MATERIAL SAFETY DATA SHEET - F1

SECTION I

Emergency Phone - Chemtrec 800-424-9300

Product Identification: Iron/Nickel/Cobalt Alloys
AD-MU-80

SECTION II HAZARDOUS INGREDIENTS

Ingredient	CAS No	OSHA-PEL*	ACGIH-TLV*
Cr-Chromium	7440-47-3	1	0.5
Co-Cobalt	7440-48-4	0.1	0.05
Fe-Iron	1309-37-1	10 as oxide fume	5 as oxide fume
Mn-Manganese	7439-96-5	5	1/5 fume/dust
Mo-Molybdenum	7439-98-7	15	10
Ni-Nickel	7440-02-0	1	1
Si-Silicon	7440-21-3	None	10
W-Tungsten	7440-33-7	None	5
V-Vanadium	1314-62-1	.1/.5 fume/dust	.05 fume/dust

*mg/m^3

SECTION III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	- N/A
Vapor Pressure (mm Hg)	- N/A
Solubility in Water	- Insoluble
Specific Gravity H_2O=1	- Approx. 8
Melting Point	- Approx. 2600°F
Evaporation Rate	- N/A
Appearance and Odor	- Odorless, gray solid

SECTION IV FIRE & EXPLOSION HAZARD DATA

Flash Point (°F) - None
Flammable (explosive) Limits - V/V% (LEL - None UEL - None)

Date of Issue 10/18/2001

Extinguishing Media - This metal is noncombustible. Use extinguishing media appropriate to the surrounding fire.

Special Fire Fighting - If the metal is reduced to powder form, caution must be used to prevent fire or explosion. To extinguish a metal powder fire use dry sand, dry graphite or other Class 'D' fire extinguishing powder.

Unusual Fire & Explosion Hazards - No unusual fire or explosion hazards are associated with this metal.

SECTION V REACTIVITY DATA

Stability - Stable

Incompatibility (materials to avoid) - Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas; the evolution of hydrogen may be an explosion hazard.

Hazardous Decomposition Products - Various elemental metals and metal oxides may be generated from melting or dross handling operations. Refer to Section II for permissible exposure limits.

Hazardous Polymerization - Will not occur.

SECTION VI HEALTH HAZARD DATA

Routes of Entry - Primary exposure is from inhalation of fumes or dust but ingredients of the iron/nickel/cobalt alloys may cause direct effects to the skin or eyes and could be harmful if swallowed.

Inhalation - Inhalation of metal dust, fume or powder may result from melting, dross handling, casting, welding, grinding, crushing or similar operations which generate airborne metal particulate during use of this material.

Ingestion - Hand, clothing, food and drink contact with metal dust, fume or powder can cause ingestion of particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc.

Skin - Skin contact with this material may cause in some sensitive individuals an allergic response if elements such as chromium, cobalt, copper and nickel are present. In the form of metal dust or powder, skin contact or abrasion may also cause irritation or dermatitis.

Eyes - Particulate metal (dust, fume or powder) may be dangerous to the eye and surrounding tissue. Airborne particulate (chips, dust or powder) is always a potential problem as well as inserting fingers into the eye socket if the hand or clothing is contaminated with metal particulate.

Operations such as burning, welding, sawing, brazing and grinding may result in the following effects if exposures exceed permissible limits as listed in Section II.

Acute - The metal dust and fumes of those elements in Section II can cause irritation to the skin, eye and mucous membranes. Contact with chromium, cobalt, copper and nickel may cause allergic skin reactions. As dust, powder or fume, exposure which abrades the skin can cause irritation and dermatitis. Injury to the eyes is generally a result of particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. Excessive inhalation of aluminum, cobalt, copper, manganese, nickel and vanadium can cause respiratory irritation, cough, bronchitis, chills, "fume fever" and asthma-like symptoms.

Chronic - Respiratory disease with symptoms ranging from shortness of breath and cough to permanent difficulty due to loss of lung function, fibrosis or subsequent effects on the heart may be caused by excessive exposure to dust or fumes containing cobalt, nickel, titanium and tungsten. Central nervous system depression has been identified with excessive manganese exposure. Nickel and chromium metal and certain compounds have been linked to nasal, bronchial and lung cancers. Aluminum and iron have been indicated to cause gastro-intestinal disorders and non-significant changes in the lung. Chronic health effects specific to an element(s) may be difficult to detect due to the numerous elemental constituents in this metal.

Carcinogenicity - Nickel and chromium metal and some of their compounds have been listed in the 4th Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) (Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man: Geneva, WHO, LARC 1972-1977 Multi volume work) 49 Sheridan Street, Albany, NY 12219. Fourth Annual Report on Carcinogens, Summary, NTP 82-330 NTP Public Information Office, MD B2-04 Box 12233, Research Triangle Park, NC27709.

Medical Conditions Generally Aggravated by Exposure -
Individuals who may have had allergic reaction or sensitivity to metals such as chromium, copper, cobalt and nickel may encounter skin rash or dermatitis if skin contact with this product occurs. Persons with impaired pulmonary function, airway diseases and conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further disability if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the Neurologic (nervous), Circulatory, Hematologic (blood) or Renal (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk if handling and use of this material causes excessive exposure.

Emergency & First Aid Procedures

Inhalation - Breathing difficulty caused by inhalation of dust or fume requires removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.

Skin - Skin cuts and abrasions can be treated by standard first aid. Skin contamination with dust or powder can be removed by washing with soap and water. If irritation persists, obtain medical assistance.

Eyes - Dust or powder should be flushed from the eyes with copious amounts of clean water. If irritation persists, obtain medical assistance. Contact lenses should not be worn if working with metal dusts and powders.

SECTION VII PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled - In solid form this material poses no special clean-up problems. If this material is in powder or dust form, clean-up should be conducted with a vacuum system utilizing a high efficiency particulate air filtration system. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Properly label all materials collected in waste container.

Waste Disposal Method - Prior to disposal consider if the material has recovery value. State or Federal regulations require specific labeling, packing, storage, transportation and disposal procedures. Contact an Environmental Engineer or consultant familiar with waste disposal regulations.

Precautions to be Taken in Handling and Storing - This product must be handled according to the size, shape and quantity of material involved. Solid metal may require use of hoists, cranes, etc. Powders should be moved or transported to minimize spill or release potential. In solid form this material poses no special storage problems. Store metal and metal powder in a dry area. Do not store adjacent to mineral acids. Fine metal powder should be kept away from flames and sources of ignition.

SECTION VIII CONTROL MEASURES

Respiratory Protection - Use NIOSH approved respirators as specified by an Industrial Hygienist or qualified Safety Professional. Lung function tests are recommended for users of negative pressure devices.

Ventilation - Local exhaust ventilation should be used to control exposure to airborne dust and fume whenever possible.