

US Department of Commerce,
National Institute of Standards and Technology
Clark, James S.
(301) 975-5810
Occupational Health
and Safety Division (354)

NIST
100 Bureau Drive, Stop 3543
Gaithersburg, MD 20899-3543
email: james.clark@nist.gov

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Dockets Management System, US DOT

400 Seventh St. SW

Washington, DC 20590-0001

Dear Sir or Madam:

RE: RSPA-99-6283, HMR Compatibility with IAEA's ST-1 Regulations

I generally agree that HMR should be brought into sync with IAEA's ST-1, with several notable exceptions. Unless the following existing provisions are retained, for domestic transport only, the adoption of ST-1 will impose undue burdens to shippers or carriers with no resulting benefits in transportation safety or to the environment:

I strongly recommend that you retain the following current provisions:

49CFR173.4 "Small quantity exceptions"

49CFR173.425, Table 7.-"Activity Limits for Limited Quantities"

Liquids: Tritiated water:	Limited quantity package limits
< 0.0037 TBq/liter (0.1 Ci/L)	37 TBq (1,000 Ci)
0.0037 TBq/liter to 0.037 TBq/liter (0.1 Ci to 1.0 Ci/L)	3.7 TBq (100 Ci)

> 0.037 TBq/liter (> 1.0 Ci/L)	0.037 TBq (1.0 Ci)
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49CFR173.427(a)(6)(vi), for domestic transportation, packages are excepted from the marking and labeling requirements...

49CFR173.427(b)(3), domestic transportation...in a strong, tight package....

49CFR173.427(b)(2), domestic transportation...in a DOT Specification 7A Type A package

49CFR173.427(b)(4), domestic transportation...packaging complies with 10CFR71.52

49CFR173.427(b)(5), any Type B, B(U), or B(M) packaging...

Additional comments and requests for clarification:

Under the proposed revision of HMR, would it still be necessary to even consult the IAEA’s ST-1 for international shipments in order to ensure compliance? Is your revision planned to be that comprehensive? Will you incorporate the additional UN numbers and categories?

For international shipments by land-conveyance:

Which set of regulations applies,...DOT or ST-1? If only one applies, what about cases where this results in non-compliance with a provision of the other regulations? Example: If you only apply ST-1, it doesn’t include any equivalent provisions for CERCLA “Hazardous substances” manifesting, marking, or labeling of “Reportable Quantities (RQ)”; would you then be in non-compliance for failure to list RQ’s? And if you apply both sets of regulations, are the ST-1 regulations in effect while transiting the US, or do they only take effect at the time when customs is cleared at the border? If you apply both sets of regulations, how would you resolve any conflicts between the regulations?

Aside from the additional UN numbers and categories, ST-1 has some differences in marking and labeling requirements, for example: the specified numeral sizes on the labels. This should be standardized, even if other aspects of ST-1 are not adopted.

From my viewpoint, I don’t see the adoption of the additional UN numbers and categories imposing an undue burden, *provided* that the exceptions from marking and labeling per 49CFR173.427(a)(6)(vi) are retained.

The compliance guides at the back of ST-1 for the transport of the different UN number classification categories are very useful. I recommend incorporating equivalent guides into

your revision *provided* that they include references to all applicable regulations, including any that would satisfy any US-only requirements (e.g.: “RQ’s”) and including separate sections referencing “for domestic transport only” exceptions.

ST-1 paragraph 647 requires ullage for packages intended for liquid radioactive material. This is especially important for packages required to meet performance test standards, e.g.: IP-2 or Type A packages. I didn’t see any equivalent requirement in DOT regulations. Is there one? If a package, together with its contents, is performance tested with a higher density liquid than the density of a liquid that is shipped in the package, it would be possible to fill the container completely (with no ullage) and still be below the gross weight of the as-tested package. In that case, it would not necessarily follow that the package could be expected to meet the same performance standards due to hydraulic effects. This needs clarification.

Regarding A1/A2 tabled values in current DOT vs. ST-1: SI unit conversions in the current DOT have resulted in some values with a ~10% differential to the ST-1 values, when the appropriate number of significant figures are used. Standardizing on one set of tabled values would clear ambiguities and prevent inadvertent misapplication of the wrong values.

Both the DOT and ST-1 are ambiguous as to whether tritiated water can be classified as LSA-I. Even though both specifically define tritiated water, with concentrations up to 0.8 TBq/liter, as LSA-II, there is nothing in either definition of LSA-I that *precludes* classifying tritiated water as LSA-I, *provided* that the relevant concentration limits are met. There are cases where it would be advantageous to classify tritiated water that meets the concentration requirements as LSA-I. If this were clarified and affirmed, then much of the advantage of the 49CFR173.425 Table 7 tritiated water concentration limits would be offset by the use of IP-1 containers in Exclusive use shipments. See the example of a 55-gallon drum of D2O in the table below.

Comparison of Maximum H3 Activity Content in 55-gal. Drums for Different Packagings March 28, 2000

Package type	Maximum H3 Activity in Drum Filled with 55 Gallons (208 Liters) of D2O, Using D2O Density = 1.11 g/ml (see attached package compliance charts)		Comments
	DOT49CFR173, Oct. 1, 1999 Edition.	IAEA ST-1, 1996 Edition.	

<p>Excepted package, Limited quantity</p>	<p>100 Ci ($< 0.1 \text{ Ci/l}$ limit = 1,000 Ci, but the 208L volume would limit the package activity to 20.8Ci)</p>	<p>0.108 Ci Materials Package limits for non-postal modes = E-4 A2; A2 for H3 = 40 TBq</p>	<p>IAEA is 1,000 times more restrictive.</p>
<p>LSA-I in IP-1 package</p>	<p>1.2 Ci/liter concentration limit x 208 liters = 249.6 Ci $< E-6 \text{ A2/g}$ is LSA-I. H3 A2= 1080 Ci. $E-6 \text{ A2/g} \times 1.11 \text{ g/ml} = \mathbf{1.2 \text{ mCi/ml}}$</p>	<p>0.9 Ci/liter concentration limit x 208 liters = 187.2 Ci $< 30 \times$ the value of concentration in paras. 406-410. [H3] limit is $1E6 \text{ Bq/g}$. $30 \times \text{limit} \times \text{D2O density} = \mathbf{0.9 \text{ mCi/ml}}$</p>	<p>There are no activity limits per package for LSA, but the concentration limit together with the package capacity limit the package activity. There are no activity limits per conveyance for LSA-I.</p>
<p>LSA-II in strong tight package</p>	<p>Per 49CFR173.427(b)(3), the the package activity limit is A2 = 1,080 Ci</p>	<p>Not applicable</p>	<p>Domestic transport only, Exclusive use. The activity limit per land-conveyance for LSA-II liquid is $100 \times A2$ DOT conveyance limit = 108,000 Ci</p>
<p>LSA-II in IP-2 package</p>	<p>20.0 Ci/liter concentration limit x 208 liters = 4,160 Ci</p>	<p>0.8 TBq/liter concentration limit x 208 liters = 4,160 Ci</p>	<p>There are no activity limits per package for LSA, but the concentration limit together with the package capacity limit the package activity. The activity limit per land-conveyance for LSA-II liquid is $100 \times A2$. IAEA conveyance limit = 100,000 Ci DOT conveyance limit = 108,000 Ci</p>

Sincerely,

James S. Clark, CHP
Health Physicist