DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Parts 172 and 173

[Docket No. HM-196; Amdt. Nos. 172-99 and 173-190]

Packaging and Placarding Requirements for Liquids Toxic by Inhalation

AGENCY: Materials Transportation Bureau (MTB), Research and Special Programs Administration, Department of Transportation.

ACTION: Final rule.

SUMMARY: This action is being taken to incorporate into the Department's Hazardous Materials Regulations special marking, labeling, packaging, placarding, and shipping paper requirements for certain poisonous liquids based on their potentially severe inhalation hazards.

This action is based on an assessment of the adequacy of the present regulations and a determination that improvements are necessary.

These amendments are considered necessary to improve the communication of the presence of, and packaging for, certain materials in transportation that, if released, may pose severe and immediate risks to the public, transportation workers and emergency response personnel.

EFFECTIVE DATE: These amendments are effective on January 1, 1986.

FOR FURTHER INFORMATION CONTACT: Darrell L. Raines, Standards Division, Office of Hazardous Materials Regulation, Materials Transportation Bureau, Washington, D.C. 20590, (202) 426-2075.

SUPPLEMENTARY INFORMATION: As a result of a release of a hazardous material identified as methyl isocyanate at a pesticide plant in Bhopal, India, on December 3, 1984, the National Transportation Safety Board (NTSB) requested that the Department re-examine its system of hazardous materials identification and classification, and to update it in accordance with current technology in order to raise the minimum level of protection provided in the Hazardous Materials Regulations. On February 7, 1985, the MTB published a Notice of Proposed Rulemaking, Docket No. HM-196; Notice No. 85-1 (50 FR 5270) proposing special packaging and communication requirements for certain poisonous liquids based on their potential inhalation hazards. An extension of time to file comments was published in the Federal Register on March 13, 1985 (50 FR 10088).

The MTB received forty-five comments regarding Notice No. 85-1. Most of the commenters were basically supportive of MTB's efforts to establish a higher level of safety for the materials addressed by the Notice. However, practically all of the commenters had specific concerns and comments regarding the proposed changes.

Three of the comments received were general in nature and did not recommend any specific changes to the regulations. Four commenters were in favor of MTB issuing a second notice of proposed rulemaking, incorporating knowledge gained from comments submitted to the current docket. MTB believes this rule is too important to delay further and does not agree that another notice of proposed rulemaking is necessary or appropriate.

Several commenters were concerned about the lack of a provision that will allow continued shipping of those materials that are presently in the transportation system. MTB agrees that sufficient time must be allowed in order for the shippers of materials affected by this final rule to bring their practices into conformance therewith. In § 173.3a(d), a priority has been established for compliance first in regard to shipments in bulk packagings (May 1, 1986) with compliance for non-bulk packagings five months late (October 1, 1986). This should provide ample time for shippers to implement the requirements of this rule.

A major concern expressed by several commenters pertained to the application of the proposal to small or limited quantities of materials. MTB agrees that this final rule should not apply to materials packaged in primary containment units of one liter or less. An exception is the labeling requirement specified in § 172.402(a)(10) which is consistent with the POISON labeling requirement for all limited quantities that meet the definition of the Poison B class. MTB believes the present shipping paper requirements for limited quantities, the POISON label which must be displayed, and small quantities of material per primary containment unit (inside package or container) justify the exclusion of limited quantity packages from the application of this final rule. In addition, § 173.4 is amended to authorize an exception of one gram quantities of liquids that are toxic by inhalation with the exception of those not authorized under § 173.4(a)(1)(iii).

One commenter suggested that the words "Poison-Inhalation Hazard" be included as part of the label which would be affixed to packages containing such materials. The commenter stated that this information would provide visibility to those having contact with the package. MTB agrees in principle with this suggestion and has amended § 172.301 to require the words "Inhalation hazard" in association (near) the required label(s) on packages. Excluded are one liter quantities as discussed above.

Several commenters stated that when "Poison by Inhalation" is a subsidiary risk identifier, the U.N. hazard class number located in the bottom quadrant of the placard should not be required. Also, the four-digit ID number should not be an integral part of the subsidiary risk "POISON" placard. MTB agrees with these commenters, and neither the display of U.N. hazard class numbers nor the four-digit ID numbering requirements have been changed by this rule.

MTB does not agree with the one commenter who recommended that §§ 176.30(a)(6), 176.30(b), 176.74, and 176.83 be amended. Paragraph (k)(4) of § 172.203 requires the words "Poison Inhalation Hazard" to be entered on the shipping paper. Since § 176.30(a)(6) and § 176.30(b) requires the information to be the same as required by § 172.203, repeating the same requirement in Part 176 is redundant. Also, special attention in § 176.74, 176.76 and 176.83 is not considered necessary in light of the requirement specified in § 176.24.

A majority of the commenters recommended that § 172.101 Table be amended to identify those materials that are subject to this rule. It is apparent that many of these commenters believe that the burden for such a determination should rest fully on MTB. Such a view raises fundamental questions concerning the basic structure of the hazardous materials transportation scheme of regulation which has been in use more than 75 years i.e., a material is, or is not, subject to regulation according to classification criteria (e.g. § 173.115 for flammable liquids) or special criteria (e.g. § 173.4 for special exceptions). It has been estimated that more than 30,000 different chemicals (including compounds and mixtures or formulations) are shipped in commerce subject to the HMR and most are not listed by name in § 172.101. In most cases it is the criteria (or descriptive definitions in certain cases) that shippers must use to determine whether materials offered for transportation are subject to the HMR.

MTB construes some of these comments as endorsing a system of preclearance, i.e., notification of MTB when a new material is to be introduced

into commerce. This would be before the first shipment in order for MTB to acknowledge the material by listing, or other means, based on the data provided by the shipper concerning the material. As a matter of practicality, this option is not viable based on the present staffing in MTB to exercise its HMR program nor would it be a desirable imposition on shippers of hazardous materials.

Several commenters suggested that special requirements in § 173.3a would be overlooked if special identifications were not provided in the § 172.101 Table for each material affected by the rule. MTB is concerned, and somewhat confused, by this view. There are a number of special requirements not specifically addressed in the Table. For example, there are special packaging requirements for shipment by aircraft in § 173.6. There are special prohibitions in § 173.21. There are also special exceptions provided in the regulations that are not addressed in the Table, e.g., § 173.3 for use of "salvage drums" and § 173.4 for small quantities. Also, it appears that several commenters based their comments on the Table alone without consideration of the rules in § 172.101 which introduce the Table and its applicability. In order to provide added clarification concerning use of the Table, a new sentence is added at the end of § 172.101(a) emphasizing the existence of other requirements in Parts 171 (e.g., § 171.12 for imported packages), Part 172, and Subparts A and B of Part 173. This emphasis also includes the applicability of new § 173.3a.

Two commenters suggested that MTB create a new hazard class for "Toxic by Inhalation" equal in status to the other hazard classes. MTB does not believe that adoption of a new hazard class is necessary to accomplish the purpose of this rule, consistent with the proposals set forth in the NPRM. As stated in the preamble of the NPRM, the entire classification scheme will be considered under Docket HM-181. In the meantime, in MTB's opinion, the U.N. criteria for inhalation toxicity hazard are the most appropriate ones for the purpose of this rulemaking.

Several commenters expressed concern about the mechanics involved in obtaining approvals for new packagings that may be required. Also, they expressed concern about the workload and time it would take to obtain an approval. MTB intends to give priority treatment to requests for approval—in particular those presenting data usable for comparison with materials addressed by specific packaging provisions in Part 173 (other than n.o.s. packagings). In addition, elimination of packagings of one liter or less from the packaging requirements will relieve the approval burden to some degree. Also, the priority specified for implementation, as specified in § 173.3a(d), will serve to distribute the approvals burden over a longer period of time.

A few commenters stated that the Poison A packaging is too restrictive and that the proposed rules "go too far" and that they fail to consider the success of current practices. MTB recognizes that there are other packagings which have been used for several years that can be safely used for materials that are toxic by inhalation. For example, Specification 51 portable tanks and DOT-5 series drums are packagings that have an excellent safety record. Such packagings will be fully considered for approval by MTB pursuant to § 173.3a(a)(3).

One commenter stated that: (1) The MTB's proposed categorization of these materials appears to be more restrictive than that permitted by ICAO; (2) cargo aircraft shipment should be permitted for "Poison-Inhalation-Hazard" materials, particularly for small quantities (up to 1 liter or 1 kg); and (3) for small quantity research items, shippers should have the option of assuming that an item is a "Poison-Inhalation-Hazard" without actually having the LC_{50} data. The answers to this commenter are: (1) ICAO's criteria of whether a material is forbidden, or if permitted, the quantities permitted are based on a basic philosophy summarized in Table S-2-7 in the supplement of the Technical Instruction. Without printing the Table, the general rule is that any 6.1, Group I liquid, that is in Group I by virtue of inhalation hazard, is forbidden on both passenger and cargo aircraft. It is true that ICAO permits cargo aircraft shipment of some materials which may be subject to this rule because of their inhalation hazard. However, based on our participation in ICAO deliberations, we are certain that ICAO would have listed these as forbidden/forbidden if they had known that the material presented such a hazard, because the general rules in Table S-2-7 would have been applied. This was not done because ICAO has no way to tell from the UN listing of a material that it has been placed in Group I because of an inhalation hazard as opposed to an oral or dermal hazard. Once data on the inhalation hazard of these materials is available, we believe ICAO will forbid them on cargo aircraft. Methyl isocyanate will be forbidden on cargo aircraft with publication of the 1986 edition of the ICAO Technical Instructions; (2) MTB did not propose to change column (6) of the § 172.101 Table for materials subject to this rule; and (3) in § 172.402(h) provisions are already provided for shipment of samples for laboratory analysis.

Several commenters suggested that MTB establish certain reference sources for obtaining published LC_{50} data to limit the scope of the required literature search. Some of the commenters went on to suggest that the current edition of the NIOSH's "Registry of Toxic Effects of Chemical Substances (RTECS)" be used as the reference source. While MTB agrees that RTECS is a recommended source for obtaining LC_{50} data and uses it as the principle reference source, MTB does not wish to limit the reference sources to a few publications. We will accept use of credible LC_{50} data from any published reference. To avoid causing unnecessary confusion, the wording in § 173.3a(c)(4) is amended to reflect this view.

The recommendation that the definition of Poison A in § 173.326 be amended is not adopted. MTB does not find any immediate need to amend § 173.326. This section was not addressed in the proposal, nor did we receive any constructive suggestions on how it should be amended.

Three commenters suggested that a distinction (or clarification) be made between systemic poisoning and corrosive poisoning (poisoning due to destruction of tissue). This is not an easy task. As a safety issue, it is the end result that matters, not the precise mechanism by which the results are incurred. Therefore, MTB considers "Poison-Inhalation Hazard" to include both systemic and corrosive poisoning. The same commenters raised the question of how to convert LC_{50} data based on other than one hour exposure tests into one hour exposure values. They went on to suggest that for systemic poisoning the conversion factor should be based on the equation: Total dose = dosage × length of exposure. For example, LC_{50} values based on 4 hour exposure should be converted to one hour value by multiplying the LC_{50} (4 hour) value by 4, not 2 as proposed in the NPRM. They indicate that the same conversion factor (or straight line conversion) is not applicable to the LC_{50} values due to corrosive poisoning. MTB agrees with the reasoning for corrosive poisoning but disagrees with the 4 hour conversion factor for systemic poisoning. As stated in the NPRM, the criteria for inhalation toxicity came from the UN and is a result of several years

of intense work in which the U.S. (including industry) participated. Without any thorough evaluation, it is not prudent to arbitrarily create new criteria which certainly will cause more problems. The MTB is aware of the controversy and difficulties in using a conversion factor of two to convert an LC_{50} value based on 4 hour exposure to an LC_{50} value based on one hour exposure. This method is even more difficult to apply to LC_{50} values based on exposure times less than one hour or longer than 4 hours. However, the majority of LC_{50} data published are either based on one hour or 4 hour exposure times. All things considered, the UN criteria remains most appropriate for the purpose of this rulemaking. With regard to corrosive poisoning, MTB's position is that the only meaningful LC_{50} value is that obtained with one hour exposure time. MTB knows of no meaningful conversion method.

One commenter suggested that more exact test parameters be established to promote uniformity of LC_{50} testing. The same commenter recommended the use of the test procedure described in the Organization for Economic Cooperation and Development (OECD) for Acute Inhalation Toxicity. MTB has reviewed the OECD procedure and agrees with the commenter that, with minor modification, the OECD's procedure be used when conducting LC_{50} testing. The OECD procedure requires at least a four hour exposure period which is not as appropriate for transportation as for other situations. For transportation purposes the exposure time need not be greater than one hour and § 173.3a(c)(1) reflects this view.

Four commenters suggested that the definition of "Saturated Vapor Concentration" and the method of calculating it from vapor pressure data be elaborated on for clarification. MTB agrees with the suggestions and has amended §§ 173.3a(b)(2) and 173.3a(c)(2) accordingly.

More than one hundred chemicals were mentioned by the commenters as possibly being subject to this rule. MTB has reviewed those chemicals mentioned, using RTECS and other available literature, and has identified at least 36 that are considered to be subject to this rule. They are—

Acetone cyanohydrin
Acrolein, inhibited
Allyl alcohol
Allylamine
Bromine trifluoride
n-Butylisocyanate
Chlorine trifluoride
Chloroacetonitrile
Chloropicrin
Crotonaldehyde
Dimethyl hydrazine, unsymmetrical
Ethyl chloroformate
Ethyl isocyanate
Ethylene chlorohydrin
Ethyleneimine
Isopropyl chloroformate
Mesitylene
Methacrylonitrile
Methyl bromide
Methyl chloroformate
Methyl chloromethyl ether
Methyl hydrazine
Methyl isocyanate
Monochloroacetic acid, liquid
Nickel carbonyl
Nitric acid, red fuming
t-Octylmercaptan
Pentaborane
Phosphorus oxychloride
Phosphorus trichloride
Propionitrile
n-Propyl chloroformate
Tetramethoxy silane
Tetranitromethane
Titanium tetrachloride
Trimethoxy silane

Among these chemicals, eleven are not specifically listed by name in the § 172.101 Table and would be shipped using generic n.o.s. proper shipping names such as "Flammable liquid, n.o.s.", or "Poison B liquid, n.o.s." etc. The remaining 25 chemicals in the list are specifically listed by name in the § 172.101 Table. Four of them refer to § 173.119, and two of them refer to § 173.346, as the packaging requirements. MTB considers those packaging requirements to be deficient for reasons described in the NPRM. To remedy this, Column 5(b) of the § 172.101 Table has been amended by adding § 173.3a respectively for those six chemicals to require more restrictive packaging requirements. These amendments are not meant to imply that other materials are not subject to this rule. Also, the reason for leaving the § 173.119 or § 173.346 packaging requirements in the Table is to provide packaging requirements for mixtures and solutions of these chemicals which do not meet the inhalation hazard criteria of this rule (see § 172.101(c)(11)).

The following is a section-by-section summary of the amendments:

Amendments to Part 172

Section 172.101. A sentence, which did not appear in the Notice, is added to paragraph (a) to inform users of the regulations that not all requirements of general applicability are found in the references in the Hazardous Materials Table. A reference to § 173.3a has been added in column (5)(b) of the Hazardous Materials Table for 6 materials to inform shippers that these materials may not be packaged in all of the packagings provided in § 173.119 and § 173.346. However, those packagings may be suitable for certain mixtures or solutions of these materials that pose risks lower than concentrations making them subject to this rule;

Section 172.203(k)(4). The reason for adding this paragraph was discussed in the Notice. This section has been changed because commenters informed MTB that the original wording was ambiguous;

Section 172.301(a). This paragraph has been amended to require packagings over one liter and no greater than 110 gallons capacity to be marked "Inhalation Hazard" in association with the required label(s);

Section 172.402(a)(10). MTB is adding a new subparagraph requiring display of POISON labels, in addition to any other label required, for packages containing materials meeting the criteria specified in § 173.3a(b)(2);

Section 172.504(c). The revised sentence in this section has been changed slightly, for clarity, from that proposed in the Notice;

Section 172.505. In agreement with the suggestions of several commenters, a provision has been added to indicate that duplication of POISON placards is not required nor display of UN class numbers at the bottom of additional placards.

Amendments to Part 173

Section 173.3a. A subparagraph has been added to § 173.3a(a)(2) to except materials addressed in paragraph (b)(1) and (b)(2) of this section from the packaging requirements of (a)(1) and (a)(3) of the section when packaged in basic containment units having a rated capacity of one liter or less.

Some commenters said the wording in (b)(2) of this section was not clear and they were unable to tell whether "that value" referred to the LC_{50} value or the saturated vapor concentration. The wording has been changed to make it clear that it is the LC_{50} value.

Paragraph (c)(1) has been changed to incorporate a reference to the procedure of the Organization for Economic Cooperation and Development (OECD) as was requested by one commenter.

Paragraph (c)(2) has been expanded to provide more detail on the method of calculating the saturated vapor concentration from the vapor pressure of a material at 20 °C, as was suggested by some commenters.

It was pointed out by one commenter that the use of a multiplying factor to convert an LC_{50} based on a 4 hour

exposure to an LC_{50} equivalent to a one hour exposure is not valid for a material which causes death by direct pulmonary effect, as opposed to one which acts by systemic poisoning. A clarification has been included in (c)(3).

Paragraph (c)(4) has been changed to mention the RTECS as a source of LC_{50} data.

Paragraph (c)(5) has been added to authorize the use of a limit test instead of a precise LC_{50} determination when no data are available in the literature or when the data in the literature are questionable. This provision will reduce the number of test animals that must be used to accomplish the purpose of this rule.

Paragraph (d) has been added to specify a compliance date for bulk packagings, a later compliance date for non-bulk packaging, and to allow two years for determination of applicability based on a 48 hour rather than 14 day observation period.

The Research and Special Programs Administration has determined that this regulatory amendment is not a major rule under the terms of Executive Order 12291 but is a significant rule under DOT's regulatory procedures (44 FR 11034). This final rule does not require a Regulatory Impact Analysis, nor does it require an environmental impact statement under the National Environmental Policy Act (42 U.S.C. 4231, et seq.). A regulatory evaluation is available for review in the Docket.

Based on information available concerning size and nature of entities likely to be affected, I certify under the criteria of the Regulatory Flexibility Act that these amendments will not, as promulgated, have a significant economic impact on a substantial number of small entities.

List of Subjects

49 CFR Part 172

Hazardous materials transportation, Labeling, Packaging and containers.

49 CFR Part 173

Hazardous materials transportation, Packaging and containers.

In consideration of the foregoing, 49 CFR Parts 172 and 173 are amended as follows:

PART 172—HAZARDOUS MATERIALS TABLES AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

1. The authority citation for Part 172 continues to read as follows:

Authority: 49 U.S.C. 1803, 1804, 1805, 1808; 49 CFR 1.53, unless otherwise noted.

2. In § 172.101, paragraph (a) is amended by adding a sentence at the end, and the Hazardous Materials Table is amended by revising certain entries, to read as follows:

§ 172.101 Purpose and use of hazardous materials table.

(a) * * * However, those references do not include other requirements having general applicability such as those specified in Parts 171 and 172, and Subparts A and B of Part 173, of this Subchapter.

§ 172.101 Hazardous Materials Table

+ EAW	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	Packaging		Maximum net quality in one package		Water shipments		
					Exceptions	Specific requirements	Passenger carrying aircraft or railcar	Cargo aircraft only	Cargo vessel	Passenger vessel	Other requirements
1	2	3	3(a)	4	5(a)	5(b)	6(a)	6(b)	7(a)	7(b)	7(c)
	REVISE										
E	Acetone cyanohydrin (RQ-10/4.54).	Poison B	UN1541	Poison	None	173.346 173.3a	Forbidden	55 gallons	1	5	Shade from radiant heat. Stow away from corrosive materials.
E	Allyl alcohol (*RQ-100/45.4*)	Flammable liquid	UN1098	Flammable liquid and poison.	None	173.119 173.3a	1 quart	10 gallons	1,2	1	
	n-Butyl isocyanate	Flammable liquid	UN2485	Flammable liquid and Poison.	None	173.119 173.3a	1 quart	10 gallons	1,2	1	
E	Crotonaldehyde (*RQ-100/45.4*).	Flammable liquid	UN1143	Flammable liquid and Poison.	None	173.119 173.3a	1 quart	1 gallon	1,2	1	
	Ethylene chlorohydrin	Poisin B	UN1135	Poison	173.345	173.346 173.3a	1 quart	55 gallons	1,2	1	Segregation same as for flammable liquids
	Methyl isocyanate	Flammable liquid	UN2480	Flammable liquid and Poison.	None	173.119 173.3a	Forbidden	10 gallons	1	5	Keep cool. Stow away from living quarters and sources of heat.

3. In § 172.203, paragraph (k)(4) is added to read as follows:

§ 172.203 Additional description requirements

* * * * *

(k) * * *

(4) If the inhalation toxicity of any material falls within the criteria specified in § 173.3a(b)(2) (subject to definitions and implementation conditions of (c) and (d) of the same section), the words "Poison-Inhalation Hazard" shall be entered on the shipping paper in association with the shipping description. However, the word "Poison" need not be repeated if it is entered as part of the basic description or in conformance with paragraph (k)(2) of this section. This paragraph does not apply to packagings having primary containment units of one liter capacity or less.

* * * * *

4. In § 172.301, paragraph (a) is amended by adding two sentences at the end to read as follows:

§ 172.301 General marking requirements

(a) * * * In addition, if the inhalation toxicity of any material in a package falls within the criteria specified in § 173.3a(b)(2), the package shall be marked "Inhalation Hazard" in association with the required label(s). This additional marking requirement does not apply to packaging having primary containment units of one liter capacity or less and to packagings of greater than 110 gallons capacity.

* * * * *

5. In § 172.402, paragraph (a)(10) is added to read as follows:

§ 172.402 Additional labeling requirements

(a) * * *

(10) A material falling within the inhalation hazard criteria described in § 173.3a(b)(2) shall be labeled with a POISON label in addition to any other label(s) required by this section. Duplication of the POISON label is not required.

* * * * *

6. In § 172.504, the last sentence in paragraph (c) is revised to read as follows:

§ 172.504 General placarding requirements.

* * * * *

(c) * * *. This paragraph does not apply to portable tanks, cargo tanks, tank cars, transportation by air or water, or transport vehicles and freight containers subject to § 172.505.

* * * * *

7. In Part 172, a new § 172.505 is added to read as follow:

§ 172.505 Special placarding requirements for certain poisonous materials.

Each transport vehicle and freight container that contains a material subject to the "Poison-Inhalation Hazard" shipping paper description of § 172.203(k)(4) must be placarded POISON on each side and each end in addition to the placards required by § 172.504. This requirement also applies to portable tanks. Duplication of POISON placards is not required nor display of UN class numbers at the bottom of additional placards required by this section.

PART 173—SHIPPING—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGING

8. The authority citation for Part 173 continues to read as follows:

Authority: 49 U.S.C. 1803, 1804, 1805, 1808; 49 CFR 1.53, unless otherwise noted.

9. In Part 173, a new § 173.3 a is added to read as follows:

§ 173.3a Packaging; special requirements for certain poisonous materials.

(a) Nothwithstanding the packaging requirements and authorizations referred to in paragraph (b)(1) of this section (including exemptions referring thereto), no person may offer for transportation a material addressed by those sections that also meets the criteria of paragraph (b)(2) of this section except in a packaging—

(1) Specified in Subpart H of this part for any Poison A material if the packaging is made of materials that are chemically compatible with the hazardous materials;

(2) The basic containment unit of which has a rated capacity of one liter or less and that is otherwise offered for transportation in conformance with this Chapter; or

(3) Approved by the Associate Director for HMR based on a determination that the packaging provides a level of safety equivalent to a packaging authorized in this Chapter for Poison A materials, or to packagings authorized for a hazardous material having similar hazards addressed by a specific packaging regulation of this part.

(b) This section applies to any liquid material other than a liquefied compressed gas—

(1) Addressed by the Table in § 172.101 (Column 5b) of this subchapter to a packaging requirement prescribed in §§ 173.119, 173.125, 173.134, 173.154, 173.221, 173.254, 173.249, 173.346, or 173.352, or which is addressed by an exemption, issued under Subpart B of Part 107 of this chapter, that refers to one or more of those section for the purpose of packaging authorization; and

(2) Having a saturated vapor concentration at 20°C(68°F) equal to or greater than ten times its LC_{50} (vapor) value if the LC_{50} value is 1000 parts per million (ppm) or less.

(c) For the purposes of this section—

(1) LC_{50} means the concentration of vapor that, when administered by continuous inhalation of both male and female young albino rats for one hour, is most likely to cause death within 14 days to one half of the animals tested. The result is expressed in milliliters per cubic meter of air (ppm). Wherever practicable, the test should be conducted in accordance with the procedure described in the Organization for Economic Cooperation and Development (OECD) for Acute Inhalation Toxicity except that the periods of exposure shall be one hour instead of four hours.

(2) Saturated vapor concentration (SVC) means the concentration of vapor at equilibrium with the liquid phase at 20°C(68°F) and standard atmospheric pressure expressed in milliliters per cubic meter (expressed in ppm). This concentration may be calculated from the vapor pressure (VP) of the liquid at 20°C(68°F). The general formula is the vapor pressure divided by the standard atmospheric pressure and multiplied by a million. If the vapor pressure is expressed in millimeters (mm) of mercury the calculation would be

$$\frac{VP(\text{in mm Hg})}{760} \times 10^6 = SVC \text{ (in ppm)}$$

(3) If LC_{50} data are available based on other than a one hour exposure, a factor may be used to determine an acceptable one hour value for the purposes of this section. If the only value available is for a 4 hour exposure, that value is multiplied by 2. This method of estimating a LC_{50} value may not be used when a material causes death by direct pulmonary effect, i.e., by destruction of lung tissue as opposed to systemic poisoning. For these corrosive poisons, the exposure period must be one hour.

(4) LC_{50} data published in scientific and technical handbooks, journals and texts may be used in place of new tests using animals to determine compliance with this section. Where different values for the LC_{50} of a material are found, the most credible value must be used. The Registry of Toxic Effects of Chemical Substances (RTECS) published by NIOSH is a recommended source of these data.

(5) *Limit test.* As an alternative to determine a LC_{50} value, the following procedure may be used to determine whether a material is subject to this section: The saturated vapor concentration at 20°C(68°F) is determined as in paragraph (c)(2) of this section. This then is divided by 10 and the resulting concentration used to test 10 animals in accordance with the OECD procedure noted in paragraph (c)(1) of this section, with a one hour exposure period. If 5 or more animals die during the 14 day observation period, the material is subject to this section. For example: If a liquid has a saturated vapor concentration of 500 ppm at 20°C. the concentration used in the test outlined in this paragraph would be 50 ppm.

(d) The requirements of this section, and other requirements of this subchapter referring to this section for application, are effective as follows:

(1) Transportation in packagings having capacities greater than 110 gallons after April 30, 1986.

(2) Transportation in packaging having capacities of 110 gallons or less after September 30, 1986.

(3) Until January 1, 1988, LC_{50} or limit test data based on a 48 hour observation period may be used in place of a 14 day observation period.

10. In § 173.4, paragraph (a)(1)(iii) is revised to read as follows:

§ 173.4 Exceptions for small quantities.

(a) * * *

(1) * * *

(iii) One (1) gram for authorized materials classed as Poison B or subject to the "Poison-Inhalation Hazard" shipping paper description requirements of §172.203(k)(4); and

* * * * *

Issued in Washington, D.C. on October 3, 1985 under authority delegated in 49 CFR Part 1, Appendix A.

M. Cynthia Douglas,

Acting Director Materials Transportation Bureau.

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