducted in the work area at the 0.003 mg/m^3 level of detection, immediate respiratory protection is available if concentrations exceed 0.003 mg/m^3, and exposure has been limited to the extent practicable by engineering controls (that is, remote operations, ventilation, and process isolation) or work practices, If these conditions are not met, workers with potential mustard exposures at concentrations less than or equal to 0.003 mg/m^3 must wear full facepiece, chemical canister, and air-purifying respirators. (The M9, M17, or M40-series or other certified equivalent masks are acceptable for this purpose in conjunction with the M3 toxicological agent protective (TAP) suit for dermal protection.)

(b) Operations conducted in atmospheres above 0.003 mg/m^3 (taken as an 8-hour TWA). A National Institute for Occupational Safety and Health (NIOSH) or Mine Safety Health Administration (MSHA) approved, pressure-demand, full-facepiece, self-contained breathing apparatus (SCBA) or supplied-air respirator suitable for use in immediately dangerous to life or health (IDLH) atmospheres is required. In addition, a protective barrier material to encapsulate the employee and the respirator is essential to provide a total protective system. The Office of The Surgeon General has conditionally approved the 20 and 30 mil thickness demilitarization protective ensembles (DPEs) for use in mustard demilitarization operations.

(4) Operational implementation of these guidelines are in AR 385-61, AR 385-64, and current DA Safety policy.

f. Respirator facepiece seal. Do not wear respirators or masks equipped with a facepiece if facial hair—

(1) Comes between the sealing periphery of the facepiece and the face.

(2) Interferes with valve functions (AR 11-34; American National Standards Institute (ANSI) Z88.2 Standard, para 3.5.8; and TB MED 502/DLAM 1000.2, para 2-7*b*(4)).

2–5. Exposure monitoring

a. Routine operations.

(1) *Monitoring.* The installation or activity commander conducts continuous real-time monitoring to determine the appropriate level of worker protective clothing according to current DA safety policy.

(2) *Air samples.*

(a) The installation or activity commander collects representative general area air samples. Representative samples should be interpreted as meaning low level monitoring in the worker's immediate vicinity, at a sufficient number of points to capture the worker's exposure profile during those agent operations, and at a sampling height that reflects where the worker's breathing zone is expected to be. Determine whether agent operations are being conducted with workers lying on the floor, sitting on a chair, or standing on a ladder.

(b) When technology is available, collect full-period consecutive samples from the breathing zone of individuals performing the agent operation tasks.

b. New agent operations.

(1) Monitor during the first 5 days to verify the adequacy of the engineering controls.

(2) Remonitor as required.

(a) Quarterly for 1 operating day.

(b) Following any significant damage or repairs of the ventilation system.

(c) Following significant changes in the operation (remonitoring is not required if the only change is to an agent of lower volatility).

c. Cleanup after a spill or accidental release. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the exposure limits for the agent worker shown in table 2-1.

d. Exposure measurement. For airborne mustard monitoring equipment, use a method of measurement that—

(1) Has an accuracy of plus-or-minus 25 percent at the 95 percent confidence level.

(2) Demonstrates this accuracy and precision over the range of 1.0 to 2.0 times the agent worker exposure limit shown in table 2-1.

Table 2–1
Airborne exposure limits for Mustard Agents H, HD, and HT[1]

Scenario	Mustard agents (mg/m^3)
Agent Worker	
8-hour TWA in any work shift	0.003[2]
General Population	
72-hour TWA	0.0001[3]
Ceiling value[4]	0.003

Notes:

[1] HT is measured as HD.

[2] This value also represents the technologically feasible real-time detection limit.

[3] It is recommended that this level of detection be demonstrated and used at all sites where mustard will be transported and destroyed.

[4] Ceiling value normally refers to the maximum exposure concentration at any time, for any duration. Practically, it may be an average value over the minimum time required to detect the specified concentration.

Chapter 3
Administrative Requirements

3–1. Recordkeeping

a. Documentation. The examining physician documents any potential exposure to mustard (including an estimate of the exposure and the type of personal protective equipment (PPE) used) in the occupational health record if—

(1) An employee working in an agent operating area exhibits signs or symptoms of mustard intoxication.

(2) Medical surveillance findings or breaches in PPE suggest that properly protected workers were potentially exposed.

b. Maintenance. The IMA or designated contract physician ensures the employee's occupational health record is maintained for the duration of the individual's employment, plus 30 years (AR 25-400-2, AR 25–55, AR 340-21, and Section 20, Part 1910, Title 29, Code of Federal Regulations (29 CFR 1910.20)).

c. Atmospheric monitoring records. Documentation of atmospheric sampling, even for negligible results, is important in assessing the present and past exposure history and in meeting legal requirements.

(1) The installation or activity commander—

(a) Designates who maintains the monitoring records.

(b) Assures that the personnel are qualified to interpret, correlate, and forward the results to the IMA or designated contract physician.

(2) The IMA or designated contract physician incorporates atmospheric monitoring data on exposed workers or potentially exposed workers into the occupational health record using a DA Form 4700 (Medical Record—Supplemental Medical Data) or other appropriate forms. (See the definition of an exposed worker and potentially exposed worker in the glossary.) Any record of exposure or potential exposure above the levels prescribed in table 2-1 must include—

(a) The date, number, duration, location, and results of each of the samples taken.

(b) A written description of the sampling and analytical methods used or a reference to a publication in the open literature describing these methods.

(c) The type of PPE used.

d. Employee access. The IMA or designated contract physician—

(1) Removes all personal identifiers from the atmospheric sampling results (after incorporating data into the occupational health record if appropriate) and forwards recommendations to the supervisor for posting in the work area.

(2) Provides the affected individuals, former employees, or their designated representatives access to the atmospheric sampling records.

(3) Makes available the medical examination records required by appendix B for inspection and copying (AR 40-66, AR 50-6, and 29 CFR 1910.20).

3–2. Information and reporting requirements

a. The surety officer, in coordination with other appropriate personnel, provides the following information to the examining physician:

(1) A copy of this pamphlet.

(2) A written description of the affected individual's duties as they relate to the potential exposure.

(3) The individual's potential exposure (measured or estimated).

(4) A description of any PPE used or to be used.

b. If an individual is removed from work because of signs and symptoms commonly associated with exposure to mustard, the IMA or designated contract physician ensures that the occurrence is—

(1) Immediately reported to the certifying official per AR 50-6.

(2) Reported in the Special Telegraphic Report of Selected Condition (RCS MED-16(R4)) as an occupationally related illness per AR 40-400.

(3) Noted in the remarks section of the DA Form 3076 (Army Occupational Health Report) covering the exposure period per AR 40-5.

(4) Reported to the safety officer.

(5) Documented in the occupational health record.

3–3. Employee information and training

a. Employee health education program. The IMA or designated contract physician coordinates with the installation commander to establish a health education program to inform employees of—

(1) Contamination control (para 2-3).

(2) Respiratory protection (para 2-4).

(3) Purpose and description of the medical surveillance program (chap 4 and app B).

b. Employee health training. The IMA or designated contract physician reviews and approves all SOPs related to employee training such as contamination avoidance, personal protection, decontamination procedures, buddy-aid, self-aid, and essential first aid practices.

c. Access to health education materials. The IMA or designated contract physician coordinates with the installation commander to ensure that a copy of all materials used in the health education program or training are readily available to all individuals with the potential for exposure.

d. Hazard communication information.

(1) The installation commander, through a written hazard communication program, defines the mechanisms for training workers about the potential exposure to mustard and the protective measures necessary for the job.

(2) Include the following mustard-specific items in employee hazard communication training:

(a) An explanation of the types of operations in the individual's workplace which involve potential mustard exposure.

(b) Methods used by the installation to recognize and evaluate potential work area exposures.

(c) An explanation of the potential acute and chronic health effects associated with mustard exposure to include potential carcinogenicity and mutagenicity.

(d) Protective measures to include administrative and engineering controls, safe work practices, emergency procedures to include self-aid, buddy-aid, first aid, and decontamination, and PPE.

(e) An explanation of the mustard material safety data sheet (MSDS) and applicable SOP to ensure that mustard materials are handled and stored per SOPs and regulations.

(f) Emergency evacuation and notification procedures.

(3) Methods of instruction may include formal classes, work area meetings, and audiovisual presentations as appropriate. As a minimum, annually repeat health-related training (para (2)(c) and (d), above). The IMA or designated contract physician provide technical assistance, monitor selected training sessions, and approve, in writing, the program of instruction and lesson plans.

(4) Document hazard communication training in writing, to include the signature of both the trainee and the approving authority. Document training for all DA employees on DD Form 1556 (Request, Authorization, Agreement, Certification of Training and Reimbursement) or other appropriate forms and incorporate as a permanent part of the official personnel folder.

3–4. Material safety data sheets

a. The employee must have direct access to the MSDSs content and location. The MSDSs are products of the

material developer. To obtain copies of the current MSDSs, contact the Chief, Safety Office, U.S. Army Chemical Research, Development and Engineering Center, ATTN: SMCCR-SFS, Bldg E5101, Aberdeen Proving Ground, MD 21010-5423 (DSN/AUTOVON 584-4411).

b. Since the MSDSs' contents may change with time, the MSDSs may not always represent the medical guidance provided by the Office of The Surgeon General.

Chapter 4
Medical Surveillance Program

4–1. Introduction

a. The IMA or designated contract physician establishes the medical surveillance program for personnel with a significant potential for exposure to mustard (app B). Personnel with a high risk of potential exposure will receive the most extensive examinations.

b. Table 4-1 presents the category specific medical surveillance requirements.

c. Appendix D provides the information on the diagnosis and treatment of mustard intoxication.

4–2. Categories

The surety officer or safety officer, in coordination with the IMA, categorizes all personnel with any potential for exposure.

a. Category A includes personnel with a high risk of potential exposure (see definition in glossary) due to the nature of the agent operations being conducted. Examples of such operations might include (but are not limited to) periodic inspections, toxic chemical munition maintenance operations that involve movement of munitions from storage locations, work in known contaminated environments, and first entry monitoring. Category A personnel may be routinely required to work for prolonged periods in high levels of mustard agents where the use of either of the following are required:

(1) TAP ensembles.

(2) Protective ensembles with self-contained or supplied-air breathing apparatus.

b. Category B includes personnel with—

(1) A low risk or infrequent potential exposure to mustard in routine industrial, laboratory, or security operations. Examples of such operations might include daily site security checks and accident/incident response by initial response force members.

(2) Job requirements involving the prolonged wearing of protective ensembles during training and emergency responses.

c. Category C includes personnel with minimal probability of exposure to mustard even under accident conditions, but whose activities may place them in close proximity to agent areas.

d. Category D includes transient visitors to agent areas where there is a potential for exposure and who are not included in the medical surveillance program for mustard at the visited installation.

4–3. Preplacement examination

a. Documentation. All personnel assigned to work involving the potential exposure to mustard will receive a medical examination to document that they—

(1) Exhibit no physical, mental, or emotional impairment which may result in a higher vulnerability to mustard exposure.

(2) Are physically and mentally able to wear and use the required protective clothing and equipment.

b. Requirements.

(1) All medical procedures required by this document are—

(a) Performed by or under the supervision of the IMA or designated contract physician.

(b) Provided without cost to the employee.

(2) Appendix B, section I, details preplacement examination requirements by category of potential exposure.

c. Examination.

(1) An acceptable preplacement examination is—

(a) Any medical examination conducted within 90 days prior to work assignment involving the potential exposure to mustard.

(b) Consistent with the requirements outlined in appendix B, section I.

(2) If the medical examination described in (1)(a), above, was not conducted specifically as a preplacement examination for work involving the potential exposure to mustard, the IMA or designated contract physician—

(a) Reviews the examination results.

(b) Renders a written opinion in the occupational health record as to its acceptability.

(3) If the medical examination described in (1)(a) above does not include all of the preplacement examination requirements described in appendix B, section I, the IMA or designated contract physician must perform the procedures which were omitted.

4–4. Periodic examination

The installation or activity commander ensures that all personnel assigned to work in areas involving potential exposure to mustard will receive the appropriate periodic examinations (AR 385-10). Appendix B, section II, details the periodic examination requirements by category of potential exposure. The IMA or designated contract physician performs the appropriate category specific or periodic examination and informs the installation or activity commander of those individuals who do not have up-to-date periodic examinations.

4–5. Termination examination

a. The IMA or designated contract physician performs a termination examination on individuals within 30 days before or after removal from the program. (See app B, sec III.)

b. Individuals who are included in a medical surveillance program for 3 months or less do not require termination examinations, unless there has been documented evidence of exposure to mustard.

c. The installation or activity commander ensures that a termination examination be given to workers who—

(1) Have been in the chemical surety program for more than 3 months.

(2) Are either permanently disqualified or administratively terminated from the chemical surety program, (See AR 50-6, chap 3.)

4–6. Documentation of examination results

The examining physician records the written opinion in the occupational health record for each medical evaluation. This opinion includes—

a. The results of the medical examination and testing.

b. A statement about any detected medical condition that would place the individual's health at an increased risk of impairment if exposed to mustard.

c. Any recommended limitations on the potential exposure to mustard or on the use of protective clothing and equipment.

d. A statement that the employee has been informed of the above.

4–7. Accidental exposure

If an individual has been accidentally exposed or potentially exposed (see definition of exposed worker in glossary), the examining physician—

a. Provides the appropriate medical examinations and emergency treatment.

b. Documents the occupational health records with an opinion of the exposure effects.

c. Records any atmospheric monitoring measurements in the occupational health record (para 3–1*c*(2)).

Table 4–1
Category specific medical surveillance[1]

Category	Preplacement	Periodic[2]	Termination
A	Occupational history (OH) Medical history (MH) Physical examination (PE) Electrocardiogram (EKG)(over 35) PPE evaluation (includes spirometry) Audiometric examination Visual acuity/pupil prescription Chest radiograph Complete blood count (CBC) with differential	Interval OH Interval MH PE EKG (over 35) PPE evaluation (spiro every 2 yrs) Audiometric examination Visual acuity/pupil prescription CBC with differential (every 2 years)	Interval OH Interval MH PE Spirometry Chest radiograph CBC with differential
B	Same as category A	Same as category A except that spirometry and CBC with differential examinations are done at least every 5 years	Same as category A
C	OH MH	OH	OH

Table 4–1
Category specific medical surveillance[1]—Continued

Category	Preplacement	Periodic[2]	Termination
D	——	——	——

Notes:
[1] Refer to appendix B for detailed guidance.
[2] Denotes annual requirement unless otherwise mentioned.

Appendix A
References

Section I
Required Publications

ANSI Z87.1 Standard
Practice for Occupational and Educational Eye and Face Protection. (Cited in para B-1*c*(4)(c).) (Available at http://www.ansi.org.)

AR 11–34
The Army Respiratory Protection Program. (Cited in paras 2-4*a* and 2–4*f*(2).)

AR 40–3
Medical, Dental, and Veterinary Care. (Cited in para 2-4*c*(1).)

AR 40–5
Preventive Medicine. (Cited in paras 1-1*a*, 3-2*b*(3), 3-5*b*(2), B-5, B-6, and B-10.)

AR 40–63/NAVMEDCOMINST 6810.1/AFR 167–3
Ophthalmic Services. (Cited in para 2-4*c*(1).)

AR 40–66
Medical Record Administration and Health Care Documentation. (Cited in para 3-1*d*(3).)

AR 40–400
Patient Administration. (Cited in para 3-2*b*(2).)

AR 50–6
Nuclear and Chemical Weapons and Materiel, Chemical Surety. (Cited in the summary and paras 1-1*a*, 2-3*d*(1)(d), 2-4*e*(1), 3-1*d*(3), 3-2*b*(1), 4-5*c*(2), B-1*c*(2)(b), B-4*b*, and B-8*b*.)

AR 385–61
The Army Chemical Agents Safety Program. (Cited in para 2-4*e*(4) and C-2*m*.)

DA Pam 40–501
Hearing Conservation Program. (Cited in para B-1*c*(3).)

TB MED 502/DLAM 1000.2
Respiratory Protection Program. (Cited in paras 2-4*a* and 2-4*f*(2).) (Available at http://chppm-www.apgea.army.mil/tbm.htm.)

TB MED 509
Spirometry in Occupational Health Surveillance. (Cited in para B-1*c*(2)(a).) (Available at http://chppm-www.apgea.army.mil/tbm.htm.)

Section II
Related Publications
A related publication is a source of additional information. The user does not have to read a related reference to understand this publication.

ANSI Z88.2 Standard
Practices for Respiratory Protection (Available at http://www.ansi.org.)

AR 25–55
The Department of the Army Freedom of Information Act Program

AR 25–400–2
The Army Records Information Management System (ARIMS)

AR 340–21
The Army Privacy Program

AR 385–10
The Army Safety Program

AR 385–40
Accident Reporting and Records

AR 385–64
U.S. Army Explosives Safety Program

DA Pam 40–503
Industrial Hygiene Program

DHHS (NIOSH) Publication No. 97–140
Pocket Guide to Chemical Hazards (Available at http://www.cdc.gov/NIOSH/npg/npg.html.)

MIL–STD 282
Filter Units, Protective Clothing, Gas-Mask Components and Related Products: Performance-Test Methods (Available at http://dodssp.daps.mil.)

Section III
Prescribed Forms
This section contains no entries.

Section IV
Referenced Forms

DA Form 3076
Army Occupational Health Report

DA Form 4700
Medical Record—Supplemental Medical Data

DD Form 1556
Request, Authorization, Agreement, Certification of Training and Reimbursement

Appendix B
Medical Surveillance Program for Personnel With a Significant Potential for Exposure to Mustard

Section I
Preplacement Examinations

B–1. Category A and category B personnel
The examining physician—

a. Obtains a comprehensive—

(1) Occupational history, with specific emphasis on prior potential exposures to mustard or other chemicals associated with cardiovascular, pulmonary, or neoplastic disease.

(2) Medical history (especially on smoking) and review of systems, focusing on the skin, eyes, and pulmonary, cardiovascular, reproductive, and hematologic systems.

b. Administers a general physical examination—

(1) With emphasis on the diagnosis of possibly disqualifying cardiovascular or pulmonary disease.

(2) To detect any significant abnormalities in visual acuity or hearing, the skin, or lymphatic system.

c. Performs specific evaluations to include the following:

(1) Electrocardiogram at rest for individuals age 35 and older. At the discretion of the examining physician, the

individual may obtain a stress EKG if the individual is to perform strenuous activities using protective clothing and equipment.

(2) Evaluation of the individual's physical ability to perform work involving potential exposure to mustard using the respiratory PPE. This evaluation uses reliable evidence (history (for example, recent successful completion of a mask confidence exercise) or observations (for example, a "use" test)) that shows that the individual can safely and effectively use the required respiratory PPE and that no physiological or psychological conditions impair the individual's ability to use this equipment. For this evaluation, document this evidence and the physician's written opinion of the individual's ability to use such equipment in the individual's occupational health record. If work practices require activities to be performed in full protective clothing (that is, TAP ensemble and protective mask), document, in the individual's occupational health record, the individual's ability to withstand heat stress and to withstand sustained use of the PPE.

(a) The examining physician must document baseline pulmonary function tests including, as a minimum, the forced vital capacity (FVC), and the 1-second forced expiratory volume (FEV^1). (See TB MED 509.) Subsequent evaluations of physiological capability to wear a respirator do not require repeated documentation of pulmonary function studies unless specifically required by the examining physician. Abnormal pulmonary function tests alone are not grounds for disqualification. If there are abnormal pulmonary function tests, consider the following before disqualifying an individual from respiratory PPE use, the individual's MH, age, the nature of the work to be performed while wearing respiratory PPE, the type of respiratory PPE employed, the results of the tests of cardiovascular status and, if necessary, a "use" test.

(b) The examining physician must inform the certifying official, in a confidential manner, of any individual who is physically unable to wear respiratory PPE. (See AR 50-6, chap 3.)

(3) Audiometric examination to determine the individual's auditory acuity per DA Pam 40-501.

(4) Determination of the near and distant visual acuity and pupillary reactivity.

(a) All individuals will have corrected near and distant visual acuity of 20/40 or better in at least one eye.

(b) If corrective lenses are required to provide this acuity, order corrective lenses prior to the individual's placement in the workplace.

(c) Provide individuals working in eye hazardous areas or jobs with appropriate protective eyewear meeting the ANSI Z87.1 Standard (to include prescription and plano industrial safety glasses and chemical splash goggles).

(d) Instruct individuals on the importance of wearing eyewear and on the proper use of these items (whether protective or merely to correct visual acuity), including optical inserts for the protective mask (if required).

(5) Other clinical tests include a 14 by 17-inch posterior-anterior chest radiograph and a CBC with differential white cell count.

B–2. Category C personnel

a. No physical examination is required. However, the IMA or designated contract physician will obtain an occupational history with specific emphasis on prior potential exposures to mustard or other chemicals associated with cardiovascular, pulmonary, or neoplastic disease.

b. The examining physician will also obtain a medical history (especially on smoking) and a review of systems, focusing on the skin, eyes, cardiovascular, pulmonary, reproductive, and hematological systems.

B–3. Category D personnel

No preplacement examination is necessary.

B–4. Abnormal findings

In the event of abnormal findings on the preplacement examination, the examining physician—

a. Determines what (if any) work practice or personal protective clothing limitations are necessary to protect the health of the worker.

b. Informs the certifying official of these limitations in a confidential manner, after discussing these findings with the worker. (See AR 50-6, chap 3.)

Section II
Periodic Job-Related Medical Surveillance

B–5. Category A and category B personnel

a. All workers in categories A and B will receive an annual examination to determine their continued fitness and to review their occupational exposure histories during the preceding year.

(1) Pay attention to the possibility of nonoccupationally related exposures to other substances producing effects similar to mustard.

(2) Obtain a complete history concerning signs, symptoms, or adverse effects that may be connected to mustard exposure, heat stress, or continued use of PPE.

b. As a minimum, perform a review and update of work and MHs in addition to the examinations listed in paragraphs B-1*b*and B-1*c*(1) through (4), and the CBC with differential white cell count.

(1) Spirometry and CBC with differential white blood cell count examinations are recommended every 2 years for category A personnel and at least every 5 years for category B personnel.

(2) These tests should supplement other job specific surveillance tests indicated by worker exposures (if any) to substances other than mustard. (See AR 40-5, chap 5.)

B–6. Category C personnel

No annual medical examination is necessary other than obtaining an occupational exposure history for the preceding year to determine job specific surveillance tests (if any) for substances other than mustard. (See AR 40-5, chap 5.)

B–7. Category D personnel

No periodic medical examination is required.

B–8. Abnormal findings

In the event of abnormal findings on the periodic examination, the examining physician—

a. Determines what (if any) work practice or personal protective clothing limitations are necessary to protect the health of the worker.

b. Informs the certifying official of these limitations in a confidential manner, after discussing these findings with the worker. (See AR 50-6, chap 3.)

Section III
Termination examinations

B–9. Category A and B personnel

a. The IMA or designated contract physician updates the occupational exposure history and medical review of systems as previously discussed in paragraph B-5. If at any of the previous examinations the individual was referred for specialty consultation, refer the individual again for followup evaluation if medically indicated.

b. Additionally, the examining physician performs—

(1) A general physical examination directed towards the detection of any abnormalities in the eyes, skin, or lymphatic or respiratory system.

(2) Spirometry, chest radiograph, and CBC with differential white blood cell count examinations.

B–10. Category C personnel

No special medical examination before termination of employment is necessary, other than updating the occupational exposure history for job specific surveillance tests (if any) for substances other than mustard. (See AR 40-5, chap 5.)

B–11. Category D personnel

No termination examination is required.

Appendix C
Qualitative Protective Mask Fit Testing

C–1. Isoamyl acetate test

a. Overview.

(1) The test depends on the odor of isoamyl acetate, so-called banana oil because of its odor.

(2) The test consists of two parts, odor sensitivity check and mask fit check.

(3) The test location should be free of sources of ignition because isoamyl acetate is flammable. The flash point is 77°F and the lower explosive limit in air is 1 percent. The safe limit in air is 0.25 percent.

(4) Test chamber should be in a well-ventilated room separate from where the facepiece selection and sensitivity checks are performed to avoid olfactory fatigue.

(5) Test chamber consists of a plastic enclosure about 24 inches in diameter that covers the head and upper body of the test subject. A clear 55-gallon drum liner suspended upside down on a suitable frame is adequate.

b. Equipment and supplies.

(1) 55-gallon drum liner and suitable frame.

(2) Supply of 4- by 5-inch pieces of absorbent paper.

(3) Small bottle (2 to 4 ounces) of isoamyl acetate, eyedroppers calibrated in milliliters (ml), and a supply of cotton-tipped swabs.

(4) Four 1-liter glass jars with metal lids (for example, Mason or Ball jars).

(5) A stock solution of 1 ml of isoamyl acetate in 800 ml of odor-free water in a 1 liter container (from (4) above). Fresh solutions will be made up weekly.

(6) Two 1-liter containers (from (4) above), each containing 500 ml of odor-free water. These will be the blank solutions in the sensitivity test.

(7) A sensitivity solution of 0.5 m1 of stock solution in 500 ml of odor-free water in a 1 liter container (from (4) above). Fresh solutions will be made daily.

(8) Preparation or expiration date should be marked on the containers of the stock and sensitivity solutions.

c. Odor sensitivity test.

(1) In a room separate from the test chamber, set up the two containers of blank solutions and the container of the sensitivity solution in random order.

(2) Instruct the test subject to identify the container of the sensitivity solution (isoamyl acetate solution) by opening lids and smelling. If the subject is unable to distinguish between the odor of the liquid in the containers, olfactory impairment is assumed and paragraph C-2 applies.

(3) Don and adjust protective mask prior to entering the test chamber room.

d. Fit check.

(1) Hang absorbent paper, which has been folded in half and wetted with 0.5 ml of isoamyl acetate, on the hook in the top of the chamber (examiner may accomplish prior to subject being tested).

(2) Wait 2 minutes before allowing the test subject to enter the chamber. This allows the isoamyl acetate concentration to reach the required level of 150 parts per million (nominal).

(3) Instruct the test subject to enter the test chamber and perform each exercise listed below for 30 seconds.

(a) Normal breathing.

(b) Deep breathing. Be certain breaths are deep and regular.

(c) Turn head from side to side. Be certain movement is complete, with one turn every second. Avoid bumping of the respirator on the shoulders.

(d) Nod head up and down. Be certain motions are complete and made about every second. Avoid bumping of the respirator on the chest.

(e) Talking. Read a paragraph that incorporates the full range of speech sounds such as the so-called rainbow passage used by speech therapists. Be certain the paragraph is read aloud and slowly.

(f) Normal breathing.

(4) Consider the mask fit adequate if the isoamyl acetate (banana oil) odor is not detected at any time during the fit test.

(5) Terminate the test if the isoamyl acetate odor is detected at any point during the test. Detection of the banana oil odor of the isoamyl acetate by the subject indicates that the mask does not fit or is defective.

(6) Remove the wetted paper after the subject leaves the test chamber and deposit in a closed container.

(7) If test is not passed satisfactorily, either because of improper mask size or mask is found to be defective, instruct test subject to obtain a new mask and repeat the entire fit test sequence.

(8) If mask is found to be defective, issue a new mask and turn in the defective mask as unserviceable.

C–2. Irritant fume protocol

a. When an individual's olfactory senses are impaired, test the mask for fit and leakage with irritant smoke.

b. Allow the test subject to smell a weak concentration of the irritant smoke to become familiar with the characteristic odor of each.

c. Have the test subject properly don the mask and wear it for at least 10 minutes before starting the fit test.

d. Review this protocol with the test subject before testing.

e. Instruct the test, subject to perform the conventional positive pressure and negative pressure fit checks. Failure of either check is cause to select an alternate respirator.

f. Break both ends of a ventilation smoke tube containing stannic oxychloride, such as the Mine Safety Appliances part no. 5645, or equivalent. Attach a short length of tubing to one end of the smoke tube. Attach the other end of the smoke tube to a low pressure air pump set to deliver 200 ml per minute.

g. Advise the test subject that the smoke can be irritating to the eyes and instruct the subjects to keep their eyes closed while the test is performed.

h. Direct the stream of irritant smoke from the tube towards the faceseal area of-the test subject. Begin at least 12 inches from the facepiece and, gradually move to within 1 inch, moving around the whole perimeter of the mask.

i. Instruct the test subject to perform each of the following exercises for 1 minute while the mask seat is being challenged by the smoke:

(1) *Normal breathing.*

(2) *Deep breathing.* Be certain breaths are deep and regular.

(3) *Turn head from side to side.* Be certain movement is complete. Alert the test subject not to bump the mask on the shoulders. Have test subject inhale when head is at either side.

(4) *Nod head up and down.* Be certain motions are complete. Alert the test subject not to bump the mask on the chest. Have the test subject inhale when head is in the fully up position.

(5) *Talking.* Count backwards from 100, slowly and distinctly.

(6) *Normal breathing.*

j. If the irritant smoke produces an involuntary reaction (cough) by the test subject, stop the test. In this case, reject the tested respirator and select another one.

k. Give each test subject passing the smoke test, without evidence of a response, a sensitivity check of the smoke from the same tube to determine whether the test subject reacts to the smoke. Failure to evoke a response will void the fit test.

l. Perform steps listed in e, h, and i above in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the irritant smoke.

m. Use masks successfully tested by the protocol in contaminated atmospheres. (See AR 385-61, table 2-3.)

Appendix D
Diagnosis and Treatment of Mustard Intoxication: General information for Healthcare Providers

D–1. Introduction

a. This appendix provides general information to medical personnel treating mustard intoxication from both surety and research, development, test, and evaluation (RDTE) materiel. Although RDTE dilution materiel may be significantly less hazardous than surety materiel, RDTE solutions may represent significant exposure potential to highly hazardous substances.

b. This appendix is not intended to provide doctrine on self-aid, buddy-aid, or first aid to nonmedical personnel.

D–2. Routes of entry

The routes of entry are through inhalation and eye and skin absorption. Ingestion is rarely a route of entry.

D–3. Toxicology

Mustard acts as a cytotoxic agent on all tissue surfaces contacted. It is thus hazardous through all routes of exposure in liquid and vapor forms.

a. Repeated exposures result in hypersensitivity to its effects.

b. Eye absorption results in injuries ranging from mild conjunctivitis to corneal necrosis and opacification. Infection of the lesions is common.

c. Skin absorption of mustard vapor results initially in capillary hyperemia and dermal edema usually followed by vesication. Skin contact with liquid mustard produces a more marked reaction, often yielding an area of tissue necrosis without vesication surrounded by an area of erythema and blisters. The skin effects of mustard agent are dependent on the concentration of the agent and the environmental conditions, with a hot humid atmosphere promoting the most severe reactions.

d. Inhalation of mustard causes damage primarily to the laryngeal and tracheobronchial mucosa. Moderate overexposure results in hyperemia and necrosis of the respiratory mucosa. More severe exposures yield congestion of the pulmonary parenchyma, edema, and atelectasis. Suppurative bronchitis or bronchopneumonia frequently complicates pulmonary lesions and is the primary cause of death from vapor exposures. Repeated or prolonged inhalation can cause bronchiectasis or chronic bronchitis.

e. If ingestion of mustard occurs, either directly or from liquid-contaminated food or drink, necrosis and desquamation of gastrointestinal mucosa occurs, producing diarrhea, gastrointestinal hemorrhage, nausea, and vomiting.

f. Systemic effects can occur after any exposure with much individual variation. Like other alkylating agents, systemic absorption results in injury to the bone marrow, lymph nodes, and spleen producing leukopenia and thrombocytopenia. Other systemic effects include fever, central nervous system depression, parasympathomimetic effects (bradycardia, cardiac irregularities), hemoconcentration, and shock.

g. In addition to its direct cytotoxic effects, mustard has also been shown to be mutagenic and carcinogenic in animals. Prolonged human exposure has been associated with cancer of the tongue, paranasal sinus, larynx, bronchus, lung, and mediastinum. Tumors observed have been of the squamous or undifferentiated cell types. Consider the possibility of skin cancer because of the frequency of this lesion in animal studies.

h. Since mustard agent is similar in its effects to nitrogen mustard, which has been associated with human leukemia, this disease might also be expected to occur in humans chronically exposed to mustard.

D–4. Signs and symptoms

a. The signs and symptoms of acute mustard-induced lesions characteristically are delayed in appearance. The length of the delay and the degree of injury are both dependent on the severity of the exposure as well as the organs affected. The delay of onset is typically 4 to 6 hours, but may range from less than 1 hour up to several days.

b. The eye is the most sensitive organ and may become inflamed at mustard levels which do not affect the skin or respiratory tract significantly. Mustard agent conjunctivitis may be present with lacrimation, discomfort, and erythema of the lids and conjunctiva. More severe exposures may produce photophobia, blepharospasm, pain, corneal erosion, iritis, conjunctival vascularization, ulceration, and corneal opacification. Delayed keratitis has been documented in many cases as long as 45 years after the original exposure.

c. Exposure of the skin to mustard vapor is marked by the appearance of erythema and edema, later followed by the development of vesication. Itching and burning may occur during the erythematous phase. Multiple small vesicles arise in the erythematous skin and gradually enlarge and coalesce to form typical large, fragile, yellowish bullae. These are usually painless. Liquid mustard contamination of the skin may result in an area of gray-white necrotic skin surrounded by erythema and vesication.

d. If mustard inhalation occurs, the symptoms may develop slowly over several days. Early symptoms could include hoarseness and a cough. The cough may later become productive and the hoarseness may progress to aphonia. Pseudomembranes, fever, dyspnea, and moist rales may develop.

e. Ingestion of mustard produces nausea, vomiting, abdominal pain, diarrhea, and prostration.

(1) Malaise, nausea, vomiting, and fever may accompany any significant exposure to mustard by any route.

(2) Symptoms and signs referable to central nervous system depression may accompany severe exposure to mustard,

(3) Signs of leukipenia and thrombocytopenia such as infection, abnormal bruising, or bleeding may develop. Bradycardia and cardiac arrhythmias may occur. Shock may develop in severely affected patients.

f. Chronic mustard-induced illness is most commonly referable to the respiratory tract.

(1) Dyspnea, productive cough, loss of exercise tolerance, frequent pulmonary infections, and changes in pulmonary function tests may indicate possible mustard-induced chronic lung disease.

(2) The development of leukoplakia, masses, or ulcerations that fail to heat on the skin or in the upper respiratory tract might indicate carcinoma.

(3) Pay particular attention to other respiratory tract symptoms such as chest pain, dyspnea, cough, hemoptysis, or hoarseness, which could suggest a respiratory tract malignancy.

g. Findings typical of leukemia must also be recognized. These might include lymph node enlargement, purpura, anemia, weakness, fever, frequent infections, splenomegaly, and leukopenia.

D–5. Treatment

a. Remove from exposure immediately. If eyes have not been protected, flush eyes with copious amounts of water. Wash or decontaminate affected skin using 5 percent hypochlorite (bleach) and water. No antidote exists for mustard exposure; therefore, direct efforts toward neutralization of any mustard still present as soon as possible. Prophylactic antibiotics are not effective or indicated for pulmonary or ophthalmic lesions. Give supportive therapy for any lesions which develop.

b. Any ocular contamination with mustard is serious. Differentiate conjunctiva involvement (conjunctivitis) from corneal (keratitis). Depending on the diagnosis, treatment may be topical steroid or antibacterial ophthalmic preparation(s). Before such treatment is initiated, consultation with an optometrist or ophthalmologist is mandatory, Use ophthalmic steroids with caution, as they cause thinning of the corneal epithelium; may mask infection, encourage fungal growth; and may, increase intraocular pressure. Do not bandage the eyes or allow the lids to stick together. Control pain by systemic medications and topical anticholinergic drops.

c. The treatment of mustard skin effects is dependent on the severity of the lesions produced. Erythema may require no treatment except symptomatic relief of pruritus or pain.

(1) Drain mustard blisters only if symptomatic relief can be obtained by the procedure.

(2) Use sterile fine needle aspiration. The fluid in the blisters does not contain active mustard and is not irritating.

(3) Clean blisters gently; do not scrub.

(4) Cover small lesions with sterile petrolatum gauze while large lesions are best treated by open methods. Antibacterial burn creams may be of value.

d. Mild respiratory tract injury from mustard may require no treatment or symptomatic treatment only. If the injury is more severe than hoarseness, sore throat, or mild cough, hospitalize the patient. If ingestion of mustard agent is suspected or if symptoms of systemic toxicity such as nausea, vomiting, pain, diarrhea, and prostration occur, hospitalize the patient for supportive care. Recovery from mustard-induced lesions may take from 1 week to several months.

Glossary

Section I
Abbreviations

ANSI
American National Standards Institute

CBC
complete blood count

DA
Department of the Army

DOD
Department of Defense

DPE
demilitarization protective ensemble

EKG
electrocardiogram

FEV^1
forced expiratory volume in 1 second

fpm
feet per minute

FVC
forced vital capacity

IDLH
immediately dangerous to life and health

IMA
installation medical authority

mg/m^3
milligrams per cubic meter

MH
medical history

ml
milliliters

MSHA
Mine Safety and Health Administration

MSDS
material safety data sheet

NIOSH
National Institute for Occupational Safety and Health

OH
occupational health

PE
physical examination

PPE
personal protective equipment

RDTE
research, development, test, and evaluation

SCBA
self-contained breathing apparatus

SOP
standing operating procedure

TAP
toxicological agent protective

TWA
time-weighted average

Section II
Terms

Agent area
A physical location where entry and exit are restricted and controlled; and where agents H, HD, and HT are manufactured, processed, packaged, repackaged, demilitarized, released, handled, stored, used, or disposed.

Agent H
Levinstein mustard. Mixture of 70 percent bis(2-chloroethyl) sulfide and 30 percent sulfur impurities produced by the Levinstein process.

Agent HD
Distilled mustard or bis(2-chloroethyl) sulfide, chemical abstract service registry No. 505-60-2. HD is H that has been purified by washing and vacuum distillation to reduce sulfur impurities.

Agent HT
Mixture of 60 Percent HD and 40 percent T. T is bis(2-chloroethylthioethyl) ether, chemical abstract service registry No. 63918-89-8.

Agent operating area
That portion of an agent area where workers are actively conducting mustard agent operations.

Agent worker
An individual assigned to exposure category A, B, or C.

Airborne exposure limits
Allowable concentrations in the air for occupational and general population exposures.

Carcinogenicity
Refers to the potential for development of cancer in a living individual. A cancer is a malignant tumor resulting from a change in the normal growth and development of cells. (Cancerous tumors have the tendency to invade surrounding tissue and spread to other sites in the body.)

Ceiling value
Normally refers to the maximum exposure concentration at any time, for any duration. Practically, it may be an average value over the minimum time required to detect the specified concentration.

Certifying official
For military and DA civilian personnel, the immediate commander (or, if civil service, the director) who is responsible for the operation or security, or both, of chemical weapons or materiel. If the commander or director is a colonel or a GM/GS-15, or above, he or she may delegate subordinates to act as organization certifying officials. Such designees should be supervisors who can feasibly cause sufficient personal contact to be maintained with personnel to continually evaluate them. For Army contractor personnel, the Army official so designated in the contract is the certifying official.

The certifying official certifies that personnel being considered for assignment to chemical surety duties meet the qualification requirements of the chemical personnel reliability program.

Designated contract physician
U.S. civilian physician under contract to provide occupational health services to employees at U.S. Government-owned facilities.

Exposed worker
An individual who exhibits clinical signs or symptoms of mustard effects.

Immediately dangerous to life or health
The maximum concentration from which, in the event of respiratory failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (for example, severe eye irritation) or irreversible health effects (DHHS (NIOSH) Publication No. 97–140). (Respiratory protection and sufficient oxygen to support life (at least 16 percent by volume) are addressed in Sections 134(e)(3) and 134g(5), Part 1910, Title 29, Code of Federal Regulations).

Impervious
Providing protection by precluding penetration of mustard (as demonstrated by methods in MIL-STD 282) for the useful life of the item concerned.

Installation medical authority
Refers to the unit surgeon, command surgeon, U.S. Army medical department activity/U.S. Army medical center commander, or the installation director of health services or representative, responsible for the provision of medical support at the unit, command, or installation concerned.

Laboratory-type hood
An enclosed ventilation device that does not require the insertion of any portion of an individual's body, other than the hands and arms, and that is designed, constructed, and maintained as described in appropriate portions of this pamphlet.

Mustard
The chemical bis(2-chloroethyl)sulfide, chemical abstract registry no. 505-60-2, in pure form and in the various impure forms that may be found in munitions as well as field, industrial, or laboratory operations. These include Levinstein mustard (H), distilled mustard (HD), and closely related preparations. This standard is not meant to be applied to nitrogen mustards.

Mutagenicity
Refers to the cause of changes in cellular genetic material which may be passed on to subsequent generations of cells. When these changes occur in germ cells (that is, sperm or ova), the mutations may be passed on to subsequent generations.

Potentially exposed worker
An individual who works in an agent operating area where levels of mustard either—
a. Exceed the protective capability of the PPE.
b. Are detectable and there is a breach in PPE or engineering controls.

Section III
Special Abbreviations and Terms
This section contains no entries.

Index

This index is organized alphabetically by topic and by subtopic within a topic. Topics and subtopics are identified by paragraph number.