**(Model SOP)**

**United States Army**

**Name of the Clinic**

**Occupational Health**

**(OFFICE SYMBOL) SOP #\_\_\_\_\_**

**Effective Date\_\_\_\_\_**

**Date Removed from Service\_\_\_\_\_**

**CADMIUM**

**1. PURPOSE**

1. To define and provide guidance to the employees of (name of clinic / facility) regarding exposure to cadmium at (name of installation)
2. To provide guidelines for appropriately assessing personnel with accidental, acute, or chronic exposure to cadmium and/or cadmium containing products
3. To provide guidelines for preventing, detecting and minimizing cadmium-induced disease

**2. AUTHORITY AND REGULATORY COMPLIANCE**

Federal, DoD, and Army authority for regulating occupational cadmium and cadmium compounds exposure are found below in the References section of this SOP

**3. REFERENCES**

1. 29 CFR 1910.1027, Occupational Safety and Health Administration (OSHA)
2. National Institute for Occupational Safety and Health (NIOSH), *Occupational Safety and Health Guideline for Benzene, 1998*
3. DOD 6055.05-M, Occupational Medical Examinations and Surveillance Manual
4. AR 40-5, Preventive Medicine, 25 May 2007
5. AR 40-66, Medical Record Administration and Healthcare Documentation, 17 June 2008 (RAR: 04 January 2010)
6. Agency for Toxic Substances and Disease Registry (ATSDR), Toxicological Profile for Cadmium
7. Centers for Disease Control and Prevention (CDC)

**4. ABBREVIATIONS / TERMS**

AD – Active Duty

AL – Action Level

B2-M – Beta 2-microglobulin

BUN – Blood urea nitrogen

CBC – Complete Blood Count

CdB – Blood Cadmium

CdU – Urinary Cadmium

CEMR – Civilian Employee Medical Records

CMSP – Cadmium Medical Surveillance Program

CNS – Central Nervous System

Cr – Serum creatinine

DA – Department of the Army

IH – Industrial Hygiene

NIOSH – National Institute for Occupational Safety and Health

NPRC – National Personnel Records Center

OHC – Occupational Health Clinic

OHP – Occupational Healthcare Provider

OIC – Officer in Charge

OSHA – Occupational Safety and Health Administration

PEL – Permissible Exposure Limit

PFT – Pulmonary Function Test

PPE – Personal Protective Equipment

PPM – Parts per Million

TWA – Time Weighted Average

WBC – White Blood Cell Count

**5. PROCEDURE**

1. Determination of Need for a Cadmium Medical Surveillance Program (CMSP)
2. The OHP will determine the need to enroll DA civilian employees or AD personnel into a CMSP through worksite sampling data made available by installation IH, safety personnel, or other designated installation personnel responsible for occupational exposure control. The requirements for enrollment are based on the OSHA AL and PEL. The CMSP will be administered by the Occupational Health Clinic at (name of OHC or location/installation)
3. Enrollment in the CMSP is required for all employees who are:
4. Currently Exposed
5. The employer shall institute a medical surveillance program for all employees who are or may be exposed to cadmium at or above the action level (AL) unless the employer demonstrates that the employee is not, and will not be, exposed at or above the action level of 2.5 micrograms per cubic meter of air on 30 or more days per year (twelve consecutive months)
6. Medical Surveillance Guidelines for Cadmium
7. Medical Surveillance. There are three (3) required medical examinations as part of the CMSP:
   1. Initial/baseline medical examination. This examination shall be provided to those employees within 30 days after initial assignment to a job with exposure to cadmium or no later than 90 days after the effective date of this section, whichever date is later. The initial examination shall include:
      1. Detailed medical and occupational history
8. Past, present, and anticipated future exposure to cadmium
9. Any history of renal, cardiovascular, respiratory, hematopoietic, reproductive, and/or musculoskeletal system dysfunction; current medication usage with potential nephrotoxic side-effects
10. Smoking history and current status
    * 1. Laboratory, diagnostic, and certification studies
11. Respirator certification (if required)
12. Pulmonary functional test (PFT)
13. Bio-monitoring laboratory tests
14. CdB
15. CdU
16. B2-M
    * 1. An initial examination is not required to be provided if adequate records show that the employee has been examined within the past 12 months
      2. The lab results for all cadmium medical surveillance examinations shall determine an employee’s bio-monitoring category
      3. Table 1. (Adapted from Table C4.T1 in DoD 6055.05M) shows cadmium biomonitoring results determining three exposure categories, with the highest result determining the category except as noted. Each exposure category requires a unique medical surveillance schedule

Table 1: Cadmium Bio-monitoring Results Category

|  |  |  |  |
| --- | --- | --- | --- |
|  | Category A | Category B | Category C |
| - Medical examinations every other year  - Laboratory examinations (CdU, CdB, B2-M) every year | - Medical examinations at 90 days, at 1 year, and then every year  - Laboratory examinations at 90days, 6 months and then every 6 months. | - Medical examinations at 90 days, 6 months, and then every 6 months  - Laboratory examinations at 90 days, 3 months, and then every 3 months |
| CdU | ≤ 3 | >3 & ≤ 7 | > 7 |
| CdB | ≤ 5 | >5 & ≤ 10 | > 10 |
| B2-M | ≤ 300 | >300 & ≤ 750 | >750\* |

\* For medical removal, must also have CdU greater than 3 or CdB greater

than 5

* 1. Periodic/annual medical examination

1. A detailed medical and work history, or update thereof, with emphasis on: past, present and anticipated future exposure to cadmium; smoking history and current status; reproductive history; current use of medications with potential nephrotoxic side-effects; any history of renal, cardiovascular, respiratory, hematopoietic, and/or musculo-skeletal system dysfunction; and as part of the medical and work history, for employees who wear respirators, questions 3-11 and 25-32 in Appendix D of 29 CFR 1910.1027
2. Physical examination with emphasis on blood pressure, respiratory system and urinary system
3. Prostate palpation for males over 40 years old
4. Chest X-ray (PA only, 14 x 17in)
5. Respirator certification (if required)
6. Pulmonary function tests (PFT) including forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV(1))
7. Laboratory tests:

Urine

Urinalysis including:

(a) Urine creatinine

(b) Urine albumin

(c) Glucose

(d) Total and low molecular weight proteins

Blood

1. CBC
2. BUN
3. Serum creatinine

Special tests / Bio-monitoring tests

1. CdB
2. CdU
3. B2-M
4. Any additional tests deemed appropriate by the examining provider
   1. Emergency Examination. The same as periodic examination
   2. Termination Examination. The same as periodic examination
   3. Special Laboratory Collection Instructions
5. Those engaged in performing cadmium medical examinations should ensure the lab is familiar with CdU collection and analysis procedures. After collection, the sample should be checked for specific gravity to ensure it is not too diluted, which would render the result (corrected per gram Cr) falsely high. To avoid this, a specimen should have a specific gravity greater than 1.008 to be submitted for lab analysis
6. The specimen should also be screened for pH. A sample too acidic (pH below 5.5) will falsely lower beta 2-microglobulin results. If the pH is below or equal to 5.5, sodium hydroxide must be added to raise the pH to approximately 7. Alternatively, the collection container can be rinsed with a dilute sodium hydroxide solution before collection and the residual will normally raise the pH into an acceptable range. Finally, beta 2-microglobulin degrades quickly. To collect it properly, the worker must void (This sample can be used for the UA and the CdU), then void a second sample (for the beta 2-microglobulin) within 1 hour of the original voiding
7. Occupational Health Provider Opinions

1. Once the medical surveillance examinations are completed, the occupational health provider (OHP) shall promptly furnish a written medical opinion to the employee’s supervisor, and make available to the employee within two weeks
2. The medical opinion shall include:
3. Diagnoses related to cadmium
4. Occupationally pertinent results of the medical examination and laboratory testing
5. Opinion of risk from further cadmium exposure
6. Recommended removal from, and/ or limitation on the activities or duties of the employee or on the employee’s use of PPE or respirator use
7. Statement that the provider has clearly and carefully explained to the employee the results of the medical examination and has been informed of the medical encounter findings related to cadmium exposure
8. Medical Removal Plan
9. A recommendation to the worker’s employer for temporary removal from his/her work environment will be made when:
10. The exposure exceeds the AL
11. When the examining OH provider determines in a written medical opinion that the employee should be removed from cadmium exposure for medical reasons
12. The provider’s determination may be based on:
13. Bio-monitoring results
14. Inability to wear a respirator
15. Evidence of illness and other signs or symptoms of cadmium-related dysfunction / disease
16. Any other reason deemed medically appropriate by the OHP
17. A recommendation for the employer to place the employee in another position where exposure to cadmium is below the action level or below the PEL if the reason for removal is inability to wear a respirator. If such a position is not immediately available, a recommendation for the employer to provide one as soon as it becomes available
18. Medical surveillance must be continued for any employee removed from duty at least every three months with follow-up bio-monitoring and medical examination semiannually until the examining provider provides a written medical opinion that the employee may be returned to the former job status or that the employee must be permanently removed from excess cadmium exposure
19. Worker Training and Education
20. Employees must receive training prior to or at the time of their initial assignment to a position that involves potential exposure to cadmium and at least annually thereafter
21. Required training elements must be conducted IAW 29 CFR 1910.1027. Training shall include:
22. Formation about where and how cadmium is used, stored, and released at the worksite, including processes or operations that involve potential cadmium exposure, especially above the PEL and AL
23. Explanation of engineering controls and work practices for the employee’s job assignment to control exposure to cadmium associated with the employee’s job assignment
24. Description of measures employees can take to protect themselves from cadmium exposure, such as modification of smoking, personal hygiene precautions, and appropriate work practices
25. Explanation of emergency procedures
26. Information on the purpose, selection, fitting, use, and limitations of personal protective equipment
27. Explanation of the medical surveillance program
28. Make a copy of the cadmium standard and its appendices readily available and provide employees with a copy of the standard if requested
29. Informing employees of their rights of access to records
30. Civilian Workers
31. Medical Records (CEMR) developed for employees who may be exposed to hazardous chemicals must be retained, made available, and transferred IAW OSHA standard for Access to Employee Exposure and Medical Records (29 CFR 1910.1020)
32. The occurrence of injury or illness related to occupational exposure must be recorded in accordance with OSHA recordkeeping regulation (29 CFR 1904). AR 40-66 also addresses compliance and use of the CEMR
33. Recordkeeping.
    1. Medical records of employees participating in the CMSP shall include:
       1. The name and social security number of the employee

* + 1. A description of the employee’s duties

* + 1. A copy of the provider’s written opinions and an explanation sheet for biological monitoring results
    2. A copy of the medical history and results of the physical examination and all test results
    3. A description of any employee symptoms that might be related to cadmium exposure
  1. Upon request of the employee, an employee’s designated representative, anyone having the written consent of the employee, and members of the employee’s family after the employee’s death or incapacitation, copies of these records will be provided within 15 days of such a request

1. Medical records of employees participating in the CMSP must be kept for the period of employment plus 30 years in accordance with 29 CFR 1910.1020. They are sent to long-term storage at NPRC in St. Louis after the employee terminates or retires from federal service