WNTI

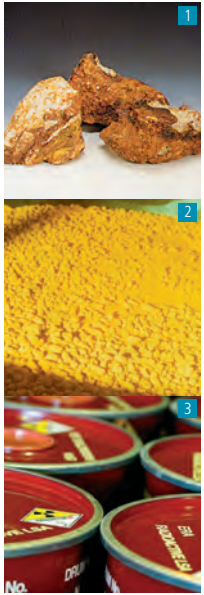
World Nuclear Transport Institute

FACT SHEET

The Safe Transport of Uranium Ore Concentrates

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

The Safe Transport of Uranium Ore Concentrates



Uranium

Uranium is a naturally occurring element found virtually everywhere throughout the earth's crust. Uranium contributes to what is termed natural background radiation. Trace amounts of uranium occur in almost everything living or otherwise. Found in rocks, soil, stream sediments, rivers and oceans; traces of uranium can also be found in food as well as in the human body. Uranium Ore Concentrate (UOC) is considered a "low level radioactive material" which means that it emits only small amounts of radiation at any given time, thereby presenting only a minor radiation hazard.

UOC is not toxic, it cannot trigger a nuclear reaction, nor is it flammable.

Processed uranium ore as UOC is shipped in a powder form to fuel conversion facilities in various countries for further processing. Depending on the nature of the process used during production, the UOC can either be yellow in colour or dark green (almost black).

Uses of UOC

While almost all uranium mined and processed today is used to produce electricity, small quantities are also used for other purposes. UOC is also used for glass colouring and for producing other radioactive materials used for such purposes as nuclear medicine and household smoke detectors.

Packaging and Shipping Containers

The packaging used for transporting any form of radioactive material must meet international standards. UOC is generally transported in sealed steel drums with tight-fitting lids meeting UN design requirements for stowage, handling, and package integrity.
The drums are loaded into general purpose freight containers securely stowed to prevent movement or load shifting during handling or transport. All shipping containers must be compliant with the International Convention for Safe Containers (CSC).

20′ GP ISO shipping container

Drums packed inside 20′ ISO

Dangerous Goods (Hazardous Materials) Classifications

Under United Nations international standards, all dangerous goods and hazardous materials fall in one of the nine hazard classes. Class 7 refers to radioactive materials such as UOC. For radioactive material, the International Atomic Energy Agency (IAEA) has established standards of safe transport and security which are adopted into international, modal and national regulations. These regulations are designed to protect people, property and the environment from the effects of radiation during transport.

Markings, Placards, Labels, Panels and Documentation

UOC drum with Class 7 labelling

Typical Class 7 drum label

UOC shipping containers must be placarded in accordance with the International Maritime Dangerous Goods (IMDG) Code.

UN2912 Class 7 label

Category III Yellow label

Modes of Transport

UOC is safely transported worldwide by road, rail and sea. The movements of UOC by road and rail transport are regulated by the appointed government authority of the country in or through which it is transported. Maritime transport of UOC is regulated according to the International Maritime Dangerous Goods (IMDG) Code.

As for all dangerous goods, a multi-modal dangerous goods form must be completed for each shipping container.

MULTIMODAL DANGEROUS GOODS FORM

This form meets the requirements of SOLAS 74, Chapter VII, regulation 4 and MARPOL 73/78, Annex III, regulation 4.
NOTE: When this form is used as a container/vehicle packing certificate only, not a combined document, a dangerous goods declaration signed by the shipper or supplier must have been issued or received to cover each dangerous goods consignment packed in the container. The container/vehicle packing certificate is not required for tanks.

1. Shipper/Consignee	2 Transport document number		
AAA Uranium Mining Company 1234 First Street ADELAIDE , SA 5000 AUSTRALIA ABN 99 100 101 102 24 hr tel no: +6112345678	3 Page 1	Page 1 of 1	4 Shippers reference 456789
			5 Freight forwarders reference
6. Consignee CAMECO CORPORATION 328 ELDORADO ROAD BLIND RIVER P0R 1B0 ONTARIO CANADA	7 Carrier (to be completed by the carrier)		
	SHIPPER'S DECLARATION (refer to box 22 below) I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name(s), and are classified, packaged, marked labeled, placarded, and are in all respects in proper condition for transport according to the applicable international and national governmental regulations.		

8 This shipment is within the limitations prescribed for: **Road rail and sea transport**		9 Additional handling information
10 Vessel and date MV LOLLIPOP	11 Port of loading PORT ADELAIDE	
12 Port of discharge VANCOUVER	13 Final destination BLIND RIVER	

14 Shipping marks Lot Number	No. and kind of packages; description of goods* **48 by 205 litre steel drums of UOC having a TI of 2.0**	Nett UOC kg	Nett U3O8 kg	Transport Index
2222		**17,677.000** (kg)	**17,497.490** (kg)	**4.5**

UN2912 Radioactive Material Low Specific Activity (LSA-I non fissile or fissile excepted) Class 7 (Radioactive Material)

Name of each radionuclide	Natural Uranium (LSA)
Physical Form	Dry Powder (Uranium Oxide Concentrate as Uranium Oxide U3O8)
Chemical Form	Uranium Ore Concentrate as Uranium Oxide U308
Maximum Activity	440 Giga Bequerels
Category of Packages	III Yellow
Transport Index:	refer to table 14 above

Emergency Response: Canadian ERAP 2-0453 applies to this shipment if transiting through Canadian territories. To activate the plan please call Cameco Corporation the plan custodian 24-hour ERAP activation telephone number +1 306 956 6204

15 Container No	16 Seal no(s)	17 Container/vehicle size & type	18 Gross mass wt	19 Gross container wt
CLHU3415342	146287|288	20 ' GP container as FCL	18,733 (kg)	21,033 (kg)

CONTAINER/VEHICLE PACKING CERTIFICATE	21 RECEIVING ORGANIZATION RECEIPT
I hereby declare that the goods described above have been packed and loaded into the container or vehicle identified above in accordance with the applicable provisions. *Must be completed and signed for all container/vehicle loads by person responsible for packing/loading.*	Received the above number of packages/containers/trailers in apparent good order and condition unless stated hereon. **Receiving organization remarks :**

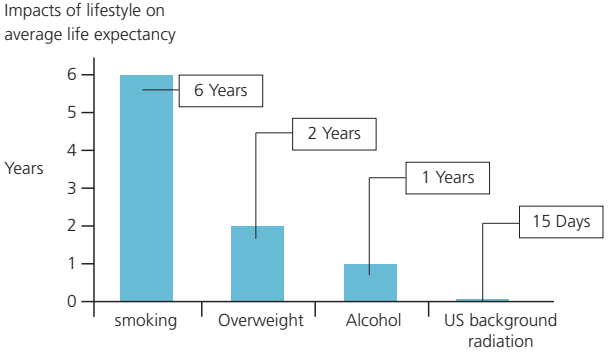
20 Name of company (see note 2 on notes page)	Name of haulier	20 Name of company (see note 2 on notes page)
AAA Uranium Mining Company		AAA Uranium Mining Company
Name/status of declarant Louis I Loadwright Uranium Logistics Manager	Vehicle reg. No.	Name/status of declarant Louis I Loadwright Uranium Logistics Manager
Place / Date ADELAIDE / 20/10/2008	Place	Place / Date ADELAIDE / 20/10/2008
Signature of Declarant Louis I Loadwright.	DRIVER'S SIGNATURE	Signature of Declarant Louis I Loadwright.

* DANGEROUS GOODS: You must specify UN number, proper shipping name, class or division and packing group (where assigned) marine pollutant and observe the mandatory requirements under applicable national and international governmental regulations.

What Are the Risks?

Packaged in steel drums UOC will not present a health hazard to people handling or otherwise coming into contact with it. Due to its slight chemical toxicity UOC can be harmful if inhaled or ingested. Skin contact should be avoided, and as with all powdered chemicals practicing personal hygiene habits such as washing of hands, not smoking and minimising the likelihood for exposure to dust are most important.

The low but measurable levels of radiation emitted from a shipping container of UOC will not cause people or objects to become radioactive, just as receiving a dental or chest X-ray does not make a person radioactive. Reducing exposure to radiation to As Low As Reasonably Achievable (ALARA) is always the objective. A US study [1] has placed some perspective on some of the health risks people impose on themselves through everyday lifestyles.



In the normal course of events, the total time involved in handling or transporting the UOC containers, combined with the very low levels of radiation emitted by the UOC itself, severely reduces the probability of receiving any hazardous exposure from the material. Indeed, exposure from this source is well below all regulatory limits for transport workers.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Protecting Your Health and Safety

As with any dangerous goods, the time and distance spent working around a UOC container should be minimised. Routine handling will not put one at risk of exceeding any regulatory limit for radiation exposure.

In general, the necessary safety precautions are similar to those that should be employed when handling other dangerous goods in powder form.

In the Unlikely Event of an Emergency

In the unlikely event that a leakage or spillage of UOC does occur, the main health consideration should be to prevent anyone from inhaling or ingesting any dust. The likelihood of this occurring is low due to the density of the material, the drum packaging and secure stowage methods employed within the packed container.

There are several simple actions to be taken after the initial discovery of a leak or spill of UOC until the arrival of an emergency response team:

- mark and secure the area to prevent access by unauthorised personnel or other traffic. This will also help to prevent the spread of contamination
- immediately locate shipping documentation and call the emergency response number to ensure the emergency response system has been activated
- avoid contact with the spilt material as with any other dangerous goods
- practice good personal hygiene by washing hands and avoiding smoking or eating in the affected area
- stay upwind to avoid any wind-blown particles. It is important to cover the material to prevent dispersion by wind or rain

- leave potentially contaminated items (i.e. personal protective equipment) at the scene and dispose of them in accordance with the instructions of the emergency response team or the requirements of the appropriate regulatory authority.

References

1 Idaho State University, Radiation Network's 'Radiation and Risk', [www.physics.isu.edu/radinf/risk.htm]

Photographs

1 Uranium ore
2 Uranium ore processed and turned into powder – "yellowcake"
3 Drums of uranium ore concentrate
4 48" Hex cylinders
5 30" Hex cylinders with overpacks
6 Uranium fuel assembly
7 Preparing drums of uranium ore concentrate for transport
8 Tie-down for fresh fuel transport
9 Road transport of front end materials

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