

Safety vs. Security of Radioactive Materials in Transport

Safety - DOT

As of January 1, 2005, the U.S. Department of Transportation required all vehicles and carriers transporting highway route controlled quantities (HRCQ) of radioactive material to pass the North American Standard Level VI Inspection at point of origin. (CVSA Level VI) This includes spent nuclear fuel

Highway route controlled quantity means a quantity within a single package which exceeds:

- (1) 3,000 times the A1 value of the radionuclides as specified in §173.435 for special form Class 7 (radioactive) material;
- (2) 3,000 times the A2 value of the radionuclides as specified in §173.435 for normal form Class 7 (radioactive) material; or
- (3) 1,000 TBq (27,000 Ci), whichever is least.

Special form Class 7 (radioactive) material means either an indispersible solid radioactive material or a sealed capsule containing radioactive material which satisfies the following conditions:

- (1) It is either a single solid piece or a sealed capsule containing radioactive material that can be opened only by destroying the capsule;
- (2) The piece or capsule has at least one dimension not less than 5 mm (0.2 in); and
- (3) It satisfies the test requirements of §173.469. Special form encapsulations designed in accordance with the requirements of §173.389(g) in effect on June 30, 1983 (see 49 CFR part 173, revised as of October 1, 1982), and constructed prior to July 1, 1985 and special form encapsulations designed in accordance with the requirements of §173.403 in effect on March 31, 1996 (see 49 CFR part 173, revised as of October 1, 1995), and constructed prior to April 1, 1997, may continue to be used. Any other special form encapsulation must meet the requirements of this paragraph (3).

Security - NRC

The NRC has establishing requirements for the transportation of fissile material which can be used for a nuclear device. The commercial sector has very few shipments which fall within this category therefore, when any of this material is transported the Dept. of Energy's Safety Secure Transport Equipment and personnel are used.

The NRC had prior to Sept. 11, 2001 established security requirements during the transport of used nuclear fuel, since 9/11 the requirements have been enhanced.

In August 2005 the NRC established security requirement that all shippers of Radioactive Materials Quantities of Concern (RAMQC) must meet. It also defined the RAMQC materials. Some of the requirements included prior notification to states and prior route approvals.

Security vs. Safety

Radioactive material	NRC RAMQC				DOT 3000 times A1 or A2			
	Category 1		Category 2		3,000 times the A1value (Special Form)		3,000 times the A2value	
	Terabequerels (TBq)	Curies (Ci) ¹	Terabequerels (TBq)	Curies (Ci) ¹	Terabequerels (TBq)	Curies (Ci) ¹	Terabequerels (TBq)	Curies (Ci) ¹
Americium-241	60	1,600	0.6	16	30,000	810,000	3	81
Americium-241/Be	60	1,600	0.6	16	30,000	810,000	3	81
Californium-252	20	540	0.2	5.4	150	4,200	9	243
Curium-244	50	1,400	0.5	14	60,000	1,620,000	6	162
Cobalt-60	30	810	0.3	8.1	1,200	33,000	1,200	33,000
Cesium-137	100	2,700	1.0	27	6,000	162,000	1,800	48,000
Gadolinium-153	1,000	27,000	10.0	270	30,000	810,000	27,000	720,000
Iridium-192	80	2,200	0.8	22	3,000	81,000	1,800	48,000
Plutonium-238 ²	60	1,600	0.6	16	30,000	810,000	3	81
Plutonium-239/Be ²	60	1,600	0.6	16	30,000	810,000	3	81
Promethium-147	40,000	1,100,000	400	11,000	120,000	3,300,000	6,000	162,000
Radium-226 ^a	40	1,100	0.4	11	600	16,200	9	111
Selenium-75	200	5,400	2.0	54	9,000	243,000	9,000	243,000
Strontium-90 (Y-90)	1,000	27,000	10.0	270	900	24,300	900	24,300
Thulium-170	20,000	540,000	200	5,400	9,000	243,000	1,800	48,000
Ytterbium-169	300	8,100	3.0	81	12,000	330,000	3,000	81,000

UN Number	Package Content
UN2919	Radioactive material, transported under special arrangement, <i>non fissile or fissile excepted</i>
UN3331	Radioactive material, transported under special arrangement, fissile
UN3327	Radioactive material, Type A package, fissile <i>non-special form</i>
UN3329	Radioactive material, Type B(M) package, fissile
UN2917	Radioactive material, Type B(M) package <i>non fissile or fissile-excepted</i>
UN3328	Radioactive material, Type B(U) package, fissile
UN2916	Radioactive material, Type B(U) package <i>non fissile or fissile-excepted</i>