Material Safety Data Sheet

SWX-630/531/240 Cadmium

Nuclead Inc.
415 North Elm. Street
West Bridgewater, MA 02379
508-583-2699
Date: January, 2004

Section 1. PRODUCT AND COMPANY NAME

MATERIAL NAME: Cadmium Metal
MANUFACTURER'S NAME: Nuclead Inc.
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West Bridgewater, MA 02379
508-583-2699
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Section 2. – COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate % by Weight	CAS Number	Occupational Exposure Limits (OELs)	
Cadmium	99.95+%	7440-43-9	OSHA PEL	0.005mg/m³
			OSHA SECAL*	0.015 or 0.05mg/m³
			ACGIH TLV	0.01mg/m³ Total
				0.002mg/m³ Respirable
			NIOSH REL	Lowest feasible level

Section 3. – HAZARDS IDENTIFICATION

Emergency Overview: A bluish-silver lustrous metal that does not burn in bulk. Clouds of finely-divided dust are a fire and explosion hazard, however. When heated strongly in air cadmium oxide fumes can be generated. Freshly formed cadmium fume is an intense pulmonary irritant and may result in development of pulmonary edema several hours after exposure. Inhalation or ingestion of dust or fumes may produce both acute and chronic health effects. Probable cancer hazard. A self-contained breathing apparatus (SCBA) and full protective clothing are required for all emergency response personnel when cadmium is involved in a fire situation. Do NOT use water or foam. Apply dry chemical, dry sand, or special powder extinguishing media.

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Potential Health Effects: Cadmium dust and fume have both acute and chronic health effects. Cadmium dust is a pulmonary irritant. Freshly formed cadmium is an intense pulmonary irritant, resulting in respiratory distress and possible pulmonary edema that may develop 4 to 10 hours after exposure. In severe cases death may result. Long term exposures may cause kidney dysfunction and lung injury (emphysema) as well as other symptoms. Cadmium is classified as a carcinogen or probable carcinogen by IARC, ACGIH, NTP, OSHA, and the EU.

Potential Environmental Effects: Cadmium metal has low bioavailability but its compounds are hazardous in the environment at low concentrations. Bioaccumulation of cadmium readily occurs in the aquatic and terrestrial food chains, specifically in plants and aquatic organisms.

SECTION 4. – FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Dust: Remove* contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Wash gently and thoroughly with lukewarm gently flowing water and non-abrasive soap for 5 minutes. If irritation persists, repeat flushing. Obtain medical advice. Completely decontaminate clothing, shoes and leather goods before reuse or else discard. *Molten Metal:* Flush contact area to solidify and cool, but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: remove source of contamination or move victim from exposure area to fresh air immediately. If breathing is difficult, trained personnel should administer medical oxygen. DO NOT allow victim to move around unnecessarily. Treat pulmonary edema as a priority, even is no symptoms (i.e. wheezing, coughing, shortness of breath, tec.) are apparent. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. Quickly transport victim to an emergency care facility.

Ingestion: NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 2-8 oz. (60-240ml) of water. The irritant and emetic action of swallowed cadmium usually leads to spontaneous vomiting. If vomiting occurs naturally, have victim rise mouth with water again. Immediately obtain medical attention and bring a copy of this MSDS.

SECTION 5. - FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Finely-divided metallic dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed is air at high concentrations and exposed to heat, flame or other ignition sources. Freshly oxidized cadmium powder, in contact with limited amounts of water, may heat spontaneously and may ignite combustible materials in contact with the powder. Fires and explosions may also occur upon contact with certain incompatible materials.

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Extinguishing Media: Do NOT use water or foam. Burning metal reacts violently with extinguishing agents such as water, foam, carbon dioxide, and Holons. Apply dry chemical, dry sand, or special powder extinguishing media.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Apply dry chemical, sand or special powder extinguishing media to burning cadmium. Highly toxic cadmium oxide fumes evolve in fires. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

Flashpoint and Method: Not applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoingnition Temperature. Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to solidify prior to clean-up. If solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment (see Section 8) and use methods that will minimize dust generation (e.g. vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated and non-recyclable material in suitable labeled containers for later disposal. Treat or dispose of waste material in accordance with all local, state and federal requirements, as applicable.

Personal Precautions: Persons responding to an accidental release should wear protective clothing; gloves and a respirator (see Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a respirator to protect against inhalation of cadmium fume. Workers should wash and change clothing following clean-up of a cadmium spill to prevent personal contamination with cadmium dust.

Environmental Precautions: Cadmium metal has limited bioavailability but its compounds can pose a severe threat to the aquatic and terrestrial environments. Contamination of water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store cadmium in a DRY, covered area, away from incompatible materials and food or feedstuffs. Cadmium ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking or smoking in appropriate, designating areas, as well as at the end of the workday. No special packaging materials are required.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when cadmium is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, respirator and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Ventilation: Use adequate local or general ventilation to maintain the concentration of cadmium fumes in the working environment will below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is strongly recommended for melting, casting grinding and welding or flame cutting of cadmium.

Respirators: Where cadmium dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge). When exposure levels are unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask should be worn.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Soft bluish-silver lustrous metal	**Odor:** None	**Physical State:** Solid	**pH:** Not Applicable
Vapor Pressure: 1 mm at 394°C Negligible @ 20°C	**Vapor Density:** Not Applicable	**Boiling Point:** 765°C	**Freezing/Melt Point Range:** 321°C
Specific Gravity: 8.65	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil:** Not Applicable	
Solubility: Insoluble in Water	**Odor Threshold:** None		

SECTION 10. STABILITY AND REACTIVITY

Stability and Reactivity: Massive metal is stable under normal temperatures and pressures. Metal surfaces tarnish on exposure to moist air. Finely powdered metal or dust can be ignited from a dust cloud in air. Freshly oxidized cadmium powder, in contact with limited amounts of water, may spontaneously and may ignite combustible materials in contact with the powder.

Incompatibilities: Cadmium reacts vigorously with oxidizing agents such as peroxides, chlorates, nitrates and halogens or interhalogen compounds such as chlorine trifluoride as well as with elemental sulfur, zinc, selenium, or tellurium. Mixtures with nitric acid liberate toxic fumes of nitrogen oxides. Violent explosions can occur when the metal is in contact with fused ammonium nitrate or immersed in hydrazoic acid. Burning metal reacts violently with fire extinguishing agents such as water, foam, carbon dioxide or Halons. Cadmium metal reacts with strong acids giving off flammable hydrogen gas.

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Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting or burning, electric arc welding or overheating a molten bath will generate highly toxic cadmium oxide fumes. They are highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Cadmium dust and fume are both pulmonary irritants, but freshly generated cadmium fume is an intense irritant and its small particle size allows it to reach into the lung more easily. The onset of symptoms is frequently delayed by 4 to 10 hours after exposure. Pulmonary edema may then develop rapidly. The mortality rate from acute pulmonary disease is about 20% according to the ACGH. Those surviving an episode of acute poisoning generally recover slowly but without apparent residual effects.

Chronic exposure to cadmium has been associated with a wide variety of gastrointestinal symptoms, pulmonary edema and kidney malfunction with increased excretion of a specific low molecular weight protein (beta-2-microglobulin). The body to a large extent retains absorbed cadmium, and excretion is very slow. Cadmium has been linked to both prostate cancer and lung cancer, though several researchers have questioned the association with prostate cancer recently.

Individuals with pre-existing lung, liver, kidney and blood ailments should be precluded from exposure until approved by a physician. Initial and periodic medical examinations are recommended for persons exposed to levels above the exposure limits of cadmium.

Acute:
Skin/Eyes: Contact with dust or fume may cause irritation but would not cause tissue damage.

Inhalation: Fumes of cadmium (i.e. cadmium oxide) are highly toxic by inhalation. They may cause serious systemic poisoning and possible permanent damage to the lungs. Early symptoms of excessive exposure include dryness of the throat, irritation of the nose, throat, and respiratory tract, headache, coughing, and a metallic taste. After a delay of several hours (up to 10), a person may develop constriction of the chest, persistent cough, and progressive shortness of breath. There may be headache, chills, diarrhea, muscle aches, nausea, vomiting, irritability, and restlessness. Pulmonary congestion may progress rapidly causing wheezing and symptoms of oxygen deficiency. Death may follow. Recovery from an acute exposure episode is slow but generally without ongoing or lingering effects. Milder cases of acute exposure have produced symptoms resembling metal fume fever with some symptoms and signs of acute gastroenteritis as well.

Ingestion: Ingestion of excessive quantities of cadmium dust may cause salivation, choking, nausea, vomiting, diarrhea, abdominal pain, tenseness, blurred vision, dizziness, vertigo, and headache. Convulsions, exhaustion, collapse, shock, and unconsciousness may occur. Death has followed within 24 hours from shock or after 7 to 14 days from acute kidney failure or cardiopulmonary depression.

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Chronic:
Prolonged exposure to cadmium dust and/or fume may cause loss of sense of smell, occasional ulcerations of the nasal passages, rhino laryngitis, cough, shortness of breath, mild anemia, sleeplessness, irritability, loss of appetite, and cadmium-yellow fringe on teeth. The primary target organ for chronic cadmium effects is the kidney with increased excretion of a specific low molecular weight protein (beta-2-microgloblulin). Damage to the lungs (of the emphysematous type) has been reported in some studies of cadmium-exposed workers but not found in other studies. Cigarette tobacco contains cadmium and smoking adds to the daily intake of cadmium which may increase the risk of cumulative toxic effects. Clinical evidence of the cumulative effects of cadmium may appear after exposure has ceased. Disease then may be progressive.

The International Agency for Research on Cancer (IARC) has classified cadmium and certain cadmium compounds as Group 1 carcinogens (carcinogenic to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies cadmium as a suspected human carcinogen (A2). The National Toxicology Program (NTP) classifies cadmium as a know human carcinogen and OSHA lists cadmium as a carcinogen. The European Union (EU) classifies cadmium as a Category 2 (probable) carcinogen.

SECTION 12. ECOLOGICAL INFROMATION

White cadmium metal is insoluble, it's processing or extended exposure in the aquatic and terrestrial environments may lead to the release of cadmium in bioavailable forms. Compared to most other heavy metals, cadmium is relatively mobile and highly toxic in the aqueous environment. Water hardness, PH and dissolved organic carbon content are factors which regulate the degree of toxicity. In soils, higher acidity results in the release of cadmium ions, causing higher toxicity to soil organisms and the uptake of cadmium by plants.

Cadmium is strongly accumulated by all organisms through both food and water. Bioaccumulation in aquatic organisms is greatest in invertebrates, followed by fish, and aquatic plants. Bioaccumulation in terrestrial plants results in higher levels of cadmium in land mammals that feed on the plants.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process, dispose of in accordance with applicable regulations.

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