WNTI

World Nuclear Transport Institute

Good Practice Guide 2018

Generic UOC Safety Data Sheet

Dedicated to the safe, efficient and reliable transport of radioactive materials

WNTI Best Practices

Generic UOC Safety Data Sheet

Generic UOC Safety Data Sheet

Table of Contents

1. Product and Company Identification

Product Identifier

Uranium Ore Concentrate [This should exactly match the identifier on product label]

Other means of identification:

U3O8 (uranium(V,VI); uranium (V,VI) oxide; triuranium octaoxide; triuranium octoxide; uranium octaoxide; uranium octoxide; urano-uranic oride)

or

Na2U2O7 (sodium diuranate; sodium uranate)

or

MgU2O7 (magnesium diuranate; magnesium uranate)

or

UO4 (Uranyl peroxide)

Product Use:

For processing into fuel for nuclear reactors.

Restriction On Use:

This material is a controlled nuclear substance.

Supplier/Manufacturer's Name & Address:

xxxxxxxx

yyyyyyyyy

In Case of Emergency:

+ 000000000

Product Type:

Powder

Text in yellow indicates a choice or information to be completed. Producers must select the relevant sections below to generate a specific safety data sheet for their product. GHS requirement is that the identifier used should exactly match the identifier on the label.

2. Hazard Identification

Classification

Acute toxicity – Oral – Category 4

Acute toxicity – Inhalation – Category 4

Hazardous to Aquatic Environment – Acute 1

Specific target organ toxicity – Repeated Exposure – Category 2

Eye irritation – Category 2B

Carcinogenicity – Category 2

Caution note: The hazardous to aquatic environment classification needs to be verified for each compound. This classification looks at LC50 based on concentration in test water. Data is expressed as uranium concentration therefore classification may be overly conservative for compounds that are insoluble.

Label Elements:

Signal Word: WARNING

Hazard Statements

Harmful if swallowed or if inhaled.

May cause damage to organs through prolonged or repeated exposure.

Causes eye irriation.

Very toxic to aquatic life.

Precautionary Statements

Do not breathe vapors, mist or spray.

Wash hands, forearms, and other exposed areas thoroughly after handling.
Do not eat, drink or smoke when using this product.

Use only in well-ventilated areas.

In case of inadequate ventilation wear respiratory protection.

IF SWALLOWED: Immediately call a poison center or doctor. Rinse mouth.

IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing. If eye irritation persists: Get medical advice/ attention.

Specific treatment is urgent. Immediately call a poison center or doctor.

Store in a well ventilated place. Keep container tightly closed.

Store locked up.

Collect spillage.

Dispose of contents/container in accordance with local, regional, national and international regulations.

Other Hazards

Repeated inhalation, ingestion or absorption through skin abrasions may lead to heavy metal toxicity or radiation poisoning. Chronic exposure to uranium may cause damage and lesions to the kidneys, liver damage, pulmonary fibrosis, anemia, cancer and bone and sterility disorders. Ionizing radiation is a known human carcinogen.

Hazards not otherwise classified (HNOC)

None identified

3. Composition and Information on Ingredients

Chemical Name	CAS Number	% (w/w)	Other identifiers
Tri-uranium Octaoxide	1344-59-8	100	Urano uranic oxide, U_3O_8

or

Chemical Name	CAS Number	% (w/w)	Other identifiers
Sodium diuranate	13721-34-1	100	$Na_2U_2O_7$

or

Chemical Name	CAS Number	% (w/w)	Other identifiers
Magnesium diuranate	13568-61-1	100	MgU_2O_7

or

Chemical Name	CAS Number	% (w/w)	
Uranium peroxide hydrate	19525-15-6	100	$UO_4.xH_2O$

4. First-Aid Measures

Immediate Measures

SKIN (Dermal) Exposure: If this product contaiminates the skin, begin flushing the skin with soap and water. Remove any exposed or contaminated clothing, taking care not to contaminate the eyes. Contaminated body surfaces should immediately be decontaminated in accordance with radiation procedures. Contaminated individual should seek medical attention if redness or irritation continues after area has been rinsed.

EYE EXPOSURE: If this product enters the eyes, open the victim's eyes while under gently running water. Use sufficient force to open the eyelids. Have the victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical attention.

INHALATION: If particulates of this material are inhaled, remove the victim to fresh air. Remove or cover gross contamination to avoid exposure to rescuers. Seek medical attention.

Caution note: Inhalation effects may vary depending on the compounds solubility in lung fluid.

INGESTION: If this product is swallowed, call physician or poison control centre for the most current information. If professional advice is not available, do not induce vomiting. Contaminated individuals should drink large quantities of water. Never induce vomiting or give diluents to someone who is unconscious, having convulsions or unable to swallow. Seek medical attention immediately.

After an Exposure Incident

Following all major exposures, contaminated individuals must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of the MSDS to health professional with contaminated individual. Follow established procedures including radiation-monitoring programs.

EMERGENCY OVERVIEW: Uranium Ore Concentrate varies in color from yellow to orange (uranates), dark green or black (oxides). It is an odorless powder.

Inhalation can be harmful due to lung irradiation by inhaled particles. In case of accident, or if you feel unwell, seek medical advice immediately.

This material is not flammable and is not reactive under normal circumstances of use. If this material is involved in a fire, use suitable extinguishing media for surrounding material and type of fire. Fire runoff water should be contained to prevent possible environmental damage. Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

5. Fire-fighting Measures

Fire Extinguishing Media:

Uranium Ore Concentrate is not flammable. Use suitable extinguishing media for surrounding material and type of fire.

Special Fire-Fighting Procedures:

Firefighters should wear full-face self-contained breathing apparatus operated in the pressure demand or positive-pressure mode. Move containers from fire area if possible. Cool containers exposed to flames with water from the side until well after the fire is out. Use a carbon dioxide extinguisher to fight small fires. Flood large fires with water (per US DOT P 5800.3 and ERG Guide 162 for example).

Unusual Fire or Explosion Hazards:

Uranium Ore Concentrate powder is not flammable. However, the product may emit toxic and radioactive particulates if released due to rupture of a container in a fire.
If this product is involved in a fire, dikes should be used to control fire runoff water for later disposal.

6. Accidental Release Measures

Spill and Leak Response:

Trained personnel using preplanned procedures should respond to uncontrolled releases. Proper protective equipment should be used. Minimum personal protective equipment should be gloves, goggles, respirator, as well as appropriate body protection. Vacuum up spilled material using a high efficiency particulate absolute (HEPA) air filter and place vacuumed material in a closed container for proper disposal. Take care not to raise dust. A self-contained breathing apparatus should be used, if oxygen levels are below 19.5% or are unknown.
In case of an unexpected release off-site, clear the affected area, protect people and respond with local emergency response personnel. Do not touch spilled materials. Cover powder spill with plastic sheet or tarp to minimize spreading. Contact the company at xxx-xxx-xxxx, 24-hours-a-day, to obtain further instructions and access to trained personal.

Caution Note: GHS requirements for some countries require identification of environmental hazards and listing specific measures. For example: keep away from drains, surface and ground water. Disposed via licensed facilities.

Methods for cleaning up:

Small spill

Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill

Move containers from spill area. Approach release from upwind. Avoid creating dusty conditions and prevent wind dispersal. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

7. Handling and Storage

All personnel who handle Uranium Ore Concentrate should be trained to handle the material safely. Do not eat, drink or smoke while handling this product. Use in a well-ventilated area. Always wash thoroughly after handling the material. Remove contaminated clothing immediately and send the clothing to be cleaned before reuse.

Keep the product in a tightly closed drum or container, when not in use. Store in a dry, ventilated area, away from sources of intense heat and protect against physical damage. Separate from incompatibles (strong acids), organic solvents and other combustible materials. {See Section 10, Stability and Reactivity} Containers, which hold this material, may be hazardous when empty because they may retain product residues (powder/dust), which are toxic when inhaled.

8. Exposure Controls - Personal Protection

EXPOSURE LIMITS/GUIDELINES									
Chemical Name	CAS Number	% w/w	Exposure Limits in Air						
			ACGIH-TLV (mg U /m^3)		OSHA-PEL (mg U /m^3)		ERPG (mg/m^3)		
			TLV	STEL	PEL	STEL	ERPG-1	ERPG-2	ERPG-3
Uranium Ore Concentrate (U_3O_8)	1344-59-8	100	0.2	0.6	0.2	0.6	ID	10	50
ID = insufficient data definition of terms.			See the Glossary at the end of this document for acronyms, abbreviations and terms						

or

EXPOSURE LIMITS/GUIDELINES									
Chemical Name	CAS Number	% w/w	Exposure Limits in Air						
			ACGIH-TLV (mg U /m^3)		OSHA-PEL (mg U /m^3)		ERPG (mg/m^3)		
			TLV	STEL	PEL	STEL	ERPG-1	ERPG-2	ERPG-3
Uranium Ore Concentrate ($Na_2U_2O_7$)	13721-34-1	100	0.2	0.6	0.2	0.6	ID	10	30
ID = insufficient data definition of terms.			See the Glossary at the end of this document						

or

EXPOSURE LIMITS/GUIDELINES									
Chemical Name	CAS Number	% w/w	Exposure Limits in Air						
			ACGIH-TLV (mg U /m^3)		OSHA-PEL (mg U /m^3)		ERPG (mg/m^3)		
			TLV	STEL	PEL	STEL	ERPG-1	ERPG-2	ERPG-3
Uranium Ore Concentrate (MgU_2O_7)	13568-61-1	100	0.2	0.6	0.2	0.6	ID	10	30
ID = insufficient data definition of terms.			See the Glossary at the end of this document						

or

EXPOSURE LIMITS/GUIDELINES									
Chemical Name	CAS Number	% w/w	Exposure Limits in Air						
			ACGIH-TLV (mg U /m^3)		OSHA-PEL (mg U /m^3)		ERPG (mg/m^3)		
			TLV	STEL	PEL	STEL	ERPG-1	ERPG-2	ERPG-3
Uranyl peroxide (UO_4)	19525-15-6	100	0.2	0.6	0.2	0.6	Not Listed	Not Listed	Not Listed
ID = insufficient data definition of terms.			See the Glossary at the end of this document						

ENGINEERING		
Area	**Control Measure**	**Description**
dust control	ventilation	suitable to maintain exposure below OSHA PELs specified above
safety station	eye wash and safety shower	suitable to meet ANSI Z358.1 Emergency Eyewash and Shower Standard
housekeeping	HEPA-equipped vacuum cleaners and wet cleaning	industrial practice
PERSONAL PROTECTIVE EQUIPMENT		
torso	clothing	long sleeved coveralls
hands	gloves	rubber or neoprene for normal industrial use

9. Physical and Chemical Properties

Property (U_3O_8)	Description or Measure
Appearance (physical state, colour etc);	solid (crystalline powder); dark green or black powder
Odour	Odorless
Odour threshold	Not applicable
pH	Not applicable
Melting point/freezing point	Not applicable
Initial boiling point and boiling range	Decomposes at 1300°C (=> UO_2)
Flash point	No data
Evaporation rate	No data
Flammability (solid, gas)	Non-flammable
Upper/lower flammability or explosive limits	Not applicable
Vapour pressure	Not applicable
Vapour density	Not applicable
Relative density	up to 8.30 g/cm^3
Solubility(ies)	Insoluble (20°C)
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Decomposes at 1300°C (=> UO_2)
Viscosity	Not applicable

Or

Property (MgU_2O_7)	Description or Measure
Appearance (physical state, colour..);	solid (crystalline powder); yellow powder
Odour	Odorless
Odour threshold	Not applicable
pH	Not applicable
Melting point/freezing point	Not applicable
Initial boiling point and boiling range	Decomposes at 600°C (=> U_3O_8) and 1300°C (=> UO_2)°
Flash point	No data
Evaporation rate	No data
Flammability (solid, gas)	Non-flammable
Upper/lower flammability or explosive limits	Not applicable
Vapour pressure	Not applicable
Vapour density	Not applicable
Relative density	Up to 6.30 g/cm^3
Solubility(ies)	Insoluble (20°C)
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Decomposes at 600°C (=> U_3O_8) and 1300°C (=> UO_2)°
Viscosity	Not applicable

Or

Property ($Na_2U_2O_7$)	Description or Measure
Appearance (physical state, colour..);	solid (crystalline powder); orange powder
Odour	Ordorless
Odour threshold	Not applicable
pH	Not applicable
Melting point/freezing point	Not applicable
Initial boiling point and boiling range	Decomposes at 1000°C (=> U_3O_8) and 1300°C (=> UO_2)°
Flash point	No data
Evaporation rate	No data
Flammability (solid, gas)	Non-flammable
Upper/lower flammability or explosive limits	Not applicable
Vapour pressure	Not applicable
Vapour density	Not applicable
Relative density	Up to 6.30 g/cm^3
Solubility(ies)	Insoluble (20°C)
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Decomposes at 1000°C (=> U_3O_8) and 1300°C (=> UO_2)°
Viscosity	Not applicable

Or

Property (UO_4)	Description or Measure
Appearance (physical state, colour..);	solid (crystalline powder); yellow powder
Odour	Odorless
Odour threshold	Not applicable
pH	Not applicable
Melting point/freezing point	Not applicable
Initial boiling point and boiling range	Not applicable
Flash point	No data
Evaporation rate	No data
Flammability (solid, gas)	Non-flammable
Upper/lower flammability or explosive limits	Not applicable
Vapour pressure	Not applicable
Vapour density	Not applicable
Relative density	4 to 4.4 g/cm^3
Solubility(ies)	Negligible (20°C)
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Decomposes at 160°C to 230°C (=> UO_3)
Viscosity	Not applicable

10. Stability and Reactivity

Reactivity Data	Description or Measure
thermal stability	stable under normal* conditions
water reactivity	no reaction
decomposition products	no hazardous decomposition products
hazardous polymerization	does not polymerize
incompatibility	HNO_3
organic solvents	no reaction
* normal conditions in an operating environment: pressure from 0.9 bar to 1.1 bar; oxygen 21% v/v; temperature from 0 to 30°C	

11. Toxicological Information

A comprehensive review, Toxicological Profile for Uranium, issued by the Agency for Toxic Substances and Disease Registry (ATSDR) in the USA (ATSDR, TP 150, 1999), cites references for potential toxicity of uranium and uranium compounds in both experimental animals and humans. The main conclusion reached was that, for insoluble compounds, such as uranium dioxide, the major health consequences are primarily due to irradiation of pulmonary tissues from inhaled respirable particles.

Full Carcinogenic Assessment (NTP Annual Report, IARC Monographs, Other):
Uranium Ore Concentrate is not listed as a carcinogen by IARC, NTP, ATSDR or OSHA, but has been identified as a carcinogen by ACGIH. ACGIH notes than, when taken internally, evidence for its ability to cause cancer has proven to be due to its radioactivity.

To quote the *Toxicological Profile for Uranium*: There is no unequivocal evidence that inhalation, oral, or dermal exposure induces cancers in humans because it is difficult to isolate the cancer risk that may be specific to exposure to uranium and other substances such as tobacco smoke, radon and its decay products, radium, thorium, silica and other dusts, and diesel engine exhaust fumes to which the human subjects of these studies were concurrently exposed. Long-term animal studies with both natural and enriched uranium were negative for carcinogenicity. No information was located on the cancer effects in humans or animals following dermal exposure to uranium for any duration (ATSDR, TP 150, 1999).

Health Effects or Risks from Exposure: An explanation in LAY TERMS.

Uranium Ore Concentrate powder is both radioactive and toxic. Radioactivity is not a regulated hazard under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). However, it is difficult to separate the effects on human health, which can arise from both types of hazard. See Section 11.
Natural uranium emits alpha particles (a form of radiation), which are of biological significance only if the Uranium Ore Concentrate powder or dust is internalized by inhalation, by ingestion or by deposition into an open wound.
Because of its slow absorption through the lungs, the primary damage from Uranium Ore Concentrate is due to radiological damage to internal organs rather than chemical damage, which is mainly to the renal system. Uranium Ore Concentrate is soluble in hydrochloric acid and some ingested material could be absorbed from the stomach.

Acute Effects:

Inhalation:
Uranium Ore Concentrate powders/dusts are respiratory irritants with coughing and shortness of breath as possible outcomes. Acute arterial lesions may also occur after acute exposure.

Ingestion:
May cause nausea and vomiting.

Eyes:
May cause redness, itching, watering, irritation or inflammation.

Dermal:
May cause redness, itching, irritation or inflammation.

Chronic Effects:

Inhalation:
Repeated exposure to dusts may result in irritation of the respiratory tract, pneumoconiosis (dust congested lungs), pneumonitis (lung inflammation), coughing and shortness of breath. Long-term pulmonary carcinogenic effects are suspected.

Ingestion:
Chemical toxicity is largely shown in kidney damage, which may not be reversible.

Eyes:
Studies indicate potential of cataracts.

Dermal:
Prolonged contact can result in dermatitis.

Target organs:
Uranium Ore Concentrate accumulates in the lungs.

12. Ecological Information

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION

Environmental Stability: This material is insoluble in water.

The *Toxicological Profile for Uranium* lists a number of studies concerning potential effects from the release of uranium and uranium compounds on the environment (ATSDR, TP 150, 1999).

13. Disposal Considerations

Scrap Uranium Ore Concentrate should be recycled through an appropriate licensed facility.

Contaminated Uranium Ore Concentrate is classified as a low-level radioactive waste (LLRW) and, as such, must be disposed of as radioactive waste, rather than as hazardous chemical waste.

Country specific disposal consideration should be provided. For example the disposal consideration for Canada and the USA are provided below:

In Canada, LLRW from uranium processing plants, nuclear power plants, nuclear research facilities and medical applications are currently managed by storage in aboveground structures or in engineered trenches and tile holes. In the USA, low-level radioactive waste, which may contain uranium, is disposed of at DOE facilities and at commercial disposal facilities (ATSDR 1999). However, because many states have enacted more stringent regulations that require artificial containment of the waste in addition to natural containment, it is recommended to consult local state and federal regulations on the ultimate disposal of uranium dioxide waste.

14. Transportation Information

IMDG Code
ICAO TI / IATA DGR
RID / ADR
Transportation of Dangerous Goods (TDG) - Canada
Department of Transportation (DOT) - USA

UN Number:	UN 2912
Proper Shipping Name:	Radioactive material, low specific activity (LSA-I)
Class:	7
Packing Group:	N.A.
Marine pollutant:	N.A.
Hazard Label:	Radioactive (7A, 7B or 7C)

or


or


In case of emergency:

- The Emergency Schedules Guide – EmS Guide (IMO)
  - Fire Schedule India (F-I)
  - Spillage Schedule Sierra (S-S)
- Medical First Aid Guide - FAG Guide (IMO)
  - Table 20
- Emergency Response Guidebook (North America):
  - Guide 162

15. Regulatory Information

International regulations

International lists

Australia Inventory (AICS):	This material is listed or exempted.
China Inventory (IECSC):	Not determined
Japan Inventory:	Not determined
Korea Inventory:	Not determined
New Zealand Inventory of Chemicals (NZIoC):	Not determined
Philippines Inventory (PICCS):	Not determined.

Chemical Weapons Convention List Schedule I Chemicals	Not listed
Chemical Weapons Convention List Schedule II Chemicals	Not listed
Chemical Weapons Convention List Schedule III Chemicals	Not listed

Canadian lists

Canadian NPRI	This material is not listed.
Canadian ARET	This material is not listed.
CEPA Toxic substances	This material is not listed.
Alberta Designated Substances	This material is not listed.
Ontario Designated Substances	This material is not listed.
Quebec Designated Substances	This material is not listed.
Canada Inventory	Not determined.

United States

HCS Classification	Toxic material, carcinogen, target organ effects.
U.S. Federal Regulations	TSCA 8(a) CDR Exempt/Partial exemption: Not determined United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)	This material is not listed.
Clean Air Act Section 602 Class I Substances	This material is not listed.
Clean Air Act Section 602 Class II Substances	This material is not listed.
DEA List I Chemicals (Precursor Chemicals)	This material is not listed.
DEA List II Chemicals (Essential Chemicals)	This material is not listed.

SARA 302/304	No products were found
SARA 304 RQ	Not applicable
SARA 311/312 Classification	No products were found

State regulations

Massachusetts	This material is listed
New York	This material is not listed
New Jersey	This material is not listed
Pennsylvania	This material is not listed
California Prop. 65	No products were found

16. Other Information

Disclaimer:

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulations are subject to change, and the conditions of handling and use or misuse are beyond our control, neither the World Nuclear Transport Institute or its members, makes no warranty, either expressed nor implied with respect to the completeness or continuing accuracy of the information contained herein, and disclaims all liability for reliance thereon. Users should satisfy themselves that they have all current data relevant to their particular use.

17. Glossary of Abbreviations, Acronyms and Terms

ACRONYMS		
Acronym	**Organization**	**URL**
ACGIH	American Conference of Governmental Industrial Hygienists	http://www.acgih.org
ANSI	American National Standards Institute	http://www.ansi.org
ATSDR	Agency for Toxic Substances and Disease Registry (U.S. Department of Health and Human Services, Public Health Service)	http://www.atsdr.cdc.gov
CAS	Chemical Abstract Service	http://www.cas.org
DOT	Department of Transportation (USA)	http://www.dot.gov
EPA	Environmental Protection Agency (USA)	http://www.epa.gov
IARC	International Agency for Research on Cancer (World Health Organization)	http://www.iarc.fr
NFPA	National Fire Protection Association	http://www.nfpa.org
NTP	National Toxicology Program	http://ntp-server.niehs.nih.gov
OSHA	Occupational Safety and Health Administration	http://www.osha.gov

ABBREVIATIONS		
Abbreviation	**Description**	**Definition**
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	CERCLA provides for the identification, emergency response to and cleanup of hazardous substances that have been spilled, leaked or discharged into the environment. This U.S. legislation is also known as the Superfund Law.
CPR	Controlled Products Regulations	The Canadian CPR prescribe the form and content of information to be disclosed on MSDSs and labels of controlled products and the regulations to define the products that fall into WHMIS classes.
DSL/NDSL	Domestic Substances List / Non-Domestic Substances List	The DSL is the sole basis for determining whether a substance is "existing" or "new" to Canada. The NDSL specifies substances, other than those on the DSL, that were in world commerce, but not in Canada, and is based on the US EPA 1985 inventory compiled for the TSCA.
ERPG	Emergency Response Planning Guideline	The ERPG defines the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour, i.e., (EPRG-1) without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odour (ERPG-2) without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action and (ERPG-3) without experiencing or developing life-threatening health effects

ABBREVIATIONS		
Abbreviation	Description	Definition
LEL	Lower Explosive Limit	The lowest percent of a vapour in air, by volume, that will explode or ignite in the presence of an ignition source.
PEL	Permissible Exposure Limit	A time-weighted average (TWA) that must not be exceeded during any eight-hour work shift or 40-hour workweek or a STEL measured over a 15-minute period. In the U.S.A., only OSHA PELs have the force of law.
RCRA	Resource Conservation and Recovery Act (EPA)	The 1976 U.S. legislation that sets minimum standards for waste disposal facilities, regulates waste treatment, storage and disposal and encourages recycling and alternative, low-waste technologies.
SARA	Superfund Amendments and Reauthorization Act (of 1986)	An extension of CERCLA, the act is designed to provide citizens & local government with information about chemical hazards in their community. Also known as the Emergency Planning & Community Right-to-Know Act (EPCRA).
STEL	Short-Term Exposure Limit	The STEL for a chemical substance/physical agent is the concentration to which workers can be exposed continuously for a short period of time (usually 15 minutes, no more than 4 x a day) without suffering (a) irritation, (b) chronic or irreversible tissue damage, or (c) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue/materially reduce work efficiency.
TDG	Transportation of Dangerous Goods	The TDG Act (1980) & Regulations (1985) governs the handling, offering for transport, & transportation, import and export of dangerous goods in, through and out of Canada.
TLV	Threshold Limit Value	Refers to the airborne concentration of a substance and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects.
TSCA	Toxic Substances Control Act	The TSCA authorizes the U.S. EPA to prohibit the manufacture, sale or use of any new or existing chemical substance, if the EPA determines that the material poses an unacceptable risk to human health or the environment.
UEL	Upper Explosive Limit	The highest percentage of vapour in air, by volume, that will explode or ignite in the presence of an ignition source.
WHMIS	WorkplaceHazardous Materials Information System	A workers 'right-to-know' system that is mandated under the Canadian Hazardous Product Act and the Controlled Products Regulations (SOR/88-66 as amended). It is designed to supply employees with information on the hazardous materials used in the workplace.

DEFINITION OF TERMS	
Term	**Definition**
Acute Health Effect	A health effect that occurs immediately or a short time after a toxic substance has been administered.
Burning Behaviour	The burning behaviour gives an indication of the ignitability and combustibility of a dust layer when a platinum wire at a temperture of approximately 1,000°C is brought in contact with the dust layer. The burning behaviour is classified in six sections: dusts in classes 1 to 3 do not aid in spreading a fire and dusts in classes four to six aid in the spreading of the fire. In German, the corresponding classes are designated BZ (**B**renn**z**ahl) 1 to BZ 6.
Carcinogen	A carcinogen is a material that causes cancer. A chemical is considered to be a carcinogen, by OSHA regulation, if: • it has been evaluated by the IARC and found to be a carcinogen or potential carcinogen • it is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the NTP • it is regulated by OSHA as a carcinogen • there is scientific evidence in man or animals demonstrating a cancer causing potential.
Ceramic-grade	A ceramic (compound) is an inorganic, non-metallic solid that is prepared from powdered materials, is fabricated into products through the application of heat and displays such characteristic properties as hardness, strength, low electrical conductivity and brittleness.
Chronic Health Effect	A health effect that develops slowly or occurs a long time after a toxic substance has been administered or after a long period of low-level exposure.
Combustible	Combustion is defined as a chemical reaction between a fuel and oxygen with evolution of heat and light. Broadly speaking, a material is combustible if it can catch fire and burn.
Decomposition	The breakdown of a material (by heat, chemical reaction, physical processes, decay or other means) into smaller parts simpler compounds or elements.
Dust Explosivity	Dusts and powders represent an explosion hazard when their characteristic particle size is less than 400 µm and they are suspended in air at a concentration between their LEL and UEL. Dust explosibility is usually measured in a Hartmann apparatus or in a 20-L spherical explosion apparatus.
Flammable	Flammable means to be able to ignite and burn readily. Under the Canadian Controlled Products Regulations (CPR), flammable materials are identified based on ease of ignition and rate of burning.
Incompatible	Materials that can cause dangerous reactions from direct contact with one another. These types of chemicals should never be stored together.
Irritant	A substance, which by contact in sufficient concentration for a sufficient period of time, can cause inflammatory response or reaction of the eye, skin or respiratory system. The contact may be a single exposure or multiple exposures.
NFPA "Fire Diamond"	The fire diamond gives NFPA 704, "Standard System for the Identification of the Fire Hazards of Materials", hazard ratings for health, flammability and reactivity. The diamond is broken into four sections. Numbers in the three coloured sections range from 0 (least severe hazard) to 4 (most severe hazard). The fourth (white) section is usually left blank.
Stable Material	A stable material has the capacity to resist changes in normal environmental exposure to air, water, heat, shock or pressure.
Water Reactive	A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

DESCRIPTION OF ANALYTICAL METHODS	
Reference	**Procedure**
ASTM E 537 - 86	Standard Test Method for Assessing the Thermal Stability of Chemicals by Methods of Differential Thermal Analysis, ASTM E 537 - 86, ASTM International, Conshohocken, PA, USA, (1986)
TP 150	*Toxicological Profile for Uranium*, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, (Update) (PB/99/163362) @ http://www.atsdr.cdc.gov/toxprofiles/tp150.html
UN-TDG-N.5	United Nations Recommendation on the Transport of Dangerous Goods, Manual of Test and Criteria, Fourth Revised Edition, Test N.5: Section 33.4.1.4 Test Method for Substances Which in Contact with Water Emit Flammable Gases, United Nations Publications, N.Y., N.Y., 2003, 366

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