



**2600SEG233**  
**CADMIUM EXPOSURE PREVENTION STANDARD**

**1.0 PURPOSE**

The purpose of this standard is to prevent hazardous exposure to cadmium. High cadmium levels in the blood cause chronic health problems, such as kidney damage, stomach irritation, increase in prostate cancer risk, and damage to the respiratory system.

**2.0 BACKGROUND**

At the Panama Canal Authority (PCA), cadmium is used in several shops in the form of silver, copper, and zinc alloys, zinc anodes, wires, plasma, pigment, and welding.

**3.0 SCOPE**

This standard applies to all PCA employees, contractors, and third parties inside the facilities, industrial shops, and areas under PCA responsibility.

**4.0 LEGAL BASIS**

This standard is based on Agreement No. 12 of the PCA Board of Directors; Chapter 1, Articles 8 and 16 of the Hazard Control and Occupational Health Regulations; Panama Ministry of Health Executive Resolution No. 255 of December 18; and Law 36 of May 17, 1997.

**5.0 DEFINITIONS**

**Cadmium:** Cadmium metal or cadmium compound in all its forms.

**High Efficiency Particulate Air (HEPA) Filters:** A filter capable of collecting and containing at least 99.97 % of dispersed particulates, with a diameter of 0.3 micrometers (microns).

**TWA – Time Weighted Averages:** The maximum concentration of air contamination to which a worker may be exposed over eight hours during his entire work life without the use of respiratory protection, without suffering damage to his health. The current value is published every year by the American Conference of Government Industrial Hygienists (ACGIH).

**6.0 GENERAL**

**6.1 WORK PRACTICES**

**6.1.1 Controls**

**6.1.1.1** Work areas with cadmium emissions that exceed the TWA shall adopt engineering controls to reduce exposure below the TWA, except in cases in which management shows that such controls are not feasible.

**6.1.1.2** When ventilation is used to control exposure, management shall take conduction speed, capture velocity, or static pressure readings to determine its effectiveness. These readings shall be taken over five work days when changes in production processes or control may increase employee exposure.

**6.1.1.3** When capture ventilation is used with air recirculation to the working environment, the system shall have high efficiency filters (N-100 or similar), and a study must be requested from the Safety and Industrial Hygiene Unit (RHSH) to verify its effectiveness.



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**6.1.1.4** In cases in which engineering controls do not reduce the airborne concentration of cadmium below the TWA, management shall complement them with respiratory protection that shall meet the requirements of Respiratory Protection Standard 2600SEG205.

**6.1.1.5** Supervisors are responsible for implementing respiratory protection as well as a thorough personal hygiene at work sites where employees may be exposed to cadmium.

**6.1.1.6** Prior to start working with cadmium containing products that will generate dust, employees shall change from their street clothes into disposable protective clothing in a clean locker room. Street clothes shall not be worn under protective clothing (see Protective Clothing Standard 2600ESS-213).

**6.1.1.7** All surfaces shall be kept free of cadmium to the extent practicable.

**6.1.1.8** Any spill or discharge of cadmium bearing materials shall be cleaned up as soon as possible.

**6.1.1.9** Cadmium containing surfaces shall be cleaned to the extent possible with vacuum cleaners with high efficiency filters or by means of any other method that minimizes airborne cadmium. Compressed air shall never be used for cleanup, unless it is used jointly with a local pickup system.

#### 6.1.2 Hygiene

**6.1.2.1** Supervisors must ensure that employees do not eat, smoke, drink, or apply makeup in areas where work is performed with cadmium, or where it is stored.

**6.1.2.2** Employees must wash their hands and clean their face prior to engaging any of the activities described in the previous item.

**6.1.2.3** Supervisors must ensure that employees shower at the end of their work shift.

**6.1.2.4** Management must ensure that dining facilities comply with Work Site Housekeeping Standard 2600ESS-285 and are kept free from cadmium contamination.

**6.1.2.5** Supervisors must ensure that employees do not enter dining facilities with contaminated personal protection equipment or tools.

#### 6.1.3 Waste

**6.1.3.1** All cadmium contaminated waste including contaminated personal protection equipment, bags, containers, and other items shall be collected in impervious plastic bags or other types of impervious containers. The container or bag shall be labeled as follows: The Sanitation, Control of Vectors and Vegetation Unit (OPEM-S) of the Environmental Division shall be notified in order that it may coordinate the disposal of cadmium contaminated waste with Panama sanitary landfills.

**DANGER  
CONTAINS CADMIUM  
CANCER HAZARD  
AVOID CREATING DUST**



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**6.1.3.2.** The Sanitation, Control of Vectors and Vegetation Unit (OPEM-S) of the Environmental Management Division shall be notified in order that it may coordinate the disposal of cadmium contaminated waste with Panama sanitary landfills.

**6.1.4 Communication of Cadmium Hazards to Employees**

**6.1.4.1** The handling and use of any cadmium bearing product shall be done according to MSDS Standard 2600SEG201.

**6.1.4.2** The Industrial Hygiene Section shall classify MSDS (Material Safety Data Sheets), showing that their use and handling shall be done according to the Cadmium Exposure Prevention Standard.

**6.1.4.3** Warning signs shall be installed at various points of the entrance to areas where cadmium work is performed.

**6.1.4.4** The signs required in the above paragraph shall contain the following wording:

**DANGER**  
**CONTAINS CADMIUM**  
**CANCER HAZARD**  
**AUTHORIZED PERSONNEL ONLY**  
**USE OF RESPIRATORY PROTECTION REQUIRED**

**6.2 PERSONAL EXPOSURE MONITORING**

**6.2.1** Safety and Industrial Hygiene Unit (RHS) employees shall monitor personal exposure by means of periodic personal air sampling, and shall determine the cadmium concentration at work sites where cadmium exposure is probable.

**6.3 TRAINING**

**6.3.1** Employees who may be exposed to cadmium in their work areas shall receive instruction or talks on cadmium toxicity, engineering controls, respiratory protection, personal hygiene, the value of personal testing, and the need for medical evaluation. Talks shall also include the amount, location, manner of use, and storage of cadmium. Industrial hygienists or other competent health staff will provide these talks. Supervisors may request this training from the Supervisor of RHS.

**6.4 RECORDKEEPING AND ACCESS TO DATA**

Personal air and environmental reading records shall be accessible through RHS according to applicable PCA regulations.

**7.0 RESPONSIBILITIES**

The responsibilities to enforce compliance with this standard are described in Section 6.1 of this Standard and the applicable portions of Occupational Health and Safety Management Standard 2600SEG101.



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**8.0 INQUIRIES**

Any information of clarification of the content or application of this standard may be requested in writing to RSHS.

**9.0 EXCEPTIONS**

Temporary deviations or exceptions to compliance with this standard shall be requested in writing to RSHS.

**10.0 TERM**

This standard shall remain in force until revised or amended.

**11.0 REFERENCES**

- 11.1 Record Retention Tables, Records Management Section, PCA.
- 11.2 RESPIRATORY PROTECTION STANDARD 2600SEG205
- 11.3 HAZARDOUS MATERIAL INFORMATION STANDARD 2600SEG201
- 11.4 WORK SITE HOUSEKEEPING AND SANITATION STANDARD 2600SEG285
- 11.5 PROTECTIVE CLOTHING STANDARD 2600SEG213
- 11.6 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT STANDARD 2600SEG101