Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

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Provisions for uranium hexafluoride with less than 0.1 kg per package

Transmitted by the expert from Austria

1. Uranium hexafluoride is a very special substance with many hazardous properties.

2. For the property fissile only the experts of TRANSSC have the necessary expertise.

3. The radiation risk depends on the isotopes. For enriched Uranium hexafluoride there is a rather low but significant radio toxicity and for depleted Uranium hexafluoride this risk is almost negligible.

4. The document presented by the IAEA and the literature provided in this document (sources are IUCLID (European Commission), RTECS (US-Government) and the IAEA) show that this substance has a very high toxicity.

5. The IAEA TECDOC 608 demonstrates that the chemical toxicity is much higher than the radio toxicity. For better understanding I added some more data to that table (Table 1).

6. A special problem is the fact that this is a substance with a sublimation point of 56° C. So the vapour pressure of this substance is the same as from a liquid with a boiling point of 56° C. The Orange Book defines toxic by inhalation only for liquids but sublimation of solid substances has the same effect for the vapour pressure and greater 56° C means 100% evaporated. So we can use Figure 2.6.1 from our regulation with the values from document 46 (Figure 1).

7. Nevertheless it is a significant change to a rather important substance to add new subsidiary risks. The experts on toxicity should deal with this problem and for the vapour pressure it should make no difference if the substance is liquid or solid because if there are only few solid substances with a high vapour pressure it does not harm. (Dusts are a completely different and much more complicated problem!)

8. The proposal of the IAEA for less than 100 g UF6 contains reasonable packing provisions, no complete exemptions and a marking directly related to UF6. The question of the class is less relevant. I prefer class 6.1 but that can be done only after the existing entries UN 2977 and UN 2978 are corrected. The existing regulation means that UN 2978 has to be used. The new UN number will therefore not change too much, it will remain in class 7 and the subsidiary risk has to be taken into account.

Table 1

IAEA-TECDOC 608: Interim guidance on the safe transport of uranium hexafluoride, page 46

(Added information for more clarity, values unchanged)

Absorbed quantity of soluble Uranium (mg/kg body weight)	Absolut amount for a 70 kg person in mg	Equivalent activity		Equivalent radiation dose/Effective dose (mSv)	Acute chemical toxicity effect	Acute radio toxicity effect
		(µCi)	(Bq)			
For highly enriched Uranium (97,5 % U-235, 1,14 % U-234, worst case for radio toxicity)						
0,03	2,10	0,160	5.920	0,280	No	No
0,06	4,06	0,300	11.100	0,540	Renal injury	No
1,63	114,10	8,300	307.100	15,000	50% lethality	No
19,29	1.350,30	100,000	3.700.000	178,000	Lethal	Onset of radiological effects
433,00	30.310,00	2208,000	81.696.000	4.000,000	Lethal	50% lethality
For depleted Uranium (0,45 % U-235, Table AII.1, added values)						
0,03	2,10	0,001	37	0,001	No	No
0,06	4,06	0,001	37	0,002	Renal injury	No
1,63	114,10	0,039	1.443	0,065	50% lethality	No
4.500,00	315.000	107,000	3.959.000	179,000	Lethal	Onset of radiological effects
100.000,00	7.000.000	2.389,00	88.393.00	3.983,000	Lethal	50% lethality

Figure 1

Figure 2.6.1: INHALATION TOXICITY: PACKING GROUP BORDERLINES