



DoD 6055.5-M

**OCCUPATIONAL
MEDICAL
SURVEILLANCE
MANUAL**

MAY 1998

**OFFICE OF THE UNDER SECRETARY OF DEFENSE
FOR ACQUISITION AND TECHNOLOGY**



OFFICE OF THE UNDER SECRETARY OF DEFENSE

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FOREWORD

This Manual is reissued under the authority of Department of Defense Instruction 6055.5 (reference (a)).

DoD 6055.5-M "Occupational Health Surveillance Manual," July 1982, is hereby canceled.

This Manual applies to the Office of the Secretary of Defense; the Military Departments, including the National Guard Bureau; the Chairman of the Joints Chiefs of Staff; the Combatant Commands; and the Defense Agencies (hereafter referred to collectively as "the DoD Components"). Its provisions encompass job-related medical monitoring of DoD military and civilian workers. This Manual does not apply to employees of contractors. However, it could be used as a model during contract negotiations.

The purpose of this Manual is to provide minimum standards for medical surveillance programs and to help occupational health professionals and others recognize and evaluate health risks associated with specific workplace exposures. Chapter 1 describes the general requirements for medical surveillance, types of examinations, and record keeping. Chapter 2 describes Occupational Safety and Health Administration (OSHA) related medical surveillance. Chapter 3 includes additional medical surveillance protocols endorsed by the Department of Defense where OSHA does not provide guidance. Medical surveillance protocols in Chapters 2 and 3 are grouped by chemical, physical, or biological stressors or by occupational groups.

This Manual is effective immediately. The heads of the DoD Components may issue supplementary guidance when necessary. This version of the Manual has been prepared by the DoD Occupational Health and Medical Surveillance Coordinating Committee of the DoD Safety and Occupational Health (SOH) Committee. This coordinating committee shall:

1. Periodically review this Manual and expeditiously recommend to the Assistant Deputy Under Secretary of Defense (Safety and Occupational Health Policy) changes, additions, or deletions as necessary to ensure compliance with current scientific knowledge, professional practice, and OSHA standards.
2. When necessary, propose alternate or supplementary standards, as defined by Title 29, Code of Federal Regulations, Part 1960 (reference (b)), and DoD Instruction 6055.1 (reference (c)), for medical surveillance.
3. Serve as a technical advisor to the SOH Committee.

Send recommended changes to the Manual to:

Assistant Deputy Under Secretary of Defense
(Safety and Occupational Health Policy)
3400 Defense Pentagon, Room 3E792
Washington, DC 20301-3400

The DoD Components may obtain copies of this Publication through their own Publications channels. Approved for public release; distribution unlimited. Authorized registered users may obtain copies of this Publication from the Defense Technical Information Center, 8725 John J. Kingman Road, Ft Belvoir, VA 22060-6218. Other Federal Agencies and the public may obtain copies from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Electronic versions will also be posted to the World Wide Web home page for the Assistant Deputy Under Secretary of Defense for Safety and Occupational Health Policy (ADUSD(ES/S&OHP)) at <http://www.acq.osd.mil/ens/sh>.

Sherri W. Goodman
Deputy Under Secretary of Defense
(Environmental Security)

Environmental Security **Defending Our Future**

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DL1.1. DEFINITIONS

DL1.1.1. Action Level. That level of worker exposure, determined by workplace sampling, at or above which occupational medical surveillance examinations will be performed. With substances with a Permissible Exposure Limit (PEL - see definition below), the action limit is defined and may be one-half of the PEL. For other exposures, not regulated by OSHA, other consensus standards may be used for an action level. One such consensus standard is use of one-half of the Threshold Limit Value (TLV - see definition below) as an action level.

DL1.1.2. Emergency Exposure. Emergency means any occurrence, such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment, that may or does result in an unexpected release of and exposure to a hazardous substance or condition.

DL1.1.3. Occupational Medical Examination. Medical examinations performed to prevent work-related health problems by assessing the health status of individuals in relation to their work and making medical recommendations regarding worker placement, accommodation, and exposure controls. An occupational medical examination may include:

DL1.1.3.1. Occupational Medical History. Information regarding an individual's medical background including work history, specific occupational exposures, work practices, and work-related health problems. The occupational medical history augments the basic medical history in assisting the practitioner in determining if the worker has (or is at risk of developing) work-caused or aggravated health problems.

DL1.1.3.2. Physical Examination. The process of inspection, palpation, percussion, and auscultation of the body to detect pathologic conditions.

DL1.1.3.3. Clinical Laboratory Tests. Clinical tests and measurements used to characterize the status of specific organ systems and physiologic functions.

DL1.1.3.4. Biologic Monitoring. Analysis of a body component (blood, urine, expired breath, hair, etc.) to detect the presence of or the effect of an agent in the body and assess potential for health harm.

DL1.1.4. Permissible Exposure Limit (PEL). The employee's permitted exposure to any material listed in Table Z-1, Z-2, or Z-3 of OSHA regulation 29 CFR 1910.1000.

DL1.1.5. Regulated Area. An area where entry and exit is restricted or controlled because of potential exposures to hazards. These areas are identified by installation industrial hygiene or safety personnel.

DL1.1.6. Significant Threshold Shift (STS). A STS is present when there is a change in hearing threshold relative to the current reference audiogram of an average of + 10 dB or more at 2000, 3000, and 4000 Hz in either ear and/or any change of + 15 dB at 1000, 2000, 3000, or 4000 Hz in either ear.

DL1.1.7. Standard Threshold Shift. An OSHA term for hearing loss.

DL1.1.8. Threshold Limit Value (TLV). Airborne concentrations of substances that represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. TLVs are recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH) (reference (e)).

DL1.1.9. Time-Weighted Average (TWA). Concentrations of stressors or hazards which have been weighted for the time duration of the sample. Most commonly expressed as an average concentration for a normal 8-hour workday or 40-hour work week.

DL1.1.10. Worker. Any DoD employee, military or civilian.

DL1.1.11. Workplace. A physical location where the Agency's work or operations are performed. Workplaces may be administrative, operational, or industrial, and may be staffed by civilian or military personnel.

C1. CHAPTER 1
GENERAL INFORMATION

C1.1. INTRODUCTION

C1.1.1. Purpose

C1.1.1.1. This Manual provides health professionals with information and references appropriate for developing occupational examination protocols for workers throughout the Department of Defense. Many occupational health problems can be prevented or their effects minimized if identified early. However, occupational medical examinations are preventive only if the workers at risk are properly identified and appropriately evaluated, and the results are used to modify exposure through work practices, process changes, engineering controls, administrative controls, personal protective equipment, or worker placement.

C1.1.1.2. The information in this Manual should be used to develop examination protocols for workers at risk of developing specific occupational health problems based on known work-related health risks. Developing and administering occupational medical examinations based on this Manual will satisfy the basic medical surveillance requirements prescribed in DoD Instruction 6055.5 (reference (a)) by identifying the known health risks associated with specific jobs, processes, and exposures.

C1.1.1.3. Occupational medicine specialists are available for consultation at the following centers of occupational health:

C1.1.1.3.1. U.S. Army -- Commander, U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD 21010-5422. (Telephone: (410) 671-4375; DSN 584-4375; Homepage: <https://www.denix.osd.mil/denix/Public/Redirect/redirect.cgi?url=http://chppm-www.apgea.army.mil/>)

C1.1.1.3.2. U.S. Navy -- Commanding Officer, Navy Environmental Health Center, 2510 Walmer Avenue, Norfolk, VA 23513-2617. (Telephone: (757) 363-5500; DSN 864-5500; Homepage: <https://www.denix.osd.mil/denix/Public/Redirect/redirect.cgi?url=http://www-nehc.med.navy.mil/>).

C1.1.1.3.3. U.S. Air Force -- U.S. Air Force Detachment One Human Systems Command/Occupational Medicine Division, Brooks Air Force Base, TX 78235. (Telephone: (210) 536-6048/5115; DSN 240-6048/5115; Homepage: <https://www.denix.osd.mil/denix/Public/Redirect/redirect.cgi?url=http://www.brooks.af.mil/AFRL/>)

C1.1.1.4. Should potentially hazardous agents not covered in this Manual be identified, promptly notify your respective center of occupational health to initiate appropriate hazard evaluation.

C1.1.1.5. Requirements for military deployment-related medical screening and surveillance for Military Services may include elements not included in this Manual. Additional information on joint medical surveillance for deployment may be found in references (f) and (g).

C1.1.2. Scope. This Manual is intended to assist medical practitioners in developing, performing, and interpreting the results of occupational medical examinations. The requirements in this Manual apply to all DoD Components.

C1.2. REQUIREMENTS

C1.2.1. Workplace Exposures. Industrial hygiene surveys of workplaces must identify all potential exposures and other worker safety and health risks, and establish complete workplace exposure profiles. Documentation of these activities is required. See DoD Instruction 6055.5 (reference (a)) for additional guidance on industrial hygiene surveillance.

C1.2.2. Work-Related Health Risks. The health of hazard-exposed workers must be monitored to determine if work-related health problems are occurring. Through this portion of the DoD occupational safety and health program, the Department of Defense meets legal and regulatory requirements to assess the effects of work-related health risks on the workers' health status. Chapter 2 of this Manual summarizes existing mandatory occupational medical examination requirements of the OSHA standard for air contaminants, 29 CFR 1910.1000 (reference (d)). Chapter 3 includes other medical examination protocols, while not required by statute, have been endorsed by the Department of Defense.

C1.3. OCCUPATIONAL EVALUATION TYPES

C1.3.1. Preplacement or Baseline. These examinations are performed before placement in a specific job to assess (from a medical standpoint) if the worker will be able to perform the job capably and safely, to determine if the worker meets any established physical standards, and to obtain baseline measurements for future comparison. Ideally, these medical examinations should be done before commencement of work. However, if the individual already has started work, these examinations will be completed within 30 days of assignment when required by DoD Instruction 6055.5 (reference (a)), and within 60 days in other cases.

C1.3.2. Periodic. These examinations are conducted at scheduled intervals. Periodic examinations may include an interval history, physical examination, and/or clinical and biological screening tests. The scope of these examinations is determined locally after consideration of the information contained in this Manual, professional practice standards, regulatory guidance, and any other relevant factors.

C1.3.3. Termination. There are two kinds of termination examinations.

C1.3.3.1. Termination-of-Employment. These examinations are designed to assess pertinent aspects of the worker's health when the employee leaves employment. Documentation of examination results may be beneficial in assessing the relationship of any future medical problems to an exposure in the workplace. This is particularly applicable to those conditions that are chronic or that may have long latency periods. Some Federal regulations require termination of employment examinations (e.g., asbestos, 29 CFR 1910.1001, (reference (h))).

C1.3.3.2. Termination of Exposure. These examinations are performed when exposure to a specific hazard has ceased. Exposure to specific hazards may cease when a worker is reassigned, a process is changed, or the worker leaves employment. Termination of exposure examinations are most beneficial when the health effect being screened for is likely to be present at the time exposure ceases. Some Federal regulations require termination of exposure examinations (29 CFR 1910.120, reference (i)).

C1.4. OCCUPATIONAL MEDICAL EXAMINATIONS

C1.4.1. Background Information. The primary reasons for conducting occupational medical examinations are listed in the following sections. When performing an examination (or constructing an examination protocol), the practitioner must understand the reasons for obtaining each historical item, performing each physical

examination procedure, and ordering each laboratory test. This understanding is essential for the practitioner to know how to properly perform the examination, investigate abnormalities, and formulate appropriate medical recommendations.

C1.4.2. Fitness and Risk Determination. Fitness and risk determination examinations address the following questions:

C1.4.2.1. Is a specific individual, from a medical standpoint, capable of performing a specific job (set of tasks with or without necessary but reasonable accommodation)?

C1.4.2.2. Will performing the job place the individual at risk of significant health harm?

C1.4.2.3. Will allowing the individual to perform the job place someone else at risk or pose an unacceptable risk to public health?

C1.4.3. Occupational Medical Surveillance. Occupational medical surveillance examinations provide baseline and periodic measurements to detect abnormalities in workers exposed to work-related health hazards early enough to prevent or limit disease progression by exposure modification or medical intervention. Medical surveillance examinations are secondary prevention measures. They are effective only if useful screening techniques (history questionnaires, medical exams, or lab tests) are available to identify abnormalities in the target organ system at a stage when modifying exposure or providing medical treatment can arrest progression or prevent recurrence. Much of the information in this Manual is presented to assist health professionals in identifying known work-related health hazards, the target organ system, specific health effects, and useful screening tests.

C1.4.4. Personnel Policy Enforcement. Personnel policy enforcement examinations medically assess workers to determine if they meet established physical standards and conditions of employment. Examples of these programs include drug use screening and fitness for duty examinations (5 CFR 339, reference (j)).

C1.4.5. Employee Health Promotion. Employee health promotion examinations are non-occupational medical examinations given to workers as a benefit and are not addressed in this Manual.

C1.4.6. Regulatory Compliance. Regulatory compliance examinations provide medical data to meet legal and regulatory requirements. Chapter 2 addresses hazards with medical surveillance evaluation requirements specified by OSHA. Chapter 3 describes hazards with medical surveillance protocols endorsed by the Department of

Defense. Both chapters provide assistance to practitioners in identifying those hazards requiring medical examinations.

C1.5. OCCUPATIONAL MEDICAL EXAMINATION PROCESS

C1.5.1. Identifying Workers Who Need Occupational Medical Examinations

C1.5.1.1. There are three ways to identify workers at risk of work-related health problems: by job title, by workplace, and by individual exposure.

C1.5.1.1.1. Job Title. Job title and description characterize the basic tasks, hazardous exposures, and health outcomes likely to be experienced by the majority of workers in a specific occupational group. This type of grouping assumes all workers will have similar job demands, experience similar stresses, have the same exposures to hazardous agents, and suffer the same health effects.

C1.5.1.1.2. Workplace. Workplace characterizes the hazardous agents present in the workplace and assumes all workers assigned to that workplace are potentially exposed to the levels of hazards found at the time the workplace was evaluated.

C1.5.1.1.3. Individual Exposure. Individual exposure quantifies job demands, stresses, and hazardous exposures for each individual.

C1.5.1.2. Each method has limitations. Likewise, any standardized examination protocol developed using a single method to identify the workers at risk will be limited. To minimize these limitations, a combination of these methods is recommended.

C1.5.2. Determining Evaluation Content and Developing Protocols

C1.5.2.1. Installation occupational health and safety personnel are jointly responsible for identifying work areas where workers need medical examinations because of specific hazardous exposures. Local occupational medical personnel establish examination content and frequency based on an understanding of the job demands, exposures to the workers, the medical effects of specific exposures, the impact of specific medical conditions on job performance and safety, and legal and regulatory requirements.

C1.5.2.2. Examination protocols may include employee health promotion and personnel programs. Local medical personnel must be aware of collective bargaining

agreements and support agreements that entitle specific employee groups to health benefit programs or other medical benefits. If medical examinations are deemed inappropriate or of little value, documentation of the rationale used in making this decision shall be maintained locally.

C1.5.2.3. The following list summarizes factors to consider when determining examination content and developing examination protocols.

C1.5.2.3.1. Specific job tasks and/or requirements.

C1.5.2.3.2. Workplace risk factors (exposures).

C1.5.2.3.2.1. Physical agents.

C1.5.2.3.2.2. Chemical agents.

C1.5.2.3.2.3. Biological agents.

C1.5.2.3.2.4. Other.

C1.5.2.3.3. Personal risk factors (medical status).

C1.5.2.3.4. Target organ systems and potential health risks.

C1.5.2.3.5. Potential public health and safety impact.

C1.5.2.3.6. Legal and regulatory requirements.

C1.5.2.3.7. Employee health promotion and personnel programs.

C1.5.3. Performing the Evaluation

C1.5.3.1. The occupational medicine practitioner takes a targeted medical history based on complaints and risk factors, does a review of systems, and then performs selected physical examinations and laboratory tests to characterize the status of specific organ systems. In some cases, a standard examination protocol (historical questionnaire and lab tests) may be administered to a group of workers with similar specific health risks.

C1.5.3.2. Workers receiving occupational medical examinations can have health conditions that can affect their job performance or indicate a problem in the workplace. Determining a particular worker's fitness and risk for a particular job and identifying work-related medical conditions requires medical judgment by a practitioner knowledgeable of the worker's working conditions and job demands.

C1.5.4. Record Keeping (Documenting Examination Results). Occupational medical surveillance examinations shall be recorded and maintained in accordance with DoD Instruction 6055.5 (reference (a)) and the DoD Components' implementing directives. All results should be recorded in employees medical records. Standard or customized forms may be used or developed to aid in collecting and recording occupational medical information.

C1.5.5. Informing the Worker of Examination Results. All workers must be informed of the results of their occupational medical examination (even if all results are normal) as soon as possible following completion. Documentation of patient notification should be noted in the medical record. All personnel with significant abnormalities must be further evaluated or referred for evaluation as appropriate. One of the primary reasons for performing occupational medical examinations is to detect job-related abnormalities at an early stage to reverse or halt progression by modifying exposure. If abnormalities are not fully evaluated and reviewed, potential opportunities for prevention are lost.

C1.5.6. Counseling and Education Concerning Identified Health Risks. Medical personnel shall inform workers receiving occupational medical examinations of any specific health risks present in the work environment. The extent of the information provided to the worker will vary depending on the nature of the hazards and health status of the worker. This should not be interpreted as a requirement to establish formal education programs in the medical facility to inform every worker of their specific potential health risks. This may be appropriate in some cases. However, in most cases a short verbal explanation of the reasons for the examination and the types of health effects being screened for is sufficient.

C1.5.7. Medical Determinations and Recommendations

C1.5.7.1. A medical examination alone cannot determine an individual's ability to perform the essential duties of a particular position. The responsibility for making this determination rests solely with the appointing official. Employment-related decisions involving health are fundamentally managerial, not medical.

C1.5.7.2. Medical information may be an essential element in determining an individual's suitability for job tasks. However, management has the obligation to consider issues that are not strictly medical (e.g., reasonable accommodation or assessment of undue hardship on the operation of the Agency's operations).

C1.5.7.3. The role of occupational medical personnel in addressing employment decisions is limited to determining whether the individual meets the medical requirements of the position and can, from a medical standpoint, perform the job capably and safely.

C1.5.7.4. To assist managers in making employment and placement decisions, medical determinations should fall in one of the following three categories.

C1.5.7.4.1. Qualified -- The individual meets the medical requirements of the position and is (from a medical standpoint) capable of performing the required tasks. Allowing the individual to perform the job will not pose a significant risk to personal health and safety or the health and safety of others.

C1.5.7.4.2. Qualified with Restriction --The individual meets the medical requirements of the position and is capable of performing the job without risk to personal health or others only with some accommodation or restriction. (When this determination is made, the practitioner should provide a list of recommended accommodations or restrictions and the expected duration of this requirement and therapeutic or risk-avoiding benefit.)

C1.5.7.4.3. Not Qualified -- The individual is incapable of performing essential tasks, will be unsafe, or fails to meet medical requirements for the job.

C1.5.8. Recommended Disqualification Procedure

C1.5.8.1. A disqualifying or not qualified medical determination is legitimate if:

C1.5.8.1.1. A medical condition prevents the worker from performing the essential functions of the job and no reasonable accommodation would enable the worker to perform the job.

C1.5.8.1.2. Allowing the worker to perform the job would endanger the health or safety of other workers or the public.

C1.5.8.1.3. Placing (or retaining) the individual in the job poses a significant risk to the worker's personal health or safety.

C1.5.8.1.4. The individual fails to meet a medical standard or physical requirement for placement in the position.

C1.5.8.2. The examining practitioner should prepare a case summary on all workers determined to be medically unsuited for their job and file this case summary in the workers medical record. The appointing official must be informed of the disqualifying recommendation. The case summary, as confidential medical information, should be provided to management only when necessary and authorized. The following information should be included in all case summaries:

C1.5.8.2.1. Diagnosis. The diagnosis must be justified in accordance with established diagnostic criteria.

C1.5.8.2.2. History. The history of the disqualifying condition(s) including references to findings from previous examinations, treatment, and responses to treatment.

C1.5.8.2.3. Clinical findings. The clinical findings including results of any laboratory tests, x-rays, or special evaluations performed.

C1.5.8.2.4. Prognosis. The prognosis must clearly state the medical basis for concluding that the individual is incapable or unsafe, plans or recommendations for future treatment, and an estimate of the expected date of full or partial recovery. If recovery is not expected this should also be clearly indicated. The prognosis must also include an explanation of the impact of the medical condition on overall activities both on and off the job, the reason(s) why restrictions or accommodations will not enable the individual to perform the job, and an explanation of the medical basis for any conclusions.

C1.5.9. Epidemiology (Reviewing Aggregate Data)

C1.5.9.1. The DoD Components shall accumulate appropriate data to allow trend analysis and early detection of job-related abnormalities that, if undetected and uncorrected, might lead to impairment, disability, or death.

C1.5.9.2. Methods should be developed to periodically analyze occupational medical surveillance examination results and local occupational injury and illness data to identify hazardous processes, operations, and work sites. Once identified,

appropriate targeted intervention programs should be developed to reduce the occurrence of occupational injury and illness.

C1.5.10. Changing Occupational Medical Surveillance Procedures. Certain occupational medical surveillance examination procedures (i.e., firefighters examinations) may be part of an installation or area-wide collective bargaining agreement between the Government and employee unions or organizations. Whenever changes are proposed in collective bargaining-agreed upon procedures, the responsible parties must be notified and allowed to accept or decline the changes. Your local or area-wide Civilian Personnel Office can provide information on collective bargaining required occupational medical surveillance and is the occupational medicine professionals point of contact for proposing any changes in examination procedures.

C2. CHAPTER 2

MEDICAL SURVEILLANCE FOR OSHA-REGULATED EXPOSURES

C2.1. INTRODUCTION

C2.1.1. History

C2.1.1.1. With the establishment of OSHA in 1970, the Federal Government began to mandate the basic elements of medical surveillance for a number of chemical and physical stressors in the workplace. Beginning in the early 1970s, the list has now grown to more than 20 individually regulated stressors. Two Executive Orders (E.O.) defined the relationship of OSHA regulations to the Department of Defense workforce. E.O. 11807 (1974) placed Federal employees under the Occupational Health and Safety Act (reference (k)). This Order was later revoked by E.O. 12196 (1980) (reference (l)) that exempted active duty military personnel and uniquely military equipment, systems, and operations. Many of the initial OSHA regulations (reference (k)) are for carcinogens that are rarely found in the Department of Defense workplaces today.

C2.1.2. Mandated Medical Surveillance Examinations

C2.1.2.1. The medical surveillance requirements for each of the OSHA-regulated programs are listed in Tables C2.T1. to C2.T3. The requirements outlined in these tables should be considered the "bare minimum" for medical surveillance. The implementing DoD Component regulations or instructions may add additional requirements based upon sound occupational medical practice.

C2.1.2.2. A written medical opinion for the employer is required on the worker's suitability for exposure to a specific stressor for many of these programs. Specific guidance is given in Tables C2.T1., C2.T2., and C2.T3.

C2.1.3. What Is Not Included

C2.1.3.1. The Cotton Dust Standard (29 CFR 1910.1043, reference (m)) was not included in this chapter because this applies to yarn manufacturing and textile operations.

C2.1.3.2. The medical certification examination for Interstate Vehicle Operators, mandated by the Federal Department of Transportation in 49 CFR 391.41-49 (reference (n)), was not included.

C2.2. MEDICAL SURVEILLANCE

C2.2.1. Mandated Medical Surveillance for Chemical Hazards

C2.2.1.1. Table C2.T1. lists the elements of a medical surveillance program for OSHA-mandated programs. The chemical name, American Chemical Society Chemical Abstract Service (CAS) number, and the Code of Federal Regulations standard for that stressor are listed in the far left column. Target organs specified in the OSHA standard and the National Institute for Occupational Safety and Health (NIOSH) Pocket Guide (reference (o)) are listed next. The criteria for entry of employees into a medical surveillance program is described for each specific OSHA standard. The schedule of examinations is listed for the time of initial assignment (Pre-A), periodic (Per), Emergency Exposure (E-Exp) and Termination of either exposure (T-Exp) or Employment (T-Emp). Elements of the required Medical History and Physical Examination (PE) are listed next; many of the early OSHA-regulated substances do not specify the requirements for the PE. Required examinations and special tests must be offered to the employees. If engineering or administrative controls are not sufficient or appropriate, exposure to many of these substances may need to be reduced by the use of respirators. The requirement for a medical evaluation for respirator use is described in 29 CFR 1910.134 (reference (p)). The occupational and medical history should be updated at each visit along with an assessment of the worker's tobacco use.

C2.2.2. Mandated Medical Surveillance for Biological and Physical Hazards. Table C2.T2. lists the program elements for biological and physical hazards using a similar format and abbreviations to those in Table C2.T1.

C2.2.3. Mandated Medical Surveillance for Occupational Groups. Table C2.T3. lists the program elements for occupational groups using a similar format and abbreviations to those in Table C2.T1.

C2.2.4. Recommended Medical Surveillance for Overexposures to Z-Table Substances

C2.2.4.1. OSHA Regulation 29 CFR 1910.1000 (reference (d)) contains the Z Tables that list stressors that have permissible exposure limits (PELs). Some of these stressors have specific regulations that mandate medical surveillance requirements (see Tables C2.T1., C2.T2., C2.T3.). The remainder of these stressors do not have any medical surveillance requirements put forth in specific regulations. Facilities with employees exposed to these stressors above the action level (AL) are required to perform medical surveillance examinations. The scope of these medical screening

examinations will be determined at the Service, command, or activity level based on the nature and extent of personnel exposed over the Action Limit. Consultation with Service points of contact listed in subparagraph C1.1.1.3. is encouraged in these cases to optimize the use of laboratory testing to assess specific organ function.

C2.2.4.2. Substances reported by the U.S. Army Health Hazard Information Module database as stressors frequently encountered in the workplace are included in Table C2.T4. This table identifies those target organs most likely to be harmed by the listed stressor. Table C2.T5. lists individual examination elements to be considered for specific target organs. Not all elements are required for every stressor with the same target organ. The application of individual elements for a particular examination is determined by the known biological effects of the specific stressor.

C2.2.5. Abbreviations Used in Tables C2.T1. to C2.T5.

<u>Abbreviation</u>	<u>Meaning</u>
A	Annual Exam Requirement
ABD	Abdominal
ABNL	Abnormal
AL	Action Level
Addl	Additional
Attn	Attention
BUN	Blood Urea Nitrogen
CAS	Chemical Abstract Service
CBC	Complete Blood Count
CNS	Central Nervous System
CVS	Cardiovascular System
Dis	Disease
E-Exp	Emergency Exposure
Exp	Exposure
GI	Gastrointestinal
Heme	Hematology
Hx	History
Incl	Including
LFT	Liver Function Tests
Med	Medical
Meds	Medications
N	No
Neuro	Neurological

<u>Abbreviation</u>	<u>Meaning</u>
Occup	Occupational
OSHA	Occupational Safety and Health Administration
PA	Posteroanterior
PE	Physical Examination
PFT	Pulmonary Function Test
PNS	Peripheral Nervous System
PPM	Parts per million
Pre-A	Pre-Assignment
Per	Periodic
Prod	Productive
Pt	Patient
Repro	Reproductive
Resp	Respiratory
Rx	Treatment
SGOT(AST)	Aspartate aminotransferase
SGPT(ALT)	Alanine aminotransferase
SOB	Shortness of Breath
STEL	Short-term Exposure Limit
Sys	System
T-Exp	Termination of Exposure
T-Emp	Termination of Employment
Y	Yes

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical History</u>	<u>Physical Exam</u> <u>(PE) Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
2-Acetylamino- fluorene CAS #53-96-3 1910.1014 (reference (q))	Lungs Liver Pancreas Kidneys Bladder Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Medical evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of genetic disease Cancer Hx Addl risk-smoking Physician's Written Opinion required *
Acrylonitrile CAS #107-13-1 1910.1045 (reference (r))	CNS Resp GI Liver Skin	Exposure at or above the AL without regard to respirator use	Pre-A Y Per A E-Exp Y T-Exp N T-Emp Y*	Smoking Hx Lung/Resp disease Cough (dry/prod) Chronic abd pain Vomiting/Other GI symptoms Change in bowel movements Liver/Kidney disease Skin disease Headache/Neuro signs/symptoms *	Complete PE incl: * CNS PNS Resp Cardiovascular GI Skin Thyroid	Chest Xray (PA view only) GI tests incl fecal occult blood if age>40 Other tests as indicated * Med evaluation if respirator required (see reference (p))	Occupational Hx Addl risk-smoking Physicians Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical CAS#</u> <u>29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam (PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
4-Aminodi-phenyl CAS #92-67-1 1910.1011 (reference (s))	Bladder Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of genetic diseases or cancer Addl risk-smoking Physician's Written Opinion required *
Arsenic-Inorganic CAS #7440-38-2 1910.1018 (reference (t))	Bladder Skin Lung	Exposure at or above the AL for more than 30 days per year without regard to respirator use*	Pre-A Y Per * E-Exp Y T-Exp Y T-Emp Y	Smoking Hx Lung/Resp disease Shortness of breath Cough (dry/prod)	Appropriate PE including: Nasal mucosa Skin Pulmonary	Chest Xray (PA view only)* GI tests incl fecal occult blood if age>40 Other tests as indicated * Med evaluation if respirator required (see reference (p))	Occupational Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical CAS# 29 CFR</u>	<u>Target Organs</u>	<u>Medical Surveillance Criteria</u>	<u>Exam Frequency</u>	<u>Required Medical History</u>	<u>Physical Exam (PE) Elements</u>	<u>Required Special Tests</u>	<u>Other Required Elements</u>
Asbestos CAS #1332-21-4 1910.1001 1915.1001 1926.1101 (references (h), (u), (v), (w))	Lungs Pleura	Use Appendices 1 & 2 of this Manual	Pre-A Y Per A E-Exp N T-Exp Y T-Emp Y*	Use Appendices 1 & 2 of this Manual -- Asbestos Exposure Medical History forms	Complete PE with emphasis on: Pulmonary Cardiovascular GI	PFT CXR See Appendix E of reference (h)	Occupational Hx Addl risk of asbestos exposure & smoking Physician's Written Opinion required * (Use Appendix 3 of this Manual)
Benzene CAS #71-43-2 1910.1028 (reference (x))	Eyes Resp Sys CNS Skin Blood/Bone marrow	Employees exposed: 1) at or above AL 30 days/year 2) at or above PEL 10 days/year 3) at or above 10 PPM 30 days/year prior to 1987 4) to >0.1% benzene solvent as tire building machine operators	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Current medications Blood diseases Liver disease Kidney disease Ionizing radiation exposure Cancer (incl leukemia)	Initial: Complete PE Periodic: every 3 years (if respirator used >30 days/year specific attention to: cardiopulmonary exam) *	CBC PFT (every 3 years if required to use a respirator >30 days/year). See 29 CFR 1910.1028 (reference (x)) for interpretation of CBC results & emergency exposure labs	Occupational Hx Past Hx of benzene exposure/ heme toxins Family Hx of blood dyscrasias Addl risk-smoking Physician's Written Opinion required * Medical referral required*

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical CAS# 29 CFR</u>	<u>Target Organs</u>	<u>Medical Surveillance Criteria</u>	<u>Exam Frequency</u>	<u>Required Medical History</u>	<u>Physical Exam (PE) Elements</u>	<u>Required Special Tests</u>	<u>Other Required Elements</u>
Benzidine CAS #92-87-5 1910.1010 (reference (y))	Liver Kidneys Bladder Skin Blood	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of genetic diseases or cancer Addl risk-smoking Physician's Written Opinion required *
1,3 Butadiene CAS #106-99-0 1910.1051 (reference (z))	Eyes Respiratory CNS Blood	Before the time of initial assignment	Pre-A Y Per * E-Exp Y T-Exp * T-Emp *	Comprehensive health hx with annual update Blood diseases See Appendix C of OSHA Standard for questionnaire sample content *	Complete PE with special emphasis on: Liver Spleen Lymph nodes Skin	CBC Addl test as necessary	Occupational Hx Past exposure to chemical or other blood toxins Written Medical Opinion required * Consultation as needed *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29</u> <u>CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical History</u>	<u>Physical</u> <u>Exam</u> <u>(PE)</u> <u>Elements</u>	<u>Required</u> <u>Special Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Cadmium CAS #7440-43-9 CAS #1306-19-0 1910.1027 (reference (aa))	Resp Sys Kidneys Prostate Blood	Employees who are or maybe exposed: (1) at or above AL 30 days/ year (2) previous exposure above AL total of 60 months	Pre-A Y Per * E-Exp Y T-Exp N T-Emp N	Detailed work & medical Hx with emphasis on: Cadmium Exp Smoking Hx/status Reproductive status Medications (nephrotoxins) Dysfunction of: Cardiovascular Sys Respiratory system Renal system Heme system Musculo-skeletal Sys	Complete PE with emphasis on: Blood pressure Resp system Urinary system Prostate exam Males >40 yrs	PFT CXR (PA only) CBC BUN/ Creatinine Blood cadmium Urinalysis Urine cadmium Urine beta-2 microglobulin Respirator certification if required (see ref (p)) (A urine creatinine is also needed for interpretation of required tests.)	Medical Removal Assessment* Addl risk-smoking Physician's Written Opinion required *
Bis-Chloro- Methylether CAS #542-88-1 1910.1008 (reference (bb))	Eyes Lungs Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of genetic diseases or cancer Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam (PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Coke Oven Emissions 1910.1029 (reference (cc)) (Also see Coal Tar Pitch Volatiles; 1910.1002 (reference (dd)))	Lungs Kidneys Bladder Skin	Employed in a regulated area 30 or more days/year	Pre-A Y Per A E-Exp Y T-Exp Y* T-Emp Y*	Smoking Hx Lung/Resp disease Shortness of breath Cough (dry/prod)	Weight Skin Pulmonary	CXR * (PA view only) PFT Urinalysis Urine & Sputum cytology Med evaluation if respirator required (see reference (p))	Occupational Hx Addl risk-smoking Physician's Written Opinion required *
1,2-Dibromo-3-Chloropropane CAS #107-13-1 1910.1044 (reference (ee))	CNS Eyes Lungs Liver/GI Spleen Kidneys Repro Skin	Employed in a regulated area and emergency exposures	Pre-A Y Per A E-Exp Y* T-Exp N T-Emp N	Impotence or sexual dysfunction Infertility or miscarriage (Self or spouse) Current pregnancy (Self or spouse)	Body habitus Genito-urinary (including testicle size)	Serum tests: Estrogen (Females only) Follicle Stimulating Hormone Luteinizing Hormone Sperm Count * (Males only)	Occupational Hx Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29</u> <u>CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam</u> <u>(PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
3,3'-Dichloro- Benzidine CAS #91-94-1 1910.1007 (reference (ff))	Lungs Liver/GI Bladder Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of- cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *
4-Dimethyl- aminoazo- benzene CAS #60-11-7 1910.1015 (reference (gg))	Lungs Liver Kidneys Bladder Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam (PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Ethyleneimine CAS #151-56-4 1910.1012 (reference (hh))	Eyes Lungs Liver Kidneys Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *
Ethylene Oxide CAS #75-21-8 1910.1047 (reference (ii))	Eye GI Resp Blood Repro CNS	For all employees who or may be exposed at or above AL >30 days/year	Pre-A Y Per A E-Exp Y T-Exp Y T-Emp Y	Work Hx with emphasis on: Eyes Skin Following systems: Pulmonary Hematologic Reproductive Neurologic	PE with emphasis on: Eyes Skin Following systems: Pulmonary Hematologic Reproductive Neurologic	CBC with differential Pregnancy/ fertility testing if indicated Med evaluation if respirator required (see reference (p))	Occupational Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required Medical</u> <u>History</u>	<u>Physical Exam</u> <u>(PE) Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Formaldehyde CAS #50-00-0 1910.1048 (reference (jj))	Eyes Resp Skin	All employees exposed at or above AL or exceeding the STEL.	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Smoking Hx Eye/Nose/Throat irritation Chronic airway problems Hyperactive airway disease Allergic skin conditions Dermatitis Upper/Lower resp problems See OSHA non-mandatory questionnaire *	PE with emphasis on: Eye irritation Irritation / sensitization of skin or respiratory system Shortness of breath	PFT - every year (if using a respirator) * Med evaluation if respirator required (see reference (p))	Medical removal assessment Occupational Hx Family Hx of blood, genetic diseases or cancer Addl risk-smoking Physician's Written Opinion required *
Lead CAS #74-39-1 1910.1025, General Industry (reference (kk)) 1926.62 Lead in Construction (reference (ll))	Gingiva GI Kidney CNS PNS Repro Sys Blood/ Bone marrow	Employees who are or may be exposed above the AL for 30 days/year	Pre-A Y Per * E-Exp Y* T-Exp N T-Emp N See Figure C2.F1. of this Manual	Detailed medical & work Hx with emphasis on: Past lead exp - Occupational - Non-occupational Personal habits - Smoking - Hygiene Past Problems: - GI - Renal - Reproductive Sys - Neuro system - Heme system	Thorough PE with particular attn to: Teeth Gums Cardiovascular Neuro Heme system Blood pressure Pulmonary system if resp protection	Blood lead CBC with peripheral smear morphology Zinc Proto-porphyrin BUN Creatinine Urinalysis with microscopic Med evaluation if respirator required (see reference (p))	Medical Removal Assessment* Occupational Hx Addl risk-smoking Other tests deemed reasonable by examining physician Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29</u> <u>CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam</u> <u>(PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Methylene- dianiline CAS #101-77-9 1910.1050 (reference (mm))	Liver Skin	Before the time of initial assignment	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Detailed Hx Medications Alcohol use Tobacco use Hx of dermatitis Hx of liver disease	Routine PE including: Signs of liver disease Skin	LFTs Urinalysis Addl test as required	Occupational Hx Past exp to chemical or other toxic substances Chemical skin sensitization Consultation as needed Medical Written Opinion required * Multiple Physician Review Mechanism
Methyl chloromethyl ether CAS #107-30-2 1910.1006 (reference (nn))	Eyes Lungs Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical History</u>	<u>Physical Exam</u> <u>(PE) Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Methylene chloride CAS# 75-09-2 1910.1052 (reference (oo))	Eyes CVS CNS Skin	Before the time of initial assignment	Pre-A Y Per * E-Exp Y T-Exp * T-Emp *	Comprehensive Medical Hx: Neurological Symptoms Heart Disease Liver Disease Blood Disease See Appendix B of OSHA Standard for questionnaire sample content *	Particular attn to: Lungs Cardiovascular Sys Liver Neuro Sys Skin	Based on Medical & Work Hx Observed health status See Appendix B of OSHA Standard for further information *	Occupational Hx including: Personal Protective Equipment; Past Exp to chemical; Work practices. Written Medical Opinion required *
Alpha-Naphthylamine CAS #134-32-7 1910.1004 (reference (pp))	Bladder Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam</u> <u>(PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Beta-Naphthylamine CAS # 91-59-8 1910.1009 (reference (qq))	Bladder Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *
4-Nitrobiphenyl CAS #92-93-3 1910.1003 (reference (rr))	Bladder Blood	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical</u> <u>History</u>	<u>Physical</u> <u>Exam</u> <u>(PE)</u> <u>Elements</u>	<u>Required</u> <u>Special</u> <u>Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
N-Nitroso- dimethylamine CAS #62-75-9 1910.1016 (reference (ss))	Nose Lungs Liver Kidneys	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *
Beta-Propio- lactone CAS #57-57-8 1910.1013 (reference (tt))	Eyes Lungs Liver Kidney Skin	Prior to assignment to enter a regulated area	Pre-A Y Per A E-Exp Y T-Exp N T-Emp N	Reduced immunity Smoking Hx Rx with steroids or cytotoxic drugs Current pregnancy (Self or spouse)	Content not specified in OSHA standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Family Hx of cancer or genetic diseases Environmental Hx Addl risk-smoking Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T1. OSHA-Regulated Toxic and Hazardous Substances--Continued

<u>Chemical</u> <u>CAS# 29 CFR</u>	<u>Target</u> <u>Organs</u>	<u>Medical</u> <u>Surveillance</u> <u>Criteria</u>	<u>Exam</u> <u>Frequency</u>	<u>Required</u> <u>Medical History</u>	<u>Physical</u> <u>Exam (PE)</u> <u>Elements</u>	<u>Required</u> <u>Special Tests</u>	<u>Other</u> <u>Required</u> <u>Elements</u>
Chromic Acid CAS #1333-82-0 CAS #7738-94-5 1910.94(d)(9) (viii) (Ventilation, reference (uu))	Eyes Skin (Other systems in ref (i) Lungs, Liver, Kidneys Blood)	Workers exposed to chromic acids (NOTE: Briefly mentioned in OSHA Ventilation standard and regards only nose and skin exposure to chrome fumes)	Pre-A N Per * E-Exp N T-Exp Y T-Emp N	Hx of ulceration in nose or other parts of body	Nostrils & other parts of body to detect ulceration	Med evaluation if respirator required (see reference (p))	Occupational Hx Addl risk-smoking
Vinyl Chloride CAS #75-01-4 1910.1017 (reference (vv))	CNS PNS Lungs Liver Blood Lymph System	Exposure at or above the AL without regard to respirator use.	Pre-A Y Per * E-Exp N T-Exp N T-Emp N	Alcohol intake Hepatitis Hx Work Hx hepatotoxins/ chemicals Blood transfusion Hx Hospitalizations	General PE with attention to:* Lungs Liver Spleen Kidneys Connective tissues Skin	SGOT (AST) SGPT (ALT) Total bilirubin Alkaline phosphatase Gamma glutamyl transpep- tidase (GGT) Repeat Abnl tests ASAP (within 3-4 wks) *	Medical history* Removal from exposure if lab tests abnormal * Physician's Written Opinion required *

* See OSHA Standard for further information.

Table C2.T2. OSHA-Regulated Physical and Biological Substances

<u>Hazard 29 CFR</u>	<u>Target Organs</u>	<u>Medical Surveillance Criteria</u>	<u>Exam Freq- uency</u>	<u>Required Medical History</u>	<u>Physical Exam (PE) Elements</u>	<u>Required Special Tests</u>	<u>Other Required Elements</u>
Blood-Borne Pathogens 1910.1030 (reference (ww))	Organs susceptible to diseases due to pathogenic micro-organisms present in human blood such as: - Hepatitis Types B&C - HIV	All Employees "reasonably anticipated" to be at risk for exposure via: - eyes - skin - mucous membranes - parenteral	Pre-A Y Per * E-Exp Y T-Exp N T-Emp N	Hx of prior Hepatitis B vaccine Medical contra-indication to Hep B vaccine	Content not specified in OSHA Standard	Verification of Hepatitis B immunity * (antibody testing or vaccination)	Hepatitis B Vaccination* Declination of Hep B Vaccine (see Appendix 5 of this Manual) Post-exp evaluations: - HBV - HIV Healthcare Professionals Written Opinion required *
Noise 1910.95 (reference (xx)) and DoD Instruction 6055.12, DoD Hearing Conservation Program (reference yy))	Cochlea	When Noise Exposure is 85 dBA 8 hr TWA or greater	Pre-A Y Per * E-Exp N T-Exp Y T-Emp Y	Content not specified in OSHA Standard	Content not specified in OSHA Standard	Audiogram	Occupational Hx Addl risk-smoking

* See OSHA Standard for further information.

Table C2.T3. OSHA-Regulated Occupational Groups

<u>Hazard 29 CFR References</u>	<u>Target Organs</u>	<u>Medical Surveillance Criteria</u>	<u>Exam Frequency</u>	<u>Required Medical History</u>	<u>Physical Exam (PE) Elements</u>	<u>Required Special Tests</u>	<u>Other Required Elements</u>
Hazardous Waste/ Emergency Response 1910.120 (reference (i)) (Also see NIOSH guide for hazardous waste site activities, reference (zz))	Virtually any organ system susceptible to disease	All Employees at risk for exposure: - above PEL >30 days - if no PEL exp >30 days - If Respirator used - Possible Overexposure - Hazmat Team Members	Pre-A Y Per Y E-Exp Y T-Exp Y* T-Emp N*	Medical & Work Hx emphasis on: - Known health hazards - Fitness for using or wearing personal protective equipment Use resources such as: - Industrial Hygiene data - Site Assessment data	Content not specified in OSHA Standard	Med evaluation if respirator required (see reference (p))	Occupational Hx Addl risk-smoking Physician's Written Opinion required *
Respiratory Protection 1910.134 (reference (p)) (also see reference (aaa))	Resp Sys Cardio-vascular Sys	- All workers wearing respirators	Pre-A Y Per Y* E-Exp N T-Exp N T-Emp N	Content not specified in OSHA Standard	Content not specified in OSHA Standard	Spirometry not specifically required in 1910.34, but may be required for other specific OSHA-regulated exposures (i.e., Asbestos).	Occupational Hx Pt education Addl risk-smoking

* See OSHA Standard for further information.

Table C2.T4. OSHA Z Table Substances Frequently Encountered

Substance	Conj/ Mucous Mem / Eyes	Resp Sys/ Lungs	Cardio- vascular	Kidney/ Urinary Tract	Nervous System	Liver	Skin	Other	- Reference
Acetaldehyde		X		X			X		(o), (bbb), (ccc)
Acetic Acid	X	X					X	Teeth	(o)
Acetone		X					X		(o)
Acetonitrile	X	X	X	X		X	X		(o)
Acetylene tetra-bromide	X	Upper Resp				X			(o)
Acrylamide	X				CNS PNS		X		(o)
Aluminum	X	X					X		(ddd)
Aluminum sulfate	X	X					X	Teeth	(ddd) (eee)
Ammonia	X	X							(o)
n-Amyl Acetate	X	X					X		(o)
Sec-Amyl Acetate	X	X					X		(o)
Antimony	X	X	X				X		(o)
Barium (soluble compounds)	X	X	X		CNS		X		(o)
Benzoyl Peroxide	X	X					X		(o)
Beryllium	X	X					X		(o)
2-Butoxyethanol - butyl cellosolve	X	X		X		X	X	Blood Lymph	(o)
n-Butyl alcohol	X	X					X		(o)
n-Butylacetate	X	X					X		(ddd)
Calcium carbonate	X	X							(ddd)
Calcium oxide	X	X					X		(o)
Calcium dioxide									(o)
Camphor	X	X			CNS		X		(o)
Carbaryl (Sevin)		X	X		CNS		X		(o)
Carbon dioxide		X	X				X		(o)
Carbon monoxide		X	X		CNS			Blood	(o)

Table C2.T4. OSHA Z Table Substances Frequently Encountered--Continued

<u>Substance</u>	<u>Conj/ Mucous Mem / Eyes</u>	<u>Resp Sys/ Lungs</u>	<u>Cardio- vascular</u>	<u>Kidney/ Urinary Tract</u>	<u>Nervous System</u>	<u>Liver</u>	<u>Skin</u>	<u>Other</u>	<u>- Reference</u>
Carbon tetrachloride	X	X		X	CNS		X	Gastro- intestinal	(o)
Chlorine		X							(o)
Chloroform	X		X	X		X	X		(o)
Chromic Acid	X	X		X		X	X	Blood	(o)
Chromium Metal		X							(ddd)
Chromium (II)&(III)		X					X		(ddd)
Cobalt		X					X		(o)
Copper		X		X		X	X		(o)
Cresol (all isomers)	X	X		X	CNS	X	X		(o)
Cyclo-hexane	X	X			CNS		X		(o)
Cyclo-hexanone	X	X					X		(o)
Diacetone alcohol	X	X					X		(ddd)
o-Dichlorobenzene	X	X		X			X		(o)
Dichloroethane				X		X	X		(o)
Dichlorofluoromethane			X		PNS				(o)
Dichlorotetrafluoro-ethane		X	X						(o)
Diethanolamine	X						X		(ddd)
Dimethylformamide			X	X		X	X		(o)
Dimethyl sulfate	X	X		X	CNS	X	X		(o)
Dioxane	X			X		X	X		(o)
Endosulfan (Thiodan)					CNS				(eee)
Ethanolamine	X	X					X		(o)
2-Ethoxyethanol (ceelosolve)		X		X			X		(o)
2-Ethoxyacetate (cellosolve acetate)		X		X	CNS	X	X		(eee)
Ethyl Acetate	X	X					X		(o)
Ethyl Alcohol	X				CNS				(eee)
Ethyl acrylate	X	X					X		(o)
Ethylbenzene	X	Upper Resp			CNS		X		(o)
Ethylenediamine		X		X		X	X		(o)
Ethylene glycol dinitrate			X				X	Blood	(o)

Table C2.T4. OSHA Z Table Substances Frequently Encountered--Continued

Substance	Conj/ Mucous Mem / Eyes	Resp Sys/ Lungs	Cardio- vascular	Kidney/ Urinary Tract	Nervous System	Liver	Skin	Other	Reference
Ethyl ether	X	X			CNS		X		(o)
Fluorides	X	X		X	CNS		X	Bones	(o)
Fluorine	X	X					X		(o)
Formic Acid	X	X		X		X	X		(o)
Graphite		X	X						(o)
n-Heptane		X			PNS		X		(o)
n-Hexane	X	X					X		(o)
Hexachloroethane	X								(o)
Hexamethylene-di-isocyanate (HDI)	X	X					X		(ddd)
Hydrogen chloride	X	X					X		(o)
Hydrogen cyanide			X	X	CNS	X			(o)
Hydrogen fluoride	X	X					X		(o)
Hydrogen peroxide	X	X					X		(o)
Hydrogen sulfide	X	X							(o)
Hydroquinone	X	X			CNS		X		(o)
Iodine	X	X	X		CNS		X		(o)
Iron oxide (fume)		X							(o)
Isobutyl acetate	X	X					X		(o)
Isobutyl alcohol	X	X					X		(o)
Isopropyl alcohol	X	X					X		(o)
Isopropyl amine	X	X					X		(o)
Lindane	X			X	CNS	X	X	Blood	(o)
Magnesium oxide	X	X							(o)
Malathion		X	X	X				Blood Gastro- intestinal	(o)
Manganese dusts		X		X	CNS			Blood	(o)
Mercury, inorganic	X	X		X	CNS		X		(o)
Mercury, organo, alkyl	X			X	CNS		X		(o)
Methyl alcohol	X				CNS		X	Gastro- intestinal	(o)
Methyl chloride				X	CNS	X	X		(o)
Methyl chloroform	X		X		CNS		X		(o)

Table C2.T4. OSHA Z Table Substances Frequently Encountered--Continued

Substance	Conj/ Mucous Mem / Eyes	Resp Sys/ Lungs	Cardio- vascular	Kidney/ Urinary Tract	Nervous System	Liver	Skin	Other	- Reference
Methylene chloride	X		X		CNS		X		(o)
Methyl-ethyl-ketone (MEK)	X	X							(eee)
Methyl-isobutyl-ketone (Hexone)		X			CNS		X		(o)
Methyl-isoamyl-ketone								No Med Surv Specified	(o)
Methylene-diphenyl diisocyanate (MDI)	X	X					X		(ccc)
2-Methoxyethanol (methyl cellosolve)	X		X		CNS		X		(o)
Mineral Oils							X		(o)
Molybdenum		X						Joints	(ccc)
Morpholine	X	X		X		X	X		(ccc)
Naphthalene	X			X	CNS	X	X	Blood	(o)
Nickel, metal		X			CNS			Nose	(o)
Nitric acid	X	X					X	Teeth	(o)
Nitric oxide		X							(o)
Nitrocellulose		X		X		X	X		(ddd)
Nitrogen dioxide		X	X						(o)
Nitrogen Oxides	X	X					X		(ddd)
Nitroglycerin			X				X	Blood	See Chapter 3
Nuisance Dusts		X							(ddd)
Oxygen difluoride	X	X							(o)
Oxalic Acid	X	X		X			X		(o)
Ozone	X	X							(o)
Pentachlorophenol	X	X	X	X	CNS	X	X		(o)
Petroleum Spirits/ Naphtha	X	X			CNS		X		(o)
Phenol				X		X	X		(o)
Phosgene	X	X					X		(o)
Phosphoric Acid	X	X					X		(o)

Table C2.T4. OSHA Z Table Substances Frequently Encountered--Continued

Substance	Conj/ Mucous Mem / Eyes	Resp Sys/ Lungs	Cardio- vascular	Kidney/ Urinary Tract	Nervous System	Liver	Skin	Other	- Reference
Phosphorous	X	X		X		X	X	Blood Jaw, Teeth	(o)
Picric Acid	X			X		X	X	Blood	(o)
Portland Cement	X	X					X		(o)
Potassium Cyanide		X	X				X		(ddd)
Propane								No Med Surv Specified	(o)
n-Propyl Alcohol	X	X			X		X		(o)
Silica - crystalline		X							(o)
Silica -amorphous		X							(o)
Silicon								No Med Surv Specified (See Nuisance Dust)	(eee)
Silver - metal	X	Nose					X		(o)
Sodium Hydroxide	X	X					X		(o)
Sodium Silicate							X		(ddd)56
Stoddard Solvent	X	X			CNS		X		(o)
Styrene - monomer	X	X			CNS		X		(o)
Sulfuric Acid	X	X					X	Teeth	(o)
Sulfur dioxide	X	X					X		(o)
Talc -(non-asbestiform & <1% quartz/silica)								(See Nuisance Dust)	(o)
Tetrachloroethylene (Perchloroethylene)			X		CNS	X	X		(ddd)
Tetra-hydrofuron	X	X			CNS		X		(o)
Tin - inorganic	X	X					X		(o)
Tin -organic	X			X	CNS	X	X	Blood	(o)
Titanium oxide		X							(o)
Toluene				X	CNS	X	X		(o)

Table C2.T4. OSHA Z Table Substances Frequently Encountered--Continued

<u>Substance</u>	<u>Conj/ Mucous Mem / Eyes</u>	<u>Resp Sys/ Lungs</u>	<u>Cardio- vascular</u>	<u>Kidney/ Urinary Tract</u>	<u>Nervous System</u>	<u>Liver</u>	<u>Skin</u>	<u>Other</u>	<u>- Reference</u>
1,1,2 Trichloroethane	X			X	CNS	X		Nose	(o)
Trichloroethylene		X	X	X	CNS	X	X		(o)
2,4,6 Trinitrotoluene	X		X	X	CNS	X	X	Blood	(o)
Triorthocresyl-phosphate					CNS PNS				(o)
Toluene-2-4-diiso-cyanate		X					X		(o)
Turpentine	X	X		X			X		(o)
Warfarin			X					Blood	(o)
Xylene	X				CNS	X	X	Blood Gastro- intestinal	(o)
Zinc chloride (fume)	X	X					X		(o)
Zinc oxide (fume)		X							(o)

Table C2.T5. Recommended Medical Surveillance Elements

<u>Organ System</u>	<u>Medical History Elements</u>	<u>Physical Examination Elements</u>	<u>Additional Tests (only if indicated by Hx and PE)</u>
Conjunctiva and Eyes (also see Mucous Membranes)	Change in vision Eye irritation Smoking history Update occupational history	Vital signs Visual acuity Eyes (conjunctiva, sclera) Ophthalmoscopic • examination of retina	Slit lamp examination
Nose	Nose deformity (septum) Nose bleeds Smoking history Update occupational history	Vital signs External and internal nares	X-ray
Teeth	Dental hygiene Tooth enamel loss Caries Smoking history Update occupational history	Vital signs Teeth • enamel loss caries	
Mucous membranes	Irritation eyes, nose, throat Eye redness Rhinitis Sore throat Smoking history Update occupational history	Vital signs Mucous membranes • eye membranes interior nares mouth/throat	
Respiratory System and Lungs	Nasal congestion Lung or respiratory disease Chest pain Cough (dry or productive) Coughed up blood Shortness of breath Smoking history Update occupational history	Vital signs Nose (nares, turbinates) Oropharynx Lungs Cardiovascular system	Chest xray Pulmonary function tests

Table C2.T5. Recommended Medical Surveillance Elements--Continued

<u>Organ System</u>	<u>Medical History Elements</u>	<u>Physical Examination Elements</u>	<u>Additional Tests (only if indicated by Hx and PE)</u>
Cardiovascular System	Chest pain Shortness of breath Dyspnea on exertion Shortness of breath during sleep Difficulty sleeping Pain or numbness in hands or feet Smoking history Update occupational history	Vital signs Neck vessels Heart Lungs Vascular System Liver (Hepatomegaly)	Chest x-ray Electrocardiogram
Kidneys and Urinary Tract	Change in urinary frequency Dysuria Hematuria Medication use <ul style="list-style-type: none"> • prescription • over-the-counter Smoking history Update occupational history	Vital signs Neck vessels Heart Lungs Abdomen	Urinalysis <ul style="list-style-type: none"> • routine • microscopic BUN Creatinine B-2 microglobulin
Nervous System	Headache Dizziness or lightheadedness Weakness Gait change Loss of coordination Numbness or tingling Change in mood or sleeping Smoking history Update occupational history	Vital signs Central nervous system <ul style="list-style-type: none"> • mental status cranial nerve function Peripheral nervous system	

Table C2.T5. Recommended Medical Surveillance Elements--Continued

<u>Organ System</u>	<u>Medical History Elements</u>	<u>Physical Examination Elements</u>	<u>Additional Tests (only if indicated by Hx and PE)</u>
Liver	Liver disease Alcohol consumption Chronic abdominal pain Vomiting Other GI symptoms Change in bowel movements <ul style="list-style-type: none"> • frequency appearance Medication use <ul style="list-style-type: none"> • prescription • over -the-counter Family Hx liver disease Change in smoking habits Smoking history Update occupational history	Vital signs Abdomen Liver (hepatomegaly) Lymphatic system Spleen Skin <ul style="list-style-type: none"> • jaundice rash hyperpigmentation 	Urinalysis <ul style="list-style-type: none"> • routine microscopic Liver function tests
Skin	Changes in skin color or texture Skin disease Childhood eczema Smoking history Update occupational history	Vital signs Skin	
Hematologic System (Blood)	Fatigue Pallor Anemia Leukemia Tachycardia Easy bleeding or bruising Frequent infections Smoking history Update occupational history	Vital signs Jaundice Skin for pallor or bruises Liver Spleen	CBC WBC with differential Platelet count

Table C2.T5. Recommended Medical Surveillance Elements--Continued

<u>Organ System</u>	<u>Medical History Elements</u>	<u>Physical Examination Elements</u>	<u>Additional Tests (only if indicated by Hx and PE)</u>
Gastro- intestinal System (excluding liver)	Chronic abdominal pain Vomiting Other GI symptoms Change in bowel movements <ul style="list-style-type: none"> • frequency appearance Liver disease Alcohol consumption Medication use <ul style="list-style-type: none"> • prescription over-the-counter Smoking history Update occupational history	Vital signs Abdomen Liver (hepatomegaly) Spleen Skin dermatitis hyperkeratosis hyperpigmentation	Urinalysis routine <ul style="list-style-type: none"> • microscopic Liver function tests Stool for occult blood

C3. CHAPTER 3

MEDICAL SURVEILLANCE ENDORSED BY THE DEPARTMENT OF DEFENSE

C3.1. INTRODUCTION

This chapter addresses hazards that OSHA has NOT identified for required medical surveillance. The Department of Defense Medical Surveillance Working Group selected these stressors and occupational groups because of their military uniqueness or common use in the Department of Defense workplace or operational setting.

C3.2. MEDICAL SURVEILLANCE

C3.2.1. Chemical Hazards

C3.2.1.1. Chemical Warfare Agents

C3.2.1.1.1. Chemical warfare agents include primarily nerve agents (GA, GB, GD, and VX), sulfur mustard agents (H, HD, and HT), Lewisite (L), and binary chemicals. Even though the toxicity of chemical warfare agents depends upon the nature and concentration of the agent and the route and duration of exposure, this group of chemicals must be considered highly hazardous. The binary chemicals are manufactured, transported, and stored as separate components of a final mixture. The separate components of sublethal toxicity are not mixed to obtain lethal toxicity until a chemical munition is directed toward an enemy target.

C3.2.1.1.2. Nerve agents are extremely potent inhibitors of acetylcholinesterase, an important enzyme in cholinergic neurotransmission. Mustard and Lewisite act as cytotoxic agents on all tissue surfaces contacted. Mustard has been shown to be mutagenic and carcinogenic in animals. The final mixture of current binary chemicals is a nerve agent. Component chemicals in the binary system have individual and quite varied toxicities.

C3.2.1.1.3. Routes of entry are through inhalation and skin and eye absorption. Ingestion is rare. Exposure may occur during manufacture, storage, transport, or destruction (demilitarization) of these agents. Exposure may also result with research, development, test, and evaluation (RDT&E) activities and during training with live agents. On rare occasions, exposure may occur during accidental excavation of unidentified chemical warfare agent burial sites.

C3.2.1.1.4. The Department of the Army is the executive agent for activities involving chemical warfare agents. Therefore, the Department of the Army, Office of The Surgeon General, is the proponent for medical surveillance guidance for workers with potential exposure. Details regarding medical examinations for these workers can be found in Department of the Army Pamphlets (DA PAM) 40-8, (reference (fff)) and 40-173 (references (ggg)). Further information on current guidelines may be obtained in the CDC "Recommendations for Protecting Human Health Against Long-term Exposure to Low Doses of Chemical Warfare Agents (reference (hhh)).

C3.2.1.2. Nitroglycerin

C3.2.1.2.1. Hazard Description. Nitroglycerin (CAS #55-63-0) in its pure form is a yellow oily liquid explosive that is usually handled as a component of a solid mixture that can produce dust. It is primarily used as a propellant for shells, rockets, and other ordnance. Exposure may be from the inhalation of dusts or vapors, or ingestion of dust, or through the skin. The primary sites of potential exposure are manufacturing plants in the United States, which are few in number. The risk of exposure to workers routinely involved with storage or operational delivery of weapons is far less.

C3.2.1.2.2. Exposure Limits. OSHA has substantially lowered the permissible exposures of nitroglycerin primarily because of cardiovascular effects, concerns of exposure to individuals with cardiovascular disease, and other health effects, such as headaches. Exposure limits for nitroglycerin carry a skin designation to emphasize that nitroglycerin can be absorbed through the skin. The reduction of skin exposure is to be achieved with any reasonable combination of controls, including engineering controls and personal protective equipment under 55 Federal Register No. 217, 26948-46950, Final Rule (reference (iii)).

C3.2.1.2.3. Target Organ(s) and Potential Health Effects. Nitroglycerin exposure is primarily manifested by symptoms in two organ systems:

C3.2.1.2.3.1. The cardiovascular system with symptoms such as palpitations and/or withdrawal angina; and

C3.2.1.2.3.2. The central nervous system with vasodilatation headaches.

C3.2.1.2.4. Criteria for Entry into Medical Surveillance Program.

Workers are recommended for placement into medical surveillance when they are exposed over the action level for more than 30 days a year or 10 days in any quarter.

C3.2.1.2.5. Surveillance Frequency. Workers identified for medical surveillance should receive pre-placement and annual examinations. Termination of exposure and/or employment medical surveillance examinations are not required. Emergency exposure examinations may be done to evaluate for acute effects.

C3.2.1.2.6. Medical and Occupational History. The history should include questions into the following areas:

C3.2.1.2.6.1. The occurrences and frequency of headaches (especially headaches occurring during exposure).

C3.2.1.2.6.2. History of heart disease (chest pain, myocardial infarctions, or abnormal electrocardiograms and/or history of chest pain when away from work -- "withdrawal angina").

C3.2.1.2.6.3. History of elevated blood pressure.

C3.2.1.2.6.4. History of elevated blood lipids (cholesterol and triglycerides).

C3.2.1.2.6.5. Use of medications (especially for hypertension and other cardiovascular diseases).

C3.2.1.2.6.6. Smoking history.

C3.2.1.2.6.7. History of previous exposure to nitroglycerin.

C3.2.1.2.6.8. History of other cardiovascular risk factors including a family history of cardiovascular disease (especially early age - less than age 55 cardiovascular disease events), diabetes mellitus and obesity.

C3.2.1.2.7. Physical Examination. The primary focus of the examination should be on the cardiovascular system including vital signs (especially blood pressure and pulse) and evaluation of the heart and lungs as indicated by the medical and occupational history.

C3.2.1.2.8. Laboratory. Additional studies should be done if indicated by history or physical examination and may include an electrocardiogram.

C3.2.1.2.9. Other Elements. The following areas should be addressed in counseling.

C3.2.1.2.9.1. Proper use of engineering controls and/or personal protective equipment to reduce exposure.

C3.2.1.2.9.2. Review of personal cardiovascular risk factors including the association of smoking and cardiovascular disease and education on the reduction of cardiovascular risk.

C3.2.1.2.9.3. Advising the patient of any health effects resulting from occupational exposure, including association of nitroglycerin exposure with an excess of ischemic heart disease in individuals under age 35.

C3.2.1.3. Organophosphate and Carbamate Pesticides

C3.2.1.3.1. Hazard Description. Organophosphate and carbamate pesticides are routinely used in a variety of pest control applications. These substances are grouped together because of a common mode of toxic action--the inhibition of the enzyme cholinesterase. Organophosphates, as a class, generally bind to the enzyme irreversibly while carbamates tend to bind reversibly. Human toxicity from these compounds can vary widely. Nearly all are readily absorbed from dermal contact, inhalation, and ingestion, making it essential for medical personnel to evaluate the exposure conditions and work practices of the applicators to assess the exposure hazards from multiple routes. Examples of compounds included in this category are: organophosphate pesticides--Dichlorvos (CAS # 62-73-7); Diazinon (CAS# 333-41-5); Chlorpyrifos (CAS# 2921-88-2); Malathion (CAS#121-75-5); and carbamate pesticides--Carbaryl (CAS# 63-25-2); Thiram (CAS#137-26-8); Propoxur (CAS#114-26-1); Ficam (CAS# 22781-23-1).

C3.2.1.3.2. Exposure Limits. Many organophosphate and carbamate pesticides have exposure limits (PEL) that are included in the OSHA-Z table. Exposure limits for these pesticides carry a skin designation to emphasize that they can be absorbed through the skin.

C3.2.1.3.3. Target Organs(s) and Potential Health Effects. The major target organs for organophosphate and carbamate pesticides are the peripheral and central nervous systems. Organophosphates and carbamates exert their toxic effects by

inhibiting cholinesterase in synapses. In acute exposures, initial hyperstimulation is followed by blockage of the affected synapses. Acute symptoms are excessive bronchial secretions, salivation, respiratory distress, incontinence, pinpoint pupils, fasciculations, abdominal cramps, tremors, cyanosis, and coma.

C3.2.1.3.4. Criteria for Entry in Medical Surveillance Program.

Personnel should be entered into medical surveillance if they are: exposed to airborne concentrations above the action level for 30 or more days per year; at significant risk of absorption from dermal exposure or ingestion; or performing an operation in an area where a worker has experienced toxicity related to pesticide exposure and exposure controls have not been in place long enough to assess their effectiveness. In addition, if a workplace survey identifies significant potential for dermal absorption or ingestion, appropriate hazard controls and work practice changes should be recommended. Medical surveillance may be used in these cases as an adjunct to industrial hygiene monitoring to determine if hazard controls are working. Medical monitoring should not be used as a substitute for industrial hygiene surveys.

C3.2.1.3.5. Surveillance Frequency.

Workers identified for medical surveillance should receive pre-placement, periodic, and termination of exposure examinations. Cholinesterase determinations will be done during the maximum usage period of the pesticide application season. At locations where organophosphate pesticides are used year-round, the worker should receive at least quarterly cholinesterase determinations. All workers should be examined following any emergency over exposure. NOTE: Because reduced cholinesterase activity can be transient, medical surveillance should be performed during the period of time workers are engaging in operations using organophosphate and carbamate pesticides. Sampling workers at times when they are not exposed is of no value and may mislead workers into believing work practices and applications operations are not producing significant exposures.

C3.2.1.3.6. Medical and Occupational History.

At each periodic evaluation, the workers history of use and exposure to pesticides and use of personal protective equipment should be reviewed and updated. A general medical history, along with a specific review of systems emphasizing symptoms of organophosphate/carbamate pesticide toxicity; i.e., headache, salivation, muscle twitching, should be updated or obtained at each evaluation.

C3.2.1.3.7. Physical Examination.

When acute toxicity is suspected, the worker should have a complete neurologic exam (including evaluation of pupillary size and reactivity and observation for muscle fasciculations and tremor), auscultation of the chest for wheezing, and inspection for cyanosis. Routine periodic examinations during

the pesticide use season may be limited to the medical and occupational history and cholinesterase testing. Physical examinations for signs of mild exposures are not recommended.

C3.2.1.3.8. Laboratory. Serum (or plasma) and red blood cell (RBC) cholinesterase baseline levels should be done at preplacement or before exposure. This baseline value should be the average of two or more tests taken at least 72 hours, but not more than 14 days apart, and analyzed at the same laboratory. If two tests are done and the difference between them exceeds 15 percent, a third baseline test should be performed. The average of the two closest values should be considered the true baseline value. All baseline tests should be taken when the worker has had no exposure to cholinesterase inhibitors for at least 30 days. Since the interpretation of cholinesterase levels may be difficult, the following guidance is provided under the guidelines (reference (jjj)).

C3.2.1.3.8.1. Serum (or plasma) cholinesterase has a relatively short half-life whereas RBC cholinesterase has the same half-life as red blood cells (about 120 days). These two enzymes are structurally distinct and are inhibited differently by the various organophosphate and carbamate pesticides. For example, diazinon inhibits serum cholinesterase to a much greater extent than RBC cholinesterase under pesticides studied in man (reference (kkk)). Whereas, carbaryl inhibits both serum and RBC cholinesterase. The normal ranges for serum and RBC cholinesterase determinations are wide with marked interindividual variability and variability if different analytical methods or laboratories are used. For this reason, baseline pre-exposure measurements done by the same methodology, and preferably by the same laboratory, are extremely important. Individuals should be compared against their baseline levels rather than the "normal" range. A reduction in serum cholinesterase activity to 60 percent of baseline may occur before any symptoms appear and a drop to 20 percent of baseline activity is required before serious neuromuscular symptoms become apparent. A variety of medical conditions can depress cholinesterase activity.

C3.2.1.3.8.2. A drop in plasma or RBC cholinesterase levels to 80 percent of a worker's baseline or lower indicates the need for retesting. If the low value is confirmed, the employer should investigate the workplace for faulty work practices and take corrective measures. A drop in RBC cholinesterase level to 70 percent of baseline or lower, or a drop in plasma cholinesterase level to 60 percent of baseline or lower, indicates a need for immediate removal of the worker from all exposure to cholinesterase inhibitors until both parameters return to within 80 percent of the pre-exposure baseline or higher under the guidelines (reference (jjj)).

C3.2.1.3.8.3. In some cases, if exposure to a specific pesticide is suspected, tests for either the chemical or a metabolic product are available. Measurement of urinary organic phosphates is a helpful adjunct to cholinesterase determinations in workers suspected of significant organophosphate exposure. Total urinary organic phosphates in excess of 0.1 mg/L are evidence of significant exposure to organophosphate insecticides. Determination of urinary 1-naphthol is helpful in evaluating workers with suspected exposures to carbaryl. Urinary 1-naphthol levels, measured by colorimetry, greater than 4 mg/L represent significant exposures to carbaryl under 29 U.S.C. 651 *et seq.* and the guidelines (references (k) and (lll)). Reference (mmm) should be consulted for further information on agent specific biologic monitoring.

C3.2.1.3.9. Other Elements

C3.2.1.3.9.1. Removal from exposure if medically indicated (see subparagraph C3.2.1.3.8.2.).

C3.2.1.3.9.2. If respirators are used to protect workers from this hazard, the requirements of 29 CFR 1910.134 (reference (p)) should be applied to assess the worker's ability to safely use the respirator.

C3.2.1.3.9.3. Workers should receive education on the routes of exposure, and the particular importance of dermal exposure; the importance of hand washing and personal hygiene to minimize exposure; and of the symptoms that could represent absorption.

C3.2.1.3.9.4. A healthcare practitioner's written opinion indicating that the worker is qualified for work with organophosphate or carbamate pesticides may be used, if desired.

C3.2.2. Biological Hazards

C3.2.2.1. Biological hazards include microorganisms such as bacteria, viruses, fungi, protozoa, and rickettsiae. Transmission of microorganisms from humans to humans or from animals to humans, in the work setting, may produce occupationally associated infection or disease. Biological hazards may pose a significant risk to many workers in such fields as health care, medical research, public safety, child day care, education, grounds keepers, and animal care. Since most of the infectious diseases caused by biological hazards are not prevented or identified through medical surveillance, no routine medical surveillance is recommended in this section. Pre-placement or baseline medical history, physical examination and immunizations

may be appropriate for certain potential exposures. Subparagraphs C3.2.2.2. through C3.2.2.7. provide general comments on biological hazards and immunizations.

C3.2.2.2. As with chemical and physical hazards, primary prevention provides the best means of protecting workers from biological hazards. Exposure to biological hazards may be prevented or minimized through appropriate infection control methods, proper work practices, and use of personal protective equipment and Universal Precautions.

C3.2.2.3. Immunizations, which also provide primary prevention of disease, are available for many biological hazards. Table C3.T1. provides a reference list of recommendations for immunizations against some frequently encountered biological hazards. Immunization requirements for all military personnel and other applicable non-military personnel can be found in the joint instruction Immunizations and Chemoprophylaxis (Air Force Joint Instruction 48-110, Army Regulation 40-562, BUMEDINST 6230.15, CG COMDINST M6230.4E of 1 NOV 95 (reference (nnn))).

C3.2.2.4. Many biological hazards do not produce a biologic marker or physiologic effect that can be readily detected prior to the development of disease. Therefore, secondary prevention by screening for early health effects is often less effective than it may be for many chemical and physical hazards. On the other hand, *Mycobacterium tuberculosis* is one biological hazard that is associated with a practical screening measure. The tuberculosis (TB) skin test may be used to identify individuals with a previous TB exposure and latent TB infection. Medical surveillance for health care workers with potential exposure to tuberculosis is included in subparagraph C3.2.3.2.

C3.2.2.5. Hantavirus is a recently identified biological hazard that is spread to humans primarily through the inhalation of aerosolized dried rodent excreta. Transmission through exposure of excreta to eyes and broken skin and the handling of rodents or rodent tissue, are also thought possible. Many types of rodents, including the deer mouse, pinon mouse, brush mouse, western chipmunk, and cotton rat have been identified as reservoirs for the virus and all geographic regions of the United States are considered at risk. The disease in humans presents like influenza and may rapidly progress to a life-threatening respiratory disease. Workers at highest risk are those employees who have contact with rodents, disturb rodent nesting, process soil, vegetation, or rodent tissue potentially infected with hantavirus, or have anticipated or suspected exposure when entering or working in facilities where there is a potential for exposure to hantavirus. Prevention of the disease involves education of workers and proper protective measures including use of personal protective equipment. For employees with a high potential for exposure, drawing and freezing pre-exposure,

baseline serum samples has been recommended. Serum samples retained for future comparison must be stored at -20 degrees C (reference (ooo)).

C3.2.2.6. Another recently recognized infectious disease is human ehrlichiosis caused by species of the genus *Ehrlichia*. The disease is usually an acute febrile illness and is associated with tick bites, much like Lyme disease. The disease may be diagnosed by the development of antibodies that cross react with the *Ehrlichia canis* antigen (*Ehrlichia canis* is not the cause of human disease). Frozen, serum samples may be helpful to recognize changes in serum antibody titers (reference (ppp)).

C3.2.2.7. Biological hazards associated with research, development, test and evaluation (RDT&E) may have special requirements. Guidance concerning immunizations and medical examinations for these programs may be found in Department of the Army Pamphlet (DA PAM) 385-69 (reference (qqq)).^{1,2}

Table C3.T1. U.S. Public Health Service Immunization Requirements^{1,2}

Subject	MMWR Publication ³
Hepatitis, viral B	1991;40(RR-13):1-25 (reference (rrr))
	1990;39(RR-2):1-26 (reference (sss))
Hepatitis, viral A	*
Influenza ⁴	1996;45(RR-5):1-24 (reference (ttt))
Measles	1989;38(s-9):1-18 (reference (uuu))
Mumps	1989;38:388-92, 397-400 (reference (vvv))
Poliomyelitis	1982;31:22-6, 31-4 (reference (www))
	1987;36:796-8 (reference (xxx))
Rubella	1990;39(RR-15):1-18 (reference (yyy))
Tetanus	1985;34:405-14, 419-26 (reference (zzz))
Typhoid	1994;43(RR-14):1-7 (reference (aaaa))
Varicella	1996;45(RR-11):1-36 (reference (bbbb))

¹ The Immunization Practices Advisory Committee (ACIP) periodically reviews recommendations on vaccination and prophylaxis. When recommendations are revised, they are published individually in the Morbidity and Mortality Weekly Report (MMWR) published by the Centers for Disease Control and Prevention (CDC).

² General information on immunization schedules and handling, storage and administration of vaccines can be found in MMWR document--"General Recommendations on Immunizations." MMWR 1994;(RR-1):1-39 (reference (cccc)).

³ The MMWR is available on the World Wide Web through the CDC Homepage (<http://www.cdc.gov>) or by subscription that can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325.

⁴ Each year influenza vaccine recommendations are reviewed and amended to reflect updated information on influenza activity in the United States and to provide information on the vaccine available for the upcoming influenza season. These recommendations are published in the MMWR annually, usually in May or June.

* Current recommendations for hepatitis, viral A, immunizations are not available in the MMWR, but may be found in the Annals of Internal Medicine 1996;124:35-40 (reference (dddd)) or the New England Journal of Medicine 1997;336:196-204 (reference (eeee)).

C3.2.3. Occupational Groups

C3.2.3.1. Animal-handlers

C3.2.3.1.1. Hazard Description. Animal handlers who work with or around wild, domestic or laboratory animals may be at risk for a number of infectious diseases spread by or in association with animals. In addition to the infectious hazards, small proteins from animal danders or urine, may be the cause of allergic reactions in sensitized individuals. Work with or around animals can also expose the worker to biomechanical hazards associated with lifting cages or feed bags and physical trauma secondary to bites and scratches from animals. Numerous infectious diseases can be spread through contact with animals, animal excretions or biologic material. Rabies is a well-known animal-related infectious disease, but other less well known diseases, such as Q-fever, brucellosis, and herpes B virus can be spread from animals to humans. Allergies to animals or animal products can produce a spectrum of allergic responses from common allergic conjunctivitis and rhinitis to life-threatening asthma (reference (ccc)).

C3.2.3.1.2. Exposure Limits. There are no exposure limits for this occupational category.

C3.2.3.1.3. Target Organ(s) and Potential Health Effects. The target organs and potential health effects will depend upon the hazards to which the employee is exposed. All infectious diseases can affect the immune and lymphatic system; sensitizing animal proteins can affect the respiratory system through the induction or

aggravation of allergic rhinitis and asthma; and the reproductive system or reproduction can be affected by the known teratogenic agents such as *Toxoplasma gondii*.

C3.2.3.1.4. Criteria for Entry into Medical Surveillance Program

C3.2.3.1.4.1. There are no mandatory criteria for entrance into medical surveillance programs for individuals exposed to animals. This program is designed for all DoD personnel who have occupational exposure to animals including: the direct care of animals or their living areas; or the direct contact with animals (live or sacrificed), their viable tissues, body fluids, or wastes. Typically animal workers are placed into three risk categories based upon the type of animals handled:

Risk Category 1: rodents, rabbits, aquatics

Risk Category 2: cats, dogs, livestock, ferrets

Risk Category 3: non-human primates

C3.2.3.1.4.2. The content of the medical surveillance program, including content of screening or requirements for immunizations, is based upon the Risk Category.

C3.2.3.1.5. Surveillance Frequency. Pre-placement evaluations are recommended for all animal handlers. The periodic examination frequency is based upon Risk Category and the need for immunizations. If periodic evaluations are necessary, they are generally done annually.

C3.2.3.1.6. Medical and Occupational History. The medical and occupational history should concentrate on those conditions or exposures that may place the worker at increased risk for infection. The following specific areas should be emphasized.

C3.2.3.1.6.1. History of medical conditions associated with suppression of the immune system, including underlying chronic medical conditions (i.e., chronic renal failure, diabetes mellitus), use of corticosteroids, and use of immune suppressive agents.

C3.2.3.1.6.2. Verification of immunizations, including tetanus.

C3.2.3.1.6.3. History of allergies, including atopy, dermatitis, allergic rhinitis, asthma, and sensitivity to latex products.

C3.2.3.1.6.4. Reproductive status of worker (specifically current pregnancy for female animal handlers).

C3.2.3.1.7. Physical Examination. Pre-placement examination requirements and annual medical screening for animal handlers may vary by Risk Category and job description. All risk categories should have vital signs and a review of their medical history. Additional requirements are listed in subparagraph C3.2.3.1.9.

C3.2.3.1.8. Additional Studies

C3.2.3.1.8.1. All Risk Categories: Tetanus immunization history and immunization update as indicated.

C3.2.3.1.8.2. Additional for Risk Category 2: toxoplasmosis titer for females of child-bearing age with exposure to cats; rabies prophylaxis if exposure warrants; and Q-fever titer if exposure warrants.

C3.2.3.1.8.3. Additional for Risk Category 3: rubeola titer/immunization if exposure warrants; and tuberculosis screening by skin test if indicated.

C3.2.3.1.9. Other Elements

C3.2.3.1.9.1. Rabies Immunization. Individuals who should receive pre-exposure prophylaxis with human diploid cell rabies vaccine (HDCV) include: those working directly with rabies virus; those having direct contact with animals in quarantine; those having exposure to potentially infected animal body organs or performing post-mortem examinations on animals with a history of poorly defined neurological disorders; those having the responsibility for capturing or destroying wild animals; or those having large animal (Risk Category 2) contact where a potential for exposure exists. Serological monitoring is performed annually on all HDCV recipients with the exception of the first year when the primary series is given. Booster doses are administered to employees with inadequate titers unless they have a history of a hypersensitivity reaction to the vaccine.

C3.2.3.1.9.2. Toxoplasmosis Titer. Women of child-bearing age who are occupationally exposed to cats and/or their waste should be screened for toxoplasmosis and receive appropriate health education regarding the risk of this disease during pregnancy. Every effort should be made to arrange temporary job reassignment while a susceptible employee is pregnant.

C3.2.3.1.9.3. Q Fever Titer. Employees at risk of exposure to Q fever include those with direct contact with *Coxiella burnetti* and those who handle or use products of parturition (placenta, amniotic fluid, blood, or soiled bedding) from infected sheep, goats or cattle. At the time of the pre-exposure examination, the individual should be assessed for the likelihood of developing chronic sequelae of Q fever should they acquire the disease. Individuals susceptible include those who are immunosuppressed and/or have valvular or congenital heart problems.

C3.2.3.1.9.4. Specific Immunizations. Other specific immunizations and antibody titers should be given or obtained on all animal-handlers working with specific agents or with infected or potentially-infected animals.

C3.2.3.1.9.5. Storage or banking of serum samples is not required except when determined to be appropriate and beneficial for the potential exposures encountered. If serum samples are stored, it is imperative that proper labeling and storage are available (reference (ppp)).

C3.2.3.2. Healthcare Workers

C3.2.3.2.1. Hazard Description. Healthcare facilities may present a number of hazards for healthcare workers (HCWs). Subparagraphs C3.2.3.2.1.1. through C3.2.3.2.1.4. provide a partial listing of possible hazards in the hospital worksite.

C3.2.3.2.1.1. Hazardous Drugs. Hazardous drugs are those drugs, whether considered cytotoxic or not, that have proven genotoxicity, carcinogenicity, teratogenicity or fertility impairment, or produce serious organ or other toxic manifestations at low doses in experimental animals or treated patients. Essentially all chemotherapeutic agents and a significant number of the anti-viral agents are included in this category. Worker exposure to these agents occurs during drug preparation, administration, and disposal under the OSHA Technical Manual Directive (reference (fff)).

C3.2.3.2.1.2. Mycobacterium Tuberculosis. *Mycobacterium tuberculosis* (TB) is an aerosol-spread organism that is a known cause of human infection. Transmission of *M. tuberculosis* from individuals with respiratory infection is a known risk to patients and HCWs in healthcare facilities. Historically respiratory tuberculosis infections were treatable with anti-tuberculous medication. Recently the organism has developed resistance to standard anti-tuberculous medication and this resistant organism is referred to as MDR-TB (multi-drug resistant tuberculosis). This

emergence of drug-resistant organisms, along with the difficulty in identifying and diagnosing the tuberculosis infection, especially in individuals with other underlying diseases such as AIDS, has increased the risk of exposure to TB for HCWs under the guidelines (reference (gggg)). TB infection in humans can be categorized as "latent" or active. Latent TB infection is an asymptomatic condition characterized by a positive purified protein tuberculin (PPD) skin test. Individuals with latent TB may or may not have chest x-ray findings consistent with "old TB." On the other hand, active respiratory/pulmonary TB infection is usually characterized by cough, sputum production, fever, night sweats, and weight loss. Typically, if the infected individual has an otherwise intact immune system, the TB skin test is positive and the chest x-ray will reveal evidence of the infection. Prevention of the spread of TB is through the early identification and isolation of infected individuals and the use of respiratory protection by the HCWs. If the HCW is provided respiratory protection they must also be enrolled in the Respiratory Protection Program (see Chapter 2).

C3.2.3.2.1.3. Other Chemical and Physical Hazards. HCWs frequently encounter numerous other workplace hazards. The biomechanical hazards of lifting patients and pushing food and laundry carts are a common cause of low back pain and injury in the healthcare setting. Heat and noise hazards can also be found in mechanical spaces, laundries and kitchens. Many chemicals are used in the hospital work environment. Individual OSHA standards govern the medical screening for workers exposed to ethylene oxide and formaldehyde, but other common hospital chemicals, such as glutaraldehyde, are not covered by any specific regulation. A recent addition to the list of hospital workplace hazards is exposure to airborne latex particles from gloves and other products made from latex. These latex particles have been identified as a cause of allergic reactions in both patients and sensitized workers (reference (hhhh)).

C3.2.3.2.1.4. Blood-borne Pathogens. Requirements for the medical aspects of the blood-borne pathogens program, including vaccination against hepatitis B virus, are found in Chapter 2. The DoD hepatitis B immunization policy requires hepatitis B vaccination for all DoD medical or dental personnel hired or beginning healthcare worker activity after January 1, 1997 (reference (iiii)). See reference (iiii) for policy and exemptions.

C3.2.3.2.2. Exposure Limits. Not applicable.

C3.2.3.2.3. Target Organ(s) and Potential Health Effects. See subparagraph C3.2.3.2.1.

C3.2.3.2.4. Criteria for Entry into Medical Surveillance Program.

Criteria for entry into the medical programs for the OSHA-mandated Blood-borne Pathogens and Respiratory Protection programs are provided in Chapter 2. The OSHA Technical Manual chapter on controlling occupational exposures to hazardous drugs, recommends that those employees potentially exposed to hazardous drugs be enrolled in medical surveillance programs under the OSHA Technical Manual Directive (reference (ffff)). In 1994 the Centers for Disease Control and Prevention published, "Guidelines for Preventing the Transmission of Mycobacterium Tuberculosis in Healthcare Facilities, 1994" (MMWR volume 43 RR-13, Oct 28, 1994, reference (gggg)). These guidelines outlined the tuberculosis program recommended for healthcare facilities and the requirements for TB skin testing in HCWs.

C3.2.3.2.5. Surveillance Frequency. Pre-placement evaluations are indicated for all HCWs with potential hazardous exposures. The frequency of follow-up evaluations is based upon type, duration and risk of exposure. Healthcare facilities at high-risk for tuberculosis exposure may need to conduct TB screening every 3-6 months, or as needed following known exposures. Otherwise, periodic screening is generally done annually. Examinations following acute exposures and at the termination of employment are also recommended for HCWs exposed to hazardous drugs. Recommendations for post-exposure prophylaxis for HIV exposed workers are provided in reference (jjjj).

C3.2.3.2.6. Medical and Occupational History. The medical and occupational history should be tailored to the type of HCW exposure.

C3.2.3.2.6.1. All HCWs should be asked about medical conditions that may suppress their immune system, including underlying chronic medical conditions (i.e., chronic renal failure, diabetes mellitus), use of corticosteroids, and use of immune suppressive agents.

C3.2.3.2.6.2. Verification of immunizations or documentation of antibodies to specific viruses is required of all HCWs. In addition to hepatitis B (see Chapter 2), immunization or immunity to rubella, measles, mumps and varicella (chicken pox) may be required or recommended (reference (vvv)).

C3.2.3.2.6.3. History of exposure to tuberculosis and history of results of prior TB skin testing.

C3.2.3.2.6.4. History of allergic dermatitis and specifically history of allergy to latex products.

C3.2.3.2.6.5. History of use or ability to wear respirator (TB and Respiratory Protection Program).

C3.2.3.2.6.6. Reproductive status (specifically for female HCWs--if they are currently pregnant).

C3.2.3.2.6.7. Physical Examination. The physical examination requirements, like the medical/ occupational history requirements, will need to be based upon the toxic effects of the potential exposure and the need for respiratory protection or other personal protective equipment. For HCWs with potential exposure to hazardous drugs, a complete examination with emphasis on the skin, mucous membranes, cardiopulmonary system, lymphatic system, and liver is recommended.

C3.2.3.2.6.8. Laboratory

C3.2.3.2.6.8.1. Immunizations, as indicated, or verification of immunity, if required.

C3.2.3.2.6.8.2. TB skin testing as recommended by CDC guidelines (reference (eeee)).

C3.2.3.2.6.8.3. Other laboratory testing as indicated by history and physical examination.

C3.2.3.2.6.8.4. Annual influenza vaccination for healthcare workers is recommended by the Centers for Disease (reference (ttt)).

C3.2.3.2.6.8.5. For HCWs with exposure to hazardous drugs, a complete blood count with differential white blood cell count, liver function tests, blood urea nitrogen, creatinine, and urinalysis are recommended. The frequency of this testing may be from every year to every 3 years and should be determined by exposure, worker history, and discretion of occupational medicine physician under the OSHA Technical Manual (reference (ffff)).

C3.2.3.2.6.9. Other Elements. See Chapter 2 for requirements for the exposure to blood-borne pathogens. Appendix 5, Hepatitis B Vaccination Declination Form, should be completed and filed in the HCWs medical record if the HCW declines to receive the hepatitis B vaccination series. For Uniformed Service members, waivers are granted only in case of legitimate religious objections to immunization and are revoked if necessary to ensure the accomplishment of the military mission.

C3.2.3.3. Firefighters. DoD Instruction 6055.6 (reference (kkkk)) adopts the National Fire Protection Association (NFPA) Standard 1582, "Medical Requirements for Firefighters" (reference (llll)) as the medical surveillance guidelines for firefighters. These medical screening guidelines replace the medical qualification specifications for civilian firefighters (GS-081) specified by the Office of Personnel Management (reference (mmmm)). These standards are also applicable to full-time military firefighters, but not those assigned fire-fighting as an additional duty (e.g., shipboard fire fighting).

C3.2.3.3.1. Hazard Description. Firefighters are exposed to the chemical hazards of smoke and combustion products and the physical hazards of heat, climbing a ladder, carrying heavy equipment, and wearing a self-contained breathing apparatus. In addition to fighting fires, some firefighters serve as first responders for toxic chemical releases, hazardous material spills, confined space rescue, and for medical emergencies. To function as a firefighter, the individual must maintain a high level of physical fitness and have a healthy cardio-respiratory system.

C3.2.3.3.2. Exposure Limits. Not defined.

C3.2.3.3.3. Target Organ(s) and Potential Health Effects. The respiratory system is the primary target organ for inhalation exposures to smokes and fumes. The cardiovascular system must be able to respond to extremes of physical exertion and exposure to high ambient temperatures. The musculoskeletal system is also at risk from the requirement to climb ladders and carry loads.

C3.2.3.3.4. Criteria for Entry into Medical Surveillance Program. All firefighters are included in the program when they are hired to fight fires.

C3.2.3.3.5. Surveillance Frequency. All firefighters shall receive a medical evaluation annually to certify ability to continue participating in a training or emergency environment as a fire fighter. The medical evaluation shall include a physical examination according to the following schedule:

At time of placement
Ages 29 and under - every 3 years
Ages 30-39 - every 2 years
Ages 40 and over - every year

C3.2.3.3.6. Medical and Occupational History. At placement, a complete medical and occupational exposure history shall be obtained. This history should be updated on each subsequent evaluation.

C3.2.3.3.7. Physical Examination. Height, weight, blood pressure, pulse rate and respirations are required. For physical examinations, completed by the schedule listed above, the required elements of the physical examination are:

C3.2.3.3.7.1. Vital signs.

C3.2.3.3.7.2. Height and weight.

C3.2.3.3.7.3. Examination of skin; eyes, ears, nose and throat; and cardiovascular, respiratory, gastrointestinal, endocrine/metabolic; musculoskeletal and neurologic systems.

C3.2.3.3.8. Laboratory

C3.2.3.3.8.1. Required tests are:

C3.2.3.3.8.1.1. Audiometry;

C3.2.3.3.8.1.2. Visual acuity and peripheral vision;

C3.2.3.3.8.1.3. Pulmonary function testing (spirometry).

C3.2.3.3.8.2. Additional laboratory tests or diagnostic imaging if clinically indicated from medical history or physical examination findings.

C3.2.3.3.8.3. Other recommended, but not required, laboratory testing includes:

C3.2.3.3.8.3.1. Pre-placement chest x-ray;

C3.2.3.3.8.3.2. Baseline electrocardiogram;

C3.2.3.3.8.3.3. For firefighters age 40 and over--complete blood count, urinalysis, and chemistry profile (i.e., a focused chemistry panel such a cholesterol panel evaluating cardiovascular risk factors would be the most appropriate screen here as opposed to a generic blood chemistry panel). Consideration should be given to obtaining the above laboratory tests at placement for a baseline.

C3.2.3.3.9. Other Elements

C3.2.3.3.9.1. Civilian Firefighters. The NFPA Medical Requirements for Firefighters provides guidance on which medical conditions disqualify (Category A conditions) or may potentially disqualify (Category B conditions) an individual from being a firefighter. Each installation providing medical screening for firefighters should have access to the NFPA document and should refer to these requirements in developing their firefighter medical monitoring program. While NFPA Category A conditions are listed as medically disqualifying, it is prudent to follow the guidance in 5 CFR Part 339 (reference (i)), Medical Qualification Determinations for the evaluation and disposition of both Category A and B conditions. This guidance specifically addresses that care be used to consider each case on an individual basis, obtaining consultation on each case with the employee's private physician or with the relevant military medical specialists as appropriate. A determination should be made by the examining physician whether a disqualifying medical condition is temporary or permanent in nature and whether the employee's medical condition has reached maximum medical benefit. This information should be discussed with the employee's supervisor and employee relations representative (with care given not to divulge medical information that might be considered confidential). Guidance should be given to the supervisor on what accommodations might be possible for the employee to perform the minimum essential functions of his/her job. The final decision on whether an employee with a disqualifying medical condition is to be retained at work or accommodated is a managerial decision, not a medical decision.

C3.2.3.3.9.2. Military Firefighters. The NFPA medical monitoring requirements defined in NFPA Standard 1582 (reference (III)) shall be applied to full-time military firefighters. Medical fitness for duty procedures for military members shall follow Service-specific Medical Evaluation and Physical Evaluation Board procedures. Final determination of duty status for military members is a personnel action (similar to the case with civilian employees) defined by the Physical Evaluation Board process mentioned above.

C3.2.3.3.9.3. Reserve Force Firefighters. Medical surveillance requirements and fitness for duty evaluations for Reserve force firefighters shall address only those exposures or functional capabilities expected during active duty, including anticipated duties during deployment. The NFPA medical monitoring requirements defined in NFPA Standard 1582 (reference (III)) shall be applied to Reserve force firefighters. Fitness for duty procedures shall follow Service-specific medical evaluation and physical examination board procedures (identical to the active duty force). Medical monitoring requirements for exposures while employed by the

States or other non-DoD organizations, as well as fitness for duty evaluations arising from these activities, is beyond the scope of this Manual and will be addressed by those employers.

AP1. APPENDIX 1

DD FORM 2493-1 (ASBESTOS EXPOSURE)

ASBESTOS EXPOSURE PART I - INITIAL MEDICAL QUESTIONNAIRE											
IDENTIFICATION											
1. NAME (Last, First, Middle Initial)			2. SOCIAL SECURITY NO. (1 - 9)			3. CLOCK NO. (10 - 18)		4. PRESENT OCCUPATION			
5. NAME OF PLANT				6. STREET ADDRESS OF PLANT				7. PLANT CITY, STATE AND ZIP CODE			
8. TELEPHONE NO. (Include area code)		9. NAME OF INTERVIEWER			10. DATE OF INTERVIEW (10 - 21) (YYYYMMDD)		11. DATE OF BIRTH (22 - 28) (YYYYMMDD)		12. PLACE OF BIRTH		
13. SEX (X one)		14. MARITAL STATUS (X one)				15. RACE (X one)			16. HIGHEST GRADE COMPLETED IN SCHOOL		
a. MALE		a. SINGLE		b. MARRIED		a. WHITE		b. BLACK		c. ASIAN	
b. FEMALE		c. WIDOWED		d. DIVORCED/SEPARATED		d. HISPANIC		e. INDIAN		f. OTHER	
MEDICAL DATA											
17. OCCUPATIONAL HISTORY						21. DID YOU HAVE ANY LUNG TROUBLE BEFORE THE AGE OF 16?					
a. HAVE YOU EVER WORKED FULL TIME (30 hours per week or more) FOR SIX MONTHS OR MORE?						Yes No N/A					
b. IF YES, HAVE YOU EVER WORKED FOR A YEAR OR MORE IN ANY DUSTY JOB? *If Yes, complete (1) - (5).						22. HAVE YOU EVER HAD ANY OF THE FOLLOWING?					
(1) Specify Job/Industry		(2) Total years worked		(3) Dust Exposure (X one)		a. ATTACKS OF BRONCHITIS * If yes, complete (1) and (2).		(1) Age at first attack		(2) Was it confirmed by a doctor?	
				MILD MODERATE SEVERE		b. ATTACKS OF PNEUMONIA (include bronchopneumonia) *If yes, complete (1) and (2)		(1) Age at first attack		(2) Was it confirmed by a doctor?	
c. HAVE YOU EVER BEEN EXPOSED TO GAS OR CHEMICAL FUMES IN YOUR WORK? *If Yes, complete (1) - (3).						23. HAVE YOU EVER HAD CHRONIC BRONCHITIS?					
(1) Specify Job/Industry		(2) Total years worked		(3) Exposure (X one)		a. HAY FEVER * If yes, complete (1) and (2).		(1) Age at first attack		(2) Was it confirmed by a doctor?	
				MILD MODERATE SEVERE		24. HAVE YOU EVER HAD EMPHYSEMA?		a. IF YES, DO YOU STILL HAVE IT?		b. WAS IT CONFIRMED BY A DOCTOR?	
d. WHAT HAS BEEN YOUR USUAL OCCUPATION - THE ONE YOU HAVE WORKED AT THE LONGEST?						25. HAVE YOU EVER HAD ASTHMA?					
(1) Job/Occupation			(2) Number of years employed in this occupation			a. AT WHAT AGE DID IT START? (List age)		a. IF YES, DO YOU STILL HAVE IT?		b. WAS IT CONFIRMED BY A DOCTOR?	
(3) Position/Job Title			(4) Business, Field or Industry			c. AT WHAT AGE DID IT STOP? (List age)		26. HAVE YOU EVER HAD ASTHMA?		a. IF YES, DO YOU STILL HAVE IT?	
e. HAVE YOU EVER WORKED (X Yes or No and specify years worked, e.g. 1980 - 1989.)						27. HEART TROUBLE					
(1) In a mine		Years Worked				a. HAS A DOCTOR EVER TOLD YOU THAT YOU HAD HEART TROUBLE?		b. IF YES, HAVE YOU EVER HAD TREATMENT FOR HEART TROUBLE IN THE PAST TEN YEARS?			
(2) In a quarry						28. HIGH BLOOD PRESSURE		a. HAS A DOCTOR EVER TOLD YOU THAT YOU HAD HIGH BLOOD PRESSURE (Hypertension)?		b. IF YES, HAVE YOU EVER HAD TREATMENT FOR HIGH BLOOD PRESSURE IN THE PAST TEN YEARS?	
(3) In a foundry						29. WHEN DID YOU LAST HAVE YOUR CHEST X-RAYED? (Year)		a. WHERE DID YOU LAST HAVE YOUR CHEST X-RAYED? (If known)		b. WHAT WAS THE OUTCOME?	
(4) In a pottery											
(5) In a cotton, flax or hemp mill											
(6) With asbestos											
18. MEDICAL HISTORY						30. CHEST X-RAY					
a. DO YOU CONSIDER YOURSELF TO BE IN GOOD HEALTH? *If No, state reason.						a. ANY OTHER CHEST ILLNESSES *If yes, please specify.					
b. HAVE YOU ANY DEFECT OF VISION? *If Yes, state nature of defect.						b. ANY CHEST OPERATIONS *If yes, please specify.					
c. HAVE YOU ANY HEARING DEFECT? *If Yes, state nature of defect.						c. ANY CHEST INJURIES *If yes, please specify.					
d. ARE YOU SUFFERING FROM OR HAVE YOU EVER SUFFERED FROM						27. HEART TROUBLE					
(1) Epilepsy (Or fits, convulsions or convulsions)						a. HAS A DOCTOR EVER TOLD YOU THAT YOU HAD HEART TROUBLE?					
(2) Rheumatic Fever						b. IF YES, HAVE YOU EVER HAD TREATMENT FOR HEART TROUBLE IN THE PAST TEN YEARS?					
(3) Kidney Disease						28. HIGH BLOOD PRESSURE					
(4) Bladder Disease						a. HAS A DOCTOR EVER TOLD YOU THAT YOU HAD HIGH BLOOD PRESSURE (Hypertension)?					
(5) Diabetes						b. IF YES, HAVE YOU EVER HAD TREATMENT FOR HIGH BLOOD PRESSURE IN THE PAST TEN YEARS?					
(6) Jaundice						29. WHEN DID YOU LAST HAVE YOUR CHEST X-RAYED? (Year)					
19. IF YOU GET A COLD, DOES IT USUALLY GO TO YOUR CHEST? (Usually means more than 1/2 of the time)*Don't get colds						30. CHEST X-RAY					
20. CHEST ILLNESSES						a. WHERE DID YOU LAST HAVE YOUR CHEST X-RAYED? (If known)					
a. DURING THE PAST THREE YEARS, HAVE YOU HAD ANY CHEST ILLNESSES THAT HAVE KEPT YOU OFF WORK, INDOORS AT HOME, OR IN BED?						b. WHAT WAS THE OUTCOME?					
b. IF YES, DID YOU PRODUCE PHEGM WITH ANY OF THESE ILLNESSES?											
c. IN THE LAST THREE YEARS, HOW MANY SUCH ILLNESSES WITH INCREASED PHEGM DID YOU HAVE WHICH LASTED A WEEK OR MORE? (List number)											

DD FORM 2493-1, JAN 2000

PREVIOUS EDITION MAY BE USED.

AP2. APPENDIX 2

DD FORM 2493-2 (ASBESTOS EXPOSURE)

ASBESTOS EXPOSURE PART II - PERIODIC MEDICAL QUESTIONNAIRE									
IDENTIFICATION									
1. NAME (Last, First, Middle Initial)			2. SOCIAL SECURITY NO. (1 - 9)		3. CLOCK NO. (10 - 15)		4. PRESENT OCCUPATION		
5. NAME OF PLANT			6. STREET ADDRESS OF PLANT				7. PLANT CITY, STATE AND ZIP CODE		
8. TELEPHONE NO. <small>(Include area code)</small>		9. NAME OF INTERVIEWER			10. DATE OF INTERVIEW <small>(10 - 21) (YYYYMMDD)</small>		11. MARITAL STATUS <i>(X one)</i>		
							<input type="checkbox"/> a. SINGLE <input type="checkbox"/> b. MARRIED <input type="checkbox"/> c. WIDOWED <input type="checkbox"/> d. DIVORCED/SEPARATED		
MEDICAL DATA									
12. OCCUPATIONAL HISTORY				Yes		No		NA	
a. IN THE PAST YEAR, DID YOU WORK FULL TIME (30 hours per week or more) FOR SIX MONTHS OR MORE?									
b. DID YOU WORK AT ANY DUSTY JOB DURING THE PAST YEAR? <i>*If Yes, complete c.</i>									
c. WAS EXPOSURE <i>(X one)</i>				MILD		MODERATE		SEVERE	
d. IN THE PAST YEAR, WERE YOU EXPOSED TO GAS OR CHEMICAL FUMES IN YOUR WORK? <i>*If Yes, complete e.</i>									
e. WAS EXPOSURE <i>(X one)</i>				MILD		MODERATE		SEVERE	
f. IN THE PAST YEAR, WHAT WAS YOUR									
(1) Job/Occupation									
(2) Position/Job Title									
13. MEDICAL HISTORY				Yes		No		NA	
a. DO YOU CONSIDER YOURSELF TO BE IN GOOD HEALTH? <i>*If No, state reason.</i>									
b. IN THE PAST YEAR, HAVE YOU DEVELOPED									
(1) Epilepsy <i>(Or fits, seizures or convulsions)</i>									
(2) Rheumatic Fever									
(3) Kidney Disease									
(4) Bladder Disease									
(5) Diabetes									
(6) Jaundice									
14. IF YOU GET A COLD, DOES IT USUALLY GO TO YOUR CHEST? <i>(Usually means more than 1/2 of the time)* Don't get colds</i>									
15. CHEST ILLNESSES									
a. DURING THE PAST YEAR, HAVE YOU HAD ANY CHEST ILLNESSES THAT HAVE KEPT YOU OFF WORK, INDOORS AT HOME, OR IN BED?									
b. IF YES, DID YOU PRODUCE PHLEGM WITH ANY OF THESE ILLNESSES?									
c. IN THE LAST YEAR, HOW MANY SUCH ILLNESSES WITH INCREASED PHLEGM DID YOU HAVE WHICH LASTED A WEEK OR MORE? <i>(List number)</i>									
16. RESPIRATORY SYSTEM									
a. IN THE PAST YEAR, HAVE YOU HAD			Yes		No		b. DO YOU HAVE		
							(1) Frequent Colds		
(1) Asthma							(2) Chronic Cough		
(2) Bronchitis							(3) Shortness of breath when walking or climbing one flight of stairs		
(3) Hay Fever							c. DO YOU		
(4) Other Allergies							(1) Wheeze		
(5) Pneumonia							(2) Cough up phlegm		
(6) Tuberculosis							(3) Smoke cigarettes <i>(X years)</i>		
(7) Chest Surgery							Packs per day		
(8) Other Lung Problems							Number of years		
(9) Heart Disease									
18. SIGNATURE							19. DATE SIGNED <small>(YYYYMMDD)</small>		

DD FORM 2493-2, JAN 2000

PREVIOUS EDITION MAY BE USED.

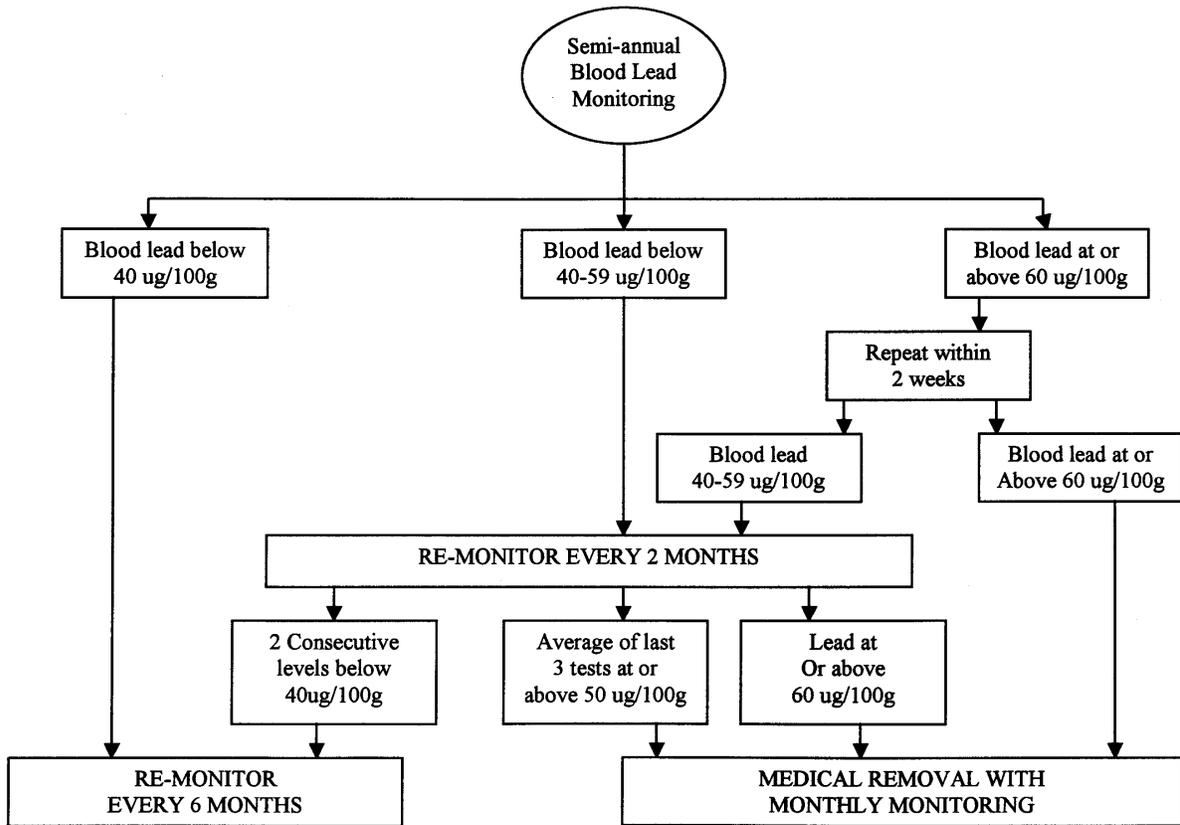
AP3. APPENDIX 3

PHYSICIAN'S WRITTEN OPINION

<u>PHYSICIAN'S WRITTEN OPINION</u>	
	DATE
OCCUPATIONAL EXPOSURE TO: PHYSICIAN'S WRITTEN OPINION in the case of:	
Name: _____ SSN: _____ Dept/Code: _____	
1. The above noted individual was examined regarding exposure to _____.	
On the basis of this examination, the following comments are submitted:	
2. A medical condition WAS or WAS NOT detected that would place the employee at an increased risk of material impairment of health from exposure to _____. Comments (if applicable):	
3. Limitations ARE or ARE NOT recommended on this individual's exposure or use of personal protective equipment, including respirators. Comments (if applicable):	
4. The employee has been counseled regarding the results of this medical evaluation and of any medical conditions resulting from this exposure that require further evaluation or treatment.	
Date _____	(Examiner's signature and stamp)
Original: employee's command Copies: employee health record	
THIS LETTER IS PROTECTED BY THE PRIVACY ACT OF 1974	

AP4. APPENDIX 4

SEMI-ANNUAL BLOOD LEAD MONITORING



AP5. APPENDIX 5

HEPATITIS B VACCINE DECLINATION

HEPATITIS B VACCINE DECLINATION

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease (chronic liver disease and primary liver cancer), and could possibly transmit (oral as well as parenteral) it to others (i.e., family members, blood transfusion recipients, etc.). If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Name

Date

[Note: This sample Hepatitis B Vaccine Declination Form contains the minimum information required by the OSHA Blood-born Pathogens Standard. Individual installations may include additional risk communication information on the serious consequences of hepatitis B, possible routes of transmission, and the advantages of the hepatitis B vaccination.]