DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS REGULATIONS BOARD
WASHINGTON, D.C. 20590

[49 CFR Parts 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189]

[Docket No. HM-126]

HAZARD INFORMATION SYSTEMS

Request for Comments

The Hazardous Materials Regulations Board (the Board) is soliciting comments concerning the merits of various Hazard Information Systems (HI-Systems). The Board believes there are deficiences in the hazard communication requirements of its regulations and that a HI-System may be necessary to provide for the adequate communication of hazards of materials in transportation. Some of the benefits that could be derived through implementation of a HI-System are:

1. Recognition of multiple hazards of individual materials;
2. Recognition of multiple hazards of mixed ladings; and
3. Provision of sufficient information whereby fire fighting and other emergency response personnel can acquire immediate information to make better informed judgments on how to handle emergency situa-

ublication of a notice in this issue
FEDERAL REGISTER (40 FR 26687) the Board has announced termination of further consideration of the use of two digit numbers to identify the hazards of materials during transportation under Docket No. HM-103; Notice 73-10. The Board also stated that there is still sufficient need for development and implementation of an effective hazard information system and made reference to the hazard information systems and criteria included in this advance notice for public comment.

The Board believes that in analyzing various HI-systems it is obvious that, even though they are intended to achieve the same end result, i.e., convey emergency response information, they pursue several different routes or philosophies by attempting to provide (1) information concerning the hazards of a material, (2) information concerning the hazards of a material in combination with the degree of risk involved; and (3) information concerning the actions to be taken during an emergency response situation.

The systems discussed in this notice incorporate these basic philosophies to different degrees and for reasons that can be attributed, at least in part, to the economic, social, and/or indusrial structures of a particular nation, and the authority or interest advocating them. The differences in these philosophies are both
and obvious, and they lead to
cal difficulties in choosing criteria
b, which to evaluate the various systems.

The Board believes that the following criteria, though not necessarily inclusive, are factors to be considered in the evaluation of hazard information systems:

1. Capability of the general public to recognize the existence of the immediate dangers presented by a material;
2. Presentation of information in a manner so that the general public will be able to accurately transmit basic information to emergency response personnel;
3. Compatibility, intermodally and internationally;
4. Capability of applicattion to both bulk and non-bulk shipments;
5. Capability of functioning without use of a manual or other subsidiary documents;
6. Capability to meet the needs of emergency response personnel, carriers, shippers, and the general public;
7. Capability of integration with documentation, packaging, and vehicle identification requirements to help insure accuracy;
8. Capability of implementation without undue economic burden on shippers and carriers; and
9. Capability of indicating degree of hazard.

It is the Board's position that any alpha/numeric/symbolic hazard information system adopted in the future be compatibile with and adaptable to the placards it adopts under Docket HM-103.

The following existing or proposed hazard information systems are summarized in this notice:

1. The previously proposed DOT HI System.
2. The NFPA 704M System.
3. The RID/ADR System.
4. The HAZCHEM System.
5. A proposal by Union Carbide Corporation (similar to a proposal submitted by Air Products and Chemicals Corporation).
6. A proposal by the U.S. Coast Guard.
7. The Canadian System (rail).
8. A proposal by the International Air Transport Association.
9. A proposal by Pennwalt Corporation.

THE DOT HAZARD INFORMATION SYSTEM

This system is based on two digit hazard information numbers on shipping papers, package labels and vehicle placards as hazards communicators. A two digit hazard information number would identify the primary and additional (if any) hazards of a material. The first digit of a hazard information number is the United Nations class number for the material and the second digit indicates whether there are significant additional hazards. A zero indicates there are no significant additional hazards.

There are approximately 59 hazard information numbers to identify materials with hazards ranging from a single hazard, such as "Nonflammable Gas" with the HI number 20, to five hazards for a material that is a "Flammable Solid" that is also "Pyrophoric, Poisonous, Water Reactive and Corrosive" which would have the HI number 47.

Defining criteria for each hazard and a specified precedence of hazards for the assignment of hazard information numbers have been developed so a material meeting a specific defining criteria will always be assigned the same hazard information number—in most cases without review by a government agency. A shipping paper containing the shipping name and classification of a hazardous material would also contain its hazard information number. A package label and a vehicle placard would bear the hazard information number in the lower corner.

An important element of the system is an Emergency Response Manual which consists of a card for each hazard information number to identify the expected health, fire and explosion hazards for each material. These cards also contain suggested responses for use by emergency response personnel during the first 10 to 30 minutes of an incident involving hazardous materials in transportation as well as suggested first aid actions.

NFPA 704 SYSTEM

The system identifies the hazards of the material in terms of three principal catagories, namely "health", "flammability", and "reactivity" (instability); and indicates the order of severity numerically by five divisions ranging from "Four (4)", indicating a severe hazard, to "Zero (0)", indicating no special hazard.

The information is presented by a spatial system of diagrams of a diamond shape sign al divided into four segments with "health" always being on the left; "flammability" at the top; and "reactivity (instability)" on the right. Color categories for backgrounds are blue for "health" hazard, red for "flammability", and yellow for "reactivity (instability)."

A fourth space in the diagram should be used to indicate unusual reactivity with water, and is indicated by placing the letter "w" with a line through the center (w) in the space. The space may also be used to indicate other additional information such as pressurized vessels, radioactivity, proper fire extinguishing agent, or protective equipment required in case of fire or other emergencies.

The system for ranking degrees of hazard is based on relative rather than absolute values. The system prescribes the number to be used in each category by describing the effects of the material, in order of severity, in each category, i.e., health, flammability, and reactivity.

RID/ADR SYSTEM (EUROPE)

The RID/ADR System applies only to bulk transport by rail and highway in Europe. It requires that in addition to a placard on the format of the U.N. label, tank vehicles and rail cars must display an orange colored plate 30 cm high and

40 cm wide; this plate must have shown on it in black, two numbers, one above the other. The top number may be either two or three digits and may or may not be preceded by the letter "X". This is the Hazard Identification number. The second number is the United Nations Serial Number of the particular commodity.

The first figure of the Hazard Identification number indicates the primary hazard as follows:

2. Compressed Gas.
3. Flammable Liquid.
4. Flammable Solid.
5. Oxidizer Material or Organic Peroxide.
6. Toxic Material.
8. Corrosive Materal.

The second and third digits indicate secondary or tertiary hazards respectively as follows:

0. No Additional Hazard.
1. Explosion Risk.
2. Gas May Be Given Off.
3. Flammability Risk.
5. Oxidizer Risk.
6. Toxic Risk.
8. Corrosive Risk.
9. Risk of Violent Reaction from Spontaneous Decomposition.

When the first and second digits are the same, an intensification of the primary hazard is indicated e.g., 33 indicates a highly flammable liquid, 66 indicates a very dangerous toxic substance, etc. A refrigerated gas is indicated by a hazard identification number of 22. The number 42 would indicate a flammable solid which may give off a gas upon contact with water. The letter "X" preceding a hazard identification number indicates that water should not be applied to the commodity.

The hazard information number is established by the governmental authorities for each material transported in bulk.

Hazchem System (United Kingdom)

In an attempt to give to emergency services information which will enable them to act independently of reference books and instructions, the "Hazchem System" was developed. The basic principle of "Hazchem" is that it gives direct information on the action to be taken by firemen and policemen and requires no interpretation of information on hazards. The United Kingdom accepts the system for international highway and railroad traffic.

The specified hazard identification panel is fire resistant and has an orange reflectorized background on which appears two numbers. The top number gives information on the hazards to be expected and the lower number is the United Nations number by means of which the substance can be precisely identified.

The "Hazchem" code gives information under the following headings:

1. Firefighting media.
2. Personal protection.
3. Explosive risk.
4. Spillages.
5. Evacuation.

The "Hazchem" scale gives information on the firefighting media to be used by the use of the numbers 1, 2, 3, or 4, and information on personal protection, explosive risk and spillage action by the letters PRST and WXYZ. Where the policeman or fireman should consider the possibility of initiating the evacuation of an area the letter E is added. Each fireman and policeman would carry a durable card showing the "Hazchem" scale enabling him to translate letters on a transport vehicle into direct action, simple first aid measures appear on the reverse side of the card.

Union Carbide Proposal

This proposal involves placarding, labeling and documentation to convey hazard information. The placard would be rectangular in shape and would be in two levels. The upper level would display the word "DANGEROUS" in 4-inch high letters. The lower level would consist of 6-inch squares, each bearing a hazard symbol within a diamond, accompanied by appropriate language associated with the hazard symbol. The system contemplates the addition or removal of symbol squares, either by the use of sliding rail holders or self-adhesive squares, as commodities are placed in or removed from the placard vehicles. For empty unpurged vehicles, the "DANGEROUS" placard would be left visible, with the word "EMPTY" displayed on the lower level.

Another proposed placard is diamond shaped similar to the placards presently used by rail carriers. This placard is proposed for both rail and highway and consists of the word "DANGER" displayed diagonally across the placard. The hazard symbols would be attached to the placard as proposed for the rectangular placard. The reverse side of the placard would bear the words "DANGER-EMPTY", for use on empty unpurged rail cars or motor vehicles.

The labeling system proposed by Union Carbide would make use of the present DOT labels used singly for commodities with a single hazard only, and multiple labels for dual or triple hazard materials. As an alternative, single labels with imprinted multiple symbols for dual hazard and triple hazard materials could be utilized.

For shipping paper identification, Union Carbide proposes that for each hazardous material entry, some distinctive letters, such as "HAZ", "DOT", or "HM" be shown preceding the description. In addition, all of the hazard classifications applicable to each material would be shown.

An emergency response manual is suggested by Union Carbide as a means of furnishing supplemental information to emergency personnel. The manual would be alphabetically indexed and cross referenced to all hazards and combinations thereof. The manual would be keyed to the language obtained from the shipping documents, placards or labels.

Proposal by the U.S. Coast Guard

The United States Coast Guard proposed a Hazard Information System as an alternative to the HI System proposed in HM-103. In this approach, the UN label or a placard incorporating the basic design of the UN label is used to identify the primary hazard. A two digit number is applied to the lower quadrant of the label or placard.

The first digit, a number from 1 to 5, indicates the relative degree of the primary hazard (i.e., the hazard identified by the label or placard). The first digit of the hazard information number relates to the primary hazard as follows:

1. Low degree of hazard such as: Combustible liquids with flashpoint over 141°F; solid Class B poison, poisonous by ingestion only; corrosive solid, corrosive to metals only.
2. Intermediate degree of hazard such as: Combustible or flammable liquid with flashpoint between 73–141°F; liquid Class B poison, poisonous by ingestion only; corrosive liquid, corrosive to metals only.
3. High degree of hazard such as: Flammable liquid with flashpoint between —18°F and 73°F; Class B poisons, poisonous by inhalation or skin absorption; corrosive materials, corrosive to skin.
4. Extremely high degree of hazard such as: Flammable liquids with flashpoints below —18°F or Reid vapor pressure above 27 PSIA with flashpoint below 73°F; Class A poisons; pyroforic material.
5. Evacuate area, do not attempt to cor fire or spill.

The second digit would indicate the secondary hazard of the commodity based on the U.N. Class Number as follows:

2d digit:	*Meaning*
0	No secondary hazard.
1	Thermal instability hazard.
2	Hazard resulting from gas evolution.
3	Flammable.
4	Flammable solid—dangerous when wet.
5	Oxidizer.
6	Poison.
7	Radioactive.
8	Corrosive.

When no hazard information number has been published for a particular commodity the shipper could determine a hazard information number based on the above criteria. Prior to the initial shipment of the commodity, the shipper would submit the number assigned plus supporting data to the Department of Transportation for approval and subsequent publication in the Federal Register. The shipper could ship the commodity under the hazard number he has determined until such time as the final determination of the number is published by the Department.

Placards on vehicles containing mixed lading bearing different hazard information numbers would bear the hazard information number derived as follows:

1. The first digit would be the higl first digit of all the hazard informa numbers on the commodities within vehicle.

2. The second digit would be one of the second digits of all the hazard informa-

n numbers on commodities within the ..icle based on the following precedence of severity of secondary hazard: 1, 6, 3, 5, 8, 4, 2, 7.

This system could be summarized on the reverse side of the required shipping documents.

Canadian System

Hazard Information—Emergency Response Form, Carloads

Carload, trailerload, and containerload shipments of dangerous commodities, as defined in regulations, originating in Canada would be accompanied by a Hazard Information—Emergency Response Form which would be furnished by the shipper to the carrier and which would accompany the car, trailer, or container from the shipper's siding to the consignee's siding.

When multi-unit shipments of a single dangerous commodity are made from one shipper at point of origin to one consignee at one destination, one only Hazard Information—Emergency Response Form would accompany each such shipment, and a list of the car numbers would be shown thereon.

In the case of compartmentized tank cars loaded with more than one regulated commodity, a separate response form would be required for each commodity and its location in the car indicated in ... appropriate block provided on the ...n.

...he Emergency Response Form would include information on the potential hazards of the commodity under the headings:

Fire	Health
Explosion	

Immediate Action Information would be included under the headings:

General	Spill or Leak
Fire	First Aid

The shipper modifies the potential hazard and immediate action information sections where necessary by adding or deleting instructions applicable to the particular commodity being shipped.

In addition, the response form provides the following information:

1. Placard endorsement.
2. Car initials and number.
3. Consignee.
4. Destination.
5. Routing.
6. Proper shipping name.
7. Classification.
8. Placard notation.
9. Date shipped.
10. Shipper.
11. Shipping point.
12. Weight or volume.
13. Shipper's certificate.
14. Emergency telephone number.

IATA System

The system identifies the hazards of the material by a two digit number, with ... first digit, which corresponds to the ...ed Nations Class number identifies ...hain danger; the second digit, which ... an arbitrary figure, indicates subsidiary risks. The second digit would be zero (0) if there were no subsidiary risk.

The system uses letters for the second digit in lieu of numbers to indicate tertiary hazards.

The information is presented in a spatial system of diagrams on a rectangular shaped placard divided into three segments, with the primary hazard number always on the bottom left, the secondary hazard number or numeral always on the bottom right. The system provides for a barred "W" in the top portion to indicate reactivity with water. Background colors indicate the following: Orange for first group of each class, white for the second group, and green for the third group, with blue provided for the barred "W".

The system suggests placing the appropriate danger labels next to the placard to make the system more explicit.

The system calls for a "simple rigid card" to be carried by emergency response personnel concerning actions which should be taken from the hazard communication.

Proposal by the Pennwalt Corporation

The system involves labeling, placarding, and documentation as a means of hazard communicators, and is predicated upon the establishment of an "Order of Importance" listing of hazard classifications in which one classification precedes in degree of severity, those which follow it. The assignments are as follows:

1. Explosive materials.
2. Compressed gases.
3. Flammable liquids, combustible liquids, flammable gases.
4. Flammable solids.
5. Oxidizing agents.
6. Poisonous materials.
7. Radioactive materials.
8. Corrosive materials.
9. Miscellaneous materials not covered by any other classification but of sufficiently dangerous character that some means of warning should be displayed.

The corresponding primary hazard number would be printed in the space provided on labels of design similar to the DOT HI System. If the product presents multiple hazards, numbers corresponding to each of the additional hazards would also be printed, with the primary hazards, in the space provided.

Placards are of the general size and shape of present placards required for the various modes of transportation by DOT regulations, with the appropriate label for the material, the shipping name of the material, the corresponding hazard number(s), and the primary classification.

Documentation contains a column, of contrasting background, whose use is restricted solely to entry of the hazard number(s) for each product listed, with the shipping name and classification.

In order to assist interested persons in their efforts to understand the various hazard information systems mentioned in this Notice, copies of all material available to the Board concerning specific systems will be made available for review or will be furnished to persons requesting such additional information. Requests should be addressed to: Chief, Regulations Division, Office of Hazardous Materials, Department of Transportation, Washington, D.C. 20590.

Interested persons are invited to give their views on these hazard information systems or other hazard information systems not discussed in this Notice. In addition, comments are invited relative to the evaluation criteria contained herein or any other criteria that should be considered. Communications should identify the docket number and be submitted in duplicate to the Secretary, Hazardous Materials Regulations Board, Department of Transportation, Washington, D.C. 20590. Communications received on or before November 5, 1975 will be considered before further action is taken. All comments received will be available for examination by interested persons at the Office of the Secretary, Hazardous Materials Regulations Board, Room 6215 Trans Point Building, Second and V Streets, SW., Washington, D.C., both before and after the closing date for comments.

(18 U.S.C. 831–835; Sec. 6, Pub. L. 89–670, 80 Stat. 937 (49 U.S.C. 1655); Title VI and Sec. 902(h) of Pub. L. 85–726 (49 U.S.C. 1421–1431, 1472(h)).)

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