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49 CFR Parts 171, 172, and 173

Elevated Temperature Materials; Notice of Proposed Rulemaking

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Parts 171, 172, and 173

[Docket No. HM-198A, Notice No. 89-6]

RIN 2137-AB31

Elevated Temperature Materials

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: RSPA is proposing to regulate materials which pose a hazard due to their being offered for transportation or transported at elevated temperatures. Materials would include those in a liquid phase having temperatures at or above 212 °F (100 °C) and materials in a solid phase having temperatures at or above 464 °F (240 °C). RSPA is also proposing to regulate, as flammable liquids, materials in a liquid phase with flash points at or above 100 °F (37.8 °C) which are offered for transportation or transported at or above their flash points. The proposed changes to the Hazardous Materials Regulations (HMR; 49 CFR parts 171–179) would communicate the hazards of these elevated temperature materials by means of marking, shipping papers and placarding, and would prescribe package requirements. The proposed changes are necessary to provide notice to the public and alert emergency response personnel concerning the risk presented by such materials and to specify minimum levels of packaging.

DATES: *Comments.* Comments must be received by November 20, 1989.

ADDRESS: *Comments.* Address comments to Dockets Unit (DHM-30), Office of Hazardous Materials Transportation, RSPA, U.S. Department of Transportation, Washington, DC 20590. Comments should identify the docket and notices mumbers and be submitted, when possible, in five copies. Persons wishing to receive confirmation of receipt of their comments should include a self-addressed, stamped postcard. The Dockets Unit is located in Room 8421 of the Nassif Building, 400 Seventh Street SW., Washington, DC 20590. Office hours are 8:30 am to 5:00 pm Monday through Friday, except public holidays.

FOR FURTHER INFORMATION CONTACT: Beth Romo, Standards Division, (202) 366-4488, or James K. O'Steen, Technical Division, (202) 366-4545, Office of Hazardous Materials Transportation, 400 Seventh St SW., Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

I. Background

In several previous rulemaking actions, RAPA has endeavored to develop appropriate definitions and regulatory controls for flammable solids, including materials offered for transportation or transported at elevated temperatures. In an ANPRM published under Docket HM-178 on May 7, 1981, (46 FR 25492), RSPA requested comments on making the definition of a flammable solid more specific and proposed methods for testing which would enable shippers to determine if their products were flammable solids for purposes of transportation. The ANPRM addressed solids or molten materials shipped at temperatures exceeding 600 °F (315 °C) because of the potential of these materials to ignite combustible materials. The ANPRM also solicited comments on types of packaging controls for these materials. In a subsequent rulemaking action, RSPA has incorporated criteria for distinguishing between liquid and solid materials. A final rule published April 20, 1987 (Docket HM-166U; 52 FR 13634), added definitions for "liquid" and "solid" to § 171.8 of the Hazardous Materials Regulations (HMR; 49 CFR parts 100–179). The definitions are based on American Society for Testing and Materials (ASTM) D 4359-84 entitled, "Standard" Test Method for Determining whether a Material is a Liquid or Solid".

On January 19, 1985, a tractor with two tank trailers filled with molten sulfur collided with the concrete median barrier on the southbound lanes of Interstate 680 on the Benecia-Martinez Bridge in Benecia, California. The molten sulfur ignited and sprayed onto other vehicles traveling in the northbound lanes. As a result of the fire and smoke from the burning sulfur, two persons died, 26 persons were taken to local hospitals, surrounding areas were evacuated, and the roadway was closed for 15 hours. Because molten sulfur was not subject to the Hazardous Materials Regulations, the hazards of the material were not communicated to emergency responders, hampering emergency response efforts. As a result to its investigation into this accident, the National Transportation Safety Board (NTSB) issued Safety Recommendation I-85-19 on August 12, 1985, which recommended that RSPA (1) regulate molten materials, as appropriate, as hazardous materials; (2) prescribe packaging and handling standards; and (3) incorporate information relating to the hazards of these materials into warning devices and publications available to emergency responders and others involved in the transportation of molten materials. The NTSB expressed concern that unregulated molten materials in the transportation system pose a substantial risk to persons and property, and could cause major disruptions to communities.

In a subsequent comment, the NTSB referenced an October 21, 1986, accident that occurred near Berrien Springs, Michigan, which involved, a load of molten aluminum and resulted in two fatalities. The drivier of a tractor trailer hauling a crucible of molten aluminum failed to negotiate a right-hand curve. The vehicle crossed the center line and overturned in the oncoming lanes. The tractor collided with an automobile, pushing if off the road and into a gully. Despite the overturn, the molten aluminum crucible remained chained to the trailer, and the lid of the vat remained bolted in place. However, one of the hinges on the top lid broke upon impact, allowing the molten aluminum to leak into the gully. The molten aluminum flowed underneath the automobile, igniting gasoline in the fuel tank. Subsequent autopsies indicate the two passengers died of smoke inhalation before extensive tissue damage caused by the hot metal or injuries due to the accident or explosion could casuse death. As a result of this accident, the NTSB recommended that DOT consider the hazards posed by molten materials in the various transportation modes.

On November 21, 1986, RSPA published an NPRM in the **Federal Register** (Docket HM-198; Notice No. 86-6; 51 FR 42114), proposing to regulate molten sulfur as a hazardous material and soliciting information concerning other molten materials. A final rulemaking on molten sulfur was published in May 13, 1988 (51 FR 42114 and included the announcement that RSPA would address other molten materials in a future rulemaking action.

RSPA received thirty-eight comments in response to Notice 86-6. Of this total twenty-one comments specifically addressed molten sulfur; the remaining seventeen comments encompassed other materials transported at elevated temperatures.

Of the seventeen commenters addressing elevated temperature materials, over one-half (9) supported some form of general regulation of elevated temperature materials. In addition, four commenters supported regulation of specific materials, with two of the four recommending regulation only for materials with temperatures greater than 1000 °F (537 °C).

The majority of commenters (13) favored improved identification and communication procedures for these materials. Only five of the commenters addressed hazard classification for elevated temperature materials. Two commenters recommended the ORM–C class for these materials, two proposed a separate hazard class, and one commenter recommended that they be classed as flammable solids.

Eleven commenters addressed the need for packaging regulations. Eight commenters indicated that packagings currently in use are sufficient. Three commenters (two state highway patrol agencies and one county fire and rescue department) stated that specification packaging is necessary to improve transportation safety for molten materials.

Based on information provided in the comments, elevated temperature materials which are transported include molten aluminum, molten steel and certain asphalts, oils, epoxies, resins and waxes. Elevated temperature materials are primarily shipped in bulk packagings by rail or highway. Comments indicated that packagings used are cargo tanks, tank cars, IM portable tanks, and crucibles. No reference was made in the comments to any non-bulk packaging. Quantities shipped range from 16,000 pounds in crucibles to 490,000 pounds in hot metal ("bottle") rail cars, 27,540 to 49,180 pounds for tank trucks, and 149,000 to 181,400 pounds for tank cars. Indicated hazards include thermal burns, ignition of combustible materials, and the release of flammable vapors. Crucibles used as packagings for molten aluminum were identified by aluminium industry commenters as having specific design criteria to minimize loss of lading due to collision or overturn. Commenters did not identify any known industry packaging standards for other elevated temperature materials.

The consensus of those commenters opposing or offering only limited support for the regulation of elevated temperature materials was that a material should not be regulated simply because of its elevated temperature. These commenters maintained that any regulatory control should be restricted to those materials with temperatures exceeding 1000 °F (537 °C). They asserted that present shipping experience does not warrant regulation based on the potential thermal hazard, but acknowledged that an exception might pertain to those metals transported above 1000 °F (537 °C).

In this proposed rule, RSPA uses the term "elevated temperature materials" in place of "molten materials" to more precisely describe the nature of the hazard posed by these materials in transportation. Not all molten (i.e., melted) materials are very hot; for example, toluene diisocyanate becomes molten between 67 °F (19 °C) and 71 °F (22 °C). Additionally, there are materials transported at high temperatures which pose significant thermal hazards but are either solid during transportation, or are liquids at both ambient and elevated temperatures.

Categories of Materials Addressed

Liquid Elevated Temperature Materials. In this notice, RSPA is proposing that 212 °F (100 °C) be the defining temperature for elevated temperature materials when offered for transportation or transported in a liquid phase. Liquid phase means a material that meets the definition of "liquid" in Section 171.8 when evaluated at the maximum temperature at which it is offered for transportation or transported. RSPA recognzies that thermal burns can occur at temperatures below 212 °F (100 °C). However, the defining temperature of 212 °F (100 °C) for materials in a liquid phase is based on the presence of sufficient thermal energy in the material to rapidly damage or destroy human tissue and the tendency of these materials to flow away from the release site. Also, the threat of package rupture from expanding vapors is present when liquids are transported at elevated temperatures.

Solid Elevated Temperature Materials. The defining temperature of 464°F (240°C) is proposed for elevated temperature materials when offered for transportation or transported in a solid phase. This temperature is slightly above the minimum ignition temperature for paper and many hydrocarbons. Solid materials transported at temperatures at or above 464°F (240°C) not only pose the hazard of thermal damage or destruction of human tissue, but also contain sufficient energy to serve as an ignition source for many common combustible materials. Hot solid materials transported below 464°F (240°C) do not pose a threat of igniting combustible materials and pose a very limited thermal hazard because they do not flow in the event of a release. Therefore, they would not be subject to regulation.

Materials Transported At or Above Their Flash Points. Another category of materials addressed in this proposal are liquids with flash points at or above 100°F which are offered for transportation or transported at temperatures at or above their flash points. In this case, the hazard is the greater tendency of the material to burn in the presence of an ignition source. The safety factor realized by transporting materials at temperatures well below their flash points is therefore lost, since the material will only need to be exposed to an ignition source and no longer needs to be heated to generate flammable vapors above the liquid. Therefore, transportation of liquid materials at or above their flash points presents essentially the same hazard as common flammable materials transported at or above their flash points.

Classification

Currently-Regulated Materials. Under this proposal, the hazard class of a currently-regulated material which meets the definition of an elevated temperature material would remain unchanged, except for materials in the ORM-E hazard class. For example, a material classed as a corrosive liquid or a Poison B material would continue to be so classed and described.

ORM-E and Newly-Regulated Materials. Materials not currently regulated or materials regulated in the ORM-E hazard class which meet the proposed definition of an elevated temperature material would be classified as ORM-C materials. RSPA believes the ORM-C hazard classification for these elevated temperature materials provides an appropriate level of regulation and is consistent with the recent regulation of molten sulfur.

Materials Transported At or Above Their Flash Points. RSPA proposes to classify materials in a liquid phase with flash points at or above 100°F (37.8°C), which are offered for transportation or transported at or above their flash points as flammable liquids. RSPA had proposed to regulate these materials as combustible liquids in Notice 87–7 under Docket HM–181 (52 FR 16482). However, RSPA believes the flammable liquid classification more accurately identifies the hazard of materials transported at or above their flash points. Therefore, this proposal supersedes the corresponding proposal under HM–181. Materials already regulated in other hazard classes of lower precedence would be reclassified as flammable liquids if offered for transportation or transported at or above their flash points.

Hazard Communication

Elevated Temperature Materials. For currently-regulated materials, information identifying the material as an elevated temperature material would be conveyed through requirements to add the word "HOT" to shipping papers

and package markings. Newly-regulated elevated temperature materials would now require shipping papers. Two new entries, "Elevated temperature materials, liquid (or solid), n.o.s.", would be added to the Hazardous Materials Table in § 172.101 to provide a generic shipping description for these materials. Package markings applicable to ORM-C materials, as well as the addition of the word "HOT" to shipping papers and package markings would also be required.

Materials Transported At or Above Their Flash Points. Newly-regulated materials and regulated materials which have been reclassified as flammable liquids would be subject to all shipping paper, marking, labeling, and placarding requirements applicable to flammable liquids. In addition, these materials would have the "HOT" included as part of the description requirements if they also meet the definition of an elevated temperature material.

Packaging

Currently-Regulated Materials. Except for ORM-classed materials, currently regulated materials which meet the definition of an elevated temperature material would continue to be subject to specific packaging requirements of part 173, as well as general packaging requirements of § 173.24. As part of this proposal, § 173.24(a)(2) would be revised to clarify that a package's effectiveness must be maintained, with respect to impact resistance, strength, compatibility, etc., for the minimum and maximum temperatures encountered during transportation.

Newly-Regulated and ORM-Classed Materials. Packagings for elevated temperature materials classified as ORM-C materials and other ORM-classed materials meeting the definition of an elevated temperature material would be specified under bulk packaging standards in § 173.990. These standards would include requirements for all openings to be securely closed during transport, be leak tight, and be designed to withstand static pressure developed by the lading.

Materials Transported At or Above Their Flash Points. All newly-regulated materials and all materials reclassified as flammable liquids would be subject to the flammable liquid bulk packaging requirements of § 173.119.

Ramifications of Imposing Packaging Standards. RSPA believes that the packaging standards proposed in this notice would not impose an undue burden upon industry by requiring extensive equipment modification or replacement. RSPA believes that most packagings currently in use would meet the proposed packaging standards; where changes are needed, a three-year transition period would be provided. Packagings in dedicated service prior to the effective date of the final rule would remain in service but would have to meet the packaging requirements of § 173.119 or § 173.990, as appropriate, no later than three years after the effective date of the final rule. For new construction, packagings would have to meet the requirements of § 173.119 or § 173.990, as appropriate, beginning six months after the effective date of the final rule.

Potential Impacts of this Proposal

RSPA's goal is to ensure that elevated temperature materials and materials transported at or above their flash points are adequately described and packaged for safety during transportation. Potential impacts of this proposed rulemaking include the regulation of a number of materials not currently addressed by the HMR, particularly those materials offered for transportation or transported at temperatures at or above their flash points. In addition to compliance with the packaging requirements outlined in this proposal, shippers of newly-regulated materials would be required to prepare shipping papers, mark packages and, for materials transported at or above their flash points, affix placards. Shippers of currently-regulated materials which now meet the definition of an elevated temperature material or a flammable liquid would be required to indicate the thermal hazard of the material through additional shipping paper and marking requirements. Other requirements imposed on shippers and carriers of previously unregulated materials would include incident reporting (for carriers); and for flammable liquids, unloading/loading and attendance requirements, coupler vertical restraint systems on tank cars, and train placement of placarded rail cars. In-depth, substantive comments to this rulemaking which identify and describe packagings presently in use for elevated temperature materials and materials transported at or above their flash points, as well as detailed information and estimated costs of package modification, are particularly encouraged. In order to further understand the scope and potential impact of this proposed rulemaking, RSPA solicits comments concerning the following questions:

1. What elevated temperature materials (as defined in this notice) are currently transported? Please furnish technical name and proper shipping name (if different), hazard class, and identification number for each material which is currently regulated and the technical name of each material that would be newly regulated.

2. At what temperatures are elevated temperature materials being offered for transportation or transported?

3. What materials with flash points at or above 100°F are currently offered for transportation or transported at temperatures at or above their flash points? What are the flash points of these materials and at what temperatures are they offered for transportation or transported?

4. What is the impact of requiring liquids transported at or above their flash points to be packaged in those specification packagings presently authorized for flammable liquids? Please be specific as to what modifications would be required and the estimated cost.

5. What modes of transport (i.e., highway, rail, water, air) are being used for materials offered for transportation or transported at elevated temperatures at or above their flash points?

6. What are the quantities and frequency of shipments for each material? Are any shipments made in non-bulk (e.g., less than 450 liter capacity) packagings?

7. What is the average shipment distance for each material? What percentage of total shipments are transported by carriers engaged solely in intrastate transportation?

8. What is the shipping experience of materials transported at elevated temperatures? Please provide incident or accident data relating to injuries, deaths, or property damage incurred by the transport of these materials.

9. What specialized equipment, if any, is currently used for transportation of elevated temperature materials? Is this equipment in dedicated service?

10. Which packagings currently used do not meet the proposed packaging requirements? What is the accident damage history for these packagings? How many of these packagings would require conversion or replacement, and what would be the estimated cost?

11. What additional costs would be incurred for training, hazard communication, or special handling requirements?

II. Administrative Notices

A. Executive Order 12291

The RSPA has determined that this rulemaking: (1) Is not "major" under Executive Order 12291; (2) is not "significant" under DOT's regulatory

policies and procedures (44 FR 11034); (3) will not affect not-for-profit enterprises or small governmental jurisdictions; and (4) does not require an environmental impact statement under the National Environmental Policy Act (40 U.S.C. 4321 *et seq.*). A preliminary regulatory evaluation is available for review in the docket.

B. Executive Order 12612

This proposed action has been analyzed in accordance with the principles and criteria in Executive Order 12612 and, based on the information available to it at this time, RSPA does not believe that the proposed rule would have sufficient Federalism implications to warrant the preparation of a Federalism Assessment. This proposal has no substantial direct impact on the States, on the Federal-State relationship, or on the distribution of power and responsibilities among levels of government. Therefore, this proposed rulemaking contains no policies with Federalism implications as defined in Executive Order 12612.

C. Regulatory Flexibility Act

Based on limited information concerning the size and nature of entities likely affected, I certify that this proposed regulation will not, if promulgated, have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects

49 CFR Part 171

Hazardous materials transportation, Definitions.

49 CFR Part 172

Hazardous materials transportation, Hazardous materials table, Marking, Placarding.

49 CFR Part 173

Hazardous materials transportation, Packaging.

PART 171—GENERAL INFORMATION, REGULATIONS AND DEFINITIONS

1. The authority citation for part 171 would continue to read as follows:

Authority: 49 App. U.S.C. 1802, 1803, 1804, 1808; 49 CFR part 1, unless otherwise noted.

2. In § 171.8, the following definitions would be added in appropriate alphabetical sequence:

§ 171.8 Definitions and Abbreviations.

* * * * *

Elevated temperature material means a material which, when offered for transportation or transported in a bulk packaging:

(a) Is in a liquid phase and at a temperature at or above 212 °F (100 °C); or

(b) Is in a solid phase and at a temperature at or above 464 °F (240 °C).

* * * * *

Liquid phase means a material that meets the definition of "liquid" when evaluated at the maximum temperature at which it is offered for transportation or transported.

* * * * *

PART 172—HAZARDOUS MATERIALS TABLES AND HAZARDOUS MATERIALS COMMUNICATION REGULATIONS

3. The authority citation for part 172 would continue to read as follows:

Authority: 49 U.S.C. 1803, 1804, 1805, and 1808; 49 CFR part 1, unless otherwise noted.

4. Section 172.101 would be amended by adding paragraph (g)(2) as follows:

§ 172.101 Purpose and use of hazardous materials table.

* * * * *

(g) * * *

(2) Each reference to a section in Column 5(b) for an ORM–A, B, C, or E that meets the definition of an elevated temperature material is modified to read § 173.990.

* * * * *

5. In § 172.101, the Hazardous Materials Table would be amended by revising the entry for "asphalt" and adding the following entries in appropriate alphabetical sequence:

§ 172.101 Hazardous materials table.

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
+/A/W	Hazardous materials descriptions and proper shipping names	Hazard Class	Identification number	Label(s) required (if not excepted)	Exceptions	Specific requirements	Passenger carrying aircraft or railcar	Cargo only aircraft	Cargo vessel	Passenger vessel	Other requirements
					(a)	(b)	(a)	(b)	(a)	(b)	(c)
	(Revise) Asphalt (*at or above its flash point*)	Flammable Liquid	NA1999	Flammable Liquid	None	173.119	Forbidden	Forbidden	1	5	When applicable, no fire or residue thereof may be present in the furnace heating the substance while the vehicle is on board a cargo vehicle
	(Add) Elevated temperature material, liquid, n.o.s. (*at or above 212°F*)	ORM-C	NA9259	None	None	173.990	Forbidden	Forbidden	1	1	Stow away from combustibles, flammables, or living qtrs
	Elevated temperature material, solid, n.o.s. (*at or above 464°F*)	ORM-C	NA9260	None	None	173.990	Forbidden	Forbidden	1	1	Stow away from combustibles, flammables, or living qtrs

6. In § 172.203, paragraph (m) would be added to read as follows:

§ 172.203 Additional descriptions requirements.

* * * * *

(m) *Elevated temperature materials.* If a liquid or solid material in a package meets the definition of an elevated temperature material in § 171.8 of this subchapter, and the fact that it is an elevated temperature material is not disclosed in the shipping name, the word "HOT" must immediately precede the proper shipping name of the material on the shipping paper.

7. Section 172.325 would be added to read as follows:

§ 172.325 Elevated temperature materials.

Except for molten sulfur, which must be marked as required in § 173.1080 of this subchapter, a bulk packaging containing an elevated temperature material must be marked on each side and each end with the word "HOT" in black or white Gothic lettering on a contrasting background. The letters in the marking must be at least 4 inches (101.6 mm) in height for rail cars and at least 2 inches (50 mm) in height for all other bulk packagings. The marking must be displayed on the bulk packaging itself or on a white square-on-point configuration having the same outside dimensions as a placard.

PART 173—SHIPPERS—GENERAL REQUIREMENT FOR SHIPMENTS AND PACKAGINGS

8. The authority citation for part 173 would continue to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1806, 1807, and 1808; 49 CFR part 1, unless otherwise noted.

9. In § 173.24, paragraph (a)(2) would be revised to read as follows:

§ 173.24 Standard requirements for all packages.

* * * * *

(a) * * *

(2) The effectiveness of the package will not be substantially reduced; for example, impact resistance, strength, packaging compatibility, etc. must be maintained for the minimum and maximum temperatures encountered during transportation.

* * * * *

10. In § 173.29, paragraph (d) would be amended by adding the following sentence:

§ 173.29 Empty packagings.

* * * * *

(d) * * * A package which previously contained an elevated temperature material may remain marked in the same manner as when it contained a greater quantity of the material even though it no longer meets the definition in § 171.8 of this subchapter for an elevated temperature material.

* * * * *

11. In § 173.115, paragraph (a) would be revised to read as follows:

§ 173.115 Flammable, combustible, and pyrophoric Liquids; definitions.

* * * * *

(a) *Flammable liquid*—(1) *Definitions.* Except as provided in paragraph (a)(2) of this section, a flammable liquid means—

(i) Any liquid having a flash point below 100°F (37.8°C); or

(ii) Any material in a liquid phase with a flash point at or above 100°F (37.8°C) which is offered for

transportation or transported at or above its flash point.

(2) *Exceptions.* (i) The following materials are not flammable liquids:

(A) Any liquid meeting one of the definitions for gases in § 173.300;

(B) Any mixture having one component or more with a flash point of 100 °F (37.8 °C) or higher, that makes up at least 99 percent of the total volume of the mixture, if the mixture is not offered for transportation or transported at or above its flash point.

(ii) For the purposes of this subchapter, a distilled spirit of 140 proof or lower is considered to have a flash point of no lower than 73 °F.

* * * * *

12. Section 173.990 would be added to read as follows:

§ 173.990 Elevated temperature material.

(a) When § 172.101 of this subchapter specifies that an elevated temperature material (see § 171.8 of this subchapter) be packaged under this section, only bulk packagings which conform to the requirements of this section are authorized.

(b) *General requirements.* Bulk packagings must conform to the following requirements:

(1) Pressure and vacuum control equipment, when required, must prevent the rupture or collapse of the package from heating, including fire engulfment, or cooling, and prevent any significant release of lading in the event the package is overturned. Pressure and vacuum controls are required as follows:

(i) Provision for pressure control must be provided on packagings where the lading can develop, as a result of fire and heating, pressure increases of greater than 10 percent from normal operating conditions.

(ii) Provision for vacuum control must be provided on packages where the lading can develop, as a result of cooling, pressure decreases of greater than 10 percent from normal operating conditions.

(2) *Closures.* All openings must be securely closed during transportation. Packages must be leak tight in any orientation.

(3) *Strength.* At operating temperatures, each package and closure must be designed and constructed to withstand without substantial deformation twice the static loading produced by the lading in any orientation.

(4) *Compatibility.* The packaging and lading must be compatible over the entire operating temperature range.

(5) *Markings.* In addition to any other markings required by this subchapter, each package must be marked with the manufacturer's name, nominal capacity, design temperature range, and maximum product weight.

(6) *Accident damage protection.* For transportation by highway, external loading and unloading valves, if any, and closures must be protected from impact damage resulting from collision or overturn.

(c) *Authorized packagings.* The following bulk packagings are authorized:

(1) DOT specification cargo tanks, tank cars, and intermodal portable tanks;

(2) AAR Specification 203W, 206A, and 211A tank cars;

(3) Nonspecification cargo tanks, tank cars and portable tanks which are equivalent in structural design and accident damage resistance to the packagings prescribed in paragraph (c)(1) of this section, except for alternative pressure and vacuum control equipment;

(4) Nonspecification crucibles designed and constructed such that the stress in the packaging does not exceed one fourth of the strength of the packaging at any temperature within the design temperature range. Stress is determined under a load equal to the sum of the static or working pressures in combination with the loads developed from accelerations and decelerations incident to normal transportation. For highway transportation, these forces are assumed to be 1.7 g's vertical, 0.75 g's longitudinal, and 0.4 g's transverse, in reference to the axes of the transport vehicle. Each accelerative or decelerative load may be considered separately;

(5) Nonspecification packagings conforming to the provisions of paragraph (b) of this section for materials that are solids when offered for transportation or transported at temperatures at or above 464 °F (240 °C); and

(6) Until three years from the effective date of a final rule, packagings which do not conform to the provisions of paragraph (b) of this section but were manufactured and used for the transportation of elevated temperature materials prior to the effective date of a final rule.

* * * * *

13. In § 173.1080, paragraph (b)(1) would be revised to read as follows:

§ 173.1080 Sulfur, molten or solid.

* * * * *

(b) * * *

(1) Conform to the requirements of § 173.990; and

* * * * *

Issued in Washington, DC, on September 15, 1989, under authority delegated in 49 CFR part 106, appendix A.

Alan I. Roberts,

Director, Office of Hazardous Materials Transportation.

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