

**SAFETY DATA SHEET**

**CARNOTITE ORE**

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**SECTION 1: CHEMICAL PRODUCTS & COMPANY IDENTIFICATION**

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NBL Program Office  
U. S. Department of Energy,  
1 Science.gov Way,  
Oak Ridge, TN 37830  
1-865-576-0598

**Emergency Phone Numbers:** 1-865-576-0598

**Substance:** Carnotite Ore Blend

**Trade Names/Synonyms:** Potassium uranium vanadate, Uranium Oxide ( $U_3O_8$ ), Uranous Oxide, Triuranium Octaoxide, Uranite Nasturan, CRM 4, CRM 5

**Use and Restriction:** This material is prepared for use as a standard or for inter-laboratory comparison programs at analytical laboratories, which routinely handle uranium and/or plutonium. NBL expects that recipients of their material are in compliance with 29 CFR 1910.1200(h) which requires employers to provide employees with effective information and training in hazardous chemicals in their work area.

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**SECTION 2: HAZARDS IDENTIFICATION**

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OSHA Hazards

Toxic by inhalation, toxic by ingestion.

Target Organs

Kidney, Liver, Lungs, Brain.

GHS Label Elements

Pictogram



Signal Word: Danger

Hazard Statements: Toxic by inhalation and ingestion

Danger of cumulative effects  
May damage kidneys

Precautionary Statements: Avoid Breathing Dust

Avoid contact with skin, eyes and clothing  
When using do not eat, drink or smoke  
In case of accident or if you feel unwell seek medical advice immediately  
Use only with adequate ventilation

GHS Classification

Skin Irritation (Category 2)

Eye Irritation (Category 2)

Specific target organ toxicity - repeated exposure (Category 2)

Specific target organ toxicity – acute exposure (Category 2)

GHS Hazard Ratings

R23/25: Toxic by inhalation and ingestion

R33: Danger of cumulative effects

S20/21: When using do not eat, drink or smoke

S45: In case of accident or if you feel unwell seek medical advice immediately

S61: Avoid release to the environment.

Carnotite ore is an odorless, tan powder or crystal. Inhalation, ingestion, or absorption through skin abrasions may lead to heavy metal toxicity or radiation poisoning. Avoid inhalation or contact with skin, eyes and clothing. Wash thoroughly after handling. Use only with adequate ventilation.

CERCLA Ratings (SCALE 0-3): HEALTH = 3; FIRE = 0; REACTIVITY = 0;  
PERSISTENCE = 3

NFPA RATINGS (SCALE 0-4): HEALTH = U; FIRE = 0; REACTIVITY = 0

CARCINOGEN STATUS:

OSHA: N

NTP: N

IARC: N

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### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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Component: Carnotite  
CAS Number: 1344-59-8  
Percentage: 100 Weight %  
Other Contaminants: None  
Chemical Family: Metal oxide, Mineral, Radioactive

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### SECTION 4: FIRST AID MEASURES

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**Necessary First Aid Measures:**

EYES: Flush with running water.

INHALATION: Remove to fresh air. Give oxygen with artificial respiration as needed. Seek medical attention for treatment, observation and support as needed.

SKIN CONTACT: Wash with soap and water.

INGESTION: Rinse mouth out. If conscious induce vomiting. Seek medical attention.

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### SECTION 5: FIRE FIGHTING MEASURES

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FIRE AND EXPLOSION HAZARD: Negligible fire hazard when exposed to heat or flame.

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, water spray, or regular foam. (See most recent edition of *Emergency Response Guidebook*, (ERG), developed jointly by Transport Canada (TC), the U.S. Department of Transportation (DOT), and the Secretariat of Transportation and Communications of Mexico (SCT).)

For Larger Fires, use water spray or fog (flooding amounts) (*Emergency Response Guidebook*, ERG).

FIREFIGHTING: Move container from fire area if you can do it without risk. Apply cooling water to sides of containers exposed to flames until well after fire is out (*Emergency Response Guidebook*, ERG).

Do not move damaged containers; move undamaged containers out of fire zone. For massive fire in cargo area, use unmanned hose holder or monitor nozzles (*Emergency Response Guidebook*, ERG).

Contact the local, State, or Department of Energy radiological response team. Use suitable agent for surrounding fire. Cool containers with flooding amounts of water; apply from as far a distance as possible. Avoid breathing dusts or vapors, keep upwind. Keep unnecessary people out of area until declared safe by radiological response team.

FLASH POINT: Non-flammable solid.

HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition may release toxic/hazardous gases.

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## SECTION 6: ACCIDENTAL RELEASE MEASURES

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OCCUPATIONAL SPILL: Inform facility safety personnel. Untrained personnel should not touch damaged containers or spilled material. Undamaged packages may be moved to a radiologically controlled area for monitoring and decontamination, if necessary. Small spills may be cleaned up using a HEPA filtered vacuum cleaner. Large spills may be settled by sprinkling with water and diked for later disposal. Stay upwind; keep unnecessary people away. Delay clean up until arrival or instruction of qualified Radiation Authority.

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## SECTION 7: HANDLING AND STORAGE

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**Precautions for Safe Handling:** Avoid contact with skin, eyes and clothing. When using do not eat, drink or smoke. Avoid breathing dust. Wash thoroughly after handling. Use only with adequate ventilation.

**Conditions for Safe Storage:** Observe all Federal, State and local regulations when storing this substance. Store in a radioactive materials area. Keep storage container tightly closed. Store separately from incompatible materials.

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## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

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EXPOSURE LIMITS:

Uranium, insoluble compounds (As U):

0.05 mg/m<sup>3</sup> OSHA TWA;

0.2 mg/m<sup>3</sup> ACGIH TWA; 0.6 mg/m<sup>3</sup> ACGIH STEL

0.2 mg/m<sup>3</sup> NIOSH Recommended TWA; 0.6 mg/m<sup>3</sup> NIOSH Recommended STEL

Vanadium compounds:

0.05 mg(V)/m<sup>3</sup> NIOSH recommended 15 minute ceiling;

0.05 mg/m<sup>3</sup> DFG MAK TWA (fine dust);

0.25 mg/m<sup>3</sup> DFG MAK 30 minute peak, average value, twice per shift

Occupational exposure to radioactive substances must adhere to standards established by the Occupational Safety and Health Administration, 29 CFR 1910.96, and/or the Nuclear Regulatory Commission, 10 CFR Part 20.

The route of entry of uranium and vanadium compounds into the body which is potentially most serious, and is also most likely if exposure is accidental, is through inhalation.

Facilities, which use radioactive materials such as uranium, must examine their operations for occupational hazards including chemical toxicity, radiation exposure, and radioactive contamination. Operations which have the potential for producing airborne particulate or powdered uranium materials must be conducted only in HEPA filtered fume hoods or HEPA filtered gloveboxes and monitored by CAAM or personal sampler as appropriate. When airborne contamination is possible, personnel in the airborne contamination area must be provided with appropriate protective gear including eye protection and respirators with high-efficiency particulate filters or self-contained air supply.

Facilities and laboratories, which use or handle uranium materials must develop safety programs which have been approved by appropriate regulatory bodies and include emergency and accident response procedures. Personnel who work with radioactive materials must pass appropriate training in handling procedures. Trained radiation safety personnel must be on call during all procedures, which have the potential for harm to personnel or facility assets.

Uranium is a radioactive material, which decays primarily by emission of alpha particles and gamma radiation. Beta radiation is emitted by uranium decay products, which are present in most uranium materials. Alpha particles are not highly penetrating; the outer skin layer protects internal tissues from damage due to an external source of alpha particles. However, alpha radiation can be extremely dangerous to cells immediately adjacent to the source of radiation. Therefore, extreme care should be taken to avoid inhalation, ingestion, or contact with an open wound or sore. Facilities which handle uranium must evaluate the potential for harmful exposure to radiation and shield workers to comply with ALARA (As Low As Reasonably Achievable) requirements.

Care should be taken to prevent accidental ingestion of uranium materials. Protective clothing, including labcoats or disposable coveralls and safety glasses or goggles, must be worn. When operations are such that splashing, splattering, or other types of contamination may occur, users should wear disposable gloves and shoe covers. Solids and solutions should not be allowed to contact eyes, skin or clothing.

Personnel who could become contaminated by uranium materials should wash and monitor their hands before touching their face, personal clothing, eyeglasses, pens, laboratory notebooks, or laboratory instruments or equipment. Surfaces, which could become contaminated, must be cleaned and monitored for radioactive contamination on a regular basis. Personnel should not eat, drink, smoke, chew gum, apply cosmetics, or perform any other action which could lead to inhalation or ingestion of radioactive materials while within a room or area in which such materials have been stored or used.

**VENTILATION:** When working with dry powders, provide process enclosure ventilation. Depending upon the specific workplace activity and the radioactivity of the isotope, a more stringent ventilation system may be necessary to comply with exposure limits set forth by law (10 CFR 20.103).

**RESPIRATOR:** Follow the recommendations given in the NIOSH *Pocket Guide to Chemical Hazards* (U.S. Department of Health and Human Services, available through the U.S. Government Printing Office); NIOSH criteria documents or 29 CFR 1910 Subpart Z (U.S. Department of Labor).

The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH/MSHA).

**FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:** Use a self-contained breathing apparatus that has a full facepiece respirator with a high-efficiency particulate filter. Alternatively, use a supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus.

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## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

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**DESCRIPTION:** Tan colored radioactive powder or crystals.

**Molecular formula:**  $U_3O_8$  in a potassium uranium vanadate ore

**Boiling point:** Decomposes

Melting point: 1300°C (2372°F) decomposes  
Specific Gravity: Not Known  
Water Solubility: Insoluble  
Solvent Solubility: Nitric acid, sulfuric acid

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#### SECTION 10: STABILITY AND REACTIVITY

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**Reactivity:** Stable under normal temperatures and pressures except for radioactive disintegration.

**Conditions to Avoid:** No potentially hazardous conditions could be found in the literature, nor could any accidents be recalled in which carnotite reacted in a hazardous manner.

**Incompatible Materials:** Bromine Trifluoride: Reaction is rapid below 135 °C.

**Polymerization:** Hazardous polymerization has not been reported to occur under normal temperature and pressure.

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#### SECTION 11: TOXICOLOGY INFORMATION

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**Routes of exposure:** Inhalation, ingestion, skin and eye contact.

**Inhalation:** Inhalation of uranium and vanadium compounds may irritate the respiratory system. Exposure may cause irreversible kidney damage or acute necrotic arterial lesions. Inhalation of large particles of uranium materials or chronic exposure to uranium compounds may result in radiation damage to internal tissues, especially the lungs and bones. Long term effects may include pulmonary fibrosis and malignant pulmonary neoplasia, anemia and blood disorders, liver damage, bone effects, sterility, and cancers.

**Skin:** Contact with uranium and vanadium compounds may result in dermatitis.

**Eyes:** Uranium and vanadium compounds and particulate matter may irritate and damage the eyes.

**Ingestion:** May cause kidney damage.

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#### SECTION 12: ECOLOGICAL INFORMATION

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Environmental Impact Rating (0-4): No data available

Acute Aquatic Toxicity: No data available

Degradability: No data available

Log Bioconcentration Factor (BCF): No data available

Log Octanol/water partition coefficient: No data available

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SECTION 13: DISPOSAL INFORMATION

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Observe all Federal, State and local Regulations when disposing of this substance.

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SECTION 14: TRANSPORTATION INFORMATION

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The U.S. Department of Transportation (D.O.T.) Code of Federal Regulations (49 CFR Parts 100-185), the International Air Transportation Association (IATA), International Civil Aviation Organization (ICAO) and International Maritime Organization (IMDG) are all factored into the classification and transport of material.

Proper Shipping Name:  
Hazard Class:  
UN/ID Number:  
Special Information:  
Packing Group:

} To be determined on a case by case basis.

Classification of substances with multiple hazards must be determined in accordance with the criteria presented in the above mentioned regulations. Due to the various quantities/combinations of materials being shipped at one time, the information above must be determined based on the characteristics of the specific shipment.

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SECTION 15: REGULATORY INFORMATION

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TSCA STATUS: Y

CERCLA SECTION 103 (40 CFR 302.4): N  
SARA SECTION 302 (40 CFR 355.30): N  
SARA SECTION 304 (40 CFR 355.40): N  
SARA SECTION 313 (40 CFR 372.65): N  
OSHA PROCESS SAFETY (29 CFR 1910.119): N  
CALIFORNIA PROPOSITION 65: N  
SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40 CFR 370.21)



ACUTE HAZARD:	Y
CHRONIC HAZARD:	Y
FIRE HAZARD:	N
REACTIVITY HAZARD:	N
SUDDEN RELEASE HAZARD:	N

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#### SECTION 16: OTHER INFORMATION

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This material is prepared for use as a standard or in inter-laboratory comparison programs at analytical laboratories, which routinely handle uranium and/or plutonium. The New Brunswick Laboratory (NBL) assumes that recipients of this material have developed internal safety procedures, which guard against accidental exposure to radioactive and toxic materials, contamination of the laboratory environment, or criticality. NBL further expects that personnel who handle radioactive materials have been thoroughly trained in the safety procedures developed by and for their Laboratory.

The information and recommendations set forth herein are presented in good faith and believed to be correct as of the revision date. However, recipients of this material should use this information only as a supplement to other information gathered by them, and should make independent judgement of the suitability and accuracy of this information. This statement is not intended to provide comprehensive instruction in developing an appropriate safety program and does not include all regulatory guidelines.

This information is furnished without warranty, and any use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

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