

Department of the Army
Pamphlet 40-506

Medical Services

The Army Vision Conservation and Readiness Program

Headquarters
Department of the Army
Washington, DC
15 July 2009

UNCLASSIFIED

SUMMARY of CHANGE

DA PAM 40-506

The Army Vision Conservation and Readiness Program

This major revision, dated 15 July 2009--

- o Updates combat theater eye injury statistics (paras 1-4d and e).
- o Describes the primary elements of an effective Vision Conservation and Readiness Program (paras 1-6 a-c).
- o Outlines potential members of the Vision Conservation and Readiness Team and their areas of expertise and responsibility (para 1-7).
- o Removes the designation of a Vision Conservation Coordinator and incorporates the responsibilities of the Vision Conservation Coordinator into those of the Vision Conservation and Readiness Officer (para 1-7a).
- o Explains occupational vision as it relates to work tasks, vision screening, and application of vision standards for safety and efficiency (paras 3-3 and 3-4).
- o Updates laser device classification (para 3-3c(5) and app E).
- o Includes a new chapter on Vision Readiness Screening and Classification for active duty personnel (chap 4).
- o Provides basis for approval of DA Form 7655 (Armed Forces Eye and Vision Readiness Summary) to record eyeglass prescriptions for Reserve and National Guard personnel (chap 4).
- o Outlines the Army Vision Screening and Classification Program (para 4-2).
- o Describes hazards to the eye, common risk sources, protective measures and equipment, and first aid (chap 5).
- o Describes various environmental conditions existing in garrison and deployed work settings (paras 6-2, 6-3, and 6-4).
- o Describes the types of workplace surveys relating to eye hazards that may be performed at installations (para 7-3).
- o Prescribes DA Form 7655 (throughout).
- o Makes administrative changes (throughout).

Medical Services

The Army Vision Conservation and Readiness Program

By Order of the Secretary of the Army:

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History. This publication is a major revision.

Summary. This pamphlet provides guidance on establishing, maintaining, and enhancing a vision conservation and readiness program. The policies and procedures regarding vision conservation and readiness are in accordance with provisions in AR 40-5, DODI 6055.1, and current professional standards.

Applicability. This pamphlet applies to all Active, Reserve, National Guard, and civil service personnel working for the Department of the Army who perform

tasks in eye-hazardous jobs or environments including deployment. It also applies to all personnel from sister services and foreign military personnel attached to Department of the Army units. Portions of this publication may not be applicable during mobilization, during preparation for imminent armed conflict, and for military unique equipment, systems, and operations. Protective measures will be applied to the maximum extent possible in the theater of operations to preserve the fighting strength. This pamphlet is also applicable to DA personnel deployed on either humanitarian or peacekeeping missions.

Proponent and exception authority. The proponent of this pamphlet is the Office of The Surgeon General. The proponent has the authority to approve exceptions or waivers to this pamphlet that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this pamphlet by providing justification that includes a full analysis of the expected benefits and must

include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25-30 for specific guidance.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Headquarters, Department of the Army (DASG-HS), 5109 Leesburg Pike, Falls Church, VA 22041-3258.

Distribution. This publication is available in electronic media only and is intended for command level A, B, C, D and/or E for the Active Army, Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

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Glossary

Chapter 1

The Army Vision Conservation and Readiness Program

1-1. Purpose

The purpose of this pamphlet is to ensure military, civilian, and contract employees of the Department of the Army (DA), U.S. Army Reserve (USAR), and Army National Guard (ARNG) have the visual performance, optical devices, and ocular health necessary to perform their assigned activities in a safe and efficient manner.

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 terms used in this pamphlet are defined in the glossary.

1-4. Background

a. Operation Desert Shield/Storm (ODS) after action reports indicated that 27 percent of the military were not vision ready (did not have the visual acuity (VA) to meet the visual requirements of their work and, therefore, needed an eye examination before deployment). Of those who needed a spectacle correction, 44 percent were not optically ready (did not have the necessary spectacles or protective mask inserts (PMIs) needed for deployment). This lack of vision and optical readiness resulted in over one million military spectacles and PMIs being ordered during ODS, many of them duplicates of previous orders. This surge of orders overloaded optical fabrication laboratories, increased production costs, wasted resources, and increased the risk of accidents and mishaps. Some forward units had to rely on host country vision examinations and optical services while in theater.

b. In recent conflicts, according to Treister G: Ocular Casualties in the Six Day War, *American Journal of Ophthalmology* 68:669-675, 1969, the incidence of eye injury has risen to 10 to 13 percent of all casualties even though the eyes comprise only 0.54 percent of the frontal silhouette area of the body.

c. The 1989 Eye Injury Program Evaluation Study (unpublished) reported 2,380 minor eye injuries per 100,000 active duty military personnel per year in the Army.

d. Evaluation of data from deployment to the Balkins (Bosnia, and so forth) (Bancroft, D and Lattimore, M: "Initial 67th Combat Support Hospital Optometry Services in Taszar, Hungary, during Operation Joint Endeavor," *Military Medicine*, vol. 166, Jan 2001) has shown a high rate of eye injury from contact lens wear (approximately 40 percent of all eye injuries in theater) even though contact lens wear in deployment is not authorized (except for individuals participating in Army Medical Department approved programs or special studies).

e. Data from the Iraq conflict collected over a 4-month period in 2003 comprising 99 individuals requiring ophthalmologic surgery indicated only one individual was wearing eyewear at the time of injury. (Information extracted from a presentation for the Surgeon General of the Army (TSG) by COL William Madigan, Army Ophthalmology Consultant to TSG and COL George Adams, Optometry Consultant to TSG, Mar 2004.)

f. Ninety percent of eye injuries are preventable through the use of effective vision safety efforts such as the Vision Conservation and Readiness Program (VCRP) according to Prevent Blindness America.

1-5. Mission

a. The VCRP promotes optimum vision, optical, and eye health (VOE) readiness of DA personnel.

(1) Vision readiness-ensure personnel have the visual ability required to perform their mission safely and efficiently.

(2) Optical readiness-ensure personnel have the appropriate serviceable optical devices (for example, spectacles and PMIs) needed to function safely and effectively.

(3) Eye health readiness-ensure personnel have a current ocular health evaluation. Any conditions that may compromise safety or effectiveness must be addressed.

b. The VCRP further promotes a visually safe and healthful working environment and applies to garrison, field training, and deployment. The VCRP is consistent with the Department of Defense (DOD) Military Readiness Strategic Plan, Military Health System Strategic Plan, Military Health System Information Management/Information Technology Strategic Plan, and Force Health Protection (Public Law (PL) 105-85). In host countries, local national employees may be included in the VCRP.

1-6. Vision Conservation and Readiness Program elements

The VCRP consists of three program elements: occupational vision, eye safety, and environmental vision.

a. *Occupational vision.*

(1) *Goal.* The goal of occupational vision is to ensure that DA military and civilian employees have the necessary vision readiness to work safely, efficiently, and comfortably.

(2) *Major scope of occupational vision.*

- (a) Job vision standards for effective, efficient visual performance (such as VA, binocularity, depth perception, and color vision).
 - (b) Vision screening and eye examinations.
 - (c) Optical readiness.
 - (d) Special optical devices (night vision devices (NVD) such as night vision goggles and industrial safety spectacles).
- b. Eye safety.*
- (1) *Goal.* The goal of eye safety is to eliminate eye injuries through—
 - (a) Evaluating (characterizing) worksites in garrison, field, and deployed areas.
 - (b) Employing engineering and administrative controls of hazards where possible.
 - (c) Providing personal eye protection equipment.
 - (d) Training and education.
 - (2) *Scope.* The major scope of eye safety is to—
 - (a) Identify mechanical, chemical, biological, and radiation eye hazards.
 - (b) Report, analyze, and evaluate eye injuries.
 - (c) Provide effective countermeasures against eye hazards by implementing—
 - 1. Engineering controls (abatement).
 - 2. Administrative controls (policies and signs).
 - 3. Personal protective equipment (PPE) use (such as ballistic, laser, and protective safety eye wear).
- c. Environmental vision.*
- (1) *Goal.* The goal of environmental vision is to evaluate and provide solutions for environmental factors which may reduce visual efficiency, safety, and/or ocular health. Examples are illumination, radiation, and workplace ergonomics.
 - (2) *Scope.* The scope of environmental vision is to—
 - (a) Evaluate the workplace environment related to visual performance.
 - (b) Advise on the use of NVDs and other special optical devices.
 - (c) Provide guidance on the visual effects of laser, microwave, and radio frequency radiation (RFR) (for example: thermal injury, glare, and flash blindness).
 - (d) Address visual aspects of video display terminal (VDT) ergonomics.
 - (3) *Environmental vision considerations.*
 - (a) Illumination as a factor affecting safety, comfort, and productivity.
 - (b) The proliferation of VDT use.
 - (c) Other special devices that may require evaluation.

1–7. Functional integration and multidiscipline matrix

The VCRP is designed to operate as an integrated, multidiscipline program. Open communication is essential for program success. The most effective method of preventing eye injury and promoting visual efficiency is by establishing an integrated installation/division level Vision Conservation and Readiness Team (VCRT). The VCRT should include a Vision Conservation and Readiness Officer (VCRO), a local occupational health (OH) professional/ technician, a worksite hazard evaluation coordinator, and a safety officer/technician. The VCRT may also include emergency room, outpatient clinic, and troop medical staff when appropriate/available.

a. Vision Conservation and Readiness Officer. The VCRO is the subject matter consultant and primary proponent of vision conservation and readiness at the local level. The VCRO will be an optometrist, ophthalmologist, or OH professional who is specifically trained in a U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)-approved Tri-Service Vision Conservation and Readiness Course (VCRC) and appointed on orders (when appropriate) by the local medical authority (LMA) or other command authority. Where the VCRO is other than an eye care professional, the VCRO will coordinate the local program and consult with the first eye care professional in the medical chain of referral. The VCRO will—

- (1) Be responsible for managing vision conservation and readiness at the installation or unit level.
- (2) Implement protocols for vision screening, referral criteria, emergency procedures, and education programs, and coordinate VOE care to eligible individuals.
- (3) Develop or utilize an existing eye injury surveillance program to monitor local eye injury trends.
- (4) Make recommendations, as needed, on special visual situations encountered by other professionals.

b. Local occupational health program coordinator. The lead professional should be an occupational health nurse (OHN), an occupational health physician, a preventive medicine physician, a preventive medicine/occupational health (OH) -trained physician assistant, or public health professional. The VCRO will coordinate vision screenings, referrals for vision examinations, and ocular surveillance programs with the local occupational health program coordinator.

c. Worksite hazard evaluation coordinator. The lead professional should be an industrial hygienist (IH) or safety

officer. The primary activity is to survey and characterize worksites, recognize and evaluate eye hazards, document hazards and locations, and provide recommendations on hazard controls.

d. Safety officer. The primary role of this professional is to be aware of all potentially hazardous conditions, implement engineering and administrative controls on eye hazards, and implement the PPE program. The PPE program refers to approving and issuing eye protection and ensuring wearing compliance. The safety officer also provides safety-related education and collects accident and injury data per Army Regulation (AR) 385-40 (which would include eye injury data).

e. Others. Emergency room, outpatient clinic, and troop medical clinic staff should be included as VCRT members when available.

1-8. Organization and function - Department of the Army level

a. United States Army Center for Health Promotion and Preventive Medicine. The USACHPPM is the sponsoring unit for the Tri-Service Vision Conservation and Readiness Program (TVCRP). The TVCRP provides consultative services to DOD elements on vision conservation and readiness matters. (Initially a DA program, this office includes optometrists from the three military branches of DOD.)

(1) *Policy, doctrine, and standards development/revision.* The TVCRP develops and interprets policies for The Surgeon General on vision conservation and readiness issues, and provides expertise and direction to vision conservation and readiness programs to enable current operations and future planning. When appropriate, USACHPPM TVCRP members represent the DOD on committees responsible for national standards.

(2) *Studies, research, surveillance, and metrics.*

(a) The USACHPPM studies and research involve analyzing VOE trends, identifying populations at risk, developing countermeasures, targeting education audiences, developing policy and doctrine, and optimizing resources. These studies and research also provide guidance for automation development.

(b) The Eye Injury Reporting System (EIRS) was a voluntary eye injury monitoring initiative that captured eye injury data in participating DOD units. The EIRS data fields have been used as templates for eye injury data collection in the Armed Forces Health Longitudinal Technology Application (AHLTA) - the DOD's electronic health record system. Encounters captured in AHLTA will become the primary source of data for eye injuries involving DOD personnel. The TVCRP office is currently data mining the M2 database for eye injury statistics as well as advising on the development of additional AHLTA functionality for enhanced eye injury data collection.

(3) *Education and training.* The USACHPPM TVCRP conducts the VCRC and provides a variety of lectures based on the current needs of vision conservation, readiness, and the professionals who work on the VCRT.

(a) Vision Conservation and Readiness Course (VCRC) -designed to train installation/unit level professionals in the principles of vision conservation.

(b) Vision conservation and readiness lectures-designed to discuss vision and readiness issues. These lectures are tailored to the vision and readiness requirements of the requestor.

(c) Education, policies, and information materials-designed to assist the local VCRT. Media available includes brochures, videos, fact sheets, news releases, public service announcements, and internet web page (<http://chppm-www.apgea.army.mil/doem/vision/>).

(4) *Automation.* The USACHPPM Tri-Service Vision Conservation and Readiness Staff (TVCRS) serves as the subject matter experts (SMEs) for clinical input on development and submission of System Change Requests to AHLTA that deal with optical devices, vision readiness, and eye injury reporting. In addition, as clinical SMEs, the TVCRS promotes, coordinates, and provides leadership in the planning, implementation, and execution of functional process improvement within the following five major areas:

(a) Vision readiness of DA personnel.

(b) Vision conservation and prevention of eye injuries.

(c) Clinical vision and eye health services delivery.

(d) Resource management pertaining to vision services.

(e) Vision services information management.

(5) *Staff assistance visit.* The USACHPPM TVCRS provides staff assistance visits (SAVs) upon request of local commands as resources permit. The SAV is a consultation service rather than an inspection. With input from the local VCRT, the USACHPPM TVCRS guides evaluation of the local VCRP and suggests possible solutions where local administrative and technical difficulties exist. Appendix B provides guidelines for VCRP evaluation.

(6) *General consultation.* The USACHPPM TVCRP assists local programs with information and guidance in all aspects of the VCRP.

(7) *Special programs.* The USACHPPM TVCRP is involved with programs such as the Vision Readiness Screening and Classification (VRSC), Military Combat Eye Protection (MCEP), and a new Joint Ocular Trauma Database and Registry, Spectacle Re-Order Transmission System, PMIs, and field optometry sets.

b. Vision Conservation and Readiness Program-Europe. The USACHPPM-Europe no longer has a distinct VCRP.

The responsibilities of the program are now performed by the Optometry Consultant for the European Regional Medical Command in coordination with the USACHPPM–Headquarters VCRP.

1–9. Organization and function - unit/installation level

a. The unit/installation commanders provide subordinate military, DA civilian employees, and local national employees working in eye-hazardous jobs/areas with appropriate eye protection.

b. The LMA or other appropriate authority appoints a VCRC-trained optometrist, ophthalmologist, or OH professional as the VCRO. This individual will coordinate the VCRP on the installation and be the resident authority on vision conservation for the installation. The VCRO should become thoroughly familiar with the responsibilities of the other professionals involved in the program. The VCRO at the installation level should be actively involved in understanding and reviewing all phases of the local VCRP. Where the VCRO is other than an eye care professional, the VCRO will coordinate with the next eye care professional in the medical chain of referral. When appropriate, the Chief, Optometry and/or Ophthalmology will assist the LMA in the selection of a VCRO.

c. The VCRO oversees the implementation of all vision conservation elements at the installation or unit level. Areas of primary emphasis are—

(1) *Occupational vision.* Establish local vision screening, inspections, and recall protocols for—

(a) Military and deployable DA civilians to determine if they are vision ready in accordance with the VRSC.

(b) Military and DA civilians who have a crucial requirement for optimum vision (for example, pilots and emergency vehicle operators).

(c) Pre-placement, periodic, and termination vision screening for workers in potentially eye-hazardous job positions for which eye protection is required. This screening is normally performed as part of the OH examination.

(d) Evaluation of the vision performance needed for special optical devices.

(e) Vision screening of VDT workers who exhibit visual symptoms potentially attributable to VDT use.

(f) Vision and ocular assessment of designated personnel in laser, RFR, and ionizing radiation environments.

(2) *Eye safety.*

(a) Ensure worksite analysis characterizes/describes the workplace, the worker, and the work-related eye hazards.

(b) Promote appropriate engineering controls, administrative controls, and PPE use.

(c) Provide workers with education about appropriate eye protection, fit and maintenance of protective eyewear, and the benefits of vision conservation consistent with Occupational Safety and Health Administration (OSHA) requirements.

(3) *Environmental vision.*

(a) Conduct worksite analysis for appropriate illumination to ensure optimum job performance.

(b) Advise unit commanders and personnel on special optical device (such as NVDs) use and the ocular effects of directed energy sources (for example, laser and radio frequency devices).

(4) *Advice and education.* Provide advice and education on matters concerning environmental vision to commanders, LMA, and employees.

(5) *Medical management.*

(a) Assists local LMA in establishing local policies and protocols on work-related emergent/urgent vision.

(b) Provide care for work-related eye injuries when within the professional scope of practice of the VCRO.

(c) Provide education about the management of occupational eye injuries and disease.

(6) *Injury surveillance.* Monitor eye injury data on the installation using the safety office, ICD- and CPT-4 code reports from AHLTA, and other data sources as appropriate. The TVCRP can provide a recommended list of ICD- and CPT-4 codes for monitoring purposes. Quarterly summaries should be sent to the TVCRP. The local VCRT develops intervention strategies, where necessary, based on the data received.

d. The VCRT will assist the VCRO in accomplishing the local VCRP mission.

e. The contracting office will ensure safe practice requirements are included in all labor contracts.

f. Supervisors will ensure eye safety practice requirements are included in the employee job description. Supervisors will ensure the eye safety compliance of contract workers as stated in the labor contract and document and report any noncompliance to the safety office and the Contracting Officer's Representative (COR). Such noncompliance may constitute a breach of contract.

g. Supervisors will discipline noncompliant workers in accordance with civil service, military, and local regulations or policies. Reassignment to non-eye-hazardous work or termination may be required in some instances.

h. Workers will wear appropriate safety eyewear, comply with safety standards, and report any unsafe conditions or practices to their supervisor.

Chapter 2 Management of the Army Vision Conservation and Readiness Program

2-1. Introduction

An effective VCRP requires administrative and resource commitment from major commands. A similar commitment, as well as efficient administrative and management procedures, must be established at the installation, Division or major unit level. Each installation/Division/unit is responsible for publishing a local regulation or standing operating procedure (SOP) which delineates the scope of the VCRP and identifies responsibilities (see appendices B, C, and D). The organizational elements identified in this section have a direct impact on the administration of the VCRP. This assignment of authority is based on this Department of the Army pamphlet (DA Pam) having been referred to by AR 40-5 and DA Pam 40-11 as the definitive document on vision conservation and readiness for the Army.

2-2. Functions

a. Commanders—

(1) Establish and implement safety and health procedures as mandated by Department of Defense Instruction (DODI) 6055.1; Executive Order 12196; Title 29, Code of Federal Regulations (CFR), Part 1960; 29 CFR 1910; and PL 105-85.

(2) Establish a VCRT per this pamphlet. The team leader should be a designated VCRO.

(3) Promote awareness of vision conservation on the installation by use of command emphasis letters and other appropriate command channels.

(4) Provide resources (budget, staffing, and space) for the VCRP and support equipment.

(5) Ensure vision readiness of all active duty and deployable DA civilian personnel. Active duty readiness is a requirement established by All Army Activities (ALARACT) message RUEWMFU5506 dated 9 November 2004.

(6) Ensure all military and DA civilian personnel receive vision screening appropriate for their job requirements and exposure to potential eye hazards.

(7) Ensure that all personnel follow proper work practices, use protective equipment, and receive proper training in the use, care, and maintenance of PPE.

(8) Ensure that unit alpha rosters are maintained for all military personnel assigned to activities and units on the installation.

b. Civilian Personal Advisory Center —

(1) Provides the VCRT with a job-title list of civilian employees on the installation (updated annually). This list will be used by the VCRT to identify employees who require vision screening and eye protection.

(2) Identifies DA civilian employees who may be deployable to a peacekeeping or hostile action zone and provides this information to the VCRT.

(3) Verifies employee job descriptions include the requirement to properly wear and maintain PPE when hazardous work conditions exist.

(4) Uses the job-vision standards (see para 3-4) to determine effective placement of employees.

(5) Assists supervisors with reclassification or disciplinary actions, as necessary.

c. Local military personnel office provides unit alpha rosters to the VCRT for the military personnel assigned to activities and units on the installation. The roster shall include the military occupational specialties (MOS) in which the Soldiers are working. The deployment status will be included when available. The list should be updated annually or more frequently where units have a high rate of personnel change or deployment.

d. Vision conservation and readiness team—

(1) Performs surveys to identify eye-hazardous occupations and processes. This includes worksite environmental hazards that may produce mechanical, chemical, radiation, or biological eye injuries.

(2) Maintains a current inventory of work areas, eye hazards associated with the work areas, and vision performance requirements using a job-title list. In Europe, this inventory is maintained by OH teams at Area Support Groups and military treatment facilities (MTFs).

(3) Monitors eye injuries and recommends corrective action for identified hazards to the safety office.

(4) Coordinates the vision screening of all employees and ensures that the results are recorded in the official health record. Ensures military and civilian personnel not demonstrating the recommended/required visual performance are referred for a comprehensive vision examination.

(5) Ensures verification of prescription industrial safety eyewear and proper fitting of all industrial safety eyewear.

(6) Ensures vision test and prescription information is kept in employee medical records.

(7) Maintains a database of the total number of employees screened, the screening results, the number of personnel employed in eye-hazardous areas, the number of eye injuries, and the number of industrial safety spectacles issued as part of the VCRP.

(8) Provides technical input and assistance to the employee health hazard education program.

(9) Reports VCRP status to the command.

e. Safety officers—

- (1) Work in coordination/consultation with the VCRT to establish and update annually a local job-title list of all military and civilian jobs on the installation.
- (2) Conduct surveys in coordination/consultation with the VCRT, to identify eye-hazardous jobs, processes, and areas. This information shall be incorporated into the Civilian Personnel Advisory Center (CPAC) job-title list, the military job-title list, and the inventory of eye hazards maintained by the IH. Validates the need for and identifies employees who require protective eyewear.
- (3) Assist the OH office, VCRO, and supervisory personnel in determining the appropriate type of protective eyewear required.
- (4) Assist unit safety officer in developing and monitoring unit eye protection safety programs.
- (5) Monitor the industrial safety spectacle procurement program. Ensure the spectacles are ordered and delivered in a timely manner, and meet national standards marking requirements.
- (6) Monitor use of eye protection by military, civilian and contract employees in work areas and, when necessary, recommend program improvements.
- (7) Coordinate with commanders, CPAC, and COR as appropriate to resolve eye safety procedure violations.
- (8) Provide education to employees and supervisors on eye safety techniques and devices.
- (9) Direct supervisors to ensure employees wear protective eyewear.
- (10) Monitor eye injury trends to guide intervention measures.
- (11) Implement controls (such as administrative and engineering) appropriate to the hazards in the workplace.
- (12) Provide a means of rewarding and/or recognizing individuals whose eye(s) are protected from injury by wearing PPE in an accident. This may be accomplished via a locally developed program or adopting an established program.

f. Logistics officers—

- (1) Consult technical specialists in safety, OH and vision care when formulating, modifying, and terminating any ophthalmic services contracts.
- (2) Ensure timely procurement and delivery (that is, not to exceed 15 working days) of vision safety-related ophthalmic services and materials.
- (3) Modify or terminate VCRP-related ophthalmic contracts and related procurement documents if the vendor does not meet the needs of the VCRP and/or conditions of the contract.
- (4) Ensure labor contracts include the requirement to use PPE and sound safety practice as performance requirements for contracted workers.
- (5) Ensure the COR is familiar with eye safety compliance required of the contract workers.
- (6) Ensure a stock of nonprescription protective eyewear (meeting the current American National Standards Institute (ANSI) Z87.1 standard) is available for distribution through unit supply. This stock will include several sizes to accommodate variations in facial structure.
- (7) Monitor the distribution of approved Military Combat Eye Protection (MCEP) during disbursements or other fielding.
- (8) Monitor stock of MCEP replacement kits and parts for all Authorized Protective Eyewear List (APEL) devices in use by the unit.

g. Supervisors—

- (1) Ensure all job descriptions include the requirement to use safe practices and appropriate safety equipment.
- (2) Use the job-vision standards (see para 3–4) as an aid to employee/job selection. Schedule all military and appropriate civilian employees working in eye-hazardous jobs for periodic vision screening in coordination with the VCRP.
- (3) Remove an employee from the eye-hazardous work/area if his/her vision does not meet required vision standards until the employee's vision can be brought up to the standards or a waiver is granted.
- (4) Ensure employees placed in eye-hazardous jobs have proper eye protection.
- (5) Obtain and keep a stock of nonprescription protective eyewear for use by employees and visitors who do not require prescription eyewear. This eyewear must meet the current ANSI Z87.1 standard.
- (6) Ensure prescription safety eyewear is provided in a timely manner. Appropriate safety goggles worn over civilian glasses may be used temporarily or the worker can be temporarily placed in a non-eye-hazardous work area while prescription safety eyewear is being procured.
- (7) Ensure that active duty and deployable civilians have the required number and type of eyewear needed for deployment to include ballistic eye protection and optical inserts if required.
- (8) Ensure all personnel receive instruction and training in safety practices and in the use and care of the protective eyewear.
- (9) Ensure personnel demonstrate knowledge in safety practices and in the use and care of the protective eyewear.
- (10) Enforce the proper wear of safety eye protection and practice of safety discipline. Use current Civilian

Personnel Laws and Regulations or Uniform Code of Military Justice as enforcement tools when needed. Take appropriate action, which may include reassignment or removal from Federal service, for any employee who will not wear required PPE.

- (11) Ensure that all employees participate in the aspects of the VCRP appropriate to their job.
 - (12) Direct all personnel having difficulties or complaints from use of industrial safety eyewear to the VCRT for evaluation and/or resolution of the problem.
 - (13) Document and report all safety violations and noncompliance with PPE wear requirements to the safety officer.
 - (14) Remove and replace PPE that becomes unserviceable (for example, scratched/broken lenses or broken frame).
- h.* Employees (military, civilian, and contract)—
- (1) Participate in the VCRP as it is outlined in this document.
 - (2) Properly use safe practices, engineering controls, administrative controls, and PPE, as mandated by 29 CFR 1910.133 and local directives. Safe practice includes—
 - (a)* Knowing how to perform assigned work in a safe manner.
 - (b)* Understanding that industrial safety eyewear complies with ANSI Z87.1 safety standards and is marked to indicate compliance with this standard.
 - (c)* Using appropriate protective eyewear in eye-hazardous areas.
 - (d)* Keeping protective eyewear clean, properly fitted, and in serviceable condition. This includes having side shields in place if they are issued as part of safety eyewear.
 - (3) Undergo training in the principles and practices of first responder if working in an eye-hazardous area.
 - (4) Report unsafe practices or eye hazards to the supervisor and/or safety specialist for timely protective intervention.
 - (5) Advise supervisor of need for safety eyewear or need for modification of processes or procedures to enhance or ensure eye protection.

2–3. Performance improvement

All levels of command should maintain an ongoing performance improvement program. As a minimum, the program should include—

- a.* Evaluating user/participant input and implementing input determined to have merit.
- b.* Reporting of eye injuries.
- c.* Developing intervention plans based on injury trend analysis.
- d.* Implementing intervention strategies.
- e.* Monitoring the effectiveness of intervention strategies.
- f.* Ensuring appropriate and timely pre-employment, periodic, and termination physicals or screenings are performed.
- g.* Ensuring effective training is provided in the use and maintenance of protective devices and safety practices.
- h.* Ensuring timely acquisition and delivery of safety eyewear to the worker.
- i.* Monitoring safety eyewear use and compliance.

2–4. Program evaluation/development

A VCRP evaluation may be performed using appendix B, Vision Conservation and Readiness Program Management Evaluation Guide. This guide has been established to assist in evaluating the status of the local VCRP and is not intended as an inspection tool since programs may vary by location and local needs. Appendix B may also be used for developing a new program.

Chapter 3 Occupational Vision

3–1. Definition

Occupational vision is the VCRP element that promotes work safety, efficiency, and comfort for military and civilian employees.

3–2. Occupational vision elements

Occupational vision must provide at least—

- a.* Vision screening program and policy.
- b.* Readiness screening. Deployment readiness vision screening is addressed in depth in chapter 4.
- c.* Vision performance standards.
- d.* Encouragement of periodic comprehensive vision examinations.

e. Worksite evaluation.

3-3. Occupational vision screening program

The key purpose of vision screening is to assess individual visual performance in relation to an established job vision efficiency standard. Vision screening is not a substitute for comprehensive vision examinations.

a. A vision screening program provides periodic evaluation of the visual performance status of DOD employees. The standards are based on visual demands of the work undertaken and may include, but not necessarily limited to—

- (1) VA.
- (2) Accommodation/convergence.
- (3) Depth perception.
- (4) Color vision (for some specific jobs).

b. Glaucoma screenings are not part of the routine vision screening. The diagnosis of glaucoma requires evaluation beyond that of a screening program.

c. Vision screening frequency varies with the employee status (that is, active duty or civil service, vision hazards to which exposed, and type of work).

(1) *All employees.* Pre-employment vision screenings, pre-placement vision screenings when appropriate, and termination vision screenings will be performed for all employees.

(2) *Employees in eye-hazardous work.* Employees in eye-hazardous work or areas will have a vision screening at least every 3 years.

(3) *Military personnel.*

(a) All soldiers receive initial vision screening for procurement according to AR 40-501, paragraph 8-15.

(b) Enlisted soldiers receive vision screening upon in-processing at reception stations.

(c) All soldiers receive vision readiness screening annually in conjunction with their periodic health assessment (PHA).

(4) *VDT worker.* A VDT worker is an employee that uses a VDT for official work at least 20 hours per week. Each worker is given a pre-employment or pre-placement vision screening. VDT use is not classified as an eye-hazardous activity and, therefore, does not require periodic screening. Vision screenings are normally part of the routine OH examination/screening. If resources permit, local programs may elect to perform periodic vision screenings for VDT workers.

(5) *Laser workers.* Laser workers are those individuals who routinely work in laser environments using class 3B or class 4 laser systems (ANSI Z136.1) or medical lasers (ANSI Z136.3). Examples of these personnel are those who work in research, development, testing, and evaluation (RDTE) of laser systems; laser maintenance; or an operating room where a medical laser is in use. All others are considered incidental workers (see app E).

(a) Laser workers will have an ocular and visual history, VA, color vision test, and a central visual fields test (Amsler Grid or similar test) at pre-placement and termination. Visual acuity, color vision test, and central visual fields tests are to be performed on each eye separately.

(b) Incidental laser workers will have each eye screened for VA. This screening is part of the pre-employment physical.

(c) Anyone with a confirmed or suspected exposure to a class 3B or more powerful laser will have a diagnostic vision examination as soon as possible (no later than 24 hours) by an eye care professional (see app E).

d. Vision screening results will be placed in the individual health record. The record will reflect the purpose of the vision screening, the results, and any required follow-up. The record should document:

(1) Demographic information—

(a) Employee name.

(b) Social security number.

(c) Organization/unit.

(d) Duty position or occupation.

(e) Job-vision standard.

(f) Eye protection requirement (if any). Protective devices may include ANSI Z87.1, MCEP, biological hazard, ASTM, or other appropriate eye protective devices.

(g) Reason for screening (pre-employment, pre-placement, problems seeing to do work, suspected laser exposure, or termination).

(2) Clinical information—

(a) Vision screening test results.

(b) Evaluation of screening results.

(c) Disposition (such as, cleared for duty, refer for further evaluation, or release).

e. The type of vision screening required depends on a number of factors.

(1) *Civilian personnel.*

(a) *Pre-employment vision screenings.* Performed at or just prior to employment to provide a baseline visual performance measurement and to assist in appropriate job placement. This is part of the pre-employment physical.

(b) *Pre-placement vision screenings.* Performed when there is a major change of job duties or change to a new job that has a significant change of duties. (Permanent change of station with no significant change of duties does not require an additional screening.)

(c) *Termination vision screenings.* Performed at or just prior to separation from government employment for employees who have worked in an eye-hazardous job or area.

(d) *Periodic vision screenings.* Performed at time periods appropriate to the type of work being performed, hazard exposures, and any surveillance requirements. Civilian personnel working in eye-hazardous areas will be screened at least every 3 years. Workers experiencing visual problems may receive screening as needed. The local OH specialist may conduct more frequent screenings, if needed, to meet the goals of their program.

(e) *Vision screenings for laser workers.* (See app E.)

(2) *Military personnel.*

(a) *Pre-employment.* This is part of the entrance physical examination. AR 40-501 is the standard used to determine eligibility for entrance into the Army. DA Pam 611-21 designates vision standards for various MOS and Army Occupational Codes.

(b) *Annual VRSC.* This screening is designed to monitor and maintain visual and optical readiness. It defines minimum standards for deployability of Soldiers. It does not replace a comprehensive eye examination (see chap 4).

(c) *Significant change of duty.* (Permanent change of station or job with no significant change of duties does not require an additional screening.)

f. The physical exam section and the Occupational Health Clinic will use a commercially produced industrial vision screener or other clinical vision screening methods capable of testing the functions listed below. Vision screening instruments will be operated according to the manufacturer's instructions.

(1) Distance VA.

(2) Intermediate VA (when applicable).

(3) Near VA.

(4) Ocular alignment (muscle balance) at distance.

(5) Ocular alignment (muscle balance) at near.

(6) Color vision.

(7) Depth perception.

(8) Confrontation visual fields (optional).

g. When selecting new screening equipment, give priority consideration to equipment with automated data processing capability.

3-4. Vision standards

a. *Job-vision standards.*

(1) Table 3-1 outlines the vision screening standards that are currently accepted for use at most Army installations. While these standards are applied to both eyes, the VA screening should include both monocular (one eye at a time) and binocular (both eyes) testing. Job-vision standards have also been developed for VDT workers and individuals requiring good color vision. For civil service employees, vision requirements determination (including performance demands and protective devices) is the responsibility of the supervisor writing the job description. These standards are for job performance only. Driving, flying, and other tasks may have more stringent requirements. Waiver of a vision standard may be granted by the LMA when recommended by the VCRT if the waiver will not create a safety hazard to the individual or fellow workers.

(2) The vision standards for some jobs may not fit into the established vision standard categories. When that occurs, a new standard should be developed locally by the VCRT and in consultation with the USACHPPM TVCRP. Reason(s) for locally developed standards must be documented.

**Table 3-1
Vision requirements on the job**

Vision standard	Corrected visual acuity			Muscle balance			Depth perception	Color vision
	Distant	Near	Intermed	Distant	Near	Intermed		
1	20/50	20/30	—	—	Normal	—	—	—
2	20/30	20/40	—	Normal	—	—	Normal	Normal
3	20/40	20/20	—	—	Normal	—	Normal	Normal
4	20/40	20/30	—	—	Normal	—	Normal	Normal
5	20/30	20/30	—	—	Normal	—	Normal	Normal
6	20/50	20/50	—	—	—	—	—	—
VDT	20/30	20/25	20/25	—	—	Normal	—	—

b. Other standards.

(1) *Color vision.* A color vision deficiency may affect a worker’s ability to perform his/her job in a safe and efficient manner depending on the type and degree of color deficiency and the color discrimination necessary to perform the particular work tasks. Color deficiency is not a sole disqualifier for a job without first evaluating the specific job tasks in relation to the individual’s color deficiency. Certain jobs have color demands that are not waivable (such as pilots, electronics repair, and chemists). Color vision deficiency is not correctable. A difference in color vision perception between the right and left eye or a reduction in performance over time is a cause for referral to an eye care professional.

(2) *Visual fields.* This test measures the effective vertical and horizontal (height and width) size of the visual field. If an undocumented visual field loss is noted in the course of vision screening or an employee complains of visual field loss, immediately refer the employee to an eye care professional for evaluation.

c. Disposition.

(1) Military and civilian employees who do not meet the minimum requirements for their particular job vision standard will—

(a) Be referred for a comprehensive vision examination unless previously documented and waived, and no significant change in degree has occurred (two or more acuity lines worse than the previous examination). (Example: an employee with documented amblyopia having 20/40 acuity in the left eye 2 years ago and 20/40 now would not be referred. A worker with documented amblyopia having 20/40 acuity in the left eye 2 years ago and 20/80 now would be referred.) Employees will also be referred for a comprehensive vision examination if replacement of prescription PPE is needed and the prescription is more than 2 years old, or if the current prescription gives worse VA (by one or more acuity lines) than previously documented. Comprehensive vision examinations are a personal health responsibility and are done at the expense of the civil service employee (see para 3-6d for exception to this policy).

(b) Notify their supervisor immediately of any changes to their vision. A duty change may be required if remaining in current job duties presents a safety hazard to the individual or fellow employees, pending resolution of vision problems.

(c) Be reassigned/reclassified when the visual requirements cannot be improved to meet standards and a waiver is inappropriate.

(d) Undergo medical board evaluation in accordance with AR 40-501. This requirement is for military personnel who are not physically eligible for a waiver or reassignment.

(2) Monocular vision means having useful vision in only one eye and thus will not pass screening standards. Monocular individuals are often fully capable of performing their work safely and effectively. Evaluate monocular individuals on a case-by-case basis. If a waiver is considered, the potential risk of injury to the employee and coworkers will be a major factor. Care must be taken to protect the eye with best vision. Protective eyewear will be furnished to active duty and retired military personnel who have vision in only one eye under the provisions of AR 40-63. Industrial safety spectacles are strongly recommended for monocular civil service employees who work in non-eye-hazardous occupations. Such eyewear for civil service employees will only be provided at government expense when the employee works in an eye-hazardous job/area.

d. Government drivers license. Periodic vision screening for military and civil service employees will be required in accordance with AR 600-55. If professional judgment indicates a safety hazard, OH and safety offices will be notified.

3-5. Readiness preparation

a. Vision ready means a Soldier or civilian employee has the minimum VA and optical devices required to deploy

and perform a mission. Each unit and/or installation will have a VCRS program that will monitor the vision readiness of all Soldiers (including the USAR and ARNG) (see chap 4).

b. Soldiers that require optical devices according to the VCRS will possess two pair of clear glasses and one PMI. One pair of MCEP may be substituted for a pair of spectacles. Depending on the deployment, additional eyewear may be required.

- (1) One pair of sunglasses when deploying to arctic, desert, or other high ultraviolet (UV) exposure environments.
- (2) A corrective insert for MCEP spectacles.
- (3) Additional pair of clear spectacles to be worn under MCEP goggles.
- (4) Special protective eyewear (such as industrial safety spectacles meeting ANSI Z87.1) may also be required.
- (5) Government-issued contact lenses, when applicable.

c. Ensure the ability to quickly order required eyewear for these individuals on short notice. Each location should have a record of the following for its military personnel:

- (1) Optical device needs by individual (spectacles, PMIs, or other required eyewear).
- (2) Current spectacle prescription (up to 4 years old for deployment readiness only) and frame specifications where applicable in the individual medical record and/or the Medical Protection System (MEDPROS).
- (3) Government-issued contact lens prescription.

3–6. Comprehensive vision examinations

When an employee's visual performance is less than expected for safe and effective job performance, a comprehensive vision examination (not a vision screening) is indicated. The examination should bring the individual to optimum visual performance for his/her job. A comprehensive vision examination is recommended for all employees every 2 to 3 years even if vision screening is passed.

a. The employee should provide his/her vision care specialist with a brief description of the visual demands of their work.

b. Obtaining comprehensive vision examinations is considered a personal health responsibility.

(1) Civil service employees will obtain comprehensive vision examinations through their personal health insurance program or at their own expense.

(2) Active duty military will obtain comprehensive vision examinations through their medical care channels, normally the local MTF. Certain USAR and ARNG personnel who are activated for extended periods are authorized medical care at the local MTF under the provisions of AR 40–3.

c. When prescription safety eyewear and/or optical inserts are required, it is the responsibility of the employee (civilian and military) to provide a current prescription (normally less than 2 years old if acuity through the prescription still provides recommended acuity standard) to the VCRT member/office responsible for ordering the eyewear.

d. Comprehensive vision examinations may be provided for civilian employees, USAR, and ARNG working in eye-hazardous jobs or areas at government expense in the rare instances when the local command determines it is cost effective to the government, is required by existing union negotiated contracts, or the local MTF has the staffing and capability to do so. For personnel not authorized care at an MTF, the cost of care will be borne by the individual worker. If this comprehensive vision examination indicates that further testing or follow-up is required, the patient will be referred for this care at the employee's expense. In an optimum VCRP, these vision examinations would be provided as a matter of course. However, with changes in budgeting and staffing of eye clinics in recent years and no Federal law mandate to provide the vision examinations, most MTFs are no longer funded or staffed at a level adequate to routinely provide the vision examinations for non-active duty personnel.

3–7. Worksite evaluation

Worksite evaluations will be performed on a regular basis by members of the safety office staff (AR 385–10) and IH section. Ideally hazardous worksites should be evaluated annually, but at large installations/locations this may need to be done on a rotating schedule so that each worksite is evaluated at least once every 3 years. Other members of the VCRT may join the safety office or IH staff in performing these evaluations or perform independent evaluations. See chapter 7 for a description of a site evaluation.

Chapter 4 Vision Readiness Screening and Classification

4–1. Introduction

a. The VRSC was borne of necessity. Several studies have shown that 50 percent of Soldiers either are not visually or optically ready to deploy. The VRSC gives commanders a clear metric to define, monitor, and improve their unit's vision and optical readiness. The VRSC may be performed annually in conjunction with the Soldier Readiness Program (SRP), PHA, or on an individual unit basis.

b. The VRSC was approved in November 2004 by the Army Surgeon General. The automated tracking in the MEDPROS of vision readiness was released in April 2005. MEDPROS is the Army's solution for tracking all individual medical readiness metrics. The VRSC readiness rating system consists of four classification levels. Class 1 means the Soldier is fully deployable and class 2 means the Soldier is fully deployable but that his/her VA is between 20/25 and 20/40. Class 3 and class 4 mean the Soldier is not deployable and corrective action needs to occur to make the Soldier deployable. The vision readiness classification is reported in MEDPROS. The VRSC screening does not replace a comprehensive eye examination. It is the responsibility of the commander to monitor MEDPROS for unit readiness.

4-2. Components

The VRSC requires the following components annually: a vision readiness screening including binocular VA and verification of required optical devices; entry of results into the MEDPROS; and referral / remediation / reclassification in MEDPROS of those identified as vision readiness class 3.

a. *Vision readiness screening is required at least annually.*

(1) *Binocular VA screening.* VRSC screening is done with both eyes open and looking at the acuity chart.

(a) Distance VA is required for all Soldiers.

(b) Near VA is required for all Soldiers age 45 or older.

(c) For Soldiers that wear mission-required contact lenses (MRCL), the distance VA screening will be required twice - once with spectacles and once with MRCL.

(2) *Physical verification of required optical devices.*

(a) *Glasses.* Two pairs of glasses are required for all Soldiers with unaided binocular VA worse than 20/40. Glasses may be military, frame of choice, or civilian. MCEP spectacles with the appropriate prescription lens carrier and lenses will count as one pair of glasses.

(b) *PMI.* One PMI shall be required for Soldiers with unaided binocular distance VA worse than 20/40. Bifocal PMI is required for all Soldiers age 45 or older whose corrected or uncorrected near VA is worse than 20/40.

(c) *MRCL.* Contact lenses procured at government expense to meet mission requirements according to AR 40-63. Note: Contact lenses procured at an individual Soldier's expense even if prescribed by a military medical provider and habitually worn are not mission required.

(3) *ARNG and USAR devices verification.* Since ARNG and USAR units rarely have access to military-issued optical devices prior to deployment, a form designed to allow reporting of current eyeglass prescription is being developed. It is currently designated as DA Form 7655, Armed Forces Eye Vision Readiness Summary. For vision readiness determination, this form fully completed will be accepted in lieu of possessing the optical devices required for deployment. The information will facilitate timely ordering of optical devices when a unit is mobilized. The form must be filled out by the eye care provider (optometrist or ophthalmologist) of the military member and must reflect data obtained by the provider. Active duty personnel in remote assignments where military vision care is not available may also submit this form in lieu of physical verification of devices. However, it is the responsibility of these individuals to ensure devices are ordered upon updates of spectacle prescription data. When ARNG and USAR personnel submit the form, it is considered equivalent to showing devices for readiness classification purposes.

b. Readiness status will be divided into four classes. Soldiers in class 1 and class 2 will be considered fully deployable. Soldiers in class 3 or class 4 are not deployable. Soldiers identified as class 3 at the time of screening will be immediately reclassified after obtaining corrective vision/optical services.

(1) *Class 1.* Soldiers whose unaided or corrected binocular VA is 20/20 or better. They possess all required optical devices. No deficiencies.

(2) *Class 2* Soldiers whose unaided or corrected binocular VA is worse than 20/20 but at least 20/40. They possess all required optical devices if uncorrected binocular VA is worse than 20/40. A comprehensive eye examination is recommended. Note: Class 2 also includes individuals possessing a waiver for binocular VA worse than 20/40. Remote Active Duty, ARNG, and USAR personnel who require optical devices to achieve binocular VA of 20/40 or better may obtain a Class 2 rating by maintaining a current DA Form 7655 as identified in paragraph 4-2a(3).

(3) *Class 3.* Soldiers who are not optically and/or not visually ready.

(a) *Class 3O - Not optically ready.* Soldiers whose corrected binocular VA is better than or equal to 20/40 but do not possess all required optical devices. Optical devices are required. For ARNG and USAR personnel optical device requirement, see paragraph 4-2a(3).

(b) *Class 3V - Not visually ready.* Soldiers whose unaided or corrected binocular VA is worse than 20/40. They do not meet VA standards. Comprehensive eye examination and optical devices are required.

(4) *Class 4.* Soldiers who require a vision screening. This includes Soldiers whose last vision screening is greater than 1 year old and Soldiers whose vision readiness classification is unknown.

c. *Entry of results into MEDPROS will be done as follows:*

(1) Vision readiness data will be entered into the vision readiness screens of MEDPROS at the completion of the screening. Vision readiness data can be directly entered into the MEDPROS mainframe, through the web interface, or through the Remote Information Data Entry System.

(2) When vision readiness data cannot be entered directly into MEDPROS, the results will be recorded on either the individual vision readiness worksheet and/or the unit vision readiness spreadsheet and then be posted to MEDPROS.

d. A comprehensive vision examination is required for Soldiers identified as Vision Readiness class 3V according to local SOP.

e. Physical verification of required optical devices is required for the vision readiness screening. Soldiers identified as Vision Readiness class 3O should be immediately referred to remedy deficiencies in required optical devices according to local SOP.

f. The following individuals are responsible for assuring the VRSC is implemented and maintained.

(1) Unit commanders—

(a) Appoint unit members as unit screeners (medical MOS not required) to perform the vision readiness screening if the vision screening requirement comes due before the service members PHA.

(b) Ensure VRSC is completed at least annually.

(c) Ensure vision readiness screening results are recorded in MEDPROS.

(2) Unit screeners—

(a) Perform vision readiness screening as prescribed in the USACHPPM Technical Guide 007 (Vision Readiness Screening Guide) available at <http://chppm-www.apgea.army.mil/documents/TG/TG007FebFinalwithlinks.pdf> and at: <https://www.us.army.mil/suite/page/407>.

(b) Record screening results directly into MEDPROS or on individual vision readiness worksheet and/or unit vision readiness spreadsheet and validate results with their signature.

(c) Identify and refer Soldiers requiring corrective action according to local SOP (see Chief of Optometry/ Unit Surgeon/ Medical Commander functions below).

(3) Unit MEDPROS users—

(a) Accurately enter vision readiness screening data into MEDPROS.

(b) Only enter vision readiness screening data that has been validated by the unit screener.

(4) Units with personnel who do not have access to MEDPROS will request access to MEDPROS for data entry by following the instructions at the MEDPROS Web Site at <http://www.mods.army.mil>. For further guidance, refer to USACHPPM TG 007.

(5) Officer-in-Charge (OIC) of medical stations of Power Projection Platforms (PPP)/Power Support Platforms (PSP)/SRP sites—

(a) Ensure the unit maintains up-to-date vision readiness classification for each Soldier assigned to the unit. The medical section at these sites must complete this requirement when Soldiers arrive with an incomplete VRSC. The vision readiness screening does not require an eye technician. It can be performed by anyone on the SRP team with minimal training (see Chief of Optometry/Unit Surgeon/Medical Commander and/or the Vision Readiness Screening Guide).

(b) Update PPP/PSP/SRP SOPs to include performing the vision readiness screening and entering the results into MEDPROS.

(6) Chief of Optometry/Unit Surgeon/Medical Commander—

(a) Provide training for unit screeners or PPP/PSP/SRP screeners when requested by unit commanders or PPP/PSP/SRP OIC.

(b) Develop a local SOP that addresses corrective action for all Soldiers identified as Vision Readiness class 3 (O or V) including updating MEDPROS following remediation.

Chapter 5 Eye Safety - Ocular Hazards, Protection, and First Aid

Section I Introduction

5-1. Background

The primary hazards to the eye are from mechanical, chemical, biological, and radiant energy operations. The protective methods in order of effectiveness are engineering controls, administrative controls, and PPE. If injury occurs, first aid and definitive follow-up care for the injured employee are required.

5-2. Engineering controls

Engineering controls are physical modifications of an operation or activity that either totally eliminate (preferred) or reduce the eye-hazardous aspect of an operation. The following are some controls that may be used.

a. *Automate the operation.* Redesign the operation so that the tasks can be performed by an automated process in an area away from the employee (such as use of robotic manufacturing processes).

b. *Modify the work area.* If the operation cannot be fully or partially automated, modify the operation or activity to reduce the hazard. For example, placing a clear shield over the wheel of a grinder reduces the potential for material to fly into the face of the operator.

5-3. Administrative controls

Administrative controls are instructions, directions, or rules that inform employees about safety procedures to be observed in eye-hazardous operations. These controls govern protective measures that minimize the risk of injury. The control requirements may be included as part of the employee job description, SOPs, and/or contract requirements. These documents should include identified hazards, protective mechanisms to be used, and safety rules to follow.

5-4. Personal protective equipment

a. When engineering and administrative controls cannot eliminate an ocular hazard, the use of PPE is required. PPE will be provided by the employee's unit. To meet the minimum general requirements per 29 CFR 1910.133, PPE shall—

- (1) Provide adequate protection against the particular hazard(s) for which they were designed.
- (2) Be reasonably comfortable when worn under the designated conditions.
- (3) Fit snugly and shall not unduly interfere with the movements of the wearer.
- (4) Be durable.
- (5) Be capable of being disinfected.
- (6) Be easily cleanable.
- (7) Be kept clean and in good repair.

b. In addition to the 29 CFR 1910 requirements, the protectors must—

- (1) Meet current ANSI Z87.1 standards.
- (2) Have distinctive marks that will allow identification of the device as approved PPE.
- (3) Be appropriate to the hazard.
- (4) Minimally obstruct vision.
- (5) Include instructions on use, cleaning, and adjustment of the equipment.

c. The types of eye protection to be provided by the employee's unit may include one device or multiple devices in combination. The devices will meet the requirements of ANSI Z87.1 which now addresses two levels of impact protection for spectacles and updates impact criteria for other protective eyewear. These spectacles will be marked as described in table 5-1. The lens markings are usually found along the upper, outside edge of each lens and the frame will be marked on the frame front and the temples (arms). It is in violation of ANSI provisions to use a basic lens in a high impact frame or a high impact lens in a basic frame. See ANSI Z87.1 for impact and marking requirements for other protective eyewear (for example, goggles and welding protectors). See Program Executive Office-Soldier's (PEO-Soldier's) current APEL to view a list of protective eyewear suitable for combat. APEL eyewear provides ballistic fragmentation protection (see table 5-2) and is compliant with ANSI Z87.1 standards.

Table 5-1
Summary of ANSI Z87.1-2003 basic impact and high impact standards for safety eyewear

Parameter	Basic impact	High impact
Prescription lenses (nonplano)		
Lens minimum thickness (thinnest point)	3.0 mm (2.5 mm if +3.00 D or more)	2.0 mm (in frame marked Z87-2)
Marking	Manufacturer's logo	+ after manufacturer's logo
Tint/shade	Shade number after manufacturer's logo	Shade number after manufacturer's logo and +
Photochromic lenses	V after manufacturer's logo	V after manufacturer's logo and +
Special purpose lenses	S after manufacturer's logo	S after manufacturer's logo and +
Impact test	1-inch steel ball dropped from 50 inches	0.25-inch steel ball @ 150 ft/sec
Plano lenses		
Plano, removable lens	Same as prescription lenses	Same as prescription lenses

**Table 5-1
Summary of ANSI Z87.1-2003 basic impact and high impact standards for safety eyewear—Continued**

Plano, nonremovable lens	Same as prescription lenses	Same as prescription lenses
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**Table 5-2
Ballistic performance of APEL eyewear**

Device type	Caliber of fragment	Weight of fragment	Impact frequency
Spectacles	.15	5.8 grains	1
Goggles	.22	17 grains	3 ¹

Note:

¹One impact each for left, right, and middle of goggle lenses.

(1) Nonprescription spectacles (also referred to as plano) with side shields will be provided for employees who do not require prescription eyewear and who are exposed to eye hazards on a regular basis.

(2) Prescription spectacles with side shields will be provided for employees who require prescription eyewear and who are exposed to eye hazards on a regular basis. Single vision, bifocal, or trifocal will be provided as appropriate.

(3) Impact goggles may be worn over nonsafety spectacles where exposure to eye hazards does not exceed 10 hours per week or 3 hours per day on a regular basis, and where the goggles do not cause a safety problem or are unduly uncomfortable.

(4) Chemical splash goggles must be worn where there is potential for a chemical splash to the eyes. They may be used in lieu of impact goggles for impact hazards.

(5) Face shields are not considered primary protection for mechanical, chemical, or radiant energy. They are to be worn in conjunction with impact or chemical protection where the hazard requires a higher level of eye or face protection. Face shields may be worn as a primary protector for biological hazards where there is no accompanying mechanical or chemical hazard.

(6) Metal spectacle frames are prohibited in areas where electrical shock or arcing is a hazard.

(7) Spring-loaded hinges may be used on a frame if the frame and hinge combination meets ANSI Z87.1 requirements.

d. Industrial safety eyewear lenses must meet or exceed the requirements of ANSI Z87.1. The current ANSI Z87.1 (2003) incorporated changes that allow a wider variety of lens thicknesses and frame designs and includes changes in the frame and lens marking requirements. Ensure that the staff ordering safety eyewear is familiar with the revised standard to ensure compliance.

(1) All industrial safety spectacle lenses must be made of polycarbonate or similar material unless another lens material is prescribed by a vision care provider as medically indicated. Polycarbonate in powers above 4.0 diopters may cause some reduction in clarity. When the use of polycarbonate is not appropriate, other plastic lens material, such as CR-39, will be used. Since the impact resistance of glass is significantly less than polycarbonate and usually less than CR-39, glass lens materials will be approved only in extremely rare conditions when the vision care provider determines no other material is satisfactory. If industrial safety eyewear cannot be prescribed with polycarbonate or CR-39 lenses, the employee must be notified of the change in lens material at the time of ordering. The VCRO and the installation safety officer must approve the use of glass lens material in a written memorandum, noting the reason for the change, and file the memorandum in the individual's OH medical record.

(2) Tinted lenses may be required in industrial safety spectacles under certain circumstances. When tinted lenses are required for job performance, they will provide adequate filtering for the hazardous wavelength and may be in either of the following two forms:

(a) A flip-up lens covering an ANSI Z87.1 device.

(b) A lens and frame combination meeting ANSI Z87.1 with appropriate lens marking identifying the tint optical density (OD).

(3) Tinted lenses are approved by the VCRT for outdoor worksites or hazards and will not be worn indoors unless they also meet protection requirements for a specific indoor radiation hazard.

(a) For individuals that require tints for medical conditions, these tints are authorized for wear only when the visual condition is specified by an ophthalmologist, optometrist or neurologist, and where the specific transmission characteristics (color and transmittance) of the tint are prescribed. Installation safety personnel must also determine that the tint will not pose a safety risk for the employee or coworkers in their specific workplace. If the tint is determined to produce an unacceptable safety risk, the individual should be retrained for another position that is compatible with the wear of the prescribed, medically indicated tint.

(b) Mirrored, tinted lenses are generally prohibited in the workplace. Prior to authorizing mirrored lenses for wear in

the workplace, local safety personnel should consider adverse effects such as potential for reflections into the eyes of nearby workers. Mirrored surface lenses will not be ordered for industrial safety eyewear using installation funds. Mirrored surfaces are very prone to scratching in the industrial environment. The resulting degradation reduces effectiveness of the tint and optical clarity of the lens. This would result in increased frequency of replacement with corresponding increased cost.

e. Photochromic lenses in industrial safety eyewear may only be used in outdoor locations where movement into and out of buildings or other facilities does not occur. The relatively slow rate of tint change in photochromic lenses presents a hazard to workers moving indoors or into other areas with lower illumination levels. When photochromic lenses are authorized but cannot be obtained in plastic lens material, the employee must be advised that glass lenses do not provide optimum industrial protection. All employees wearing photochromic lenses will be advised of the potential hazard when moving from an area of full illumination to one of reduced illumination. Photochromic lenses should rarely be authorized. ANSI Z87.1 specifies that photochromic lenses should only be authorized when approved by a safety professional for a specific operation. It is the responsibility of the supervisor to ensure safe use of photochromic lenses. Local policy may be established to totally prohibit photochromic lenses. When an employee is authorized to wear photochromic lenses, the employee will bear the additional cost over that of standard clear lenses.

f. Variable focus lenses (progressive addition lenses or no-line bifocals) in an eye-hazardous environment are not normally authorized because of peripheral distortions, difficulty in properly measuring lens alignment, and additional costs. Employees who are successfully wearing variable focus lenses and have good safety records may be allowed to obtain ANSI Z87.1 variable focus lenses. All others who need correction for both distance and near vision will be required to wear standard bifocal or trifocal lenses. When an employee is authorized to wear variable focus lenses, the employee will bear the costs over that of standard bifocal or trifocal lenses (to include remakes if necessary). Local policy may be established to prohibit offering variable focus lenses.

g. When a single power lens will not correct the worker for distance and near tasks, multifocal lenses are the correction of choice. Reading glasses will not be allowed as safety eyewear meeting ANSI Z87.1, because when the employee removes the reading glasses to walk or look across the room, the PPE is no longer in place and the employee is not protected.

h. Contact lenses are not considered protective devices and must be covered by primary protectors meeting ANSI Z87.1 standards. Contact lenses generally should not be worn under respirators or in areas of potential hazard from chemical splash or fumes. Contact lenses will not be worn during basic training, field exercises, gas chamber exercises, deployments, or combat. The only exception to this prohibition is where the Office of The Surgeon General has approved an exception to meet mission requirements or a waiver has been granted through the combatant commander's surgeon's office. Personnel who wear contact lenses for medical reasons are not permitted to be in a prohibited environment (basic training, field exercises, gas chamber exercises, deployments or combat) with or without the contact lenses. Individuals participating in research studies with protocols, duties, or evaluation programs approved by the Office of The Surgeon General are exempt from these restrictions. Theater Commanders have the authority to prohibit wear of contact lenses in the theater, an action implemented in Operation Iraqi Freedom and Operation Enduring Freedom.

i. The protective needs of Soldiers in recent deployments in Operation Iraqi Freedom and Operation Enduring Freedom have prompted authorization of commercially available protective devices approved by PEO-Soldier. The APEL is maintained by PEO-Soldier and details all of these MCEP devices. These devices have been given National Stock Numbers and display the "APEL Authorized" sticker on the packaging when sold at post exchanges and military clothing and sales stores. Products not listed on the APEL should not be procured directly by individual units or Soldiers since they may not meet military ballistic impact resistance requirements. The devices listed on the APEL have been tested to ensure impact resistance meets current military standards for ballistic protection. See table 5-2.

Section II

Mechanical Hazards, Protection, and First Aid

5-5. Introduction: mechanical hazards characteristics

- a.* Mechanical agents are normally described as being—
- (1) Large (greater than 2 millimeter (mm) in diameter) or small (2 mm or less in diameter).
 - (2) Blunt (edges that rip or tear tissue) or sharp (edges that make a smooth cut or puncture in tissue).
 - (3) Fast-moving (such as metal flakes from a grindstone) or slow-moving (such as a fist or finger while playing sports).
 - (4) Stationary (such as a door, cabinet edge, or protruding object).
 - (5) Any combination of (1) through (4).
- b.* Mechanical hazards are agents that are likely to cause—
- (1) A penetrating laceration (puncture).
 - (2) A nonpenetrating laceration (cut).
 - (3) An abrasion (scratch or scrape).

- (4) A contusion (damage from pressure exerted by the material).

5-6. Common mechanical injury mechanisms

a. Large and small particle injury is typically caused by the following or similar activities:

- (1) Chiseling, hammering - a piece of material breaks off the tool or the material being hit and is propelled into the eye.
- (2) Woodworking - a piece of wood or sawdust is propelled by a saw or chisel.
- (3) Grinding - particles from the item being ground or part of the grinding wheel. Failure to keep the tool rest plate adjusted to not more than 1/8-inch from the grinding wheel (29 CFR 1910) may allow material to slip between the wheel and the tool rest. This will cause the wheel to stop suddenly with a resulting catastrophic explosion of the wheel causing serious eye and head injury from parts of the stone wheel.
- (4) Nailing - a nail or piece of the nail or hammer head is propelled into the eye.
- (5) Drill or lathe use - shavings typically fall on the hand and are wiped into the eye. Material rarely flies directly from the lathe or drill into the eye.
- (6) Sports activities - sports equipment or body parts impact the eye in the course of participation in the sport.
- (7) Bungee, elastic, or shock cords - an end slips loose and strikes the eye.
- (8) Automobile accidents - various materials from the vehicle may come in contact with the eye. Glass propelled into the eye from a windshield or mirror is a common injury agent.
- (9) Warehousing - banding straps (plastic or metal) on packages may impact the eye when the straps are cut.
- (10) Stationary objects - injury to the eye occurs when the worker falls on or walks into stationary objects.
- (11) Line trimmers and lawn maintenance equipment - may propel dirt, vegetation, or other materials into the eye of the worker or individuals nearby.
- (12) Explosives - using or being near simulators or munitions being detonated (including munitions explosions in combat). The material injuring the eye is most commonly shrapnel, rock, dirt, and vegetation.
- (13) Compressed air - when used for cleaning, the line pressure will be reduced to 30 pounds per square inch (psi) or an OSHA-approved reduction nozzle will be used to prevent injury from air-propelled objects.
- (14) Other mechanical operations.

b. Common sources of blunt mechanical injury are—

- (1) Body parts - primarily due to sports used for either training or recreation but occasionally due to assault, fights, or accidents.
- (2) Tools - occurs when a tool slips while in use or is laid in a place where it subsequently falls and hits the eye of the worker.
- (3) Sports participation - occurs when the player is struck by the ball, bat, racket, or in collision with another player (see body parts). The most common sports injuries to Army personnel currently come from basketball. A relatively new source of injury is the use of paint ball guns in both the recreation and training environments. The typical injury occurs when the participant removes the protective goggles to clean them and another shot hits the eye. In addition to the blunt trauma from the ball, a chemical injury may occur from the paint coming from inside the ruptured paint ball.
- (4) Stationary objects and furniture - occurs when the employee inadvertently bumps or falls into or onto a fixed object.

c. Common sources of sharp mechanical injury are—

- (1) Glass shards - from broken windows in buildings and vehicles, and broken glass lenses.
- (2) Cutting tools - from the tool being pulled toward the user. The tool slips from the material being cut and is pulled into the eye. Injury may also occur when a knife or similar weapon is used in assault.
- (3) Metal pieces - turnings from lathes and drill presses that get propelled or rubbed into the eye.

5-7. Mechanical hazard personal protective equipment

a. Industrial protective eyewear. Protective devices must meet the specific impact, strength and marking (lens and frame) requirements stated in ANSI Z87.1. The following is a synopsis of the current ANSI Z87.1 specifications:

- (1) *Primary eye protectors.* Industrial safety spectacles with side shields, impact goggles, or chemical splash goggles are primary eye protectors.
- (2) *Secondary eye protectors.* Face shields are considered secondary eye protectors to be worn over industrial safety spectacles or goggles to provide additional protection to the eyes, face, and neck. These face shields will have Z87 or Z87.1 and the manufacturer's logo imprinted on the top sides. Face shields do not, by themselves, provide adequate protection to the eyes for either impact or chemical hazards.

b. Sports recreational eyewear. The ASTM International provides recommended eye protection strength standards for several sports. Industrial safety spectacles do not provide adequate protection for sports activities.

- (1) *Racket sports - ASTM F803.* Proper use of protectors with lenses meeting ASTM standards will be a requirement for play in Army indoor racket sports facilities. Although a lensless protector is approved by ASTM, they will not be used for racket sports on Army installations.

- (a) Eye guards with lenses are available in both prescription and nonprescription styles.
- (b) Eye cages/lensless eye guards will not be used. A high velocity ball may compress enough to partially penetrate the cage and impact the front of the eye, or a finger may pass through the gap in the protector and injure the eye.
- (2) *Paint ball - ASTM F1776*. Protectors meeting this standard will be used for paint ball games/training on Army installations.
- (3) *Alpine skiing - ASTM F659*. Protectors meeting this standard will be used when skiing on military installations or during official ski training.
- (4) *Youth baseball programs - ASTM F910*. Protectors meeting this standard will be used for youth baseball programs on Army installations.

5-8. Mechanical injury emergency care

Do not put pressure on an injured eye. Pressure may cause catastrophic damage to internal ocular tissues. With a mechanical eye injury, always assume there has been penetration of the globe until proven otherwise. An optometrist or ophthalmologist should determine the extent of ocular tissue penetration in all but the most obvious cases. In the case of multiple injuries, the attending health care provider will determine which injuries take priority for care.

- a. Care of mechanical trauma patients includes—
 - (1) Immediate stabilization and transport to emergency care for penetrating foreign bodies, lacerations (except those known to be superficial), marked contusions of the orbit tissues and globe, especially where hemorrhaging inside the eye is noted.
 - (2) For an avulsed eye (eye dislodged from socket), do not attempt to push the eye back into the orbit. Cover the eyes with a moist dressing (preferably sterile gauze and normal saline) and move the patient by litter, face up in the reclined position, to emergency treatment.
 - (3) Immediate evaluation by an eye care specialist (optometrist or ophthalmologist) for superficial foreign bodies, partial thickness lacerations, abrasions (especially corneal), and contusions. Avulsion and other severe ocular trauma patients should be transported directly to an emergency room and receive required treatment from an ophthalmologist.
- b. Some ocular injuries may be treated by local medical care professionals. Care must be exercised to ensure that the nature of the injury is not beyond the scope of care of the provider. When the eyelids are lacerated, repair should be done by an ophthalmologist or plastic surgeon experienced in eyelid repair. The position of the lids on the surface of the eye is critical to tear film application, and even small amounts of scar tissue in the wrong place can prevent effective lid function.
- c. Long-term medical follow-up may be required for trauma to the eye. The eye care provider will determine the type and duration of the follow-up care.
- d. Some mechanical trauma agents/injuries to ocular tissues are—
 - (1) Foreign bodies - parts of the mechanical injury agent remain imbedded in the ocular tissues. Penetrating foreign bodies pass through one or more ocular tissue. Superficial foreign bodies penetrate less than one thickness of tissue.
 - (2) Lacerations - a tear of or a cut to one or more ocular tissues.
 - (3) Contusions - compression injury to ocular tissue, usually from blunt trauma.
- (a) Ocular adnexa - superficial ocular tissue around the globe is bruised and may have hemorrhaging (ecchymosis or black eye).
- (b) Globe - potential for internal globe damage to the retina, choroid, ciliary body, iris, or lens of the eye. Damage may include hemorrhaging, retinal detachment, lens displacement, or cataract. Retinal detachment and traumatic cataract may occur at the time of initial trauma or months later.
- (c) Orbit - blow-out fracture of the orbit may occur when the orbital tissues are compressed and the resulting force ruptures the floor or wall of the bony orbit of the eye, often entrapping orbital tissues including extraocular muscle tissue.
- (4) Abrasions - disruption of superficial layers of ocular tissues (eyelids, conjunctiva, and cornea) without complete penetration.
- (5) Avulsed eye - the eyeball (globe) is pushed completely out of the orbit.

Section III Chemical Hazards, Protection, and First Aid

5-9. Introduction

A chemical hazard is any chemical agent foreign to the eye that reacts with the ocular tissues and results in damage to the ocular tissues. The primary and first treatment of chemical injury to the eye is flushing with water. Do this before and, if possible, while transporting the injured individual to medical care. Minimum flushing time is 15 minutes. Some chemical injuries require extended flushing.

5-10. Chemical hazard characteristics

Liquids are the most common form of chemical agent, but gaseous and solid chemical agents may also produce injury

to the eye. Alkali burns are the most devastating and represent a true ocular emergency. Most other chemicals are irritants that normally cause superficial injury to the eye tissues.

a. Chemical hazard agents are likely to cause—

- (1) Penetration of ocular tissues by infiltration through the tissues.
- (2) Chemical burns of ocular tissues.
- (3) Irritation of ocular tissues.

b. Chemical agents likely to produce injury to ocular tissues are alkali (most severe), acid, surfactants (detergents), petroleum products, and crowd control agents. For chemicals considered military unique, see paragraph 5–15.

5–11. Chemical hazard sources

a. Alkali is the chemical agent most harmful to ocular tissues. Common sources of alkali are electrolytes in nickel-cadmium rechargeable batteries, chemical reagents in laboratories, and cleaning agents (both industrial and home).

b. Acid is the most common chemical injury agent and is found predominantly as electrolytes in rechargeable vehicle batteries, chemical reagents in laboratories, and some cleaning agents. Acids are also often found in solder cores and as a surface curing agent for newly poured concrete.

c. Surfactants (detergents) may splash into the eyes while applying to a surface to be cleaned. Some detergents also contain alkali in mild concentrations.

d. Petroleum products such as fuels and lubricants may splash into the eyes during the refueling process or while lubricating machinery.

e. Crowd control/military-unique agents may splash into the eyes during simulated exercises, crowd control actions, or combat.

f. See appendix F for additional chemicals found in the workplace.

5–12. Mechanism of chemical ocular injuries

Almost all chemicals have the potential to cause eye injury if the concentration is high enough or the volume is excessive. The most hazardous chemicals commonly producing eye injury are—

a. *Alkalis*. Alkalis combine with the fatty component of the cornea and pass through the corneal barrier into the anterior chamber of the eye. Alkali produces a sustained reaction with ocular tissues. In higher concentrations, the cornea may be penetrated within 5 seconds. Once the alkali has penetrated the cornea, injury to the interior structures of the eye continues with no effective way to prevent the action.

b. *Acids*. Acid will normally precipitate the protein of the ocular tissues and set up a self-limiting barrier. The superficial tissues may be severely injured but the injury is rarely deep. Hydrofluoric acid is an exception that will penetrate the ocular tissues.

c. *Surfactants*. The typical injury is a modification of the tear film layer of the eye either by dilution or mild chemical reaction. The most common injury is mild to moderate irritation of the corneal and conjunctival tissues with no severe long-term effects.

d. *Petroleum products*. Mild to moderate irritation of the ocular tissues occurs when petroleum products splash onto them.

e. *Other chemicals*. Most other chemicals produce irritation of ocular tissues.

5–13. Eye protection against chemical injury

a. Chemical splash goggles will be worn when chemical splash potential exists. These goggles will meet ANSI Z87.1 standards, provide the same strength and marking requirements as impact goggles, and have indirect venting. These goggles provide protection against chemical, biological, and impact hazards.

b. Face shields (a secondary protector) provide additional impact and chemical splash protection for the eyes, face, and neck when worn over chemical splash goggles. Face shields will not be used alone instead of chemical splash goggles for chemical splash hazards.

5–14. Chemical eye injury emergency care

Chemical burns caused by alkalis, acids, or other chemical agents demand immediate first aid attention.

a. Immediately assist the victim to the nearest eyewash station. Flush the eyes with water for a minimum of 15 minutes. Extended flushing is required for chemicals that are more concentrated or hazardous such as alkali. Flush before and, if possible, while transporting the injured individual to be seen by an optometrist or ophthalmologist (see app G). Training workers in using eyewash units and assisting a chemically injured individual is critical to effective use of eyewash devices. If an eyewash unit is not available, a nearby source of clean, flowing water may be used to irrigate the eyes.

b. Do not try to neutralize the chemical agent with anything other than water. If desired, litmus paper may be used to test the tears periodically during the flushing process to determine if the chemical has been diluted to essentially neutral pH. Even if the pH indicates neutralization, continue flushing for at least 15 minutes.

c. Do not apply a bandage until the eye care specialist has completed a vision examination since flushing cannot

continue while bandaged and there is potential for tissue adhesions and for chemical agent to be trapped under the eye lids.

5-15. Special chemicals and warfare agents

a. Mustard agent (H, HD, or HT). Mustard agent is a blister agent. Typical effects of exposure to the eye are a burning sensation of the eyes, swelling of the eyelids, and marked blinking. Pupil miosis (constriction) may also occur. Suitable respirators are to be worn in areas of potential exposure to mustard agent. Where the VA of the employee is reduced to the point that they cannot safely perform their work without spectacles, optical inserts will be provided for use in the respirators. Infrequent visitors to such areas may use contact lenses under a full faceplate respirator only if accompanied by an escort. Currently, employees with potential exposure to mustard agent are enrolled in the unit or installation respiratory protection program. See DA Pam 40-173 for current personnel categories and medical surveillance requirements.

b. Nerve agents (GA, GB, GD, and VX). Individuals with potential exposure to nerve agents are assigned specific personnel categories based on potential of exposure. Medical surveillance requirements are based on these personnel categories (DA Pam 40-8). Care must be taken to ensure health care providers and decontamination team members are not contaminated or spreading contamination while providing care.

c. Military/crowd control chemicals. Treatment of individuals exposed to military/police-related chemicals is the same as for other chemicals (flushing eyes with copious amounts of water). Additional care must be taken to ensure the health care providers and decontamination team members are not contaminated or spreading contamination while providing care.

Section IV

Biological Hazards, Protection, and First Aid

5-16. Introduction

Biological hazard agents are any of the bacterial, viral, or fungal agents to which an individual may be exposed in the workplace. The unique difference between eye exposure to other hazards and exposure to biological agents is that there is rarely any pain or noticeable physical injury to the eye on initial biological exposure unless the tissue is injured by another agent at the same time. The primary injury hazard occurs after exposure and incubation/infection times are reached.

5-17. Biological hazard sources

Biological hazards are primarily found in medical facilities, medical research facilities, and at the scene of accidents or incidents involving human injury but may also include biowarfare agents. Those most likely to be exposed are health care providers, emergency medical teams, law enforcement officers, firemen, and victims and perpetrators of assault.

5-18. Biological hazards of primary concern

The following biological hazards/diseases are of most concern when ocular tissues are exposed to infectious agents:

- a.* Human Immunodeficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS).
- b.* Hepatitis B and C.
- c.* Other diseases—
 - (1) Viral conjunctivitis.
 - (2) Bacterial conjunctivitis.

5-19. Protective devices

- a.* Protection may be accomplished in medical and research facilities by—
 - (1) Applying routine infection control procedures for medical facilities.
 - (2) *Using a face shield protector.* Unless an impact hazard exists, the device may be a thin acetate barrier with clips that attach to a normal eyeglass frame or a regular ANSI Z87.1 face shield (used as an additional protector in industry). Wraparound-type ANSI Z87.1 protectors with no side vents worn with chemical splash goggles also provide good protection from biological spray.
- b.* Protection in other potentially hazardous areas include—
 - (1) Safety eyewear with side shields.
 - (2) Non-ANSI Z87.1 eyewear with side shields or wrap-around design.
 - (3) Face shields (see para 5-19a(2), above).

5-20. Biological injury urgent care

Biological injury is most likely to occur when the ocular tissues have been abraded or lacerated and then been in

contact with biological pathogens. Those exposed should be treated by initial flushing of the eyes with water (15 minutes minimum) then transported for medical evaluation and treatment.

Section V

Ionizing Radiant Energy Hazards and Protection

5-21. Introduction

Ionizing radiation is electromagnetic radiation capable of producing ionization (radioactive) changes in ocular tissues. Included are charged alpha and beta particles, nonparticulate radiation such as gamma and x-rays, and neutrons, which are uncharged elementary particles.

a. Ionizing radiation sources include—

- (1) Nuclear reactors.
- (2) Atomic/nuclear bomb blasts.
- (3) Medical procedures such as diagnostic nuclear medicine/x-ray procedures, and cancer treatment.
- (4) Industrial and military materials or devices that produce radiation.

b. Degree of injury will be determined by—

- (1) Type of radiation (alpha, beta, gamma).
- (2) Energy level of the source.
- (3) Tissue absorption characteristics for the specific radiation at the output energy and frequency levels.
- (4) Distance between the source and the tissue.
- (5) Duration of the exposure.
- (6) Number of repeated exposures (cumulative effect).

c. Ionizing radiation effects include—

- (1) Deterioration of ocular tissues.
- (2) Destruction of ocular tissues.
- (3) Cataract formation.

5-22. Risk levels and monitoring requirements for ionizing radiation

a. There is low risk of overexposure in peacetime if PPE is used and safety precautions are followed. The risk may increase during nuclear conflicts or during accidents involving nuclear materials or radiation devices.

b. Individuals who have the potential to receive a dose to the eyes in excess of Federal health and safety standards will be enrolled into a dosimetry program in accordance with AR 40-14. This is an occupational standard, however, and does not apply to tactical scenarios.

c. Allowable dose rates are published in DA Pam 40-18.

5-23. Ionizing radiation protection

Ionizing radiation protection is provided by—

- a.* Time, distance, and shielding.
- b.* An effective training program.

Section VI

Nonionizing Radiant Energy Hazards, Protection, and Medical Management

5-24. Introduction

Nonionizing radiation is electromagnetic energy, for which the quantum energy is insufficient to ionize matter. The nonionizing radiation spectrum is divided into spectral bands and include UV, visible, infrared (IR), and RFR.

a. Nonionizing radiation sources include—

- (1) Sunlight.
- (2) High intensity lights.
- (3) Lasers.
- (4) Welding.
- (5) Electric arcing.
- (6) Blast furnaces.
- (7) Germicidal lamps.
- (8) Radar and microwave devices.
- (9) Radios.

b. Degree of injury will be affected by—

- (1) Wavelength of the radiation.

(2) Total energy absorbed, which is based upon the duration of the exposure, the number of exposures, and the incident field strength.

(3) Tissue absorption characteristics for the specific radiation at the output energy and frequency levels.

(4) The incident field strength, which decreases with increasing distance between the source and the tissue (field strength decreases according to the inverse square of the distance).

(5) Duration and number of exposures, which is important for cumulative effects such as photochemical effects.

c. Effects of nonionizing radiation to the eyes include—

(1) Ocular tissue irritation and burns.

(2) Ocular tissue destruction.

(3) Cataract formation.

d. Risk levels and monitoring requirements for exposure to nonionizing radiation are—

(1) There is low risk of overexposure in peacetime if PPE is used and safety precautions are followed. The risk may increase during conflicts, especially if directed energy weapons are used.

(2) Safety procedures are designed to prevent exposure to nonionizing radiation in excess of permissible exposure limits (PELs). These procedures are monitored for compliance.

(3) Emitting devices and their associated safety devices are monitored through preventive maintenance to ensure they function properly.

5-25. Ultraviolet radiation hazards

a. *UV spectrum.* UV radiation hazards occur in any or all of the three defined UV bands in the electromagnetic spectrum:

(1) UV-A: 380 - 315 nanometers (nm).

(2) UV-B: 315 - 280 nm.

(3) UV-C: less than 280 nm.

b. *UV hazards sources.* UV hazards sources include—

(1) Welding operations (the most common source of UV injury).

(2) Germicidal lamps and high power welding (source of UV-C).

(3) Overexposure to the sun. The exposure may be direct, reflected (for example, from sand, snow, or water), or a combination of exposure routes. Some medications increase skin sensitivity to UV radiation.

(4) Tanning salons (simulated sun conditions can produce UV eye injury).

(5) Dermatology light boxes.

(6) Laser exposure. Some lasers (primarily medical) emit radiation in the UV segment of the electromagnetic spectrum (not a common source of UV injury).

c. *UV effects/injury characteristics.* The UV injury symptoms consist of eye pain and a scratchy, sandy, or gritty sensation of the cornea and conjunctiva. Onset of symptoms is from 30 minutes to 15 hours after exposure depending on the length of exposure and intensity of the source. Most common ocular injuries produced by UV-A and UV-B are—

(1) Erythema (sunburn) of the eyelids.

(2) Photokeratitis (sunburn of corneal epithelium).

(3) Photoconjunctivitis (sunburn of conjunctival epithelium).

(4) Skin cancer and cataracts may be long-term effects of exposure.

5-26. Infrared radiation hazards

a. IR radiation hazards are from heat-producing devices.

b. Common sources of IR radiation include—

(1) Large furnaces such as those used in the steel production industry.

(2) Heating plants where large boilers heat very large or multiple buildings.

(3) Laser devices.

(4) Glass blowing used for both decorative work and custom glassware for experiments in laboratories.

c. IR effects/injury characteristics are—

(1) Short-term IR injury is primarily to the eyelids and cornea.

(2) Long-term IR injury affects the crystalline lens in the eye, causing cataracts.

5-27. Laser hazards

a. *Introduction.* Laser devices are a special case of radiant energy delivery to the eye (see app E). The output and wavelength vary depending on the medium being used in the laser. In recent years, more wavelengths and power outputs have been developed including tuneable lasers in which one laser can emit radiation in multiple wavelengths.

b. *Sources.* Laser hazard sources include—

- (1) Military laser systems.
 - (2) Medical lasers in health care facilities.
 - (3) Lasers in industry.
 - (4) Lasers in research.
 - (5) Any laser source when beamed directly into the eye for an extended period of time (example: commercial laser pointers that would not normally cause eye injury may produce injury if observed for an extended period of time).
- c. Laser effects/injury characteristics.* Depending on the wavelength, power level and exposure, lasers may produce veiling glare, flash blindness, corneal injury, or retinal injury. Since laser emissions cover a large part of the electromagnetic spectrum, injuries will be—
- (1) The same types of injury described in paragraphs 5–25 and 5–26 for UV and IR when the lasers are low to moderate power.
 - (2) In higher power/short pulse (microsecond or less) lasers emitting a wavelength that affects retinal tissues (400–1400 nm), there is an injury mechanism known as thermoacoustic shock. Thermoacoustic shock occurs when—
 - (a) The retinal tissue is rapidly heated.
 - (b) A subsequent violent expansion (vaporization) occurs in the tissues and fluids where the beam is focused.
 - (c) A hole is blasted in the adjacent tissues by either the laser beam or the expansion of instantaneously vaporized ocular fluids. Usually the retina and choroid are affected.
 - (d) Adjacent tissue is destroyed and often hemorrhaging occurs when adjacent blood vessels are damaged.
 - (e) Significant drop in VA may occur. Acuity may or may not return to normal depending on the location and severity of the injury. Historically, injuries to the macular area have the poorest prognosis for recovery. The prognosis for recovery of functional vision increases as the distance of the injury from the macula increases.
 - (3) Injury to the cornea, crystalline lens, and eyelids may also occur.
- d. Reporting requirements.* The unique nature of laser energy, definitions of laser type, classification of employees using lasers, and laser incidents necessitate unique reporting requirements. See appendix E and U.S. Army technical bulletin, medical (TB MED) 524.

5–28. Radio frequency radiation

- a.* Radio frequency radiation hazards can exist near man-made sources.
- b.* Common sources of RFR include—
 - (1) Radar.
 - (2) Radio.
 - (3) Satellite communication terminals.
 - (4) High power microwave generators.
 - (5) Electronic countermeasure systems.
 - (6) Shortwave diathermy.
- c.* RFR exposure causes tissue heating which over the long-term can affect the crystalline lens in the eye, forming cataracts. RFR can also affect medical implants and other electronic life-support equipment. Electromagnetic interference is a growing concern in hospitals with the ever increasing reliance upon electronic equipment and the increased presence of RFR sources in the form of personal communication devices. An RFR exposure incident is defined as an overexposure in excess of five times the PEL. If an RFR incident is suspected and USACHPPM has investigated and confirmed the likelihood of an incident, a dilated examination of the eye with emphasis on the crystalline lens should be performed with a slit lamp. If changes are noted in the clarity of the lens or development of cataracts occurs, periodic follow-up examinations should be scheduled to monitor the lens/cataract for increasing density. The timeframe for follow-up will vary with the degree of exposure, any crystalline lens opacification noted, and the judgment of the ophthalmic provider (optometrist or ophthalmologist). There is some evidence that suggests an RFR overexposure may also affect the neural tissues. If visual symptoms are reported by the patient, neurological tests may be required as well.

5–29. Nonionizing radiation eye protection

- a. Introduction.* When selecting radiant energy protective devices, ensure absorptive lenses are appropriate to the wavelength and power output of the radiation source. An opaque helmet and/or absorptive face shield are used where high temperature sources exist.
- b. Welding.* ANSI Z49.1 will be used in conjunction with ANSI Z87.1 requirements for the selection of protective goggles and helmets for welding and cutting operations (see app H). These standards address—
 - (1) Helmet characteristics.
 - (2) Shade selection for lenses. Optical density (light attenuating ability) and tint of the lens must be appropriate for welding type and radiation intensity.
 - (3) Welding goggles and hand shields.
 - (4) Additional eye protection guidance.

(a) In addition to protecting the eyes from optical radiation, ANSI Z87.1 protection must be worn under the helmet because the helmet is usually lifted to inspect welds.

(b) Helmets with photosensing lenses are recommended for large-scale arc welding operations to minimize the time the helmet has to be lifted for inspection of welds (also see app H).

c. *Solar.*

(1) Appropriate tint in sunglasses and UV blocking characteristics on all lenses should be determined by the eye care practitioner.

(2) Optimize eyewear or other devices for the environmental conditions.

(3) Absorptive lenses can affect color perception. Therefore, training should be conducted using the same or similar tint to that used in actual missions.

(4) The sun should never be viewed directly with either the naked eye or through lenses. Looking at the sun may cause severe and permanent injury to the retina.

d. *Laser.* ANSI Z136.1 is the applicable standard for safe laser use except for lasers used in health care facilities (see app E). ANSI Z136.3 is the standard for lasers used in health care facilities. Laser protective goggles provide the best protection when engineering and administrative controls are not adequate. Spectacles with laser lenses and opaque side shields are acceptable. Laser protective eyewear is required when using class 3B and class 4 lasers but only in a few specific instances for the other classes of lasers. Laser protective eyewear will—

(1) Have OD appropriate to the power output of the laser.

(2) Be wavelength-specific to the spectral output of the laser.

(3) Have lenses marked with OD and wavelength.

(4) Be inspected by competent technicians with devices that can measure OD and wavelength attenuation characteristics after multiple exposures to laser emissions (frequency of inspection of the eye protective devices will vary with power output and wavelength of the laser). Replace devices that no longer provide the required protection.

e. *RFR.* There is currently no suitable PPE for RFR exposure.

5–30. Treatment for radiant energy injuries

a. Immediate treatment for radiant energy injury addresses the symptoms and usually consists of—

(1) Alleviating the pain with cold compresses for erythema (sunburn) of external tissues such as the eyelids prior to evacuation.

(2) Administering pain medications (none that would inhibit clotting) at the MTF by health care providers.

(3) Prescribing antibiotics to prevent secondary infections.

(4) Referring known laser injury or exposure immediately to a military optometrist or ophthalmologist for a same-day evaluation even if no injury is immediately apparent. (A civilian eye care specialist may be used if no military care is available within 24 hours.)

(5) Reporting laser injury or exposure through appropriate channels per appendix E.

b. Follow-up care should be provided.

(1) An eye care specialist may be required to treat or observe internal ocular tissues depending on the degree of injury. If the macula (area of best vision) has not been damaged, the prognosis for return of a majority of visual function is good.

(2) A retinal specialist may be required to treat intraocular hemorrhage. See appendix E for referral protocol for laser injuries.

Section VII

Thermal Hazards, Protection, and Medical Management

5–31. Introduction

Thermal hazards addressed in this document are those that are direct contact heat hazards that cause burns. The IR radiation hazards from heat and other sources are covered in section VI, paragraph 5–26 above.

a. Common sources of thermal injury include—

(1) Hot liquids such as boiling water and grease used in cooking.

(2) Heated objects such as solder, welding spatter, and hot curling irons.

(3) Hot gases from flames and steam.

(4) Open flames and fires.

b. Sources of thermal injury in field exercises and combat include—

(1) Explosion of improperly used immersion heaters. (This is the most common source of thermal injury in the Army.)

(2) Flash from munitions and munitions simulators.

(3) Fire from fuel ignition.

5-32. Thermal eye protection

Thermal eye protection measures are—

- a. Avoidance of the hazard.
- b. Protective eyewear appropriate to the type of hazard(s).
- c. Chemical splash goggles combined with a face shield where there is a risk of hot fluid splash.

5-33. Treatment for thermal injuries

The treatment for thermal injuries is consistent with the treatment for any burn such as those identified in paragraph 5-30 above.

Chapter 6 Environmental Vision

6-1. Introduction

Environmental vision is the assessment, evaluation, monitoring, and management of external/physical conditions that affect visual performance. These conditions may include the effects of tools and equipment used in work, work station physical design, illumination, and weather. Environmental factors affect efficiency, safety, and comfort. The environment may be natural, artificial, or both.

6-2. Atmospheric elements affecting vision

a. *Temperature and humidity.*

(1) Optical surfaces (such as lenses or windshields) have reduced clarity with fogging, pitting, and dust accumulation.

(a) Fogging often occurs with—

1. Low temperatures in most humidity levels.
2. Medium to high temperatures in high humidity levels.
3. Any temperature for eyewear worn by someone doing strenuous exercise.
4. Sudden change to a higher temperature environment.

(b) Lens/windshield pitting occurs with repeated exposure to impact from small particles. This often results in glare when driving into the sun or oncoming bright headlights.

(c) Dust accumulation often occurs with—

1. Low humidity conditions.
2. High temperature conditions.

(2) The low humidity that normally occurs at high altitudes or arid locations often causes drying of the ocular tissues. Most people adapt to this condition within 2 to 3 weeks. This drying also occurs in air conditioned rooms and aboard aircraft flying at high altitudes. Contact lens wearers may experience difficulty wearing their lenses in low humidity conditions.

b. *Dusty, dirty, smoky, and otherwise polluted environments.*

(1) Ophthalmic lenses.

(a) Dust and dirt on lenses reduce the clarity of images seen through the lenses and increases glare from light sources.

1. Spectacles, including safety glasses - the lens surfaces are affected.
2. Sighting devices - may be on the external lens surfaces or internal lens surfaces if the device is poorly sealed.

(b) Dust and dirt in ocular tissues may produce irritation, minor abrasions or cause a secondary infection if pathogens are in the dust.

(2) Optical performance.

(a) Light reflecting from dust particles on lenses produces glare.

(b) Lenses, especially polycarbonate, scratch easily in dusty environments if not cleaned carefully. However, the increased protection provided by polycarbonate lenses outweighs the negative factor of the scratching.

(3) Contact lenses.

(a) Difficulty cleaning the lenses.

(b) Increases risk of abrasion to the cornea.

(c) Increases risk of infection due to abrasions and poor lens hygiene.

(d) Makes contact lens wear more difficult and uncomfortable.

(e) Increases incidence of deposits on the lenses from tears and other ocular secretions.

(f) Contact lens wear in field conditions (for example, FTX or deployment) is prohibited unless the contact lenses

are part of a military program and are provided by the military. Wear of contact lenses under military protective masks is not allowed since the lenses cannot be removed when prolonged wear of the mask is necessary.

c. *Wind/air movement.* The movement of wind and air—

- (1) Dries the ocular tissues by evaporation of tears.
- (2) Promotes irritations of the cornea and conjunctiva.
- (3) Carries chemical pollutants.
- (4) Adversely affects the wear of contact lenses.

6-3. Illumination and lighting

a. *General.* Appropriate lighting levels promote a safe work environment and improve visual efficiency and comfort. Illumination surveys may be performed by an IH, VCRO, OHN, safety officer, or other qualified individual who is familiar with illumination instruments, measurements, and standards. Lighting evaluations reflect the quality, quantity, and location of natural and artificial lighting. Lighting surveys must also consider the vision and lighting requirements of tasks and the visual capabilities of the employees. Problems may occur with either insufficient or excessive illumination levels. Guidelines for illumination are available from the Illuminating Engineering Society of North America.

b. *Illumination terms.*

(1) *General illumination.* Ambient light, the light from natural or artificial sources, that normally illuminates a broad work area.

(2) *Supplemental task lighting.* Lighting which is added to general illumination at a worksite to increase the visibility of objects or tasks.

(3) *Quantity of illumination.* The amount of light emitted by a light source falling on a surface or work station is called illuminance and is measured in units called Lux (1 lumen/m²) or foot-candle (fc) (1 lumen/ft²). Illumination should match the visual demands of the task. Detailed work (such as reading machinists calipers) requires more illumination than gross tasks (such as operating a forklift).

(4) *Level of illumination.* The Illuminating Engineering Society Handbook and other references provide guidelines for illumination. Recommended minimum levels of illumination should not be confused with optimal levels of illumination that allow for maximum worker safety and productivity. Older workers often need higher illumination levels than younger workers due to changes in the pupil diameter, clarity of ocular tissues, and accommodative ability with the natural aging process. Table 6-1 provides recommended illumination levels based on several references on lighting.

Table 6-1
Recommended task illumination in foot-candles (fc)

Task/Activity Description	DOD MIL-STD 1472F ¹	Illuminating Engineering Society of North America ²	41 CFR 101-20.107 ³
Auto parking areas	————	10-20 fc	6-10 fc
Corridor, stairs, elevator boarding area, walk surfaces	10-20 fc	10-20 fc	1-5 fc
Loading dock	10-20 fc	20 fc	21-30 fc
Storage areas (medium)	20-30 fc	10-20 fc	6-10 fc
Assembly (course)	30-50 fc	10-20 fc	6-10 fc
Shipping preparation	————	20-50 fc	21-30 fc
Work areas - general	30-50 fc	20-50 fc	30 fc
Work station surface	50-75 fc	50-100 fc	50 fc
Food preparation, assembly, and manufacturing (medium)	50-75 fc	50-100 fc	————
Drafting/drawing - fine detail	100-200 fc	50-100 fc	————
Assembly (fine)	75-100 fc	100-200 fc	————
Fine inspection (detailed)	100-200 fc	100-200 fc	————
Machine work (fine detail)	100-200 fc	200-500 fc	————
Inspection - very fine	200-300 fc	200-500 fc	————

Table 6-1
Recommended task illumination in foot-candles (fc)—Continued

Notes:

¹ DOD Military Standard 1472F, Department of Defense Design Criteria Standard, Human Engineering, 23 August 1999.

² Lighting Handbook, Illuminating Engineering Society of North America, 9th ed., 2000.

³ Title 41, Code of Federal Regulations, Section 101-20.107, Energy Conservation.

(5) *Direct lighting.* Direct lighting (light that falls directly on the task) is the most efficient type of illumination. However, direct lighting often produces shadows and glare which may interfere with efficiency of the visual system.

(6) *Indirect lighting.* Indirect lighting (light that reflects off adjacent ceilings or walls) produces a more comfortable visual work environment. However, indirect lighting is less efficient (uses more energy per illumination unit incident on the work surface) than direct lighting.

c. Energy conservation requirements. Title 41, CFR, Section 101-20.107, mandates maximum illumination levels for an energy conservation program in U.S. Government facilities. Installations should use the CFR-mandated illumination levels unless that level jeopardizes worker performance, safety, or health. See table 6-1 for a comparison of the CFR-mandated maximum illumination levels based on energy conservation versus the visual performance and comfort-based recommendations from several references on illumination. Worker safety takes precedence over energy conservation requirements; thus, illumination of work areas and surfaces will be based on safety and performance. The VCRT should determine local supplemental lighting requirements.

d. Color perception.

(1) The human visual system is composed of two primary sets of sensors in the retina. They are described as rods and cones. Rods are primarily responsible for vision during dim and dark illumination conditions. Cones are primarily responsible for vision during bright and light illumination conditions and are more sensitive to color stimulation. The color perceived is either the color of a light source when looking at the source itself or the color of light reflected from an object when an object is illuminated. Visual acuity and visual field both vary with the illumination level.

(2) Color rendering (color subtraction) is the color perceived by the eye when light reflects from an object. Good color rendering means the perceived or measured color is similar to that produced when the object is illuminated by sunlight. Poor color rendering means the object color appears distinctly different than if it were illuminated by sunlight. Illumination sources may distort color perception, increase visual fatigue, and reduce productivity. As a general rule, lamps with higher efficiency (lumens per watt) tend to have poorer color-rendering properties (table 6-2).

Table 6-2
Lamp efficiencies, color renditions, and uses

Luminaire type	Lumens / watt	Color rendition	Use
Incandescent	17 - 23	very good	Task and general lighting
Fluorescent	70 - 80	excellent	Task and general lighting
Mercury vapor	44 - 55	good	Warehouse, manufacturing area
Metal halide	80 - 90	good	Warehouse, manufacturing area
High-pressure sodium	115	poor	Parking lot, storage area
Low-pressure sodium	170	very poor	Parking lot, highway

(a) Incandescent light has good color-rendering properties but is less energy efficient than many other sources. These lamps may be used for general or supplemental task lighting.

(b) Fluorescent lights are the most commonly used lights in workplaces and emit a relatively broad spectrum of light, giving them excellent color-rendering properties. They may be used for general or task lighting.

(c) Mercury high intensity discharge vapor and metal halide lamps, often used in gymnasiums and large industrial bays, are very efficient light sources but may cause a mild distortion of color perception. These lamps are good for general illumination but may require supplemental lighting.

(d) High-pressure sodium lamps are used in warehouses and some industrial manufacturing bays. They produce a golden, bright, relatively narrow spectrum light with its maximum intensity centered on 589 nm. These lamps are well suited for general illumination but should not exceed 50 fc. These lamps should not be used in areas where tasks require good color discrimination. Supplemental task lighting is usually required.

(e) Low-pressure sodium lamps, the most efficient lamps currently made in large quantities, are often used to illuminate highways and parking lots. The intense yellow light produced has a very narrow spectrum (consisting of a double wavelength at 589.0 and 589.6 nm) that significantly distorts perception of many colors. The monochromatic

light produced also degrades depth perception which may increase risk of accident or injury. These sodium lamps reduce the visibility of the standard black and yellow safety warning markings and may pose a safety hazard. Low-pressure sodium lamps will not be used in manufacturing operations.

(f) Light emitting diodes are the new technology in illumination. They are very energy efficient and are rapidly entering the field of space illumination. The first mass use of these lamps were in devices such as flashlights but have now made major inroads into automotive and internal structure illumination.

(3) Either inadequate or excessive lighting may contribute to inefficient visual performance and decreased visual comfort. The National Safety Council estimates that insufficient lighting is the sole cause of 5 percent of industrial accidents. No single procedure or formula will solve all lighting problems. Some of the factors that may contribute to visual discomfort are direct glare, reflected glare, and harsh shadows. The VCRT should determine the local supplemental lighting requirements.

(a) *Direct glare.* Direct glare comes from uncontrolled light sources (light sources without reflectors or diffusers) or from light sources that allow the worker to view the light source directly while working. The adverse effects associated with direct glare may be reduced by—

1. Restricting the light sources by using appropriate reflectors, diffusers, blinds, or louvers.
2. Decreasing the brightness of the light sources.
3. Directing the glare source away from the line of sight of the employee.
4. Increasing the brightness of the area surrounding the glare source. A ratio of 3:1 or 1:3 between task and background illumination has been found to be comfortable for most people.

(b) *Reflected glare.* Reflected glare (veiling glare) occurs when there is a reflection from a highly polished surface (such as desk tops, VDT screen, or glossy paper) and may cause significant visual discomfort. Reflected glare may be minimized by—

1. Moving the light source.
2. Changing the angle of the work plane to minimize reflection.
3. Using matte-type surfaces that minimize reflection.
4. Using polarized filters (for example, clip-on over prescription spectacles).

(c) *Harsh shadows.* Intense artificial lighting and direct sunlight produce harsh shadows. Visual discomfort occurs when the task falls in the line of the shadow. The shadows may be minimized or removed by—

1. Adding supplemental lighting on the task.
2. Reducing the intensity of general area lighting.
3. Adding diffusers to the general lighting.
4. Using screens or draperies or tinting windows to block sunlight.

(d) *Physiological or anatomical factors of the employee.* Several physiological and anatomical factors may affect the way illumination and other elements of the environment modify visual performance. As the worker ages, physiological changes occur which affect visual performance. These changes may include smaller pupils, cataracts, decreased accommodation, reduced ability to detect movement in the periphery, more noticeable glare, and reduced contrast sensitivity.

1. Reduce pupil size. Reduced pupil size allows less light to the retina and, therefore, often requires increased illumination.

2. Insufficient accommodation. In the normal eye, there is a focusing mechanism (accommodation) to allow focus change from distant to near objects. This focusing ability is reduced in some individuals making it difficult to see near objects clearly (such as books, documents, correspondence, VDT screens, and fine detail).

3. Cataracts. Some individuals develop cataracts in the lens of the eye by trauma from mechanical or chemical agents, systemic diseases, systemic medications, or aging. This is characterized by the tissue becoming opaque. If the cataract is in the periphery of the lens, increased illumination will reduce the pupil size and help with clarity. If the cataract is in the center of the lens, often reduced illumination in the work area will produce a larger pupil size and allow the worker to see around the cataract.

4. Increased illumination. Increased illumination will assist the aging worker in most of these factors except central cataract. Periodic comprehensive vision examinations usually provide additional information and spectacles (when necessary) that will enhance work performance. These examinations are the responsibility of the employee.

6-4. Special devices and systems

a. *Protective mask.* Use of the protective mask (gas mask) presents some unique visual conditions. Training in the mask is very important. This will ensure that the Soldier/worker will understand and be ready to cope with the change in visual environment produced by wear of the mask and be able to perform critical tasks in that environment. The wearer should understand that—

- (1) The lateral (side) and vertical fields of view are reduced.
- (2) The head must be rotated or tilted more than usual to see in all directions.
- (3) When PMIs are required for clear vision, the visual environment is restricted by the lens diameter.

(4) Bifocal wearers will find the area available for reading to be smaller than with their regular bifocal spectacles.

b. Tinted lenses and sunglasses. Any optical device placed in front of the eyes will have an effect on the image seen by the eye. Even plain clear lenses block 4 to 6 percent of visible light. Any tint will modify the way the environment is seen. Tinted lenses enhance or detract from visual performance depending on the combined optical characteristics of the eye and target. Whenever possible, individuals should train with the optical devices they will use in combat or on the job, or with devices that have very similar tint characteristics. The most commonly used military tints are neutral density gray and laser protective tints/filters (often green or brown).

(1) Neutral density (gray) lenses for MCEP items listed on the APEL provide between 12 and 18 percent light transmission. Aviator lenses (N-15) transmit 15 percent of light. Color rendition remains fairly close to normal perception of the eye but with an overall reduced illumination level.

(2) Laser protective tints/filters are designed to protect users from specific wavelengths. A common color is green which enhances green colors but markedly attenuates red and mildly attenuates yellow, blue, and brown in addition to providing laser protection. Brown laser lenses are also used by the military and attenuate reds and greens.

(3) Amber and yellow tints have gained popularity, but are not authorized for use by military personnel. These lenses work by restricting transmission of specific wavelengths or light. Restricting transmission of specific wavelengths may pose a danger by limiting the ability to detect warning indicators, identifying enemy positions, and reading topographic map features.

c. Authorized Protective Eyewear List. The Army's APEL provides a list of approved commercial eye protection devices for use in combat. These devices may be used as alternatives to the standard Special Protective Eyewear Cylindrical System, ballistic laser protective spectacles and sun, wind, and dust goggles which are being phased out. The APEL includes both spectacle and goggle configurations and are available with both clear and neutral grey lenses. All devices are ANSI Z87.1 compliant, provide ballistic fragmentation protection, protect the eyes from UV radiation, and have been subjected to user testing in a field environment. Both prescription and nonprescription wearers are accommodated. Laser protective lenses for APEL products will be available in the near future.

d. Night vision devices.

(1) NVDs present a unique visual environment to the operator. The current devices produce—

(a) A relatively narrow field of view.

(b) An isochromatic (shades of a single color) green phosphorus picture.

(c) An image with reduced clarity (best corrected VA of 20/25 to 20/40 in most devices). However, devices expected to be deployed to units in the near future will approach 20/20 VA capability through the devices.

(d) Significant reduction in depth perception even with the newest binocular NVD.

(e) Reduced effectiveness with reduced night illumination (such as no moon or artificial lighting, under tree canopies, and overcast skies).

(f) Very limited depth of focus requiring adjustments for clear viewing within 10 feet.

(2) Corrective spectacles/lenses may be used with NVDs to obtain optimum VA. Aviators required to use vision correction during flight duties must wear vision correction with NVDs.

(3) NVD training should be conducted to familiarize the user with the devices uses, capabilities, and limitations.

(4) Ground transportation drivers who use NVDs must—

(a) Demonstrate at least 20/30 best VA at distance without the NVDs.

(b) Exercise speed discipline when using NVDs.

1. Do not exceed 25 miles per hour (mph) under optimum conditions (such as full-moon illumination).

2. Do not exceed 10 mph under limited conditions (such as quarter-moon or less illumination). Speed should be reduced with decreasing illumination and visibility to provide at least 5 seconds of reaction time to obstacles.

(5) Special warning: Aviators have a special set of problems with NVDs. They have a decreased ability to determine distance, elevation, or contour. They are not able to see wires through NVDs.

e. VDTs. Computer screens/monitors are often called VDT screens. The most common display screen types currently in use are the cathode ray tube and liquid crystal display. Anyone using a computer for 20 or more hours of their official work per week is considered a VDT worker. Many studies have concluded that there are no health effects to the eyes or other parts of the body (including the fetus during pregnancy) for VDT users. The main problems encountered with VDTs are related to visual performance and work station ergonomics (design for function and comfort). Conditions such as carpal tunnel syndrome or stress are beyond the purview of this pamphlet. The increased use of liquid crystal display screens will reduce some of the visual symptoms common to workers that use cathode ray tube screens. USACHPPM Technical Guide No. 156 provides additional information.

(1) VDT-related visual discomfort symptoms. VDT workers may experience—

(a) Visual discomfort, including fatigue.

(b) Eyestrain.

(c) Burning sensation of the eyes.

(d) Dry eyes.

(e) Blurring of the monitor screen.

- (f) Intermittent double vision.
 - (g) Distance blurring after using the VDT.
 - (h) Headaches.
 - (i) Neckache.
 - (j) Backache.
- (2) *VDT-related visual discomfort factors.* These symptoms may be partially due to vision conditions such as—
- (a) Uncorrected or improperly corrected refractive errors which may produce blur, headache, or discomfort.
 - (b) Accommodative (focusing) problems or presbyopia.
 - (c) Binocular coordination problems.
 1. Eyes may tend to point outward, away from the expected line of sight, exceeding normal posture (exophoria).
 2. Eyes may tend to point inward, inside the expected line of sight (esophoria).
 3. One eye may point too far above or below the expected line of sight resulting in a vertical imbalance.
- (3) *Solutions to common VDT vision symptoms.* Suggested solutions include the following:
- (a) Ensure work station is ergonomically correct.
 - (b) Perform an alternate work task (for example, filing or making phone calls) for 15 minutes after every 2 hours of VDT use to help relieve many eye discomfort symptoms.
 - (c) Occasionally looking at objects more than 10 feet away from the VDT screen to relax the focusing and converging systems of the eyes.
 - (d) Have a comprehensive vision examination by an eye care professional. The eye care professional should be familiar with the functional needs of VDT users and prescribing glasses to meet those visual needs. The comprehensive vision examination is performed in the MTF for active duty military personnel. Civilian personnel are responsible for obtaining the examination at their own expense. To assist the eye care professional in prescribing the most effective eyewear, the following information should be provided:
 1. The distance from the eyes to center of the VDT screen.
 2. The distance from the eyes to the keyboard.
 3. The distance from eye level to the top of the VDT screen.
 4. The location of the document holder or other document placement and its distance from the eyes.
 5. Special visual demands such as type of work performed, materials used, illumination, monitor size, and print size.
- (4) *Visual ergonomics.* VDT workers may experience vision-related symptoms due to the design of their computer work station. (Also see USACHPPM Technical Guide 156.)
- (a) Improper illumination or glare from surrounding illumination sources.
 - (b) Reflected glare from light striking the VDT screen at such an angle that a reflected image appears on the screen.
 - (c) Background or contrast glare from general illumination that is overly bright.
 - (d) Incorrect distance from the eyes to the VDT screen (16 to 22 inches is normal but may need to be modified for font size, screen size, and binocularity).
 - (e) Improper visual angle in reference to line of sight.
- (5) *Solutions to visual ergonomic problems.*
- (a) Reflected glare may be reduced by—
 1. Moving the location of the VDT work station.
 2. Adjusting the angle of the VDT screen.
 3. Modifying the light source (reduce wattage or place shade to block light on screen) or changing light diffusers to parabolic louvers that utilize parabolic reflectors in a grid to distribute light more evenly on the task area.
 4. Using an antireflection screen over the VDT screen to reduce the effects of reflected glare from overhead lights. Such a screen should only be used after all other potential solutions have been tried. However, this screen has no effect on direct or contrast glare. Antireflective screens also compromise the effective contrast and resolution of the VDT screen, which makes it more difficult to read.
 - (b) Background or contrast glare may be reduced by—
 1. Increasing or decreasing the ambient (overall) lighting to provide a comfortable contrast between the VDT screen and the surrounding area. (A 3:1 ratio or 1:3 ratio of background to screen is comfortable for most people.)
 2. Using curtains, blinds, or parabolic louvers to help control the glare from nearby windows during different times of the day.
- (6) *Contour sharpness.* The sharpness of the images displayed on the monitor depends on the matrix (a pixel size of 0.28 or smaller is recommended). Older low-resolution monitors may need to be replaced.
- (7) *Screen color.* Generally, no particular color or combination of colors on the screen has proven more effective or comfortable than any other for all workers. Individual preferences can make a difference. Dark letters on a light background works better for most users. However, a low density colored background with brighter text letters may be more comfortable for some workers. If the colors are fixed (such as green letters on a black background), try adjusting the brightness or contrast controls for more comfortable images.

(8) *Flicker effect.* The normal eye has the ability to detect flickering of light sources beyond the conscious ability to see the source. This ability is more noticeable to the peripheral retina than in the central part of the retina. The flickering does not physically hurt the eyes but it is distracting for some people. To minimize awareness of this effect, the VDT screen and the document holder should be placed near the center of the field of view. A monitor with a refresh rate of 72 hertz or higher will usually minimize this effect.

(9) *Physical ergonomic requirements.* The effective ergonomic design of VDT work stations for the rest of the body can improve visual comfort and productivity. Work spaces should meet the physical and visual needs of the employee. The ability to easily modify the work station is critical to work station design flexibility. No 2 employees fit a work station exactly alike. Generally, a wholesale solution such as buying a single type of glare screen for everyone is not effective. Evaluate each individual employee who presents symptoms as a separate problem to be solved. Contact a VCRT member for assistance with VDT problems.

(a) Screen height and angle should be adjustable. The top of the monitor should never be above eye level. For most people, the center of the screen should be located 5 to 15 degrees below the straight ahead position. Bifocal wearers may require a lower screen position. Large monitors and flat screens may require special consideration to screen position.

(b) The employee's chair should be comfortable and fully adjustable. The chair should also have adequate lower back and arm support to reduce associated ergonomic problems.

(c) Keyboards and other input devices should be located so that the arms are relaxed and approximately horizontal to the floor.

(d) Document holders should be designed to place the work material next to the screen to avoid postural and visual fatigue, glare, flicker, and the constant need for the eyes to change focus.

Chapter 7

Site Survey

7-1. Introduction

A site survey evaluates and characterizes employees, their tasks, and workplace in relation to their visual system. When applicable, the VCRT may also survey a recreational site (for example, racquetball court). The survey identifies occupational vision, eye safety, and environmental factors that may adversely impact visual and overall efficiency. The survey documents the identified problems to be corrected. The survey includes evaluation of the effectiveness and appropriateness of current protective measures and worksite visual environment characteristics. Where existing protective measures or worksite visual environmental controls are found to be inadequate, outdated, or nonexistent, appropriate measures will be adopted. An inventory of eye hazards, individuals at risk, visual environment characteristics, and protective devices required will be maintained. This inventory will be included in the health hazard inventory (HHI) maintained by IH or in safety inventories.

7-2. Essentials of a vision conservation site survey

a. A site survey should be designed to evaluate both hazardous and nonhazardous locations. Consider the following when evaluating a worksite—

(1) Identify the characteristics of the worksite.

(a) What are the location task characteristics?

(b) What are the occupational factors?

1. Job vision requirements.

2. Special occupational vision requirements.

3. Readiness considerations.

4. Job activities that may be eye hazardous.

(c) What are the eye safety factors?

1. What mechanical, chemical, radiant energy, or biological ocular hazards exist?

2. Have engineering controls been implemented? (for example, what safety interventions are in place that prevent or reduce exposure to eye hazards?)

3. Are administrative controls adequate and appropriate? (that is, are buildings, areas, tasks, and equipment having eye-hazardous characteristics posted with appropriate signs? Are related regulations and SOPs in place?)

4. Is PPE appropriate to the ocular hazard(s) and readily available?

5. Are eyewash stations appropriately located and maintained?

6. Are there any unsafe practices being used by management or employees?

(d) What are the environmental vision factors?

1. Illumination: Is the lighting of the appropriate type? Does it provide a comfortable illumination level? Is supplemental lighting necessary and available?

2. VDT working environment: What illumination factors may affect the VDT employee(s)? What visual ergonomics may affect the VDT employee(s)? What illumination factors or visual ergonomics improvements may be necessary?

3. Special environmental factors (such as UV, IR, microwave, and lasers).

(e) What other factors or issues are involved?

(2) Identify the characteristics of the work.

(a) Have eye-hazardous tasks been identified (mechanical, chemical, biological, or radiant)?

(b) Is PPE required in addition to administrative and engineering controls for eye hazards?

(c) Is the PPE appropriate for the eye hazard(s)?

(3) Identify the characteristics of the employees.

(a) What are the visual demands on the employees?

1. Do the optical devices used by the employees meet the visual demands of the job?

2. Are there any special visual performance problems with an individual employee or group of employees?

(b) What are the personal protective needs of the employees?

1. Are required PPE available to the employees at the worksite?

2. Are the employees using the provided PPE?

3. Are the employees maintaining the PPE in a clean and serviceable condition?

b. Where eye safety equipment is involved—

(1) Who is responsible for acquisition, replacement, training, and maintenance of safety equipment?

(2) What general use safety equipment is available?

(3) Is the safety equipment in serviceable condition?

(4) What PPE is in place?

(5) Is the PPE appropriate for the job(s)/hazards?

(6) Is there appropriate PPE for visitors to the worksite?

(7) Are general safety procedures and PPE being used appropriately?

7-3. Types of surveys

There are four types of site surveys that may be conducted at any installation—

a. *Periodic survey.* This type of survey includes a representative sample of the locations, areas, buildings, or operations identified as eye hazardous. Survey sites will be selected (at least one-third of the installation each year) to ensure all eye-hazardous locations are visited within a 3-year evaluation period. The HHI database and safety inventory should be updated based on the survey results. Where engineering controls are missing or inadequate, a request for resolution will be routed through the safety office for implementation. Note: Often safety and IH have a requirement for annual worksite evaluation. Adhere to the most stringent requirement.

b. *Problem-oriented survey.* This survey responds to a specific vision question or accident/incident. This survey may be requested by the safety office, preventive medicine, supervisors, or employees (typically through their supervisor). Evaluation of the specific operation, task, or incident will be made.

c. *Mission change survey.* The mission of an installation or facility may change. This is especially true in times of mobilization, downsizing, mission realignment, or workforce outsourcing. A mission change survey is conducted when the functions/operations in a specific building or location change. This survey provides a baseline determination of operations/tasks in the locations that are eye hazardous and identifies what protective measures are needed. Several surveys may be required over an extended period of time if major mission changes occur. After the baseline is determined, the areas, buildings, and operations become part of the eye hazard inventory in the periodic survey.

d. *Familiarization survey.* A familiarization survey involves visiting a variety of installation eye-hazardous areas to gain an understanding of the types of missions and hazards that exist on the installation. This also allows personnel to become acquainted with the individual(s) performing this survey. When a VCRO or VCRT member is newly assigned or appointed, he/she should visit a representative sampling of the eye-hazardous areas on the installation within the first 3 months of assignment.

7-4. Survey reporting

Survey reporting is not required at the DA level. Reporting is strongly encouraged locally to measure the program status over time. Reporting requirements may be established locally.

a. *Periodic survey report.* A periodic survey report should be prepared annually as a summary of the areas visited. The areas meeting requirements and standards as well as areas requiring corrective action will be identified. Recommendations should be specific enough to allow corrective action with minimal or no consultation with the surveying officer(s). Copies should be distributed to the Commander, Safety Office, the Chief of Preventive Medicine, VCRT members, and a courtesy copy to the USACHPPM TVCRO. In Europe, a courtesy copy should be sent to the optometrist designated as the Vision Conservation and Readiness Consultant for Europe. Where the corrective actions

can be implemented at the supervisory level, copies of the pertinent portion of the survey may be given to the supervisor. Other copies may be distributed as deemed appropriate.

b. Problem-oriented evaluation report. A report should be prepared to address the problem(s) and make recommendation(s). Copies of this report should be sent to the supervisor of the site involved, Commander, Safety Office, Chief of Preventive Medicine, and VCRT members.

c. Mission change survey report. A mission change survey report should be prepared as a summary of the areas visited. The areas meeting requirements and standards as well as areas requiring corrective action will be identified. Recommendations should be specific enough to allow corrective action with minimal or no consultation with the surveying officer(s). Distribution of copies is the same as the problem-oriented evaluation report in paragraph *b* above.

d. Familiarization survey. No formal report is required. However, the VCRO should keep a record of the sites visited and observations made during the visits.

7-5. Secured area survey

a. Reports and actions accomplished in secured areas will meet security procedures.

b. Certain installations may have areas that require a higher security clearance than normally possessed by the VCRO. If potential eye injury in a restricted area is limited to one or two small operations, the staff of the secured area may be able to sanitize the area which allows the VCRO to view items within his/her security clearance limits. If large secured areas must be visited, it may be necessary for the VCRO to have a security clearance that allows evaluation in these areas.

7-6. Staff assistance visit

When a VCRT cannot solve the problem(s) locally, a staff assistance visit (SAV) may be requested from USACHPPM. In most cases the SAV will be a problem-oriented visit. Requests should be made through the chain of command through the U.S. Army Medical Command (USAMEDCOM) to the USACHPPM TVCRO. The request for an SAV in Europe should be made through the USAMEDCOM Europe Optometry Consultant. The request for an SAV in Asia and the Pacific should be made through the USAMEDCOM Pacific Optometry Consultant.

Appendix A References

Section I

Required Publications

Army regulations and DA pamphlets are available online from the U.S. Army Publishing Directorate Web site: <http://www.apd.army.mil/>. Technical bulletins, medical and USACHPPM technical guides are available online from the USACHPPM Web site: <http://chppm-www.apgea.army.mil/>. DOD manuals, directives, and instructions are available online from the Washington Headquarters Services Web site: <http://www.dtic.mil/whs/directives>. ANSI publications listed in sections I and II below are available at <http://www.ansi.org> or may be obtained from Global Engineering Documents, 15 Inverness Way, Englewood, CO 80112.

AR 40-3

Medical, Dental, and Veterinary Care (Cited in para 3-6b(2).)

AR 40-5

Preventive Medicine (Cited in para 2-1.)

AR 40-63/NAVMEDCOMINST 6810.1/AFR 167-3

Ophthalmic Services (Cited in paras 3-4c(2) , 4-2a(2)(c).)

AR 40-501

Standards of Medical Fitness (Cited in paras 3-3c(3)(a), 3-3e(2)(a), and 3-4c(1)(d).)

AR 385-10

Army Safety Program (Cited in para 3-7.)

AR 385-40

Accident Reporting and Records (Cited in para 1-7.)

DA Pam 40-11

Preventive Medicine (Cited in para 2-1.)

TB MED 524

Control of Hazards to Health from Laser Radiation (Cited in para 5-27d.)

29 CFR 1910

Occupational Safety and Health Standards (Cited in para 2-2a(1).)

American National Standards Institute (ANSI) Z49.1

Safety in Welding, Cutting, and Allied Processes (Cited in para 5-29b.)

ANSI Z87.1

Occupational and Educational Eye and Face Protection (Cited in paras 2-2f(6), 2-2g(5), 2-2h(2)(b), 3-3d(1)(f), 3-5b(4), 5-4b(1), 5-4c, 5-4c(7), 5-4d, 5-4d(2)(a), 5-4d(2)(b), 5-4e, 5-4f, 5-4g, 5-4h, 5-7a, 5-13a, 5-19a(2), 5-19b(2), 5-29b, 5-29b(4)(a), and 6-4.)

ANSI Z136.1

Safe Use of Lasers (Cited in paras 3-3c(5) and 5-29d.)

ANSI Z136.3

Safe Use of Lasers in Health Care Facilities (Cited in paras 3-3c(5) and 5-29d.)

Section II

Related Publications

A related publication is a source of additional information. The user does not have to read it to understand this publication.

AR 11-9

Army Radiation Safety Program

AR 25-30

The Army Publishing Program

AR 25-400-2

The Army Records Information Management System (ARIMS)

AR 40-14

Occupational Ionizing Radiation Personnel Dosimetry

AR 40-400

Patient Administration

AR 385-32

Protective Clothing and Equipment

AR 600-55

The Army Driver and Operator Standardization Program (Selection, Training, Testing, and Licensing)

AR 600-8-101

Personnel Processing (In-, Out-, Soldier Readiness, Mobilization, and Deployment Processing)

AR 612-201

Initial Entry/Prior Service Trainee Support

DA Pam 40-8

Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, and VX

DA Pam 40-18/DLAI 1000.30

Personnel Dosimetry Guidance and Dose Recording Procedures for Personnel Occupationally Exposed to Ionizing Radiation

DA Pam 40-173

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

DA Pam 611-21

Military Occupational Classification and Structure

ALARACT (All Army Activities) Message, RUEWMFU5506

Office of the Chief of Staff of the Army, Director of the Army Staff (DACS-ZD), 09 November 2004, subject: Vision Readiness and Classification System

ANSI Z80.1

Ophthalmics - Prescription Ophthalmic Lenses - Recommendations

ANSI Z80.3

Ophthalmics - Nonprescription Sunglasses and Fashion Eyewear - Requirements

ANSI Z80.5

Ophthalmics - Requirements for Ophthalmic Frames

ANSI Z358.1

Emergency Eyewash and Shower Equipment

ASTM Standard F659

Skier Goggles and Faceshields (ASTM Standards may be obtained from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

ASTM Standard F803

Standard Specification for Eye Protectors for Selected Sports

ASTM Standard F910

Standard Specification for Face Guards for Youth Baseball

ASTM Standard F1776

Standard Specification for Eye Protective Devices for Paintball Sports

Civilian Personnel Regulation

Personnel Relations and Services (General)

Document

Determining Visual Standards for Industrial Jobs by Statistical Methods, Tiffin, Joseph and Wirt, S.E., Transactions of the American Academy of Ophthalmology, 50(72), 1945

Document

Eyes and Industry, Kuhn, Herwig S., 1950

DODI 6055.1

Department of Defense Safety and Occupational Health (SOH) Program

DODI 6055.2

Personal Protective Equipment

Executive Order 12196

Occupational Safety and Health Programs for Federal Employees

Handbook

Illuminating Engineering Society Lighting Handbook, 9th Edition, 2000, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017

Journal Article

Ocular Casualties in the 6 Day War, Treister, G., American Journal of Ophthalmology, 68:669–675, 1969

MIL–HDBK 828A

Laser Range Safety, 15 April 1993

MIL–STD–1472E

Department of Defense Design Criteria Standard, Human Engineering, Table XXI. Specific task illumination requirements. 31 October 1996

PL 79–658

Health Programs for Government Employees, as amended

PL 91–596

Occupational Safety and Health Act of 1970

PL 105–85

Force Health Protection

TB MED 6

Occupational Health and Safety in Dental Clinics

TB MED 502/DLAM 1000.2

Respiratory Protection Program

TB MED 521

Management and Control of Diagnostic X-Ray, Therapeutic X-Ray, and Gamma-Beam Equipment

TB MED 523

Control of Hazards to Health from Microwave and Radio Frequency Radiation and Ultrasound

Textbook

Industrial and Occupational Ophthalmology, Fox, Samuel L., Springfield, IL, 1973. Hofstetter, H. W., Industrial Vision, Chilton Company, Philadelphia, PA, 1956

Textbook

Textbook of Military Medicine, Part III - Disease and the Environment, Volume 2 - Occupational Health: The Soldier and the Industrial Base

USACHPPM Technical Guide 006

Vision and Safety Eyewear Guide for U.S. Army Civilian and Military Job Series

USACHPPM Technical Guide 007

Vision Readiness Screening Guide

USACHPPM Technical Guide No. 156

Questions and Answers: Video Display Terminals

21 CFR 801.410

Use of Impact-Resistant Lenses in Eyeglasses and Sunglasses

29 CFR 1960

Safety and Health Provisions for Federal Employees

41 CFR 101–20.107

Energy Conservation

Section III

Prescribed Forms

DA forms are available on the Army Publishing Directorate Web site, www.apd.army.mil.

DA Form 7655

Armed Forces Eye and Vision Readiness Summary. (Prescribed in para 4–2a(3).)

Section IV

Referenced Forms

DA Form 2028

Appendix B

Vision Conservation and Readiness Program Management Evaluation Guide

The purpose of this guide is to assist the local VCRT to improve its VCRP. This guide is not designed for program inspection. The following factors will help in evaluating the overall local VCRP.

B–1. References available to the VCRT

a. Primary.

- (1) 29 CFR 1910.133, Occupational Safety and Health Standards.
- (2) ANSI Z87.1, Occupational and Educational Eye and Face Protection.
- (3) AR 40–5, Preventive Medicine.
- (4) AR 385–10, Army Safety Program.
- (5) DA Pam 40–506, The Army Vision Conservation and Readiness Program.

b. Support.

- (1) ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes.
- (2) ANSI Z136.1, Safe Use of Lasers.
- (3) ANSI Z136.3, Safe Use of Lasers in Health Care Facilities.
- (4) ANSI Z358.1, Emergency Eyewash and Shower Equipment.

(5) ASTM Standard F803, Standard Specification for Eye Protectors for Selected Sports.

B-2. Applicability

- a. Does the installation have any of the following eye hazards?
 - (1) Mechanical (for example, flying objects).
 - (2) Chemical.
 - (3) Biological.
 - (4) Radiant energy (for example, welding, laser, or microwave).
- b. Does the installation have operations that require eye protection?
- c. Does the installation have sporting activities that require eye protection?
- d. Does the installation have work areas needing special illumination?
- e. Does the installation have individuals that are likely to be deployed on combat or peacekeeping missions?

B-3. Policy/regulation

- a. Does the installation have an up-to-date vision conservation and readiness regulation or policy?
 - (1) Did the installation commander sign the vision conservation and readiness regulation or policy?
 - (2) Does the local regulation or policy include managerial and labor responsibilities?
 - (3) Does the local regulation or policy include the provision of command resources to support the VCRP?
 - (4) Is there a fixed schedule (normally annually) to review the local regulation or policy?
- b. Does the installation have a written SOP describing the operation of the VCRP?
 - (1) Does the local SOP include managerial and labor responsibilities?
 - (2) Does the local SOP require reporting (for example, OSHA 200 log) of all injuries and incidents where PPE prevented eye injuries?
 - (3) Does the local SOP address medical management of eye injuries during duty and non-duty hours?
 - (4) Does the local SOP address risk assessment for eye hazards?
 - (5) Is there a fixed schedule (normally annually) to review the SOP?
- c. Does the installation have a written policy or SOP covering a safety eyewear program?
- d. Does the installation command have a designated (put on orders) VCRO?
- e. Does the installation command have a chartered VCRT?
- f. If there is a VCRT, do team members participate in design and development of protocols to identify potential eye hazards and appropriate countermeasures?
- g. Do VCRT members review and approve program design and/or modifications, SOP development, and contracts pertaining to the program?
- h. If the installation has deployable individuals or units, do the installation and tenant units have a Memorandum of Agreement to meet the readiness requirements?
 - i. Is there an established program that recognizes workers when use of safety eyewear has prevented eye injury?
 - j. Is there an established program that recognizes units, supervisors, and individuals that maintain good eye safety compliance?
 - k. Is there an established SOP to provide visitors with safety eyewear in eye-hazardous areas?
- l. Does the command encourage periodic (for example, annual, biennial, or triennial) review and propose necessary update of the VCRP by external elements?
- m. Does the CPAC have a standard policy to include compliance to eye safety as part of the job description?
- n. Does the purchasing and contracting office have a standard policy to include compliance to eye safety as part of the contract requirement?

B-4. Vision Conservation and Readiness Program (at installation level) staffing

- a. Who is responsible for managing the VCRP?
- b. What program or office does the VCRO work for (optometry, ophthalmology, safety, IH, OH, or preventive medicine)?
- c. What is the professional training of the VCRO?
- d. Who are the other members of the VCRT?
 - (1) Optometrist/ophthalmologist.
 - (2) OH physician.
 - (3) OH nurse.
 - (4) OH technician.
 - (5) Safety officer.
 - (6) Safety specialist.
 - (7) Industrial hygienist.

- (8) Industrial hygienist technician.
- (9) Others.
- e. How many hours are dedicated monthly to support the VCRP?
- f. Is the VCRT sufficiently staffed to allow an effective program to function? If not, what affects such staffing?

B-5. Vision Conservation and Readiness Team (at installation level) resource management: funding, equipment, supplies, and services

- a. Does the command provide adequate funding to allow the VCRT to operate an effective program? Sources of funding: _____
- b. Is there an effective system to provide optical services?
- c. What is the annual cost of the VCRP?
 - (1) Equipment.
 - (2) Supplies.
 - (3) Nonprescription safety eyewear.
 - (4) Prescription safety eyewear.
- (a) Who pays for the comprehensive vision examination for individuals requiring prescription safety eyewear (individual, installation, unit, or contract)?
- (b) Who is the supplier of prescription safety eyewear?
- (c) Who pays for the safety eyewear (individual, installation, unit, contract, co-payment, or other)?
- (d) What is the reimbursement process for prescription safety eyewear?

B-6. Eye hazard recognition/assessment

- a. Who performs the worksite evaluation to identify eye hazards?
 - (1) Safety.
 - (2) Industrial hygiene.
 - (3) Occupational health.
 - (4) Optometry.
 - (5) Other.
- b. Worksite eye injury review.
 - (1) Is there a current list of employees/jobs that require eye protection?
 - (2) Are installation eye injury statistics maintained?
 - (3) Are previous worksite eye injuries reviewed prior to a worksite visit?
- c. Are new or modified processes reviewed for eye hazards before being implemented?

B-7. Workplace ocular safety and visual environment evaluation

- a. Is there an overall ocular safety and visual environment management plan implemented?
- b. Does the VCRT review the overall ocular safety and visual environment management plan periodically (for example, annually) for effectiveness?
- c. Are eye hazards entered into the Health Hazard Inventory Module (HHIM) of the Defense Occupational Health Readiness System (DOHRS)?
- d. Are engineering controls used to eliminate eye hazards and eye-hazardous operations where possible?
 - (1) Is there a maintenance plan for engineering controls?
 - (2) Are engineering controls monitored for effectiveness in controlling or reducing workplace eye hazards?
- e. Are administrative controls used to eliminate eye hazards and eye-hazardous operations where engineering controls are not possible?
 - (1) Are administrative control procedures in place?
 - (2) Do employees observe the administrative control procedures?
 - (3) Are administrative control procedures monitored for effectiveness in controlling or reducing workplace eye hazards?
- f. Have treatment protocols been established for eye injuries?
- g. Did a VCRT member conduct studies and document illumination problems where applicable?

B-8. Incident investigation and reporting

- a. How many eye injuries have occurred on the installation within the last year and what is the rate per 1000?
- b. Are incidents involving eye injuries and near-misses investigated promptly?
- c. Has the eye injury rate increased in specific locations or on the overall installation?
- d. Where eye injury rates have decreased, have the techniques used been evaluated for applicability to other areas or operations?

e. Is there a mechanism in place for reviewing and developing a plan(s) of action to resolve eye hazard protection deficiencies?

B-9. Communication

a. Does the VCRT meet periodically to consult with team members on matters concerning vision conservation and readiness?

b. Does the VCRT consult with any professionals who may not have representation on the team (see list in paragraph B-4d) on matters concerning vision conservation and readiness?

c. Does the VCRT consult with worksite supervisors and/or employees on matters concerning vision conservation and readiness to include identifying potential eye hazards?

d. Does the VCRT keep up with the external regulations and policies that may impact its mission?

e. Does the VCRT provide a channel of communication or access to department heads, managers, and supervisors to discuss potential eye safety issues and workplace program support?

B-10. Training and leadership development

a. *VCRP leadership.*

(1) Has the VCRO attended the Vision Conservation and Readiness Advance Course?

(2) Do VCRT members have the training to recognize, assess, evaluate, and recommend controls relating to eye hazards?

(3) Is the technical expertise of the VCRT adequate for input on designs, SOPs, and contracts?

b. *Workforce.*

(1) Are workers trained in the proper wear and maintenance of safety eyewear/devices upon issue and annually thereafter?

(2) Is the workforce trained in the proper use of the eyewash stations?

(3) Is the workforce trained in first responder treatment and/or management protocols for eye injuries?

(4) Is the workforce trained in preventive measures to reduce the incidence of eye injury?

(5) Is the workforce training documented in accordance with recordkeeping requirements to include reporting injuries and near injuries?

(6) Is the workforce aware of safety practice recognition programs such as the Wise Owl Club?

c. *Supervisors.*

(1) Are supervisors trained on their responsibilities related to vision conservation and readiness?

(2) Do supervisors provide and/or oversee training of the workforce in VCRP principles?

(3) Is the VCRP training documented?

(4) Are supervisors trained in reporting procedures for eye injuries?

(5) Do supervisors ensure the workforce knows to report eye injuries and near-miss instances?

Appendix C

Sample Standing Operating Procedure/Instruction

C-1. General

Each installation/Division/unit is responsible for publishing a standing operating procedure (SOP) which delineates the scope of the VCRP and identifies responsibilities.

C-2. Sample design

Figure C-1 presents a sample SOP designed to give a format and examples of common responsibilities. Each installation will need to modify this sample to meet the local needs and staffing of the installation.

STANDING OPERATING
PROCEDURE NO. _____
PREPARING OFFICE/AGENCY LOCATION

Occupational and Environmental Health

VISION CONSERVATION AND READINESS PROGRAM
(Effective Date)

1. PURPOSE. To establish a comprehensive VCRP that is applicable to all employees of the installation to assure they have the visual ability required to perform their mission safely and efficiently.
2. REFERENCES.
 - a. AR 40-400, Patient Administration.
 - b. AR 40-5, Preventive Medicine.
 - c. AR 40-501, Standards of Medical Fitness.
 - d. AR 385-10, Army Safety Program.
 - e. DA Pam 40-506, The Army Vision Conservation and Readiness Program.
 - f. PL 105-85, Force Health Protection.
 - g. USACHPPM TG 006, Vision and Safety Eyewear Guide for U.S. Army Civilian and Military Job Series.
 - h. USACHPPM TG 007, Vision Readiness Screening Guide.
3. OBJECTIVE. To assure periodic vision screening of all personnel to determine their visual skills, and refer for corrections if needed.
4. APPLICABILITY. This SOP includes all segments of _____ (installation).
5. RESPONSIBILITIES.
 - a. *Commander.*
 - (1) Establishes and implements safety and health procedures as mandated by DODI 6055.1, Executive Order 12196, 29 CFR 1960, 29 CFR 1910, and PL 105-85.
 - (2) Establishes a VCRT per DA Pam 40-506. The team leader should be a VCRO.
 - (3) Promotes awareness of vision conservation on the installation by use of command emphasis letters, media presentations, and other information mechanisms.
 - (4) Provides resources (budget, staffing, and space) for the VCRP and support equipment as specified in AR 385-10.
 - (5) Ensures vision readiness of all active duty and deployable DA civilian personnel.
 - (6) Ensures that all military and DA civilian personnel receive vision screening appropriate for their job requirements and exposure to potential eye hazards. Also ensures individuals identified as requiring comprehensive vision examinations are appropriately referred.

Figure C-1. Sample of a Vision Conservation and Readiness Program (at installation level) Standing Operating Procedure

(7) Ensures that all personnel follow proper work practices, use protective equipment, and receive proper instruction and training in the use, care, and maintenance of PPE.

b. Civilian Personnel Advisory Center

(1) Provides the VCRT with a job-title list of civilian employees on the installation (updated at least annually). This list will be used by the VCRT to identify employees who require vision screening and eye protection.

(2) Identifies DA civilian employees who may be deployable to a peacekeeping or hostile action zone and provides this information to the VCRT.

(3) Verifies employee job descriptions include the requirement to properly wear and maintain PPE when hazardous work conditions exist. If this factor is not in the current job description, ensures inclusion in a revision of the job description.

(4) Uses the job-vision standards in DA Pam 40-506 to determine eligibility and effective placement of employees.

(5) Assists supervisors with reclassification or disciplinary actions, as necessary.

c. Local military personnel office. Provides unit alpha rosters to the VCRT for the military personnel assigned to activities and units on the installation. The roster shall include the MOS in which the Soldiers are working. The deployment status will be included when available. The list should be updated at least annually or more frequently where units have a high rate of personnel change or high rate of deployment.

d. Vision Conservation and Readiness Team.

(1) Performs surveys to identify eye-hazardous occupations and processes. This includes worksite environmental hazards that may produce mechanical, chemical, radiation, or biological eye injuries. The main responsibility for maintaining hazard inventories rests with IH and safety.

(2) Maintains a complete and current inventory of all work areas, eye hazards associated with the work areas, and vision performance requirements (vision standards) at the installation/location using a job-title list. The civilian job-title list is maintained and provided by CPAC. The military job-title list is obtained from the military personnel office.

(3) Monitors injuries and recommends corrective action for identified hazards to safety and local command offices.

(4) Coordinates the vision screening of all employees and ensures that the results are recorded in the official health record. Ensures military and civilian personnel not demonstrating the required visual performance are referred for a comprehensive vision examination.

(5) Ensures verification of prescription industrial safety eyewear and proper fitting of all industrial safety eyewear.

(6) Ensures vision test and prescription information is kept in employee medical records. Maintains current eyewear prescription of deployable DA civilian employees.

(7) Maintains a database of the total number of employees screened, the screening results, the number of personnel employed in eye-hazardous areas, the number of eye injuries, and the number of industrial safety spectacles issued as part of the VCRP.

Figure C-1. Sample of a Vision Conservation and Readiness Program (at installation level) Standing Operating Procedure - continued

(8) Provides technical input and assistance to the employee health hazard education program.

(9) Reports VCRP status to command.

(10) Consults with USACHPPM TVCRP for assistance and updated information.

(11) Provides eye injury data to USACHPPM at their request.

e. Safety officer.

(1) Works in coordination/consultation with the VCRT to establish and update annually a local job-title list of all military and civilian jobs on the installation.

(2) Conducts surveys, in coordination/consultation with the VCRT, to identify eye-hazardous jobs, processes, and areas. This information shall be incorporated into the CPAC job-title list, the military job-title list, and the inventory of eye hazards maintained by IH. Validates the need for and identifies employees who require protective eyewear.

(3) Assists the OH office, VCRO, and supervisory personnel in determining the appropriate type of protective eyewear required.

(4) Monitors the industrial safety spectacle procurement program. Ensures safety spectacles are ordered and delivered in a timely manner, and meet national standards (ANSI Z87.1) strength and marking requirements.

(5) Monitors use of eye protection and safe practices by military, civilian and contract employees in work areas and, when necessary, recommends program improvements.

(6) Coordinates with commanders, CPAC, and CORs as appropriate to resolve eye safety violations.

(7) Provides education to employees and supervisors on eye safety techniques and devices.

(8) Motivates supervisors to ensure employees wear protective eyewear.

(9) Monitors eye injury trends to guide intervention measures.

(10) Implements controls (such as administrative and engineering) appropriate to the hazards in the workplace.

(11) Provides a means of rewarding and/or recognizing individuals whose eye(s) are protected from injury by wearing PPE in an accident. This may be accomplished via a locally developed recognition program or adopting an established program.

f. Logistics officer.

(1) Consults with technical specialists in safety, OH and vision care when formulating, modifying, and terminating any ophthalmic services contracts.

(2) Ensures timely procurement (15 working days) and delivery of safety-related ophthalmic services and materials.

(3) Modifies or terminates VCRP-related ophthalmic contracts and related procurement documents if the vendor does not meet the contract requirements.

(4) Ensures labor contracts include the requirement to use PPE and sound safety practice as performance requirements for contracted workers.

(5) Ensures the COR is familiar with eye safety compliance required of the contract workers.

Figure C-1. Sample of a Vision Conservation and Readiness Program (at installation level) Standing Operating Procedure - continued

(6) Ensures a stock of nonprescription protective eyewear (meeting the current ANSI Z87.1 standard) is available for distribution. This stock will include several sizes to accommodate variations in facial structure.

(7) Monitors the distribution of APEL-approved eyewear from the central issue facilities and other designated issue facilities.

g. Supervisors.

(1) Ensure all job descriptions include the requirement to use safe practices and appropriate safety equipment.

(2) Use the job-vision standards in DA Pam 40-506 as an aid to employee/job selection. Schedule military and civilian employees for periodic vision screenings in coordination with the VCRP.

(3) Remove an employee from the eye-hazardous work/area if his/her vision does not meet required vision standards until the employee's vision can be brought up to the standards or a waiver is granted.

(4) Ensure employees placed in eye-hazardous jobs have proper eye protection.

(5) Obtain and keep a stock of nonprescription protective eyewear for use by employees whom do not require prescription eyewear and visitors. This eyewear must meet the current ANSI Z87.1 standard.

(6) Ensure prescription safety eyewear is provided in a timely manner. Appropriate safety goggles worn over civilian glasses may be used temporarily or the worker can be temporarily placed in a non-eye-hazardous work area while prescription safety eyewear is being procured.

(7) Ensure that active duty and deployable civilians have the required number and type of eyewear needed for deployment.

(8) Ensure that eyewash stations are accessible and functioning properly.

(9) Ensure all personnel receive instruction and training in safety practices and in the use and care of the protective eyewear.

(10) Ensure personnel demonstrate knowledge in safety practices and in the use and care of the protective eyewear.

(11) Enforce the proper wear of safety eye protection and practice of safety discipline. Use current Civilian Personnel Regulations or Uniformed Code of Military Justice as enforcement tools when needed.

(12) Ensure that all employees participate in the aspects of the VCRP appropriate to their job.

(13) Direct all personnel having difficulties or complaints from use of industrial safety eyewear to the VCRT for evaluation and/or resolution of the problem.

(14) Document and report all safety violations and noncompliances with PPE wear requirements to the safety officer or COR as appropriate.

(15) Reassign or terminate an employee when the employee will not wear required PPE.

Figure C-1. Sample of a Vision Conservation and Readiness Program (at installation level) Standing Operating Procedure - continued

h. Employees (military, civilian, and contract).

(1) Participate in the VCRP as it is outlined in this SOP.

(2) Properly use safe practices, safety equipment, PPE, engineering controls, and administrative controls as mandated by 29 CFR 1910.133 and local directives. Safe practices include—

(a) Understanding how to perform their work in a safe manner.

(b) Knowing the difference between combat eyewear (ballistic-protective), industrial safety eyewear (ANSI Z87.1) and standard eyewear (ANSI Z80.1).

(c) Ensuring provided protective equipment is readily accessible for use with hazardous instruments, machines, processes, or areas.

(d) Keeping protective eyewear clean, properly fitted, and in serviceable condition.

(e) Using appropriate industrial safety eyewear and protective equipment in eye-hazardous areas and tasks.

(3) Undergo training in the principles and practices of first responder if working in an eye-hazardous area.

(4) Report unsafe practices or eye hazards to the supervisor and/or safety specialist for timely protective intervention.

(5) Advise supervisor of need for safety eyewear or need for modification of processes or procedures.

(6) Report eye injuries or near misses to supervisors.

i. Performance improvement. All levels of command should maintain an ongoing performance improvement program. As a minimum, the program should include:

(1) Evaluating user/participant input and implementing input determined to have merit.

(2) Reporting of eye injuries.

(3) Developing intervention plans based on injury trend analysis.

(4) Implementing intervention strategies.

(5) Monitoring the effectiveness of intervention strategies.

(6) Ensuring appropriate and timely pre-employment, periodic, and termination physicals are performed.

(7) Ensuring timely vision care services as applicable.

(8) Ensuring effective training is provided in the use and maintenance of protective devices and safety practices.

(9) Verifying the accuracy of prescription safety eyewear and optical inserts.

(10) Ensuring timely acquisition and delivery of safety eyewear to the worker.

(11) Monitoring safety eyewear use and compliance.

(12) Ensuring continued communication is kept with USACHPPM-HQ to ensure most up-to-date information and access to Army-wide eye safety hazards or trends.

Figure C-1. Sample of a Vision Conservation and Readiness Program (at installation level) Standing Operating Procedure - continued

6. CONCURRENCE.

(Local Medical Authority)

(Comptroller)

(C. Civ Personnel)

(Post Safety Officer)

7. APPROVAL: (If applicable) or (Command Line - if applicable)

Figure C-1. Sample of a Vision Conservation and Readiness Program (at installation level) Standing Operating Procedure - continued

Appendix D
Sample Local Regulation

D-1. General

Each installation/Division/unit is responsible for publishing a local regulation which delineates the scope of the VCRP and identifies responsibilities.

D-2. Sample design

Figure D-1 presents a sample local regulation designed to give a format and examples of common responsibilities. Each installation will need to modify this sample to meet the local needs and staffing of the installation.

COMMAND
PREPARING OFFICE/AGENCY
LOCATION

Issue of further supplements to this regulation by subordinate commanders is prohibited unless specifically approved by HQ, _____ (installation).

1. **PURPOSE.** This regulation establishes and defines a comprehensive VCRP for _____ (installation).
2. **SCOPE.** This regulation applies to all personnel on this installation.
3. **BACKGROUND.** The ability to use one's vision effectively and with safety depends upon an efficient vision program that includes—
 - a. Determining visual acuity necessary for a particular occupation, and using this determination for job placement and retention.
 - b. Determining periodically employees' visual capacity and making referrals for professional eye care of those employees with defective vision.
 - c. Ensuring that adequate lighting is available for each occupational activity.
 - d. Ensuring the availability and use of both environmental and personal protective measures necessary for maximal eye safety.
 - e. Continuing health education program pointing out the benefits of the VCRP and stimulating cooperation of all concerned.
 - f. Ensuring eye injuries and incidents are reported and evaluated to develop interventions against future injuries.
4. **GENERAL.**
 - a. Commanders at every echelon shall ensure that each physical operation is analyzed to determine eye hazards. Standing operating procedures will reflect a requirement for the use of protective clothing and equipment including safety eyewear (prescription and nonprescription) to prevent injury. Continuous monitoring will be conducted to maintain maximum safety standards.
 - b. Items of protective clothing and equipment required to comply with safety regulations and procedures shall be furnished to military and civilian personnel. The cost of required personal protective equipment shall be borne by the installation or activity to which these personnel are assigned. If upgrades to basic safety eyewear are allowed, additional costs will be borne by the employee.
 - c. A desire to obtain and use eye protection and industrial safety eyewear shall be stimulated among personnel by an educational program to include informal discussion, educational films,

Figure D-1. Sample of a Vision Conservation and Readiness Program (at installation level) local regulation

and the use of posters. Safety awards may be used to increase motivation. Employees habitually or purposefully not using safety eyewear and safety precautions in eye-hazardous areas shall be subject to disciplinary action.

d. Contact lenses do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear. Contact lens wear under military protective masks is not allowed since the lenses cannot be removed when prolonged wear of the mask is necessary.

e. All personnel having useful vision in only one eye shall be identified and encouraged to wear industrial safety eyewear regardless of job assignment. However, it should be pointed out that all lenses are potentially breakable and unusual risk should not be taken.

5. RESPONSIBILITIES.

a. The installation commander is responsible for the establishment and implementation of OH activities at _____ and other activities for which the Commander has OH activity responsibilities.

b. The MTF commander, U.S. Army Medical Center/U.S. Army Medical Department Activity (USAMEDCEN/USAMEDDAC), is charged with the overall supervision of OH activities at _____ and other activities for which the MTF commander, USAMEDCEN/USAMEDDAC, has OH activity responsibility.

c. The VCRT shall—

(1) Classify all work activities under one of the vision standards developed for this purpose (see DA Pam 40-506). These standards represent the degree of visual skill desired for efficient job performance.

(2) Coordinate with the installation safety office in determining occupations requiring industrial safety spectacles.

(3) Ensure vision screening of new employees before job placement or as soon after employment as possible. Screen the vision of all personnel, as required. Periodic screening shall be scheduled each month alphabetically; however, screening should be available at the request of an individual.

(4) Determine whether personnel screened meet the visual standards for their particular job.

(5) Ensure vision readiness screening for active duty military is conducted at SRP and/or the PHA.

(6) Ensure that military personnel not possessing desired visual capabilities are referred to the appropriate MTF clinic for professional eye care.

(7) Refer eligible civilian employees not possessing desired visual capabilities for comprehensive vision examinations.

(8) Ensure complete prescription information is entered into employee medical record and new eyewear is ordered as appropriate.

(9) Provide follow-up screening for referred employees as needed.

(10) Conduct lighting surveys as required.

(11) In conjunction with the Installation Safety Director, conduct surveys to ensure installation and use of proper eye safety equipment (for example, eyewash stations and safety eyewear).

Figure D-1. Sample of a Vision Conservation and Readiness Program (at installation level) local regulation- continued

(12) Provide education to military and civilian employees, and where appropriate dependents, on various vision safety topics.

d. The Chief, Optometry Service shall—

(1) Provide guidance to the VCRT on questions related to optics, safety eyewear, illumination, and vision subjects related to safety in the workplace.

(2) Ensure professional vision care is provided to active duty personnel.

(3) Assist units with their vision readiness screening programs. This may include—

(a) Having optometry clinic staff perform actual screening.

(b) Training medical technicians that support individual units in proper vision screening techniques.

(4) Assist other members of the VCRT in performing illumination and safety characterization of the workplace.

(5) Assist the contracting office in determining the optical requirements, quality assurance requirements, and product delivery times to be specified in contracts for prescription safety eyewear.

(6) Ensure 24-hour access to emergent care for individuals having eye injuries.

e. The Chief, Preventive Medicine/OH shall ensure—

(1) Vision screening is provided to installation civilian employees for the purpose of job placement and other surveillance or job-related needs as determined by regulations governing hazard exposure or as determined by the VCRT.

(2) Periodic vision screening, when required, is performed on military and civilian employees on the installation.

(3) An OHN or technician is involved with characterization of the worksite and periodic evaluation of worksite vision safety conditions.

(4) Coordination with other members of the VCRT on vision safety and visual efficiency matters.

f. The OHN shall—

(1) Have/be a representative on the VCRT.

(2) Perform all types of OH vision screenings as required.

(3) Be involved with characterization of the worksites and periodic evaluation of worksite vision safety conditions.

(4) Coordinate with other members of the VCRT on vision safety and visual efficiency matters.

g. The industrial hygienist shall—

(1) Have/be a representative on the VCRT.

(2) Perform all types of OH vision screenings as required.

(3) Maintain and routinely update an inventory of eye-hazardous jobs and areas, in coordination with the safety office.

(4) Keep the VCRT updated on the vision hazards that are on the installation and field sites.

(5) Perform or assist in the performing of illumination measurements.

h. The safety office shall—

(1) Assign a member of its staff to the VCRT where possible.

Figure D-1. Sample of a Vision Conservation and Readiness Program (at installation level) local regulation- continued

(2) Provide guidance to the VCRT on vision safety matters if a member of the safety staff is not on the VCRT.

(3) Coordinate with the VCRT, the procurement system and respective supervisors to ensure the proper type, quality, and quantity of safety eyewear are provided to employees in a timely manner.

(4) Monitor compliance with wear of vision safety equipment and use of safe practices. Provide posters and signs, make applicable recommendations, and use rewards when possible or disciplinary measures when necessary to promote safe work practices.

(5) Assist the VCRT in characterization surveys of the workplace and field sites in relation to vision hazards and vision demands in the work environment.

(6) Collect and report all eye injuries to the VCRT.

i. The Chief, Civilian Personnel, shall—

(1) Refer new employees for vision screening prior to job placement.

(2) Coordinate scheduling of required periodic vision screenings with preventive medicine/OH.

(3) Ensure that eye safety compliance is included in job descriptions of new employees and in the revised job descriptions of incumbents.

(4) Coordinate with supervisors to enforce eye safety disciplinary actions.

j. Division/Branch Chiefs and other supervisors shall—

(1) Coordinate scheduling of required periodic vision screenings with preventive medicine/OH.

(2) Submit prescription safety eyewear orders within 1 day of obtaining all necessary prescription information, and coordinate with the VCRT and the procurement system to ensure the proper type and quality of safety eyewear are provided to employees in a timely manner.

(3) Enforce the wearing of safety eye protection and the use of proper safety procedures.

(4) Brief new personnel on safety devices for eye protection, to include how to use them, care for them, clean them, and their importance in maintaining good vision.

(5) Ensure that individuals are not allowed in an eye-hazardous area or job without proper eye protection. When workers do not have serviceable safety eyewear, provide temporary safety eye protection, and if necessary, temporarily place the worker in non-eye-hazardous work.

(6) Acquire, post, and maintain signs and posters stressing eye safety.

(7) Direct personnel having difficulties or complaints with their safety eyewear or vision to the VCRT for assistance and/or vision screening. Safety eyewear that needs adjusting should be brought by the wearer to the installation eye clinic for proper fitting or repair.

(8) Document and communicate with the COR about any unsafe practice or noncompliance of eye safety of the contract workforce.

k. Logistics/Procurement System shall—

(1) Maintain a supply of plano (nonprescription) safety eyewear in adequate sizes at the installation for immediate issue to personnel who require safety eyewear but do not require prescription eyewear.

(2) Develop and maintain a method for the procurement of prescription safety eyewear that is user friendly and results in rapid receipt of the safety eyewear. Prescription safety eyewear

Figure D-1. Sample of a Vision Conservation and Readiness Program (at installation level) local regulation- continued

will be obtained and issued to the distribution point within 15 working days of receiving the procurement order. Orders for prescription safety eyewear will not be held and batched, but will be processed daily on a priority basis so as to expedite the process.

(3) Maintain a log or database of all orders for prescription safety eyewear that includes patient identification, unit or activity information, date procurement order received, date completed safety eyewear received from vendor, and date issued to distribution point.

(4) Monitor the procurement time for prescription safety eyewear and take necessary action, to include changing vendor(s), to maintain at least a 90 percent compliance rate with the 15 working day delivery time.

6. REFERENCES.

- a. AR 40-5, Preventive Medicine.
- b. AR 385-32, Protective Clothing and Equipment.
- c. DA Pam 40-506, The Army Vision Conservation and Readiness Program.

The proponent of this local regulation is:

Users are invited to send comments and suggested improvements on
DA Form 2028 (Recommended Changes to Publications and Blank
Forms) to Commander, (____major command____), ATTN:
_____, location_____.

FOR THE COMMANDER:

DISTRIBUTION:

Figure D-1. Sample of a Vision Conservation and Readiness Program (at installation level) local regulation- continued

Appendix E Light Amplification by Stimulated Emission of Radiation

E-1. Laser

a. Laser is an acronym for Light Amplification by Stimulated Emission of Radiation. A laser is a device that produces a beam of radiant energy that is monochromatic (of a single wavelength) and coherent (all of the electromagnetic wave is spatially in phase).

b. Depending on the design of the laser, radiation may occur in many different parts of the electromagnetic spectrum. Some lasers are tunable, meaning the same device may produce several different wavelengths of emitted light.

E-2. Classification of lasers

Lasers are divided into classifications based on wavelength, output power, pulsed or continuous output, and exposure duration. The technical definitions are beyond the scope of this document but may be found in ANSI Z136.1 and ANSI Z136.3. For the purposes of this document, the classes of lasers are described from the standpoint of potential injury to the eye. Class 1 lasers are not required to have a warning label attached. All other lasers including class 1M require a label indicating that the device presents a hazard to the eye. Class 2 and above must include the power, wavelength, and class of the laser. All fielded laser rangefinders and designators are class 3b or class 4. None of the current devices are hazardous to the skin and do not pose a combustible hazard. All lasers, regardless of classification or risk, are

potentially capable of causing eye injuries if used improperly. Most laser pointers used by lecturers are class 2 and class 3R laser devices; however, some class 3B laser pointers are now available.

a. Class 1 lasers have recently (ANSI Z136.1–2007) been divided into two subclasses.

(1) Class 1 lasers are considered eye-safe under the viewing conditions for which the laser was intended because the output beam is considered to be incapable of causing radiation damage. Class 1 lasers are exempt from control measures or forms of medical surveillance.

(2) Class 1M lasers may present a hazard if the beam is viewed through magnifying optics such as binoculars. Class 1M devices are exempt from control measures or medical surveillance but must have a label designating the class and warning the user not to view through optical instruments.

b. Class 2 lasers are low-power devices (< 1.0 milliwatt (mW)) that emit only visible radiation (400–700 nm) and are divided into two subclasses. Since the duration of the normal blink reflex is 0.25 seconds and 1 mW is not injurious at that duration, the blink reflex is considered to be adequate protection for class 2 but not class 2M lasers.

(1) Class 2 lasers are considered to be eye-safe unless a person makes a deliberate attempt to look into the beam for a period longer than 0.25 seconds.

(2) Class 2M lasers are similar to class 2 lasers, except the beam is not intended to be viewed through optical devices. Viewing class 2M lasers through optical devices may produce injury to the eye.

c. Class 3 lasers are medium-power devices and are subdivided into two subclasses. Class 3 lasers usually do not present a combustion (fire) hazard.

(1) Class 3R lasers have a low probability of being hazardous to vision when viewed directly but may be hazardous when collected and directed into the eye with a magnifying device such as binoculars.

(2) Class 3B lasers produce sufficient power to produce eye injuries when viewed directly or by specular reflection (reflected off a relatively smooth object).

d. Class 4 lasers are high-power devices. They are hazardous to the eyes when there is direct or specular reflection exposure. Some very high-power class 4 lasers can be hazardous even when the beam is reflected from diffuse surfaces. Some class 4 lasers can present a combustion hazard if used improperly.

E–3. Classification of laser workers

a. Laser workers are those individuals who routinely work in a laser environment having class 3B and 4 lasers and therefore have a higher risk of accidental overexposure. Laser workers include those who regularly perform laser RDTE, individuals who work with or near medical lasers found in operating rooms, and workers who perform routine laser maintenance. **Laser workers have a moderate to high risk potential for laser injury.**

b. Incidental laser workers are those individuals whose work makes it possible, but unlikely, that they will be exposed to laser energy that is sufficient to damage the eye. Incidental workers include operators of fielded laser equipment, individuals who oversee laser use on approved laser ranges, and Soldiers who participate in force-on-force laser-training exercises. **Incidental laser workers are considered to have low risk potential for laser injury.**

c. Laser workers and incidental laser workers can be considered equivalent to laser personnel and incidental personnel as defined in ANSI Z136.1 and laser personnel and incidental health care personnel as defined in ANSI Z136.3.

E–4. Protective measures required

a. Laser workers are required to wear wavelength-specific laser protective goggles whenever a class 3b or class 4 laser is in use. In addition, the OD of the filtering lenses must be capable of reducing the power of the incident laser beam to a level safe to view. Refer to MIL–HDBK 828A to find the wavelength and OD requirements for laser eye protection when using military laser equipment. In addition to PPE, laser work areas should be set up in accordance with procedures outlined in ANSI Z136.1 unless the laser safety officer (LSO) establishes other criterion based on the specific laser and laser operation.

b. Incidental laser workers do not require laser protective goggles unless the LSO, the installation safety officer, or the installation VCRO deem it necessary.

c. Filters and some materials used in laser protective equipment tend to darken and crack with time (long-term storage). They may also provide less protection after repeated exposure to laser emission. The LSO or a designated representative should inspect the equipment periodically for integrity of the protective devices and lenses as well as the ability to filter the laser radiation (ANSI Z136.1).

E–5. Laser medical surveillance/assessment

Medical assessments will be performed for individuals that work with lasers per ANSI Z136.1 and ANSI Z136.3.

a. *Laser workers (laser personnel)*. If the worker's distance VA is 20/20 in each eye, color vision test is normal, central visual fields are normal via Amsler grid test or similar macular integrity test, and medical history is normal for the eyes, no further examination is required. Any deviation from the acceptable normals will be evaluated to determine the reason. This may be done by ocular funduscopic examination or other tests as deemed appropriate by the eye care professional.

b. Incidental laser personnel (incidental health care personnel). Visual acuity testing will be conducted during the pre-employment physical.

c. Suspected or confirmed laser accident or incident. Documentation of the injury will include a history of the event and a thorough vision and ocular examination. The examination is required to include ocular history, distance VA, Amsler grid (or similar central visual field) test, slit lamp examination, ocular fundus evaluation through dilated pupil, ocular fundus photographs which depict the extent of injury or lack of injury, and photographs of any external or anterior segment injury. If ophthalmic photographic capabilities are not available, then a detailed representation of the finding may be hand-drawn or the patient will be referred to the nearest MTF (or authorized local civilian provider) that has such capabilities.

E-6. Emergency care for laser injury

Exposure to laser radiation may occur in almost any portion of the electromagnetic spectrum. Suspected or actual acute exposure to lasers will follow the procedure below.

a. Any Soldier or DOD employee who is known or suspected of having been overexposed to laser radiation, must be examined by an optometrist or ophthalmologist at the nearest MTF within 24 hours of being injured (immediate examination). If a military eye care professional or MTF is not reasonably available then a civilian source may be used. See paragraph E-5c above for required examination items.

b. Individuals with confirmed exposure will be examined by a retinal specialist.

E-7. Reporting

a. Once the optometrist or ophthalmologist suspects or confirms an acute laser overexposure incident, he/she will notify the—

- (1) Division/installation LSO.
- (2) Division/installation radiation protection officer (RPO).
- (3) Tri-Service Laser Incident Hotline (DSN 240-4784, commercial 210-536-4784 or toll free 1-800-473-3549) (e-mail: laser.safety@hedo.brooks.af.mil).
- (4) USACHPPM Laser/Optical Radiation Program (DSN 584-3932/2331, commercial 410-436-3932/2331 or toll free 1-800-222-9698) (e-mail: laserincident@amedd.army.mil).
- (5) USACHPPM TVCRP Manager (DSN 584-2714 or commercial 410-436-2714) (e-mail: laserincident@amedd.army.mil). After normal duty hours, contact the USACHPPM personnel via the staff duty officer (DSN 584-4375, commercial 410-436-4375 or toll free 1-800-222-9698).

b. Information to be reported—

- (1) Patient name, rank, and patient identification number.
- (2) Unit name.
- (3) Hospital providing care and registration number.
- (4) Exposure date and source.
- (5) Duty being performed at the time of the incident.
- (6) Summary of symptoms and evaluation.
- (7) Any follow-up information.

c. The installation RPO, with the help of the safety office, will secure the laser in question. (**Do not send the laser equipment to maintenance for repairs.**) The USACHPPM Laser/Optical Radiation Program will initiate a technical evaluation of the incident and of the laser equipment involved and will render a technical report as soon as possible after the incident. The U.S. Army Medical Research Detachment of the Walter Reed Army Institute of Research (USAMRD-WRAIR) Ocular Hazards Division, in cooperation with the USACHPPM TVCRP, will coordinate the initial and follow-up care of the patient and will render a report on the patient's status and prognosis. The USAMRD-WRAIR Ocular Hazards Division maintains a Laser Accident and Incident Registry and will forward copies of the reports to the USACHPPM TVCRP Manager.

Appendix F Listing of Selected Areas and Potential Eye-Hazardous Substances

F-1. Workplace and chemical hazards

Chemical agents in the workplace can be harmful to ocular tissue.

F-2. Potential sources

Table F-1 is a selected list of areas and chemicals found in the workplace that are potentially harmful to the eyes.

**Table F-1
Selected areas and potential eye-hazardous substances**

Shop/Area	Substance	Form	Action/Effect
Roads and grounds	Acridine	V	Conjunctivitis Corneal damage
	Calcium cyanamide	D	Eye irritant
	Calcium oxide	D	Eye irritant
	Carbon disulfide	V/L	Eye irritant Optic nerve damage
	Cobalt & compounds	D	Corneal irritant
	Cresol	V/L	Eye irritant
	Ethylene dibromide	V/L	Eye irritant
	Ethylene dichloride	V/L	Eye irritant
	Fluorine & compounds	G/F/M/V	Eye irritant
	Furfural	V/L	Eye irritant
	Selenium & compounds	D/V/L	Eye irritant Conjunctivitis Palpebral edema
Metal	Ammonia	D/V/L	Blepharospasms Corneal ulcers Blindness
	Fluorine & compounds	G/F/M/L	Eye irritant
	Phosphorus & compounds	D	Eye irritant
	Sulfur dioxide	V	Eye irritant
	Trichloroethylene	V/L	Eye irritant
	Zinc & compounds	F/D/L	Eye irritant
Entomology	Ammonia	G	Blepharospasms Palpebral edema Corneal ulcers Blindness
	Cresol	V/L	Eye irritant
	Ethylene dibromide	V/L	Eye irritant
	Ethylene dichloride	V/L	Eye irritant
	Ethylene oxide	L/G	Eye irritant
	Fluorine & compounds	G/F/M/V	Eye irritant
	Methylene chloride	L/V	Eye irritant
	Mercury	V	Loss of vision
	Naphtha	L/V	Eye irritant
	Phosphorus & compounds	D	Eye irritant
	Toluene	V	Eye irritant

**Table F-1
Selected areas and potential eye-hazardous substances—Continued**

Shop/Area	Substance	Form	Action/Effect
	Xylene	V	Eye irritant
	Zinc & compounds	F/D/V	Eye irritant
Refrigeration	Ammonia	G	Blepharospasms Palpebral edema Corneal ulcers Blindness
	Bromine & compounds	V/G	Eye irritant
	Ethyl chloride	L/G	Eye irritant
	Methylene chloride	L/V	Eye irritant
	Sulfur dioxide	V	Eye irritant
Paint	Acetone	L/V	Eye irritant
	Ammonia	G	Blepharospasms Palpebral edema Corneal ulcers Blindness
	Arsenic	D/F	Conjunctivitis
	Benzene	L/V	Eye irritant
	Carbon disulfide	L/V	Eye irritant Optic nerve damage
	Diacetone alcohol	V	Eye irritant
	Methyl alcohol	L/V	Eye irritant Central field loss Blurred vision Blindness
	Mercury	V	Loss of vision
	Naphtha	L/V	Eye irritant
	Toluene	V	Eye irritant
	Trichloroethylene	L/V	Eye irritant
	Turpentine	L/V	Eye irritant
	Xylene	V	Eye irritant
	Zinc & compounds	F/D/V	Eye irritant
Hospital	Acetone	L/V	Eye irritant
	Benzene	L/V	Eye irritant
	Dioxane	L/V	Eye irritant
	Ethyl alcohol	V	Eye irritant
	Formaldehyde	G	Eye irritant
	Hydrogen peroxide	L/M	Eye irritant
	Toluene	V	Eye irritant
	Xylene	V	Eye irritant
Printing plant	Acetone	L/V	Eye irritant
	Benzene	L/V	Eye irritant
	Methyl alcohol	L/V	Eye irritant Central field loss Blurred vision Blindness
	Trichloroethylene	L/V	Eye irritant
	Zinc & compounds	V/F/D	Eye irritant

**Table F-1
Selected areas and potential eye-hazardous substances—Continued**

Shop/Area	Substance	Form	Action/Effect
Sewage Treatment	Chloride of lime	D	Conjunctivitis Blepharitis Corneal ulcer
	Chlorine	L/G	Eye irritant
	Hydrogen sulfide	G	Eye irritant
Water Plant	Chloride of lime	D	Conjunctivitis Blepharitis Corneal ulcer
	Chlorine	L/G	Eye irritant
	Fluorine & compounds	G/F/V/M	Eye irritant
	Hydrazine	L/V	Eye irritant Chemical burning
	Ozone	G	Eye irritant
	Phosphorus & compounds	D	Eye irritant
Petroleum, oils, and lubricants	Dimethylhydrazine	L/V	Eye irritant
	Ethylene dibromide	L/V	Eye irritant
	Ethylene dichloride	L/V	Eye irritant
	Fluorine & compounds	G/F/V/M	Eye irritant
	Gasoline	L/V	Eye irritant
	Hydrogen peroxide	M/G	Eye irritant
	Kerosene	L/V	Eye irritant
	Methyl alcohol	L/V	Eye irritant Central field loss Blurred vision Blindness
	Xylene	V	Eye irritant
Battery	Hydrogen chloride	G/M	Eye irritant
	Sulfuric acid	L/V	Eye irritant Progressive damage

Legend for Table F-1:
V=vapor; D=dust; L=liquid; G=gases; F=fume; M=mist

Appendix G Summary of Requirements for Eyewash Stations Detailed in ANSI Z358.1–2004

G–1. Source of requirements

Requirements for eyewash stations are detailed in ANSI Z358.1 (2004), Emergency Eyewash and Shower Equipment. If eyewash stations are being used on the installation, a copy of the ANSI Z358.1 should be available for occupational, safety, and health personnel.

G–2. Specifications for standards and equipment

Table G–1 summarizes emergency eyewash and shower standards and equipment. In addition to the detailed testing and evaluation procedures specified in ANSI Z358.1, other major requirements for eyewash stations are:

- a. Water used in units must be potable and flow to both eyes simultaneously.
- b. The water temperature must be tepid (defined by ANSI as between 60 degrees and 100 degrees Fahrenheit).
- c. The nozzles must be protected from airborne contaminants.
- d. Plumbed units must be attached to a line providing 30 psi water pressure at a temperature appropriate to the hazard and environment.
- e. Units must require no more than 10 seconds walk to reach and must be immediately adjacent to the hazard in the case of strong acids or caustics.
- f. The valve must be able to be activated within 1 second and remain on without further use of the hands.
- g. The unit will be well marked, easily accessible, pose no hazard to the user, and be at a specified height and distance from obstructions.

Table G–1
American National Standards Institute requirements for eyewash stations

Device	Flow Rate	Duration	Testing	Inspection
Eye/face units	3.0 gpm	15 min	Weekly	Annually
Eye/plumbed	0.4 gpm	15 min	Weekly	Annually
Eyewash, self-contained	0.4 gpm	15 min	Per maker	Annually
Personal eyewash ¹	No rate requirement	None specified	None	Per maker
Drench hose ¹	0.4 gpm	15 min	Weekly	Annually

Legend for Table G-1:
gpm=gallon per minute
min=minutes

Notes:

¹ These supplemental devices do not replace eye/face or eyewash units.

Appendix H Welding

H–1. Primary types of welding

a. *Oxy-Acetylene Welding/Cutting*. A mixture of acetylene and oxygen gases used primarily for cutting metal but may also be used for welding of limited-stress joints on a variety of metals.

b. *Arc Welding (Shield Metal Arc Welding)*. An electrical arc is produced that deposits metal from an appropriate rod to the metals to be joined. The intensity of illumination and heat produced by the arc varies with the rod material, the materials being joined, and the amperage applied to the rod.

c. *Gas Metal Arc Welding*. Also known as metal inert gas (MIG) welding - combines a wire electrode feeding through a hand piece that also directs an inert gas on the weld line. This minimizes corrosion at the weld.

d. *Gas Tungsten Arc Welding*. Also known as tungsten inert gas (TIG) or Heli-arc welding - uses a process similar to MIG welding but is much cleaner in both the work environment and weld.

e. *Other*. There are other specialty welding types that are beyond the scope of this document. The protective eyewear for these operations will be determined by compliance to manufacturer guidelines.

H-2. Protective equipment for the eyes

a. Goggles. Goggles are primarily worn for gas welding, brazing, and cutting.

b. Helmet. A helmet is primarily worn for arc welding since the helmet provides both radiation protection for the eyes and mechanical protection for the face. A helmet also provides secondary mechanical protection for the eyes, but industrial safety eyewear is still required to be worn under the helmet. For occasional welding, a fixed tint, simple helmet is adequate and relatively inexpensive. For frequent use, helmets equipped with a photosensing lens that darkens the lens when the arc is struck is recommended. These helmets are a bit more expensive than standard welding helmets but are more efficient for many operations. Select helmets based on use patterns versus cost.

H-3. Suggested tints for various welding operations

Darker tints are used for heavier (thicker) work (ANSI Z87.1). More definitive information on welding operations and protection may be found in ANSI Z49.1.

a. Oxy-Acetylene.

(1) Brazing-Shades 3 to 4.

(2) Cutting-Shades 3 to 6.

(3) Welding-Shades 4 to 8.

b. Arc, Rod, MIG and TIG. Shades 10 to 14.

Glossary

Section I Abbreviations

AHLTA

Armed Forces Health Longitudinal Technology Application

AIDS

Acquired Immune Deficiency Syndrome

ALARACT

all Army activities

ANSI

American National Standards Institute

APEL

Authorized Protective Eyewear List

AR

Army regulation

ARIMS

Army Records Information Management System

ARNG

Army National Guard

CFR

Code of Federal Regulations

COR

contracting officer's representative

CPAC

Civilian Personnel Advisory Center

DA

Department of the Army

DA Pam

Department of the Army pamphlet

DOD

Department of Defense

DODI

Department of Defense instruction

DOHRS

Defense Occupational Health Readiness System

DSN

defense switched network

DVS

Defense Vision Services

EIRS

Eye Injury Reporting System

fc

foot-candle

FDA

Food and Drug Administration

FHP

Force Health Protection

FPI

Functional Process Improvement

gpm

gallons per minute

HHI

health hazard inventory

HHIM

Health Hazard Inventory Module

HIV

Human Immunodeficiency Virus

HQ

headquarters

HQDA

Headquarters, Department of the Army

IH

industrial hygiene (hygienist)

IM/IT

Information Management/Information Technology

IR

infrared

LASER

light amplification by stimulated emission of radiation

LMA

local medical authority

LSO

laser safety officer

MCEP

Military Combat Eye Protection

MEDPROS

Medical Protection System

MHS

Military Health System

MIG

metal inert gas

mm

millimeter

MOS

military occupational specialty

mph

miles per hour

MRCL

mission-required contact lenses

MRSP

Military Readiness Strategic Plan

MTF

military treatment facility

mW

milliwatt

nm

nanometer (10⁻⁹ meters)

NVD

night vision device

OD

optical density

ODS

Operation Desert Shield; Operation Desert Storm

OH

occupational health

OHN

occupational health nurse

OIC

officer-in-charge

OPM

Office of Personnel Management

OSHA

Occupational Safety and Health Administration; Occupational Safety and Health Act

OVP

Occupational Vision Program

PEL

permissible exposure limits

PEO-Soldier

Program Executive Office-Soldier

PHA

periodic health assessment

PL

public law

PMI

protective mask insert

PPE

personal protective equipment

PPP

Power Projection Platforms

psi

pounds per square inch

PSP

power support platforms

RDTE

research, development, testing, and evaluation

RFR

radiofrequency radiation

RPO

radiation protection officer

SAV

staff assistance visit

SOH

safety and occupational health

SOP

standing operating procedure

SP

strategic plan

SRP

Soldier Readiness Program/Processing

TB MED

Technical Bulletin-Medical

TIG

tungsten inert gas

TVCRO

Tri-Service Vision Conservation and Readiness Office

TVCRP

Tri-Service Vision Conservation and Readiness Program

TVCRS

Tri-Service Vision Conservation and Readiness Staff

USACHPPM

U.S. Army Center for Health Promotion and Preventive Medicine

USACHPPM–EUR

U.S. Army Center for Health Promotion and Preventive Medicine-Europe

USACHPPM–Main

U.S. Army Center for Health Promotion and Preventive Medicine

USAMEDCEN

U.S. Army Medical Center

USAMEDCOM

U.S. Army Medical Command

USAMEDDAC

U.S. Medical Department Activity

USAMRD

U.S. Army Medical Research Detachment

USAR

United States Army Reserve

UV

ultraviolet

VA

visual acuity

VCRC

Vision Conservation and Readiness Course

VCRO

vision conservation and readiness officer (at installation level)

VCRP

Vision Conservation and Readiness Program (at installation level)

VCRT

Vision Conservation and Readiness Team (at installation level)

VDT

video display terminal

VRSC

Vision Readiness Screening and Classification

W

watt

WRAIR

Walter Reed Army Institute of Research

Section II**Terms****Accommodation**

The ability of the eye to clearly focus on objects at various distances by changing power. The power change is due to changes in muscular tension that reshapes the crystalline lens inside the eye.

Ambient

As applied to lighting, the general illumination in an area.

Amblyopia

A reduced visual acuity that is not correctable by refractive means and is not attributable to obvious pathology. Amblyopia generally occurs in only one eye but has been known to occur bilaterally. It often occurs in conjunction with strabismus. This term is synonymous with “lazy eye.”

Blepharospasm

Involuntary contraction of muscles of the eyelid that control blinking.

Cataract

Partial or complete loss of transparency of the crystalline lens (and/or its capsule) of the eye.

Characterize

The process of evaluating the nature of the worker (to include warfighters), workplace (to include field environment), and work activities (to include military operations) in relation to safety and environmental factors that may or may not adversely affect worker safety and/or efficiency.

Comprehensive Vision Examination

Evaluation of the visual system, which permits diagnosis and treatment of vision disorders, ocular pathology, and related systemic conditions. A refraction is one part of a comprehensive vision examination.

Contract Vision Care

When an optometrist or ophthalmologist provides comprehensive vision care services through a contract-for-services arrangement. The vision care may be for comprehensive vision examinations and/or treatment of ocular injury. These providers are not active duty or civilian employees of the Federal Government. They do not have the decision authority on any provisions of the VCRP.

Contrast

The manifestation or perception of a difference between two objects or between an object and its background.

Convergence

The turning inward of the eyes to view an object nearer than 20 feet.

Diopter

A unit of measurement of lens power. It is equal to the reciprocal of the focal length of the optical device or system measured in meters. Also see prism diopter.

Employee

Any person employed or otherwise permitted or required to work by an Army command including civilian, contract, and military personnel.

Ergonomics

Evaluation and design of workplaces, environments, jobs, tasks, equipment, and processes in relationship to human form capabilities and interactions in the workplace.

Eye care professional

An optometrist or ophthalmologist.

Foot-candle

The illumination on a surface 1 square foot in area in which there is a uniformly distributed flux of 1 lumen.

Glare

Relatively harsh bright light within the field of vision that interferes with vision and causes discomfort, annoyance, or eye fatigue.

Health Care Provider

An individual credentialed through the MTF to provide definitive patient care with minimal or no direct supervision. The individual is independently licensed by a State licensing authority.

Illuminance

The density of luminous flux impinging upon a surface (that is, the amount of light falling upon a surface).

Illumination

The process by which light is made to be incident on a surface. Units of illumination are foot-candle and lux.

Impact-resistant lenses

Impact-resistant lenses are:

a. Industrial safety-spectacle lenses meeting the impact standards of the Z87.1 Standard of the American National Standards Institute (ANSI).

b. Dress safety-spectacle lenses meeting the impact standards of the ANSI Z80.1. Formerly, dress safety spectacles met the construction standards of the Food and Drug Administration (FDA), 21 CFR 801.410, Use of Impact-Resistant Lenses in Eyeglasses and Sunglasses.

Industrial safety spectacles

Spectacles meeting the ANSI Z87.1 construction standards for frames and lenses and adopted by the Occupational Safety and Health Administration (OSHA), 29 CFR 1910.133.

Ionizing radiation

Radiation that produces ions in compounds and elements, especially when radioactive emissions result.

Light

Visually evaluated radiant energy. That portion of the electromagnetic spectrum capable of giving rise to the sensation of vision.

Local Medical Authority (LMA)

The officer with the ultimate responsibility for health care on an installation. In most instances, the LMA will be the MTF Commander at fixed installations and the division surgeon in field units.

Local National

Citizen of a host country hired by the U.S. Government.

Lumen

The unit of luminous flux (emitted light).

Luminaires

Light fixtures and other devices providing illumination to an area.

Luminance

The flow of light from an emitting, transilluminated, or reflecting surface (that is, the amount of light given off by a surface).

Luminous flux

The time rate of flow of light, usually designated in lumens.

Lux

The metric equivalent of foot-candles, equal to 1 lumen per square meter.

Military Treatment Facility (MTF)

Any medical care facility operated by the military medical system from major medical centers to aid stations.

Nonionizing radiation

Radiation that does not produce ionization of compounds or elements (see ionizing radiation).

Ocular and/or visual condition

Any condition that prevents visual function within the normally expected capabilities for the work in which the employee is engaged. The condition may be refractive, muscle coordination/control, or pathologic in nature.

Optical density (OD)

A logarithmic expression for the attenuation produced by a medium, such as an eye protection filter.

Periodic

Recurring at intervals such as once a year, once every 2 years, once every 3 years, and so forth.

Plano or nonprescription eyewear

Eyewear that contains plano or nonprescription lenses.

Plano or nonprescription lenses

Ophthalmic lenses that contain zero or no dioptric power.

Prescription eyewear

Eyewear that contains prescription lenses.

Prescription lenses

Ophthalmic lenses that contain dioptric power other than zero. Such lenses are used to place the visual image on the retina of the eye to improve vision.

Prism diopter

The unit used to measure the deviation of the eye from the standard position of rest at a given distance. Each unit is the amount of power causing an image to be displaced one centimeter at one meter distance.

Professional ocular services

Services requiring unique knowledge/expertise normally found among opticians, ocular technicians, ophthalmic technicians, optometry technicians, optometrists, or ophthalmologists.

Readiness

As related to vision, the employee has the visual performance, ocular health, and optical devices necessary to perform his/her mission in a safe and effective manner in garrison and deployed settings.

Refraction

The process of determining the refractive state (eyewear prescription) of the eye. A refraction is one part of a comprehensive vision examination.

Screening

A limited evaluation or limited examination. Also see vision screening.

Strabismus

The ocular condition where coordinated, binocular viewing of images does not occur even in the presence of strong fusional stimulus. Strabismus is usually accompanied by amblyopia.

Visibility

The state or degree of being visible. Many factors influence the state of visibility, but the following six are the most important:

- a. *Size.* Angular size or visual angle subtended at the eye by an object.
- b. *Brightness.* The quality and amount of light reflected, transmitted, or emitted from a surface.
- c. *Contrast.* The ability to differentiate between an object and its surround in visual space.
- d. *Time.* The time required for perception of details in visual work.
- e. *Color.* Visibility based on color of light reflected from an object.
- f. *Movement.* The speed at which an object moves relative to the eye.

Vision

The ability of the eye to focus light rays on the receptors within the eye, the ability of the visual nerve pathway to transmit impulses to the area of the brain that processes visual stimuli, and the ability of the brain to integrate and interpret those impulses.

Vision conservation and readiness officer (VCRO)

An optometrist, ophthalmologist, or other physician who has demonstrated expertise in vision and ocular care, who has completed the Vision Conservation and Readiness Course (or is scheduled to attend the next offering), and has been appointed as the installation VCRO by appropriate authority. The individual serves as a local authority and point of contact for visual safety/performance matters.

Vision Conservation and Readiness Program (VCRP)

The organized program designed to prevent eye injuries, to promote visual efficiency, and monitor vision readiness in

DOD employees. Implementation is at the DOD, Service, major Army command, installation, and/or subordinate site level.

Vision Conservation and Readiness Team (VCRT)

The Vision Conservation and Readiness Team normally includes the VCRO, safety officer, OHN, IH, and other individuals as deemed necessary on a given facility.

Vision examination

This term is synonymous with eye exam. See Comprehensive vision examination.

Vision screening

A limited evaluation to determine current vision readiness status and need for professional ocular services.

Visual acuity

Acuteness or clearness of vision (especially of form vision) that is dependent on the sharpness of the retinal focus, the sensitivity of the nerve elements, and the interpretative faculty of the brain. Clinically, it is usually measured with a Snellen chart in terms of the Snellen fraction (for example, 20/20 and 20/40).

Section III

Special Abbreviations and Terms

This section contains no entries.

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