



DGP-WG/14-IP/10  
10/12/14

**DANGEROUS GOODS PANEL (DGP)  
MEETING OF THE WORKING GROUP OF THE WHOLE**

**Rio de Janeiro, Brazil, 20 to 24 October 2014**

**Agenda Item 7: Other business**

**PRESENTATION ON THE TRANSPORT OF URANIUM HEXAFLUORIDE SAMPLES BY AIR  
UNDER NEW UN 3507**

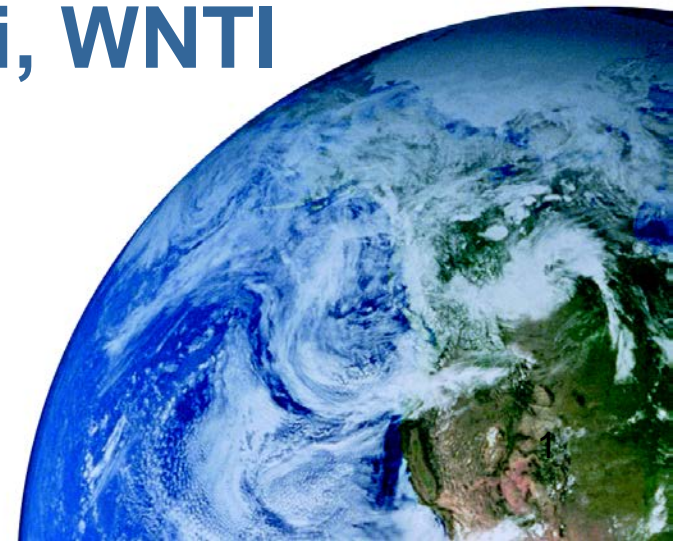
(Presented by B. Bonnardel-Azzarelli, WNTI)

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# Transport of Uranium Hexafluoride samples by air under new UN3507

**Betty Bonnardel-Azzarelli, WNTI**

ICAO DGP WG14 - Rio de Janeiro, Brazil  
20-24 October 2014



# World Nuclear Transport Institute

WNTI

WORLD NUCLEAR TRANSPORT INSTITUTE

- The voice of the radioactive materials transport industry
- Observer status at International Organisations
- Factual information – factsheets, website [www.wnti.co.uk](http://www.wnti.co.uk)
- Good practice guides for the industry
- Working groups for industry members
- Thematic / Regional Workshops



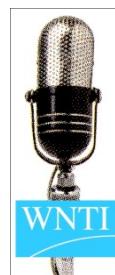
**IAEA**  
International Atomic Energy Agency  
*Atoms For Peace*



UNITED NATIONS



IMO



## Why new UN3507? (1/2)

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- $\text{UF}_6$  samples have been transported by air for decades, both for industrial and safeguards purposes.
  - The UN SCETDG decided in 1980/1994 that  $\text{UF}_6$  needed to be labelled Class 7 with subsidiary risk Class 8 only, although being toxic, because corrosivity was considered to be the predominant subsidiary hazard over toxicity.
  - Sample quantities of  $\text{UF}_6$  was classified since as “excepted package corrosive solid N.O.S.”.
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## Why new UN3507? (2/2)

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- The IAEA introduced specific requirements for  $UF_6$  with the 1996 Edition, but not for  $< 100g UF_6$ .
  - This omission needed addressing and several options have been discussed.
  - The decision was...
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# New UN3507 - new discussion at UN SCTDG (1/2)

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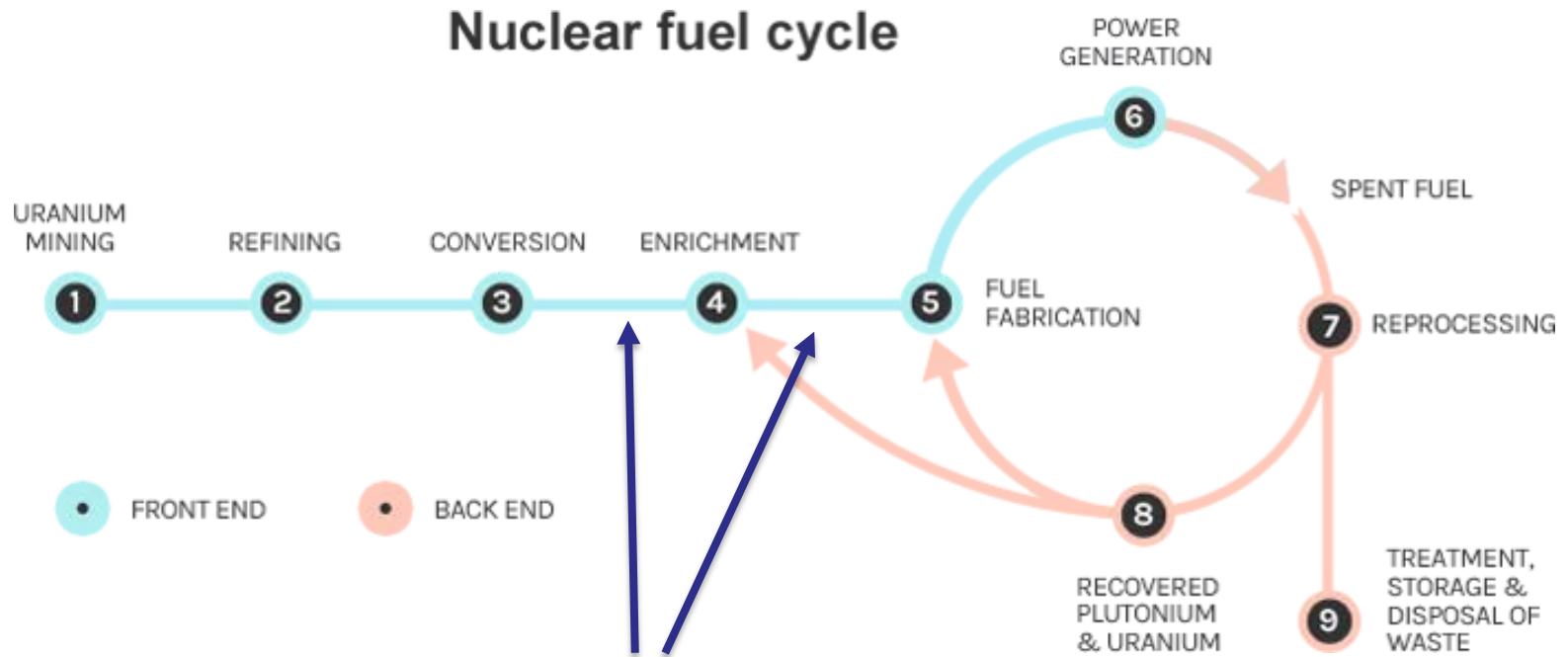
- A new UN number for small quantities was agreed upon by the IAEA as a solution and the UN SCETDG assigned UN3507.
  - As a side effect of this work however, a discussion on the subsidiary risks of  $UF_6$  was started, focussing specifically on toxicity.
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# New UN3507 - new discussion at UN SCTDG (2/2)

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- A proposal was presented to the UN SCETDG requiring additional Class 6.1 labelling and even in priority to Class 8.
  - The WNTI presented a position paper to the UN SCETDG to support the earlier UN SCETDG decisions of 1980/1994 and with that, continuation of the current proven practice.
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# Uranium Hexafluoride - UF<sub>6</sub>



UF<sub>6</sub> Transport



## UF<sub>6</sub> samples by air

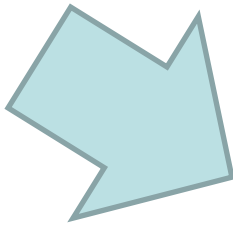
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- How are UF<sub>6</sub> samples transported by air?
    - In solid form (UF<sub>6</sub> is solid below 56 °C)
    - In P10 tubes (max. 10 g per tube)
    - In IAEA/Euratom safeguards sample bottles (few grams per bottle)
    - P10 tubes/sample bottles are packed in an intermediate packaging and/or in a 20L-30L steel drum
    - Less than 100 g UF<sub>6</sub> per package
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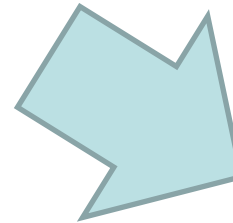
# Examples of packaging



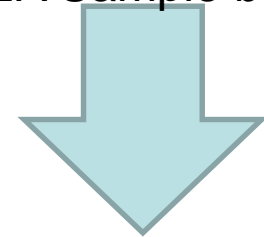
P10 tube



Biopack



IAEA Sample bottle



20L or 30L drum

# UF<sub>6</sub> samples by air

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- How many transports each year?

## **Industry:**

- Some 30 kg UF<sub>6</sub> in total
- Some 300 shipments

## **IAEA/Euratom Safeguards:**

- Some kg UF<sub>6</sub> in total
  - Some shipments
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# Properties of UF<sub>6</sub>

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- UF<sub>6</sub> is a chemical compound of uranium and fluor
  - UF<sub>6</sub> is high density material (solid = 5.2 g/cm<sup>3</sup>)
  - UF<sub>6</sub> is a volatile material, but with sub-atmospheric pressure below 56 °C
  - UF<sub>6</sub> reacts readily in contact with water (moisture in air) to form HF and UO<sub>2</sub>F<sub>2</sub>
  - UF<sub>6</sub> is not flammable
  - UF<sub>6</sub> is not explosive
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# Hazards of UF<sub>6</sub>

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- Chemo-toxic hazard
    - Uranium is a heavy metal
  - Radiological hazard
    - Direct radiation exposure ( $\beta$  and  $\gamma$  radiation)
    - Intake of contamination ( $\alpha$  radiation)
  - Criticality hazard
    - Sample quantities are fissile excepted or non-fissile material
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# Key messages

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- Safety vested primarily in package – SSR-6 principle.
  - Transport of  $UF_6$  samples by air is important for both IAEA/Euratom Safeguards and industry.
  - The industry and IAEA/Euratom have a long safety record of  $UF_6$  sample transport by air.
  - The classification should relay that message.
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# Thank you

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