

**ATTACHMENT H**

**HEALTH AND SAFETY PLAN**

**HEALTH AND SAFETY PLAN – Revision 2**  
**DRESDNER ROBIN Project No. B-080-64**

SITE NAME: Berry Lane Park – Former Morris Canal

ADDRESS: Garfield Avenue

CLIENT CONTACT: Mr. Benjamin Delisle, Jersey City Redevelopment Agency

PHONE: 201-547-5604

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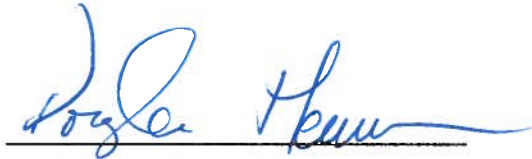
HASP PREPARATION:

Prepared by:

Richard Mailhot  
Name

January 18, 2012  
Date

Dresdner Robin  
Company



1-18-12

Rich Mailhot  
Health and Safety Manager/HSM

Date

**Berry Lane Park Property  
Former Morris Canal  
Jersey City, Hudson County, New Jersey**

**I. ON-SITE ORGANIZATION**

The following personnel are designated to carry out the stated job functions on-site. All site personnel have been trained and found medically qualified for site assignment.

**Dresdner Robin Personnel**

**Responsibilities**

<u>Douglas Neumann</u>	<u>Project Director</u>
<u>John Tregidgo</u>	<u>Senior Project Manager</u>
<u>Jason Villacis</u>	<u>Project Manager</u>
<u>Ryan Miller</u>	<u>Project Manager</u>
<u>Garry Gutshteyn</u>	<u>Site Geologist</u>
<u>Richard Mailhot</u>	<u>Health &amp; Safety Officer/Air Quality</u>
<u>Elena DeFeo</u>	<u>Environmental Scientist</u>
<u>Nick Kasimis</u>	<u>Environmental Scientist</u>
<u>Gina Quinones</u>	<u>Environmental Scientist</u>
<u>Matthew Sheehan</u>	<u>Environmental Scientist</u>

**Scope of Work**

- Delineation of CCPW metals on Chrome Site 121 and 207
- Survey by New Jersey licensed surveyor of horizontal limits of the excavation area
- Oversight of Remedial Action – Excavation/Removal of Chromate Chemical Production Waste (CCPW)
- In-Situ Waste Classification, Soil Boring and Soil Sampling
- Monitoring Well Decommissioning
- Air Monitoring/Emissions Observation

*NOTE:* Other subcontracted companies' personnel will be responsible for the health and safety of their own employees and will be required to abide by the provisions of their SSHASP at a minimum.

**II. SITE HISTORY:**

The future Berry Lane Park property is located in a primarily commercial/light industrial area of Jersey City and consists of an amalgamation of twelve (12) properties. The former Morris Canal intersects Berry Lane Park from north to south. The limits of Berry Lane Park are broadly defined by the Hudson Bergen Light Rail Train (HBLRT) tracks to the south, Communipaw Avenue to the north, Garfield Avenue to the west and Woodward Street to the east. Work

performed under this HASP will be conducted over the area of the former Morris Canal extending from 500 feet south of Communipaw Avenue on the north to the Hudson Bergen Light Rail Train tracks on the south.

The Jersey City section of the Morris Canal was constructed in the 1830s. The Morris Canal was reportedly drained and decommissioned in the 1920s and filled in 1924.

Properties between the west side of the former Morris Canal and Garfield Avenue formerly were dominated by automotive uses including the repair of automobiles and other vehicles and the sale of automotive parts. The southwest asphalt paved portion of the Site was formerly used for bus parking. Most of the structures adjacent to the west side of the Morris Canal were demolished in 2010 and 2011. Extensive removal of junked automobiles and other vehicles and trailers used for the storage of used auto parts was completed in 2011.

The Site is located within a reclaimed floodway which is mapped by the NJDEP as an area of Historic Fill; a media that typically includes metal and base neutral contaminant concentrations above regulatory standards.

Dresdner Robin identified Chromate Chemical Production Waste (CCPW) during the Site Investigation of the Morris Canal in November-December 2010 and refined the limits of CCPW within the Morris Canal in a Remedial Investigation in May 2011. The CCPW contamination is associated with the filling of the former Morris Canal. CCPW is a concern because it contains hexavalent chromium, a highly mobile material and a known human carcinogen. CCPW at this Site is indentified by its distinctive greenish-yellow color. In addition to chromium and hexavalent chromium, antimony, nickel, thallium and vanadium are metals associated with CCPW.

### **III. SITE DESCRIPTION:**

The portion of the former Morris Canal investigated by the JCRA extends for approximately 2,400 feet from the Hudson Bergen Light Rail right-of-way north. The property is approximately 40 to 60 feet in width and comprises approximately 5 acres. The effected properties are currently vacant land and formerly contained a “junkyard”.

**IV. SITE STATUS:**  Active  Inactive  Unknown

### **MEDIA TYPES TO BE ENCOUNTERED:**

Liquid  Solid  Sludge  Gas  
 Soil  Groundwater

### **CHARACTERISTICS:**

Corrosive       Ignitable       Reactive  
 Volatile       Toxic       Radioactive  
 Unknown       Other: Historic Fill Material

**V. HAZARD EVALUATION**

Known Hazardous/Toxic Materials:

**Chromate Chemical Production Waste in Soil and Groundwater:**

**Hexavalent Chromium and Chromium, Antimony, Nickel, Thallium and Vanadium**

**Historic Fill Related Compounds and Contamination of Historic Fill:**

**Poly-cyclic Aromatic Hydrocarbons (PAHs), Lead, Arsenic and other Metals**

Toxic/Pharmacological Effects: See Attachment A

The primary pathways of exposure to Hexavalent Chromium, PAH's, Lead, Arsenic and other metals are inhalation of airborne dusts, direct dermal contact and ingestion of contaminated soils. These exposures can be effectively controlled and the health hazards minimized by implementation of good practices and health and safety procedures outlined in this HASP.

To protect potentially exposed personnel, work zones will be established and respirators and personal protective equipment will be provided, as addressed herein.

REACTIVITY:      None  
STABILITY:      Stable  
FLAMMABILITY:      Non-Flammable  
OVERALL HAZARD:  Serious       **Moderate**       Low       Unknown  
COMMENTS:      None

**VI. OTHER HAZARDS:**

The following are possible hazards that may be encountered at the Site:

- **Slip, Trip and Fall Hazards:**

Storage of work materials on Site in designated areas to minimize disruption of walkways should be practiced. Personnel should take care in negotiating around areas where the placement of materials is necessary for the performance of the scope of work. Uneven ground surfaces and muddy or wet surfaces exist at the Site. The use of sturdy safety footwear (steel-toe boots) is required to minimize these hazards.

- **Site Vehicles/Drill Rig:**

Moving vehicles may be present at the Site. Operators of such vehicles may not be able to see personnel due to limited visibility. Do not enter areas within the blind spots of operating vehicles. Brightly colored reflective safety vests should be worn around such vehicles. Drill rigs and other vehicles may emit high noise levels that are a hindrance to voice communication and is potentially damaging to hearing. Hearing protection will be provided at the Site.

- **Overhead Hazards:**

Overhead hazards may be present, especially if working in an excavation or around equipment operating in an upright position. The Site is a hardhat area. Utility wires may be hazardous if struck by the drill rig or other equipment operating in an upright position.

- **Biological Hazards:**

Hazards include ticks and the transmission of Lyme's Disease, mosquitoes and the transmission of West Nile Disease, and stinging insects. Insect repellents and long sleeve garments may help in keeping such insects away from personnel. Personnel should inspect skin and hair after working in areas where ticks may be present. Hives of stinging insects often are located in the ground; therefore, personnel should observe the ground to avoid stepping on hives. Personnel known to be allergic to bee stings should carry supplies for counteracting an allergic reaction.

Poisonous plants such as poison ivy should be identified to avoid contact with the leaves and an allergic reaction.

- **Excavation Hazards:**

Excavation/trench depths during this project are expected to extend to a depth beyond 15 feet deep. The summary of cave in prevention actions listed below is brief and meant to remind employees of the significant hazards associated with entering and unshored excavation/trench. It is the sole responsibility of the excavation contractor to ensure compliance with OSHA's Excavation Standard (19 CFR1926.650) and to provide a person competent in identifying excavation hazards to the project.

Should it be necessary for personnel to enter an excavation proper excavation safety procedures will be followed. The minimum excavation safety procedures are as follows:

- A stairway, ladder, ramp or other similar means of egress must be located in excavation greater than 4 feet in depth so as to require no more than 25 feet of lateral travel for employees in the trench excavation.
- The excavation must be free of accumulated water before entry is allowed.
- No person shall enter an excavation greater than 5 feet in depth unless one of the following conditions are met:
  - The walls of the excavation have been sloped back to an angle not steeper than one and one-half horizontal to one vertical.
  - The walls of the excavation have been shored.
  - The work in the excavation is to be performed within the confines of an approved shield system (e.g., trench box).

- **Heat Stress:**

Heat cramps are muscle spasms caused by heavy sweating. They normally affect the arms, legs, or stomach and frequently they don't occur until after work, at night, or when relaxing. Drinking electrolyte solutions during the day and eating fruit such as bananas helps prevent cramps.

Heat exhaustion occurs when surface blood vessels and capillaries that originally enlarged to cool the blood collapse from loss of body fluids and necessary minerals. Symptoms include headache, heavy sweating, dizziness, fatigue, nausea, cool moist skin, weak and rapid pulse, and low to normal blood pressure.

Heat stroke is a life-threatening illness that occurs when the body has exhausted its supply of water and salt, and the victim's body temperature rises dangerously. It can be mistaken for heart attack, so co-workers must be able to recognize its symptoms: elevated body temperature, no sweating, dry skin that is red or flushed, rapid pulse, breathing difficulty, high blood pressure, and possibly the dizziness, headache, nausea, and confusion associated with heat exhaustion.

**Preventive Measures:**

1. *Drink cool water.* Someone working in a hot environment should drink cool water in small amounts frequently. Employers should make water available. Avoid alcohol, coffee, tea, and caffeinated soft drinks, which cause dehydration.
2. *Dress appropriately.* Wear lightweight, loose-fitting clothing and change clothing if it becomes completely saturated. Use sunscreen and wear a hat when working outdoors.
3. *Work in ventilated areas.* All workplaces should have good general ventilation, as well as spot cooling in work areas of high heat production. Good air flow increases evaporation of sweat, which cools the skin.
4. *Work less, rest more.* Supervisors should assign a lighter workload and longer rest periods during days of intense heat. Short, frequent work/rest cycles are best. Heavy work should be scheduled for cooler parts of the day.

5. *Ask workers how they're feeling.* Supervisors should monitor workplace temperature and humidity and check workers' responses to heat at least hourly. Allow a large margin of safety, be alert to early signs of heat-related illness, and allow workers to stop for a rest break if they become uncomfortable.

6. *Know the signs and take prompt action.* Employees and employers should learn to spot the signs of heat stroke, which can be fatal. Get emergency medical attention immediately if someone exhibits confusion, loss of consciousness, flushed face, hot and dry skin, or has stopped sweating.

7. *Train first aid workers.* First aid workers should be able to recognize and treat the signs of heat stress, heat exhaustion, heat cramps, and other heat-related illness. Be sure all workers know who is trained to give first aid.

8. *Reduce work for anyone at risk.* Employers should use common sense when determining fitness for work in hot environments. Lack of acclimatization, age, obesity, poor conditioning, pregnancy, inadequate rest, previous heat injuries, certain medical conditions and medications are some factors that increase someone's susceptibility to heat stress.

9. *Check with your doctor.* Certain medical conditions, such as heart conditions and diabetes, and some medications can increase the risk of injury from heat exposure. Employees who have medical conditions or take medications should ask their doctors before working in hot environments.

- **Cold Stress:**

Employees working under cold conditions, particularly in windy conditions may develop cold stress related injuries that can impair their ability to work safely. Therefore, the project employees should be trained to recognize warning signs and symptoms, which include reduced coordination, drowsiness, impaired judgment, fatigue and numbness in toes and fingers. Following is a summary of the cold stress related conditions that may develop in the field and the protective measures that should be implemented:

Hypothermia:

This condition develops as a result of rapid decrease in body temperature to below 90°F. This condition does not require extremely cold conditions. The typical hypothermia conditions are rainy and windy days with temperature of 50°F or below. Employees who develop this condition start shivering and complain of feeling chilly. Continued exposure to cold and wet conditions can result in lack of coordination, mild unresponsiveness, drowsiness, stumbling, coma and even death. Such cold stress related injuries can be prevented by wearing appropriate warm clothing, moving in to warm shelters, by carefully scheduling work/rest periods and by monitoring the weather conditions.

**Preventive Measures:**



Provide sufficiently warm clothing and protective clothing against rain and/or wet conditions. If the employees start experiencing signs and symptoms described above, then more insulating clothing or additional layers should be worn. If the employee is wearing wet clothing, it should be removed. They should move indoors and consume warm drinks (no caffeinated beverages). If the sign or symptoms persist, or get worse, take the affected employee to the nearest hospital emergency room.

#### Frostbite:

Frostbite is a localized injury that results from the freezing of the bodily tissues. It is most common in fingers and toes, and on the face and the ears. This condition occurs in subfreezing temperatures, and the condition is compounded by windy conditions. The signs and symptoms of this cold stress related condition include reddening of the tissues and feeling of extreme pain in the affected areas. The more severe condition can result in numbness and freezing of the tissues and/or fluid in the underlying soft tissues.

#### **Preventive Measures:**

The employees working under extremely cold and/or windy conditions with low wind chill factors should be trained to use adequate warm clothing. They should be instructed to cover bodily extremities, such as hands and fingers, toes, face and ears with sufficient clothing. If they experience any signs and symptoms described above, they should move indoors and drink warm fluids (no caffeinated beverages). The frozen tissues can be re-warmed by immersing in warm water. If the feeling of pain persists, they should be taken to the nearest hospital emergency room.

### **VII. SCOPE OF WORK**

The proposed environmental services for this project will include the following tasks:

- Delineation of vanadium on Chrome Site 121
- Survey by New Jersey licensed surveyor of horizontal limits of the excavation area
- Oversight of Remedial Action – Excavation/Removal of Chromate Chemical Production Waste (CCPW)
- In-Situ Waste Classification, Soil Boring and Soil Sampling
- Monitoring Well Decommissioning
- Air Monitoring/Emissions Observations

### **VIII. ON-SITE CONTROL**

Ultimate site security is the responsibility of the property owner. Dresdner Robin and subcontractor personnel will endeavor to prohibit unauthorized persons from entering exclusion zones by establishing perimeter markings and control boundaries. The exclusion zone may be a combination of a temporary structure and an area adjacent to the structure. Ventilation of the

structure is likely necessary for protection of workers inside, and it would be necessary to filter this exhaust to prevent impacts outside the structure and at the Site fenceline. The exclusion zone for the Remedial Action is:

- CCPW excavation/removal area (likely in a temporary tent or structure)
- CCPW stockpiling area (when soil is not direct loaded into a truck, likely in the temporary structure).
- Areas where soil geological assessment and soil sampling is conducted.

If excavation, waste handling or sampling outside a temporary structure is performed, the exclusion zone will be delineated with caution tape.

Soil assessment/sampling and waste storage areas will be lined with plastic sheeting to minimize contamination.

Site monitoring equipment will include:

RAE (PID)     LEL Meter (CGI)     CO Meter  
 OVA (FID)     O2 Meter     SO2 Meter  
 Dust Monitor     Noise Meter (SLM)     Sampling Pump  
 Colormetric detector tube     Rad. Dosimetry     Other: Metal Detector

Methods of Surveillance: Monitor the work area during all intrusive activities. Dust monitoring will be conducted in the work area and at downwind and upwind locations along the Site perimeter.

## SPECIAL PROCEDURES: HEALTH AND SAFETY ACTION LEVELS

	READING/CONCENTRATION	ACTION
PID	To be provided in PAMP and/or DSP	To be provided in PAMP and/or DSP
Dust Monitor	To be provided in PAMP and/or DSP	To be provided in PAMP and/or DSP

### IX. LEVELS OF PROTECTION

Based on an evaluation of the potential hazards at the site and the activities to be conducted, the following levels for personal protection are designated for the following work areas/activities:

LOCATION	TASK	PERSONNEL	LEVEL
Former Morris Canal (Site)	See Section VII	Douglas Neumann, John Tregidgo, Jason Villacis, Ryan Miller, Garry Gutshteyn, Richard Mailhot, Elena DeFeo, Nick Kasimis, Gina Quinones, Matthew Sheehan	D

Specific protective equipment for each level of protection is as follows:

**LEVEL A:** Fully-encapsulating chemical resistant suit; pressure demand, atmosphere supplying respirator; inner chemical resistant gloves; radio communications; chemical resistant safety boots/ shoes; cooling unit\*; coveralls\*; hard hat\*; disposable gloves and boot covers\*.

**LEVEL B:** Pressure demand, atmosphere supplying respirator; chemical resistant protective clothing; inner and outer chemical resistant gloves; chemical resistant safety boots/ shoes; hard hat; radio communications; coveralls\*; disposable boot covers\*; face shield\*; long cotton underwear\*.

**LEVEL C:** Full-face piece air-purifying respirator (with appropriate cartridges) as/if needed; chemical resistant protective clothing; inner and outer chemical resistant gloves; chemical resistant safety boots/shoes; disposable boot covers; hard hat; radio communications; coveralls\*; face shield\*; escape mask\*; long cotton underwear\*.

**LEVEL D: Tyvek coveralls; inner and outer chemical resistant gloves; chemical resistant safety boots/ shoes; disposable boot covers; safety glasses or goggles; hardhat.**

Modifications to these levels of protection require approval from the Health and Safety Manager (HSM); downgrades require the approval from either the Health and Safety Officer (HSO) or Health and Safety Manager or the (HSM).

## **X. DECONTAMINATION AND DISPOSAL**

### **DECONTAMINATION PROCEDURE:**

A Segregated equipment drop; boot cover and glove wash/ rinse; tape removal; boot cover removal, outer glove removal; suit and boot wash/ rinse; suit removal; SCBA backpack removal; inner glove rinse; face piece removal; inner glove removal; inner clothing removal; field wash; redress.

B Segregated equipment drop; boot cover and glove wash/rinse; tape removal; boot cover removal; outer glove removal; suit and boot wash/rinse; boot removal; SCBA backpack removal; suit removal; inner glove wash/rinse; face piece removal; inner glove removal; inner clothing removal; field wash; redress.

C Segregated equipment drop; boot cover and glove wash/rinse; tape removal; boot cover removal; outer glove removal; suit and boot wash/rinse; boot removal; suit removal; inner glove wash/rinse; face piece removal; inner glove removal; inner clothing removal; field wash; redress.

D X Segregated equipment drop, boot and glove wash/rinse.

### **DISPOSAL:**

Investigation-derived wastes (“IDW”) generated during the field operations may include drill cuttings, concrete coring cuttings, contaminated personal protective equipment (“PPE”), decontamination fluids, well purge water, and trash. IDW will be placed into United States Department of Transportation (“USDOT”) approved 55-gallon drums. The drums will be temporarily staged on site pending waste characterization and offsite disposal. PPG Industries, Inc. (PPG) will be listed as the generator of all IDW associated with this scope of work.

Wastes generated during the remedial actions may include decontamination water, contaminated personal protective equipment (“PPE”), decontamination fluids, and trash. This waste will be placed into United States Department of Transportation (“USDOT”) approved 55-gallon drums and or removed via vacuum trucks. Drums will be temporarily staged on site pending waste characterization and offsite disposal. PPG Industries, Inc. (PPG) will be listed as the generator of all IDW associated with this scope of work.

## **XI. EMERGENCY PROCEDURES FOR OVERT PERSONNEL EXPOSURE**

- Skin Contact: Wash exposed skin immediately
- Inhalation: Get to fresh air, artificial respiration as necessary, transport to medical facility.

### **Emergency Decontamination**

Generally, emergency decon for a medical emergency will consist of removal of the victim's outer protective clothing. Where chemical contamination is involved, the victim will be washed with excess water until emergency assistance arrives. If the medical emergency is life threatening itself, decontamination may be postponed until emergency medical attention is received. The provider of medical attention must be advised of the potential contamination.

## **XII. CONTINGENCY PLAN**

In the event of an incident that would potentially expose site personnel or the public to hazardous materials or conditions, the Health and Safety Officer or Site Manager will be responsible for initiating the following actions:

- Evacuate all personnel from any area on the site where the potential for exposure exists.
- Stop site operations until the added risk is adequately addressed.
- Provide for the immediate medical treatment of any injured or exposed personnel.
- Notify the appropriate agencies for response to the incident.

## **XIII. LOCAL RESOURCES:**

<b>AMBULANCE</b>	<b>911</b>
<b>FIRE</b>	<b>911</b>
<b>POLICE</b>	<b>911</b>

## **XIV. EMERGENCY CONTACTS:**

CHEMTREC	(800) 424-9300
POISON INFORMATION, Nationwide	(800) 222-1222
NJDEP Spill Hotline	(877) 927-6337
DRESDNER ROBIN	(201) 217-9200

## **XV. HOSPITAL INFORMATION:**

Hospital Name: Jersey City Medical Center/Wilzig Hospitals

Address: 355 Grand Street

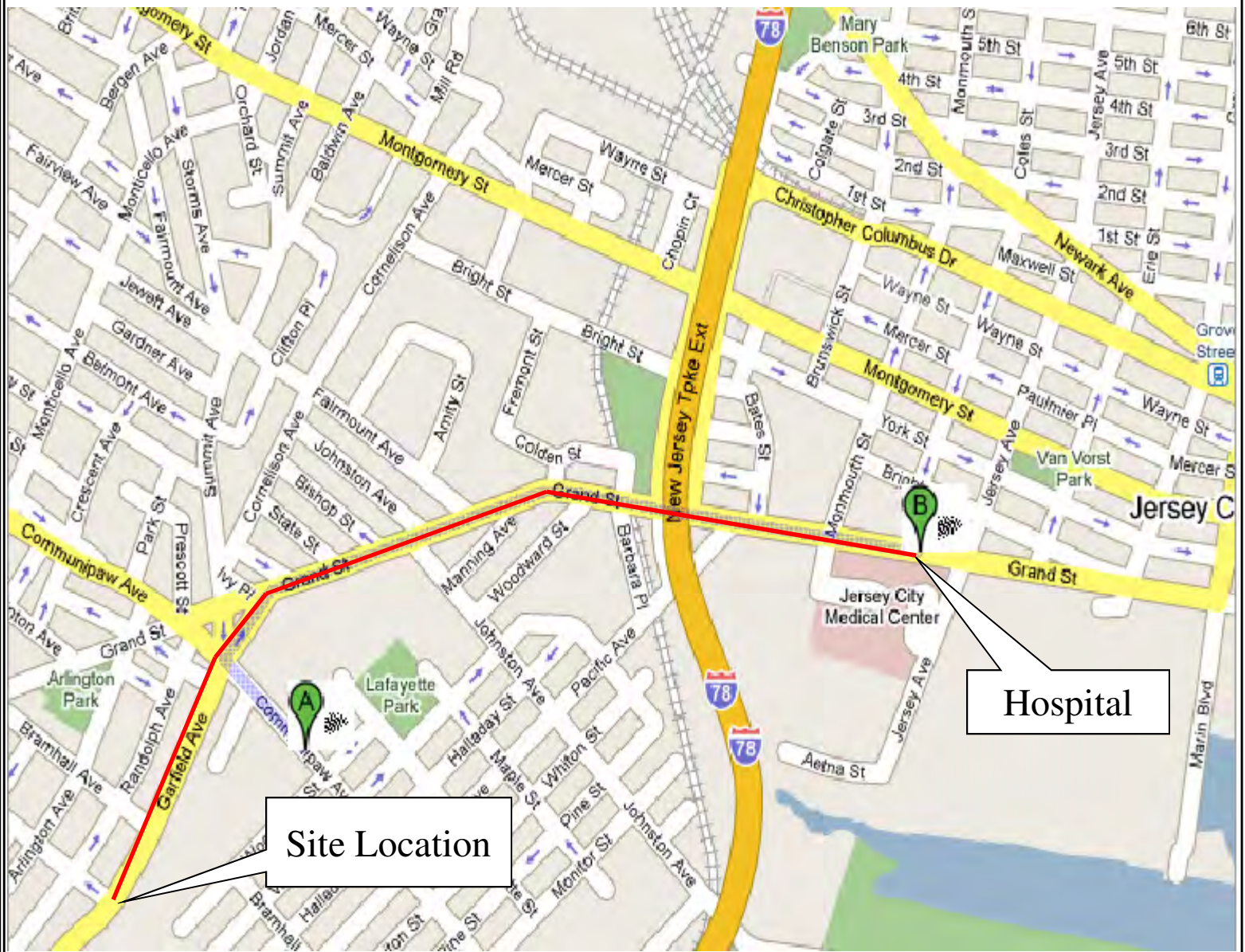
Jersey City, Hudson County, NJ

Telephone: (201) 915-2000

***\*Call prior to arrival for Hazardous Material Decontamination\****

Directions from Site: Exit Site and turn right (north) onto Garfield Avenue proceeding approximately 0.5 miles to traffic light at Communipaw Avenue. Proceed through traffic light and stay to the right to continue on Garfield Avenue. Proceed to next traffic light and make a slight right-hand turn onto Grand Street. Travel east on Grand Street for 0.9 miles. The entrance to the Jersey City Medical Center is on the right side.

See attached **Figure 1**, map for hospital route.



Site Location

Hospital



**Hospital Location Map**  
**Berry Lane Park Property**  
**Former Morris Canal**  
**Hudson Bergen Light Rail to Communipaw Avenue**  
**Jersey City, New Jersey**

Source: Hagstrom - Hudson County, New Jersey

**DRESDNER**  
**ROBIN**

**Project #B080**

**Figure 1**

**XVI. HASP REVIEW**

SITE: Berry Lane Park – Former Morris Canal

ADDRESS: Garfield Avenue

LOCATION: Jersey City, Hudson County, New Jersey

The undersigned certify that they have read this health and safety plan document, understand it, and will comply with its provisions.

NAME	AFFILIATION	DATE	TIME

This document is to be submitted to the Health and Safety department at the conclusion of site operations.



## XVII. PROTECTIVE EQUIPMENT LOG

SITE: Berry Lane Park Property – Former Morris Canal

ADDRESS: Garfield Avenue

LOCATION: Jersey City, Hudson County, New Jersey

USER	DATE	LEVEL OF PROTECTION	DURATION (HOURS)	HAZARD

### COMMENTS:

\_\_\_\_\_  
Manager, Site Operation

\_\_\_\_\_  
Date

**(Return To Health and Safety Department at Conclusion of Operation)**

## ATTACHMENT A

### KNOWN OR SUSPECTED HAZARDOUS/TOXIC MATERIALS

- Poly-cyclic Aromatic Hydrocarbons (PAHs)
- Historic Fill and related Metals (i.e. Lead)
- CCPW Constituents: Hexavalent Chromium, Antimony, Nickel, Thallium and Vanadium

### TOXIC/PHARMACOLOGICAL EFFECTS:

- Hazardous materials can be toxic through inhalation, absorption, ingestion, and skin or eye contact. Proper protection includes the minimum Level D protective equipment that would exclude direct contact, ingestion, or inhalation of any product. Level C protective equipment will be implemented if monitoring levels require it and for soil sampling activities.



# Polycyclic Aromatic Hydrocarbons (PAHs)

## What are PAHs?

Short for polycyclic aromatic hydrocarbons, PAHs describe chemicals that are often found together in groups of two or more. PAHs are found naturally in the environment but they can also be man-made. In their purest form, PAHs are solid and range in appearance from colorless to white or pale yellow-green. PAHs are created when products like coal, oil, gas, and garbage are burned but the burning process is not complete. Although PAHs can exist in over 100 different combinations, the National Waste Minimization Program defines this group using the Toxic Release Inventory reporting category for polycyclic aromatic compounds.

Chemicals included in this category, by name and CAS number, are:

1. Benzo(a)anthracene, 56-55-3
2. Benzo(a)phenanthrene (chrysene), 218-01-9
3. Benzo(a)pyrene, 50-32-8
4. Benzo(b)fluoranthene, 205-99-2
5. Benzo(j)fluoranthene, 205-82-3
6. Benzo(k)fluoranthene, 207-08-9
7. Benzo(j,k)fluorene (fluoranthene), 206-44-0
8. Benzo(r,s,t)pentaphene, 189-55-9
9. Dibenz(a,h)acridine, 226-36-8
10. Dibenz(a,j)acridine, 224-42-0
11. Dibenzo(a,h)anthracene, 53-70-3
12. Dibenzo(a,e)fluoranthene, 5385-75-1
13. Dibenzo(a,e)pyrene, 192-65-4
14. Dibenzo(a,h)pyrene, 189-64-0
15. Dibenzo(a,l)pyrene, 191-30-0
16. 7H-Dibenzo(c,g)carbazole, 194-59-2
17. 7,12-Dimethylbenz(a)anthracene, 57-97-6
18. Indeno(1,2,3-cd)pyrene, 193-39-5
19. 3-Methylcholanthrene, 56-49-5
20. 5-Methylchrysene, 3697-24-3

21. 1-Nitropyrene, 5522-43-0

It should be noted that some PAHs are listed individually on EPA's Priority Chemical list. They are:

1. Acenaphthene, 83-32-9
2. Acenaphthylene, 208-96-8
3. Anthracene, 120-12-7
4. Benzo(g,h,i)perylene, 191-24-2
5. Fluorene, 86-73-7
6. Phenanthrene, 85-01-8
7. Pyrene, 129-00-0

## Why are PAHs bad actors?

PAHs are a concern because they are persistent. Because they do not burn very easily, they can stay in the environment for long periods of time. Individual PAHs vary in behavior. Some can turn into a vapor in the air very easily. Most do not break down easily in the water.

## What are PAHs used for?

Most PAHs are used to conduct research. However, some PAHs are used to make dyes, plastics, and pesticides. Some are even used in medicines.

## How can PAHs enter and leave your body?

One of the most common ways PAHs can enter the body is through breathing contaminated air. PAHs get into your lungs when you breathe them. If you live near a hazardous waste site where PAHs are disposed, you are likely to breathe PAHs. If you eat or drink food and water contaminated with PAHs, you could be

exposed. Exposure to PAHs can also occur if your skin contacts PAH-contaminated soil or products like heavy oils, coal tar, roofing tar, or creosote. Creosote is an oily liquid found in coal tar and is used to preserve wood. Once in your body, PAHs can spread and target fat tissues. Target organs include the kidneys and liver. However, PAHs will leave your body through urine and feces in a matter of days.

#### **How can you be exposed to PAHs?**

You can be exposed to PAHs in the environment, in your home, and in the workplace. Because PAHs exist naturally in the environment and are man-made, you can be exposed in a number of ways. Fumes from vehicle exhaust, coal, coal tar, asphalt, wildfires, agricultural burning and hazardous waste sites are all sources of exposure.

You could be exposed to PAHs by breathing cigarette and tobacco smoke, eating foods grown in contaminated soil, or by eating meat or other food that you grilled. Grilling and charring food actually increases the amount of PAHs in the food.

If you work in a plant that makes coal tar, asphalt and aluminum, or that burns trash, you can be exposed to PAHs. You can also be exposed if you work in a facility that uses petroleum or coal, or where wood, corn, and oil are burned.

#### **How can PAHs affect your health?**

A number of PAHs have caused tumors in laboratory animals that were exposed to PAHs through their food, from breathing contaminated air, and when it was applied to their skin. When pregnant mice ate high doses of a PAH (benzo(a)pyrene) they experienced reproductive problems. In addition, the offspring of the pregnant mice showed birth defects and a decrease in their body weight. Other effects include damage to the skin, body fluids, and the immune system. However, these effects have not been seen in humans.

**Is there a medical test to determine if you have been exposed to PAHs?**

There is a test that can measure the presence of PAH in your urine. This test can only tell you if you have been exposed; but it can't reveal how harmful the effects of the exposure will be. This test would have to be performed in a laboratory that has special equipment to detect the PAHs. Another test currently being developed will be able to measure PAHs in your body tissue and blood.

#### **What are the medical treatments in cases of exposure?**

Most exposures to PAHs happen every day at very low levels in the air we breathe and the foods we eat. Treatment for a short-term exposure is unlikely. Contact your doctor if you experience symptoms of PAHs poisoning.

#### **What levels of exposure have resulted in harmful health effects?**

There is no information available from studies on humans to tell what effects can result from being exposed to individual PAHs at certain levels. However, breathing PAHs and skin contact seem to be associated with cancer in humans. Animal studies showed that mice exposed to 308 parts per million (ppm) of PAHs (specifically benzo (a) pyrene) in food for 10 days (short term exposure) caused birth defects. Mice exposed to 923 ppm of benzo (a) pyrene in food for months caused problems in the liver and blood.

#### **Where can I get more information?**

Contact your state health or environmental department, or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, N.E., E-29  
Atlanta, Georgia 30333

#### **References**

1. Agency for Toxic Substances and Disease

**Registry (ATSDR), Public Health Statement,  
Polycyclic Aromatic Hydrocarbons, December  
1990. U.S. Public Health Service, U.S.  
Department of Health and Human Services,  
Atlanta, GA, December 1990.**

- 2. United States Environmental Protection  
Agency, Office of Environmental Information,  
Emergency Planning and Community Right-to-  
Know Act – Section 313: Guidance for  
Reporting Toxic Chemicals: Polycyclic Aromatic  
Compounds Category, EPA 260-B-01-03,  
Washington, DC, August 2001.**



# Hazardous Substance Fact Sheet

Right to Know

Common Name: **LEAD**

Synonym: Metallic Lead

Chemical Name: Lead

Date: September 2001 Revision: September 2007

CAS Number: 7439-92-1

RTK Substance Number: 1096

DOT Number: UN 3077

## Description and Use

Lead is a heavy, soft, silvery-gray metal. It is used in the production of storage batteries, ammunition, cable covering, pigments, glass, ceramic glazes, casting metals, and solders.

## Reasons for Citation

- ▶ Lead is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS and EPA.
- ▶ This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

### Eye Contact

- ▶ Immediately flush with large amounts of cool water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while rinsing.

### Skin Contact

- ▶ Remove contaminated clothing. Wash contaminated skin with soap and water.

### Inhalation

- ▶ Remove the person from exposure.
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE PAGE 6

## Hazard Summary

Hazard Rating	NJDHSS	NFPA
HEALTH	4	-
FLAMMABILITY	0	-
REACTIVITY	0	-
CARCINOGEN TERATOGEN POISONOUS FUMES ARE PRODUCED IN FIRE DOES NOT BURN		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ Lead can affect you when inhaled or swallowed.
- ▶ Lead is a CARCINOGEN and may be a TERATOGEN. HANDLE WITH EXTREME CAUTION.
- ▶ Contact can irritate the eyes.
- ▶ Exposure can cause headache, irritability, and muscle and joint pain.
- ▶ Repeated exposure can cause *Lead poisoning* with metallic taste, colic and muscle cramps.
- ▶ Lead may damage the nervous system.
- ▶ Exposure may cause kidney and brain damage, and anemia.

## Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is 0.05 mg/m<sup>3</sup> averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is 0.05 mg/m<sup>3</sup> averaged over a 10-hour workshift. Air concentrations should be maintained so that blood lead is less than 0.06 mg per 100 grams of whole blood.

ACGIH: The threshold limit value (TLV) is 0.05 mg/m<sup>3</sup> averaged over an 8-hour workshift.

- ▶ Lead is a PROBABLE CARCINOGEN in humans and may be a TERATOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

### Determining Your Exposure

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet, available on the RTK Program website ([www.nj.gov/health/eoh/rtkweb](http://www.nj.gov/health/eoh/rtkweb)) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) requires private employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

### Health Hazard Information

#### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Lead:

- ▶ Contact can irritate the eyes.
- ▶ Lead can cause headache, irritability, reduced memory, disturbed sleep, and mood and personality changes.
- ▶ Exposure can cause upset stomach, poor appetite, weakness and fatigue.

#### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Lead and can last for months or years:

#### Cancer Hazard

- ▶ Lead is a PROBABLE CARCINOGEN in humans. There is some evidence that Lead and Lead compounds cause lung, stomach, brain and kidney cancers in humans and they have been shown to cause kidney cancer in animals.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

#### Reproductive Hazard

- ▶ Lead may be a TERATOGEN in humans since it is a teratogen in animals.
- ▶ It may decrease fertility in males and females, and damage the developing fetus and the testes (male reproductive glands).

#### Other Effects

- ▶ Repeated exposure to Lead can cause Lead poisoning. Symptoms include metallic taste, poor appetite, weight loss, colic, nausea, vomiting, and muscle cramps.
- ▶ Higher levels can cause muscle and joint pain, and weakness.
- ▶ High or repeated exposure may damage the nerves causing weakness, "pins and needles," and poor coordination in the arms and legs.
- ▶ Lead exposure increases the risk of high blood pressure.
- ▶ Lead may cause kidney and brain damage, and damage to the blood cells causing anemia.
- ▶ Repeated exposure causes Lead to accumulate in the body. It can take years for the body to get rid of excess Lead.

### Medical

#### Medical Testing

Before first exposure, and every six (6) months thereafter, OSHA requires your employer to provide (for persons exposed to 30 micrograms or more of Lead per cubic meter of air):

- ▶ Blood Lead test
- ▶ ZPP (a special test for the effects of Lead on blood cells)

For employees with blood Lead levels above 40 micrograms per 100 grams of whole blood (40 micrograms per deciliter) OSHA requires blood Lead level monitoring every two months until two consecutive blood Lead levels are below 40 micrograms per 100 grams of whole blood. These employees must undergo a medical evaluation, which should include:

- ▶ Complete work and medical history
- ▶ Thorough physical examination, including examination of the central nervous system
- ▶ Blood Lead test
- ▶ ZPP
- ▶ Hemoglobin, hematocrit with complete blood count
- ▶ Urinalysis with microscopic examination
- ▶ Any other tests determined necessary by the examining physician

This evaluation should be performed at least annually.

OSHA requires your employer to provide you and your doctor with a copy of the OSHA Lead Standards (29 CFR 1910.1025 and 1926.62).

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020)

**Mixed Exposures**

Body exposures to Lead from hobbies using Lead solder or pigments, target practice, and drinking moonshine made in Leaded containers will increase Lead levels. Repeated breathing or handling of Leaded gasoline may also add to body Lead levels.

**Workplace Controls and Practices**

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at [www.cdc.gov/niosh/topics/ctrlbanding/](http://www.cdc.gov/niosh/topics/ctrlbanding/).

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Lead Standards (29 CFR 1910.1025 and 1926.62).
- ▶ Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.
- ▶ Use a high efficiency particulate air (HEPA) filter when vacuuming. Do not use a standard shop vacuum.

**Personal Protective Equipment**

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

**Gloves and Clothing**

- ▶ Avoid skin contact with Lead. Wear personal protective equipment made from material which can not be permeated and/or degraded by this substance. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- ▶ Safety equipment manufacturers recommend *Nitrile*, *Latex*, or *Rubber* for gloves and DuPont Tyvek® as protective material for clothing.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

**Eye Protection**

- ▶ Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- ▶ For impact hazards (such as flying fragments, chips or particles), wear safety glasses with side shields or safety goggles.
- ▶ Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

**Respiratory Protection**

*Improper use of respirators is dangerous.* Respirators should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure not higher than  $0.5 \text{ mg/m}^3$ , use a half-mask air purifying respirator equipped with high efficiency filters.
- ▶ Where the potential exists for exposure not higher than  $2.5 \text{ mg/m}^3$ , use a full facepiece, air purifying respirator with high efficiency filters.
- ▶ Where the potential exists for exposure not higher than  $50 \text{ mg/m}^3$ , use any powered-air purifying respirator with high efficiency filters or a half-mask supplied-air respirator operated in a positive pressure mode.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect Lead, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- ▶ Be sure to consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- ▶ Where the potential exists for exposure greater than  $50 \text{ mg/m}^3$  but less than  $100 \text{ mg/m}^3$ , use supplied-air respirators with full facepiece, hood, helmet or suit, operated in a positive pressure mode.
- ▶ Where the potential exists for exposure greater than  $100 \text{ mg/m}^3$ , use full facepiece, self-contained breathing apparatus operated in a positive pressure mode.



**Fire Hazards**

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ Extinguish fire using an agent suitable for type of surrounding fire. Lead itself does not burn.
- ▶ **POISONOUS FUMES ARE PRODUCED IN FIRE, including Lead Oxides.**
- ▶ Use water spray to keep fire-exposed containers cool.

**Spills and Emergencies**

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If Lead is spilled, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Collect spilled material using a HEPA-filter vacuum and deposit into sealed containers.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ It may be necessary to contain and dispose of Lead as a **HAZARDOUS WASTE**. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

**Handling and Storage**

Prior to working with Lead you should be trained on its proper handling and storage.

- ▶ A regulated, marked area should be established where Lead is handled, used, or stored.
- ▶ Lead reacts violently with **HYDROGEN PEROXIDE; AMMONIUM NITRATE; ZIRCONIUM; SODIUM AZIDE; SODIUM ACETYLIDE; and CHLORINE TRIFLUORIDE.**
- ▶ Lead is not compatible with **OXIDIZING AGENTS** (such as **PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE**) and **STRONG ACIDS** (such as **HYDROCHLORIC, SULFURIC and NITRIC**).
- ▶ Store in tightly closed containers in a cool, well-ventilated area.

**Occupational Health Services Resource:**

The New Jersey Department of Health and Senior Services, Occupational Health Service, offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health & Senior Services  
Right to Know Program  
PO Box 368  
Trenton, NJ 08625-0368  
Phone: 609-984-2202  
Fax: 609-984-7407  
E-mail: [rtk@doh.state.nj.us](mailto:rtk@doh.state.nj.us)  
Web address: <http://www.nj.gov/health/eoh/rtkweb>

*The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.*

# LEAD

## GLOSSARY

**ACGIH** is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

**Boiling point** is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

**CFR** is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group.

**Ionization Potential** is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

**IRIS** is the Integrated Risk Information System database by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

**LEL** or **Lower Explosive Limit**, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemical and reviews evidence for cancer.

**OSHA** is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEOSHA** is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

**Permeated** is the movement of chemicals through protective materials.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**UEL** or **Upper Explosive Limit** is the highest concentration in air above which there is too much fuel (gas or vapor) to begin reaction or explosion.

**Vapor Density** is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

# INFORMATION FOR EMERGENCY RESPONDERS

**Common Name:** LEAD

**Synonym:** Metallic Lead

**CAS No:** 7439-92-1

**Molecular Formula:** Pb<sub>2</sub>

**RTK Substance No:** 1096

**Description:** Heavy, soft, silvery-gray metal

## HAZARD DATA

Hazard Rating	Firefighting	Reactivity
<b>4 - Health</b> <b>0 - Fire</b> <b>0 - Reactivity</b> DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance)	Extinguish fire using an agent suitable for type of surrounding fire. Lead itself does not burn. POISONOUS FUMES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> . Use water spray to keep fire-exposed containers cool.	Lead reacts violently with HYDROGEN PEROXIDE; AMMONIUM NITRATE; ZIRCONIUM; SODIUM AZIDE; SODIUM ACETYLIDE; and CHLORINE TRIFLUORIDE. Lead is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

## SPILL/LEAKS

Isolation Distance: 10 to 25 meters (30 to 80 feet)  
 Use a HEPA-filter vacuum for clean-up.  
 Toxic to aquatic organisms.  
 Hazardous to the environment and persists in the environment.

## EXPOSURE LIMITS

OSHA: 0.05 mg/m<sup>3</sup>, 8-hr TWA  
 NIOSH: 0.05 mg/m<sup>3</sup>, 10-hr TWA  
 ACGIH: 0.05 mg/m<sup>3</sup>, 8-hr TWA  
 IDLH LEVEL: 100 mg/m<sup>3</sup>

## HEALTH EFFECTS

**Eyes:** Irritation  
**Skin:** No Information  
**Acute:** Headache, irritability, upset stomach, and weakness  
**Chronic:** Lead may cause lung, brain, stomach, and kidney cancer in humans.  
 Metallic taste, colic, muscle cramps  
 Damage to the nervous system

## PHYSICAL PROPERTIES

**Odor Threshold:** No odor  
**Flash Point:** Not combustible  
**LEL:** N/A  
**UEL:** N/A  
**Specific Gravity:** 11.35 at 68°F (20°C)  
**Vapor Pressure:** 0 mm Hg at 68°F (20°C)  
**Water Solubility:** Insoluble  
**Boiling Point:** 3,164°F (1,740°C)  
**Melting Point:** 621.5°F (327.5°C)

## PROTECTIVE EQUIPMENT

**Gloves:** Nitrile, Latex, Rubber  
**Coveralls:** DuPont Tyvek®  
**Boots:** Latex, Butyl, Neoprene  
**Respirator:** <0.5 mg/m<sup>3</sup> - N100  
 >0.5 mg/m<sup>3</sup> - full facepiece APR with High Efficiency filters  
 >50 mg/m<sup>3</sup> but ≤100 mg/m<sup>3</sup> Supplied Air

## FIRST AID AND DECONTAMINATION

Remove the person from exposure.  
 Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.  
 Remove contaminated clothing and wash contaminated skin with soap and water.  
 Transfer to a medical facility.



# Hazardous Substance Fact Sheet

Right to Know

Common Name: **CADMIUM**

Synonyms: None

Chemical Name: Cadmium

Date: December 1999 Revision: December 2007

CAS Number: 7440-43-9

RTK Substance Number: 0305

DOT Number: UN 2570

## Description and Use

Cadmium is a soft, blue-white solid, gray-black metal, or gray or white powder. It is used in silver solder, making batteries and metal plating, for plastics and pigments, and as a catalyst. It is a byproduct of Zinc production.

## Reasons for Citation

- ▶ Cadmium is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS and EPA.
- ▶ This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

### Eye Contact

- ▶ Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while rinsing.

### Skin Contact

- ▶ Remove contaminated clothing and wash contaminated skin with soap and water.

### Inhalation

- ▶ Remove the person from exposure.
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.
- ▶ Medical observation is recommended for 24 to 48 hours after overexposure, as pulmonary edema may be delayed.

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE PAGE 6

## Hazard Summary

Hazard Rating	NJDHSS	NFPA
HEALTH	4	-
FLAMMABILITY	3	-
REACTIVITY	1	-

CARCINOGEN  
TERATOGEN  
FLAMMABLE DUST OR POWDER  
POISONOUS GASES ARE PRODUCED IN FIRE  
CONTAINERS MAY EXPLODE IN FIRE

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ Cadmium can affect you when inhaled.
- ▶ Cadmium is a CARCINOGEN and a TERATOGEN. HANDLE WITH EXTREME CAUTION.
- ▶ Contact can irritate the skin and eyes.
- ▶ Exposure to Cadmium may cause a flu-like illness called *metal fume fever*.
- ▶ Cadmium can cause nausea, vomiting, diarrhea and abdominal pain.
- ▶ Inhaling Cadmium can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency.
- ▶ Repeated low exposures can cause liver and kidney damage, anemia and loss of smell.
- ▶ Cadmium *dust or powder* is FLAMMABLE and EXPLOSIVE and may ignite spontaneously in air or when exposed to heat.

## Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is 0.005 mg/m<sup>3</sup> averaged over an 8-hour workshift.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The threshold limit value (TLV) is 0.01 mg/m<sup>3</sup> (as total particulates), and 0.002 mg/m<sup>3</sup> (as the respirable fraction), averaged over an 8-hour workshift.

- ▶ Cadmium is a CARCINOGEN and TERATOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

**Determining Your Exposure**

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet, available on the RTK Program website ([www.nj.gov/health/eoh/rtkweb](http://www.nj.gov/health/eoh/rtkweb)) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

**Health Hazard Information**

**Acute Health Effects**

The following acute (short-term) health effects may occur immediately or shortly after exposure to Cadmium:

- ▶ Contact can irritate the skin and eyes.
- ▶ Exposure to Cadmium may cause "metal fume fever." This is a flu-like illness with symptoms of metallic taste in the mouth, headache, fever and chills, aches, chest tightness and cough. The symptoms may be delayed for several hours after exposure and usually last for a day or two.
- ▶ Cadmium can cause nausea, vomiting, diarrhea and abdominal pain.
- ▶ Inhaling Cadmium can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

**Chronic Health Effects**

The following chronic (long-term) health effects can occur at some time after exposure to Cadmium and can last for months or years:

**Cancer Hazard**

- ▶ Cadmium is a CARCINOGEN in humans. It has been shown to cause lung and prostate cancer.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

**Reproductive Hazard**

- ▶ Cadmium is a PROBABLE TERATOGEN in humans.
- ▶ Cadmium may damage the male reproductive system (testes) and affect the female reproductive cycle.

**Other Effects**

- ▶ Cadmium can irritate the lungs. Repeated exposure may cause bronchitis to develop with coughing, phlegm, and/or shortness of breath.
- ▶ Repeated low exposures can cause liver and kidney damage.
- ▶ Cadmium can cause anemia, loss of sense of smell (anosmia) and/or discoloration of teeth.

**Medical**

**Medical Testing**

Before first exposure and every 12 months thereafter, OSHA requires your employer to provide (for persons exposed to greater than or equal to 0.0025 mg/m<sup>3</sup> of Cadmium) a work and medical history and exam which shall include:

- ▶ Blood test for Cadmium (levels should be less than 5 micrograms per liter of whole blood)
- ▶ Urine test for Cadmium (levels should be less than 3 micrograms per liter of urine)
- ▶ Urine test for Beta-2 microglobulin to detect kidney damage
- ▶ Liver and kidney function tests
- ▶ Lung function tests
- ▶ Complete blood count

If symptoms develop or overexposure is suspected, the following is recommended:

- ▶ Consider chest x-ray after acute overexposure

OSHA requires your employer to provide you and your doctor with a copy of the OSHA Cadmium Standards (29 CFR 1910.1027 and 1926.1127).

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020)

## Mixed Exposures

- ▶ Smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems. It may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- ▶ More than light alcohol consumption can cause liver damage. Drinking alcohol may increase the liver damage caused by Cadmium.
- ▶ Cigarette smoke contains some Cadmium. Because it is hard for the body to eliminate Cadmium, it tends to build up in the body. Any workplace exposure adds to these levels.

## Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at [www.cdc.gov/niosh/topics/cribanding/](http://www.cdc.gov/niosh/topics/cribanding/).

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Cadmium Standards (29 CFR 1910.1027 and 1926.1127).
- ▶ Use a vacuum or a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP.**
- ▶ Use a high efficiency particulate air (HEPA) filter when vacuuming. Do not use a standard shop vacuum.
- ▶ Before entering a confined space where Cadmium dust or powder may be present, check to make sure that an explosive concentration does not exist.

## Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Gloves and Clothing

- ▶ Avoid skin contact with Cadmium. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- ▶ Safety equipment manufacturers recommend *Nitrile* or *Neoprene* for gloves and *DuPont Tyvek®* as protective material for clothing.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- ▶ Wear eye protection with side shields or goggles.
- ▶ Do not wear contact lenses when working with this substance.

### Respiratory Protection

*Improper use of respirators is dangerous.* Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure less than or equal to  $0.05 \text{ mg/m}^3$ , use a NIOSH approved air-purifying, particulate filter respirator with an N100, R100 or P100 filter.
- ▶ Where the potential exists for exposure less than or equal to  $0.250 \text{ mg/m}^3$ , use a NIOSH approved full facepiece air-purifying respirator with high-efficiency filters. Even greater protection is provided by a powered-air purifying respirator.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect Cadmium, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- ▶ Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridge: to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- ▶ Where the potential exists for exposure over  $5 \text{ mg/m}^3$ , use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

# CADMIUM

- ▶ Exposure to  $9 \text{ mg/m}^3$  (dust or fume) is immediately dangerous to life and health. If the possibility of exposure above  $9 \text{ mg/m}^3$  exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

## Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ Cadmium dust or powder is FLAMMABLE and EXPLOSIVE and may ignite spontaneously in air or when exposed to heat.
- ▶ Use dry chemicals appropriate for extinguishing metal fires.
- ▶ DO NOT USE water, foam,  $\text{CO}_2$  or Halons.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE.
- ▶ CONTAINERS MAY EXPLODE IN FIRE.
- ▶ Use water spray to keep fire-exposed containers cool.
- ▶ Cadmium powder may ignite combustibles (wood, paper and oil).

## Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If Cadmium is spilled, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Moisten powdered spilled material first or use a HEPA-filter vacuum for clean-up.
- ▶ Collect solid material in the most convenient and safe manner and deposit in sealed containers.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ It may be necessary to contain and dispose of Cadmium as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

## Handling and Storage

Prior to working with Cadmium you should be trained on its proper handling and storage.

- ▶ A regulated, marked area should be established where Cadmium is handled, used or stored as required by the OSHA Cadmium Standards (29 CFR 1910.1027 and 1926.1127).
- ▶ Cadmium reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and explosive Hydrogen gas.
- ▶ Cadmium dust or powder reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); HYDROGEN AZIDE; AMMONIUM NITRATE; AMMONIA; POTASSIUM; ZINC; SULFUR; SELENIUM; and TELLURIUM to cause fire and explosions.
- ▶ Sources of ignition, such as smoking and open flames, are prohibited where Cadmium powder is used, handled, or stored.
- ▶ Metal containers involving the transfer of Cadmium powder should be grounded and bonded.
- ▶ Use explosion-proof electrical equipment and fittings wherever Cadmium powder is used, handled, manufactured, or stored.
- ▶ Store Cadmium powder under Nitrogen.

## Occupational Health Information Resources

The New Jersey Department of Health and Senior Services, Occupational Health Service, offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health & Senior Services  
Right to Know Program  
PO Box 368  
Trenton, NJ 08625-0368  
Phone: 609-984-2202  
Fax: 609-984-7407  
E-mail: [rtk@doh.state.nj.us](mailto:rtk@doh.state.nj.us)  
Web address: <http://www.nj.gov/health/eoh/rtkweb>

*The Right to Know Hazardous Substance Fact Sheets  
are not intended to be copied and sold  
for commercial purposes.*

# CADMIUM

## GLOSSARY

**ACGIH** is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

**Acute Exposure Guideline Levels (AEGs)** are established by the EPA. They describe the risk to humans resulting from once-in-a lifetime, or rare, exposure to airborne chemicals.

**Boiling point** is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

**CFR** is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible substance** is a solid, liquid or gas that will burn.

A **corrosive substance** is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

**ERG** is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

**Emergency Response Planning Guideline (ERPG)** values are intended to provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable substance** is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group.

**Ionization Potential** is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

**IRIS** is the Integrated Risk Information System database maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

**LEL or Lower Explosive Limit**, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEOSHA** is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

**Permeated** is the movement of chemicals through protective materials.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive substance** is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**UEL or Upper Explosive Limit** is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

**Vapor Density** is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.



# INFORMATION FOR EMERGENCY RESPONDERS

Common Name: **CADMIUM**

Synonyms: None

CAS No: 7440-43-9

Molecular Formula: Cd

RTK Substance No: 0305

Description: Soft, blue-white solid, gray-black metal, or gray or white powder

## HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire 1 - Reactivity DOT#: UN 2570 ERG Guide #: 154 Hazard Class: 6.1 (Poison)	Use dry chemicals appropriate for extinguishing metal fires. DO NOT USE water, foam, CO <sub>2</sub> or Halons. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed containers cool. Cadmium powder may ignite combustibles (wood, paper and oil).	<b>Cadmium reacts with STRONG ACIDS</b> (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and explosive <i>Hydrogen gas</i> .  Cadmium <i>dust or powder</i> reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); HYDROGEN AZIDE; AMMONIUM NITRATE; AMMONIA; POTASSIUM; ZINC; SULFUR; SELENIUM; and TELLURIUM to cause fires and explosions.

## SPILL/LEAKS

Isolation Distance: 25 meters (75 feet)

Moisten powdered spilled material first or use a HEPA-filter vacuum for clean-up.

Collect solid material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

## PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	Non-combustible solid, flammable powder/dust
Vapor Pressure:	0 mm at Hg 68°F (20°C)
Specific Gravity:	8.65
Water Solubility:	Insoluble
Melting Point:	610°F (321°C)
Boiling Point:	1,409°F (765°C)
Molecular Weight:	112.4

## EXPOSURE LIMITS

OSHA:	0.005 mg/m <sup>3</sup> , 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m <sup>3</sup> , 8-hr TWA (total particulates)
	0.002 mg/m <sup>3</sup> , 8-hr TWA (respirable fraction)
IDLH LEVEL:	9 mg/m <sup>3</sup> (dust or fume)

## PROTECTIVE EQUIPMENT

Gloves:	Nitrile or Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	>0.005 mg/m <sup>3</sup> - APR with High efficiency filters >5 mg/m <sup>3</sup> - Supplied air

## HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Lung irritation with coughing and/or shortness of breath Nausea, vomiting, Headache, fever and chills, aches and chest tightness
Chronic:	Carcinogen (lung and prostate) in humans Teratogen in humans

## FIRST AID AND DECONTAMINATION

- Remove the person from exposure.
- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.
- Medical observation is recommended as symptoms may be delayed.

Date prepared on: 9/14/95

Last revised on: 1/20/08

Page 1

#### Section I: Product Identification

CATALOG NUMBER: 1400/4180/4182/4183/224180/8250/8252	PRODUCT NAME: <u>Hexavalent Chromium</u>
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#### Section II - Hazardous Ingredients/Identity Information

Chemical Name	CAS Reg. No.	OSHA PEL (TWA)	% Composition*
Nitric Acid	7697-37-2	2 ppm	1.2%

#### Non-Hazardous Ingredients/Identity Information

Chemical Name	CAS Reg No	OSHA PEL (TWA)	% Composition*
Potassium Dichromate	7778-50-9		<0.02%
Water			>98%

\* Components are calculated on a weight/weight basis.

#### Section III - Physical/Chemical Characteristics of Hazardous Ingredients

##### Nitric Acid

BOILING POINT >83°C	SPECIFIC GRAVITY Water = 1.5027 @ 25°C
VAPOR PRESSURE: 47.9 mm @ 20°C	SOLUBILITY IN WATER: Complete
	APPEARANCE/ODOR: Colorless to pale yellow liquid with suffocating odor.

#### Section IV - Fire and Explosion Hazard Data

FLASH POINT (Method used): Not available	AUTO IGNITION TEMPERATURE: Not available	FLAMMABLE LIMITS: Not available	LEL NA	UEL NA
EXTINGUISHING MEDIA: Non-flammable, use extinguisher media appropriate for surrounding the fire.				
SPECIAL FIRE FIGHTING PROCEDURES: NA				
UNUSUAL FIRE AND EXPLOSION HAZARDS: NA				

#### Section V - Reactivity Data

STABILITY:	Unstable <input type="checkbox"/>	Stable <input checked="" type="checkbox"/>	Conditions to Avoid: None known
INCOMPATIBILITY (Materials to avoid): Concentrated Nitric Acid will react violently with organic and hydrophobic compounds			
HAZARDOUS DECOMPOSITION PRODUCTS: None known			
HAZARDOUS POLYMERIZATION	May Occur <input type="checkbox"/>	Will Not Occur <input checked="" type="checkbox"/>	Conditions to Avoid: NA

#### Section VI - Health Hazard Data

ROUTES OF ENTRY	Inhalation? YES	Skin? YES	Ingestion? YES
HEALTH HAZARDS (Acute and Chronic): ACUTE: No CHRONIC: Chromium is a human poison by Ingestion. Long term effects are localized itching, burning and dermatitis. Individuals with bronchial asthma can be affected. The metal is a severe irritant of the mucous membranes.			

**COMPONENTS LISTED AS CARCINOGENS OR POTENTIAL CARCINOGENS** Chromate is listed in the IARC Monograph as carcinogen. The concentrations of chromate in the analytical standards are less than 0.1%.

**SIGNS AND SYMPTOMS OF EXPOSURE:** See under chronic health hazards.

**MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:** Individuals with dermatitis.

**EMERGENCY AND FIRST AID PROCEDURES:** Seek medical assistance for treatment, observation and support if necessary. **EYE CONTACT:** Wash immediately with large amounts of water, occasionally lifting upper and lower eyelids (15-20 minutes). **SKIN CONTACT:** Wash affected area with soap and large amount of water (15-20 minutes). In case of chemical burns, cover area with sterile, dry pad. **INHALATION:** N/A. **INGESTION:** Drink large quantities of water or milk. If vomiting persists administer fluids repeatedly.

### Section VII - Precautions for Safe Handling and Use

**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:** Add neutralizing agent, flush to sewer.

**WASTE DISPOSAL METHOD:** Observe all federal, state, and local regulations. Samples should be diluted for disposal unless local practice procedures specify otherwise.

**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:** These analytical standards may be stored in a non-hazardous chemical storage.

**OTHER PRECAUTIONS:** Never heat or evaporate analytical standards to dryness.

### Section VIII - Control Measures

**RESPIRATORY PROTECTION (Please specify):** Depends on contamination levels in the workplace.

**VENTILATION:** Local exhaust.

**PROTECTIVE GLOVES:** Employee should wear appropriate protective gloves.

**EYE PROTECTION:** Safety glasses.

**OTHER PROTECTIVE EQUIPMENT:** N/A.

**EMERGENCY WASH FACILITIES:** Maintain eye wash and quick drench showers in work area.

### Section IX - WHMIS Class: E - Corrosive Material

The information stated in this Material Safety Data Sheet (MSDS) is believed to be correct on the date of publication and must not be considered all conclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. Persons not specifically and properly trained should not handle this chemical or its container. This MSDS is provided without any warranty expressed or implied, including merchantability or fitness for any particular purpose.

This product is furnished for laboratory use ONLY! Our standards may not be used as drugs, cosmetics, agricultural or pesticidal products, food additives or as house hold chemicals.

\* Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Environmental Protection Agency, and others) may have specific regulations concerning the transportation, handling, storage or use of this product which may not be contained herein. The customer or user of this product should be familiar with these regulations.



New Jersey Department of Health and Senior Services

# HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ANTIMONY**

CAS Number: 7440-36-0

DOT Number: UN 2871 (Powder)

RTK Substance number: 0141

Date: February 1998 Revision: June 2004

## HAZARD SUMMARY

- \* **Antimony** can affect you when breathed in and by passing through your skin.
- \* Skin and eye contact can cause irritation and an itchy skin rash.
- \* Exposure to **Antimony** can irritate the nose, mouth, throat and lungs causing coughing, wheezing and/or shortness of breath.
- \* **Antimony** can cause headaches, nausea, vomiting, abdominal pain and loss of sleep.
- \* Repeated exposure can affect the lungs and cause an abnormal chest x-ray to develop.
- \* Prolonged or repeated contact can cause ulcers or sores in the nose.
- \* **Antimony** may damage the kidneys, liver and heart.

- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

## WORKPLACE EXPOSURE LIMITS

The following exposure limits are recommended for *Antimony* and *compounds* (measured as *Antimony*):

OSHA: The legal airborne permissible exposure limit (PEL) is **0.5 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **0.5 mg/m<sup>3</sup>** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **0.5 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

- \* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

## IDENTIFICATION

**Antimony** is a silver-white, hard, brittle and shiny metal or a dark gray, shiny powder. It is used to make metal alloys, enamels, rubber compounds, bullets, fireworks and matches.

## REASON FOR CITATION

- \* **Antimony** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, IRIS and EPA.
- \* Definitions are provided on page 5.

## HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.

## WAYS OF REDUCING EXPOSURE

- \* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to **Antimony** and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Antimony** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

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## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Antimony**:

- \* Skin and eye contact can cause irritation and an itchy skin rash.
- \* Exposure to **Antimony** can irritate the nose, mouth, throat and lungs causing coughing, wheezing and/or shortness of breath.
- \* **Antimony** can cause headaches, nausea, vomiting, abdominal pain and loss of sleep.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Antimony** and can last for months or years:

### Cancer Hazard

- \* While **Antimony** has not been identified as a carcinogen, it should be HANDLED WITH CAUTION since *Antimony ore* has been shown to cause lung cancer in animals.

### Reproductive Hazard

- \* **Antimony** may decrease fertility in males and females.

### Other Long-Term Effects

- \* Repeated exposure can affect the lungs and cause an abnormal chest x-ray to develop.
- \* Prolonged or repeated contact can cause ulcers or sores in the nose.
- \* **Antimony** may damage the kidneys, liver and heart.

## MEDICAL

### Medical Testing

For those with frequent or potentially high exposure (half the PEL or greater), the following is recommended before beginning work and at regular times after that:

- \* Urine test for *Antimony*.

If symptoms develop or overexposure is suspected, the following are recommended:

- \* EKG.
- \* Liver and kidney function tests.
- \* Consider chest x-ray after acute overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

### Mixed Exposures

- \* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- \* Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by **Antimony**.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- \* Where possible, automatically transfer **Antimony** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Antimony** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Antimony**.
- \* Eye wash fountains should be provided in the immediate work area for emergency use.
- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Antimony**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Antimony**, whether or not known skin contact has occurred.

- \* Do not eat, smoke, or drink where **Antimony** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
- \* Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

- \* Avoid skin contact with **Antimony**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- \* Wear eye protection with side shields or goggles.
- \* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
- \* Contact lenses should not be worn when working with this substance.

### Respiratory Protection

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- \* NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.

- \* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Antimony**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- \* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- \* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- \* Exposure to **50 mg/m<sup>3</sup>** is immediately dangerous to life and health. If the possibility of exposure above **50 mg/m<sup>3</sup>** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

## HANDLING AND STORAGE

- \* Prior to working with **Antimony** you should be trained on its proper handling and storage.
- \* When HEATED or in contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC), **Antimony** will form toxic *Stibine gas*.
- \* **Antimony** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); METALS (such as ALUMINUM, SODIUM, and POTASSIUM); METAL SALTS; PEROXIDES; METAL OXIDES; and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
- \* Store in tightly closed containers in a cool, well-ventilated area away from COMBUSTIBLES and HEAT.
- \* Sources of ignition, such as smoking and open flames, are prohibited where **Antimony** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.
- Q: Don't all chemicals cause cancer?
- A: No. Most chemicals tested by scientists are not cancer-causing.
- Q: Should I be concerned if a chemical causes cancer in animals?
- A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.
- Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
- A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.
- Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
- A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.
- Q: Who is at the greatest risk from reproductive hazards?
- A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

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The following information is available from:

New Jersey Department of Health and Senior Services  
Occupational Health Service  
PO Box 360  
Trenton, NJ 08625-0360  
(609) 984-1863  
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

#### **Industrial Hygiene Information**

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

#### **Medical Evaluation**

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

#### **Public Presentations**

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

#### **Right to Know Information Resources**

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

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**DEFINITIONS**

**ACGIH** is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

**CFR** is the Code of Federal Regulations, which consists of the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.







# HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **NICKEL**

CAS Number: 7440-02-0

DOT Number: UN 3077

DOT Hazard Class: 9 (Environmentally Hazardous  
Substance)

RTK Substance number: 1341

Date: August 1998

Revision: March 2007

## HAZARD SUMMARY

- \* Nickel can affect you when breathed in.
- \* Nickel should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
- \* Nickel can irritate the eyes and skin.
- \* Nickel may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a rash.
- \* Nickel may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
- \* Breathing Nickel can cause a sore or hole in the "bone" (septum) dividing the inner nose.
- \* Nickel may damage the kidneys and may affect liver function.
- \* Repeated exposure may cause scarring of the lungs.
- \* Nickel powder or "Raney Nickel" is HIGHLY FLAMMABLE and a DANGEROUS FIRE HAZARD.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).
- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

## WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is  $1 \text{ mg/m}^3$  averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is  $0.015 \text{ mg/m}^3$  averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is  $1.5 \text{ mg/m}^3$  (as the *inhalable fraction*) averaged over an 8-hour workshift.

- \* Nickel is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

## IDENTIFICATION

Nickel is a silvery-white metal, silver foil, or grey powder. It is used in electroplating and in making coins, batteries, catalysts and metal alloys such as stainless steel. "Raney Nickel" or Nickel Catalyst is composed of fine Nickel grains derived from Nickel-Aluminum alloy, which has been "activated" by being treated with a concentration base.

## REASON FOR CITATION

- \* Nickel is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NTP, DEP, IARC, NFPA and EPA.
- \* This chemical is on the Special Health Hazard Substance List because it is a CARCINOGEN.
- \* Definitions are provided on page 5.

## HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) requires private employers to provide similar training and information to their employees.

## WAYS OF REDUCING EXPOSURE

- \* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to Nickel and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Nickel to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Metal, metal compounds and alloys are often used in "hot" operations in the workplace. These may include, but are not limited to, welding, brazing, soldering, plating, cutting, and metallizing. At the high temperatures reached in these operations, metals often form metal fumes which have different health effects and exposure standards than the original metal or metal compound and require specialized controls. Your workplace can be evaluated for the presence of particular fumes which may be generated. Consult the appropriate New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheets.

## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Nickel**:

- \* **Nickel** can irritate the eyes and skin.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Nickel** and can last for months or years:

### Cancer Hazard

- \* **Nickel** is a PROBABLE CARCINOGEN in humans since it has been shown to cause lung cancer in animals.
- \* Many scientists believe there is no safe level of exposure to a carcinogen.

### Reproductive Hazard

- \* There is no evidence that **Nickel** affects reproduction. This is based on test results presently available to the New Jersey Department of Health and Senior Services from published studies.

### Other Long-Term Effects

- \* **Nickel** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a rash.
- \* **Nickel** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
- \* Breathing **Nickel** can cause a sore or hole in the "bone" (septum) dividing the inner nose.
- \* **Nickel** may damage the kidneys and may affect liver function.
- \* Repeated exposure may cause scarring of the lungs.

## MEDICAL

### Medical Testing

For those with frequent or potentially high exposure (half the PEL or greater), the following are recommended before beginning work and at regular times after that:

- \* Urine or plasma test for **Nickel** (unexposed persons have urine levels of less than **10 micrograms/liter**).
- \* Chest x-ray

If symptoms develop or overexposure is suspected, the following are recommended:

- \* Daily urine **Nickel** test for several days (persons with urine **Nickel** over **100 micrograms/liter** need medical attention).
- \* Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy.
- \* Lung function tests. These may be normal if the person is not having an attack at the time of the test.
- \* Kidney and liver function tests

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

### Mixed Exposures

- \* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- \* Because more than light alcohol consumption can cause liver damage, drinking alcohol may increase the liver damage caused by **Nickel**.

### Conditions Made Worse By Exposure

- \* Persons who are allergic to **Nickel** may also react to *Nickel-coated* jewelry, watchbands, and sometimes to prolonged contact with keys, coins, etc.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- \* Where possible, automatically transfer **Nickel** from drums or other storage containers to process containers.
- \* Work surfaces should be cleaned thoroughly on a routine basis.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Nickel** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Nickel**.
- \* Eye wash fountains should be provided in the immediate work area for emergency use.
- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Nickel**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Nickel**, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where **Nickel** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, applying cosmetics, smoking, or using the toilet.
- \* Use a vacuum or a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP.**
- \* When vacuuming, a high efficiency particulate air (HEPA) filter should be used, not a standard shop vacuum.

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

## Clothing

- \* Avoid skin contact with **Nickel**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

## Eye Protection

- \* Wear impact resistant eye protection with side shields or goggles.

## Respiratory Protection

### IMPROPER USE OF RESPIRATORS IS DANGEROUS.

Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- \* Where the potential exists for exposure over **0.015 mg/m<sup>3</sup>**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- \* Exposure to **10 mg/m<sup>3</sup>** is immediately dangerous to life and health. If the possibility of exposure above **10 mg/m<sup>3</sup>** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

## HANDLING AND STORAGE

- \* Prior to working with **Nickel** you should be trained on its proper handling and storage.
- \* **Nickel** in *powder* or *foil* form may react violently with TITANIUM POWDER; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); HYDRAZINE; HYDRAZOIC ACID; SELENIUM; and SULFUR.
- \* **Nickel** in *powder* or *foil* form is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) as highly flammable *Hydrogen gas* is produced.
- \* Store in tightly closed containers in a cool, well-ventilated area away from COMBUSTIBLES.
- \* "*Raney Nickel*" or *Nickel Catalyst* must be kept under inert gas or water as it will explode when dry or can ignite spontaneously in air.
- \* Sources of ignition, such as smoking and open flames, are prohibited where **Nickel powder** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

- \* Metal containers involving the transfer of *Nickel powder* should be grounded and bonded.
- \* Use only non-sparking tools and equipment, especially when opening and closing containers of *Nickel powder*.
- \* Wherever *Nickel powder* is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
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- Q: Should I be concerned if a chemical causes cancer in animals?
- A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.
- Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
- A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

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New Jersey Department of Health and Senior Services  
Occupational Health Service  
PO Box 360  
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## DEFINITIONS

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**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

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A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

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**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.





# HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **THALLIUM**

CAS Number: 7440-28-0

DOT Number: UN 1707

RTK Substance number: 1840

Date: March 1998

Revision: November 2004

## HAZARD SUMMARY

- \* **Thallium** can affect you when breathed in and by passing through your skin.
- \* **Thallium** can irritate and burn the skin and eyes.
- \* Prolonged contact can cause blurred vision and/or loss of vision, nail changes, skin rash and dryness, and hair loss.
- \* Exposure can cause fatigue, poor appetite, nausea, vomiting, metallic taste, insomnia, confusion and mood changes.
- \* **Thallium** can damage the nervous system causing headache, weakness, irritability, pain, and "pins and needles" in the arms and legs.
- \* Repeated exposures can cause tremor, convulsions, hallucinations, coma and death.
- \* **Thallium** may damage the liver and kidneys.

- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

## WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **0.1 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **0.1 mg/m<sup>3</sup>** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **0.1 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

- \* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

## IDENTIFICATION

**Thallium** is a solid, bluish-white metal. It is used in rodenticides for the control of vermin, and in the production of semi-conductors, photoelectric equipment, lenses and thermometers. **Thallium** is contained in flue dusts from *Lead* and *Zinc* smelters.

## REASON FOR CITATION

- \* **Thallium** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP and EPA.
- \* Definitions are provided on page 5.

## HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.

## WAYS OF REDUCING EXPOSURE

- \* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to **Thallium** and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Thallium** to potentially exposed workers.



This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Thallium**:

- \* **Thallium** can irritate and burn the skin and eyes.
- \* Exposure can cause fatigue, poor appetite, nausea, vomiting, metallic taste, insomnia, confusion and mood changes.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Thallium** and can last for months or years:

### Cancer Hazard

- \* According to the information presently available to the New Jersey Department of Health and Senior Services, **Thallium** has not been tested for its ability to cause cancer in animals.

### Reproductive Hazard

- \* While **Thallium** has not been identified as a reproductive hazard, it should be HANDLED WITH CAUTION since several related *Thallium compounds* are teratogens in animals.

### Other Long-Term Effects

- \* Prolonged contact can cause blurred vision and/or loss of vision, nail changes, skin rash and dryness, and hair loss.
- \* **Thallium** can damage the nervous system causing headache, weakness, irritability, pain, and "pins and needles" in the arms and legs.
- \* Repeated exposures can cause tremor, convulsions, hallucinations, coma and death.
- \* **Thallium** may damage the liver and kidneys.

## MEDICAL

### Medical Testing

For those with frequent or potentially high exposure (half the PEL or greater), the following is recommended before beginning work and at regular times after that:

- \* Complete exam of the nervous system.

If symptoms develop or overexposure is suspected, the following are recommended:

- \* Complete visual exam.
- \* Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

### Mixed Exposures

- \* Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by **Thallium**.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- \* Where possible, automatically transfer **Thallium** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Thallium** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Thallium**.
- \* Eye wash fountains should be provided in the immediate work area for emergency use.
- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Thallium**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Thallium**, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where **Thallium** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
- \* Use a vacuum or a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP.**

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

- \* Avoid skin contact with **Thallium**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- \* Wear impact resistant eye protection with side shields or goggles.
- \* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

### Respiratory Protection

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- \* NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.
- \* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Thallium**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.

- \* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- \* Where the potential exists for exposure over **1 mg/m<sup>3</sup>**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- \* Exposure to **15 mg/m<sup>3</sup>** is immediately dangerous to life and health. If the possibility of exposure above **15 mg/m<sup>3</sup>** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

- Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
- A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.
- Q: Who is at the greatest risk from reproductive hazards?
- A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.
- Q: Should I be concerned if a chemical is a teratogen in animals?
- A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

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The following information is available from:

New Jersey Department of Health and Senior Services  
Occupational Health Service  
PO Box 360  
Trenton, NJ 08625-0360  
(609) 984-1863  
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

#### **Industrial Hygiene Information**

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

#### **Medical Evaluation**

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

#### **Public Presentations**

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

#### **Right to Know Information Resources**

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

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## DEFINITIONS

**ACGIH** is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

**CFR** is the Code of Federal Regulations, which consists of the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: **THALLIUM**  
 DOT Number: **UN 1707**  
 NAERG Code: **151**  
 CAS Number: **7440-28-0**

Hazard rating	NJDHSS	NFPA
<b>FLAMMABILITY</b>	0	-
<b>REACTIVITY</b>	0	-
DUST MAY EXPLODE IN AIR POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

**FIRE HAZARDS**

- \* **Thallium** in bulk form does not burn, however, **Thallium dust** and air mixtures may be explosive as **Thallium** is air-sensitive.
- \* Extinguish **Thallium dust** fires with dolomite, dry powder for metal fires, sand, graphite or soda ash.
- \* POISONOUS GASES ARE PRODUCED IN FIRE.
- \* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

**SPILLS AND EMERGENCIES**

If **Thallium** is spilled, take the following steps:

- \* Evacuate persons not wearing protective equipment from area of spill until clean-up is complete.
- \* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- \* Ventilate and wash area after clean-up is complete.
- \* It may be necessary to contain and dispose of **Thallium** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
- \* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300  
 NJDEP HOTLINE: 1-877-WARN-DEP

**HANDLING AND STORAGE**

- \* Prior to working with **Thallium** you should be trained on its proper handling and storage.
- \* **Thallium** is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS; and ORGANICS.
- \* Store in tightly closed containers in a cool, well-ventilated area.
- \* **Thallium** should be packaged under water.

**FIRST AID**

For POISON INFORMATION call 1-800-222-1222

**Eye Contact**

- \* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

**Skin Contact**

- \* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention.

**Breathing**

- \* Remove the person from exposure.
- \* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- \* Transfer promptly to a medical facility.

**PHYSICAL DATA**

**Water Solubility:** Insoluble

*Not intended to be copied and sold for commercial purposes.*

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES  
**Right to Know Program**  
 PO Box 368, Trenton, NJ 08625-0368  
 (609) 984-2202



New Jersey Department of Health and Senior Services

# HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **VANADIUM**

CAS Number: 7440-62-2

DOT Number: None

DOT Hazard Class: None

RTK Substance number: 3762

Date: January 2001 Revision: January 2007

## HAZARD SUMMARY

- \* **Vanadium** can affect you when breathed in.
- \* Contact can irritate the skin and eyes.
- \* Breathing **Vanadium** can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- \* High exposure to **Vanadium** can cause nausea, vomiting, abdominal pain and greenish discoloration of the tongue.
- \* Exposure to **Vanadium** can cause headache, tremors and dizziness.
- \* **Vanadium** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
- \* **Vanadium** may damage the kidneys.
- \* Repeated high exposure may cause anemia.

- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

## WORKPLACE EXPOSURE LIMITS

NIOSH: The recommended airborne exposure limit is **0.05 mg/m<sup>3</sup>** (as **Vanadium dust**), which should not be exceeded at any time.

## WAYS OF REDUCING EXPOSURE

- \* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to **Vanadium** and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Vanadium** to potentially exposed workers.

## IDENTIFICATION

**Vanadium** is a gray or white, shiny powder or solid metal. It is used to make steel alloys, other **Vanadium** compounds, x-ray equipment, *Sulfuric Acid*, and synthetic rubber.

## REASON FOR CITATION

- \* **Vanadium** is on the Hazardous Substance List because it is cited by NIOSH, DEP and EPA.
- \* Definitions are provided on page 5.

## HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) requires private employers to provide similar training and information to their employees.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

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## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Vanadium**:

- \* Contact can irritate the skin and eyes.
- \* Breathing **Vanadium** can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- \* High exposure to **Vanadium** can cause nausea, vomiting, abdominal pain and greenish discoloration of the tongue.
- \* Exposure to **Vanadium** can cause headache, tremors and dizziness.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Vanadium** and can last for months or years:

### Cancer Hazard

- \* According to the information presently available to the New Jersey Department of Health and Senior Services, **Vanadium** has not been tested for its ability to cause cancer in animals.

### Reproductive Hazard

- \* There is limited evidence that **Vanadium compounds** may damage the male reproductive system in animals.

### Other Long-Term Effects

- \* **Vanadium** can irritate the lungs. Repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.
- \* **Vanadium** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
- \* **Vanadium** may damage the kidneys.
- \* Repeated high exposure may cause anemia.

## MEDICAL

### Medical Testing

Before beginning employment and at regular times after that, for those with frequent or potentially high exposures, the following are recommended:

- \* Lung function tests. These may be normal if the person is not having an attack at the time of the test.

If symptoms develop or overexposure is suspected, the following are recommended:

- \* Complete blood count
- \* Kidney function tests
- \* Urine test for **Vanadium**

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

### Mixed Exposures

- \* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- \* Where possible, automatically transfer **Vanadium** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Vanadium** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Vanadium**.
- \* Eye wash fountains should be provided in the immediate work area for emergency use.

- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Vanadium**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Vanadium**, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where **Vanadium** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, applying cosmetics, smoking, or using the toilet.
- \* Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

- \* Avoid skin contact with **Vanadium**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- \* Wear impact resistant eye protection with side shields or goggles.
- \* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
- \* Contact lenses should not be worn when working with this substance.

### Respiratory Protection

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- \* NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.
- \* Where the potential exists for exposure over  $0.5 \text{ mg/m}^3$ , use a NIOSH approved full facepiece respirator with a high efficiency particulate filter. Increased protection is obtained from full facepiece powered-air purifying respirators.
- \* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Vanadium**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- \* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- \* Where the potential exists for exposure over  $1.25 \text{ mg/m}^3$ , use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- \* Exposure to  $35 \text{ mg/m}^3$  is immediately dangerous to life and health. If the possibility of exposure above  $35 \text{ mg/m}^3$  exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
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A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

# EMERGENCY INFORMATION

Common Name: **VANADIUM**  
 DOT Number: **None**  
 DOT Hazard Class: **None**  
 NAERG Code: **No Citation**  
 CAS Number: **7440-62-2**

Hazard rating	NJDHSS	NFPA
<b>FLAMMABILITY</b>	0	-
<b>REACTIVITY</b>	0	-
<b>POISONOUS FUMES ARE PRODUCED IN FIRE</b>		

*Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe*

## **FIRE HAZARDS**

- \* Extinguish fire using an agent suitable for type of surrounding fire. **Vanadium** itself does not burn.
- \* **POISONOUS FUMES ARE PRODUCED IN FIRE**, including *Vanadium Oxide*.
- \* Use water spray to keep fire-exposed containers cool.
- \* If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

## **SPILLS AND EMERGENCIES**

If **Vanadium** is spilled, take the following steps:

- \* Evacuate personnel and secure and control entrance to the area.
- \* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- \* Ventilate and wash area after clean-up is complete.
- \* It may be necessary to contain and dispose of **Vanadium** as a **HAZARDOUS WASTE**. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
- \* If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300  
 NJDEP HOTLINE: 1-877-WARN-DEP

## **HANDLING AND STORAGE**

- \* Prior to working with **Vanadium** you should be trained on its proper handling and storage.
- \* **Vanadium** must be stored to avoid contact with **OXIDIZING AGENTS** (such as **PERCHLORATES**, **PEROXIDES**, **PERMANGANATES**, **CHLORATES**, **NITRATES**, **CHLORINE**, **BROMINE** and **FLUORINE**) and **LITHIUM** since violent reactions occur.
- \* **Vanadium** is not compatible with **STRONG ACIDS** (such as **HYDROCHLORIC**, **SULFURIC** and **NITRIC**) and **ALKALI METALS**.
- \* Store in tightly closed containers in a cool, well-ventilated area away from **HEAT**.

## **FIRST AID**

*For POISON INFORMATION call 1-800-222-1222*

### **Eye Contact**

- \* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

### **Skin Contact**

- \* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

### **Breathing**

- \* Remove the person from exposure.
- \* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- \* Transfer promptly to a medical facility.

## **PHYSICAL DATA**

**Vapor Pressure:** 0 mm Hg at 68°F (20°C)

**Water Solubility:** Insoluble

## **OTHER COMMONLY USED NAMES**

### **Chemical Name:**

Vanadium

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*Not intended to be copied and sold for commercial purposes.*  
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NEW JERSEY DEPARTMENT OF HEALTH AND  
 SENIOR SERVICES

### **Right to Know Program**

PO Box 368, Trenton, NJ 08625-0368  
 (609) 984-2202

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